Arch Obstet Gynecol. 2024;5(1):16-17.

Archives of Obstetrics and Gynaecology Editorial

# Use of Algorithms to Predict Disease in Obstetrics: A Clinical Perspective

**Elliot M. Levine, MD**[1,*]

[1]Rosalind Franklin University Chicago Medical School, North Chicago, Illinois, USA

*Correspondence should be addressed to Elliot M. Levine, Elliot.levine@rosalindfranklin.edu

**Received date:** April 04, 2024, **Accepted date:** April 10, 2024

**Citation:** Levine EM. Use of Algorithms to Predict Disease in Obstetrics: A Clinical Perspective. Arch Obstet Gynecol. 2024;5(1):16-17.



## Abstract

Artificial Intelligence (AI) has been the subject of many contributions to the lay and professional literature in the past few years. While it may seem that the medical benefits of its use are immense, there may be reasons to consider a degree of caution in this regard. In particular, the clinical value of using algorithms to predict disease should be measured against the cases in which such algorithms are not used. Then, the resultant costs can be measured to show possible clinical benefit of AI. However, it is possible that clinical benefit in this circumstance may not be shown necessarily – and the associated expense may not be worthy of its application.

**Keywords:** Artificial Intelligence, Machine learning prediction, Postpartum hemorrhage, Shoulder dystocia, Preeclampsia

## Editorial

Artificial Intelligence (AI) has been the focus of many recent publications describing its use in a variety of medical specialties, yielding seemingly overwhelming positive success. Its dependence on a tremendously large volume of information from different sources requires a computerized analysis for its execution. Rather than explain the complexities of its operation, it is the intent of this communication to advance reasons for caution in its medical applications in Obstetrics and Gynecology (OBGYN) and elsewhere. Machine Learning (ML) represents a significant aspect of AI, and the concepts that help to explain its function are unique and different from how data is traditionally visualized and statistically described [1]. AI and the algorithmic approach to making diagnoses has become popularized recently, along with the use of *prediction* models for the screening of targeted populations of patients for possible disease.

In OBGYN, there may be value in predicting clinical circumstances that may not otherwise be predicted, but applying these formulas should be measured against the interventions which can have the desired clinical outcomes. For example, does it matter if we can predict the occurrence of postpartum hemorrhage (PPH) [2] if we know there is a finite risk of it happening, and that we need to *always* be prepared for it, regardless of whatever predicted risk there may be? Moreover, there appears little that can prevent PPH at the site of care when a prediction is made. Another predictable clinical scenario, shoulder dystocia (SD) [3], can also be considered in this light. We may need to contrast these prediction models with scenarios for which there may be an intervention that can be offered to prevent their associated morbidities from occurring. Preeclampsia (PE) is such an example of a condition that can be predicted by AI (better than by statistical measures) [4-6], for which there may be interventions that can diminish its likelihood of occurrence and severity in later pregnancy (e.g. with low-dose aspirin, LDA) [7].

In order to explore this further, the medical literature was searched in PubMed for articles having the keywords of "obstetrics gynecology" and "algorithms" and "clinical success", published in the past 5 years. 17 articles which are clinically relevant to the specialty were found, and three specifically impactful articles were selected to compare their clinical utility, relative to what was mentioned in the Introduction. Three particular relevant citations were selected to consider in detail.

Venkatesh *et al.* reported that 4.8% of over 152,000 births had PPH, which was predicted 93% of the time with ML [2]. Whether PPH is recognized at vaginal or cesarean birth or not, no evidence has shown that the cascade of actions which are necessary for its successful management can be employed any more quickly whether it is predicted or not. Preparedness for its occurrence is a necessary skill for every obstetric professional at every delivery.

As reported by Tsur *et al.*, 0.44% of over 53,000 births had SD, which was predicted 87% of the time with ML [3]. The clinical benefit of its prediction was not demonstrated, regarding the value of *preparedness* for when SD occurs (approximately one in 200 vaginal births). For example, the time it takes to execute the necessary maneuvers for delivery when SD is recognized may not at all relate to its *prediction*.

