EDITORIAL 10.5005/newborn-4-1-iv

Are We Ready to View Artificial Intelligence Not as a Threat but as Supplementary and/or Supplemental Intelligence?

In 2025, the United Nations Educational, Scientific and Cultural Organization (UNESCO) dedicated January 24th, the International Day of Education, to celebrate artificial intelligence (AI).[1–3] In medicine, AI is still under evaluation until the possibilities of a negative impact on patient care can be confidently excluded; fears persist that biases and errors in clinical data could result in suboptimal algorithms with increased healthcare disparities, breaches in privacy of patient data, and decreased transparency in decision-making.[4–16] In the bigger picture, there are concerns that AI could lead to a partial/panoramic attrition in original thinking, creativity, ingenuity, and innovation.[16–19]

This issue needs serious thought. The use of electronic tools to augment functional efficiency is not entirely new—all of us have been using online search engines to polish/expand our ideas now for many years. Most of us have searched for synonyms, antonyms, sentence constructs, historical context, online articles, and blogs with opinions.[20] And does this ethical dilemma of "artificially" enhancing efficiency/productivity[21] not remind of the times when automobiles began to replace horse-carts? When typewriters replaced human calligraphers? Calculators for elementary mathematics? Basic computers for calculators? Using artistic fonts with these computers to replace calligraphers? Computing with databases has altered the life of chartered accountants. In medicine, electronic medical records have changed our way of storing details of a patient's medical history and hospital events.[22] This list could go on.

There are definitely some concerns. But AI has the potential to revolutionize many aspects of life—there can be a quantal impact on efficiency that would make it difficult to ignore it completely.[23] And all things considered, its advent and rapid progression in many areas of medicine so far is making it look unstoppable (**Fig. 1**).[24,25] Hence, we need to think—should we continue to consider it as "artificial", which has a negative connotation,[26] or accept it and call it "supplementary", or additional intelligence that augments human functionality.[27] In certain areas, it might even deserve further recognition to be called "supplemental", to acknowledge that many of these software programs can independently add to the efficiency of cognitive tasks.[28] We will definitely need to get together to evaluate AI for its merits and deficiencies for different tasks—no one solution will fit all.[29] In medicine, there are enormous possibilities in complex/high-volume data analysis, repetitive tasks, decision-making, personalized tailored therapy, and simulating human-like interaction.[30] It might also be useful in quality control and improvement; service automation, generation of creative content for personalized family education, monitoring of environmental factors by bringing in multisource expertise, and in development of accessible technology for infants with disabilities.[31–38] In research, the possibilities are even stronger, be it as one of the tools for literature search, for preliminary study design prior to expert review, additional training of personnel, and in integration of data—from *in vitro* studies of gene regulation to protein interaction to pathway analysis in neural networks or other methods, to evaluation/enhancement or even as an alternative to animal models, to development of chemical modulators/"drugs", and to human safety/efficacy studies.[39–47] There could be more.

