

Incorporating Artificial Intelligence Into Athletic Training Education: Developing Case-Based Scenarios Using ChatGPT

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Context: ChatGPT is an AI-based large language model platform capable of mimicking human language patterns by responding to user queries. Although concerns over AI-generated content exist in health care and higher education, the ChatGPT platform can assist athletic training educators in creating academic content to alleviate aspects of their academic workload and responsibilities.

Objective: To provide a brief historical overview of ChatGPT, accepted positives and negatives, and examples of how athletic training educators can use ChatGPT for case-based scenario contention creation.

Background: The initial development of ChatGPT began in 2018, with its public launch in November 2022. ChatGPT uses machine and in-context learning to replicate human language expression. Since its public launch, students, researchers, educators, clinicians, governments, and companies have sought to determine how to incorporate ChatGPT into their workflow operations.

Data Synthesis: Athletic training educators can incorporate ChatGPT into their academic content creation methodology. With the capability of ChatGPT, athletic training educators have the potential to facilitate athletic training student learning more efficiently.

Results: ChatGPT can ease the academic workload of athletic training educators while being a beneficial clinical tool that athletic training students may use in their future workplace settings.

Recommendation(s): Athletic training educators should consider using ChatGPT or a similar AI-based large language model platform when developing education content and simulation scenarios.

Conclusions: ChatGPT can lessen athletic training educator workload and potentially facilitate athletic training student learning.

Key Words: Technology, chatbot, faculty workload, scenario development

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KEY POINTS

- ChatGPT is an AI-based large language model platform that can quickly generate humanlike language patterns based on user queries.
- ChatGPT integration into health care and academic settings is occurring, whereby athletic training students and faculty should become knowledgeable about the advantages, disadvantages, and limitations of ChatGPT.
- Athletic training educators can reduce their academic workload by using ChatGPT to develop initial case-based scenario concepts before refining the ChatGPT-generated material for athletic training student simulations.

Historically, technological advancement has often been uneven, with particular sectors progressing more rapidly or slower than others.¹ Computer, software, and communication domains are advancing rapidly compared with other United States Patent and Trademark Office areas.¹ The historical evolution of and increasing access to technology has progressed, altering education delivery models and instructional programs. The professional preparation and education of athletic trainers are unexempted. In 1997, Tsuchiya² discussed the need for athletic training educators to embrace and use technology in their athletic training education programs by recommending the promising technology of CD-ROM anatomy software, Microsoft PowerPoint presentations, plug-in projector technology, and online distance learning. In 2002, Wright et al³ presented the concept and benefits of asynchronous online learning (eLearning) and how athletic training programs and educators can provide a quality education experience and assess learning remotely. The examples continue with a 2009 article in which authors discussed mobile learning that uses personal digital assistants,⁴ a 2014 article in which authors discussed the benefits of integrating high-fidelity simulation,⁵ a 2015 article in which authors presented various mobile device applications,⁶ and a 2020 article in which authors evaluated the ability of athletic training students to perform telehealth evaluations.⁷

Moffit and Lindbeck⁸ surveyed athletic training educators about their current use and future desires to incorporate technology into their teaching practices. Most respondents described simple and standard technology integration for education, such as PowerPoint, learning management systems, videos, YouTube, and online exams.⁸ These technologies focused on transmitting and storing information instead of student engagement and experiential learning.⁸ When asked about which technology the faculty members wished to integrate into their classrooms the following year, 56% indicated some version of currently available technology, and 44% reported no plans to integrate new technology. The 44% who had no plans to integrate technology the following year reduced to 14% when financial and support barriers were removed.⁸ Although the lack of funds as a barrier for athletic training educators to implement technology during instruction is not new, these findings are problematic because athletic training educators resisted incorporating new technologies or were limited

based on their financial constraints to obtain new electronic platforms and devices.^{8,9} In contrast, athletic training students have historically demonstrated they could learn from computer-based and asynchronous content delivery methods.^{10–12}

