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Using instant messaging applications to promote clinical teaching of medical students

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Abstract:

BACKGROUND: The main purpose of this study was to evaluate the use of Telegram as an Instant messaging application in clinical teaching of medical students, especially clinical ward rounds.

MATERIALS AND METHODS: In this quasi-experimental study, Telegram as an Instant messaging application was employed. To do this, a Telegram group entitled as "Lavender" was created and then selected patients were divided between students and externs daily. After that, students and externs were asked to take medical histories, perform complete physical examinations, and then share their data in the Lavender group. Ultimately, to evaluate the effects of this intervention, two quantitative and qualitative approaches were used.

RESULTS: From the students' point of view the highest average was associated with "Readiness for teaching round" (3.71 ± 1.34) and the lowest average was related to "Time-saving for studying about illnesses" (2.08 ± 1.44). In addition, medical trainees mentioned that reporting patients' daily medical histories and progress notes could create a reflective process. The suggestion made by many medical trainees was to select and discuss simpler cases who have more teaching points for them, while other trainees recommended focusing on common illnesses in the Lavender group.

CONCLUSION: The use of messaging software applications such as Telegram in medical education has created a new paradigm, which could facilitate interpersonal interactions among trainees.

Keywords:

Clinical teaching, instant messaging application, medical students, online software, ward round

Introduction

One part of clinical education provided to medical students in clinical departments is a ward round, in which a clinician and medical students stay at a patient's bedside and discuss the patient condition.[1] Learning in a clinical setting has numerous strengths because it focuses on real problems of professional practice. Learners' motivation is reinforced through effective communication and active participation. Besides, their professional thinking, behaviors, and attitudes are modeled by instructors. In such an environment, one can thus integrate the teaching of a series of skills such as history taking, physical examinations, clinical reasoning, making decisions, showing empathy, and practicing professional behaviors.[2]

Despite these strengths, clinical teaching is encountered by several problems such as an interaction with duties associated with providing healthcare services to patients, which might sometimes affect the training of trainees. Other drawbacks may include space limitations at the patient's bedside, high number of learners,[2] time constraints, various tedious tasks in clinical settings, etc.

Although the high number and diversity of patients can improve teaching and learning,

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clinical residents and teachers would need to spend most of their time to provide healthcare services to patients and there would be no time for deep discussions and learning.[3] In fact, a clinical setting is an appropriate learning environment that has been often undermined due to administrative problems.[4] New programs such as web-and smartphone-based medical training have been recommended to deal with the effects of such challenges in teaching.

Nowadays, with the extensive use of smartphones and the increasing use of online software (such as WhatsApp, WeChat, and Telegram), these applications have become a common means of sharing information.[5] The benefits of using the new technology include mobile usability and accessibility for many people, especially ease of use. Students have also emphasized the benefits of using mobile devices in learning and distance education because of their quick access to course content and sharing it without any space limitations.[6,7]

These students also believe that mobile gadgets (such as smartphones) can help them establish better interactions with their teachers and classmates and consequently improve their learning process.[8] Moreover, students can have better access to educational content and find their own attitudes towards their courses.[8-10] In addition, studies have indicated that shy or socially anxious people feel more comfortable in online social relationships compared with face-to-face interactions.[11]

Accordingly, the main purpose of this study was to evaluate the use of Telegram as an Instant messaging application in clinical teaching of medical students, especially clinical ward rounds.

Materials and Methods

study design and setting

Ward round teaching in Gastroenterology Ward at Al-Zahra Teaching Hospital affiliated to Isfahan University of Medical Sciences, Iran, is a multidisciplinary busy clinical course attending by medical trainees, i.e., students and externs, internal medicine residents, and gastroenterology fellows. This is a multi-grade and sometimes multi-disciplinary round visiting a high number of patients. Patients admitted to the Gastroenterology Ward and Emergency Department are visited routinely. Accordingly, the number of patients could exceed more than 10 individuals on some days, which might pose a challenge to the clinical teaching of medical trainees. Patient visits and ward rounds approximately take 4 h daily.

