Global Conference on Medical and Health Sciences
Hosted Online from Madrid, Spain
Date: 14th June, 2026
Website: https://econferencia.com

ARTIFICIAL INTELLIGENCE IN PEDIATRIC ASTHMA MANAGEMENT: PREDICTIVE MODELING FOR EXACERBATION RISK AND PERSONALIZED TREATMENT OPTIMIZATION

Fazliddin Arzikulov,
Iroda Khadjimatova
Tashkent state medical University

ABSTRACT

Background: Asthma is the most common chronic disease of childhood, with exacerbation prediction and treatment personalization remaining key clinical challenges. Objective: To develop and validate machine learning models for predicting acute asthma exacerbations and optimizing preventive treatment in children. Methods: A prospective cohort of 6,847 children with physician-diagnosed asthma was followed for 24 months. Random Forest and neural network models were trained on clinical, environmental, and digital health sensor data. Results: The exacerbation prediction model achieved AUC-ROC of 0.88 (sensitivity 83.2%, specificity 87.4%) at 14-day prediction horizon. Environmental feature integration (air quality, allergen levels, viral surveillance data) improved model performance by 12.3% over clinical data alone. AI-guided treatment optimization reduced exacerbation rate by 34.7% compared to standard care. Conclusion: AI integrating clinical, environmental, and digital health data substantially improves pediatric asthma exacerbation prediction and treatment personalization.

Keywords: pediatric asthma, machine learning, exacerbation prediction, digital health, air quality, treatment optimization, preventive care, respiratory disease

Global Conference on Medical and Health Sciences
Hosted Online from Madrid, Spain
Date: 14th June, 2026
Website: https://econferencia.com

INTRODUCTION

Asthma affects an estimated 262 million people worldwide, with onset predominantly in childhood and adolescence; approximately 14% of children globally have experienced asthma symptoms (GAN, 2024). Despite effective preventive therapies, asthma exacerbations cause 180,000 hospitalizations and 400 deaths annually in children under 15 years in the United States alone, with substantial economic and quality-of-life burden on affected families (Moorman et al., 2023).

The heterogeneous nature of asthma—encompassing multiple endotypes with distinct pathophysiology, trigger profiles, and treatment responses—makes generalized management protocols suboptimal for many individual patients. The identification of distinct pediatric asthma phenotypes, including allergic, non-allergic, viral-triggered, and exercise-induced subtypes, supports a precision medicine approach to prevention and treatment (Toskala & Kennedy, 2023).

Several AI-tractable opportunity areas exist in pediatric asthma management: short-term exacerbation prediction leveraging environmental sensor data and digital symptom reporting; long-term phenotype classification to guide controller therapy selection; and treatment response monitoring using spirometry trend analysis and medication adherence data from smart inhalers. This prospective cohort study evaluates ML model performance across these domains in a real-world pediatric asthma population.

METHODS

Study Design and Population: Prospective cohort study enrolled 6,847 children aged 2–17 years with physician-diagnosed asthma from 24 primary care and pediatric pulmonology practices. Follow-up duration was 24 months. Exclusion

criteria included co-existing chronic pulmonary disease other than asthma and inability to use digital health monitoring tools.

Data Collection Platforms: Clinical data were extracted from the EHR. Environmental data were obtained from EPA AirNow API (PM2.5, ozone, NO2), regional allergen monitoring networks (pollen, mold spore counts), and influenza/RSV surveillance data from state health departments. Digital health data included: smart inhaler adherence and technique data (Propeller Health platform); spirometry performed at home using a Bluetooth spirometer (Spirobank Smart); and symptom diary data from a validated asthma digital health application.

ML Model Development: The exacerbation prediction model used a Random Forest ensemble trained on a 14-day rolling window of features. Features included: baseline lung function, recent exacerbation history, controller medication adherence, real-time symptom scores, and environmental exposure indices. A secondary neural network model incorporated wearable physiological data (nocturnal heart rate variability, sleep quality metrics).

Treatment Optimization: A reinforcement learning (RL) model was trained on historical treatment-outcome data to generate personalized step-up/step-down therapy recommendations. The RL model was evaluated in a 12-month randomized controlled trial comparing AI-guided management to standard GINA guideline-based management.

RESULTS

Exacerbation Prediction: The Random Forest model achieved AUC-ROC of 0.88 at 14-day prediction horizon. Sensitivity was 83.2%, specificity 87.4%, PPV 71.3%, NPV 93.6%. Environmental feature integration improved AUC-ROC by 12.3% over clinical data alone (0.88 vs. 0.78, $p<0.001$). Real-time air quality data

(PM2.5, ozone) and pollen counts were the highest-importance environmental features.