Although the previous examples were not an exhaustive historical listing of technology integration into athletic training education, they present how educators have proposed integrating new technology into professional athletic training programs and the effects on athletic training student learning since the 1990s. One theme that arises is the faculty workload for learning, developing, and integrating technology into class assignments and experiences.^{8,10} Athletic training faculty are under professional pressure to perform their roles as faculty and educators successfully. The expectations of athletic training educators include recruiting and retaining athletic training students, operating a successful professional or residency athletic training program, meeting each Commission on Accreditation of Athletic Training Education (CAATE) standard, performing programmatic quality assurance and improvement, engaging in scholarship, developing and overseeing simulations, maintaining competitive Board of Certification (BOC) for the Athletic Trainer pass rates, and completing CAATE annual reports. These requirements are in addition to successfully meeting employer mandates, such as serving on committees, professional development, seeking tenure and academic promotion, engaging in professional or community service, and performing research, publications, and presentations.^{13,14} Finally, athletic training faculty are expected to provide quality athletic training education outcomes through in-person or online instructional methods. At times, the responsibilities placed on athletic training educators can seem overwhelming, creating a work-life balance incongruity and potentially leading to professional burnout.^{15–17} Learning and integrating recent technology into the classroom environment and standard daily workflow can be expensive, time consuming, daunting, and anxiety provoking. However, harnessing the ChatGPT (OpenAI) interface is a potential tool that can change the delivery of athletic training education and patient care while facilitating athletic training educator workload expectations when creating educational content.

This commentary aims to describe ChatGPT, the potential positives, negatives, and limitations of ChatGPT specific to the athletic training educator, and to provide general examples of how athletic training educators can incorporate ChatGPT as a resource during the case-based scenario content creation process. Although ChatGPT is one of the multiple available chatbots, this commentary focuses specifically on ChatGPT because it is the most well-known and publicly accessible to mainstream audiences at the time of this writing.

OVERVIEW OF CHATGPT DEVELOPMENT

After years of internal development, the San Francisco-based AI research and development company OpenAI publicly

released the chatting robot (chatbot) ChatGPT in November 2022.^{18,19} Trained to produce complex humanlike responses to user queries from copious amounts of text-based datasets across multiple languages, ChatGPT is an AI-based large language model (LLM) that uses a generative pretrained transformer (GPT) model to perform chatting functions for creativity, correspondence, debate, and general investigation.^{18–21} Initial development of ChatGPT began in 2018, with each iteration (GPT-1, GPT-2, GPT-3, GPT-4) increasing in complexity and function through advancing computer learning models and methodologies.^{18,22} These advancing methodologies are based on machine, meta, and in-context learning to process diverse inputs and replicate human language expression.²² Furthermore, the user can save and store past conversations, enabling ChatGPT to recall previous user queries, adapt, and respond in organized conversations.²¹ This feature furthers ChatGPT's ability to mimic the human thought expression and general conversational interactions by adapting to a conversation in real time. Additionally, chain-of-thought processing can increase ChatGPT's ability to solve complex tasks and logical reasoning inquiries, mimicking human brain operation.²²

In March 2023 (from data ending February 16, 2023), Sallam¹⁸ published a systematic review of ChatGPT as an example of LLMs and their utility in health care education and practice. Of the 60 studies evaluated, 19 were classified as editorials or letters to the editor; 21 were research articles, case studies, brief reports, opinions, or recommendations; and 20 were designated preprint (gray literature) articles.¹⁸ As evidenced by the 19 editorials, 20 preprint sources, and with 4 of the 21 research articles being experimental based, the currently published material specific to ChatGPT and health care education and practice is limited.¹⁸ Still, it demonstrates the sudden and significant increase in ChatGPT applications across the health care education field. However, most of this information describes either opinion or theory instead of satisfying scientific and evidence-based criteria. In this commentary article, we do not contribute to increasing scientific knowledge of ChatGPT. However, we hope the content spurs athletic training educators to consider incorporating ChatGPT and LLM platforms across their athletic training programs and into aspects of their general professional workflow.

