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Study Protocol

Designing a customized model of effective clinical teaching for an undergraduate medical program: protocol for a mixed-method study

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Abstract

Background: Clinical teaching is a vital component of medical education. However, evidence indicates that clinical teaching still confronts numerous challenges, as its quantity and quality are not always desirable. The need for improvement has been emphasized in the planning, teaching, and evaluation of clinical education. Therefore, this study aims to design a customized model of effective clinical teaching for the undergraduate medical program.

Methods: A mixed-method study will be conducted in three consecutive phases. The first phase, using a grounded theory approach, explores the lived experiences of clinical teachers and undergraduate medical students concerning effective clinical education in an undergraduate medical program. In the second phase, a systematized review will be conducted on secondary data sources to fill theoretical categories and to extend the theory emerging from the qualitative phase. Finally, in the third phase, a model of clinical teaching will be developed for an undergraduate medical program.

Discussion: The findings of this study will offer new insights into the clinical teaching paradigm in developing curriculum, setting policies, designing suitable undergraduate medical-clinical education programs, and developing effective teaching methods. These results will contribute to understanding the challenges of clinical education in an undergraduate medical program.

Background

Clinical teaching is a vital component of medical education,[1] and has been considered "the heart and soul of academic medical education",[2] such that its pre-eminence in medical care is associated with high-quality clinical education.[1] Clinical teaching effectively helps learners improve their clinical skills, clinical reasoning, communication skills, physical examination skills, and procedural and professional skills.[3-6] It provides opportunities for learners to use four of their senses (hearing, vision, smell, and touch) to learn more about diseases as well as humanistic and ethical aspects of medicine.[5,7] In addition, clinical settings help develop personal advancement and identity among junior doctors in the medical profession.[8,9]

Despite the importance of clinical education, it encompasses multiple challenges, including being time-consuming, unwillingness of clinical professors to engage in clinical teaching, inaccessibility of patients, lack of attention to patient privacy, learners' lack of interest, and presence of learners with different levels of education.[9,10] Unfortunately, these factors have led to a decline in clinical teaching and reduced exposure among medical students to patients in clinical settings.[1]

Many studies on clinical teaching and allied health education have reported that a considerable number of learners perceived insufficient competence in their training courses.[9,11,12] Studies have found that clinical teaching in Iran also encounters numerous challenges.[13-15] Medical students have problems in the application of basic medical sciences in their clinical practice in the real environment.[16] Following the 2015 health reform plan in Iran and the integration of the Ministry of Health and Medical Education, the number of patients in teaching hospitals has increased.[17] Medical teachers must

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simultaneously provide services to more patients and teach medical students while being obliged to allocate more time to patient care.[18] Establishing a balance between provision of service and teaching is difficult, and teachers are confronted by insufficient time to engage in clinical teaching.[18] In addition, the large number of medical students at different educational levels in these clinical settings (stagers, interns, residents, and fellows) have led to the confusion among both students and teachers.[19] Since residents and fellows have the chief responsibility for patient care; therefore, interns often lose the chance to offer service and receive feedback from professors on their performance.[1,13]

Several studies in Iran have found that clinical education is suffering both in terms of quality and quantity, and thus the improvement of planning, teaching, and evaluation has been accentuated in clinical education.[9,20] Therefore, it is necessary to design a customized model for the clinical teaching of junior doctors. Considering these gaps, especially in the Iranian context, this study will be conducted to provide a deep and comprehensive view of the lived experiences of clinical education stakeholders about effective clinical education in an undergraduate medical clinical education program to explore its formation process to help develop a customized model of clinical teaching appropriate for undergraduate medical studies.

Materials and Methods

The study objectives

1. Identifying factors affecting the process of effective clinical teaching formation in an undergraduate medical program.
2. Identifying the process of effective clinical teaching formation in undergraduate medical programs.
3. Designing a customized model of clinical teaching for an undergraduate medical program appropriate for the Iranian context.

Study design

A mixed-method study will be conducted in three consecutive phases. The first phase, using a grounded theory approach, will explore the lived experiences of clinical teachers and undergraduate medical students concerning effective clinical education in an undergraduate medical program. In the second phase, a systematized review will be conducted on the secondary data sources to fill theoretical categories and extend the theory emerging from the qualitative phase. Finally, in the third phase, a model of clinical teaching will be developed for an undergraduate medical program.

