Small group teaching improves students' acquisition of knowledge and skills

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ABSTRACT

الأهداف: تقييم مدى فعالية التدريس عن طريق المجموعات الصغيرة في تحسين مهارات ومعرفة طلاب الطب قبل التخرج.

الطريقة: أُجريت هذه الدراسة الاستطلاعية في كلية الطب، جامعة طيبه، المملكة العربية السعودية وذلك خلال الفترة من سبتمبر 2011م إلى سبتمبر 2012. ولقد قام قسم الجراحة بتقديم طريقة المجموعات الصغيرة أثناء التدريس. لقد قمنا بتقسيم الطلاب في السنة الخامسة إلى مجموعات في كل مجموعة 8 طلاب، ومن ثمنا قمنا بتطبيق هذه الطريقة في التدريس. وبعدها قمنا بعمل مقارنة بين طلاب السنة 2010–2011 وطلاب السنة 2011–2012 وذلك فيما يخص علامات كلاً من اختبار الفحوص السريرية على المدى الطويل والاختبار السريري الموضوعي المنظم (اختبار أوسكي). ثم قمنا بتحليل البيانات وذلك بمقارنة متوسط البيانات، والانحراف المعياري، والخطأ المعياري.

النتائج: شارك في هذه الدراسة 164 طالب، وكان مجموع الطلبة هو 82 طالب في كل سنة)41 ذكر، و41 أنثى(. أشارت نتائج التحليل إلى وجود فروق من الناحية الإحصائية في العلامات بين الذكور والإناث بين المجموعتين في السنتين الدراسيتين)p=0.000(. لقد كان متوسط علامات الذكور خلال السنة 2011–2012 43.1±2.99، وهذا المتوسط كان أعلى من الناحية الإحصائية من علامات الذكور خلال 2010–2011 38.7±2.81)p=0.000(. كما كان متوسط علامات الإناث خلال السنة 2011–2012 39.8±4.0، وهذا المتوسط كان أعلى من الناحية الإحصائية من علامات الإناث خلال 2010–2011 35.6±3.88)p=0.000(.

خاتمة: أظهرت هذه الدراسة بأن التدريس عن طريق المجموعات الصغيرة يعد فعالاً في تحسين أداء الطلبة ومهاراتهم أثناء إجراء الفحوص السريرية، كما ويمكن تطبيق مثل هذه الطريقة على كافة المناهج الطبية والفحوص السريرية حتى نضمن تخريج مجموعة من طلاب الطب الناجحين في إجراء الفحص السريري.

Objectives: To evaluate the effectiveness of small group teaching (SGT) in improving the undergraduate medical students' knowledge and skills.

Methods: This study took place at the College of Medicine, Taibah University, Madina, Kingdom of Saudi Arabia between September 2011 and September 2012. Small group teaching was applied by the surgery department. In this prospective study, fifth year students were divided into groups of 8 students, and teaching strategies of SGT were applied. The marks in the clinical examinations of long case and objective structured clinical examination (OSCE) of the students with a traditional teaching cohort of 2010-2011 were compared to a SGT cohort of 2011-2012. Data were analyzed by comparing the means, standard error, and standard deviation.

Results: One hundred and sixty-four students were incorporated, 82 students for each year (41 males and 41 females) in each group. The analysis showed a statistical significant difference in marks obtained by male and female students of both cohorts ($p=0.000$). In the 2011-2012 group, male students' mean score was 43.1 ± 2.99 which was higher than the 2010-2011 male students' (mean$\pm$SD: 38.7 ± 2.81; $p=0.000$). Similarly, the 2011-2012 female students attained a higher mean score than those in the 2010-2011 (39.8 ± 4.0 and 35.6 ± 3.88) ($p=0.000$).

Conclusion: Small group teaching is a valuable strategy in enhancing students' performance in the clinical settings. Small group teaching can be applied to other clinical disciplines of the medical curriculum for production of safe and clinically competent graduates.