At early morning rounds, medical trainees stay at the patient's bedside individually or in pair, take medical histories, review laboratory tests, and write preliminary orders supervised by an internal medicine resident. After that, the working round is completed under the supervision of a senior internal medicine resident or a gastroenterology fellow. Subsequently, the teaching round is performed by an attending gastroenterologist to check orders, and finally, the teaching round continues by attending physicians which can be fulfilled in the classroom or in the corridor or even online which was implemented in the present study.

This study was conducted using a one-group quasi-experimental research design at Gastroenterology Ward of Al-Zahra Teaching Hospital in the city of Isfahan, Iran. Medical trainees (i.e., students and externs) were our major participants spending their teaching course under the supervision of attending gastroenterologists in 2-week intervals. The program was implemented on seven groups of medical trainees in total, including 24 trainees during 14 weeks. Gastroenterology fellows and internal medicine residents usually changed every month.

Intervention

The desired intervention was implemented using Telegram as an Instant messaging application that allows users to send messages and exchange photos, videos, audio files, along with files in any other format without any size limitations. To do this, firstly, a Telegram group entitled as "Lavender" was created and the members including clinical attending, gastroenterology fellows, internal medicine residents, and medical students enrolled as Internship I (students) and Internship II (extern). At first, a file including ward rules along with the study design was given to the students.

The activities of the Telegram group were as follows:

At the beginning of the ward round, the patients were divided between students and externs. Then, a student and an extern were asked to take medical histories, perform complete physical examinations, and then share their data in the Lavender group. The activities and tasks fulfilled by the Lavender group members are illustrated in Figure 1.

Description of tasks and activities in the lavender group

Intervention evaluation

To evaluate the effects of this intervention, two quantitative and qualitative approaches were used as follows.

Quantitative approach

At the end of the internship in the Gastroenterology Ward, an online questionnaire was used to assess

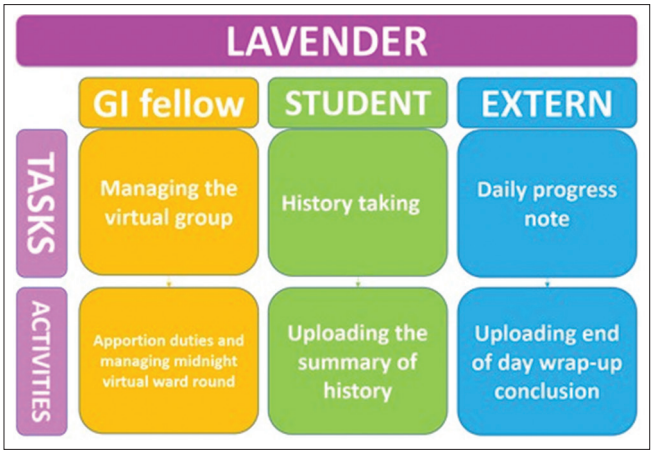

Figure 1: Description of tasks and activities in lavender group

participants' attitudes towards the implemented intervention. This researcher-made questionnaire had been divided into four sections and its validity was confirmed by 8 experts in the field of medical education. Different sections of this questionnaire were as follows;

In the first section, demographic characteristics information including gender and age were asked. Then, respondents could answer items about the amount of Telegram use, the average daily time spent in the Lavender group, and the amount of sharing files and texts in this group.

In the second section, using a Likert-type scale, individuals were asked to comment on the effects of the Lavender group on their motivation toward studying common diseases in the ward, tracking patients, searching for references, and sharing content. Moreover, the medical trainees could complete items about the role of the Lavender group in facilitating communication with clinical teachers, gaining information about patients' progress, increasing scientific information, enhancing readiness to attend daily rounds, and obtaining teamwork skills.

In the third section of the questionnaire, the participants were further requested to rate the Lavender group via a Likert-type scale regarding the appropriateness of the files shared, quality of content shared, and usefulness of content. In the three sections above, the Likert-type scale options were designed as completely inappropriate = 1, inappropriate = 2, neutral = 3, appropriate = 4, and completely appropriate = 5.