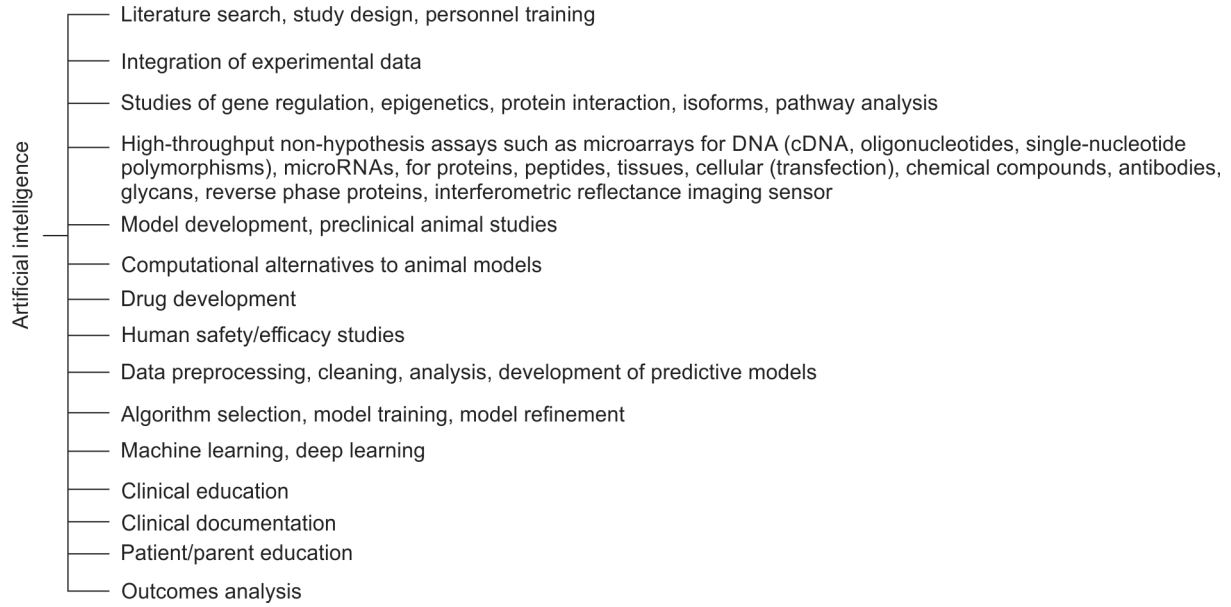

Fig. 1: Artificial intelligence is transforming medicine. When we look at the areas of impact in research and clinical medicine, the question is not about the likely areas of growth, but is more to identify the areas that would not benefit from correct application. Maybe we would be better off in getting involved to set priorities and prevent misuse. The cart is already in motion.

Moving from this line of discussion, we once again remind our readers and ourselves that the Global Newborn Society (GNS) aims to be a worldwide social movement for improving neonatal care. Recent commitments of financial support from the Mozib Center for Neonatal Care (Bangladesh) and the Carlo GNS Center for Saving Lives at Birth (USA) have added momentum. Since the last issue, 10 newly formed or existing organizations have joined the efforts; these include the Global Newborn Society Iran Chapter; National Federation of Neonatologists of Mexico; College of Neonatologists of the State of Jalisco, Mexico; The Skylar Project; American Society for Black Lives; Friends Aid Africa, Bukedea, Uganda; Society for Bacteriophage Research and Therapy; the GNS Center for Computational Scientific Methodology; the GNS International Association of Neonatal POCUS; and the SABREE Enrichment Academy: Empowering Ability. We are excited about the all the possibilities emerging in underserved geographic areas and populations, our understanding of the biological modifiers of bacterial pathogens, and novel monitoring systems of critically-ill/extremely premature infants. We have unfortunately lost the company of one organization, the GNS Cardiology Association of Iraq, because of their changed needs. Currently, our group is comprised of the GNS and 47 other organizations. We consult each other and share scientific data, viewpoints, and our experiences relevant for care of newborn infants in various parts of the world.

In each issue of this journal, our editorial team highlights the achievements of one of our partnering members. Here, we recollect the efforts of the neonatology team at the Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, to develop a human milk bank (HMB) compliant with Islamic religious practices **(Fig. 2)**.[48,49] There are more than 500 large HMBs in the world but only a few are functioning in Muslim countries.[50] Islamic laws do not allow infants to receive human milk from multiple unidentified donors.[51] To comply with these guidelines, milk from each donor has to be processed and stored separately, and can be provided to an infant only after counseling both the donor and recipient families about Islamic laws of prohibition of future marriages between milk siblings.[52] All relevant records need to be maintained for future reference. After extensive review of the proposals by the country's health services and Islamic foundations and community debates,[53] this HMB was developed with allocation of appropriate hospital space, investment in necessary equipment, and extensive training of personnel. The facility was finally inaugurated in December 2019.[54]

Our team would like to express our sincere gratitude to Professor Dr Robert D Christensen,[55,56] who is retiring from active academics after many decades of service. His contributions to neonatal hematology and large-cohort clinical research are known the world over. All of us hope and believe that he will resume his scholarly activities after a brief period of much-deserved rest. He has promised that he will remain available for guidance and solutions based on his experience. We need him.

