

Peer teaching, a didactic strategy for learning basic electrocardiography

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Abstract

Teaching electrocardiography is a very important area in undergraduate student training. A constant concern of professors is for physicians in training to acquire competence in reading and interpreting electrocardiograms (EKGs). This study describes and explores how the didactic strategy of peer teaching improves learning processes for second-year medical students. Evidence was found that peer teaching fosters significant learning of cardiac physiology and electrocardiograms, in particular, because it allows students to acquire abilities and skills in EKG reading, and improves the understanding and interpretation of this test. In addition, it promotes horizontal peer relationships which facilitate the development of autonomy, self-learning and teamwork. (*Acta Med Colomb* 2021; 46. DOI: <https://doi.org/10.36104/amc.2021.1971>).

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Introduction

The development of cognitive, attitudinal and bioethical abilities and skills is one of the training objectives of medical curricula. These are reflected in a correct understanding of patients' clinical pictures and their correlation with diagnostic tools (1).

Electrocardiograms (EKGs) are a highly valuable diagnostic tool for detecting cardiac diseases such as ischemic heart disease, which according to epidemiological studies, is the first cause of death in Colombia and worldwide (2). Finding the most appropriate didactic strategies for teaching electrocardiography, its interpretation and understanding of the results is a research aim in the educational setting. Some studies have evidenced a degree of variability in EKG learning and recommend using teaching strategies such as workshops, virtual courses, clinical case studies, seminars or clinical rounds, among others (3, 4).

Medical practice requires solving situations which affect patients' health and life, and therefore physicians in training must develop the necessary behaviors and abilities for making decisions, whether in the outpatient department, hospital wards or emergency room. In the case of EKGs, knowledge of cardiovascular physiology, signs and symptoms, and technical components like electrode placement and equipment calibration must be included, as well as the correct reading, analysis and interpretation of this test.

Pedagogical models and changes in teaching

The traditional pedagogical model has predominated in medical teaching, with a paternalistic basis and a passive student role, in which the teacher transmits knowledge vertically and hierarchically, aided by lectures. Consequently, tests are a resource for verifying learning, usually through written single-response multiple-choice questions, a method which stimulates repetitive, rote learning. In this process, although it is effective, the teacher often does not perceive if the student has acquired sufficient ability to understand and interpret diagnostic tests like EKGs (5).

The new pedagogical tendencies, on the other hand, give the student the leading role, favoring significant learning in medical curricula and healthcare fields. Many teachers gravitate empirically and intuitively towards these models, finding better results on written tests, which could translate into a greater appropriation of the concepts taught.

Significant learning is defined as the acquisition of new information which is related in a non-arbitrary (non-literal, non-rote) fashion to knowledge the student already has, establishing relationships which build a new knowledge with greater sense and meaning (6). Thus, in the first semesters of training, the student acquires a set of basic skills which, when linked to previously learned concepts through logical and experiential or emotional relationships, will provide the

basis for constructing new, more complex knowledge. For this study, this is what happens with electrocardiography practice sessions and peer tutoring. p

Peer learning: An active teaching strategy

Keith Topping defines peer learning as: “*People from similar social groups, who are not professional teachers, helping each other to learn and learning, themselves, through teaching*” (7). Meanwhile, *Ross and Cameron* propose that a fundamental characteristic of peer teaching is that the tutors are not experts in the field nor in teaching (8).

In peer learning, students feel like they are speaking to an equal, in a horizontal relationship which displaces the typical vertical or hierarchical relationships of classroom lectures. Using this strategy, the peer tutor becomes the guide or mediator, with whom the students can express their ideas without fear. The dynamic in this setting forces the students to think about their own learning processes, use all of their knowledge, and put this knowledge into play both to develop the practice as well as to discuss and debate with their fellow students, fostering the development of cognitive abilities such as identifying and correlating.

