ORIGINAL ARTICLE

Clinical biochemistry teaching: use of peer debriefing by Pendleton's rule as an instructional tool

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Abstract

Objective: To explore the effectiveness of peer debriefing in practical sessions of undergraduate medical students in Pakistan.

Method: The cross-sectional quasi-experimental study was conducted from November 2016 to October 2018 at Shifa College of Medicine, Islamabad, Pakistan, and comprised second year medical students who were randomly divided into two groups. Group A was delivered skill sessions of Nutrition and Metabolism module through facilitator-led demonstration, while Group B was delivered skill sessions through peer debriefing using Pendleton's method. All the students were assessed in formative integrated practical exam . A focus group discussion followed by interviews was subsequently arranged for recording the perception of students regarding the effectiveness of peer debriefing as an instructional tool for skill sessions. Data was analysed using SPSS 21.

Results: Of the 84 subjects, 39(46.4%) were in Group A and 45(53.6%) were in Group B. Group B results were statistically significant for total cumulative scores and scores for the station of calculating body mass index ($p<0.05$). No significant difference was found in terms of general physical exam and counselling ($p>0.05$). Thematic analysis showed that students found the process of peer debriefing as fun, more interactive, time-consuming yet organized and less stressful. Students considered peer debriefing as an effective tool for learning skill sessions.

Conclusion: Peer debriefing approach can be a useful instructional strategy to deliver skill sessions. It increases students' participation and thus effectively promotes learning.

Keywords: Peer, Debriefing, Sill session.

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Introduction

Simulation-based learning and post-simulation debriefing has been given immense importance in clinical education in healthcare over the past decade. The use of debriefing has been previously utilised in military and aviation industries,[1] and its use across multiple nursing and medicine disciplines is being explored to promote team training and reflective learning.[2] Dreifuerst defined debriefing as "the process whereby faculty and students re-examine the clinical encounter in order to foster the development of clinical reasoning and judgment skills through reflective learning".[3] Decker et al. described debriefing as "a learner-centred reflective conversation".[4] It is intended to assist learners in examining the meaning and implications of actions taken during a simulated experience.[4] It is labelled as the most significant factor in any simulation-based exercise1. It is debated that simulation alone does not carry much importance in promoting learning; rather, debriefing promotes learning only if it is done skilfully.[1]

Debriefing has been reported as "crucial to learning" in a survey carried out at an international simulation education meeting.[5] Mayville stated that debriefing provides purposeful direction to help improve thinking and clarify the thought processes.[6] Understanding of new knowledge can easily be created through this process[4] It is also considered to be reflective practice at its best and a critical element in the learning process.[6] It provides useful criticism and opportunities for reflection, both of which are considered significant pillars for professional progress.[7] Debriefing given to the students stays longer in the memory and helps in better learning.[7]

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Various models of debriefing have been used in medical education, including instructor/facilitator-led (FL), peer-led, video-assisted instructor, and self-led debriefing.[8] Although FL debriefing has been commonly utilised, there is little evidence to support its efficacy.[7,9] Peer-assisted learning (PAL) has been a topic of interest for educationists for very long,[10,11] but no work has yet been done on exploring the effectiveness of peer debriefing (PD) in skill sessions. PD through Pendleton's rule has been frequently utilised mainly for providing feedback to the students.[12] The central tenets of Pendleton's rule are learner comments preceding trainer's comments, followed by positive features preceding developmental areas.[12] This method has been used in clinical scenario but seldom in basic medical sciences.

The current study was planned to determine the effects of peer debriefing on the performance of of 2nd year medical students on stations of skill in the module of Nutrition and Metabolism. It was also planned to investigate the perceptions of students regarding PD use as an instructional strategy.

