

Realistic simulation for teaching diagnostic reasoning in nursing consultations for patients with pulmonary tuberculosis

Simulação realística para ensino do raciocínio diagnóstico na consulta de enfermagem a pacientes com tuberculose pulmonar

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ABSTRACT

Objective: Evaluate the realistic simulation scenario for teaching diagnostic reasoning in nursing consultations for patients with pulmonary tuberculosis. **Method:** This research addresses the third stage of a methodological study, whose previous stages involved structuring and validating a realistic simulation scenario between 2020 and 2021. The scenario was applied and evaluated by Bachelor's degree Nursing students at the Universidade Federal de Sergipe in September 2023. Twenty-six students enrolled in the last academic period of the Bachelor's degree in Nursing were included. The scenario assessment was made during three stages of the Debriefing. **Results:** In the Briefing, they demonstrated engagement regarding the use of the active simulation methodology. In the Debriefing, absence of relevant information for diagnostic was identified. Of the 18 selected diagnoses, 14 were listed, as well as suggestions for improving the scenario, including the time available for the activity. The quality of the scenario was analyzed by design scale. **Conclusion:** The realistic simulation scenario was evaluated by students as satisfactory in relation to the parameters. The presented suggestions aimed to improve the clarity and structuring of the simulation and were adapted. The need for content adjustments is relevant between the simulated case and the nursing diagnoses.

KEYWORDS: Nursing Education. Simulation Training. Tuberculosis, Pulmonary.

RESUMO

Objetivo: Avaliar o cenário de simulação realística para o ensino do raciocínio diagnóstico na consulta de enfermagem para pacientes com tuberculose pulmonar. **Método:** A pesquisa aborda a terceira etapa de um estudo metodológico, cujas etapas anteriores envolveram estruturação e validação de um cenário de simulação realística entre 2020 e 2021. O cenário foi aplicado e avaliado por estudantes de Enfermagem Bacharelado da Universidade Federal de Sergipe em setembro de 2023. Foram incluídos 26 estudantes matriculados no último período letivo do curso de Bacharelado em Enfermagem. A avaliação do cenário foi realizada durante três etapas do *Debriefing*. **Resultados:** No *Briefing*, eles demonstraram engajamento quanto ao uso da metodologia ativa por simulação. No *Debriefing*, foi identificada a ausência de informações relevantes para o diagnóstico. Foram elencados 14 dos 18 diagnósticos selecionados e sugestões de melhoria do cenário, incluindo o quesito tempo disponibilizado para atividade. A qualidade do cenário foi analisada a partir da escala de *design*. **Conclusão:** O cenário de simulação realística foi avaliado pelos estudantes como satisfatório em relação aos parâmetros. As sugestões apresentadas visaram a aprimorar a clareza e a estruturação da simulação e foram adaptadas. A necessidade de ajustes conteudistas revela-se pertinente entre o caso simulado e os diagnósticos de enfermagem.

PALAVRAS-CHAVE: Educação em Enfermagem. Treinamento por Simulação. Tuberculose Pulmonar.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* that can be prevented, treated, and cured. Because it is transmitted via the respiratory route and its pulmonary form is the most common, it is characterized as a public health problem with a high potential for lethality¹. In this scenario, the World Health Organization (WHO) recommends prevention, diagnosis, and early treatment of TB, and through Nursing Consultation within the scope of Primary Health Care (PHC), the nurse plays a crucial role in promoting individualized and effective treatment for each patient².

In terms of healthcare, nurses are on the front line in the fight for early diagnosis of TB, as they must identify symptoms, order tests, report confirmed cases, prescribe medications, and ensure the effectiveness of this treatment with the entire healthcare team. Therefore, clinical reasoning and diagnosis are crucial in all nursing assessments. In this sense, the evolution in the teaching-learning concept reflects a conception in which professional health training requires a gradual inclusion of digital and teaching technologies, since practice increasingly demands autonomy, critical thinking, diagnostic reasoning, and precision³.

In the teaching-learning process, different complementary strategies can be used to improve conduct with a scientific basis and that link theory to practice. In the context of active and interactive methodologies, Simulation-Based Teaching (SBT) is of great relevance in the development of competences, especially in nursing⁴. This critical-reflective link occurs due to the use of scenarios based on real life, aiming at the training of techniques, the awakening of protagonism, professional multidisciplinary and the correction of possible errors within an ethical and safe⁵ environment.

Based on the EBS (Emergency Clinical Simulation), a clinical scenario is recreated, aiming to foster student autonomy and improved clinical conduct in their future professional lives. This simulated environment allows students to practice repeatedly without causing harm, improving their technical skills and diagnostic reasoning. Students can also refine other non-technical skills such as communication, case awareness, teamwork, decision-making, empathy, and emotional management when interacting with patients⁶.

There are three stages that make up a Realistic Simulation (RS): briefing, simulation, and debriefing. Each stage has a different objective; therefore, in constructing the simulation, the clinical case must be designed addressing all the necessary parameters. Thus, it is necessary that it be structured with clearly and cohesively pre-established objectives, working on all the student's competences, including self-confidence. In this context, validation of the clinical case with expert judges in the field is relevant to ensure the reliability of the RS and the achievement of the expected⁷ results.

With a focus on EBS, it is justified to test and evaluate the SR scenario previously validated at the master's level during the period from 2020 to 20218, aiming to contribute to diagnostic clinical reasoning in nursing consultations for patients with TB, in order to allow students to experience complex situations in a safe and controlled manner, in which they can analyze different clinical situations, consider possible diagnostic hypotheses, and learn from the results obtained.

