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Effectiveness of Integrating Simulation with Art-Based Teaching Strategies on Oncology Fellows' Performance Regarding Breaking Bad News

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Abstract

The task of breaking bad news (BBN) may be improved by incorporating simulation with art-based teaching methods. The aim of the present study was to assess the effect of an integrating simulation with art-based teaching strategies, on fellows' performance regarding BBN, in Iran. The study was carried out using quasi-experimental methods, interrupted time series. The participants were selected from medical oncology fellows at two teaching hospitals of Tehran University of Medical Sciences (TUMS), Iran. Participants were trained through workshop, followed by engaging participants with different types of art-based teaching methods. In order to assess the effectiveness of the integrating model, fellows' performance was rated by two independent raters (standardized patients (SPs) and faculty members) using the BBN assessment checklist. This assessment tool measured seven different domains of BBN skill. Segmented regression was used to analyze the results of study. Performance of all oncology fellows ($n = 19$) was assessed for 228 time points during the study, by rating three time points before and three time points after the intervention by two raters. Based on SP ratings, fellows' performance scores in post-training showed significant level changes in three domains of BBN checklist ($B = 1.126$, $F = 3.221$, $G = 2.241$; $p < 0.05$). Similarly, the significant level change in fellows' score rated by faculty members in post-training was $B = 1.091$, $F = 3.273$, $G = 1.724$; $p < 0.05$. There was no significant change in trend of fellows' performance after the intervention. Our results showed that using an integrating simulation with art-based teaching strategies may help oncology fellows to improve their communication skills in different facets of BBN performance. Iranian Registry of Clinical Trials ID: IRCT2016011626039N1

Keywords Simulation · Education · Breaking bad news · Interrupted time series

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Introduction

Doctor-patient communication is a critical aspect of cancer care. Breaking bad news (BBN) is an important skill for all clinicians, particularly for oncologists. Bad news can be categorized in the range of telling a patient that he/she needs to take medication for high cholesterol or telling family members that a patient has died. Although, several studies have recognized that delivering bad news is a stressful process for physicians as well as patients [10, 22]; a considerable proportion of experienced doctors still feel insufficiently trained and prepared for dealing with such stressful conversations [8].

In addition, recent research has emphasized the notion of the missed empathic opportunities [28]. At the same time, the need for receiving empathic communication also was rated as important by patients living with life-limiting illnesses [15]. So, these results support the assumption that communication skills training program should be focused on empathy and practice strategies on how to deal with uncertain conditions during difficult consultations. This issue is particularly true for oncologists, who involved directly in BBN practice.

Based on the assumption that task of BBN is teachable, Baile et al. recommended a protocol called "SPIKES" [(a) ***S***etting up the interview, (b) assessing the patient's ***P***erception, (c) obtaining the patient's ***I***nvitation, (d) giving ***K***nowledge and information to the patient, (e) addressing the patient's ***E***motions with empathic responses, and (f) **S**trategy and ***S***ummary] in which they identify six key domains that need to be addressed in training BBN skill [1].

Despite interest in improving formalized training in BBN skills, the question arises which, if any, format of communication skills training is the best? Whereas, the benefits of simulation-based education, involving SPs in BBN teaching, has been well-documented [21]; literature proposed key improvements in the simulation-based communication trainings. First and foremost, recent research suggests that adding emotional content to simulation-based education can positively influence sustainability and quality of a learning experience [6]. Also, the evidence indicated that the quality of BBN education in medical students can be enhanced through the use of integrated reality simulation [3]. For example, evidence suggests that clinical communication can be effectively taught by integration of art and simulation tools [4]. Furthermore, scientists such as Chen (2011) emphasized the point that simulation setting in communication skills training should change its direction from objective and technique-based towards more empathic approaches [7]. For these reasons, Eisenberg et al. (2015) based on lessons learned from theater arts education developed a technique called Facilitated Simulation Education and Evaluation (FSEE) [9].