Problem-based learning (PBL) was introduced by McMaster University in the 1960s[1] and since then, has been nurtured and modified by different researchers.[2,3] Problem-based learning during the medical education has positive effects on physician's competency after graduation, mainly in social and cognitive dimensions.[4] Vernon et al[5] suggested that the clinical performance and skills of the students exposed to PBL were superior than those educated in a traditional way. Nowadays, PBL is developed and implemented in a wide range of domains and characteristically 6 core concepts are outlined;[6] students-centered learning, performance as small students group under the guidance of a tutor, tutor as a facilitator, problems being primarily encountered in the learning sequence before any preparation, problems are used as a tool to achieve the required knowledge, and new information is acquired through self-directed learning. Problem-based learning relies almost entirely on small group teaching (SGT) methods, and many medical schools with more traditional curricula have incorporated a significant number of SGT sessions into undergraduate programs for medical students. Small group teaching works through active group facilitation and group management leading to better learning outcomes.[6] It supports understanding, and the long-term retention of information, problem-solving skills, critical thinking and the development of positive attitude, thus improving reflective practice.[7] This approach aims to develop a team that has been trained to work independently of any form of traditional teacher, by promoting individual involvement, and active participation.[8] However, learners, teaching faculty, and administrative staff[9] may resist introducing novel approaches of SGT in an environment with a history of didactic teaching. The present study analyzes the impact of SGT in the surgery course of the fifth year undergraduate medical students at the College of Medicine, Taibah University, Madinah, Kingdom of Saudi Arabia.

Methods. The College of Medicine, Taibah University, Madinah, Kingdom of Saudi Arabia follows a traditional teacher-centered and discipline-based undergraduate medical curriculum. During each academic year, the department of surgery conducts a 9-week course for third year and a 12-week for fifth year

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

medical students, delivered by lectures, tutorials, long case discussions, and skills labs. Assessment includes a mid-course, and the final examination composed of multiple-choice questions, OSCE, long, and short cases. Until 2010, the clinical bedside teaching was delivered as long case presentation by the students, followed by teacher's leading role in patient's examination and knowledge dissemination. During the academic year 2011-2012, in this prospective study, SGT strategy was introduced to the fifth year group. This group of students was incorporated in this study without any inclusion or exclusion criteria. The group was divided into subgroups containing 8 students per subgroup. **Table 1** outlines the working plan adapted from Jones[9] by the Surgery Department, which details the steps a facilitator such as organizing, initiating, conducting, and evaluating the SGT session.

Clinical cases were used to guide students through the small group process. The group of students remained stable, but the tutors changed it according to the topics under discussion as they were expected to have content expertise. Students were assessed based on their small group participation, preparedness, and responses. The

Table 1 - Jones'[9] working plan for small group teaching in medical education.

Environment
- Choose optimal small group method/s to achieve desired objectives
- Select appropriate room/s
- Check equipment
- Brief co-instructions/ assistants

Set
- Set mood including ice-breaker activities, if appropriate
- Establish content usefulness/identify relevance/motivate learners
- State intended learning objective
- Clarify roles of learners, instructors, and establish ground rules

Dialogue
- Introduce topic
- Use appropriate questions
- Draw on learner's perspectives to make new points
- Use body language, eye contact, position, and movement
- Limit personal contributions to facilitating group participation, ensuring adherence to time
- Summarize learner responses to reinforce participation
- Control difficult learners (e.g. quiet, dominating, disruptive)
- Maintain group focus throughout teaching session
- Respond positively wherever possible

Closure
- Allow learners to reflect on session content
- Invite questions and/or comments
- Review major points from session
- Summarize any other relevant information
- Terminate the session appropriately

Evaluate session
- What went well? Why?
- What could be improved? How?
- What will be changed for future sessions?

assessment grades of the fifth year surgery students during the academic year 2010, who got didactic clinical bed-side teaching were compared to the corresponding group of the year 2011 who received SGT instead of traditional teaching tools. The clinical components of assessment under consideration were the long and short cases, and OSCE.