Thus, the following question arose: how do nursing students evaluate the applicability of the realistic simulation scenario developed and validated for teaching diagnostic reasoning in nursing consultations with patients with pulmonary TB?

To answer this inquiry, the following objective was established: to evaluate the realistic simulation scenario for nursing diagnostic reasoning (ND) in patients with pulmonary TB.

METHODOLOGY

This research describes the third stage of a methodological study in which the first two stages (structuring and validation of the realistic simulation scenario) were developed at the master's level between 2020 and 20218, as published in the article "Validation of a realistic simulation scenario for teaching diagnostic reasoning in nursing consultations with patients with pulmonary tuberculosis". In this third stage, the validated realistic simulation scenario was implemented and evaluated by undergraduate Nursing students from the Federal University of Sergipe in September 2023. Twenty-six of the 32 students enrolled in the final semester of the course participated in the research, representing a participation rate of 76.3%. The selection of this sample was based on the advancement in the course curriculum, providing greater experience and contact with patients compared to other undergraduate students; this was the sole inclusion criterion for this study.

The scenario was set up in a classroom in the Nursing Department on the Health Campus in Aracaju, simulating a home visit, with two chairs arranged to represent the living room. In addition, the patient wore her own clothes and a surgical mask, while the nurse wore her own clothes, a lab coat, a PFF2 mask, and protective eyewear, both represented by trained and rehearsed actresses.

The application of the SR scenario followed three stages: Briefing, simulation of the validated case, and Debriefing. In the first stage, the facilitators introduced themselves, thanked everyone for their presence, and informed them of the research objectives. Participants signed the Informed Consent Form and were reminded of the ethical behaviors and conduct expected of everyone involved in the simulated activity. The simulation environment was also detailed, including equipment, assessment methods, and the Simulation Design Scale⁹.

Furthermore, the rules regarding the schedule for each stage and the guidelines for creating nursing diagnoses (ND) according to NANDA-I (2021-2023) were explained. During the initial 10 minutes of the briefing, learning expectations and experiences on the topic were discussed.

Next, the validated case simulation was carried out, with the participation of two actresses who underwent prior rehearsals and preparations in order to meet the established criteria for the case. The actresses meticulously followed the scene's script, embodying gestures, tone of voice, and specific symptoms of pulmonary TB. This phase lasted 15 minutes, and during this time the facilitators filled out a checklist, which was designed to monitor the execution of the scene, redirect the actors towards the correct development of the validated realistic simulation, allowing for immediate interventions if the proposed objectives were not being met.

The final phase of the simulation process consisted of Debriefing, subdivided into three stages, based on the guidance guide "Three Stages of Holistic Debriefing"¹⁰, with a proposed total time of 40 minutes. The first stage, called Focused Debriefing, lasted 20 minutes, divided into two moments: immediate self-reflection by the student (5 minutes) and the identification of nursing diagnoses (15 minutes). In the immediate self-reflection, participants were encouraged to reflect on their cognitive learning and clinical judgment resulting from the simulation.

Next, participants were instructed to identify the nursing diagnoses related to the case worked on in the simulation. 15 minutes were allocated to each participant for this activity, using NANDA-I (2021-2023) as a reference¹¹. At this point, it was explained that there were 18 previously validated nursing diagnoses for the case, contained in the expected outcomes section of the scenario script, but that others could also be considered.

The second stage, called Formative Debriefing, was directed towards reflection and group discussion, and participants were encouraged to share the identified DEs and present the clinical reasoning used. The third and final stage, Summative Debriefing, was designed to produce a final summary of the learning derived from the simulation and to ask participants a series of questions, including: "How do you feel about the simulation experience?", "What did you learn from participating in the simulation experience?".

The learning obtained was also assessed through individual completion of the Simulation Design Scale⁹, which evaluates the factors (1) objectives and information, (2) support/facilitation, (3) problem-solving, (4) feedback/reflection, and (5) realism, using a Likert-type scale score to assess Strongly Agree, Agree, Disagree, and Strongly Disagree.

In factor 1, the following items were evaluated: (1) sufficient information was provided at the beginning of the simulation to provide guidance and encouragement; (2) I clearly understood the purpose and objectives of the simulation; (3) the simulation provided sufficient information, in a clear way, for me to solve the problem situation; (4) I was provided with sufficient information

during the simulation; (5) the clues were adequate and directed to promote my understanding.

Regarding factor 2, the following were evaluated: (6) support was offered in a timely manner; (7) my need for help was recognized; (8) I felt supported by the teacher/facilitator during the simulation; (9) I was supported in the learning process.

Regarding factor 3, the following were evaluated: (10) autonomous problem-solving was facilitated; (11) I was encouraged to explore all the possibilities of the simulation; (12) the simulation was designed for my specific level of knowledge and skills; (13) the simulation allowed me the opportunity to prioritize nursing assessments; (14) the simulation provided me with an opportunity to establish goals for my patient's care.

The items evaluated in factor 5 were: (15) the feedback provided was constructive; (16) the feedback was provided in a timely manner; (17) the simulation allowed me to analyze my own behavior and actions; and (18) after the simulation there was an opportunity to obtain guidance/feedback from the teacher/facilitator in order to build knowledge to another level. Finally, factor 5 assessed (19) whether the scenario resembled a real-life situation and (20) whether real-life factors, situations and variables were incorporated into the simulation scenario.

The data collected regarding the participants' suggestions were analyzed, following the principles of the qualitative approach, using Bardin's content analysis technique¹². Initially, the data were organized and prepared for analysis, according to the recommended steps involving pre-analysis, material exploration, coding, and categorization. For the evaluation of the data from the Simulation Design Scale, descriptive statistical analysis was performed, represented by absolute and relative numbers.

