

# A comparative study of the effectiveness of case-based learning and lecturing in enhancing nursing students' skills in diagnosing cardiac dysrhythmias

*Un estudio comparativo de la efectividad del aprendizaje basado en casos y las conferencias para mejorar las habilidades de los estudiantes de enfermería en el diagnóstico de las arritmias cardíacas*

Mostafa Bijani<sup>1\*</sup>, <http://orcid.org/0000-0002-8067-6160> Shekoofeh Hashemi<sup>2</sup>, <https://orcid.org/0000-0003-0324-3430> Khatereh Rostami<sup>3</sup>, <https://orcid.org/0000-0003-0433-2267>, Simin Soudagar<sup>4</sup>, <https://orcid.org/0000-0001-9132-1333>, Kobra Salami-Kohan<sup>5</sup>, <https://orcid.org/0000-0002-6536-1718> Afsaneh Ghasemi<sup>6</sup> <https://orcid.org/0000-0001-6643-5056>

<sup>1</sup>Assistant Professor, Department of Medical Surgical Nursing, Fasa University of Medical Sciences, Fasa, Iran,

<sup>2</sup>General Medical Candidate, School of Medicine, Fasa University of Medical Sciences, Fasa, Iran,

<sup>3</sup>Community Based Psychiatric Care Research Center, Shiraz University of Medical Sciences, Shiraz, Iran,

<sup>4</sup>Department of Nursing, Faculty of Nursing and Midwifery, Hormozgan University of Medical Sciences, Bandar Abbas, Iran,

<sup>5</sup>PhD student in nursing, Department of nursing, faculty of nursing and midwifery, Iran University of Medical Sciences, Tehran, Iran,

<sup>6</sup>Assistant Professor of Health Education, Department of public Health, Fasa University of Medical Sciences, Fasa, Iran,

\*Corresponding Author: Mostafa Bijani, Department of Medical Surgical Nursing, Fasa University of Medical Sciences, Fasa, Iran. [bizhani\\_mostafa@yahoo.com](mailto:bizhani_mostafa@yahoo.com)

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## Abstract

**Introduction:** As one of the modern methods of learning, case-based learning is playing an important part in medical education today. The present study aims to compare case-based learning and lecturing in terms of their effectiveness in enhancing nursing students' skills in diagnosing cardiac dysrhythmias.

**Method:** The present study is an interventional work conducted in a nursing school in the south-west of Iran in 2019. Data were collected using a researcher-made questionnaire. Also, clinical questions embedded in scenarios were asked to assess the students' skills in diagnosing cardiac dysrhythmia. The collected data were analyzed using SPSS v.22 and the statistical tests, independent T test and Chi Square test. The significance level value was considered as  $p < 0.05$

**Results:** 45 (75%) of the participants were female and 15 (25%) were male. The mean of their ages was  $23.45 \pm 1.6$ . The majority of the students 88.3% were found to rate case-based learning as better than lecturing and were highly satisfied with the former approach ( $8.66 \pm 1.33$  out of 10). Also, the results of the evaluations of the students' clinical skills in diagnosing cardiac dysrhythmias were as follows: a mean score of  $14 \pm 1.65$  for lecturing and  $17 \pm 1.38$  for case-based learning.

**Conclusion:** Compared to lecturing, case-based learning is a more effective method for educating nursing students about cardiac dysrhythmias and enhancing their diagnostic skills. Accordingly, it is recommended that this modern learning approach be employed in other lessons for nursing students and other medical majors.

**Keywords:** Cardiac Dysrhythmia, Comparative Studies, Nursing Student, Education.

## Resumen

**Introducción:** como uno de los métodos modernos de aprendizaje, el aprendizaje basado en casos juega un papel importante en la educación médica de hoy. El presente estudio tiene como objetivo comparar el aprendizaje basado en casos y las conferencias en términos de su efectividad para mejorar las habilidades de los estudiantes de enfermería en el diagnóstico de las arritmias cardíacas.

**Método:** el presente estudio es un trabajo de intervención realizado en una escuela de enfermería en el suroeste de Irán en 2019. Los datos se recopilaron mediante un cuestionario realizado por un investigador. Además, se hicieron preguntas clínicas integradas en escenarios para evaluar las habilidades de los estudiantes en el diagnóstico de la arritmia cardíaca. Los datos recopilados se analizaron utilizando SPSS v.22 y las pruebas estadísticas, la prueba T independiente y la prueba Chi Square. El valor del nivel de significación se consideró como  $p < 0.05$

**Resultados:** 45 (75%) de los participantes eran mujeres y 15 (25%) eran hombres. La media de sus edades fue de  $23.45 \pm 1.6$ . Se encontró que la mayoría de los estudiantes 88.3% calificaron el aprendizaje basado en casos como mejor que dar una clase y estaban muy satisfechos con el enfoque anterior ( $8.66 \pm 1.33$  de 10). Además, los resultados de las evaluaciones de las habilidades clínicas de los estudiantes en el diagnóstico de las arritmias cardíacas fueron los siguientes: una puntuación media de  $14 \pm 1.65$  para las conferencias y  $17 \pm 1.38$  para el aprendizaje basado en casos.