Moreover, the need for developing theory-based CS training programs has been emphasized by literatures [5, 19]. For example, Brown has recommended applying transfer model to CS training program may facilitate transfer of the skills learnt to clinical practice [4]. In this regard, authors designed an integrating simulation model (ISM) with art-based teaching strategies, which is a theory-based model, applying the activity theory and transformative learning theory [32].

Since there is no ISM with art-based teaching strategies in teaching empathic communication, the objective of this pilot study, as a new experience, was to evaluate the effectiveness of ISM with art-based teaching strategies on fellows' performance in BBN before and after the educational program.

Methods

We performed quasi-experimental, interrupted time series (ITS), as a strong quasi-experimental design to detect immediate and longitudinal change in fellows' BBN performance.

Participants

We conducted 228 time points rating of fellows' performance during the study. All oncology fellows in the oncologist wards of two teaching hospitals at Tehran University of Medical Sciences (TUMS) took part ($n = 19$). The assessment of each oncology fellow was conducted three times before and three times after the educational intervention by two independent raters (standardized patient (SPS) and faculty members).

The Intervention

We designed the intervention on the basis of simulation and the art-based strategies which was previously developed by the authors [32]. The multifaceted intervention for all fellows($n = 19$) was developed based on 1-day workshop consisting of (a) interactive lectures about the essential sub-skills of BBN,)b) small group discussions followed by presenting different art approaches such as films, music, and telling story, (c) scenario-based learning, (d) writing reflective essay, and (e) role playing. During this session, each fellow had encounter with different art-based scenarios, followed by involving an actor as a simulated patient. After the encounter, all fellows gather in groups of three to five to discuss the art engagement and interactions with the SP. Furthermore, all fellows had opportunities to comment on other interactions. In these interactive and multifaceted learning approaches,

the emphasis of the educational objectives and materials was on understanding how to communicate bad news with empathy. The educational content and material were developed based on the key sub-skills of BBN with a focus on the SPIKES model. In addition, we provide an opportunity for solving clinical problems by the use of scenario based on an art approach such as the following:

- Creative art: engaging fellows in writing scenario, telling the fellows' stories in order to encourage them respond to patients' emotions empathically

- Visual art: encouraging fellows by making them observe and interpret paintings or pictures of patients in order to simulate the wider experience of real life and improve their empathetic imagination.

- Performing art: triggering fellows' attention by having them watch clinical scenarios through movie clips and presenting emotional messages of a patient via music in order to assist fellows in developing empathic respond to patients' emotions.

Our educational process utilizes elements of art-based education and simulation, based on the developed model, and can be summarized as follows:

- Selecting and displaying variety of artworks as patient scenarios; including films, music, painting, and poetry. For example, we selected different movie clips 10–15 min extracted from cinema or television which presented cases of BBN and we presented variety of music in which composer experienced chronic illness such as works of Beethoven and Robert Schumann.
- Time allocation for participants to hear or observe artworks, for example, after hearing the music, participants were given 10–15 min to speak about composer emotion.
- Providing opportunity for careful observation on artwork, for example, after watching different painting opposite to a small group on a screen, fellows were given time to look and debate the narrative of the painting
- Engaging the participants in role play with actors as simulated patient
- Encouraging participants to fill in a BBN checklist and express their learning experiences
- Writing reflective essay with giving feedback
- Discussing and debriefing in small groups (self-evaluation and constructive feedback)

Educators were multidisciplinary, chaired by medical education experts and included professional academic members from the art faculty, communication skills educators, and two faculty members of oncology.

Outcome Measure

Fellows' performance in BBN was simultaneously rated by two raters during outpatient setting. Four faculty members were allocated to measure fellows' BBN performance following SPs encounter in real oncology setting. In addition, eight trained standardized patients were utilized from the educational developmental center (EDC) at the Tehran University of Medical Science (TUMS). Each fellow was visited by three different SPs, with two or three scenarios, three time points before, and three time points after the intervention. Fellow–SP interactions were allocated randomly in a way which ensured that the SP encountered by the fellow after the course differed from the first fellow–SP interaction. In order to ensure satisfactory authenticity and inter-rater reliability, we held the educational meeting for training of raters.