The ethical procedures set forth by Resolution No. 466/2012 of the National Health Council of the Ministry of Health were rigorously followed. The research project was approved by the Research Ethics Committee on Human Beings of the Federal University of Sergipe, Brazil – UFS (Opinion n.º 4.962.789; CAAE n.º 31401820.8.0000.5546).

RESULTS

During the Briefing, when questioned about their learning expectations and experiences related to the topic, most students expressed that, during their undergraduate studies, they had few opportunities for learning through realistic simulations. Based on this observation, they demonstrated enthusiasm and engagement regarding the activity, considering it an innovative and dynamic teaching methodology. Regarding their expectations, they reported the desire for the simulation to be as close to reality as possible, allowing them to capture all relevant information through the scene.

Throughout the case simulation, through the use of a script and a verification checklist

containing the expected actions of the actors and the clues provided, the facilitators were able to observe that the two actresses fully followed the script throughout the scene and for obtaining the diagnoses, including the initial approach to the patient, anamnesis, physical examination, signs, symptoms, TB treatment, and socioeconomic issues.

During the Focused Debriefing, participants were invited to reflect on their experience in RS, answering specific questions about their feelings and learning. The students' reports as observers of the RS indicated feelings of encouragement and a desire for active participation, highlighting greater development of clinical reasoning. Regarding the appreciation of realistic simulation, several aspects were mentioned as positive, including the authenticity of the patient's presentation, expressed through speech, gestures, signs, and symptoms consistent with a case of active pulmonary tuberculosis, as well as the professional attitude of the nurse involved in the scenario.

However, when discussing the negative aspects of the simulation, participants mentioned the absence of crucial information that would be relevant for the development of diagnostic reasoning. They emphasized that this was the first time the class had participated in a simulation and expressed the belief that greater exposure to RS would contribute to improving clinical management. In summary, they reiterated the importance of realistic simulation in undergraduate education, emphasizing how this experience facilitates the management of real patients and prepares students for the challenges of professional practice.

Within the allotted time, still in this phase for listing the nursing diagnoses, of the 18 diagnoses analyzed, considering the diagnostic accuracy assessment already validated by the expert judges, the students identified 14 diagnoses, such as ineffective breathing pattern; impaired spontaneous ventilation; impaired gas exchange; imbalanced nutrition: less than body requirements; decreased activity tolerance; fatigue; acute pain; anxiety; insomnia; risky health behavior; ineffective health maintenance behaviors; risk of suicidal behavior; chronic sadness; and spiritual distress.

In addition, six more diagnoses were listed, such as: ineffective self-management of health; sedentary lifestyle; risk of impaired liver function; hopelessness; situational low self-esteem; impaired social interaction. At the end of the designated period, the participants expressed concern about the limited and insufficient time to identify all possible diagnoses, which was reassessed for reformulation of the case.

During the comparison of the DEs listed by the participants with the DEs validated by the judges, in the Formative Debriefing, the participants made several suggestions to improve the case and the information contained therein. These suggestions were organized and submitted to analysis for adaptation to the case, as presented in Table 1.

Table 1 – Suggestions listed by the students during the Formative Debriefing
(Continues)

Suggestions	Accepted	
	Yes	No
What is the current situation regarding viral infections? And how is the vaccination card?	X	
Is the patient still smoking?	X	
Was the patient referred to the smoking cessation group?	X	
What type of environment does the patient live in? Is it a humid, enclosed, ventilated, or unventilated environment?	X	
Was the patient informed about the transmission time?	X	
What is the patient's level of contact with the other residents of the village? Have tests been carried out on these people? Is there anyone showing symptoms?	X	
Is the patient using the prescribed medication properly? The nurse should inquire about its use to ensure correct administration.	X	
It is essential that there be close supervision of this treatment. Who is entrusted with this responsibility?	X	
Monitor the patient's blood glucose.	X	
Regarding sexually transmitted infections, is the patient still sexually active? Has he been properly advised about this issue?	X	
Is the patient's capillary refill time decreased?	X	
If the person lives alone and is debilitated, who is responsible for preparing their meals? And what foods are they consuming?	X	
Is the patient using anxiolytics or not? Have they had consultations with a psychiatrist or undergone therapy previously? It is essential to assess the risk of suicide.	X	
It is necessary to obtain additional information about the patient's sleep pattern.	X	
During the consultation, the nurse cannot ensure that everything will go smoothly; however, she can guarantee that the patient will receive the most effective support.	X	
The time between the consultation at the UBS and the home visit was not evident.	X	
It would be appropriate for the nurse to establish contact with the neighbor.	X	
What is the patient's income?	X	
Why is the blood pressure elevated? Additional tests should be requested.		X

Suggestions	(Conclusion)	
	Accepted	
	Yes	No
Was the patient weighed during the home visit consultation?		X
How long does the patient experience respiratory distress and coughing?		X
What type of sputum is the patient presenting?		X
Explain the side effects of the medications used to treat tuberculosis.		X

Source: Prepared by the authors using data from the study (2024)

In the third and final stage, called Summative Debriefing, participants reaffirmed the confidence gained in managing patients with active TB. They recognized the fundamental importance of simulation in the evaluation process and in considering details that might not have been prioritized in conventional clinical practice. Among these details, socioeconomic and psychological issues stand out, which were addressed in a professional and humane manner during the simulation. This approach allowed for a more comprehensive and sensitive analysis, promoting a deeper and more holistic understanding of patients' needs.

The results of the evaluation using the Simulation Design Scale are described in detail in Table 1. Although the Likert scale was used to evaluate four distinct levels, it is important to highlight that none of the items were classified as "Strongly Disagree".

