

A Picture Worth a Thousand Words, Created with One Sentence: Using Artificial Intelligence–created Art to Enhance Medical Education

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ABSTRACT

With the advancement of digital technology, the medium in which medical education is delivered has evolved from chalk talks, to the use of overhead projectors, and now to a digital format. Although the old *modus operandi* of a good chalk talk can still seize the attention of pupils and inspire, new methods continue to emerge. In recent years, artificial intelligence has materialized as a tool to advance the medical field, and medical education is no exception. The purpose of this perspective is to introduce a new, powerful instrument to the medical educator: artificial intelligence–generated art. This tool can be leveraged to improve medical education, both in narrative medicine and in the creation of educational imagery.

At our institution, first-year medical students are taken on a field trip to the Yale Center for British Art to learn the skill of observation (1). In this narrative medicine

course, they are placed in front of a painting for 15 minutes but are blinded to the caption and title of the work. Each painting is meant as a “surrogate for a patient,”

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and students are coached to observe both the “important” and “unimportant” details, just as we do during the physical examination. The course was aptly created by a dermatologist and has been shown to enhance the visual diagnostic skills of students (2, 3). There are vast examples of the cross-section of art and medical education. Medical illustrations created by the likes of Frank H. Netter have taught generations of physicians anatomy and physiology; interactive illustrated cases help us “experience” the process of diagnostic reasoning; and medical photography can teach us patterns of pathology and tell a patient’s story.

In recent years, there has been substantial promise and investment in using artificial intelligence (AI) within medicine (4). Novel approaches using AI to promote medical education are being attempted, such as employing natural language processing to give students feedback on their case presentations (5). Tools are being developed, but at the same time, literature suggests that medical students desire more formalized training on AI applications as they pertain to the future of medicine (6).

Novel AI-based programs have emerged that can turn natural language into high-fidelity artwork (7). At first, the idea that a simple string of words can be turned into



Figure 1. “A Van Gogh style painting of a young doctor looking at art in a museum.” Image created with artificial intelligence.

complex art is hard to believe. However, after a few seconds of computing, these AI systems create impressive photorealistic imagery, abstract oil paintings, three-dimensional renderings, in the style of Picasso or Kara Walker, and anything else you can imagine (8). Some of these AI programs have been trained using 12 billion online images and their associated captions (9). For example, Figure 1 was created with one of these systems by the authors of this paper. The input of “A Van Gogh Style painting of a young doctor looking at art in a museum” generated this image that, in our opinion, captures the experience of a student engaged in the narrative medicine course described above. We contend that this new tool, AI-generated art, can be leveraged to improve medical education within narrative medicine and in the creation of educational imagery.

Narrative medicine uses storytelling and narrative skills to understand and communicate the experiences of patients, healthcare providers, and others involved in the healthcare system. AI-generated art has the potential to enhance the practice of narrative medicine by providing new ways of creative expression, communication, and reflection. AI-generated art can be used to create visual representations of patient narratives or healthcare provider experiences that might be difficult to express in words alone. For example, within narrative medicine curricula, instead of using creative writing, medical students can create artwork to reflect and share their impactful clinical or patient experiences in a small-group setting. This practice can also serve as an effective outlet for debriefing. Residents or fellows may use AI-generated art to create interactive cases when teaching educational conferences, using imagery to take learners with them on the case. This avoids the

concern of HIPAA (Health Insurance Portability and Accountability Act of 1996) violations because there is no need to use real patient photographs if a photograph can be generated that accurately represents the case. Attendings and clinical educators can employ AI-generated art to construct new medical illustrations or diagrams for didactic lectures. They need not worry about copyright infringement with AI-created images, which is the case with many images found online. Finally, at all career stages, these systems can be used to create effective patient education materials that convey helpful information to patients about their illnesses (Table 1).

To demonstrate AI’s use and value, we provide three concrete examples of AI-created art in medical education (Figures 2, 3, 4A, and 4B).

