

SELECTED ABSTRACTS FROM PUBMED

1. *Taghizadeh-Waghefi A, Petrov A, Wilbring M, Alexiou K, Kappert U, Matschke K, et al. Cardiac Surgery for Treatment of COVID-19-Associated Infectious Endocarditis. Tex Heart Inst J. 2023 Mar 1;50(2):e227884. doi: 10.14503/THIJ-22-7884.*

ABSTRACT

Background: Significant uncertainty exists about the optimal timing of surgery for infectious endocarditis (IE) surgery in patients with active SARS-CoV-2 infection. This case series and a systematic review of the literature were carried out to evaluate the timing of surgery and postsurgical outcomes for patients with COVID-19-associated IE.

Methods: The PubMed database was searched for reports published from June 20, 2020, to June 24, 2021, that contained the terms infective endocarditis and COVID-19. A case series of 8 patients from the authors' facility was also added.

Results: A total of 12 cases were included, including 4 case reports that met inclusion criteria in addition to a case series of 8 patients from the authors' facility. Mean (SD) patient age was 61.9 (17.1) years, and patients were predominantly male (91.7%). Being overweight was the main comorbidity among patients studied (7/8 [87.5%]). Among all patients evaluated in this study, dyspnea (n = 8 [66.7%]) was the leading symptom, followed by fever (n = 7 [58.3%]). *Enterococcus faecalis* and *Staphylococcus aureus* caused 75.0% of COVID-19-associated IE. The mean (SD) time to surgery was 14.5 (15.6) days (median, 13 days). In-hospital and 30-day mortality for all evaluated patients was 16.7% (n = 2).

Conclusion: Clinicians must carefully assess patients diagnosed with COVID-19 to prevent missing underlying diseases such as IE. If IE is suspected, clinicians should avoid postponement of crucial diagnostic and treatment steps.

Keywords: COVID-19; cardiac surgery; endocarditis.

2. *Nicolotti D, Grossi S, Nicolini F, Galligani A, Rossi S. Difficult Respiratory Weaning after Cardiac Surgery: A Narrative Review. J Clin Med. 2023 Jan 7;12(2):497. doi: 10.3390/jcm12020497.*

ABSTRACT

Respiratory weaning after cardiac surgery can be difficult or prolonged in up to 22.7% of patients. The inability to wean from a ventilator within the first 48 h after surgery is related to increased short- and long-term morbidity and mortality. Risk factors are mainly non-modifiable and include preoperative renal failure, New York Heart Association, and Canadian Cardiac Society classes as well as surgery and cardio-pulmonary bypass time. The positive effects of pressure ventilation on the cardiovascular system progressively fade during the progression of weaning, possibly leading to pulmonary oedema and failure of

spontaneous breathing trials. To prevent this scenario, some parameters such as pulmonary artery occlusion pressure, echography-assessed diastolic function, brain-derived natriuretic peptide, and extravascular lung water can be monitored during weaning to early detect hemodynamic decompensation. Tracheostomy is considered for patients with difficult and prolonged weaning. In such cases, optimal patient selection, timing, and technique may be important to try to reduce morbidity and mortality in this high-risk population.

Keywords: cardiac surgery; respiratory weaning; tracheostomy; ventilation.

3. *Kloeser R, Buser A, Bolliger D. Treatment Strategies in Anemic Patients Before Cardiac Surgery. J Cardiothorac Vasc Anesth. 2023 Feb;37(2):266-275. doi: 10.1053/j.jvca.2022.09.085. Epub 2022 Sep 22.*

ABSTRACT

Both preoperative anemia and the transfusion of red blood cells have been associated with increased morbidity and mortality after cardiac surgery. To reduce the need for blood transfusion during surgery and improve patient outcomes, patient blood management programs have been developed. A primary focus of patient blood management in the preoperative period is the identification, diagnosis, and treatment of preoperative anemia, as anemia is associated with an increased risk of preoperative blood transfusion. In this narrative review, the authors focus on the laboratory screening of anemia before surgery and the evidence and limitations of different treatment strategies in anemic patients scheduled for cardiac surgery. To accurately correct preoperative anemia, the timely detection and definition of the etiology of anemia before elective cardiac surgery are crucial. Multiple randomized studies have been performed using preoperative iron supplementation and/or administration of erythropoiesis-stimulating agents in patients undergoing cardiac surgery. Although preoperative iron substitution in patients with iron deficiency is recommended, the evidence of its effectiveness is limited. In patients with nonpure iron deficiency anemia, combined therapy with erythropoiesis-stimulating agents and intravenous iron is recommended. Combined therapy might effectively reduce the need for red blood cell transfusion, even if applied shortly before cardiac surgery. The therapeutic effect on morbidity and mortality remains unclear. Nonetheless, the timely preoperative assessment of anemia and determination of iron status, eventually leading to targeted therapy, should become a standard of care and might potentially improve patient outcomes.