Training the Standardized Patient

For SPs training, the educational program was divided into two phases including SPs portrayal as real patients (authenticity), and their filling out checklist. During the first phase, four different scenarios regarding cancer illness (chronic myeloid leukemia (CML), chronic lymphocytic leukemia (CLL), lung cancer, stomach cancer) were compiled by three oncologists. Based on the scenarios, observation rating scale for assessing SP role play was designed by the expert team consisted of three oncologists and two medical education experts. The validity of the scale was confirmed by a group of five oncologists who were faculty members of Tehran University of Medical Sciences (TUMS). Then, SPs were trained by three oncologists and one medical education expert in a small group setting. In 3-day educational meeting, SPs practiced with the assigned scenario in the group and received feedback on role playing. Next, in order to assess SP portray, three oncologists and one medical education expert rated each SP role play according to the items on the observation rating scale designed by the group of oncologist. The validity of the SPs' portrayals was rated by criterion validity. SPs' portrayal validity was confirmed when they had the cutoff score 90% or above (in our study, it was = 95%). The approach to assess the reliability of SPs portrayal was test–retest and was found to be acceptable ($r = 0.89$).

In the second training phase (three sessions), the educations were provided to the SPs about the BBN assessment checklist and how to fill the checklists accurately and consistently. After the end of the training course, concurrent validity was measured by correlations between the SPs that completed the checklist and the checklist which was completed by three independent oncologist faculty members (as a gold standard) during a SPs' role play with one oncologist as the doctor ($r = 0.82$). Inter-rater reliability which assessed

the consistency of SPs groups in filling the checklists was high acceptable ($r = 0.86$). In previous studies, this training process when testing psychometric characteristics of SP was also addressed [20, 26].

Faculty Rating Training Course

Four faculty members (attending) were trained by two medical educationalists and one oncologist. Training process was through four educational sessions of 2 h each. The training focused on the scoring method by the checklist and important and significant aspects of the assessments based on the guideline compiled by medical education experts in research group.

In the working group, each faculty member rated the BBN performance of the SPs' role plays with one oncologist as the doctor. Afterwards, assessment results were discussed with the raters. Finally, individual feedbacks were provided to the raters. The consistency of filling the checklist by faculty members was confirmed using inter-rater reliability ($r = 0.79$).

After training both SPs and faculty, in order to evaluate the inter-rater agreements between two raters, we calculated Cohen's kappa coefficient and intra-class correlation coefficient (ICC). Inter-rater agreement between the SPs and by faculty members at pre-intervention is computed by Cohen's kappa coefficient and ICC values were 0.89, $p = 0.001$ and 0.87, $p = 0.0001$, respectively. In the post-intervention, the inter-rater agreement between the two raters is estimated by Cohen's kappa coefficient and ICC values were 0.92, $p = 0.001$ and 0.90, $p = 0.0001$, respectively.

Data Collection

We used the BBN checklist to assess effectiveness of integrating simulation model. The BBN assessment checklist that was used by raters is a structured detailed scale containing items in which the 20 items cover performance areas resulting from a literature review, consensus panel, and patient view of BBN skills [12, 16]. Description of the process of psychometric characteristic of the instrument in Iranian context has been reported elsewhere [13]. Modified 16 items that we used here measured seven different domains of BBN performance, including A = setting interview (three items), B = strategy (two items), C = planning (two items), D = professionalism (one item), E = empathy (two items), F = knowledge (four items), and G = invitation (two items). Each item is scored from 0 to 2 (0 = poor, 1 = moderate, and 2 = good). Scores for each domain are calculated as the sum of each individual item score calculated based on the average domain.