Subjects and Methods

The cross-sectional quasi-experimental study was conducted from November 2016 to October 2018 at Shifa College of Medicine, Islamabad, Pakistan, and comprised second year medical students. After approval from the institutional review board of Shifa Tameer-e-Millat University, Islamabad, the sample was raised from among second year medical students using convenience sampling during the Nutrition and Metabolism module of Biochemistry. Written informed consent was obtained from the students and permission was taken from the respective course director of the module. The whole team involved in the module was trained by three senior researchers on debriefing by Pendleton's rule.[12] They were also trained on the method of formative assessment. Simulated patients (SP) were also trained regarding the skill sessions.

Pendleton in 1984 developed some rules that allow both the learner and the educator on how well a learner has performed a skill.[12] For the purpose of the current study, "Trainee" was replaced by "Learner" and the "Trainer" was replaced by a "Peer". According to the rule, the learners performed an activity, and said what they thought they did well. The peer commented on what was done well. The learner identified what was not done so well and how the performance could be improved in the future. And, finally, the peer commented on the aspects to be improved and offered suggestions in a constructive manner.[12]

The learning material, including checklists, related videos and reading material, regarding the sessions was uploaded in the drop box for all the students prior to the sessions. The students were required to go through the material before coming to the skill sessions. The students were divided randomly into two equal main groups A and B. Two smaller practical groups of were formed in each larger group. For ease of facilitation, each sub-group was further divided into two smaller groups 1 and 2. One smaller group was assigned one faculty member and one SP. Only students who were present both on the days of the session and the formative IPE were included.

Skill sessions were delivered through the conventional FL demonstration method to all the subgroups of Group A. Skill sessions were taught with PD by Pendleton's rule[12] to all the subgroups of Group B. Three skill sessions were conducted in the module; counselling of obesity, performing general physical examination (GPE) and checking of body mass index (BMI). Case scenarios were provided to students of each group.

In Group B, 15 minutes were initially given to each sub-group to prepare for the respective case scenarios given to them in the skill session. Each member of the sub-groups 1 and 2 performed the skill.

One student performed the skill and the rest of the members of the sub-group delivered the debrief. The same cycle was repeated with each member of the sub-group. In the end, the faculty member wrapped up the session by covering the points not covered by students during PD.

Formative assessment was arranged to assess the skills of all the students. Faculty members assessed the students on the checklists. The scores and rating of the Groups A and B were compared.

After the formative assessment, all the sessions were taught to Group B by PD technique so that they may not be at a disadvantage of not being exposed to this new instructional strategy.

The perception of the students regarding PD by Pendleton's rules as an instructional tool was obtained

ANNEXURE: Interview guide.

Question 1:	What do you think about peer debriefing regarding its use in skill sessions?
Questions 2:	Can you comment on any strengths of the process of peer debriefing regarding its use in skill sessions?
Question 3:	Do you find any weaknesses in the process of peer debriefing regarding its use in skill sessions.
Question 4:	How was this method different from the previous method used for delivering skill sessions?
Question 5:	How did this strategy of peer debriefing help in your integrated practical exam (IPE)?
Question 6:	How can this process be improved in the future?
Question 7:	Was the session equally useful in all the three sessions (general physical examination [GPE], counselling, body mass index [BMI])?

through focus group discussion (FGD) for which 8 volunteers were selected, and each one was allocated a number (1-8) for maintaining anonymity. From FGD, questions were extracted and a different set of 9 volunteers was selected for the interview. These students were allocated numbers 1-9. These students were interviewed individually on specific questions extracted through FGD regarding the use of PD as an instructional strategy for skill sessions (Annexure).

The scores of formative assessment were compiled. The total marks depicted the overall scores of the students. Counselling, GPE and BMI skills were assessed individually and their scores were documented. Data was analysed using SPSS 21, and was expressed as frequencies and percentages as well as mean +/- standard deviation (SD). Student's t test was applied for comparative analysis, and qualitative data was analysed by thematic analysis. Three independent researchers developed their independent themes and codes from the transcript. The common themes and codes were finally extracted for analysis.

Results

Of the 100 subjects initially enrolled, 84(84%) completed the study. Of them, 39(46.4%) were in Group A and 45(53.6%) in Group B. The total marks scored in all the sessions and the marks scored in the individual BMI session of Group B were significantly different from Group A ($p<0.05$), but the difference was not significant in GPE and counselling sessions ($p>0.05$) (Table).

in the thematic analysis, the interviews resulted in the certain positive and negative aspects of the exercise.