Phase 1: Qualitative study

Clinical education bears a unique meaning for each teacher, influencing his/her management behaviors and the choice of teaching strategies. Therefore, a qualitative approach must discover effective clinical teaching shaped by a dynamic process.[21] To study such a social phenomenon, it is essential to pay attention to the social context in which this process occurs, since different social situations influence the development of this process. Grounded theory is an appropriate approach for the examination of processes in their social backgrounds and to understand related factors and conditions.[22] Therefore, the experiences of clinical teachers and undergraduate students of medical sciences on clinical teaching will be collected and analyzed using the grounded theory approach. This phase will explore the lived experiences of the stakeholders of clinical teaching to develop a customized model of effective clinical teaching.

Setting and sample (phase 1)

The proposed protocol of "Designing a customized model of effective clinical teaching for an undergraduate medical program: A grounded theory" is based on the first author's doctoral dissertation at the Iran University of Medical Sciences. The participants will be clinical faculty members with teaching experience in clinical settings and undergraduate medical students. Sampling will initially be purposive and then continued as theoretical. Considering the heterogeneity of participants, suitable key informants will be selected from clinical faculty members, managers of the Educational Development Center (EDC), and undergraduate medical students at several universities (Iran, Shahid Beheshti, Tabriz, Guilan, Mazandaran, Shiraz, and Mashhad Universities of Medical Sciences). Theoretical sampling will continue to develop the categories.

Data collection (phase 1)

The data collection method will consist of in-depth semi-structured interviews and observations (field notes, daily notes, and narration). Interviews will be conducted at a location and time suitable for participants after obtaining their permission.

Before initiating the interview, an information sheet will be provided to the participants in which the purpose of the study, the confidentiality of information, and the freedom to participate in or withdraw from the study at any time they wish will be mentioned. Participants will sign an informed consent form before participation. The interviews will be conducted with open guided questions to encourage the participants to speak freely and express their personal experiences about clinical teaching; for example, "Can you talk about one of your best clinical teaching experiences, in an outpatient or patient bedside, for medical students? What were its characteristics?"

As the interview progresses, probing questions will become more specific, allowing a deeper exploration. Each interview will be recorded using a digital sound recorder, and notes will be taken on important points. Each interview will be transcribed verbatim and re-read

several times by one of the researchers (HH). Since the process is iterative, based on the analysis of each previous interview, the next participant will be selected and the next subsequent interview will be conducted. Thus, each interview directs the selection of the next participant. Data collection will continue until data saturation, that is, when no new data emerge.

In this study, daily notes and narration will be used as needed. The researchers will observe nonverbal behaviors of participants before, during, and after the interviews. Regarding the authorization of the head of the medical education department and the dean of teaching hospitals, researchers will participate in clinical settings such as inpatient, outpatient, and emergency wards, and will become familiar with clinical teaching and training processes in the field.

To analyze interviews and perform coding, field notes (theoretical and methodological memos) will be taken; observational notes will be used to describe events, while theoretical notes will be utilized to describe ideas and questions about the extracted codes.

In addition, methodological notes on the methods used in the study will help us understand the recorded interviews, establish logical relations between the categories, and improve the grounded theory as it emerges.

Data analysis (phase 1)

We will adopt the grounded theory approach for data synthesis based on Strauss and Corbin.[23] The analytic process consists of open coding, axial coding, and selective coding (Figure 1). In open coding, the content of interviews will be carefully read line by line. Then, significant insights will be identified in each statement, and subsequently the "semantic unit" will be identified and receive a conceptual label written beside the text of the interviews or field notes. Similar concepts will be grouped for primary categorization to begin. This step will focus on the development of concepts within the data and will continue the primary axial coding by relating small concepts to more general ones when entering and listing secondary concepts. Possible categories will be proposed and specified. During this phase, categories will remain unrevised and undeveloped. Analysis at the time of open coding will aim to collect the next pieces of data, and ambiguous cases or new questions that arise will be incorporated in the subsequent interviews.