The data was analyzed using SPSS version 13. Student's t test was employed to review the average score attained by each cohort for the specifies exam categories for both years. *P*-value less than 0.05 was considered significant.

Results. One hundred and sixty-four students were included in this study, 82 students for each year (41 male and 41 female) in each group, mean age 22.5 years with age range of 21-25 years. The mean male
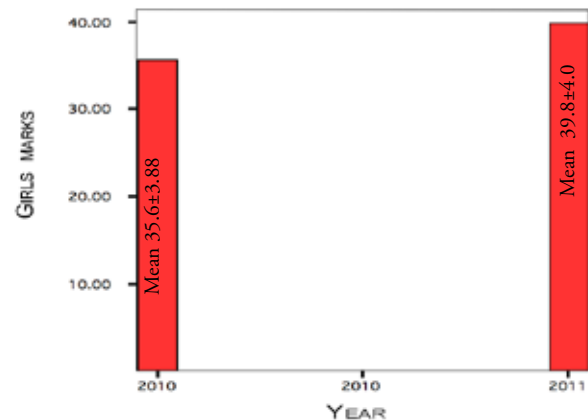
student's marks for the year 2010 was significantly lower than that for the year 2011 (*p*=0.000) (**Figures 1 & 2**). The mean female student's marks for the year 2010 was significantly lower than that for the year 2011 (*p*=0.000) (**Figures 3 & 4**).

The 95% confidence interval (CI) for difference between mean of boys and girls for year 2010 was <2.93 while the 95% CI for difference between mean of boys and girls for the year 2011 was <3.15. The results demonstrated a strikingly improved performance of the students who were taught by the SGT strategy, as compared to the group taught by traditional teaching (*p*≤0.005).
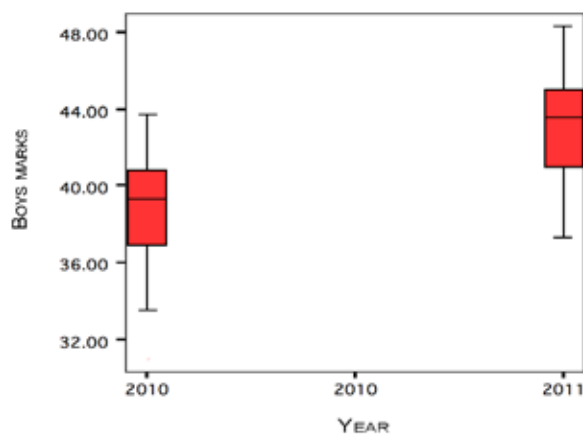
Discussion. Small group learning has been coined as a group of learners demonstrating active participation, a specific task, and reflection.[10,11] As Kolb suggested in
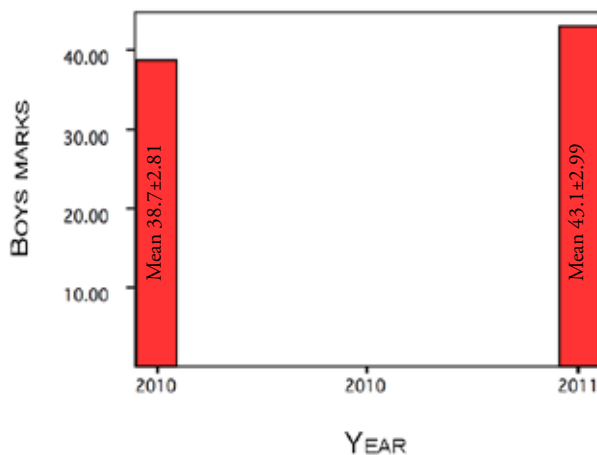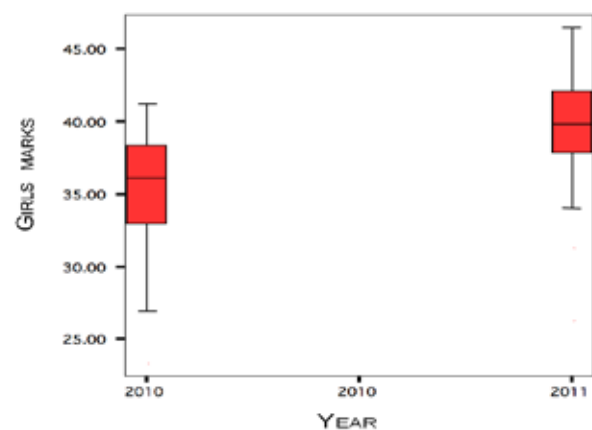

Figure 1 - Mean male students' marks by year.