Jhee *et al.* reported that 4.7% of about 11,000 patients had late term (≥ 34 weeks of gestation) PE, which was predicted 92% of the time with gradient boosting ML [4]. PE has a finite occurrence in late pregnancy, causing premature birth and other related perinatal morbidities, for which LDA has been shown to improve pregnancy outcome if initiated prior to 16 weeks of gestation [5]. The initiation of such prophylaxis has been shown to not regularly occur for those at increased risk. It appears that ML may be able to cause initiation of prophylaxis which may not otherwise sufficiently occur. Therefore, the clinical benefit of prediction may have important potential value in this case, if prompting the initiation of prophylaxis, resulting in decreased incidence of PE complications.

While the ability to predict clinical events may seem to be attractive, the clinical outcomes in those circumstances must be measured against the alternative scenario, in which the particular clinical event is not predicted with AI. Three such examples of prediction models were compared (SD, PPH, and PE), and the potential difference in clinical outcome is described, even if the data collected was insufficient to exactly measure any difference. If technology enhancement is provided to efficiently enable AI prediction, there should be an analysis which demonstrates its specific value. In the cases described, there may not be clinical benefit of prediction models, unless the added value is demonstrated. If prediction of a clinical event does not result in an improved clinical outcome, this may simply not be worth the expense of its implementation. This is certainly true when preparedness for an event such as SD or PPH is always necessary. In the case of PE, predicting the diagnoses in the 1st trimester can possibly have value and this should be pursued. The clinical value of AI should indeed be recognized [8]. However, caution is advised before resources are provided for it without the necessary demonstration of clinical benefit from such AI prediction models [9,10].

## References

1. Wang R, Pan W, Jin L, Li Y, Geng Y, Gao C, et al. Artificial intelligence in reproductive medicine. Reproduction. 2019;158:R139-54.

2. Venkatesh KK, Strauss RA, Grotegut C, Heine RP, Chesheir NC, Stringer JSA, et al. Machine learning and statistical modelsto predict postpartum hemorrhage. Obstet Gynecol. 2020;135(4):935-44.

3. Tsur A, Batsry L, Toussia-Cohen S, Rosenstein MG, Barak O, Brezinov Y, et al. Development and validation of a machine-learning model for prediction of shoulder dystocia. Ultrasound Obstet Gynecol. 2020 Oct;56(4):588-96.

4. Jhee JH, Lee S, Park Y, Lee SE, Kim YA, Kang SW, et al. Prediction model development of late-onset preeclampsia using machine learning-based methods. PLoS One. 2019 Aug 23;14(8):e0221202.

5. Rolnik DL, Nicolaides KH, Poon LC. Prevention of preeclampsia with aspirin. Am J Obstet Gynecol. 2022 Feb;226(2S):S1108-S1119.

6. Gabbay-Benziv R, Oliveira N, Baschat AA. Optimal first trimester preeclampsia prediction: a comparison of multimarker algorithm, risk profiles and their sequential application. Prenat Diagn. 2016 Jan;36(1):34-9.

7. Ansbacher-Feldman Z, Syngelaki A, Meiri H, Cirkin R, Nicolaides KH, Louzoun Y. Machine-learning-based prediction of pre-eclampsia using first-trimester maternal characteristics and biomarkers. Ultrasound Obstet Gynecol. 2022;60:739-45.

8. Gu W, Lin J, Hou YY, Lin N, Song MF, Zeng WJ, et al. Effects of low-dose aspirin on the prevention of preeclampsia and pregnancy outcomes: A randomized controlled trial from Shanghai, China. Eur J Obstet Gynecol Reprod Biol. 2020 May;248:156-63.

9. Bukowski R, Schulz K, Gaither K, Stephens KK, Semeraro D, Drake J, et al. Computational medicine, present and the future: obstetrics and gynecology perspective. Am J Obstet Gynecol. 2021 Jan;224(1):16-34.

10. Sarno L, Neola D, Carbone L, Saccone G, Carlea A, Miceli M, et al. Use of artificial intelligence in obstetrics: not quite ready for prime time. Am J Obstet Gynecol MFM. 2023 Feb;5(2):100792.