Data Analysis

The mean of assessment scores was obtained at three time points before and three time points after the intervention. We applied segmented regression analysis to assess both the immediate-level change as well as the change in the trend of the participants' performance before and after the intervention. Segmented regression models fit a least squares regression line in each segment and assume a linear relationship between the outcome and independent variables within each segment [31]. Moreover, we created the scatter plot of outcomes over time to visually inspect our data and examine whether there was an intervention effect. Autocorrelation was evaluated through visual detection of the plot of the residuals vs. time; through Durbin-Watson test [18]. We also took seasonal trends into account [31]. p value less than 0.05 was considered to indicate statistical significance. SAS version 9.2 was used for our data analysis. In order to evaluate the effect of independent variables such as SPs' gender on the BBN scores of the fellows, we used independent t test.

Ethical Considerations

The study was approved by Ethics Committee at TUMS, and it was registered in the Iranian Registry of Clinical Trials (ID: IRCT2016011626039N1). Informed consent is obtained from fellows and SPs.

Results

Demographics of Participants

Learner

In this study, a total of 19 participants were invited to take part. There were 16 men (84.2%) and 3 women (15.8%). The mean age of the oncologist fellows was 37.5 ± 1.4 years; 57.9% were married. The majority of the participants (84.2%) had no formal training in CS. From self-perceived communication skills, 57.9% of the participants rated their communication skills as about moderate, 36.8% assessed as good, and 5.3% assessed as weak. Moreover, 100% of the participants identified that their communication skills need to improve with formal communication skills training course.

The Raters

The oncology faculty members as rater in our study had a mean age of 46 ± 2 years with 17.5 ± 2 years of work experience. All oncologist faculty members were men. SPs as raters,

two men and six women, had a mean age of 46.5 ± 9 years with 9.5 ± 2.5 years of work experience.

Effect of Intervention on the BBN Scores of the Participants Over Time

Fellows' scores were performed three times before and three times after the educational intervention with 2 weeks interval by two raters. Therefore, the analyses were based on 228 time point assessment of fellows' performance during the study ($n = 19$). Table 1 shows the results of segmented regression of fellows' performance in BBN at pre- and post-training. Figures 1 and 2 are graphical representations of the time series analysis and measuring the fellows 'performance in BBN skill by raters before and after the intervention. In order to indicate the level change and trend change, p value for the B2 and B3 coefficients are represented in Table 1.

Based on the results, before the intervention, there was no significant change in the level of all domains of BBN performance scored by raters over time. After the intervention, the SPs score showed a significant level change in three of the seven domains of participants' BBN performance ([B, $p = 0.023$], [F, $p = 0.004$], [G, $p < 0.001$]). Similarly, the significant level change for learners' BBN performance scored by faculty was [B, $p = 0.015$], [F, $p < 0.001$], [G, $p < 0.001$]. The average SP rating BBN domains were sharply improved by 1.126, 3.221, and 2.241 per week for B (β_2, $p = 0.023$), F (β_2, $p = 0.004$), and G (β_2, $p < 0.001$) domains respectively. Also, after the intervention, the average faculty member scores on BBN domains were sharply increased by 1.091, 3.273, and 1.724 per week for B (β_2, $p = 0.015$), F (β_2, $p < 0.001$), and G (β_2, $p < 0.001$) respectively. These results showed that the effect of intervention on three domains of the BBN scores of the participants over time had been significantly different with pre-intervention. In this study, although the immediate difference levels after the intervention in three domains were changed, these changes in trend were not significant ($p > 0.05$). Notably, similar results have also been found for measuring fellows' BBN performance by raters which allow a high reliability in a study with two independent raters.

Independent *t* Test

A total score was calculated as the mean of the 16 items for the different genders of SPs, and fellows were compared using the independent t test. The results of independent t test showed that the fellows' overall breaking bad news scores rating with male and female standardized patients was not significant ($p = 0.408$), indicating male and female fellows are being evaluated equivalently by male and female SPs.