Qualitative approach

Using an open-ended question in the fourth section of this online questionnaire, the participants in the program were asked to mention interesting points of their experience as well as their suggestions for improving this educational program. To complete this process, semi-structured interviews were conducted with medical trainees individually and in group. During the interviews, the participants were also assured that their attitudes would not influence the evaluation of their scores. An interviewer was correspondingly selected not to interfere in participants' scoring so that the students could easily demonstrate their attitudes. Given that the responsibility of the Lavender group was by the gastroenterology fellows, separate interviews were also conducted with these individuals.

In the course of interviews, the participants were asked to share their experiences of using this Telegram group. As well, the interviews continued until no further information was obtained and then each interview was carefully recorded, transcribed, and analyzed.

To analyze data, SPSS statistics software (SPPS Inc. Chicago, IL, The USA, version 21) was used and descriptive statistics (i.e., frequency, mean, and standard deviation) were reported. To analyze qualitative data, qualitative content analysis was also used.

Medical trainees were free to participate in this program, and they could leave the study at any time without affecting their routine trainings or final grades.

Results

During more than 3 months of implementing this program and working with gastroenterology round team members in the Lavender group, a daily average of 15 ± 5 text messages with scientific content were shared. In this respect, 77% of the given messages contained daily tasks documentation and 23% were associated with interpersonal interactions such as questioning and answering as well as discussing patients. Moreover, 54 ± 35 photos and 10 ± 7 portable-document-format files were posted in the group on a monthly average.

Furthermore, the average days of activity by each student and each extern in the group were 4 ± 2 days a week; but, the teaching round for students and externs at Gastroenterology Ward Lasted for 2 weeks. In addition, the activity level of the Telegram group based on the number of messages exchanged during the week is shown in Chart 1. Accordingly, the lowest activity in the group was on Fridays, as 6.4% of the total activity; and the highest one on Mondays by 24% of total. Working days in Iran are from Saturday to Thursday, and Friday is the weekend. Moreover, the activity level of the group at different times of the day is illustrated in Chart 2. As observed, most activities by the Lavender group members had been observed around 10 p. m., with 27% of messages being exchanged at this time.

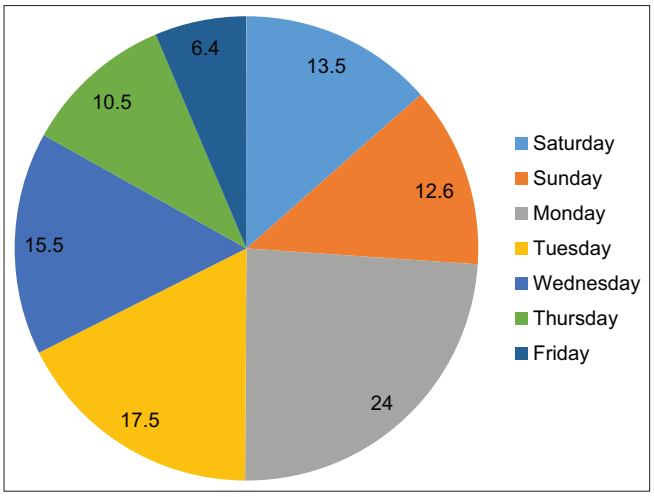

Chart 1: Activity during weekdays

Quantitative results

The total number of participants in the quantitative section of the study who completed the designed questionnaires was 24 students and externs. Moreover, 47% of the participants were males and 53% were females. The age range of the participants was 21–25 years with a mean age of 23.17 ± 1.09 years.

In response to the items in the first section of the questionnaire according to Table 1, 66% of the participants selected the option "Between 1 and 5 h" for daily use of Telegram (at the time of performing this study, Telegram was the dominant instant messaging application used by trainees). The results of responses to other items about daily use of the Lavender group and the amount of file and text shared can be seen in Table 1.

The results of the second and third sections of the questionnaire aimed at examining the effects of the Lavender group on the activities of medical trainees using a five-point Likert-type scale are presented in Table 2.

