LETTER TO EDITOR

The path to the future of pediatrics: new opportunities with artificial intelligence in child care

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To the Editor

Currently, the emergence of artificial intelligence (AI) is revolutionizing medicine in general, and it is essential to be informed about the different options that the use of these artificial tools allows us, such as Machine Learning (ML) ChatGPT, Bard, and others (1).

INTRODUCTION

AI is defined as algorithms capable of performing activities that require human skills on computers or digital devices (2). Over the last year, the capacity of solutions such as ChatGPT, which presents an adequate response speed and contextual adaptation, has been highlighted, making it a complementary tool in orienting and resolving problems in education and clinical care (3).

The different medical subspecialties in pediatrics, such as neurology, cardiology, gastroenterology, and others, are no strangers to this transformation and have been having novel results in AI-oriented management. One review found that AI-based tools are showing promising results for the diagnosis and treatment of pediatric diseases, such as jaundice and cancer (4). Meanwhile, in neonatal outcomes, machine learning algorithm techniques have demonstrated adequate performance in predicting diseases in newborns (5).

Faced with the recent emergence of new findings, it is necessary to analyze the degree of importance they may have in medical practice, depending on the specialty. In this letter, we explore the visionary impact of AI in pediatric care and how these new opportunities in different pediatric subspecialties can generate new ways to improve patient's quality of life.

Applications in Pediatrics and its Specialties

To explore the impact of artificial intelligence in medical pediatrics and its utilities in the subspecialties of this branch, a quick bibliographic search was conducted in the Scopus and PubMed databases. The search was performed using keywords such as "artificial intelligence," "medical pediatrics," "child care," and "pediatric specialty," among others. Several studies were found that revealed new developments in pediatric practice.

The applications of AI in pediatrics span several specialties, transforming the delivery of medical care to children in each of them. Among the novelties, it was found that, in the field of pediatric neurology, the use of deep learning models and graph metrics analysis allows for discriminating and understanding different brain states in children with epileptic spasms. The model made it possible to discriminate and understand different types of brain states not easily perceptible by visual inspection through electroencephalogram (6).

In the field of pediatric cardiology, a study sought to evaluate the efficacy of Ligence Heart® software (Ligence Heart version 3.5.0, Ligence, UAB, Vilnius, Lithuania) initially developed for adults in the analysis of pediatric echocardiography studies. The software was found to reduce echocardiographic evaluation time and helped improve accuracy and consistency of interpretation. Good agreement between the software and experienced physicians was shown for two measurement parameters: ejection fraction (EF) and sinotubular junction (STJ), but more training and research is needed for other characteristics (7).

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Currently, software such as IBM Watson Health® (Armonk, NY) and BoneXpert® (Visiana, Hørsholm, Denmark), designed for images with a precise description or classification, are available. However, there are interesting future applications for the use of AI in pediatric radiology, for example, in syndromic radiographic studies, for child abuse imaging, and in metabolic imaging (e.g., bone mineral density measurement), as they are showing great potential for improving diagnosis and image interpretation (8). Concerning pediatric surgery, AI has begun to show a significant impact on diagnosis, surgical planning, and execution of procedures, which is being achieved with the application of artificial neural networks, deep learning, and virtual surgery, which helps computer-assisted diagnosis, preoperative simulation and video analysis for identification of intraoperative adverse events (9).

In gastroenterology, AI has focused on computer-aided detection (CADe) and computer-aided characterization or diagnosis (CADx) to identify polyps. CADe-focused algorithms are developed primarily to detect pathology, such as polyps. CADx is developed for optimal diagnosis and characterization of lesions. Both improve the quality of pediatric patient-centered endoscopic care (10) (see Table 1).

Table 1. Pediatric subspecialties with development in the use of Artificial Intelligence

Author(s), Country, Year of publication	Pediatric Subspecialty	Development with Artificial Intelligence
Nogales A, et al., España, 2023	Neurology	Deep-learning techniques in the analysis and interpretation of EEG signals. In particular, CNNs are used.
Vasile CM, et al., Francia 2023	Cardiology	Deep-learning techniques, Ligence Heart Software (v.3.5.0) analyzes echocardiographic images. Reduced measurement time and automated segmentations.
Otjen, et al., Alemania, 2021	Radiology	Applications such as healthcare and IBM Watson Health are used in syndromic radiographic studies and BoneXpert for measuring bone mineral density in children, improving radiological diagnosis.
Jasbir Dhaliwal, et al., EE.UU /Canadá, 2022	Gastroenterology	The CADe computer is used to detect gastrointestinal pathologies such as polyps, and CADx is useful in the detection of GI lesions. Both benefit pediatric endoscopic care.
Gödeke, et al., Alemania, 2019	Surgery	Artificial Neural Networks outperform parameters such as APACHE. Deep-learning; predicts death in pediatric trauma and virtual surgery, is useful for detection and prediction of intraoperative events.

***Note**: CNNs, Convolutional Neural Networks. CADe, computer-aided detection. CADx, computer-aided characterization or diagnosis. GI, gastrointestinal. APACHE, Acute Physiology and Chronic Health Evaluation*

Ethical considerations and prospects

Definitively, the use of AI in pediatrics should be considered to reinforce and strengthen new management and interventions. Its integration enables new opportunities for diagnosis, treatment, and patient care, transforming how pediatric care is developed. However, this path also requires caution and reflection on management, respecting ethical aspects, and patient privacy.

AI is advancing rapidly, and action must be taken in its development and implementation. Researchers, clinicians, regulators, and others involved in the development and use of AI must ensure that the outcomes are more positive than negative and that AI is not harmful in the future. A patient-centered and ethical approach must be ensured when using AI models. Therefore, there is a need for national and international regulations on the use of AI in a healthcare context that allow its use.

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