Table: Results of formative assessment between Group B and Group A.

	Group B (n=45)	Group A (n=39)	t value	95% CI	p-value
Total Marks Scored	25.68 ±1.76	24.39 ± 2.09	3.03	0.443-2.12	0.003
Counseling	8.51 ± 8.89	8.42 ± 1.33	0.35	-0.414-0.59	0.72
GPE	8.16 ± 1.17	8.11 ± 1.61	0.16	-0.571-0.674	0.87
BMI	9.01 ± 0.62	7.85 ± 1.53	4.38	0.623-1.68	**<0.0001**

Group B was taught by Peer-debriefing, whereas Group A was taught through facilitator-led demonstration. Values are given as means ± standard deviation (SD).
p-value calculated by independent samples t test (unpaired).
$p<0.05$ indicates statistical significance. GPE: General Physical Examination, BMI: Body Mass Index, CI: Confidence Interval.

Organised: Of the 8 students, 7(87.5%) felt that the PD sessions were more organised and beneficial. Student 1 stated: *"The sessions were much more organised and enabled everyone to participate".*

However, student 5 had another viewpoint: *"Everyone is trying to be organised but it isn't that organised"*

Diverse mistakes identified: It was perceived by all the 8(100%) students that every student makes a different mistake which exposes the whole group to diversity of mistakes, thus enabling them to know "what not to do. Student 2 commented: *"One person teaching cannot cater to all the potential mistakes of all students. There are so many different types of mistakes that can happen."*

Time-consuming: The students agreed that the process, although beneficial, was time-consuming. Student 2 described: *"It has its advantages but it consumes a lot of time as well because every single person has a group of 25 students, each taking 3 to 4 minutes, and that would take a long time."*

Less stress: Interacting with peers was more comfortable for the students compared to interacting with instructors. Student 3 commented: *"Referring to the counselling session if we look at it that way that your peers are debriefing you, it will be less stressful and more of a comfort level with your friends."*

Equal level of participation: It gave all the students an opportunity to participate equally compared to the FL demonstration. This is beneficial for shy students. Student 2 said: *"Each person, especially the ones who are not so outspoken, get an equal participation, which is important as a lot of people generally do better on written tests tend to be quieter and these same people don't perform as highly in the practical examinations".*

Self-evaluation: The students identified peer debriefing

as an instructional strategy which teaches them to self-evaluate. Commented student 6: *"When you're asked what you have not done right you think about it on your own independently. So that's what you realize and that is what helps you in your exam, that you don't repeat your own mistakes"*

Interactive process: The PD sessions were thought of as interesting and not tedious, and, therefore, the students came for learning and not for the sake of attendance. Student 4 commented: *"Facilitator-led demonstrations are very boring."*

Repetition: The element of repetition was the highlight of the process as this led to clearing the concepts well and promoted participation. Commented student 8: *"The strongest point I think is repetition."*

Confidence in Exams: The students taught through the PD felt more confident before and during the exam compared to the FL demonstration. Student 1 commented: *"The reason being that when you are there and everyone is pointing out your mistakes and asking you what you did right and wrong, it actually improves my confidence."*

Useful only for skill sessions: It was observed by the students that this instructional strategy was beneficial for only those sessions which required certain skill to be mastered. As commented by student 8: *"There are some skill sessions which are simple, for example, the session of intramuscular injection. For such sessions it is not that useful. It should be the method of choice where there is human-to-human interaction."*

Student 5 added: *"When you see other people who show empathy, for example, there was one person who showed a lot of empathy during the counselling on obesity, so by watching those you get the idea about how you are supposed to do this."*

Another student shared the same opinion: *"In BMI session, there are some simple steps that do not need much of peer debriefing."*

Discussion

Feedback is an integral constituent of learning through which the trainee develops the skills, understanding, competencies and behaviours required to eventually become a trainer. When this is combined with reflection it incorporates self-regulation, autonomy and decision-making in a student. Debriefing, especially PD, incorporates all these characteristics and more in a learner.[13] In the present study, PD has been undertaken to improve the performance of undergraduate medical students of 2nd year in skill sessions. This strategy has previously been applied in a clinical setting,[14] but data is very scarce on its use in the pre-clinical years of undergraduate level.