In axial coding, categories and sub-categories will be formed and categories will be linked to one another. Theoretical sampling will be formed from key informants to develop and complete these clusters. In this step, the researchers will be committed to the main storyline and will move from a description of the phenomenon to conceptualization. After relating complementary categories to the central category using the paradigm specified in the study, the categories will be related to one another at the next level, validating the relationships (confirming the relations concerning the data), discovering patterns, managing the relationships, categorization, validating the theory arising from the data, and finally completing the categories modified or needed to be developed, to form the theory for explaining the phenomenon in question. The final development of the theory will be performed by writing the storyline. The interviews will continue until data saturation where no new data emerge.

Rigor

To maintain trustworthiness, four criteria -- credibility, confirmability, dependability, and transferability[23] -- will be considered. For credibility, researcher HH will have prolonged engagement with the data, and data collection and analysis will be continued over 12 months while the researchers attend different clinical settings several times and closely observe the interaction between clinical teachers and medical students and become familiar with the clinical context of Iranian teaching hospitals. Effective communication will be established by gaining the trust of the interviewees. Source triangulation (clinical faculty members, clinicians, undergraduate medical students at different levels, and managers of EDCs will be interviewed. The content of interviews will be read and re-read several times by the research team so that they will be immersed in the data. For member check, the initially extracted

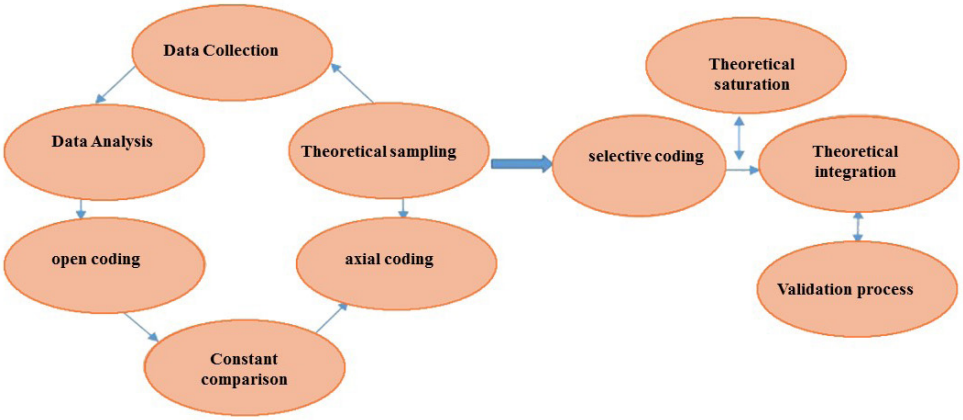

Figure 1. Steps of data collection and data synthesis based on Strauss and Corbin.[23]

codes will be sent to the interviewees for confirmation, and the researchers will pay attention to bracketing during data collection and analysis and will bracket their prior experiences with clinical teaching and settings and their own beliefs about effective clinical teaching.[24]

For confirmability, the interviews will be coded by authors SKA, HH, and ShB and MB, who will continuously discuss issues with the research team to reach a consensus on extracted codes.

For dependability, evidence-based writing (quotations) and external review will be used.

For transferability, maximum variant sampling will be selected; that is, participants will be selected from various universities of medical sciences (Tehran, Shahid Beheshti, Iran, Tabriz, Shiraz, Esfahan, Guilan, Mazandaran, Semnan, and Mashhad). The researchers will participate in the annual National Iranian Conference of Health Professions Education to interview pioneer medical clinical educators as well as EDC managers to collect their experiences related to the research. To increase maximum variation, participants will be selected from different ages, genders, and positions. Finally, the codes and the coding process will be checked by an external reviewer.

Phase 2: Systematized review

A review of the literature will be performed to extract secondary data sources. To promote rigor and extend the model, quoted sentences from interviews in previous studies will be used. The process of searching sources, analyzing data, and reporting results in this study will be based on the PRISMA Standard Guide.[25]

Search strategy

To search all aspects of the topic, the "PICo" (Population, phenomenon of Interest, Context) will be defined as follows: "What are the experiences of clinical teachers or medical students concerning effective clinical teaching for undergraduate medical students?"