Accordingly, the highest average was associated with "Readiness for teaching round" by 3.71 ± 1.34. On the other hand, the lowest average was related to "Time-saving for studying about illnesses" by 2.08 ± 1.44.

Qualitative results

In addition to the analysis of the open-ended questionnaire at this stage, the interviews were conducted with 4 medical trainees (two men and two women) and 3 gastroenterology fellows. The results were then grouped into three categories; advantages, disadvantages, and suggestions to improve the use of Telegram as a complementary educational intervention. Each category also included subcategories according to the themes in the content.

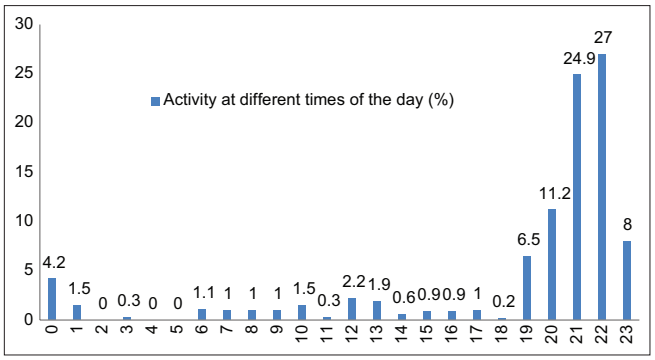

Chart 2: Activity at different times of the day (%)

Table 1: Results of the first section of the questionnaire

Variable	Option	Response rate (%)
Daily use of telegram	0	0
	<1 h	29.1
	Between 1 and 5 h	66.6
	>5 h	4.1
Daily use of lavender group	0	4.1
	<30 min	25
	Between 30 min and 1 h	45.8
	>1 h	25
File and text sharing rate	Very much	8.3
	Much	37.5
	Little	37.5
	Very little	4.1
	Zero	12.5

Advantages

Dominance over patients' conditions

Patients' daily medical histories and progress notes could create a reflective process and also establish dominance over patients' conditions, which had been pointed out by the study participants.

"Other students and those who were not involved with patients could make use of educational points about patients through reading medical histories and comments on them. In fact, they were reviewing all patients and they could be informed about all cases." (Fellow number 1)

Development of communications

Creating this online group facilitated effective interpersonal interactions between medical trainees or between trainees and clinical teachers, which was mentioned as a positive point by the students.

Teacher-student relationships

"The answers to the questions raised during the teaching round and later posted in the Lavender group were good and would allow the morning round to be continued in Telegram. Therefore, the patients would be tracked and the unanswered questions would be addressed by clinical teachers." (Trainee number 1)

Table 2: Results of the second and third sections of the questionnaire

Variables	Mean±SD
Dominance over patients' conditions	
Motivation towards tracking patients	3.08±1.38
Information about patients' progress in the ward	3.52±1.25
Increased awareness of cases admitted to the ward	3.43±1.28
Readiness for attending in teaching round	3.71±1.34
Help to enhance efficiency of rounds	2.71±1.58
Development of communications	
Creating more trainee-teacher relationships	2.5±1.31
Skills for teamwork	2.71±1.58
Possibility of discussions	
Increasing scientific information by studying discussions	3.29±1.18
More mastery of scientific information through participating in group discussions	3.1±1.41
Sharing educational files and texts	
Enhancing scientific information via studying shared files	3.05±1.43
Appropriateness of files shared by students	3.42±1.07
Appropriateness of files shared by teachers	3.21±1.39
Adequacy of texts and files shared by students	3.11±1.04
Adequacy of texts and files shared by teachers	2.74±1.36
Quality of shared files	3.44±1.24
Diversity of shared files and texts	3.16±1.42
Effect on better learning	
Appropriateness of using telegram and teaching content	2.81±1.32
Motivation towards studying illnesses	2.75±1.42
Motivation towards searching for resources	2.88±1.48
Time-saving for studying about illnesses	2.08±1.44
Gaining information from scientific sources for studying about illnesses	2.86±1.38
Interesting topics and content	3.37±1.34
Applicability of topics and content	3.37±1.3

SD=Standard deviation

Student-student relationships

In trainees' opinions, the Lavender group created some kind of synergy and increased collaboration between both internships.