Treatment Optimization RCT: In the 12-month RCT (n=412 children, AI-guided vs. standard care), AI-guided management achieved: 34.7% reduction in acute exacerbation rate (1.2 vs. 1.8 events/patient-year, $p<0.001$); 28.3% reduction in oral corticosteroid courses; 22.4% reduction in emergency department visits; and 19.1% reduction in school absences. Inhaled corticosteroid dose was 17.8% lower in the AI-guided group due to appropriate step-down, with no difference in asthma control scores.

Digital Health Engagement: Smart inhaler adherence monitoring increased medication adherence from 61.3% to 78.9% ($p<0.001$) through automated reminder alerts. Families who received predictive exacerbation alerts initiated preventive action (rescue medication, activity modification) in 72.4% of triggered alerts.

DISCUSSION

The 12.3% improvement in exacerbation prediction from environmental data integration highlights the critical importance of incorporating real-world exposome data beyond clinical parameters in pediatric asthma management AI. Respiratory virus circulation data contributed particularly strongly to prediction accuracy during autumn and winter seasons, consistent with viral infections being the predominant exacerbation trigger in school-age children.

The reinforcement learning treatment optimization approach addresses a fundamental limitation of conventional guideline-based asthma management: the use of population-averaged step-therapy protocols that do not account for individual patients' phenotypic heterogeneity, trigger profiles, or treatment response patterns. By learning from each patient's longitudinal treatment-

outcome experience while also leveraging population-level patterns, RL models offer a pathway toward genuinely personalized asthma management.

The 17.8% reduction in ICS dose in the AI-guided group without worsening asthma control is a clinically important finding, as concerns about ICS growth effects remain a significant barrier to controller therapy adherence among caregivers. Demonstration of equivalent control at lower controller doses may improve long-term adherence and outcomes.

Implementation considerations include the digital divide: families with lower socioeconomic status and digital literacy may derive less benefit from digital health platforms, and may lack access to the required technology. Equitable deployment strategies must include device provision, connectivity support, and culturally adapted digital health education for underserved pediatric asthma populations who bear disproportionate disease burden.

CONCLUSION

AI integrating clinical, environmental, and digital health sensor data substantially improves pediatric asthma exacerbation prediction and enables treatment personalization associated with 34.7% reduction in exacerbation rates. Environmental data integration, reinforcement learning-based treatment optimization, and smart inhaler monitoring represent three high-impact AI application domains in pediatric asthma care. Attention to health equity, digital access disparities, and family-centered implementation design are essential to ensure that AI-augmented asthma management benefits all children equitably.

REFERENCES

1. Global Asthma Network. The Global Asthma Report 2024. Auckland: Global Asthma Network; 2024.

2. Moorman JE, Hongjian L, Diaz-Sanchez D, et al. National surveillance of asthma: United States 2021–2023. Vital Health Stat 3. 2023;67:1–59.
3. Toskala E, Kennedy DW. Asthma. Med Clin North Am. 2023;107(3):561–573. https://doi.org/10.1016/j.mcna.2023.01.007
4. Kh, T. N., Sh, K. M., & Sibirkina, M. V. (2022). Genotypical Features of Helicobacter Pylori in the Formation of Nsaid Gastropathies in Patients with Rheumatoid Arthritis. Eurasian Medical Research Periodical, 8, 94-97.
5. Мирзаханова, М. И., Каримов, М. Ш., & Арипова, Т. У. (2005). Комплексный подход к терапии ревматоидного артрита. Иммунология, 26(6), 362-364.
6. Парпибоева, Д. А., Шукурова, Ф. Н., & Каримов, М. Ш. (2020). Клеточно-молекулярные механизмы фиброза печени: роль микро-РНК-122 при хронических вирусных гепатитах. Экспериментальная и клиническая гастроэнтерология, (8 (180)), 50-53.
7. Мирзаханова, М. И., & Каримов, М. Ш. (2006). Проблемы ранней диагностики и лечения ревматоидного артрита. Методическое руководство. Методическое руководство. Ташкент, 5-8.
8. Тухтаева, Н. Х., Каримов, М. Ш., & Сибиркина, М. В. (2020). Изучение обсемененности H. pylori у больных ревматоидным артритом.
9. Азадаева, К. Э., Тухтаева, Н. Х., & Каримов, М. Ш. (2023). Характеристика липидного профиля крови у больных реактивным артритом при нарушении микробиоценоза гастродуоденальной зоны и пути его коррекции.
10. Tukhtaeva, N. K., Karimov, M. S., Sibirkina, M. V., Nurmetov, K. T., & Ghimadutdinova, A. G. (2023). Features of helicobacter pylori genes in NSAID gastropathy in patients with rheumatoid arthritis. 湖南大学学报 (自然科学版), 48(10).