Table 1 – Evaluation of the Realistic Simulation Scenario Design

(Continues)

Factors	Items	Strongly agree		Partially agree		Partially disagree	
		Total	%	Total	%	Total	%
1- Objectives and information	1	8	30,77	17	65,38	1	3,85
	2	21	80,77	5	19,23	-	-
	3	4	15,38	19	73,08	3	11,54
	4	5	19,24	17	65,38	4	15,38
	5	12	46,15	12	46,15	2	7,7
2- Support	6	20	76,92	5	19,23	1	3,85
	7	21	80,77	4	15,38	1	3,85
	8	24	92,3	2	7,7	-	-
	9	23	88,46	3	11,54	-	-

(Conclusion)

Factors	Items	Strongly agree		Partially agree		Partially disagree	
		Total	%	Total	%	Total	%
3- Problem solving	10	20	76,92	6	23,08	-	-
	11	21	80,77	4	15,38	1	3,85
	12	25	96,15	1	3,85	-	-
	13	21	80,77	5	19,23	-	-
	14	18	69,23	8	30,77	-	-
4- Feedback / resolutions	15	23	88,46	3	11,54	-	-
	16	20	76,92	5	19,23	1	3,85
	17	24	92,3	2	7,7	-	-
	18	19	73,08	7	26,92	-	-
5- Realism	19	12	46,15	10	38,47	4	15,38
	20	15	57,7	7	26,92	4	15,38

Source: Prepared by the authors using data from the study (2024)

After analyzing the data, it was found that most items were rated more than 50% with the statement "strongly agree," which highlights the simulation design. In the specific context of objectives and information, item (1) at the beginning of the simulation sufficient information was provided to provide guidance and encouragement, (3) the simulation provided sufficient information, clearly, for me to solve the problem situation, and (4) I was provided sufficient information during the simulation, received a significant percentage of "partially agree" ratings and a small percentage of "partially disagree." However, considering that these items address the provision of information during the briefing and the simulation, it is expected that, with the implementation of the suggestions presented in Table 1 and the effectiveness of the information provided during the first stage, the necessary demands will be met satisfactorily. Based on the results obtained from the application of the simulation, the reflections, the Design scale, and the suggestions in Table 1, the scenario was reformulated in a clearer and more structured way, as shown in Table 2.

Table 2 - Realistic simulation scenario

(Continues)

REALISTIC SIMULATION SCENARIO FOR NURSING DIAGNOSTIC REASONING FOR PATIENTS WITH PULMONARY TUBERCULOSIS
Expected results: Identification of the main possible DEs related to the case.
NANDA-I 2021-2023: Ineffective breathing pattern, impaired spontaneous ventilation, impaired gas exchange, hyperthermia, imbalanced nutrition: less than body requirements, decreased activity tolerance, fatigue, acute pain, chronic pain, anxiety, insomnia, personal identity disorder, deficient knowledge, risk-prone health behavior, ineffective health maintenance behaviors, risk of suicidal behavior, chronic sadness, and spiritual distress.
Duration: Briefing: 10 to 15 minutes, simulated case: 10 to 15 minutes, Debriefing: 40 to 60 minutes
Required Materials: for the living room - at least chairs and/or a sofa; for the bedroom - at least a bed; medical records, stethoscope, sphygmomanometer, portable pulse oximeter, thermometer, digital scale, measuring tape, surgical mask, N95 or PFF2 mask, protective glasses, personal clothing, lab coat, and cell phone.
Participants/Actors: Patient, nurse, and target audience of the simulation (facilitator/teacher and students/nurses).
Setting and characterization of participants: The scene will take place in a home environment; if it's a living room, there will be chairs or a sofa; if it's a bedroom, there will be a bed. The patient will be dressed in their own clothes and wearing a surgical mask. The nursing professional will be dressed in their own clothes and lab coat, wearing an N95 or PFF2 mask and protective eyewear.
Simulated case (read to participants by the facilitator before the scene begins): Pedro Guilherme (PG), 26 years old. Denies chronic illnesses. He has been an active smoker since age 17, 3 cigarettes/day; reports excessive weekly alcohol consumption, has a sedentary lifestyle and no prior medical follow-up. Denies drug and food allergies. Marital status: single, no children, lives alone in a rented townhouse. Completed elementary school (eighth grade). Does not have a fixed job and works as a construction laborer, with a monthly income varying between R\$ 600.00 and R\$ 800.00. Two weeks ago, he sought care at the Pedrinhas Basic Health Unit (UBS) for medication to control the intermittent fever and cough he had been experiencing for more than 15 days, and was invited for a medical consultation and evaluation. Following a consultation, clinical investigation, and examinations, the patient was diagnosed with pulmonary tuberculosis (TB) through a positive sputum smear microscopy (AFB+) bacteriological examination, a positive rapid molecular test for TB (TRM-TB), and radiological imaging compatible with the infection, showing bilateral infiltrates and cavities. Tests for the most prevalent viruses were performed, all of which were negative. Counseling and a rapid HIV test were also conducted, which also yielded non-reactive results. Additional laboratory tests were requested, including cardiac, hepatic, and renal function tests, and fasting blood glucose, all within the normal range. Maria Eduarda (ME), a nurse at the primary health care unit, conducted a consultation to welcome the patient and initiate treatment, emphasizing its importance, the correct method of use and adverse reactions, as well as the mode of transmission of the disease and the precautionary measures to be taken. The intensive phase of tuberculosis treatment was initiated, and based on his initial weight of 56 kg, he was prescribed 4 RHZE tablets (Rifampicin, Isoniazid, Pyrazinamide, and Ethambutol). During the consultation, Pedro was asked for his vaccination card, which he reported losing and stating he had only been vaccinated in childhood. He was referred to the vaccination room to update his vaccination status. Due to his social vulnerability, alcohol abuse, and fragile social/family network, he was referred for evaluation by the psychology team, and social services were contacted. Because he lives in a small village and has direct contact with other residents, a search is being conducted to evaluate and test this population. In the week that treatment began, Maria Eduarda was contacted by Carla, the community health worker in her area responsible for supervising Directly Observed Treatment (DOT) for tuberculosis at home, to assess PG. She reported that while supervising the administration of the fifth daily dose, she noticed that the patient was not well. In this way, the nurse travels that same morning to conduct the home visit.