"*Those who are attending the round including students, externs and residents can visit each patient separately, but more relationships can be observed in the Telegram group. Students also used to raise more questions than externs and we had to be more aware of patients' conditions*." (Trainee number2)

Possibility of discussions

The Telegram group could provide a convenient platform to discuss patients' diseases during daily teaching rounds and also facilitate answering students' questions.

"*The good point about this program was that if one asked me a question in person, I might not know it; but when they asked me a question via the Lavender group, I could have the opportunity to search and then post the answer in the Telegram group*." (Fellow number 2)

Sharing educational files and texts

The Telegram group allowed users to share a variety of multimedia and text files, which greatly influenced teaching medical trainees.

"*Regarding educational files about icterus, we understood that what should be done when visiting patients with such laboratory tests and when I visited these patients I could decide that what actions should be taken. Once the round was completed, the same thing could be ordered for patients and I could go through the same round and it could stay in my mind*." (Trainee number 1)

Effect on better learning

Writing about what medical trainees had seen during the day could make the educational content more permanently in their minds. In addition, if they had no concentration due to fatigue at some point in time, they could participate in the Lavender group at another time and study the content. Moreover, reporting content in the group could make individuals prepared, hence, they could get ready to answer probable questions raised by clinical teachers about their cases.

"*It made me search and find answers for questions that might arise in the Telegram group regarding a patient. So, I could know what measures had been taken and what had been ignored about them*." (Trainee number 1)

"*After a while in the daily teaching round, I got tired of standing up for a long time and could not listen carefully to some patients' points; so I could read about them in the Lavender group. I think with the advent of cyberspace, a new educational paradigm has been created*." (Trainee number 2)

Disadvantages

Time-consuming to type

The amount of time the medical trainees spent to report their patients' information in the group created a challenge for them sometimes due to the complexity and outnumbering patients.

"*Patients are very complex and the ward is really overcrowded, so I think posting a complete medical history of these patients in the Lavender group is a difficult task.*" (Trainee number 1)

Long messages to read

The complexity of some patients as well as lack of enough knowledge about illnesses by trainees could make it sometimes impossible to separate the more important content from less important ones, which could also result in a large volume of reports.

"*The knowledge of students and externs is not sometimes enough to select important tests that should be reported. Group members also post all laboratory tests in the Lavender group, so I think some of the messages are too long*." (Trainee number 3)

Not involvement of all group members

Some medical trainees were more likely to participate in the Telegram group, but some others had less activity.

"*A certain number of people were also active, so we needed to take measures to make all group members active in the group*." (Fellow number 3)

Less education to residents and fellows

Since Medical trainees were the target group of this study, fellows could also review educational content while the Lavender group could provide less teaching for them.

"*If attending physicians want to talk at the level of residents or fellows, medical trainees cannot realize it. Moreover, educational content would be duplicated if it is limited to students and externs and thus residents and fellows would get bored. Almost certainly, there is less teaching for fellows compared to students*." (Fellow number 2)

Suggestions

Patient selection

The suggestion made by many medical trainees was to select and discuss a number of patients who could be considered as simpler cases and have more teaching points for them, while other trainees recommended focusing on common illnesses in the Lavender group.

"*If we select particular patients and then write about their progress in the Lavender group, it will be better. I think each member should report one patient*." (Trainee number 4)

"*I think it is better to talk about common and useful issues for general practitioners such as peptic ulcer disease, irritable bowel syndrome, and so on, not issues such as hepatorenal syndrome*." (Trainee number 2)

Restructuring report-writing

To save time, the medical trainees suggested that patient reporting skills should be taught to summarize the patient condition purposefully to use the Lavender group easier.

"*A series of routine tests and examinations do not help in diagnosis and treatment of some illnesses and I do not think patients should be reported using a classic progress note in the group. I think group members need to try reporting patients in five lines like fellows and focus more on new steps*." (Trainee number 3)

More involvement of teachers

With better supervision of attending physicians in the Lavender group, more motivation is created among medical trainees to be more active. In addition, medical trainees in this group can simultaneously use their clinical teachers' experiences with different patients at the same time.