**Conclusión:** en comparación con las conferencias, el aprendizaje basado en casos es un método más efectivo para educar a los estudiantes de enfermería sobre

las arritmias cardíacas y mejorar sus habilidades de diagnóstico. En consecuencia, se recomienda que este enfoque de aprendizaje moderno se emplee en otras lecciones para estudiantes de enfermería y otras especialidades médicas.

**Palabras clave:** Disritmia cardíaca, estudios comparativos, estudiante de enfermería, educación.

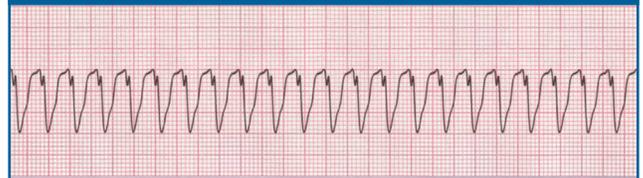
One of the major challenges in nursing schools worldwide is to enhance in students the ability of critical thinking and capability to provide holistic care in various clinical situations<sup>1</sup>. The main objective of nursing education is to help nursing students acquire the necessary knowledge and skills to provide the best care possible<sup>2</sup>. To meet new educational needs in nursing, nursing professors should be familiar with and employ various learning environments and new teaching methods<sup>3</sup>. Today, it is stressed that the conventional methods of teaching (e.g. lecturing) should be replaced with more modern approaches which encourage active learning in students<sup>4</sup>. Nursing is a practice-based profession and too much reliance on teacher-centered approaches can deteriorate the efficacy of education for nursing students<sup>5</sup>. Thus, recent theories in education emphasize students' active participation in their learning process. By applying non-traditional methods of teaching, nursing professors should help their students develop critical thinking and problem solving skills<sup>6</sup>. One of the modern methods of learning which encourages active learning in students and prepares them for clinical care is case-based learning. Initially introduced in Harvard University, this method is presently used in various academic fields, nursing included, as a teaching strategy and a tool for problem-solving and decision-making<sup>7</sup>. Case-based learning leads to the active participation of teachers and students in class discussions of the presented material<sup>8</sup>. In case-based learning, one particular case from a real situation is introduced as a scenario which requires problem solving and decision making<sup>9</sup>. First, the teacher presents the scenario as the students are listening carefully and taking notes; next, the students are allowed some time to contemplate the situation— in this approach, the teacher acts as an initiator, mediator, and facilitator of the learning process and guides the students to the objectives of the class<sup>10</sup>. Teaching lessons in special care, including diagnosis of cardiac dysrhythmias, requires students' active participation in learning: the conventional teaching methods, e.g. lecturing, cannot result in in-depth learning, hence the need for methods which encourage creative thinking and problem solving and, consequently, a better understanding of the material. Considering the benefits of modern methods of teaching, case-based learning included, the

present study was conducted to compare case-based learning and lecturing in terms of their effectiveness in developing nursing students' skills in diagnosing cardiac dysrhythmias in a medical school in the south-west of Iran in 2019.

The present study is an interventional work. The study subjects were the entire nursing students who had been accepted in 2016 and were doing the first semester in the 2019-2020 academic year. The study started with a complete enumeration; accordingly, 60 nursing students were considered for participation. The exclusion criteria were missing more than two sessions of the intervention and being unwilling to participate. Topics on cardiac dysrhythmias were introduced in 8 sessions: 4 sessions of lecturing and 4 sessions of case-based learning. In the lecturing section, the material was presented only theoretically. In the case-based learning sessions, the students were divided into groups of 6 and presented with a scenario related to cardiac dysrhythmias. Then the groups were asked to contemplate the scenario and discuss the cause, diagnosis, and treatment of the dysrhythmia and the measures which a nurse should take. Two examples of the presented clinical scenarios follow:

*Scenario 1:* A 55 year-old male with severe chest pain, perspiration, and dyspnea is admitted in the emergency ward. You, as a nurse, notice the following rhythm in the patient's cardiac monitoring. How would you interpret this strip? What is the treatment? (**Figure 1**)

**Figure 1.** A 55 year-old male with severe chest pain, perspiration, and dyspnea is admitted in the emergency ward. You, as a nurse



*Scenario 2:* As a CCU nurse, you notice that the patient on bed 4 has vomited and the patient declares that she is suffering from dizziness and blurred vision. You see the following rhythm in the patient's cardiac monitoring. How would you interpret this strip? What kind of intervention is required? (**Figure 2**)