Keywords: anemia; cardiac surgery; outcome; red blood cells; transfusion.

4. *Alabdjalbar MS, Hasan B, Noseworthy PA, Maalouf JF, Ammash NM, Hashmi SK. Machine Learning in Cardiology: A Potential Real-World Solution in Low- and*

Middle-Income Countries. J Multidiscip Healthc. 2023 Jan 28;16:285-295. doi: 10.2147/JMDH.S383810. eCollection 2023.

ABSTRACT

Artificial intelligence (AI) and machine learning (ML) is a promising field of cardiovascular medicine. Many AI tools have been shown to be efficacious with a high level of accuracy. Yet, their use in real life is not well established. In the era of health technology and data science, it is crucial to consider how these tools could improve healthcare delivery. This is particularly important in countries with limited resources, such as low- and middle-income countries (LMICs). LMICs have many barriers in the care continuum of cardiovascular diseases (CVD), and big portion of these barriers come from scarcity of resources, mainly financial and human power constraints. AI/ML could potentially improve healthcare delivery if appropriately applied in these countries. Expectedly, the current literature lacks original articles about AI/ML originating from these countries. It is important to start early with a stepwise approach to understand the obstacles these countries face in order to develop AI/ML-based solutions. This could be detrimental to many patients' lives, in addition to other expected advantages in other sectors, including the economy sector. In this report, we aim to review what is known about AI/ML in cardiovascular medicine, and to discuss how it could benefit LMICs.

Keywords: artificial intelligence; cardiology; countries; income; low; machine learning; middle.

5. *Gilson A, Safranek CW, Huang T, Socrates V, Chi L, Andrew R, et al. How Does ChatGPT Perform on the United States Medical Licensing Examination? The Implications of Large Language Models for Medical Education and Knowledge Assessment. JMIR Med Educ. 2023 Feb 8;9:e45312. doi: 10.2196/45312.*

ABSTRACT

Background: Chat Generative Pre-trained Transformer (ChatGPT) is a 175-billion-parameter natural language processing model that can generate conversation-style responses to user input.

Objective: This study aimed to evaluate the performance of ChatGPT on questions within the scope of the United States Medical Licensing Examination Step 1 and Step 2 exams, as well as to analyze responses for user interpretability.

Methods: We used 2 sets of multiple-choice questions to evaluate ChatGPT's performance, each with questions pertaining to Step 1 and Step 2. The first set was derived from AMBOSS, a commonly used question bank for medical students, which also provides statistics on question difficulty and the performance on an exam relative to the user base. The second set was the National Board of Medical Examiners (NBME) free 120 questions. ChatGPT's performance was compared to 2 other large language models, GPT-3 and InstructGPT. The text output of each

ChatGPT response was evaluated across 3 qualitative metrics: logical justification of the answer selected, presence of information internal to the question, and presence of information external to the question.

Results: Of the 4 data sets, AMBOSS-Step1, AMBOSS-Step2, NBME-Free-Step1, and NBME-Free-Step2, ChatGPT achieved accuracies of 44% (44/100), 42% (42/100), 64.4% (56/87), and 57.8% (59/102), respectively. ChatGPT outperformed InstructGPT by 8.15% on average across all data sets, and GPT-3 performed similarly to random chance. The model demonstrated a significant decrease in performance as question difficulty increased ($P=.01$) within the AMBOSS-Step1 data set. We found that logical justification for ChatGPT's answer selection was present in 100% of outputs of the NBME data sets. Internal information to the question was present in 96.8% (183/189) of all questions. The presence of information external to the question was 44.5% and 27% lower for incorrect answers relative to correct answers on the NBME-Free-Step1 ($P<.001$) and NBME-Free-Step2 ($P=.001$) data sets, respectively.

Conclusions: ChatGPT marks a significant improvement in natural language processing models on the tasks of medical question answering. By performing at a greater than 60% threshold on the NBME-Free-Step-1 data set, we show that the model achieves the equivalent of a passing score for a third-year medical student. Additionally, we highlight ChatGPT's capacity to provide logic and informational context across the majority of answers. These facts taken together make a compelling case for the potential applications of ChatGPT as an interactive medical education tool to support learning.

Keywords: ChatGPT; GPT; MedQA; NLP; artificial intelligence; chatbot; conversational agent; education technology; generative pre-trained transformer; machine learning; medical education; natural language processing.