Figure 2 - Male students' marks by year.

Figure 3 - Mean female students' marks by year.

Figure 4 - Female students' marks by year.

1984, small groups allow learners to reflect on their own experiences as well as experiences of others in a way that engenders deep learning.[12] One study suggested that the students were more articulate in their description of small group goals in understanding the course material and objectives to achieve, to work as a team and to learn from each other, to apply content to 'real-life' situation, and to learn to solve the problems.[8] The stimulus material should be prepared by the course organizers or the facilitator, and may include problem-based scenarios, videos, and patient 'real-life' presentations. Learning outcomes of SGT sessions should match the course curriculum and meeting the students before each session can identify learning needs to be addressed.[7] A non-threatening atmosphere, group interaction, and integration, and pedagogical methods that encourage problem solving and thinking have been defined as the fundamental characteristics of SGT.[13] In this study, a non-threatening learning environment was ensured which encouraged the students to participate openly and confidently. Another outright benefit of SGT is that it fosters the learners' ability to work collegially to acquire skills such as task prioritization, time management, teamwork, inter-personal relationship, effective communication, group dynamics, and enhancement of self-confidence.[14] The facilitator of SGT plays pivotal role in the entire process. Their major role should build trust and encourage bonding of group members.[15] Tuckman et al have mentioned 6 developmental stages: orientation, formation, storming, norming, performing, and terminating.[16] At an early stage, group members get to know each other, establish communication patterns, and agree on the ground rules and roles of members. The facilitator needs to develop confidence among group members, which are the key factor for learning and sharing others' knowledge and skills. The facilitator should motivate students to act flexibly around what they know, guide students to use their knowledge to construct their own flow diagrams and mechanisms, and encourage lateral thinking and making links.[17] At the same time, the facilitator should be a role model for the group by monitoring his/her facilitation skills, acknowledging own mistakes, and by updating knowledge about PBL and SGT on regular basis.[18] Taibah University, being a relatively new institution does not have highly qualified and trained teaching staff which was a partially overcome by overcome by selecting only senior academicians for the SGT methods. In the present study, female students' performance was better than the male counterparts, a finding consistent with the usual pattern of gender performance. A wide range of approaches to SGT

has been described.[19,20] Ultimate choice depends on intended learning objectives, group size, personnel, available time, and resources. For successful SGT sessions, a combination of SGT approaches is employed. Using multiple approaches in a single session permits the facilitator to customize the optimal approach in achieving the desired educational outcomes. Various types of SGT sessions are described.[21] In buzz groups, during a discussion, students are asked to turn to their neighbor for discussing any difficult point or explaining the situation from one's perspective. Buzz group allows the students to explain the difficulties, which they would have not been to express in a larger group. Snowball groups are extension of buzz groups where pairs join to make 4, which join to develop groups of 8, ultimately joining the whole group. This exercise ensures active participation of each student and gradual assimilation of ideas within a group. Tutorials and free- discussion is a useful category of SGT where the discussion material is introduced before or during the teaching sessions. In the paired (one-to-one) discussion, one participant in each pair is required to express his opinion for 5 minutes while his counterpart listens. Then the roles are reversed. Upon completion, the group reassembles and each participant is required to present to the whole group the knowledge shared by each pair. Clinical teaching is another practical tool widely used for SGT. The group actively participates in the information shared by group members and draw important conclusions, and management strategies being guided by the tutor, as and when required. The fishbowl configuration allows the inner group to discuss certain issues and ideas while the outer group listens and consolidates their knowledge and arguments in a passive manner. Later on, the roles for the inner and outer groups are reversed. In circular questioning, participant formulates a question related to the theme or topic under consideration and put it to the person opposite, which has specified time limit to answer. This question and answer session continues clockwise until everybody has contributed. Horseshoe groups formulation provides another important SGT strategy where groups are arranged around the tables with each group in a horseshoe formation, facing the tutor in front. The tutor can delegate different tasks to each group in horseshoe arrangement, and then each group reports back to the entire group in return. Other commonly used tools during SGT are simulations, seminars, plenary sessions, short quizzes, videos, and games.[22,23] In the current study, multiple SGT modalities were applied which awarded better clinical outcomes.