The results of the present study indicated significant improvements in the overall performance of the students who were exposed to PD compared to the ones taught by FL demonstration. Similar findings were observed by Chronister and Brown in 2012[15] in a study which compared two types of debriefing methods with 37 undergraduate nursing students. One group was exposed to the video-assisted instructor-facilitated debriefing, while the other group was exposed to the instructor-facilitated debriefing after a simulation exercise. The participants of the group with video-assisted instructor-facilitated debriefing showed better performance in assessment and skills needed for cardiopulmonary resuscitation than the other group.

Studies indicate that students can be extremely effective teachers and one of the reasons is their ability to relate to other students in a way that is easily understandable. The students are not intimidated by their peers, and, therefore, they can easily clear their concepts by repeated questioning which they are unable to do with a trained tutour.[16] This concept can also be applied to PD as deep insight in learning is achieved through contextual task, repetition and training through reflection.[17] Although the students in the current study did not demonstrate significant improvement in their marks in the individual stations of the formative practical exam except BMI, they were more receptive to learning these skills during PD sessions compared to their previous experience with the FL demonstration. This was quoted by student 4: *"I noticed I used to be really sleepy in facilitator-led demonstration sessions, usually everyone is sleepy during these sessions and with this new method of teaching it has really helped me to stay alert".*

Elias & Merriam[18] indicated that ideal debriefing is the one where learners are the focal point of learning and they themselves carry out most of the discussions. In the present study, irrespective of the session (GPE, BMI and counselling), students participation and interaction in the learning process was increased when the control was given in their hands. Student 9 stated: *"I think in the*

facilitator-led sessions the problem is that they are not very interactive, but in students debriefing sessions everyone is attentive and everyone is participating. In facilitator-led demonstrations, students just come for attendance."

Student 7 stated: *"Another thing I would like to add is that during peer debriefing, everyone is attentive"*.

Appropriate debriefing requires learners to be respectful towards each other in terms of verbal and non-verbal communication. Learners should be free of any fear and they should feel comfortable in expressing their thoughts and feelings. The environment should be conducive enough that the participants can easily agree or disagree with each other.[19] The present study indicated that although mean scores of students of the two groups at the counselling and GPE stations were almost equal, students liked the learning process of getting debriefed by peers and stated that the whole environment was conducive which helped them to learn better. Student 3 stated: *"Referring to the counselling session if we look at it the way that your peers are debriefing you, it will be less stressful and more of a comfort level with your friends and your peers"*.

Student 4 said: *"Another thing is that there is a competition sort of an environment, then the ones who don't want to participate thinking that there are 3 groups, you tend to present their group in the best way possible"*.

Student 5 commented in the same context: *"In peer debriefing there is a more laid-back environment so it is fun to participate as compared to the facilitator-led demonstration. Because it is very boring and students want to sleep. But in peer debriefing, it is more interactive and everyone is talking and doing, cracking jokes and at the same time you are learning. So it is more fun. So I think the participation level is more in peer debriefing compared to facilitator-led demonstration*."

It has already been proven in a study that students as near-peer instructors not only improve the didactic ability of the students, but also develop their own teaching skills.[16] The current study identified similar findings that PD enabled the students to easily grasp the concepts, and, hence, perform better in assessments. Student 5 stated: *"So everybody performs and gets debriefing from peers and actually does debriefing so it helped me in the formative IPE that I knew most of the things even without studying. It is easier to prepare for the IPE*."