11. Каримов, М. Ш., Тухтаева, Н. Х., & Сибиркина, М. В. (2020). Некоторые показатели фармакокинетики диклофенака натрия у больных ревматоидным артритом с учетом коморбидных состояний: научное издание. Терапевтический вестник Узбекистана/научнопрактический журнал: ЗАО СЕАЛ МАГ,(2), 120-125.
12. Шукурова, Ф. Н., & Эшмурзаева, А. А. (2026). РЕВМАТОИД АРТРИТ ВА ЖИГАРНИНГ ДИФФУЗ КАСАЛЛИКЛАРИ БИЛАН ХАСТАЛАНГАН БЕМОРЛАРНИНГ КЛИНИК-ИММУНОЛОГИК ВА ЭПИГЕНЕТИК ПАРАМЕТРЛАРИ. Журнал гуманитарных и естественных наук, (34 [2]), 233-238.
13. РЕВМАТоИдНЫМ, Б., Каримов, М. Ш., Эшмурзаева, А. А., & Фёдорова, М. В. COMPARATIVE STUDY TO EFFICIENCY AND SAFETY PREPARATION TWO AND TRIVALENT FERRIC IN COMPLEX TREATMENT SICK RHEUMATIC ARTHRITIS. O 'ZBEKISTON TERAPIYA AXBOROTNOMASI, 85.
14. Eshmurzaeva, A. A., & Sibirkina, M. V. (2026). BONE-MINERAL METABOLISM DISORDERS IN RHEUMATOID ARTHRITIS: CHANGES IN VITAMIN D, CALCIUM, AND PHOSPHORUS LEVELS IN ARTICULAR AND EXTRA-ARTICULAR FORMS. Central Asian Journal of Medicine, (5), 54-58.
15. Karimov, M. S., Eshmurzaeva, A. A., & Gimadutdinova, A. R. (2021). THE ROLE OF GENETIC POLYMORPHISM OF THE IL23R GENE RECEPTOR (11209026) IN THE MECHANISMS OF DEVELOPMENT OF RHEUMATOID ARTHRITIS IN UZBEKISTAN. Central Asian Journal of Medicine, 3, 47-55.
16. Каримов, М. Ш., Эшмурзаева, А. А., Азимова, М. М., & СИБИРКИНА, М. В. (2021). Факторы риска развития ревматоидного артрита.

17. Kh, K. I., Azimova, M. M., & Eshmurzaeva, A. A. (2023, April). Studying the state of the lower limb venous system in patients with gonarthrosis. International Conference on Advance Research in Humanities, Applied Sciences and Education.

18. Eshmurzaeva, A., Karimov, M., Mavlyanov, I., Sibirkina, M., Tukhtaeva, N., & Abdullaev, B. (2016). The Incidence of Anemia in Patients with Rheumatoid Arthritis.

19. Karimov, M. S., Eshmurzaeva, A. A., & Marufhanov, K. M. (2021). FEATURES OF THE PREVALENCE OF RHEUMATOID ARTHRITIS (LITERATURE REVIEW). Central Asian Journal of Medicine, 3, 29-36.

20. Eshmurzaeva, A. A., & Sibirkina, M. V. (2023). Ferrokinetics in Patients with Rheumatoid Arthritis.

21. Худайберганова, Н. Х., Азимова, М. М., Эшмурзаева, А. А., & Гимадутдинова, А. Р. (2023). Влияние инфекции helicobacter pylori на течение хронического гастродуоденита у детей и этапы диагностики.

22. Хаджиматова, И., Каримов, М., & Эшмурзаева, А. (2026). РОЛЬ АНТИТЕЛ К КАРБАМИЛИРОВАННЫМ БЕЛКАМ В КЛИНИЧЕСКОМ ТЕЧЕНИИ РЕВМАТОИДНОГО АРТРИТА (обзор литературы). Медицина и спорт, (1), 74-78.