"*Round approach adopted by attending physicians for a specific patient could be recorded and posted in the group, because it is kind of big encouragement for students since they are seeking for what instructors say about a patient even for 1 or 3 min*." (Trainee number 4)

Using other messaging methods

To facilitate patient progress reporting, it has been suggested to use other messaging methods such as audio files and images as well as signs and symptoms of illnesses and even medical imaging techniques used for patients.

"*I find it very helpful to keep patients' information in mind through looking at their faces. I think it is a good thing for me to be able to incorporate visual memory into the group as well. This makes us encouraged to read the content about patients when we see their faces along with important signs*." (Trainee number 3)

Sharing approaches

In participants' opinions, the use of highly advanced guidelines was not beneficial to general practitioners, so they suggested that diagnostic approaches needed to be searched in general practitioners' reference books.

"*We need to ask students to report patient's progress as well as the approach adopted to treat them from a reference book and post it in the Telegram group so that others can use it such as gastrointestinal bleeding, jaundice and etc.*" (Trainee number 2)

Reporting patient summary upon discharge

Upon discharge, each patient can be briefly reviewed, summarizing the entire course of the patient's complaint about regarding diagnostic and therapeutic approaches, and patient outcome.

"*In my opinion, when everything is over and a patient can be discharged, patient's summary file needs to be shared in the group to find out what had been done for his or her. I think writing patient summary makes us realize how much we have understood them*." (Trainee number 4)

Discussion

The main purpose of this study was to develop clinical teaching of medical students and enhance their abilities

in diagnostic and therapeutic approaches using an online platform.

Evaluation of the results also showed that the educational intervention implemented in this study could have favorable effects in areas such as establishing dominance over patients' conditions and enhancing perceptions of different diseases among medical trainees. In addition, it could create a new educational platform to use cyberspace to better review more common illnesses and to provide useful images and files in the form of complementary education.

Moreover, analysis of the participants' attitudes in this study highlighted several weaknesses such as the amount of time that medical trainees had to spend due to the high number of hospitalized patients as well as the complexity of illnesses.

A new paradigm in medical education to enhance cognitive development is the use of cyberspace. In this regard, it has been demonstrated that the use of cyberspace in medical education can be effective in terms of supporting routine interactions within educational processes. Studies have further revealed that 93.4% of medical students use online software and 89.3% of them exploit them to meet their scientific goals. Moreover, such investigations have confirmed that more creative students have more motivation toward using information and communication technology in education in online groups created by students to share educational content.[5,12]

The use of cyberspace for education should thus provide grounds for interactions, dialogs, cooperation, and choice power in students.[13] There must be also a change in the role of students from information recipients to independent directors of their educational process. The use of cyberspace in education converts teaching courses from mere cognitive learning into practice-based interactions. Therefore, instead of using typical teaching lectures, trainees can discuss educational topics.[14] For example, in the study by Afonso *et al*., students had been encouraged to use cyberspace to share their experiences through dialogues and interactions for better learning. The goals mentioned in the given study had been achieved using chats and video conferencing.[13]

In the present study, qualitative and quantitative evaluations showed that the use of reflective processes in taking medical histories and recording patient progress along with disease progression after daily teaching rounds and their correction and reporting in the Telegram-based Lavender group had increased medical trainees' dominance over patients' conditions. In addition, discussions about patients in the above-mentioned group reinforced perceptions of different illnesses and how to approach them as the main achievement of this study.

Better dominance over patients' conditions by medical trainees could thus reinforce their readiness to take part in teaching rounds, and naturally. Therefore, when medical trainees had sufficient knowledge regarding patients' conditions during rounds, learning would be more than talking to patients, and more important questions could be formed in their minds. Hence, bringing such questions to patient's bedsides could encourage attending physicians to provide more varied patient information during teaching rounds.