BENEFITS AND DRAWBACKS OF USING CHATGPT IN HEALTH CARE AND HIGHER EDUCATION

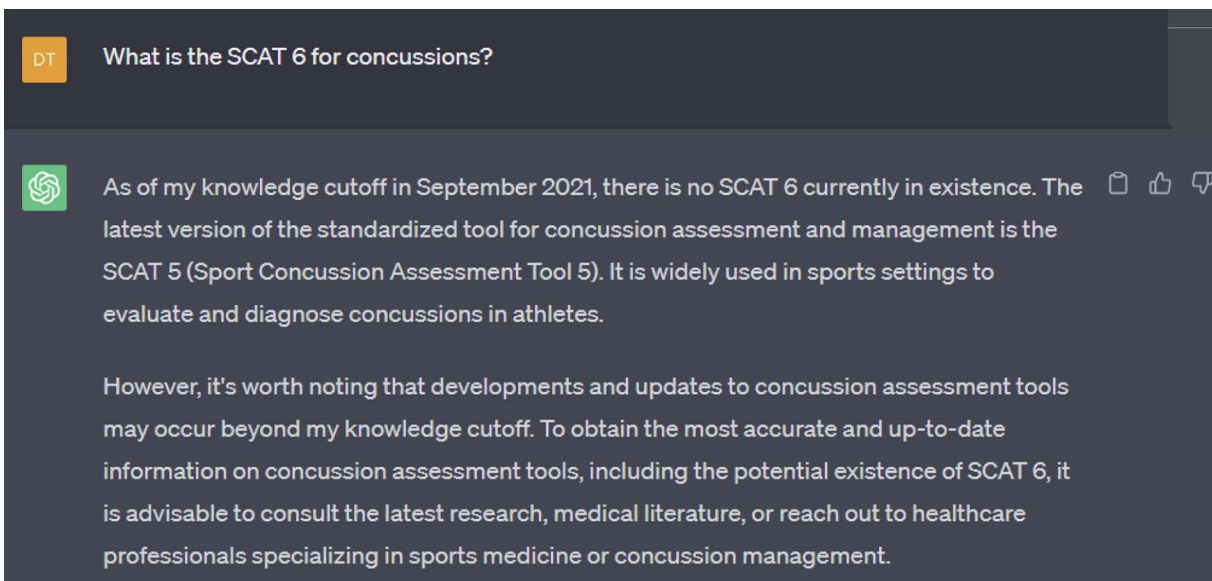
ChatGPT and similar LLM platforms have the potential to become integral components of 21st century society. However, since the public release of ChatGPT in November 2022, many industries and employment sectors are considering how best to incorporate this technology into their system and workforce. ChatGPT can rapidly generate and mimic human-level performance, creativity, thinking, and thought in diverse areas, such as content and artistic creation, software development, and response generation, and quickly compare and summarize large amounts of data. ChatGPT demonstrates promise as a general multipurpose task solver and creative engine for the general public. However, ChatGPT possesses specific positives and negatives relative to academia and health care settings.^{18–23} Incongruencies regarding incorporating ChatGPT into health care education activities are primarily theoretical. Some of the attributed positives and negatives may be specific to the current iteration of ChatGPT (GPT-4)

because it is plausible that, as ChatGPT evolves, its functions, responses, and capabilities will also. Those future enhancements might exacerbate or mitigate benefits or adverse aspects of ChatGPT. However, commonly articulated positive, negative, and cautionary attributes of the most recent iteration of ChatGPT (GPT-4) and how they relate to health care education activities are discussed below.

ChatGPT can quickly generate literature reviews and write concepts about diverse topics that can appear eloquent and have a pleasant conversational tone.^{18,20,21,23,24} This can be advantageous for students and faculty to summarize articles and large bodies of knowledge quickly. The saved time could enable students or faculty to dedicate more effort toward performing complex tasks such as in-depth analysis, developing projects or methodologies, or creative integration and application of the information.²¹ However, relying on ChatGPT-generated literature reviews and synopses can result in a superficial understanding of the topic and learning or disseminating inaccurate, incorrect, or disinformation.^{18,20,21} Like humans, ChatGPT can struggle to identify important information based on ambiguous prompts and differentiate between reliable and unreliable sources.²¹ For students, this could lessen learning or inadvertently lead to plagiarism, factual inaccuracies, copyright infringement, and other types of academic dishonesty.^{19,21} Faculty have similar pitfalls but added issues related to research honesty and fraud. The underlying problems for both students and researchers involve data integrity and transparency.²⁰ Multiple sources have indicated that ChatGPT is prone to “hallucinations” where ChatGPT either improperly attributes origins to information or manufactures content, sources, and references,^{18,20–22} potentially further exacerbating claims of plagiarism, disinformation, misinformation, and related factual inaccuracies. ChatGPT does not share its logic or process when answering prompts and can construct different answers to the same inquiry. Students or faculty cannot check ChatGPT's process to reconstruct its literature review and writing or provide specifics regarding the whereabouts of information sourcing.