(Continued)

REALISTIC SIMULATION SCENARIO FOR NURSING DIAGNOSTIC REASONING FOR PATIENTS WITH PULMONARY TUBERCULOSIS

Scene script (performed by the actors):

The scene begins with the nurse arriving at the home fully equipped with an N95 or PFF2 mask and protective goggles. The house in the village has only two rooms, a combined living room and kitchen, and a bedroom with a small bathroom. It is a hot, dark, and poorly ventilated space, containing only the front door and a small window in the bathroom. ME approaches the patient PG in an empathetic and cordial way:

ME- *"Good morning, Pedro! I came to visit you today because I heard you haven't been feeling well. How are you?"*

Pedro is alone at home, wearing a surgical mask as instructed and provided by the health center. He is quite anxious and has a fearful expression, alternating with expressions of pain. He was visibly dyspneic, with episodes of non-expectorative cough. He greets the nurse apathetically:

PG- *"Good morning. I'm going... I can't wait for all this to be over! [PAUSE...] Maria, you can call me 'you'."*

ME - In a soft voice, she replies: *"- Pedro, you are on the fifth day of treatment. I observed on the medication supervision sheet that you have been using it correctly during these five days under Carla's supervision. [PAUSE...]"*. ME continues: *"Last week I explained to you that the treatment normally lasts 6 months, with the first two being an intensive phase, in which the medications must be taken daily in a single dose, preferably on an empty stomach, without interrupting the treatment. In general, after two to three weeks of treatment, there is a decrease in the ability to transmit the virus and you will undergo new tests."*

At this moment Pedro nods positively and the nurse continues: *"- Therefore, let's be optimistic that you will soon resume your life and follow your routine. I remind you again of the importance of following the treatment correctly."* She pauses for a few seconds and continues: *"Are you alone?"*

PG- *"Maria, yes, I am alone. I live alone. As I told you, I live alone in this small rented room and I only have my mother who lives in the countryside and can't travel! I talk to her once a day when your neighbor lends me her cell phone, because unfortunately we can't afford to buy one for her."* [Speaks with a sad look]. *"That's why I need to get better! I need to go back to work to support my home and help my mother!"* [Speaks with a tone of anxiety and sadness].

The nurse noticed some respiratory discomfort during Pedro's speech, interspersed with episodes of irritating dry cough.

ME- *"I imagine how difficult this must be for you! I'm sure your mother is very worried about your health. Could you give me the phone number of that neighbor of hers so I can contact your mother, okay?"*

Pedro responds again with affirmative signals:

PG- *"Of course, of course. With great pleasure, she will be happy and less worried."*

ME- *"Pedro, do you have contact with your closest neighbors? If so, we will need to talk to them about transmission, symptoms, and test those people."*

PG - *"I'm in contact with about 3 neighbors who have always liked me. Twice a week they come here to ask how I am and even help with cleaning the house."*

ME- *"Okay, we will actively search for these people. Also, have you been having sexual relations with anyone?"*

(Continued)

REALISTIC SIMULATION SCENARIO FOR NURSING DIAGNOSTIC REASONING FOR PATIENTS WITH PULMONARY TUBERCULOSIS

PG- *"No, I don't. I'm just tired, I don't feel like dating."*

ME- *"I understand, it's also important not to have sexual relations during this phase of treatment because of the risk of tuberculosis transmission from respiratory fluids, in addition to the increased risk of tuberculosis/HIV co-infection."*

The nurse pauses briefly and, changing her tone of voice, continues: "Pedro, how long have you been having this difficulty breathing? When did all this fatigue start?"

PG- *"Maria, since yesterday afternoon I haven't been feeling very well! I've been very tired, especially in the late afternoon, with difficulty breathing and increased chest pain. I've been feeling this pain for more than three months, but it has gotten much worse in the last few days. My body also started aching last week. The doctor explained that it could be due to the disease."*

ME- *"- And are you still smoking?"*

Pedro lowers his head and, looking ashamed, replies: "I managed to cut down quite a bit, I'm smoking less than a pack a day, but I still haven't managed to quit! Nurse, I know I need to stop, you've already told me that!"

ME- *"- Besides the tiredness and pain, are you feeling anything else?"*

PG - *"Last night I felt hotter and sweated a lot, plus this dry cough got worse. I don't have enough strength to do housework or take care of myself. I spend all day in bed!"*

ME- *"Pedro, have you been eating well this past week? How is your appetite? How have your meals been? Are you able to prepare your own food or do you have any help?"*

PG- *"Today I couldn't eat almost anything, just a piece of bread and coffee. Actually, I haven't been eating very well for a while and I've noticed that I'm worse in the last week. In the cupboard I have bread, crackers, packaged juice, salami, canned sardines and flour. I don't eat because I don't feel hungry, I can barely drink liquids, even though I already know that I should try to start eating again... In three months I've already lost more than 17 kilos. The neighbors who come here every week even bring ready-made meals for me, but I have no appetite."*

After noticing the compromised diet, with poor nutrition and a diet based on processed foods, the nurse seeks to understand the patient's sleep and rest patterns:

ME- *"- And are you able to sleep?"* She asks spontaneously.