**Figure 2.** As a CCU nurse, you notice that the patient on bed 4 has vomited and the patient declares that she is suffering from dizziness and blurred vision



**Scenario 3:** A 60-year-old woman arrives in the Emergency Department with a sudden onset of weakness, fatigue, and chest pain. She has a medical history of diabetes, hypertension. Her vital signs are respiration 16 breaths per minute, BP 150/90 mm Hg, and heart rate 75 bpm. Once the patient is attached to the ECG monitor, the rhythm ECG is seen. How would you interpret this strip? What is the treatment? (**Figure 3**)

**Figure 3.** A 60-year-old woman arrives in the Emergency Department with a sudden onset of weakness, fatigue, and chest pain. She has a medical history of diabetes, hypertension. Her vital signs are respiration 16 breaths per minute, BP 150/90 mm Hg, and heart rate 75 bpm. Once the patient is attached to the ECG monitor, the rhythm ECG is seen



After the implementation of education via the two methods of lecturing and case-based learning, the students were evaluated using a researcher-made questionnaire developed by Ghafourifard. (2013) Designed for comparing the characteristics of case-based learning and lecturing, the questionnaire has had its reliability and validity validated. The questionnaire consists of 20 items scored on a 5-point Likert scale (Strongly agree, Agree, Undecided, Strongly disagree, Disagree). At the end of the questionnaire, there is a question which is intended to measure the subject's level of satisfaction with the case-based learning approach on a scale of 0 to 10<sup>11</sup>. In the present study, the reliability and validity of the instrument were examined again: to verify the content validity

of the questionnaire, the researchers had the items examined by 20 nursing professors who confirmed that the instrument was valid. Reliability was measured using the test-retest method: the questionnaire was completed by 30 nursing professors; after two weeks, they completed the questionnaire again. The results validated the reliability of the instrument with a Cronbach's alpha of 0.89. In addition, the subjects' skills in diagnosing cardiac dysrhythmias were tested with 20 clinical scenario questions. Each correct answer was given a score of 1 and each incorrect answer was given a score of 0. The collected data were analyzed using SPSS software (version 22, IBM Corporation, Armonk, NY, USA) and descriptive statistical tests, independent T test and Chi Square test.

**Results**

45 (75%) of the participants were female and 15 (25%) were male. The mean of their ages was 23.45±1.6. From the students' point of view, the most significant feature of case-based learning, in comparison with lecturing, was its capacity to improve comprehension of materials (**Table 1**). The results showed that there was not a significant difference between the genders in terms of their views on the characteristics of case-based learning (P>0.05).

The majority of the students (88.3%) rated case-based learning as more effective than lecturing and were highly satisfied with the former learning approach (8.66 ±1.33 out of 10). Moreover, the results of the evaluations of the students' clinical skills in diagnosing cardiac dysrhythmias were as follows: a mean score of 14±1.65 for lecturing and 17±1.38 for case-based learning (**Table 2**).

**Table 1.** A comparison between the characteristics of case-based learning and lecturing as perceived by the nursing students (%)

Item	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1. The objectives are properly covered.	70	23.33	6.66	-	-
2. It is more interesting.	76.66	15	8.33	-	-
3. It enhances students' comprehension.	83.33	11.66	5	-	-
4. Students actively participate in the learning process.	73.33	18.33	8.33	-	-
5. It develops students' clinical decision making skills.	76.66	20	3.33	-	-
6. It motivates students.	80	10	10	-	-
7. It enhances students' skills in clinical reasoning.	75	15	10	-	--
8. It facilitates learning.	76.66	16.66	6.66	-	-
9. Information is neatly organized.	71.66	12.66	6.66	-	-
10. It is more practical.	73.33	18.33	8.33	-	-
11. Learned material is retained longer.	70	23.33	6.66	-	-
12. It is applicable to most nursing subjects.	63.33	20	16.66	-	-
13. It increases self-confidence in students.	83.33	16.66	-	-	-
14. It reduces monotony in the classroom.	88.33	6.66	5	-	-
15. It encourages in-depth thinking.	90	10	-	-	-
16. It allows for more room for asking and answering questions.	76.66	20	3.33	-	-
17. It is more effective in preparing students for the clinical environment.	83.33	16.66	-	-	-
18. It allows for more objective evaluation.	71.66	21.66	6.66	-	-
19. It is easier to sum up the subjects.	73.33	18.33	8.33	-	-
20. Overall, case-based learning is better than lecturing.	88.33	11.66	-	-	-

**Table 2. Mean score and standard deviation (SD) of comparison between the characteristics of case-based learning and lecturing as perceived by the nursing students each question**