Population: This systematized review will examine publications on effective clinical teaching in undergraduate medical programs.

The phenomenon of Interest**:** Effective clinical teaching is influenced by different components such as the characteristics and role of the medical teacher, clinical teaching behaviors, teaching methods, etc.[26] Therefore, all publications providing data on clinical teaching components will be reviewed.

Context: Clinical teaching should be applied in undergraduate medical programs across every discipline, whether internal medicine, surgery, emergency, obstetrics, or any other specialty department, in teaching hospitals worldwide. All studies on dentistry, medical residency programs, continuing professional development, or continuing medical education and paramedical education will be excluded from this review.

The keyword validity ratio (KWVR) will be used to validate the study-selected keywords.[27] For this method, some related words are initially selected from the literature, then discussed by subject specialists and expert searchers (librarians). Subsequently, the optimal words will be selected and combined with truncations and Boolean operators to augment the search syntax. For example, the "OR" operator will be used to combine similar words and expand the search result to achieve broader results. The "AND" operator will be used to combine the sets, and "NOT" will be used to restrict the entry of unwanted topics. The search will be examined and refined to reach recall.

Keywords

In this systematized review, the following keywords and appropriate Boolean operators will be used: Clinical Teaching, Teaching Skills, Undergraduate Medical Student(s), Undergraduate Medical Education; Clinical Teacher(s), Teaching Hospitals, Ward Round Teaching, Teaching Round, Morning Report, Attending Round, "Effective Teaching Clinical Behaviors", Educational Program, Teaching Program.

Information sources

A systematic search strategy will be used to extract data from the available resources and electronic databases. We will search the following databases for the related literature: Web of Science, Medline (through OVID SP), Cochrane Library, EMBASE, Scopus, and ERIC. Google Scholar will be used for manual search, and ProQuest will be searched for gray literature, dissertations, and theses. Magiran, SID, IranDoc, and Barakat will also be searched for literature in the local language (Persian). Some specific sources such as core journals in the field of clinical teaching, including *Medical Teacher*, *Medical Education*, *BMC Medical Education*, *Academic Medicine*, *Clinical Teacher*, *Teaching and Learning in Medicine*, and websites such as ACGME (Accreditation Council for Graduate Medical Education) and the *AMEE International Conference Report* will be searched manually.

Inclusion criteria

Articles published from January 1980 through January 2019 that were published in Persian and/or English, and qualitative studies using a qualitative data collection technique (interview, observation) for obtaining data, mixed-method studies with qualitative data separated and synthesized independently from quantitative data, and studies that explored the perception of clinical teachers or undergraduate medical students about factors influencing effective clinical teaching will be included.

Exclusion criteria

Literature reviews, letters to the editor, conference abstracts, dissertations, and non-profit organization reports will be excluded because they do not encompass

original data.

Data management (phase 2)

Details of search strategies will be documented. Search results will be exported to EndNote 8 to identify duplicate publications in different databases and to rank the importance and relevance of the publications based on the study objectives.

Data extraction (phase 2)

The titles and abstracts of all publications will be concurrently screened against the inclusion criteria by two independent researchers. It should be noted that if there is a difference in the extraction of data, an agreement will be obtained through discussion or consultation with a third researcher. At the next step, the full text of the remaining publications will be reviewed and assembled in an extraction form that includes the name of the first author, the year of publication, the research design, and the study results. The reliability of the extracted data will be taken into account before beginning the extraction. Two reviewers will independently extract data from several articles and the kappa coefficient will be measured for all the Critical Appraisal Skill Programs (CASP) checklist items. All items with a kappa >0.7[28] will be examined by the reviewers. The selection process, including reasons for exclusion of search results in each stage of screening, will be illustrated in a PRISMA flow diagram.[29]

Methodological quality assessment

The CASP checklist[30] will be employed for critical appraisal of the methodological quality of the selected articles by two independent reviewers.[31] Scores ≥70% will be accepted. Any difference between reviewers will be resolved through discussion or consultation with a third reviewer.