PG: *"I haven't been sleeping well since I started having fever and cough these past weeks — I wake up several times during the night and take a long time to fall asleep. And last night I couldn't even take a nap!" [Speaks with an air of fatigue].*

The nurse nods with an expression of empathy and concern, and assesses adverse reactions to the drugs used in the treatment, previously addressed at the start of treatment:

ME: *"Since starting the treatment, have you presented any of these symptoms: nausea, vomiting, stomach pain, red-colored urine, itching, body rashes, headaches, or anything else?"* **PG:** With a vacant look, he replies: *"- No, I haven't had any of that! As you explained to me at the other consultation, I will let you know if I feel any of those things!"*

Pedro, with a sad look, continues:

(Continued)

REALISTIC SIMULATION SCENARIO FOR NURSING DIAGNOSTIC REASONING FOR PATIENTS WITH PULMONARY TUBERCULOSIS

PG: *"Maria, my problem is something else! [PAUSE]. My mind hurts, I feel empty, I have no courage for anything, I feel no happiness in anything. I haven't been able to sleep at night — I see the days break! I think all the time about my situation, my health, how much I made mistakes and didn't give importance to my life. I am very worried about all of this, scared."*

The nurse turns all her attention to Pedro's words and nods her head understandingly, giving him the security to continue speaking.

PG: *With a trembling voice broken by dyspnea: "Sometimes, the desire to disappear, to give up on everything and just rest, comes to my mind. I have already thought several times about how I could do this..."*

The nurse shows an expression of shock but tries not to show Pedro how worried she is at that moment.

ME: *"Pedro, we are here to help you! Don't think this way — we are caring for you so that you get better. Despite the complexity of your condition, tuberculosis is a curable disease! I also understand that you have a difficult life." She pauses and continues: "Were you able to see the psychologist I referred you to last week?"*

PG: *Pedro nods affirmatively and says: "Yes, the other day I spoke with the psychologist; I told her that most of the time I blame myself for what happened. Besides never taking care of myself, I also didn't know anything about the disease. But my mind isn't helping!" [Speaks irritably, alternating with fatigue]. Pedro pauses, takes a deep breath, and continues: "I will try to improve and change! [Speaks hopefully]. She told me I need to be evaluated by a psychiatrist to start treatment with medications that will help me, since I'm not taking anything for my mind! Actually, I have never taken medications for this!"*

ME: *"Look, you told me last week that you are Catholic! So hand all your problems over and have faith to face them! You need to be strong and brave to fight! You need to help yourself — the treatment will only work if you do your part!"*

Pedro shows a slight smile on his face when he sees how moved Maria was by his words.

ME: *Continues with an assertive tone: "I have already contacted social services to also help you! As we discussed, in addition to tuberculosis, there are other points to be resolved. The social worker will contact you soon! Furthermore, I have already referred you to the smokers' support group; after the first two weeks of treatment, we will evaluate your participation in the group's activities so that you can receive the treatment as desired."*

PAUSE OF A FEW SECONDS.

ME: *"Pedro, I need to perform your physical examination now — do you allow me?"*

Pedro nods affirmatively. The nurse, in a careful, agile, and meticulous manner, performs a head-to-toe physical examination and checks vital signs. The findings are spoken aloud by the nurse as she performs the physical examination.

The general state was found to be compromised: weight loss, hypochromic ocular mucosa, and poor oral cavity hygiene. Cardiac auscultation showed normal bulbous heart sounds in two beats without murmurs. On respiratory auscultation, decreased vesicular murmurs and wheezes in the bases and middle third bilaterally were identifiable, with compromised expectoration, in addition to pain on palpation of the rib cage (Pedro shows a pained expression at the moment of chest palpation), and use of the abdominal musculature during the respiratory cycle. Abdominal region without abnormalities, hydroaerial sounds present, no pain on palpation. Extremities free of edema, cold skin, acyanotic, slow capillary refill, CRT > 3 seconds. Vital signs: BP — 180/110 mmHg, HR — 128 bpm, RR — 27 breaths/min, SpO2 — 90%, axillary temp. — 38.2°C, blood glucose — 78 mg/dL. Height — 1.71 m, body weight — 53 kg, BMI — 18.13 kg/m².

(Conclusion)

REALISTIC SIMULATION SCENARIO FOR NURSING DIAGNOSTIC REASONING FOR PATIENTS WITH PULMONARY TUBERCULOSIS

With an expression of concern, the nurse speaks:

ME: *"- Pedro, your general condition is compromised, your vital signs are altered, and at this moment you need greater support!"*

PAUSE AND PROLONGED BREATHING FROM PEDRO.

ME: With an emphatic voice: *"It is necessary to refer you to an emergency care facility! You cannot stay here in this state!"*

PG: With an apprehensive and fearful expression, replies: *"Maria, I had a feeling this was going to happen to me! If it is for my own good, I will go! After all, I have already made many mistakes..."* **ME:** Touching Pedro's hands, she says: *"- You will be assisted and will receive the care you need to get better!"*

Maria quickly contacts the referral transport service by cell phone to refer Pedro. The scene ends with the facilitator narrating to the audience that Pedro was transferred to an emergency care facility.