Item	Mean	SD
1. The objectives are properly covered.	4.37	0.59
2. It is more interesting.	4.45	0.38
3. It enhances students' comprehension.	4.67	0.29
4. Students actively participate in the learning process.	4.39	0.47
5. It develops students' clinical decision making skills.	4.51	0.22
6. It motivates students.	4.67	0.17
7. It enhances students' skills in clinical reasoning.	4.43	0.47
8. It facilitates learning.	4.49	0.13
9. Information is neatly organized.	4.37	0.23
10. It is more practical.	4.57	0.19
11. Learned material is retained longer.	4.36	0.60
12. It is applicable to most nursing subjects.	4.25	0.87
13. It increases self-confidence in students.	4.76	0.15
14. It reduces monotony in the classroom.	4.86	0.07
15. It encourages in-depth thinking.	4.95	0.21
16. It allows for more room for asking and answering questions.	4.51	0.39
17. It is more effective in preparing students for the clinical environment	4.85	0.27
18. It allows for more objective evaluation.	4.25	0.68
19. It is easier to sum up the subjects.	4.39	0.47
20. Overall, case-based learning is better than lecturing.	4.89	0.09

a chance to expand their knowledge and have a realistic understanding of nursing by actively participating in their learning process. It also helps them retain facts and details<sup>18</sup>. According to the participants of the present study, case-based learning results in longer retention of learned facts in comparison to lecturing. It also increases motivation in students more than lecturing does. These findings are consistent with the results of the study of Li et al. (2019) which shows that case-based learning enables students to improve their learning by discussing and contemplating a complex situation. Also, as an active learning approach, case-based learning brings about better learning and longer retention of information<sup>19</sup>. Bi (2008) believes that the key to effective education is the learner's active participation in the learning process. In addition, students' active participation in their learning will make learning a more pleasant experience for them and increase their motivation, which in turn results in longer retention of materials<sup>20</sup>. In the present study, 65.7% of the nursing students reported that, compared to lecturing, case-based learning facilitated learning more and was more interesting. They claimed that case-based learning is a more practical approach to learning than lecturing in the field of nursing. Also, 87.5% of the participants found case-based learning superior to lecturing and were highly satisfied with the former educational approach.

Similarly, according to Mclean (2016), case-based learning is more effective than lecturing and develops students' critical thinking and decision making skills<sup>21</sup>. Likewise, Kantar (2018) reports that case-based learning considerably improves nursing students' creative and critical thinking skills and increases their expertise in clinical reasoning. This approach also enables students to use theories in practice and develop their clinical decision making skills. Moreover, it improves provision of feedback and teacher-student relationship and encourages group discussions in the classroom<sup>22</sup>. Nevertheless, Kaddoura (2011) reports that, despite abundant evidence of the benefits of case-based learning, in reality, nursing professors in nursing schools do not usually use this learning approach. After enumerating the advantages of case-based learning, Kaddoura recommends that nursing professors use this approach to develop critical thinking in nursing students and nurses. Case-based learning is simple, easy to use, and does not require special equipment for implementation. For effective learning to happen, students should discuss the material which is presented in the classroom and engage in such higher-order thinking activities as analyzing, synthesizing, and evaluating, which goals can be achieved via modern educational approaches, including case-based learning<sup>23</sup>. According to Scicluna (2012), it is essential that learners' professional capabilities be stressed in medical education. The educational programs for medical majors should rely on modern methods, including case-based learning, to develop critical thinking skills, among them clinical judgment, clinical reasoning, and clinical decision making<sup>24</sup>.

## Discussion

One of the problems with traditional methods of teaching, which are usually teacher-centered and do not give learners a chance to practice critical thinking (a necessity of learning), is that they do not prepare learners to apply their academic knowledge in practice when they should perform their professional duties<sup>12,13</sup>. The traditional methods do not meet the needs of educational systems: today, teachers are in search of methods which lead to active learning in students and develop their critical thinking and decision making skills. One such method is case-based learning which facilitates in-depth, active learning<sup>14,15</sup>.

In the present study, 87.5% of the participants strongly agreed that, compared to lecturing, the approach of case-based learning resulted in a better comprehension of the material, which finding is consistent with the results of other similar studies<sup>16,17</sup>. Sayyah (2017) report that case-based learning enhances in-depth learning in nursing students. This approach also offers students

The results of the present study show that, compared to lecturing, case-based learning is more effective in developing nursing students' skills in diagnosing cardiac dysrhythmias. Thus, it is recommended that this modern educational approach be employed for other nursing subjects as well. Nursing professors' and students' sufficient awareness of modern methods of evaluation, educating them in the procedures of modern educational approaches, and support on the part of the administrators of educational institutes can facilitate the implementation of modern learning approaches.

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