This journal aims to cover fetal/neonatal problems that begin during pregnancy, at the time of birth, or during the first 1,000 days after birth.[57] As in our previous issues, we present 8 articles here **(Fig. 3)**. Hoyos et al.[58] have presented a new set of guidelines for adequate nutrition to promote growth for premature neonates. Although optimal postnatal growth should ideally replicate intrauterine rates, most premature infants lose weight for the first few days before resuming slow weight gains that are usually below intrauterine rates.[59] This extrauterine growth restriction (EUGR) can be seen at the time of discharge with lower weight Z-score medians than those

Figs 2A to F. Development of a human milk bank in Bangladesh. (A and B) The Special Care Neonatal Unit and Neonatal Intensive Care Unit at the Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, are respected for having saved countless newborn lives in the region; (C) In Islam, there are many important restrictions on sharing milk from one lactating mother between multiple infants. Considering the life-saving importance of human milk feeds, the Institute of Child Health at the BSMMU established a core medical group to discuss the possibilities for developing a socially accepted, religiously compliant human milk bank; (D and E) These potential solutions were reviewed by the National Health Services and Islamic Foundations, first together and then in smaller groups for in-depth discussions; (F) After much effort by medical and social leaders, a human milk bank was inaugurated in December 2019.

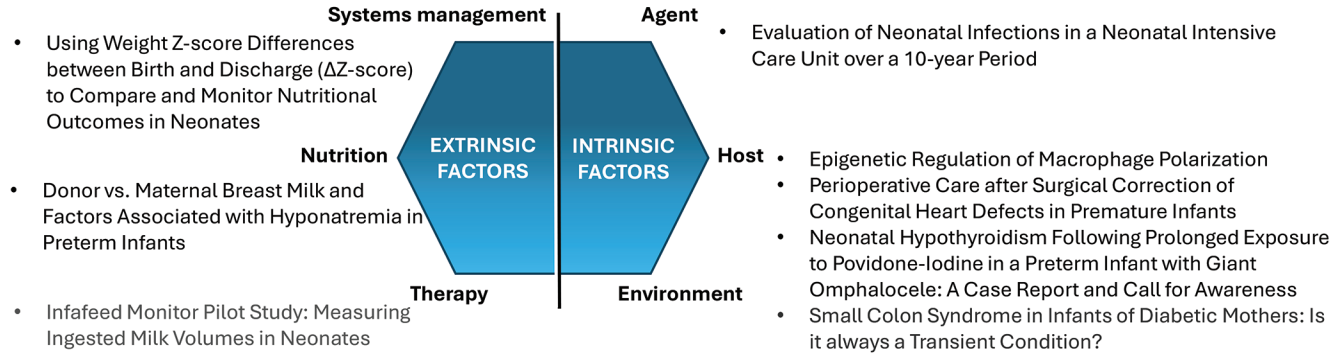

Fig. 3: Areas of focus in the *newborn*, Volume 4, Issue 1. We have expanded the traditional agent-host-environment trinodal disease model to a hexagonal system. The three additional foci represent extrinsic factors that can affect health—those originating in therapy, nutrition, and systems management are shown. This issue covers 5 nodes, with articles focused on agents, host factors, therapy/monitoring systems, nutrition, and systems management.

at birth.[60–62] The authors hypothesized that improved nutrition could reduce the incidence of EUGR in convalescing premature infants. They reviewed the clinical information of 480 infants born at ≤32 weeks' gestational age in EpicLatino units in the past 8 years. Even though the sample size was not large enough to establish causality, the authors noted that nutrition was not effective as the sole intervention. The risk of EUGR was higher in infants with higher severity of illness.

Bacterial infections are a leading cause of morbidity and mortality in premature and critically ill neonates.[63] In another quality-improvement (QI) study, Shah et al.[64] reviewed the spectrum of bacterial infections in their neonatal intensive care unit over a 10-year period. They identified 151 culture-positive bacterial sepsis events in 125 infants. The spectrum of bacterial isolates largely remained similar during the study period. Early-onset sepsis (EOS) was caused most frequently by *Escherichia coli* (*E. coli*) and group B *Streptococcus*, whereas the leading causes of late-onset sepsis (LOS) were coagulase-negative *Staphylococcus* (CoNS) and methicillin-sensitive *Staphylococcus aureus*. There was a trend for increasing *Klebsiella* isolates since 2015. Overall, there was no significant shift in organisms causing neonatal infections in this hospital during the last decade. This study is an important template; these bacterial isolates need to be monitored in all centers, all over the world.