Writing transparency is a related but separate concept to generating literature reviews and synopses.^{18,20,22} ChatGPT can quickly generate content from large and diverse source material, allowing students or faculty to refine and alter that writing to present to an audience (eg, instructor class or journal). However, since the writer may not be able to fully describe or know where the ChatGPT content begins or ends, this is problematic during the proofreading and editing phases. Faculty and journals can use AI plagiarism and writing detectors with varying accuracy.^{19–21,25–27} Currently, the material generated by AI, including ChatGPT, is not considered copyrighted, primarily because the United States Copyright Office does not register works created by autonomous AI platforms, as the generated material must involve human creativity and be able to take public responsibility for the published work.^{18,24,28,29} In the future, this could potentially change. Although copyright is not an issue when creating material designed for personal consumption and use,²⁸ problems arise when using AI-generated content for academic work and professional publications.^{20,23,26,29} No consensus exists on whether a student or faculty should specifically indicate or list ChatGPT as a coauthor.^{18,19} Since the argument can be made that ChatGPT can meet the International Committee of Medical Journal Editors (ICMJE) authorship

Figure 1. ChatGPT response when asked about the SCAT-6 for concussions. Response generated in June 2023.



criteria,³⁰ extensively relying on ChatGPT to generate passages and assist in research projects can lead those who perform conference presentations, create online courses, or submit materials to professional academic journals to the additional ethical consideration of authorship.²⁰ Those who use ChatGPT to generate significant portions of materials for scientific and peer-reviewed consumption should view the journal's authorship criteria to determine if ChatGPT should be a coauthor, listed in the acknowledgments, unlisted, or otherwise disclosed to the reviewers and reading audience.

Assisting in education and clinical workflow is among the most compelling potential positives of ChatGPT and similar platforms.^{18,19,21} The ability to quickly generate and summarize general patient information can lessen clinician administrative duties.^{18,21} Examples include SOAP (Subjective, Objective, Assessment, Plan) notes, patient discharge summaries, improving health literacy by quickly translating information into other languages, simplifying health care materials for patient populations, and generating email responses. Voice interface applications can allow the user to talk to ChatGPT and listen to the response in multiple languages. ChatGPT is scalable and can use its ability to accommodate and remember abundant answers and conversations while adapting to real-time queries.^{21,23} However, ChatGPT lacks the understanding of empathy and emotions, which can be problematic when used in situations requiring compassion and human connection.²³ Athletic training educators can encourage athletic training students and preceptors to search for clinical integration techniques for ChatGPT writing platforms. The education and clinical burden reductions are similar because methods that increase efficiency and reduce time can decrease health care costs, staffing burdens, and educator preparation times.^{18,23}

ChatGPT can improve the writing quality and communication of those whose primary and nonprimary language is English because ChatGPT generates humanlike and cohesive written responses.^{18,19,23,24} This characteristic of ChatGPT can be helpful for students to improve their ability to write

and express passages naturally in the English language.^{23,24} These enhanced writing passages are useful for academic work and related endeavors such as emails; patient documentation; and personal, diversity, research, and teaching statements for employment. Like seeking professional editing services through an agency or science writer, faculty and researchers can use ChatGPT to enhance the phrasing of manuscripts to increase the likelihood of their acceptance for journal publication.

The ChatGPT (GPT-4) academic dataset is small, and the overall training dataset ended in January 2022.^{20,23} ChatGPT cannot access the most current information because it cannot actively search the Internet.²⁰ The inability to actively search the Internet can be significant because scientific and medical knowledge can rapidly change.²³ Knowing any information cutoff date and that ChatGPT has access to limited academic databases and cannot actively search the Internet is essential, especially in health care and science fields where information can change rapidly—such as concussions, surgical techniques, and treatment methodologies. For example, ChatGPT (GPT-4) knows about the Sports Concussion Assessment Tool 5th Edition (SCAT-5) because it was published in 2017.³¹ However, ChatGPT (GPT-4) is unaware of the Sports Concussion Tool 6th Edition (SCAT-6) because of its 2023 publication (Figure 1).³² ChatGPT may be better at searching and providing information for material that is not cutting edge, current, or highly specialized and for information with more extensive historical scientific research than newer discoveries and medical advances.²⁰

Like any tool or technology, users must understand the positives, negatives, and limitations of ChatGPT. Faculty, athletic training programs, and institutes of higher learning will need to determine how and the appropriate amount to incorporate ChatGPT into their educational philosophy, workload, and delivery.³³ ChatGPT will likely evolve, improve, and integrate into multiple software platforms across education and workplaces. Athletic training educators should begin to practice incorporating ChatGPT and LLM platforms into their workflow. By acknowledging the existence of and using ChatGPT

Table. General Guidance and Precautions for Using ChatGPT to Develop Clinical and Patient-Related Scenario Scripts. Information Adapted From Levitt⁴² and Nguyen and Pepping⁴³