6. *Kim H-Y, Kim E-Y. Effects of Medical Education Program Using Virtual Reality: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2023 Feb 22;20(5):3895. doi: 10.3390/ijerph20053895.*

ABSTRACT

Several studies have examined the effect of virtual reality (VR) education. However, they are mostly systematic reviews or meta-analyses focusing on doctors and residents; they fail to consider VR medical education for a broader range of learners. We evaluated the effectiveness of VR education for health professionals and identified the essential features of education. Randomized controlled trials published from January 2000 to April 2020 were identified from PubMed, Embase, CINAHL, and the Cochrane Library ($n = 299$). The randomized studies' bias risk was evaluated using Cochrane's Risk of Bias tool. Meta- and subgroup-analyses were conducted using Review Manager 5.4.1. The overall effect was measured using Hedges' g and determined using Z-statistics ($p < 0.05$). Heterogeneity was assessed

using X2 and I2 statistics. Among the identified records, 25 studies were selected through systematic review, and 18 studies were included in the meta-analysis. We identified a significant improvement in the VR group's skill and satisfaction levels, and that less immersive VR was more efficacious for knowledge outcomes than fully immersive VR. Maximizing the advantages of VR will increase learning opportunities and complement the limited clinical experience, thus improving medical services. A systematic and efficient VR medical education program will greatly enhance learners' core competencies.

Keywords: health personnel; randomized controlled trial; systematic review; unlicensed; virtual reality.

7. *Sun Z, Wong YH, Yeong CH. Patient-Specific 3D-Printed Low-Cost Models in Medical Education and Clinical Practice. Micromachines (Basel). 2023 Feb 16;14(2):464. doi: 10.3390/mi14020464.*

ABSTRACT

3D printing has been increasingly used for medical applications with studies reporting its value, ranging from medical education to pre-surgical planning and simulation, assisting doctor-patient communication or communication with clinicians, and the development of optimal computed tomography (CT) imaging protocols. This article presents our experience of utilising a 3D-printing facility to print a range of patient-specific low-cost models for medical applications. These models include personalized models in cardiovascular disease (from congenital heart disease to aortic aneurysm, aortic dissection and coronary artery disease) and tumours (lung cancer, pancreatic cancer and biliary disease) based on CT data. Furthermore, we designed and developed novel 3D-printed models, including a 3D-printed breast model for the simulation of breast cancer magnetic resonance imaging (MRI), and calcified coronary plaques for the simulation of extensive calcifications in the coronary arteries. Most of these 3D-printed models were scanned with CT (except for the breast model which was scanned using MRI) for investigation of their educational and clinical value, with promising results achieved. The models were confirmed to be highly accurate in replicating both anatomy and pathology in different body regions with affordable costs. Our experience of producing low-cost and affordable 3D-printed models highlights the feasibility of utilizing 3D-printing technology in medical education and clinical practice.

Keywords: 3D printing; anatomy; cardiovascular disease; cost; heart; medicine; model; pathology.

8. *Singh T, Shah N. Competency-based medical education and the McNamara fallacy: Assessing the important or making the assessed important? J Postgrad Med. 2023 Jan-Mar;69(1):35-40. doi: 10.4103/jpgm.jpgm_337_22.*

ABSTRACT

The McNamara fallacy refers to the tendency to focus on numbers, metrics, and quantifiable data while disregarding

the meaningful qualitative aspects. The existence of such a fallacy in medical education is reviewed in this paper. Competency-based medical education (CBME) has been introduced in India with the goal of having Indian Medical Graduates competent in five different roles - Clinician, Communicator, Leader and member of the health care team, Professional, and Lifelong learner. If we only focus on numbers and structure to assess the competencies pertaining to these roles, we would be falling prey to the McNamara fallacy. To assess these roles in the real sense, we need to embrace the qualitative assessment methods and appreciate their value in competency-based education. This can be done by using various workplace-based assessments, choosing tools based on educational impact rather than psychometric properties, using narratives and descriptive evaluation, giving grades instead of marks, and improving the quality of the questions asked in various exams. There are challenges in adopting qualitative assessment starting with being able to move past the objective-subjective debate, to developing expertise in conducting and documenting such assessment, and adding the rigor of qualitative research methods to enhance its credibility. The perspective on assessment thus needs a paradigm shift - we need to assess the important rather than just making the assessed important; and this would be crucial for the success of the CBME curriculum.

Keywords: Assessment; McNamara fallacy; competency; narrative.