Role-plays can also be effectively used in small groups to promote skill acquisition and to help students

develop solutions to a problem, try new behaviors and receive feedback.[24] As role-plays generally provoke less anxiety than real-life situations, students may be able to use newly acquired skills more easily and attend to what is going on with fewer distractions and concerns. The main idea is that the learners should develop and practice communications skills in a low stake environment before applying their acquired skills and knowledge in real life.[8] Facilitating role-play requires an elaboration of the content and purpose, defining the ground rules, explaining the situation, and selecting the student roles. After the session, student feedback should be discussed and explored.[25,26]

Once the discussion has initiated, managing the group climate demands facilitator's contextual understanding of the topic, empathy with the students, possessing the listening, reinforcing, and summarizing capabilities.[27] To promote group functioning, the facilitator should recognize the group members' interactions, communication patterns, and nonverbal behaviors, which often identify shifts in mood, attitudes and participation. The facilitator must be able to observe signs of interest, disagreement, and willingness to contribute. If the discussion stagnates and cannot be refocused, the facilitator can call a 'time-out' for few minutes and then take a fresh start. Dolmans et al[28] described a facilitator as an individual who promotes deep thinking and problem-solving, is not threatening, encourages interaction, does not lecture, highlights clinical relevance, convene the group, and develops mutually acceptable agenda, vary the teaching methods, and knows to overcome commonly encountered problem during the sessions. Groups problems usually stem from 3 sources; unclear or unattainable goals, lack of group interaction, or poor group motivation.[29] Managing the group problems during troubleshooting is a daunting task and if the group is new or tackling complex problems, the facilitator must be harmonizing and conciliating difference in point of view by relieving tension and draining off negative feeling. At times, labeling the problem and sharing the perception may serve the purpose; at other times certain interventions are required such as changing the classroom, directly redressing the group conflict, or changing the theme in a smooth manner.[19] Although in the present study, the student populations are different, but we can assume that the standards of medical students are similar year after year. The present study emphatically affirms the effectiveness of SGT in enhancing the students' performance in the examination. Small group teaching is a perspective that illuminates group dynamics in a way that can help tutors, and students understand interactions and learning through a lens.[30] However, Tiberius[29] has reported in a systemic review that PBL did not impact knowledge acquisition and unequivocal support for enhanced learning. The advantages of PBL were difficult to quantify; raising concerns around the most appropriate outcome measures for evaluating learning strategies. Most studies examined short-term knowledge acquisition measured by standardized exams. The extent which this outcome correlated with what makes a good physician was unclear. Small group teaching is not without problems; unproductive attitudes can develop during teaching which can be detrimental to the whole group, students may become hostile and unreasonable, and some of them may dominate the sessions giving a feeling of deprivation to the slow pacers. The availability of appropriate learning environment, study guides, sufficient number of trained staff, resources and equipment are prerequisites for ideal SGT. The implications of the study include the appropriate application of teaching strategies of SGT in all clinical disciplines of the undergraduate medical curriculum. This would help enhance the clinical acumen of students in accurate judgment of complex problems.

There are a few limitations to our study, which include insufficient number of staff, lack of enough space, and limited resources for teaching and learning.

In conclusion, SGT is an acceptable teaching strategy that helps the learners in acquisition of desired learning and educational outcomes. If scientifically organized and implemented, SGT can provide better results in a clinical setting.

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Case Reports

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