How to carry out peer teaching

This teaching-learning strategy was applied in a heart physiology course through peer tutor-guided practice sessions in taking, reading and identifying electrocardiographic tracings of fellow students and employees (normal patients). The course objectives stipulate, among others, taking electrocardiograms, calibrating the electrocardiograph machine, placing electrodes, identifying external variables which may affect the tracing, identifying normal morphology on electrocardiographic tracings and reading and interpreting electrocardiograms.

During the cardiorespiratory course in the third semester of basic training, specific topics regarding morphology, physiology and electrocardiography are addressed prior to peer tutoring. This tutoring takes place outside of the regular course schedule with a peer tutor who accompanies a group of six students as a volunteer, with no grading. Peer tutors are students in more advanced semesters who, in addition to having qualities such as attitude and aptitude for teaching, must have passed 40 to 90% of the undergraduate courses with a cumulative grade point average greater than 3.8. Novice tutors are trained by the course coordinator and advanced tutors (those with more than two semesters' experience in tutoring) who accompany them during the first sessions, explain the activity and train them on the methodology used in the activity.

Comments and discussions from the sessions

Tutor-led learning breaks the barriers inherent in the traditional pedagogical model, which usually intimidate and

block the student, and establishes a knowledge exchange relationship which stimulates a more active student participation, essential for specifying and clarifying the session's concepts, principles and objectives (9). In this regard, one of the interviewees stated:

They weren't teachers, but fellow students, and while they really knew the topic, I think they also had a vocation for teaching because they knew how to explain things to us. Because you can have a lot of knowledge but not know how to communicate it. (E01 – p1)

According to *Carolien Bulte et al.* (10), the cognitive and social congruence between peers fosters appropriate teaching in a calm and safe setting. The peer recognizes the strengths and weaknesses and emphasizes those specific topics for the student. With regard to this concept, one of the students described:

Electrocardiogram tutoring was given to us by some students from a more advanced semester, and it was very good because, since they are also students who studied the same thing relatively recently, they know the students' strengths and weaknesses, so they know how to reinforce the things that are harder for us [...] (E02 – p1)

Furthermore, *Bennet et al.* (11) consider that the social proximity between peers enables them to more easily express their difficulties and feel more relaxed, and having a peer assume the role of the teacher puts them at ease and makes it easier for them to ask questions, as expressed by one of the participants in the tutoring sessions:

I found the tutors' way of explaining things to me very understandable, especially the physiological explanation, because I hadn't understood it in class. I didn't understand about the vectors and all that, but they explained it in a very enjoyable way. (E03 – p1)

In the tutoring sessions, the students develop practical skills, such as electrode placement and how to position the patient (student simulation) for performing the EKG. They also identify the variables that can alter the diagnostic test, followed by analysis and interpretation of the results. These practice sessions provide a setting for significant learning, due to the effort made by the students to establish connections and interactions with what they are experiencing. This leads them to order their thoughts and acquire instrumental and operative logic which will help them familiarize themselves with future scenarios (12). One of the students related the following:

[...] I had the opportunity to learn how to place the electrodes and everything, which I thought was really interesting, and I was able to understand even more about what the electrocardiogram was, everything about it [...] (E04 – p1)

Conclusions

Peer learning is carried out with undergraduate students, and it fosters a horizontal relationship environment which creates a commitment to learning and greater participation.

The interaction between the peer tutor and the students facilitates comprehension of the concepts, and the identification and prompt correction of learned errors to keep them from becoming fixed in the students' memory. Both tutors and students learn through a self-designed experience, strengthening autonomy, self-learning skills and teamwork (13).

This didactic strategy, which fosters significant learning and the acquisition of skills and abilities in the first years of training, solidifies knowledge regarding reading and interpreting electrocardiograms and improves the students' performance on written tests (data not published in this study). In addition, working in small groups of students provides closer accompaniment in the teaching-learning process, supported by higher-level students with a particular interest in teaching.

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