9. *Xie X, Li X, Song W. Tumor organoid biobank-new platform for medical research. Sci Rep. 2023 Feb 1;13(1):1819. doi: 10.1038/s41598-023-29065-2.*

ABSTRACT

Organoids are a new type of 3D model for tumor research, which makes up for the shortcomings of cell lines and xenograft models, and promotes the development of personalized precision medicine. Long-term culture, expansion and storage of organoids provide the necessary conditions for the establishment of biobanks. Biobanks standardize the collection and preservation of normal or pathological specimens, as well as related clinical information. The tumor organoid biobank has a good quality control system, which is conducive to the clinical transformation and large-scale application of tumor organoids, such as disease modeling, new drug development and high-throughput drug screening. This article summarized the common tumor types of patient-derived organoid (PDO) biobanks and the necessary information for biobank construction, such as the number of organoids, morphology, success rate of culture and resuscitation, pathological types. In our results, we found that patient-derived tumor organoid (PDTO) biobanks were being established more and more, with the Netherlands, the United States, and China establishing the most. Biobanks of colorectal, pancreas, breast, glioma, and bladder cancers were established more, which reflected the relative maturity of culture techniques for these tumors. In addition, we

provided insights on the precautions and future development direction of PDTO biobank building.

10. **Davis HE, McCorkell L, Vogel JM, Topol EJ. Long COVID: major findings, mechanisms and recommendations. *Nat Rev Microbiol.* 2023 Mar;21(3):133-146. doi: 10.1038/s41579-022-00846-2. Epub 2023 Jan 13.**

ABSTRACT

Long COVID is an often debilitating illness that occurs in at least 10% of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections. More than 200 symptoms have been identified with impacts on multiple organ systems. At least 65 million individuals worldwide are estimated to have long COVID, with cases increasing daily. Biomedical research has made substantial progress in identifying various pathophysiological changes and risk factors and in characterizing the illness; further, similarities with other viral-onset illnesses such as myalgic encephalomyelitis/chronic fatigue syndrome and postural orthostatic tachycardia syndrome have laid the groundwork for research in the field. In this Review, we explore the current literature and highlight key findings, the overlap with other conditions, the variable onset of symptoms, long COVID in children and the impact of vaccinations. Although these key findings are critical to understanding long COVID, current diagnostic and treatment options are insufficient, and clinical trials must be prioritized that address leading hypotheses. Additionally, to strengthen long COVID research, future studies must account for biases and SARS-CoV-2 testing issues, build on viral-onset research, be inclusive of marginalized populations and meaningfully engage patients throughout the research process.

11. **Cianflone A, Savoia F, Parasole R, Mirabelli P. Pediatric biobanks to enhance clinical and translational research for children. *Eur J Pediatr.* 2023 Jan 24;1-10. doi: 10.1007/s00431-023-04818-3. Online ahead of print.**

ABSTRACT

Including children in biomedical research is an argument for continual reflection and practice refinement from an ethical and legal standpoint. Indeed, as children reach adulthood, a reconsent method should be used, and data connected with samples should ideally be updated based on the children's growth and long-term results. Furthermore, because most pediatric disorders are uncommon, children's research initiatives should conform to standard operating procedures (SOPs) set by worldwide scientific organizations for successfully sharing data and samples. Here, we examine how pediatric biobanks can help address some challenges to

improve biomedical research for children. Indeed, modern biobanks are evolving as complex research platforms with specialized employees, dedicated spaces, information technologies services (ITS), and ethical and legal expertise. In the case of research for children, biobanks can collaborate with scientific networks (i.e., BBMRI-ERIC) and provide the collection, storage, and distribution of biosamples in agreement with international standard procedures (ISO-20387). Close collaboration among biobanks provides shared avenues for maximizing scarce biological samples, which is required to promote the translation of scientific breakthroughs for developing clinical care and health policies tailored to the pediatric population. Moreover, biobanks, through their science communication and dissemination activities (i.e., European Biobank Week), may be helpful for children to understand what it means to be engaged in a research study, allowing them to see it as a pleasant, useful, and empowering experience. Additionally, biobanks can notify each participant about which projects have been accomplished (i.e., through their websites, social media networks, etc.); they can facilitate future reconsent procedures and update sample-associated data based on the children's growth. Finally, because of the increasing interest from public and commercial organizations in research efforts that include the sharing and reuse of health data, pediatric biobanks have a crucial role in this context. Consequently, they could benefit from funding opportunities for sustaining research activities even regarding rare pediatric disorders. Conclusion: Pediatric biobanks are helpful for providing biological material for research purposes, addressing ethical and legal issues (i.e. data protection, consent, etc.), and providing control samples from healthy children of various ages and from different geographical regions and ethnicities. Therefore, it is vital to encourage and maintain children's engagement in medical research programs and biobanking activities, especially as children become adults, and reconsent procedures must be applied. What is Known: • Biobanks are critical research infrastructures for medical research, especially in the era of "omic" science. However, in light of their fragility and rights children's participation in biobanking and medical research programs is a complex argument of continuous debate in scientific literature. What is New: • We propose a review of the literature on pediatric biobanks with a particular focus on oncological biobanks. The main current limitations and challenges for pediatric biobanks are presented and possible solutions are discussed.

Keywords: Biobank; Children; Consent; Pediatrics; Rare disease; Rare tumors; Reconsent.