Discussion

The objective of the current study was to assess the efficacy of an integrated educational program that provided both simulation and art-based training to oncology fellows in order to improve their skills in BBN. The results obtained demonstrate that integrating simulation model with art-based teaching strategies significantly improves immediate difference levels change of fellows' performance in three domains of BBN (B, F, and G).

Moreover, the fellows' skills taught were evaluated using different rating perspectives (SPs and faculties). In terms of raters' gender, it should be noted that we used SPs and faculty members as rater randomly, and no attempt was made to select or exclude specific types of raters. In other words, different raters are used from one visit to the next. According to the pilot study which was run for assuring psychometric characteristic of raters, the results showed that there were no differences between male and female raters for assessing BBN skill of fellows. In addition, the standardized testing of different rater's performance with male and female participants may mitigate the potential for gender to influence BBN scores of the fellows. While many of the socio-demographic and environmental factors can inhibit or enhance BBN skill, it was hypothesized that the relative improvement in the BBN skills of fellows included in this study may be a consequence of using two experiential learning methods (art, SP) as well as providing opportunities for participants to feel situation from patient's perspectives. Our results were in accordance with the findings of other evidence in which improvement in learners' communication skills was observed after training with experiential-based [10, 17] and art-based training programs [14, 27].

In addition, previous research has shown evidence of experiential-based learning module for skill building to improve the BBN skills of medical students in clinical practice, as rated by two independent raters. Notably, the finding of the mentioned study showed significant improvement only in two domains from five different domains of BBN performance following intervention. A significant improvement reported in domain A (introduction) and B (disclosing bad news). Although, in their study, improvement was observed in domains C (eliciting concerns), D (providing importation), and E (general aspects), these changes were not statistically significant [25]. Fallowfield et al. (2002), also in their study, showed significant improvement after intervention in different domains of communication skills by oncologist including "asking open and focused questions" as well as "more empathic responses to patients' cues." They failed to show improvement in the physicians "ability to gain a patients' understanding" after educational course [11].

The results of our study were also comparable to the results of a study by Reed et al. (2015), in which BBN education

Table 1 Scores of the participants' BBN skills by SPs and faculty members before and after the intervention