Be specific: Clearly state your expectations and requirements for the chatbot's response. Mention the format, word count, and other relevant patient parameters (age, sport, gender, previous injury, or history).
Use open-ended questions: Encourage more thoughtful and comprehensive answers by asking open-ended questions rather than those allowing a simple yes or no.
Keep it simple: Avoid using overly complex language or technical jargon. Ensure your prompts are easily understandable by the chatbot.
Provide context: Offer background information or context to help the chatbot understand the subject matter and deliver more accurate responses.
Iterate and refine: Experiment with different phrasings and approaches to find the best response for your needs. Be prepared to make adjustments and refinements to your prompts as needed.
Ensure correctness: Check the output accuracy and make necessary adjustments before deploying the simulation.
Boolean operators: Using NOT, AND, or related phrases (without) in the writing prompt can assist scenario development.
Privacy: Refrain from putting any actual patient names or identifying information into the chatbot prompt. Ensure the information provided to the chatbot is deidentified to promote privacy.

and LLM platforms, athletic training educators can help athletic training program graduates to learn technological skills that are increasing in societal prominence, especially in health care.³³ In the following section, we have created a case-based simulation example of how ChatGPT can be used across an athletic training program to help faculty create educational content for athletic training student learning while facilitating faculty efficiency and workflow.

CREATING CASE-BASED SIMULATION SCENARIOS USING CHATGPT

Case-based simulations can facilitate student skill development and in-context knowledge assessment.³⁴⁻³⁶ However, faculty knowledge of and comfort with technology affects their ability to create simulation-based education.^{36,37} Athletic training educators may not have been formally trained to develop simulation scenarios or may fear the appearance of incompetence when developing or implementing case-based scenario activity.³⁶⁻³⁸ The CAATE Curricular Content Standards allow for clinical skill evaluation through simulations performed by a preceptor in a clinical environment or completed in a class environment when directed by a faculty member.³⁹ Athletic training faculty can benefit from using the ChatGPT platform to quickly create case situations by typing the general patient parameters into the ChatGPT query box, allowing any faculty to develop and write case-based learning examples to efficiently assess student learning. ChatGPT will then use its humanlike language expression, chain-of-through processing, and general topic knowledge to generate possible detailed scenario scripts quickly. ChatGPT's ability to follow along with and store conversations can further assist the athletic training educator in altering and modifying scenarios until reaching an acceptable draft that best matches the learning objectives.

Little difference exists between using ChatGPT to develop case-based learning scenarios and using predeveloped or educator-generated materials. The athletic training educator must first identify the specific activity learning objective and how the activity fits into the overall course and program learning objectives.^{40,41} Once establishing the learning objective and how it fits into the instructor's pedagogy and programmatic framework, the ChatGPT platform can assist the athletic training educator in developing the scenario to

evaluate or facilitate athletic training student learning or skill acquisition. Finally, the athletic training educator must make specific script and scenario adjustments based on the desired learning objective and finalize the material before use.

Once the learning objective is established, the athletic training educator creates meaningful prompts that allow ChatGPT to generate appropriate outputs to develop clinical scenarios. ChatGPT queries that are overly vague or nonspecific will produce responses that will not adequately align with the established learning objectives, meet the expectations of a master's level health care student, be of sufficient academic or clinical challenge, or require substantial educator time and effort to adjust and refine the scenario. The ChatGPT chain-of-thought conversational flow allows the athletic training educator to modify the input specificity, changing the generated ChatGPT output for that case scenario. ChatGPT's rewrite function enables the educator to create multiple related scenarios quickly. The Table describes general recommendations and precautions when writing chatbot prompts to assist in providing meaningful responses during simulation development.^{42,43}

For the scenario we exemplify, the purpose was to assess the athletic training student's ability to accurately assess, diagnose, and treat a patient with asthma. This 2-part scenario has acute asthma attack recognition and follow-up evaluation modules. The specific learning objectives are

- (1) Recognize the clinical presentation of an acute asthma attack and intervene accordingly.
- (2) Interpret common asthma diagnostic tests.
- (3) Differentiate asthma from other similar respiratory and general medical conditions.
- (4) Develop an evidence-based management plan for asthma, including pharmacological and nonpharmacological interventions.