Gomez Pomar et al.[65] compared the clinical profile of premature infants who developed hyponatremia, defined as plasma sodium (Na) <135 mEq/L, during their clinical course. Existing studies have suggested that infants who receive donor human milk may be at higher risk of having low serum Na levels.[66,67] In this cohort, 60 infants were noted to have developed hyponatremia at some point, including 32 who received supplemental Na and 28 who did not. These were compared with 29 controls. Contrary to assumptions, most infants with hyponatremia received more mothers' own, not donor, milk. They might have had a higher severity of illness. Sodium chloride supplementation did not always correct serum Na levels or improve the growth parameters at discharge. Further studies are needed.

Boyd et al.[68] have studied the technical feasibility of a novel noninvasive prototype instrument for measuring ingested milk volumes in 24 neonates. A monitor recorded feeding sounds via a microphone placed on the infant's neck, and a secondary microphone captured background noise for cancellation. This modality could help in serial monitoring of milk intake in breast-fed infants without disrupting the natural nursing process because test-weighing during the feeding session is not necessary. Power spectral density analysis[69] was performed to differentiate swallow and non-swallow events, and a linear regression model[70] was then used to estimate feed volumes based on 20 recordings. More studies are needed in larger cohorts.

Al-Ethawi et al.[71] reviewed existing information on factors that might affect outcomes of premature infants with congenital heart defects following corrective surgical interventions. Many pathophysiological changes related to surgery-related tissue disruption and cardiopulmonary bypass include Na/water overload, systemic inflammatory response syndrome (SIRS), and ischemia/reperfusion in the heart and other major organs are seen during this period.[72] Focused intensive care is needed with close monitoring of cardiac function, tissue oxygenation, hemostasis, pain control, and sedation.[73] There are also some center-specific needs; all care-providers need to reach a consensus on evidence-based protocols for initiation, maintenance, and weaning from assisted ventilation, which can facilitate earlier extubation and prevent ventilation-related complications.[74,75] Finally, a clearly defined discharge protocol can enhance safety.[76]

Singh and Maheshwari[77] have reviewed the presence and mechanisms of innate immune memory of prior stimuli in macrophages in infants. This memory is rooted in epigenetic regulation of lineage- and tissue-specific transcription that may enhance/suppress immune responses to repeated exposures to a stimulus.[78,79] In this article, they have specifically focused on lineage-determining changes such as those in the erythroblast transformation-specific gene purine-rich sequence binding protein 1 (PU.1) and histone methylation, and have also outlined the role of several other newly discovered regulators.[80–82] These changes promote macrophage differentiation into several phenotypes essential for host defense or tissue homeostasis in response to environmental stimuli.[83] Maladaptive changes in macrophages can disrupt the normal sequence of immune/inflammatory responses and predispose to disease states.[84]

Raghavendra et al.[85] have described a 36-week-gestation infant of a diabetic mother with an unusually severe and persistent neonatal small colon syndrome (NSCS).[86] She manifested signs of intestinal obstruction at about 6 hours after birth and a contrast enema showed a small caliber distal small intestine and colon. There was no clinical improvement over the next 2 weeks and so an exploratory laparotomy was performed after much discussion. Intra-operatively, the surgeons noted viscous meconium with pellets in

the involved bowel and later histopathological examination showed normal bowel histoarchitecture with an appropriate morphology/number of ganglion cells.[87] A double barrel enterostomy was created and the distal gastrointestinal tract was regularly flushed. She then showed good improvement and was discharged home. The authors want to remind that NSCS may not always show prompt, spontaneous resolution and should be considered in the differential diagnosis of a newborn infant with unusually prolonged signs of intestinal obstruction.[88] Some of these infants may require surgical management with ostomy formation.[89]

Finally, Ben Ayad et al.[90] call for caution about the risk of secondary hypothyroidism in infants with large omphaloceles who are managed conservatively with topical iodine on polymeric carriers. There are two well-accepted strategies for management of giant omphaloceles (GOs): (a) surgical closure after initial stabilization;[91] or (b) a more conservative "paint and wait" strategy without graft closure.[92] In this second protocol, the sac is maintained with topical medications such as silver sulfadiazine or combinations of polyvinylpyrrolidone (povidone), iodine, and, sometimes, with added topical antibiotics. This repeated exposure to iodine is usually tolerated well[93] but there is a need for cautious monitoring as some infants have been noted to develop thyroid dysfunction.[94] The authors present one such case; the goal is to sensitize the medical care-providers to these adverse effects.

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Akhil Maheshwari, MD
Kei Lui, MD
Mario Motta, MD