Source: Prepared by the authors (adapted from Santos⁸ following an evaluation by the study participants – 2024)

DISCUSSION

The criteria for designing scenarios must be aligned with the objectives outlined for each simulated practice, aiming at the comprehensive development of the students' competencies, with the goal of refining their professional training. In this context, it is essential to perform a continuous evaluation of the realistic simulation, with the purpose of optimizing its effectiveness and ensuring its consistency with the simulated reality¹³. Therefore, the suggestions made by the participants that were marked with "yes" correspond to pertinent discussions incorporated into the simulated case; those marked with "no" indicate information that was already part of the scenario. Thus, the importance of having this information spoken aloud during the simulated case in a paced manner is highlighted, in order to ensure greater accuracy and attention on the part of the students.

Nursing assessment, which encompasses anamnesis and physical examination, plays an essential role in clinical practice, providing a solid foundation for assertive decision-making regarding nursing diagnoses and the elaboration of appropriate care plans. Anamnesis allows for a thorough investigation of symptoms, while the physical examination contributes to objective assessment, allowing the detection of relevant clinical signs and symptoms and evaluation of physiological function¹⁴. In this sense, this stage was adapted in the simulated scenario to enhance the patient's diagnostic and prognostic reasoning.

As for the suggestion regarding the patient's vaccination status, it is of utmost importance that the nurse devote special attention to the patient's vaccination history, given the significant

contribution of vaccines in disease prevention. This care is particularly crucial in patients with TB, who present a compromised immune system, making them susceptible to other infections, such as pneumonia and influenza, for which vaccines are available. In addition, the immune fragility caused by TB may predispose the patient to additional complications¹⁵. The importance of COVID-19¹⁶ and dengue¹⁷ vaccination is also emphasized. Therefore, it was added to the case that the patient's vaccination card is irregular and the nurse's conduct to regularize it.

From this same perspective, the concern with viral infections also arises, which can trigger an exacerbated immune response, resulting in temporary immunosuppression and making the individual more susceptible to infections. In addition, co-infections may occur, that is, the simultaneous presence of viral infection and TB, a situation in which one disease can influence the course and severity of the other¹⁵. In this context, a comprehensive approach and the performance of complementary tests to rule out any possible complications become crucial. Thus, it was added to the case that tests were carried out for prevalent viral infections, all with negative results, ruling out the possibility of co-infection in the patient.

Regarding the inquiry about the persistence of the patient's smoking habit and the referral to the smokers' support group, the importance of nursing assessment is emphasized, given the condition of smoking as a significant risk factor for infection by *Mycobacterium tuberculosis*, due to its harmful impact on lung function. The smoking habit directly influences the response to TB treatment, interfering with the effectiveness of the medications used. This interference occurs because exposure to the toxic components of cigarettes can result in reduced therapeutic efficacy¹⁸.

The association between smoking and high TB-related mortality rates is already known in the literature, with a marked disparity between smokers and non-smokers being observed. Therefore, it is relevant to highlight that the act of smoking not only increases the risk of TB infection and the progression of active TB, but also unfavorably affects the negativization of the sputum test, treatment adherence, the recurrence rate, and contributes to the emergence of multidrug-resistant TB cases¹⁹. In this context, it was added that the patient continues to smoke, although in a reduced manner, and that he will be referred to the support group for smokers, beginning after the period of TB transmissibility.

Regarding the suggestion about the environmental context in which the patient lives, this consideration was incorporated into the simulated scenario due to the significant impact of the environment on the rate of TB transmission in that location. In this context, it is recommended that the patient's home be characterized by dry and ventilated environments, aiming at the reduction of the microbiological burden, which, if humid and closed, favors the outbreak of infections such as bronchitis and pneumonia, as well as an increase in particles contaminated by *Mycobacterium tuberculosis*²⁰. Given the airborne mode of transmission of TB, the association

between the type of environment and the therapeutic protocol of the disease is of utmost importance, and the nurse must correlate these data to avoid complications and improve the patient's prognosis.

In the same line of argument, the questions related to the transmission period and the patient's interactions with the other residents of the alley housing emerge as pertinent inquiries and were incorporated into the design of the simulated case. In this sense, it becomes essential to clarify to the patient that the dissemination of pulmonary TB occurs primarily through the inhalation of particles containing the bacteria, expelled during acts such as coughing, sneezing, or speaking by an infected person¹. Thus, in every approach to the patient at the start of TB treatment, the importance of social isolation until the sputum smear becomes negative, as well as treatment adherence, must be emphasized.

Regarding the patient's social interactions with their neighbors, the implementation of an educational approach is relevant, elucidating the modes of TB transmission and promoting active search for symptomatic cases. Therefore, all neighbors who have daily contact with him and are asymptomatic must undergo the tuberculin skin test or the Interferon-Gamma Release Assay (IGRA), in order to detect the presence of latent tuberculosis infection (LTBI), while symptomatic individuals must undergo sputum smear microscopy or RMT-TB¹. This testing is essential, considering the epidemiological and clinical context for early diagnosis. Such a strategy contributes not only to disease control but also to the prevention of new cases and the interruption of the chain of transmission in the community environment.

Regarding the issue of the patient using the medication correctly and the importance of supervision of this treatment, it is possible to verify, in the present case, the reaffirmation of the prominence of Directly Observed Treatment (DOT) in the therapeutic approach to TB. DOT involves administering the drugs under the supervision of a health professional, ensuring better adherence to treatment, minimizing the risk of interruptions and, consequently, the spread of TB. The importance of implementing DOT as a guiding directive of clinical practices is highlighted, contributing to the effectiveness of TB control²¹.

Regarding the inquiry about the patient's glycemic index, it is of utmost relevance due to the correlation between TB and possible dysfunctions in glycemic levels. This association is based on the ability of certain drugs, such as Rifampicin, to influence carbohydrate metabolism, increasing insulin resistance and causing alterations in blood glucose levels. In parallel, Isoniazid emerges as another relevant medicinal substance, associated with the possibility of triggering hypoglycemia²². Therefore, the importance of the health professional in minimizing potential metabolic complications during TB treatment due to glycemic alterations is highlighted.