ChatGPT Prompt #1: *Develop a patient profile for a 21-year-old football player who has asthma (without using the word asthma).*

Figure 2 shows the ChatGPT overview of the patient without providing specific objective information. The athletic training educator can further develop and refine this patient's history and background. However, ChatGPT can also expand on

Figure 2. The ChatGPT prompt to the query: *Develop a patient profile for a 21-year-old football player who has asthma (without using the word asthma).*

Name: John Smith
 Age: 21 years
 Gender: Male
 Occupation: Football Player
 Medical History:
 John has a history of a respiratory condition that occasionally affects his athletic performance. His symptoms include shortness of breath, wheezing, and occasional coughing, especially during intense physical activities like football matches or training sessions. John's condition is well-managed with appropriate medication and lifestyle modifications, allowing him to participate in his chosen sport.
 Allergies:
 John has reported sensitivity to certain environmental factors, such as pollen, dust, and smoke. Exposure to these triggers may exacerbate his respiratory symptoms and affect his athletic performance.
 Medications:
 John uses prescribed medications to manage his respiratory condition. These medications include bronchodilators, which help to relax and open up the airways, as well as anti-inflammatory medications to reduce any underlying inflammation.
 Emergency Action Plan:
 John has an emergency action plan in place, which includes specific instructions for managing his symptoms during an asthma-related episode. His coach, teammates, and medical personnel are aware of the plan and know how to respond swiftly if he experiences any severe breathing difficulties.
 Lifestyle Modifications:
 To optimize his athletic performance and minimize the impact of his respiratory condition, John has made certain lifestyle modifications. These include avoiding exposure to known triggers, such as staying indoors during high pollen seasons or using protective masks in situations where air quality may be compromised. He also maintains a regular exercise routine to enhance his overall lung function and cardiovascular fitness.
 Medical Team:
 John is under the care of a team of healthcare professionals, including a pulmonologist and an athletic trainer, who closely monitor his condition. They provide guidance on medication management, offer advice on breathing techniques during physical activity, and ensure John's overall well-being.
 Goals:
 John's primary goal is to continue participating in football while managing his respiratory condition effectively. He aims to maintain optimal athletic performance, minimize the impact of his symptoms on the field, and lead a healthy and active lifestyle.

previous prompts and responses because ChatGPT uses chain-of-thought processing and remembers the conversation thread. This developed patient profile equates to the patient's general asthma background.

Chat GPT Prompt #2: *Develop subjective information to provide symptoms that the patient (John Smith) is experiencing asthma-related issues.*

The Figure 3 ChatGPT output displays the current patient signs and symptoms for the asthma attack used in the case scenario. This information would be used by the simulated patient and the athletic training educator to describe the patient's current issues. The athletic training student would then evaluate the simulated patient based on this information and make a next-steps determination for evaluating the acute asthma attack and vital signs.

Figure 3. The ChatGPT prompt to the query: *Develop subjective information to provide symptoms that the patient (John Smith) is experiencing asthma-related issues.*

Subjective:

John Smith, a 21-year-old football player, presents to the clinic with complaints of recurrent respiratory symptoms that he believes are related to his athletic activities. He reports experiencing episodes of shortness of breath, chest tightness, and wheezing during and after football matches and training sessions. John states that these symptoms have been ongoing for several months and have been progressively worsening, leading to a decline in his athletic performance and overall enjoyment of the sport.

John describes the onset of symptoms primarily during vigorous physical activities, especially when he engages in high-intensity exercises such as sprinting and continuous running. He notes that his symptoms tend to worsen in colder weather or when the air is dry and dusty. John further explains that he often has to take breaks during matches to catch his breath, which hinders his ability to keep up with his teammates and affects his overall stamina on the field.

Additionally, John recalls experiencing occasional coughing spells, especially after physical exertion. He states that the cough is dry and persistent, and it tends to linger for some time after his matches or training sessions have ended.

John admits that he has never had any respiratory issues before and is concerned about the sudden onset of these symptoms. He denies any recent illnesses, fever, or chest pain, and he has not had any previous history of asthma or other respiratory conditions.

John is eager to find a solution for his respiratory problems to regain his peak athletic performance and continue his football career without being hindered by these distressing symptoms.

Chat GPT Prompt #3: *Provide specific values for respiration rate, heart rate, and blood pressure for John Smith.*

The Figure 4 ChatGPT output describes general vital sign values expected during the patient's asthma attack. The ranges provided by ChatGPT are general. Therefore, the athletic training educator could copy and paste the ChatGPT output into an electronic word processing document, allowing the athletic training educator to increase case specificity or promote particular learning objectives. At this point in the simulation scenario, the athletic training student would take corrective actions to treat this acute asthma attack based on the scenario goals and identified learning objectives, concluding the acute asthma attack

Figure 4. The ChatGPT prompt to the query: *Provide specific values for respiration rate, heart rate, and blood pressure for John Smith.*

Specific Values for "John Smith" during an Acute Asthma Attack:

- Respiratory Rate:** During an acute asthma attack, John's respiratory rate may be significantly increased, ranging from 25 to 40 breaths per minute or even higher, depending on the severity of the attack.
- Heart Rate (Pulse):** John's heart rate is expected to be elevated during the asthma attack. It may range from 100 to 140 beats per minute or higher, reflecting the increased demand on the cardiovascular system due to breathing difficulties.
- Blood Pressure:** John's blood pressure may show some variability during an acute asthma attack. It can range from normal to slightly elevated due to increased sympathetic nervous system activity and the body's response to stress.