Data synthesis (phase 2)

For the synthesis of results, a thematic synthesis will be performed. This method is suitable for categorizing similarities and differences within data and identifying patterns.[32] First, the data related to effective clinical teaching experiences and attributes of the clinical teacher from the perspectives of clinical teachers and medical students are coded. Coding will be performed independently by the two reviewers. Initially, five articles will be coded independently, and then the reviewers will meet to discuss the extracted codes and will reach a consensus (inter-rater reliability). Differences or divergences between the reviewers will be resolved through discussions or consultation with a third reviewer. In the second stage, similarities between the codes will be identified. Codes will be clustered into 'descriptive themes' that describe patterns among clusters.[31] The results will be summarized in the extraction table. This table will show the themes and categorized data based on similarities and differences within the data. To this end, according to the results of the current study, three themes will be extracted as follows:

- The attributes of effective clinical teaching.
- The characteristics of undergraduate medical teachers.
- Recommendations and strategies for promoting clinical teaching in undergraduate medical programs.

Phase 3

The ultimate goal of this grounded theory is to develop a theory or model. In this stage, focus group discussion will be conducted by the research team who will systematically check and re-check the categories extracted from the qualitative and systematized review phases and review the ideas emerging from the categories and the logical connections among them. The research team will identify the properties and dimensions of the categories as well as adequate variation in each category.

In this step, it is possible to go back to the interviews, memos (codes, analyses, and situations), and field notes and review them. To complete a category using theoretical sampling, we will return to the field or selectively collect additional data. This phase will be continued to reach theoretical saturation. This means that each category will be well defined and developed in terms of properties, dimensions, and adequate variation within categories. At the end of the selective coding process, the storyline will be developed using a reflective coding matrix. The processes, properties, dimensions, contexts, and approaches for understanding the concerns of each concept will be identified in this matrix.[33] This will facilitate the development of categorical connections and patterns as well as a cohesive and trustworthy storyline.[33]

Discussion

Clinical teaching has always been viewed as an opportunity through which tangible and intangible clinical competencies can be demonstrated and educated.[34,35] In spite of the importance of clinical teaching, several studies have reported that the quality and amount of clinical education is declining,[13,36] and a considerable number of doctors have insufficient perceived competencies.[11] Undergraduate clinical education is significant in the formation of professional identity and professional roles of learners.[8,9] According to the results of the current study, factors affecting the formation process of effective clinical teaching in an undergraduate medical program will be identified, and the process of effective clinical teaching in an undergraduate medical program will be explained. Ultimately, a customized model of clinical teaching will be designed for an undergraduate medical program appropriate for the Iranian context. We acknowledge that the small sample in this qualitative study may not be representative of clinical teachers across undergraduate medical programs in Iran. However, to increase the

diversity of participants, medical faculties and EDC managers from across the country will be interviewed to reach maximum variation and to resolve inconsistencies.

Conclusion

The main goal of this study is to design a clinical teaching model applicable to teaching hospitals in Iran. The findings from this study will offer new insights for clinical teachers, curriculum developers, and policymakers to design suitable undergraduate clinical education programs appropriate for the Iranian context. In addition, this will enhance the understanding of the challenges of clinical education in undergraduate programs and facilitate the design of appropriate clinical teaching methods in undergraduate medical education. This study will create the potential for further research on these issues, the implementation and evaluation of the developed theoretical model in Iranian teaching hospitals, and evaluation of its effectiveness and efficacy.

Ethical approval

This study was approved by the Research Ethics Committee of the Iran University of Medical Sciences (IR.IUMS.FMD.REC.1398.217).

Consent to participate

Before initiating the interview, an information sheet will be provided to the participants to explain the purpose of the study, delineate who will be provided with the results, and ensure the confidentiality of information and freedom of participants to participate or withdraw, and their informed consent will be secured. Each interview will be recorded using a digital sound recorder after obtaining their permission, and notes will be taken.

Competing interests

No competing interests.

Authors' contributions

KS, HH, SB, MB, VZG, and SZ were involved in this study to design and draft the research and the manuscript. HH and MB provided the qualitative design. HH and VZG provided the systematic review design. SB and MB reviewed the designs and provided recommendations for their revisions. HH wrote the first and second drafts of the paper. SB and MB reviewed the first and second drafts of the paper and improved them. KS was responsible for coordinating the study. All authors have read and approved the final version of the manuscript.

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