In the clinical context mentioned, the importance of addressing sexual life and sexually transmitted infections was emphasized in the simulated case. The risk of TB transmission through

respiratory fluids, as well as the risk of TB/HIV co-infection during unprotected sexual relations, was highlighted. Since the patient in the case was still on the fifth day of treatment, there is a risk of transmission, considering that, in general, only after two to three weeks of treatment does a decrease in transmissibility occur¹.

In addition, the inquiry about Capillary Refill Time (CRT) is also relevant to the simulated case due to its clinical importance, since it represents the interval necessary for blood to return to the capillaries after the application and release of pressure. In addition to being easily measurable, CRT provides valuable information about blood circulation and tissue perfusion²³. Therefore, considering the alterations in vital signs and the patient's clinical state, the assessment of CRT is an essential parameter to be considered during evaluation.

A crucial point, emphasized and consensual among the students in the simulated scenario, refers to the relevance of the patient's nutrition. A healthy diet plays a vital role in providing essential nutrients that not only strengthen the immune system but also reduce the risk of malnutrition, especially in patients affected by TB, who face elevated weight loss due to the disease. This approach ensures effective treatment, minimizing the possibilities of associated complications²⁴. However, it is imperative to recognize that the main challenges lie in the socioeconomic complexities faced by the patients, as well as in the lack of a support network.

On the topic that highlights the patient's use of anxiolytics and the risk of suicide, along with the referral to professionals such as psychologists and psychiatrists, these were inquiries accepted for the case. The need for the nurse to maintain a holistic approach toward the patient is emphasized, following the biopsychosocial model. This model emphasizes the importance of a complete approach to the patient, taking into consideration not only the physical aspects, but also the psychological and social ones²⁵. Evaluating them in their multiple dimensions, which encompass all aspects that compose their wholeness²⁶. Thus, evaluations related to the mental state and socioeconomic issues are as essential as the physical issues discussed. This integral approach to the patient is important in health care to promote a better understanding of their needs and ensure a comprehensive and adequate intervention.

According to research, it is evidenced that depression affects more than 50% of patients diagnosed with TB. In addition, it is emphasized that depression in patients with TB negatively impacts the cure of the disease and treatment adherence, manifesting through symptoms such as discouragement, alterations in sleep and appetite, fear, and a feeling of hopelessness — symptoms observable in the simulated case. Therefore, a multi-professional approach is essential, incorporating nurses, physicians, psychiatrists, psychologists, social workers, and community health agents, to ensure a good prognosis both physically and mentally²⁶. Given the evidence, it becomes relevant to evaluate and treat depression in patients with TB given its negative impact on treatment adherence and disease prognosis.

In the context of the patient's sleep pattern, a large portion of these patients affected by TB face difficulties in maintaining adequate sleep due to the respiratory symptoms associated with the disease, such as cough and fever. This clinical situation is concerning, and the deprivation of effective sleep has significant impacts on the patient's quality of life, since, being a biological and essential process, sleep performs vital functions, such as the restoration of physiological systems after wakefulness events, conservation and restoration of energy metabolism, and strengthening of the immune system²⁷. Therefore, it is information that deserves to be highlighted during anamnesis and clinical analysis of patients.

Regarding the topics related to the interval between the consultation at the Primary Care Unit (PCU) and the home care visit, as well as the nurse's interaction with the neighbor of the patient's mother and the other neighbors, these were incorporated into the simulated case in order to deepen the analysis of the clinical condition. This inclusion aims to address the social relationships of the patient in question, since a fragility in this aspect is evident, because, due to stigmas and prejudices, individuals with this diagnosis go through changes that involve the family, social, and individual environment²⁸.

The issue of the patient's income was emphasized, since the economic aspect is a cause of concern for him, which demonstrates the bidirectional relationship between health and income²⁹. Given his clinical condition, the patient is unable to work. In addition, the patient's referral to the social worker, who will be responsible for investigating the social and economic issues related to him, was highlighted.

Another aspect modified in the clinical case concerns the nurse's statement at the end of the consultation. Initially, the simulation ended with the nurse stating: '- You will be fine! You will be assisted and will get better!'. However, it is understood as not advisable for health professionals to guarantee with absolute certainty that a patient will be fine. The most appropriate approach is to ensure humanization in care, health education, empathetic communication, and the provision of clear and adequate information²⁵. Therefore, the nurse's statement was adjusted to: '- You will be assisted and will receive the necessary care for your improvement!'.

CONCLUSION

The RS scenario, designed, validated, and evaluated for teaching diagnostic reasoning in nursing consultations for patients with pulmonary TB, assumes a crucial role as a methodological teaching tool. The quality of the proposed scenario and its setting were endorsed by the simulation participants, who pointed out the good quality of the scenario design.

It is considered that there was a need for content adjustments so that the relationship between the simulated case and the nursing diagnoses would be consistent with the state of the

individual, the family, or the community. Thus, the proposed modifications aim to ensure a more realistic simulation, with crucial details pertinent to professional practice, guaranteeing a more faithful and enriching experience in the practical sphere. Therefore, the simulation was adequately adapted, incorporating the suggestions presented for better clarity and structuring.

Validated and evaluated clinical scenarios can be reapplied in teaching, based on the scripts and the training of more professionals to work with this active teaching methodology, with the potential to achieve learning objectives and serve as a facilitating resource in the training of nursing students and in the improvement of nurses with regard to care for patients with TB.

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