It is important to note that these specific values can vary depending on the individual and the severity of the asthma attack. Vital signs should be monitored closely during an acute asthma exacerbation to assess the response to treatment and ensure appropriate management. In case of a severe asthma attack, immediate medical attention should be sought to provide necessary interventions and support.

Figure 5. The ChatGPT prompt to the query: *What objective tests need to be performed on John Smith to assist in the diagnosis?*

To assist in diagnosing exercise-induced asthma (EIA) in John Smith, the following objective tests should be performed:

1. **Spirometry:** Spirometry is a fundamental test for assessing lung function and diagnosing asthma. This test measures the amount of air a person can inhale and exhale and how quickly they can exhale. It helps determine if there is airflow obstruction and provides information on the severity of the obstruction.
2. **Exercise Challenge Test:** The exercise challenge test is specifically designed to reproduce symptoms of exercise-induced asthma. During this test, John will be asked to perform physical activity, such as running on a treadmill or using a stationary bike, while his lung function is closely monitored. The goal is to observe if exercise triggers bronchoconstriction and a decrease in lung function, indicating EIA.
3. **Peak Flow Monitoring:** Peak flow monitoring measures the maximum flow of air that John can exhale forcefully in one breath. Regular peak flow monitoring, both before and after exercise, can help detect variations in lung function and identify exercise-induced changes.
4. **Allergy Testing:** Allergy testing, such as skin prick tests or blood tests (specific IgE testing), can identify potential allergens that might be triggering or exacerbating John's exercise-induced asthma. Common allergens tested for include pollen, dust mites, pet dander, and other environmental triggers.

scenario module. The athletic training student would make recommendations for further patient testing and perform any required documentation activity.

ChatGPT Prompt #4: *What objective tests need to be performed on John Smith to assist in the diagnosis?*

This portion reframes the case-based scenario by informing the athletic training student that the situation changed with this interaction occurring several days later with the patient in the athletic training facility. The Figure 5 ChatGPT output displays 4 types of diagnostic tests and the general purpose of each. However, the specific diagnostic findings of

these objective asthma tests are still missing. Depending on the scenario goal, the athletic training educator can further focus on particular asthma testing that would be most relevant to athletic training students and applicable to their knowledge. In this situation, it is realistic that allergy testing results would not apply to the expected capabilities of an entry-level athletic trainer. The athletic training educator can then refine the subsequent ChatGPT output and request only diagnostic test results categories and details to enhance the scenario's specificity and application to the learning objectives.





ChatGPT Prompt #5: *Provide the expected results from the objective tests in the last response, excluding allergy testing.*

The Figure 6 ChatGPT output provides generalized test results for spirometry, the exercise challenge test, and peak flow measurements. Again, the athletic training educator can copy and paste the generated ChatGPT output to word processing software and insert particular testing figures based on the scenario learning objectives. The athletic training student is then asked to make clinical recommendations from this information and patient interaction throughout the scenario.

ChatGPT Prompt #6: *Develop a differential diagnosis for the patient in the previous scenario.*

The Figure 7 ChatGPT output lists potential differential diagnoses. Although the athletic training educator can develop his or her own differential diagnosis list, ChatGPT may provide some additional diagnoses that the athletic training educator had not considered but the athletic training student may. The athletic training educator would then determine and use the differential diagnosis the athletic training student would have previously learned, depending on the program framework and course sequencing. At this

Figure 6. The ChatGPT prompt to the query: *Provide the expected results from the objective tests in the last response, excluding allergy testing.*

 Expected Results from Objective Tests for Exercise-Induced Asthma (EIA) in John Smith:   

1. Spirometry:

- Pre-exercise FEV1: Normal or near-normal values, indicating adequate lung function at rest.
- Pre-exercise FVC: Normal or near-normal values, suggesting no significant lung volume abnormalities.
- Pre-exercise FEV1/FVC ratio: Within normal limits, indicating no airflow obstruction at rest.
- Post-exercise FEV1: A decrease of 10-20% or more from the pre-exercise value, indicating exercise-induced bronchoconstriction and airflow limitation.