The main purpose of the debriefing is to improve learner's critical thinking, clinical judgment and performance. To achieve this goal, both negative and positive components of the performance should be addressed adequately. Learners should also reflect on their own performance and that of others in order to find out actions or strategies that can improve their performance in the future.[19] In our study when the students were given the PD opportunity, they felt themselves equipped with knowledge and skills to perform better during the formative IPE. According to the participants, during the sessions, they identified mistakes and strengths in peers' performances and critically analysed it in mind to debrief them. This resulted in better performance in the IPE. Student 8 stated: *"The purpose of peer debriefing is that everyone in the group observes the performance of the learner and then analyse it*."

They identified 'repetition' as the key for clearing the concepts. as student 8 stated: *"The strongest point I think is repetition. In facilitator-led demonstration there is one demonstrator who tells you how to do it and we take mental notes how to do it and you write things down but you only get to do it once if you actually get to do it and nobody tells you anything*."

It has been proved that learning is facilitated or hampered by emotions and that emotions drive learning and memory. Experiences effect the emotions, thus learning is also affected. The debrief model, in the constructivist tradition, helps the learners to take responsibility for their own learning, to develop integrated understandings of concepts, to be autonomous thinkers, and to seek answers to important questions.[13] This was evident in the students' perception regarding the process of debriefing as it was appreciated by majority of the students. Student 2 said: *"With reference to the BMI in particular, there were two main advantages that I saw, with each group of students who were participating there would be a different problem that would arise e.g. the way this is important is if the facilitator is telling us something he/she will tell us perfectly and we won't know about the potential mistakes that we can make with the BMI one person might forget to empty pockets; one person forgot to out the mat on the scale; one person forgot to take the bar at the top and place it down softly; we wouldn't know this if there is only one person teaching us. There are so many different types of mistakes that can happen*."

Confidence is also another emotion that potentiates the

ability of the student's learning. Van Heukelomet et al. in 2010 conducted a study with 161 third year medical students to compare the effectiveness of debriefing given after the simulation exercise and debriefing given during the simulation exercise. There was significant improvement in self-reported confidence and knowledge in both the groups.[20] In the current study, students who were exposed to PD reported a significant rise in their confidence during the exam, which, in turn, improved their performance. Student 1 stated: *"What I felt was that it helped me in the IPE, the reason being that when you are there and everyone is pointing out your mistakes and asking you what you did right and wrong, it actually improved my confidence".*

Student 4 stated regarding improvement in performance: *"So everybody performs and gets debriefing from peers and actually does debriefing so it helped me in the formative IPE."*

However, student 5 had his concerns regarding these sessions: *"In debriefing by your peers, people mention that you feel more comfortable with your friends, but I think that you also feel kind of attacked by a group of 20 people judging you and telling you what you're doing wrong".*

Boet et al. compared the effectiveness of student self-debriefing with the instructor debriefing by involving 50 anaesthesiology residents. Residents were divided into two groups and were exposed to the high fidelity crisis scenario. One of the groups was given video-assisted feedback from the facilitator. The other group was asked to self-debrief and identify mistakes of their own. Afterwards, all the residents were scored on another crisis simulation exercise. There was no significant difference reported in the performance of the two groups, but a significant improvement in the performance of all the residents were reported irrespective of the debriefing method used.[21] This is in contrast to our study, which indicated that students learn more effectively when during the PD process they reflect on their own performance, identify their own mistakes and strengths and then as a next step, they ponder on the mistakes identified by their peers.

Student 6 stated during focus group discussion: *"I just want to add one good thing about the counselling session is when your friends are debriefing you, they tell you what you did right or wrong by reflecting on their own counselling experience that gives room for self-evaluation and after doing a practical and having been told what you did right or wrong you don't recognize it yourself. When you're asked what you have done right you think about it on your own independently so that is what you realise and that is what helps you in your IPE that you don't repeat your own mistakes."*

Conclusion

Peer-debriefing is a feasible, effective, time- and cost-efficient instructional strategy which is under-utilised at the undergraduate level. The tool has a broader use within medical education and can easily be applied at the undergraduate level wherever skill is required.

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