BBN domains		SP				F			
		Parameter estimate	Standard error	*t* value	*p* value	Parameter estimate	Standard error	*t* value	*p* value
A	Baseline difference level (β_0)	0.936	0.2281	4.1	< 0.001	1.0966	0.2643	4.15	< 0.001
	Baseline difference trend (β_1)	− 0.011	0.088	− 0.13	0.899	− 0.042	0.0924	− 0.45	0.650
	Change in difference level after intervention (β_2)	0.008	0.6341	0.01	0.988	− 0.0713	0.6214	− 0.11	0.909
	Change in difference trend after intervention (β_3)	0.110	0.1491	0.74	0.460	0.1453	0.1405	1.03	0.303
B	Baseline difference level (β_0)	2.598	0.1591	16.33	< 0.001	2.6336	0.1451	18.15	< 0.001
	Baseline difference trend (β_1)	0.078	0.0702	1.12	0.266	0.0785	0.0621	1.26	0.209
	Change in difference level after intervention (β_2)	1.126	0.4895	2.3	0.023	1.091	0.4399	2.48	0.015
	Change in difference trend after intervention (β_3)	− 0.050	0.113	− 0.44	0.661	− 0.0495	0.1025	− 0.48	0.629
C	Baseline difference level (β_0)	0.440	0.2938	1.5	0.137	0.5062	0.2853	1.77	0.078
	Baseline difference trend (β_1)	− 5.33E−03	0.1021	− 0.05	0.958	− 0.0587	0.1046	− 0.56	0.576
	Change in difference level after intervention (β_2)	0.260	0.7397	0.35	0.726	0.0225	0.7563	0.03	0.976
	Change in difference trend after intervention (β_3)	0.045	0.1745	0.26	0.798	0.1248	0.1782	0.7	0.485
D	Baseline difference level (β_0)	1.69E+00	0.1678	10.07	< 0.001	1.8052	0.1559	11.58	< 0.001
	Baseline difference trend (β_1)	− 2.32E−03	0.0556	− 0.04	0.967	− 0.0021	0.0459	− 0.05	0.964
	Change in difference level after intervention (β_2)	− 1.86E−02	0.3933	− 0.05	0.962	2.61E−01	0.327	0.8	0.426
	Change in difference trend after intervention (β_3)	0.005	0.0916	0.05	0.959	− 0.0502	0.0764	− 0.66	0.512
E	Baseline difference level (β_0)	1.1973	0.1756	6.82	< 0.001	1.3875	0.2032	6.83	< 0.001
	Baseline difference trend (β_1)	− 0.001	0.0665	− 0.01	0.992	− 0.0266	0.0767	− 0.35	0.729
	Change in difference level after intervention (β_2)	0.644	0.4418	1.46	0.148	0.6298	0.5372	1.17	0.244
	Change in difference trend after intervention (β_3)	0.025	0.0991	0.26	0.798	0.0251	0.1241	0.2	0.840
F	Baseline difference level (β_0)	2.909	0.3807	7.64	< 0.001	3.2367	0.3443	9.4	< 0.001
	Baseline difference trend (β_1)	− 0.044	0.1537	− 0.29	0.774	0.001811	0.1282	0.01	0.988
	Change in difference level after intervention (β_2)	3.222	1.1024	2.92	0.004	3.273	0.9264	3.53	< 0.001
	Change in difference trend after intervention (β_3)	− 0.005	0.2586	− 0.02	0.983	0.1016	0.2182	0.47	0.642
G	Baseline difference level (β_0)	1.171	0.1705	6.87	< 0.001	1.2254	0.1644	7.45	< 0.001
	Baseline difference trend (β_1)	0.006	0.0746	0.08	0.934	0.0555	0.0728	0.76	0.448
	Change in difference level after intervention (β_2)	2.241	0.5038	4.45	< 0.001	1.724	0.5061	3.41	< 0.001
	Change in difference trend after intervention (β_3)	0.033	0.1143	0.29	0.772	0.0462	0.1167	0.4	0.693

A indicates setting interview (three items), B indicates strategy (two items), C indicates planning (two items), D indicates professionalism (one item), E indicates empathy (two items), F indicates knowledge (four items(, G indicates invitation (two items)

SP rating BBN performance by standardized patient, *F* rating BBN performance by faculty members

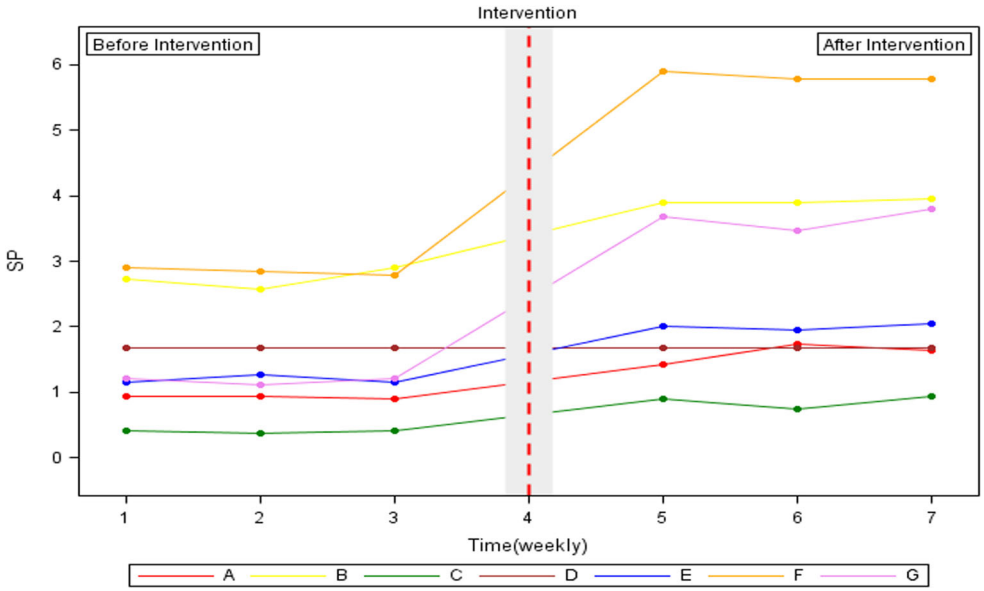

Fig. 1 Fellows' performance in BBN skill by SPs before and after the intervention. SP standardized patient