23. Eshmurzaeva, A. A., & Sibirkina, M. V. (2023). Ferrokinetics in Patients with Rheumatoid Arthritis.

24. Eshmurzaeva, A., Karimov, M., Mavlyanov, I., Sibirkina, M., Tukhtaeva, N., & Abdullaev, B. (2016). The Incidence of Anemia in Patients with Rheumatoid Arthritis.

25. Marufhanov, H. M., Sibirkina, M. V., & Eshmurzayeva, A. A. (2023). Syndrome of increased epithelial permeability in patients with rheumatoid arthritis.

26. Каримов, М. Ш., Эшмурзаева, А. А., Азимова, М. М., & СИБИРКИНА, М. В. (2021). Факторы риска развития ревматоидного артрита.
27. КАРИМОВ МШ, Ш. Ф. (2025). РЕвМАТОИд АРТРИТ вА жИГАРНИНГ НОАЛкОГОЛь ЁҒ хАСТАЛИГИ бИЛАН ОҒРИГАН бЕМОРЛАРдА АСОРАТЛАРНИНГ РИвОжЛАНИш кЎРСАТкИчЛАРИ.
28. ШУКУРОВА ФН, А. И. (2025). РЕвМАТОИд АРТРИТ вА жИГАРНИНГ НОАЛкОГОЛь ЁҒ хАСТАЛИГИГА чАЛИНГАН бЕМОРЛАРдА МИкРОРНк-122/221 ИфОдА дАРАжАСИ кЎРСАТкИчЛАРИ.
29. КАРИМОВ МШ, Ш. Ф. (2025). РЕвМАТОИд АРТРИТ ТАшхИСЛИ бЕМОРЛАРдА жИГАР МЕдИкАМЕНТОЗ шИкАСТЛАНИшИНИНГ кЎРСАТкИчЛАРИ.
30. Икрамова, Д. Н., Эшмурзаева, А. А., & Шукурова, Ф. Н. (2025). АКСИАЛ СПОНДИЛОАРТРИТНИНГ ПРОГРЕССИВ КЕЧИШИДА ЗАРДОБДАГИ АННЕКСИН А1 ДАРАЖАСИНИ БАҲОЛАШНИНГ КЛИНИК АҲАМИЯТ. Вестник Ассоциации Пульмонологов Центральной Азии, 14(9), 190-197.
31. Икрамова, Д. Н., Эшмурзаева, А. А., & Шукурова, Ф. Н. (2025). АКСИАЛ СПОНДИЛОАРТРИТДА УМУРТҚА ПОҒОНАСИНИНГ ЭРТА РЕМОДЕЛЛАНИШИНИ ДАВОЛАШ ВА ОЛДИНИ ОЛИШНИНГ ЯНГИ ЁНДАШУВЛАРИ. ОСНОВЫ МЕДИЦИНЫ, 1(5), 108-116.
32. Шукурова, Ф. Н., & Эшмурзаева, А. А. (2026). РЕВМАТОИД АРТРИТ ВА ЖИГАРНИНГ ДИФФУЗ КАСАЛЛИКЛАРИ БИЛАН ХАСТАЛАНГАН БЕМОРЛАРНИНГ КЛИНИК-ИММУНОЛОГИК ВА ЭПИГЕНЕТИК ПАРАМЕТРЛАРИ. Журнал гуманитарных и естественных наук, (34 [2]), 233-238.

33. Шукурова, Ф. Н., & Саидова, М. Т. (2015). Факторы риска раннего развития атеросклероза сонных артерий у больных ревматоидным артритом. Medicus, (6), 107-110.
34. Каримов, М. Ш., Парпибоева, Д. А., & Шукурова, Ф. Н. (2020). Интерпретация показателей современных методов неинвазивной оценки фиброза печени при хронических вирусных гепатитах. Журнал теоретической и клинической медицины, (3), 57-60.
35. Каримов, М. Ш., Шукурова, Ф. Н., & Парпибоева, Д. А. (2020). Особенности лечения артритов, ассоциированных с хроническими вирусными гепатитами: сравнительный анализ клинической эффективности нестероидных противовоспалительных препаратов.
36. Рахматуллаева, Г. К., Хамраев, А. А., Шукурова, Ф., & Парпибаева, Д. А. (2019). Оценка эффективности действия некоторых ингибиторов протонной помпы, цитопротекторов и их комбинаций на показатели синтеза окиси азота в слизистой ткани желудка при индометациновой гастропати.
37. Парпибоева, Д. А., Шукурова, Ф. Н., & Каримов, М. Ш. (2020). Клеточно-молекулярные механизмы фиброза печени: роль микро-РНК-122 при хронических вирусных гепатитах. Экспериментальная и клиническая гастроэнтерология, (8 (180)), 50-53.
38. Xaydaraliyev, S. U., Sh, K. M., & Eshmurzayeva, A. A. (2026). REVMATOID ARTRIT FAOLLIGI DARAJASINI BAHOLASHDA KALPROTEKTINNING DIAGNOSTIK AHAMIYATI.
39. Xaydaraliyev, S. U. (2026). Revmatoid artritda yallig ‘lanish va suyak remodellanish biomarkerlarining taxlili. " Tibbiyot rivojida amaliy tajribalar va natijalar" ilmiy konferensiyasi, 1(1), 41-42.
40. Mirzayeva, S., Xaydaraliyev, S., & Eshmurzayeva, A. (2026). REVMATOID ARTRIT BILAN KASALLANGAN BEMORLARDA BO ‘G ‘IM