In a narrative medicine course, learners may be asked to share a particular patient encounter that impacted them professionally. To illustrate an interaction between physicians and their patients with interstitial lung disease, the authors typed the phrase “Diego Rivera art, depicting a doctor using a stethoscope to listen to the lungs of an aged man with pulmonary fibrosis, who is short of breath but grateful” (Figure 2). The result shows a scared and vulnerable-looking patient with a comforting and steadfast physician.

As a medical educator, you may seek to inspire your audience by visually representing an abstract idea that may not be depicted in stock photos found with an internet search. For example, to convey the impact of the environment on pulmonary health, one of the authors typed “An expressive oil painting of the lungs and the Earth.” A painting emerged (Figure 3) that was more evocative than we could have ever conceived or created on our own and was used on the first slide of a presentation

Table 1. Potential uses for artificial intelligence–generated art in medical education

Who Can Benefit	Use	Specific Examples
Medical students	Narrative medicine: using art to reflect on patient encounters/experiences Debriefing	In a small-group educational setting, students will have the ability to create art that may tell a patient's story, help in debriefing, and share an experience with others.
Residents/fellows	Interactive case presentation creation	Trainees can create “real” patient cases using images that do not violate HIPAA but accurately convey a similar patient and disease.
Attendings/clinical educators	Medical illustrations/art: use of art in didactic lectures, presentations Creation of educational diagrams	Educators can produce high-quality imagery that is free of copyright, curating images to a specific case, and engages learners in a creative manner.
Patients	Development of patient education materials/aids	Individuals at all levels in medicine can develop patient education materials and high-quality visual aids that convey information about illness and management.

Definition of abbreviation: HIPAA = Health Insurance Portability and Accountability Act of 1996.

titled “We Are What We Breathe” (Figure 3).

In preparing for a talk to leadership on the impacts of work overload, one of the authors wished to illustrate a burnt-out physician artfully. They typed “A Picasso Blue Period style painting of a tired critical care physician talking on the phone and looking at a computer screen.” However, on second thought, they decided to go with a Basquiat-style painting and changed some inputted words. Ultimately, they showed both, highlighting the impacts of sleep deprivation and isolation in one and sensory overload and stress in another (Figures 4A and 4B). As may be expected, a reflective process is involved in creating these images. The user types a

sentence, looks at the pictures generated, then can either request more variations or modify the wording to get a different image that conveys a more accurate meaning. The process is not simply passive but rather iterative, with the user trying multiple options until an image that best expresses the meaning materializes. In our experience, the meaning we wish to convey crystallizes as we engage in this process, making the communication more effective.

To be sure, there are limitations and concerns with this emerging technology. AI art-generating systems were not designed for creating medical images/illustrations and, at times, lack the ability to turn medical jargon into art. Moreover,