SP: standardized patient

resulted in improvement in all their three domains of BBN performance including preparation, bad news delivery, and wrap-up. The results of their study reported long-term consequences to BBN performance in residence after reassessing the BBN skill of doctors at 3 months after course [23].

One explanation for the controversial findings could be that Reed et al. applied a different course content, have different assessment tool, and used different educational methods.

In addition, when evaluating different domains of BBN skills, it is clear that there are many different challenges for doctors in order to "successfully" break bad news to a patient. For example, in Iranian context, these barriers included cultural-attitudinal barriers like religion, medical paternalism, and training issues [29]. Based on religious factors in the Iranian context, patients could not accept touching their hand or arm by doctor when breaking bad news especially if they

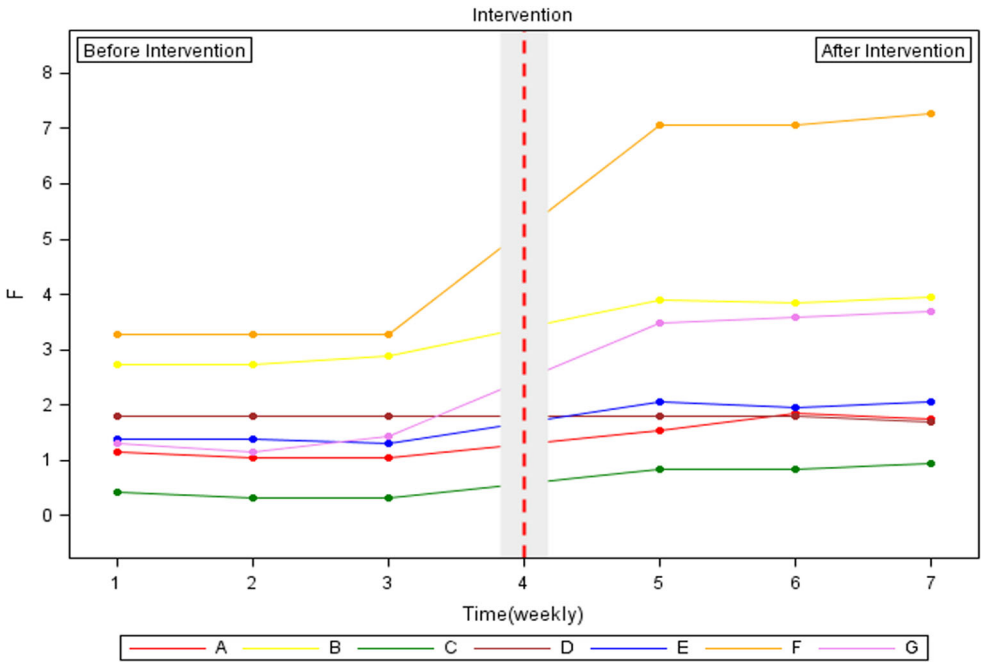

Fig. 2 Fellows' performance in BBN skill by faculty members before and after the intervention. F faculty members

F= faculty members

were not from the same sex; they recognize this situation as an impolite communication. In addition, hierarchy of power by doctor in Iranian health care system is dominated. On the other hand, in Iranian context, there are still no formal programs to train different degrees of medicine in the general communication skills required for breaking bad news. Perhaps, for this reason, fellows pay less attention to improve their BBN skill.