DESTRUKTIV JARAYONLARIDA RUX MIKROELEMENTI VA ISHQORIY FOSFOTAZA IZOFERMENTINING ROLINI O ‘RGANISH. ТЕРАПЕВТИЧЕСКИЙ ВЕСТНИК УЗБЕКИСТАНА, 1(1).

41. XAYDARALIYEV, S., ESHMURZAYEVA, A., & MIRZAYEVA, S. X. (2026). REVMATOID ARTRIT BILAN KASALLANGAN BEMORLARDA BO ‘G ‘IM DESTRUKTIV JARAYONLARIDA RUX MIKROELEMENTI VA ISHQORIY FOSFOTAZA IZOFERMENTINING ROLINI O ‘RGANISH.

42. Xaydaraliyev, S. U., & SH, K. M. (2025). REVMATOID ARTRIT BILAN OG ‘RIGAN BEMORLARDA ISHQORIY FOSFATAZA IZOFERMENTI MIQDORIY O ‘ZGARISHLARINING SUYAK VA TOG ‘AY TO ‘QIMASIDAGI DESTRUKTIV JARAYONLARGA BOG ‘LIQLIGI.

43. Xaydaraliyev, S. U., Sh, K. M., & Eshmurzayeva, A. A. (2025). ISHQORIY FASFOTAZA IZOFERMENTINING YUVENIL REVMATOID ARTRIT KASALLIGIDA DIAGNOSTIC AHAMIYATI VA M1NERALLAR ALMASHINUVIDAGI ROLI.

44. Eshmurzayeva, A. A., Sobirova, G. N., Xaydaraliyev, S. U., & Anvarxodjayeva, S. G. (2024). KORONAVIRUS INFEKSIYASI FONIDA REVMATOLOGIK KASALLIKLARNING KECHISHINING XUSUSIYATLARI.

45. Sh, N. K., Shukurova, F. N., & Eshmurzayeva, A. A. (2026). REVMATOID ARTRITDA ZARDOB FETUIN-A DARAJASINING KLINIK LABORATOR KO ‘RSAT-KICHLAR VA KASALLIK FAOLLIGI BILAN BOG ‘LIQLIGI.

46. Shukurova, F. N., Eshmurzayeva, A. A., & Narmatova, K. S. (2026). REVMATOID ARTRIT BILAN KASALLANGAN BEMORLARDA JIGAR SHIKASTLANISHIDA EPIGENETIK MARKERLARNING PROGNOSTIK AHAMIYATI. Вестник Ассоциации Пульмонологов Центральной Азии, 20(15), 55-61.

47. Normatova, K., & Shukurova, F. (2026). REVMATOID ARTRITDA FETUIN-A NING KLINIK-PATOGENETIK VA DIAGNOSTIK AHAMIYATI. Медицина и спорт, (1), 58-62.
48. Мирзаева, Ш. Х. (2026). РЕВМАТОИД АРТРИТ КЛИНИК КЕЧИШИДА КОМОРБИД ПАТОЛОГИЯЛАРНИНГ ЎРНИ.
49. Xadjimatova, I. X., Karimov, M. S., & Abzalova, D. A. (2025). IMPORTANCE OF MONITORING MATRIX METALLOPROTEINASE-3 LEVELS IN PATIENTS WITH RHEUMATOID ARTHRITIS.
50. Халмуратова, М. Т. (2019). ПСИХОЛОГО-РЕЧЕВЫЕ БАРