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EXPERIENCE REPORT

Active methodologies in sepsis education: an experience report in medical training

Metodologías activas en la enseñanza de la sepsis: relato de experiencia en la formación médica

Metodologias ativas no ensino da sepse: relato de experiência na formação médica

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Abstract

The aim was to report on the teaching experience regarding sepsis, to empower future physicians in the recognition and management of this condition. This is an experience report from the first class of an extracurricular course organized by medical students, focusing on Internal Medicine. The definition, epidemiology, and pillars of sepsis management were addressed: prevention, early recognition, treatment, and rehabilitation. Concepts such as infection, SIRS, septic shock, and organ dysfunction were detailed. A care protocol was presented, including a diagnostic checklist, initial examinations, management, and antibiotic therapy. Subsequently, the students analyzed a clinical case, applying the protocol to identify diagnostic criteria, procedures, examinations, and treatment. Protocols for children and pregnant women, risks of fluid expansion, and antibiotic use were also discussed, demonstrating a deeper understanding of the topic and the students' preparedness. The experience demonstrated that teaching critical topics improves clinical skills, highlighting the introduction of NEWS, which reinforced the importance of early recognition and management of sepsis. Thus, the lesson enabled students to identify and treat this condition, preparing them for real-life situations.

Descriptors: Sepsis; Health Education; Clinical Protocol; Medical Education; Early Diagnosis.

Resumén

El objetivo fue informar sobre la experiencia docente en sepsis, para capacitar a los futuros médicos en el reconocimiento y manejo de esta afección. Este es un informe de la primera clase de un curso extracurricular organizado por estudiantes de medicina, enfocado en Medicina Interna. Se abordaron la definición, la epidemiología y los pilares del manejo de la sepsis: prevención, reconocimiento precoz, tratamiento y rehabilitación. Se detallaron conceptos como infección, SIRS, choque séptico y disfunción orgánica. Se presentó un protocolo de atención, que incluía una lista de verificación diagnóstica, exámenes iniciales, manejo y antibioticoterapia. Posteriormente, los estudiantes analizaron un caso clínico, aplicando el protocolo para identificar criterios diagnósticos, procedimientos, exámenes y tratamiento. También se discutieron protocolos para niños y mujeres embarazadas, riesgos de expansión de líquidos y uso de antibióticos, lo que demostró una comprensión más profunda del tema y la preparación de los estudiantes. La experiencia demostró que la enseñanza de temas críticos mejora las habilidades clínicas, destacando la introducción del NEWS, que reforzó la importancia del reconocimiento precoz y el manejo de la sepsis. De esta manera, la lección permitió a los estudiantes identificar y tratar esta afección, preparándolos para situaciones de la vida real.

Descriptores: Sepsis; Educación en Salud; Protocolo Clínico; Educación Médica; Diagnóstico Precoz.

Resumo

Objetivou-se relatar a experiência de ensino sobre sepse, para capacitar futuros médicos no reconhecimento e no manejo dessa condição. Relato de experiência da primeira aula de um curso extracurricular organizado por estudantes de Medicina, com foco em Clínica Médica. Abordaram-se definição, epidemiologia e pilares do manejo da sepse: prevenção, reconhecimento precoce, tratamento e reabilitação. Conceitos como infecção, SIRS, choque séptico e disfunções orgânicas foram detalhados. Apresentou-se um protocolo de atendimento, com checklist diagnóstico, exames iniciais, manejo e antibioticoterapia. Posteriormente, os alunos analisaram um caso clínico, aplicando o protocolo para identificar critérios diagnósticos, condutas, exames e tratamento. Também foram discutidos protocolos para crianças e gestantes, riscos da expansão volêmica e uso de antibióticos, evidenciando aprofundamento no tema e preparo dos discentes. A experiência demonstrou que o ensino de temas críticos aprimora habilidades clínicas, destacando a introdução do NEWS que reforçou a importância do reconhecimento e manejo precoce da sepse. Assim, a aula capacitou estudantes a identificar e tratar esse quadro, preparando-os para situações reais.

Descritores: Sepse; Educação em Saúde; Protocolo Clínico; Educação Médica; Diagnóstico Precoce.

Introduction

Chronic non-communicable diseases contribute to an increased risk of sepsis, a secondary complication in patients with hypertension and diabetes that can progress to urinary tract sepsis after an ineffective urinary tract infection[1]. In the field of medical education, Foucault describes the interference of biopower and its influence on medical practice, considering that the interrelation between the political scenario, social context, and the health-disease process impacts the development of public policies for the prevention of complications such as sepsis[2,3]. It is worth noting that, in Brazil, health education is a means of promoting and preventing health problems[4]. Primary health care, in its preventive aspect, is fundamental for patient-centered care developed within care networks, contributing to the integration between levels of health care and thus promoting a reduction in the rate of sepsis in public health[5,6].

Sepsis is defined as a systemic inflammatory response triggered by the entry of a pathogen into the body, leading to the excessive production of inflammatory mediators and exacerbated activation of inflammatory cells. It is characterized by the presence of two or more of the following criteria: body temperature above 38.3°C or below 36°C; heart rate greater than 100 beats per minute (bpm); respiratory rate greater than 20 breaths per minute (bpm) or partial pressure of CO_2 (pCO_2) less than 32 mmHg; white blood cell count above 12,000/mm³, below 4,000/mm³, or the presence of more than 10% band neutrophils. The main consequence of this inflammatory response is the impairment of many organs and the development of shock, evolving into multiple organ failure syndrome, which is accompanied by high mortality[7].

Sepsis is responsible for approximately 26% of hospital deaths and about 41% of deaths in Intensive Care Units (ICUs), being the leading cause of death in this hospital setting worldwide[8]. Although its incidence has increased over the years, mortality associated with the condition shows only a modest reduction, a scenario that can be attributed to the difficulty in early diagnosis and inadequate management by physicians[9,10].

Despite advancements in Intensive Care Medicine (ICM), a significant gap persists in the transfer of knowledge about sepsis to undergraduate students in many medical schools. Ensuring that physicians possess at least a basic familiarity with the fundamental principles of the specialty is necessary, including the ability to identify severe conditions early, implement supportive measures before transfer to the ICU, and appropriately refer the patient for intensive care. Thus, adequate medical training that prepares future professionals to care for septic patients is essential for improving clinical outcomes[11].

The use of music in creating educational parodies in the health field is a creative pedagogical strategy aligned with active learning methodologies, promoting meaningful learning and participant engagement. By adapting the lyrics of well-known songs with technical content, it is possible to transform complex themes, such as disease prevention, hygiene, vaccination, or the correct use of medications, into accessible, memorable, and attractive messages. Familiarity with the melody enhances memorization, as it articulates rhythmic repetition, emotion, and meaning, elements that contribute to the internalization of knowledge. Studies analyzing the use of parody in health education show that this strategy promotes greater student participation, integration between theory and practice, and strengthening of the conceptual, procedural, and attitudinal dimensions of learning, making the student an active subject in their own formative process[12,13].

In the context of emergency care, this strategy can be applied to establishing sepsis criteria, helping the team to recognize early signs of severity and act with greater clinical safety. Considering that sepsis is defined as a potentially fatal organ dysfunction resulting from a dysregulated response to infection, rapid identification is crucial for reducing mortality[14,15]. The construction of a parody can rhythmically and repetitively include signs such as altered level of consciousness, systolic blood pressure ≤ 100 mmHg, respiratory rate ≥ 22 breaths per minute, tachycardia, fever or hypothermia, and other markers of organ dysfunction, reinforcing the need for systematic assessment and immediate intervention. By incorporating these criteria into continuing education, training, or clinical simulations, the multidisciplinary team internalizes the warning signs in a dynamic and collaborative way, which can favor faster and more assertive decisions in the care of septic patients. Thus, music consolidates itself as a complementary tool in the health education process, especially in environments that require speed, precision, and teamwork, in addition to aligning with contemporary proposals for active learning in health education.

It is worth noting that this learning, through extension activities, is in line with the current demands of teamwork in the context of health services. Active teaching methodologies, such as the use of parodies and gamification, are suitable for the new scenario in the training of health professionals. This report presents the experiences of students and teachers in the development and application of active learning methodologies, with parody and musicalization being the teaching strategies for medical students.

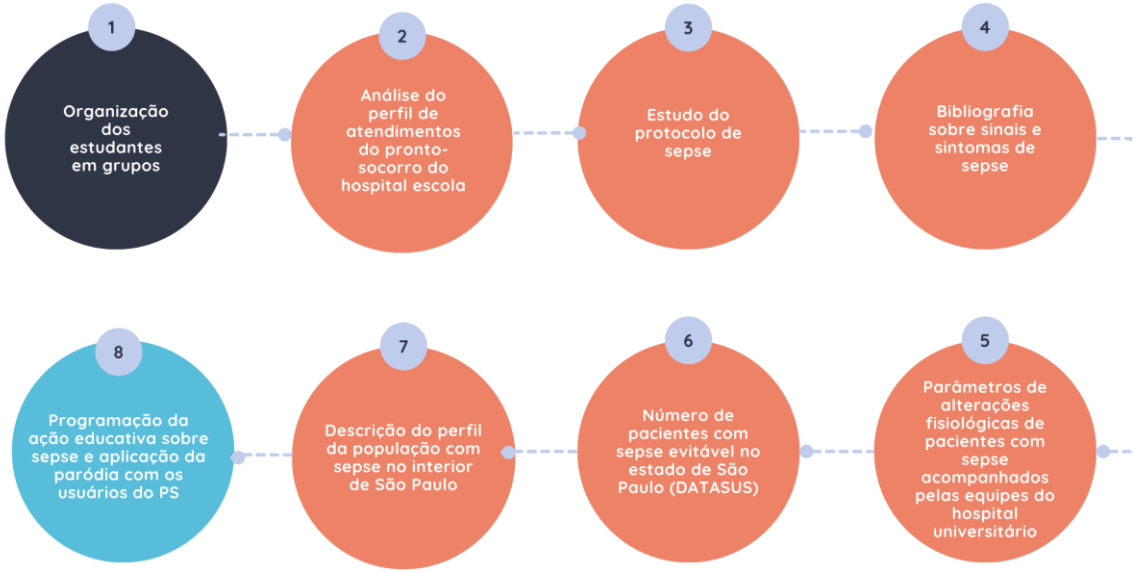
Methodology

This experience report refers to the first class of a project conceived and implemented by third-year medical students at a university in the interior of the state of São Paulo. The students, together with specialist professors from various areas of medicine, organized a non-profit, 12-month elective course at the institution itself. The project aims to provide medical students with a free and accessible extracurricular course, with monthly in-person classes at the university, taught by specialists in Internal Medicine and its subspecialties. The objective of the project is to offer theoretical and practical knowledge to future healthcare professionals on important and recurring topics in the daily practice of general practitioners, thus enabling a complete education based on up-to-date scientific evidence.

The students participating in the outreach activities on sepsis belong to the fourth, fifth, sixth, and seventh

semesters of the Medicine course at a higher education institution located in the interior of the state of São Paulo. As participation criteria, the students selected for the activities had to have previously completed theoretical training on sepsis, developed through interactive lectures and the preparation of strategies based on active learning methodologies. For participation in the practical activities, only students who attended the training and actively participated in the research and creation of the parody about sepsis aimed at a lay audience were included.

Figure 1. Planning outline for a parody campaign about sepsis aimed at the public. Araras, SP, Brazil, 2026



Note: 1. Organization of students into groups; 2. Analysis of the emergency room patient profile at the teaching hospital; 3. Study of the sepsis protocol; 4. Bibliography on signs and symptoms of sepsis; 5. Parameters of physiological changes in sepsis patients monitored by the university hospital teams; 6. Number of patients with preventable sepsis in the State of São Paulo (DATASUS); 7. Description of the profile of the population with sepsis in the interior of São Paulo; 8. Program of educational action on sepsis and application of parody with emergency room users.

Figure 1 schematically presents the methodological steps developed in the extension project on sepsis, highlighting the sequential organization of activities carried out by students from the fourth to the seventh semester of Medicine. Initially, the organization of students into groups is observed, followed by an analysis of the profile of care provided in the emergency room of the teaching hospital, which allowed contextualizing the relevance of the topic. Next, a study of the sepsis protocol and a bibliographic survey on signs, symptoms, and associated physiological changes were conducted, articulating the previously described theoretical training - conducted through interactive lectures and active learning methodologies - with scientific investigation. The analysis of epidemiological data, including the number of patients with preventable sepsis in the state of São Paulo (DATASUS) and the description of the affected population profile, reinforced the technical basis of the intervention.

Finally, the educational program culminated in the application of parody with emergency room users, integrating theory and practice and consolidating student leadership in the health education process.

Experience Report

Thus, on December 2, 2024, the first class of the schedule was held, with the theme "Sepsis," taught by a specialist in Internal Medicine and Infectious Diseases. The meeting was in person, open to all medical students of the institution, as well as residents and other faculty members. Initially, the epidemiology of sepsis in Brazil was presented, which manifests as an extremely serious condition in most identified cases. Following this, the definition of sepsis and its four pillars - prevention, early recognition, correct treatment, and rehabilitation - were detailed. Furthermore, for the correct identification of this diagnosis, concepts such as SIRS (Systemic Inflammatory Response Syndrome), infection, organ dysfunction, and septic shock were also detailed throughout the class, with the similarities and differences between each of these conditions.

To provide students with tools for early recognition of sepsis, a protocol to be followed in the care of patients suspected of having sepsis was presented. This protocol includes a checklist of diagnostic criteria, necessary laboratory tests within the first hour of admission, correct management, and a guide for antibiotic therapy. At this time, the students were able to experience the application of clinical reasoning in its entirety, from understanding what sepsis is and its manifestations, its appropriate treatment, and even how to complete hospital documentation.

The explanation presented by the specialist aimed to reach students from all stages of their undergraduate studies, from the Basic Cycle to the Internship. For this reason, even the most specific topics, such as treatment and antibiotics, were explained in a clear and simple way, facilitating comprehension.

At the end of the theory session to consolidate the acquired knowledge and apply the sepsis management protocol, a clinical case was the subject of resolution, discussion, and questioning between the instructor and the students. Thus, the undergraduates read the data from the clinical history, as well as the vital signs manifested by the hypothetical patient, and, along with the guidance of the previously presented protocol, analyzed the diagnostic criteria, the initial actions to be followed, the tests to be collected, the appropriate management during the care of this patient, and the effective treatment. This moment was extremely important for the development of the clinical and problem-solving reasoning of the students present, who were able to gain confidence to recognize and treat possible cases of sepsis early in their professional practice, based on scientific evidence and updated protocols.

Furthermore, it was noted that the course offered, in addition to presenting technical content, also provided a safe environment for the exchange of experiences between teachers and students, since the students had the opportunity to question the health professional about topics related to the class, and this meeting also provided networking opportunities between students from different periods of the course and professors from the institution.

During the class, several questions were raised regarding aspects of clinical practice in sepsis management. Initially, the risks and contraindications of volume expansion were discussed, highlighting that, although acute pulmonary edema can occur, it is easier to manage this and other complications of volume expansion than the complications of sepsis caused by dehydration. The question about excessive hydration led to inquiries about antibiotic dosage and a possible benefit of its excess, which was clarified that there are no advantages to such a practice, and, unlike hydration, the excessive use of antibiotics is not recommended, either in relation to the spectrum of medication or the dose, and can lead to the selection of multidrug-resistant bacteria and de-escalation. The discussion continued with the management of pregnant women and children, noting that, while pregnant women follow protocols similar to adults, with greater care due to natural hypovolemia, pediatric management is more complex, with specific protocols for early-onset sepsis, for newborns under 28 days old; There is a sepsis protocol for children under 1 year old, called late-onset sepsis; and a childhood sepsis protocol for children older than one year. Regarding pregnant women, the antibiotics that could be prescribed were discussed. It was clarified that beta-lactams, such as ceftriaxone, and penicillin derivatives can be used, while some classes, such as quinolones, should be avoided. In general, antibiotic management for pregnant women follows the same guidelines as antibiotics prescribed for non-pregnant adults. Finally, the de-escalation process was discussed, which proved to be more challenging because it is linked to several components, such as the hospital microbiota, the environmental microbiota, and the infectious focus, dimensions that depend on a good anamnesis, hospital data, culture history, and the patient's antibiotic use history. This data is essential to identify which bacteria are present, facilitating the choice of the best therapeutic decision.

On December 5th and 6th, 2025, educational activities on sepsis were carried out with the aim of promoting health education on the subject in the emergency room of the teaching hospital (Chart 1).

Chart 1. Educational campaign on sepsis. Araras, SP, Brazil, 2026

Educational parody about sepsis warning signs in layman's language
Application of the parody in the emergency room with patients in the waiting room and reception area
Gamification with patients and emphasis on warning signs
Distribution of an explanatory brochure about treatment locations
Clarification of doubts related to the topic

Chart 1 presents, in an objective and structured way, the strategies used in the outreach intervention carried out in the emergency room, focusing on health education for the public. The chart describes four main axes that make up the action. The first element refers to the application of an educational parody about warning signs of sepsis in accessible language, carried out in the waiting room and reception area of the emergency room. This step highlights the adaptation of technical content for simplified communication, favoring comprehension, early identification of signs, and closer ties between students and the community. Next, gamification with patients is highlighted, with emphasis on warning signs. This strategy demonstrates the use of interactive resources to reinforce learning, promoting active participation, stimulating memory, and increasing audience engagement. Gamification complements the parody, consolidating information through repetition and participatory dynamics. The third component of the framework is the distribution of an explanatory brochure about healthcare facilities, indicating that the intervention was not limited to transmitting knowledge about signs and symptoms, but also provided guidance on the appropriate flow for seeking assistance, strengthening user autonomy, and the organization of the care network. The framework mentions the clarification of doubts related to the topic, highlighting the dialogical nature of the educational action. This moment allowed for direct interaction between students and patients, promoting the exchange of information, correction of misconceptions, and consolidation of learning. In an integrated way, the framework demonstrates that the educational action was planned in multiple dimensions, informative, interactive, preventive, and guiding, articulating accessible language, playful strategies, and scientific foundations to broaden the early recognition of sepsis in the community.

Chart 2. Text structuring for a parody about sepsis. Araras, SP, Brazil, 2026

If I had a fever, Muscle weakness, Some heart problem, I would think: "It could be sepsis, my brother." I would be alert If I stopped swallowing To a new inflammation. I would think: "It could be sepsis, my brother." I would suspect some infection. I couldn't lose my breath. I wouldn't rule out sepsis as an option. I couldn't lose my function, Have difficulty concentrating. I would think: "It could be sepsis, brother."

The structuring of the text related to the sepsis parody presents a lyrical organization built to convey, in simple and repetitive language, the main warning signs associated with sepsis. The composition uses short verses, with repetition of the expression "I would think it could be sepsis, my brother," functioning as a refrain and element of cognitive reinforcement, a strategy characteristic of educational parodies. It is observed that the text includes symptoms such as fever, muscle weakness, difficulty swallowing, respiratory changes, possible cardiac involvement, difficulty concentrating, and loss of function, in addition to mentioning the presence of infection or inflammation, which are central factors in triggering sepsis. The repetition of the idea of "not ruling out sepsis as an option" highlights the educational objective of stimulating early suspicion in the face of nonspecific clinical signs, favoring the rapid seeking of care. The structure presents a thematic progression: it begins with general symptoms, expands to signs of organ dysfunction, and reinforces the need for vigilance. Accessible language, the use of simple rhymes, and first-person narration bring the content closer to a lay audience, promoting identification and facilitating memorization. Thus, the scenario demonstrates that the parody was structured to transform technical clinical criteria into understandable messages, focusing on awareness and early recognition of sepsis.

Discussion

The impact of the experience demonstrated that a theoretical-practical approach beyond the curriculum significantly improves clinical skills. This is particularly true when addressing a topic as critical as sepsis, a life-threatening organ dysfunction caused by a dysregulated host response to infection[6], The aim is to reduce the insecurity felt by future professionals regarding the management of sepsis in the initial stages. Throughout the class, which covered everything from definitions to examples of clinical cases, the proper use of SCOREs for patient assessment was emphasized. In accordance with the literature, it was confirmed that it is important to activate the Sepsis Protocol when two or more of the following criteria are present: temperature >38.3ºC or < 36ºC; heart rate > 100 bpm; respiratory rate > 20 breaths per minute; leukocytes >12,000 or < 4,000. For timely recognition, it is recommended to use the NEWS (National Early Warning Score), which uses respiratory rate, oxygen saturation, systolic blood pressure, temperature, heart rate, and level of consciousness as evaluative criteria. If sepsis is confirmed or suspected, it is urgent to collect lactate, obtain blood cultures (before starting antimicrobial use), start intravenous antibiotics, administer 30 mL/kg of intravenous crystalloid for hypoperfusion, and maintain a target mean arterial pressure (MAP) ≥ 65 mmHg[16].

Thus, sepsis remains one of the greatest challenges in the medical field due to its late recognition and inadequate treatment, causing thousands of deaths worldwide annually, many of which could be avoided with proper management.

Therefore, the lesson's objective is to prepare medical students to identify this serious condition, which can ultimately lead to the patient's death, and to treat it correctly to avoid this outcome. To achieve this goal, the following topics were covered: differentiating sepsis; its early recognition; possible organ dysfunctions; the correct treatment, which consists of tests, antibiotics, and fluid resuscitation; frequent monitoring and reassessment of the patient; and rehabilitation. These were the subjects covered in the lesson, and they are extremely effective in helping students better understand what sepsis actually is and how to act in the face of this clinical condition[16,18]. Furthermore, the multidisciplinary approach of the class and the topic discussed offers students the opportunity to apply the knowledge they have acquired through the various modules covered in the academic environment to a single subject, considering the patient as a whole and not in separate modules. Moreover, the clinical simulations that were carried out promote a dynamic learning environment where students can practice their clinical reasoning with real cases, applying the knowledge acquired in class and developing medical skills, promoting greater knowledge for future doctors and consequently improving the clinical outcomes of sepsis[17,18].

Therefore, the inclusion of these practical activities in medical training is extremely important, as these activities

allow students to apply their theoretical knowledge acquired in the classroom to realistic simulations of a doctor's daily life, consolidating their theoretical and practical learning and developing clinical reasoning. Knowing the importance of these practical activities in the training of future doctors, the project aims to expand classes to address other relevant topics besides sepsis, such as the management of hypovolemic shock[18].

Since the goal is always to expand students' knowledge and prepare them for real-life situations as doctors, implementing metrics to evaluate knowledge retention over time is essential to ensure the effectiveness of this learning[19]. By implementing these metrics, students can identify their progress or gaps in their learning, making it possible to adjust or develop a new teaching strategy to maximize knowledge. Therefore, the combination of classes, practical activities, and continuous assessment reinforces students' preparation to face medical environments and achieve the best outcomes.

Limitations of this outreach activity, even considering the prior training provided to the students, include several methodological and contextual aspects. Although the students participated in theoretical training through interactive lectures and the preparation of strategies based on active learning methodologies, the impact of this training was not measured using standardized assessment instruments that would allow for quantifying knowledge gains before and after the intervention. Furthermore, the activity was developed in a single teaching hospital in the interior of the state of São Paulo, which limits the extrapolation of results to other healthcare settings. The application of parody, gamification, and the distribution of educational materials occurred in a specific environment (waiting room and emergency room reception area), without longitudinal follow-up to assess content retention by the population or changes in behavior regarding seeking care in response to warning signs of sepsis. Because this is a descriptive educational intervention, structured in stages such as group organization, analysis of service profiles, study of the sepsis protocol, bibliographic research, and practical application with users, the results mainly reflect qualitative perceptions and extension experience. Although prior training strengthened the students' theoretical foundation and confidence in conducting the activity, the absence of formal quantitative evaluation and subsequent follow-up constitutes a significant limitation of the study.

Final Considerations

Primary Health Care (PHC), as well as secondary and tertiary care, plays a fundamental role in the management of medical emergencies, including sepsis. As the entry point to the health system, PHC is essential in the early identification of signs of severe infection, enabling rapid and appropriate referral to more complex levels of care when necessary. Sepsis is a dysregulated inflammatory response of the body to an infection, which can rapidly progress to septic shock and multiple organ failure. Early recognition of this condition allows for the adoption of effective therapeutic measures, reducing complications and improving clinical outcomes. To this end, the education and training of primary care professionals regarding the available diagnostic criteria for sepsis are essential, ensuring that they can identify the condition quickly and accurately. Reducing delays in diagnosis is essential for the effectiveness of treatment, directly impacting patient survival. Thus, qualified action in PHC not only saves lives but also contributes to the more efficient use of health system resources.

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