Another strength point of this educational method was the possibility to upload images and files online, which could allow fellows as those in charge of teaching to benefit from appropriate images to enhance the quality of education during teaching and also provide students with a platform to take photos of important and interesting signs in patients and share them in the group. In addition to the above-mentioned advantage, this group could become a source of useful information for ones that would be trained in gastroenterology wards in the future. In this regard, Shah and Cunningham reported that one of the benefits of using online education was that it could create a wealth of useful resources via sharing content. Furthermore, this study found that lack of time as well as imprecise assignment of tasks was among factors that limited students' participation in the educational process. Therefore, it seems that students need to find strategies to exploit their time effectively in this type of teaching.[14]

In this respect, one of the problems mentioned by the study participants was spending too much time typing content in the above-mentioned group, which had been referred in numerous evaluations, and different approaches had been adopted by medical trainees and fellows to address this including the use of resident-level experiences in reporting medical histories in brief and avoiding information that have no effect on diagnostic and therapeutic approaches. Another solution provided by students was the use of images or audio files to report patients. Another approach was to select patients that are tailored to medical trainees' needs and simply report a limited number of patients, followed by detailed discussions about them that could help medical trainees make good use of their time along with high-quality education.

Another major problem which was not confined to this group was clinical education system implemented in big universities. The complexity of patients referred to educational tertiary centers might not comply with medical students' abilities, levels of knowledge and

needs. However, in the related studies, it had been emphasized that although accurate diagnosis and advanced treatment of such patients does not have a place in teaching medical students, the approach toward an illness for which a patient has been referred is of utmost importance. In addition, the context created in this environment could introduce a new educational setting providing an opportunity to present current cases tailored to the duties of general practitioners and effective teaching these patients, which had been repeatedly suggested and welcomed by students to promote the quality of mentioned Telegram group.

The results of this quasi-experimental study were used to improve clinical education in our gastroenterology ward.

As well, the use of qualitative and quantitative data collection methods provided an opportunity to evaluate various aspects of the effects of this intervention on teaching medical trainees. Findings that revealed the promotion opportunity of medical education by this intervention are summarized in Figure 2. On the other hand, time constraints and limited capacity of clinical teaching rounds at this Gastroenterology Ward did not allow more medical trainees to participate in this study.

Conclusion

The use of messaging software applications such as Telegram in medical education has created a new paradigm, which could facilitate interpersonal interactions among trainees in clinical teaching rounds and help in better learning and knowledge transfer.

Acknowledgments

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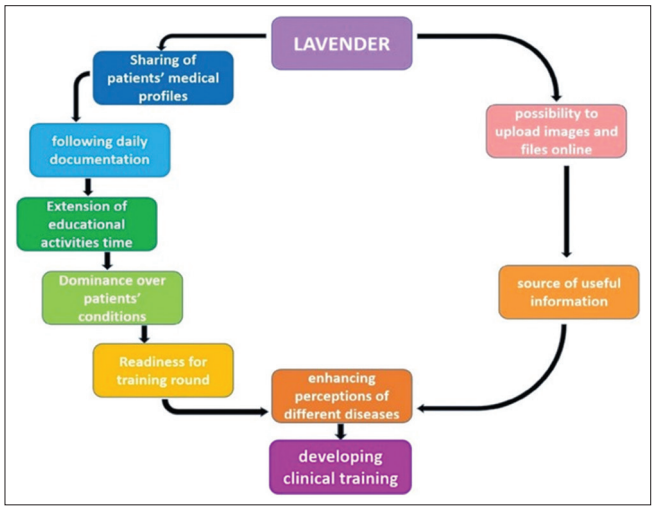

Figure 2: Impacts of Lavender group on clinical teaching

Ethics approval and consent to participate

Informed verbal consent was obtained from all individual participants because the research involved no risk to the subjects and no adversely affect the rights and welfare of the subjects. This research was approved in Isfahan University of Medical Sciences with the codes of ethics of IR.MUI.RESEARCH. REC.96.2.112.

Availability of data and materials

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Lavender

Telegram group entitled as "Lavender" and consisted of clinical attending, gastroenterology fellows, internal medicine residents and medical students.

Financial support and sponsorship

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Conflicts of interest

There are no conflicts of interest.

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