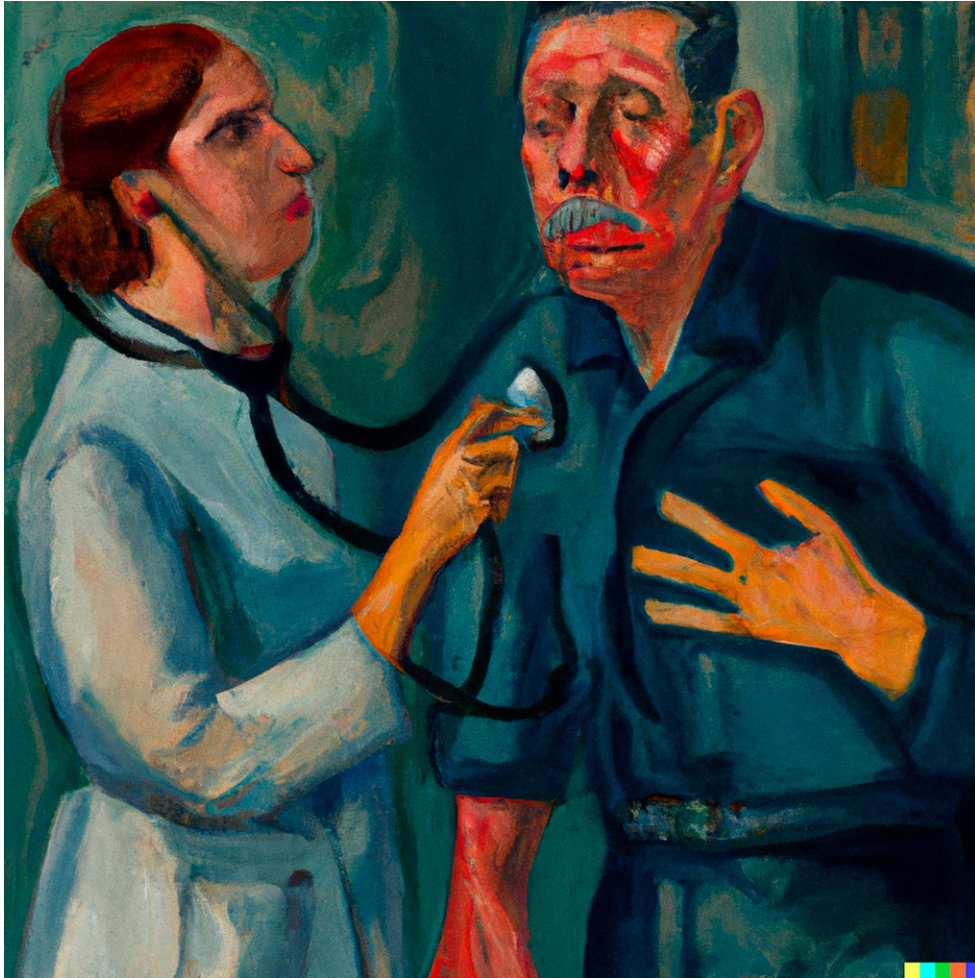


Figure 2. “Diego Rivera art depicting a doctor using a stethoscope to listen to the lungs of an aged man with pulmonary fibrosis who is short of breath but grateful.” Image created with artificial intelligence.

creating meaningful images may take several iterations of the inputted phrase and may add time when compiling a presentation. Telling a story through narrative medicine does not necessarily require imagery or art; it can be done with reflective writing or another creative medium. Finally, to our knowledge, there is no data on using AI-generated art to enhance medical education. Our experiences have been very positive; creating the images, as previously mentioned, enriched our views of the topics we presented, with attendees and trainees responding enthusiastically. Although our observations are naturally anecdotal, we hope to see future studies assessing the use of

AI-generated art in medical education, regarding both narrative medicine and the creation of medical illustrations.

Nevertheless, there are many perceived benefits to using AI-generated art for medical education. The programs are often freely available; the images created are novel and without copyright; and you can tailor the image to your thesis rather than the inverse. AI artwork generators can concoct pictures of the patients described in our cases; the patients created have never existed and do not require privacy protection under HIPAA.

Leonardo da Vinci, the Renaissance artist and scientist, wrote that sleep and hunger



Figure 3. "An expressive oil painting of the lungs and the Earth." Image created with artificial intelligence.



Figure 4. (A) "Picasso Blue Period style painting of a tired critical care physician talking on the phone and looking at a computer screen." (B) "Basquiat style painting of a tired critical care physician talking on the phone and looking at a computer screen." Images created with artificial intelligence.

would overcome a poet before the poet could describe with words what a painting depicts in an instant (10). AI-generated art allows us to create images that encourage reflection; narrate our stories; communicate our experiences of the patients we care for;

and, as Leonardo suggested; with a sentence or less, create a picture that says a thousand words and perhaps even much more.

Author disclosures are available with the text of this article at www.atsjournals.org.

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