2. Exercise Challenge Test:

- During the exercise challenge test, John may experience symptoms of exercise-induced asthma, such as coughing, wheezing, chest tightness, and shortness of breath.
- Lung function parameters, specifically FEV1, will decrease significantly (by 10-20% or more) during or shortly after exercise, confirming exercise-induced bronchoconstriction.

3. Peak Flow Monitoring:

- Pre-exercise PEFR: Normal or near-normal values, reflecting good lung function at rest.
- Post-exercise PEFR: A decrease of 10-20% or more from the pre-exercise value, indicating exercise-induced airflow limitation.

Figure 7. The ChatGPT prompt to the query: *Develop a differential diagnosis for the patient in the previous scenario.*

1. Exercise-Induced Bronchoconstriction (EIB): EIB is a common condition characterized by airway narrowing and respiratory symptoms triggered by physical activity. Symptoms such as shortness of breath, wheezing, and coughing typically occur during or shortly after exercise.
2. Allergic Rhinitis: Allergic rhinitis, also known as hay fever, is an allergic reaction to environmental triggers such as pollen, dust mites, or pet dander. It can cause nasal congestion, sneezing, itching, and a runny nose, which may contribute to respiratory symptoms during physical activity.
3. Upper Respiratory Tract Infection: Infections affecting the upper respiratory tract, such as the common cold or sinusitis, can lead to symptoms like coughing, congestion, and difficulty breathing. These symptoms may worsen during physical exertion.
4. Exercise-Induced Asthma (EIA): EIA is a condition where physical activity triggers asthma-like symptoms. While not using the word "asthma," this condition describes the occurrence of respiratory symptoms specifically during exercise. It shares similarities with asthma but may have distinct triggers and patterns.
5. Chronic Obstructive Pulmonary Disease (COPD): Although less likely in a young individual, certain forms of COPD, such as alpha-1 antitrypsin deficiency or early-onset COPD, can manifest at a younger age. COPD is characterized by persistent airflow limitation and symptoms such as shortness of breath, cough, and wheezing.
6. Gastroesophageal Reflux Disease (GERD): GERD is a condition where stomach acid flows back into the esophagus, causing symptoms like heartburn, regurgitation, and cough. Acid reflux may irritate the airways and lead to respiratory symptoms during physical activity.
7. Cardiac Conditions: Certain cardiac conditions, such as exercise-induced arrhythmias or structural abnormalities, can mimic respiratory symptoms during exercise. These conditions may cause shortness of breath, chest discomfort, and fatigue during physical exertion.
8. Anxiety/Exercise-Induced Panic Attacks: Psychological factors like anxiety or panic attacks can produce physical symptoms that mimic respiratory distress during exercise. Hyperventilation, rapid breathing, and a sense of impending doom are common manifestations.

time, the case scenario would conclude, and the athletic training educator would prompt the athletic training student to complete his or her patient documentation, discuss the overall treatment course and recommendations with the patient, create an asthma action plan, or reflect on the entire scenario experience.

The asthma case-based simulation scenario exemplified above demonstrates the basic process for using ChatGPT to assist in creating clinical scenarios for simulations and standardized patient activities. ChatGPT's chain-of-through logic and ability to swiftly adapt to differing inputs allows the athletic training educator to generate various types of case-based scenario or scenario portions quickly. By using the general knowledge and humanlike writing capabilities of ChatGPT, the athletic training educator can outsource components of case-based scenario creation responsibilities to ChatGPT. Once ChatGPT has created generalized scenario shells, the athletic training educator can then refine and adjust the ChatGPT output specific to the simulation learning objective or applicable knowledge level of the athletic training student. This process can help alleviate portions of the intensive process for developing case-based scenarios and assist the athletic faculty member in focusing on other vital aspects of athletic training student learning and the overall clinical integration of skill development.

CONCLUSIONS

Athletic training educators should understand new technology and how to incorporate the technology among athletic

training students, peers, and professionals. As exemplified above, LLM chatbot interfaces such as ChatGPT have the potential to assist athletic training educators in creating educational content and facilitating student learning while providing athletic training educators with a tool that can help lessen some aspects of their administrative and academic duties. ChatGPT and LLM chatbots have the potential to transform the education, technology, and health care sectors and become analogous to incorporating PowerPoint presentations, eLearning, high-fidelity simulations, mobile applications, and telehealth. Athletic training educators must adapt and use emerging technology that athletic training students and future health care professionals will employ in their clinical practice settings after graduation because ChatGPT is part of a more significant AI transition in the health care industry.

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