In our study, both SPs and faculty members showed no significant improvement in four domains of BBN skill after the intervention: A, C, D, and E. It is possible that these domains might have been affected by the mentioned barriers in Iranian context. It should be underlined that the setting interview in domain A and planning in domain B require a physical and environmental support. In addition, crowded outpatient setting and lack of equipment and facilities in public hospital may be considered as other reasons for the shortage in the fellow's performance in these domains. Therefore, we find that although integrated teaching methods used are acceptable and effective, busy doctors cannot exert an effort to correct physical domain of their communication skills related BBN skills ([A (setting interview), [C (planning)] in the outpatient setting.

There are several possibilities for why professionalism (D) and empathy (E) domains have no significant levels of change after the intervention. One possibility is that measurement of professionalism domain should be done by multiple criteria instead of one item in the BBN assessment tool. This means that a measurement instrument may not be sensitive enough to indicate the changes in this domain. Another explanation could be that the professionalism and empathy should be taught in a sequence of high-stakes experiences in which allowed participants to gradually become more confident in these skills. In other words, changes in two domains take time to realize. In terms of empathy, other studies have identified particular challenges in promoting participants' skill about responding to patient's emotions during communicating bad news [2, 30].

In our study, we were not able to find any significant positive change in trend of learners' performance. In other words, this non-significant change in trend seems to indicate that ISM had no longitudinal effect on fellows' performance in BBN. Some possibility for getting this result in our study explained by restrictions on participants sample size ($N = 19$) limited fellows' duration of worked in the outpatient setting and then insufficient number of performance assessment before and after implementation of the training program. This is in line with the results of the studies that used interrupted time series in order to assess longitudinal effect of training in patient-centered interviewing skills for psychiatric residents. These findings showed that after the intervention, while the immediate difference level change in learners' performance was significant, the change in their trend was not significant [24]. When assessing different techniques of BBN, it is clear that there are many different styles of learning among the participants as well as different ways of "successfully" BBN to a patient. For these reasons, the integrating model through providing multifaceted learning methods can be effectively used in future BBN training course in Iran and is also possibly applicable in other parts of the world. The expected intermediate outcome is that fellows improve their BBN skill relatively, thus improving the potential for enhanced outcomes for the patients. Our study followed fellows over multiple weeks and included multiple opportunities for active learning. Further, our study also suggests that active learning event may lead to better fellow's outcomes. As the recognition of communication skills is a core clinical competency, we propose a theory-based framework integrating simulation and art to serve fellows' double needs in progressive skill-based and human-based of these skills. Although indirect support exists for this approach, further studies are recommended regarding its effect on patient outcomes.

In terms of study strength, first, this study assessed the transfer of the learned BBN competencies to real clinical practice. The second strength is that participants' performance was assessed by two independent raters (SPs and faculty members). The third strength is the use of strength quasi -experimental designs in our study (interrupted time series).

To interpret the study results, it is important to consider the study limitations. Small sample size with participants from two teaching hospitals and non-random selection of the participants limit the generalizability of the results. Moreover, the assessment of fellows' performance in short-term interval series is another limitation of the current study. It should also be noted that the differences detect changes before and after the course and cannot necessarily be attributed to the teaching intervention because of the lack of a control group. Additionally, although the pre-test and post-test were measured by different raters, blinding was not possible as the assessors were aware of the fellows' training program. Also, further elucidating studies are recommended for comparison of the current integrated simulation model with the conventional guideline. Finally, although the checklist for assessing the BBN performance of fellows by SPs and faculty members proved to be simple to use, further studies will need to examine its psychometric characteristics in oncology setting.

Conclusion

Our study indicated that integrating simulation with art-based teaching strategies effectively improves fellows' BBN performance in different domains.

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Compliance with Ethical Standards

The study was approved by Ethics Committee at TUMS, and it was registered in the Iranian Registry of Clinical Trials (ID: IRCT2016011626039N1). Informed consent is obtained from fellows and SPs.

Conflict of Interest The authors declare that they have no conflict of interest.

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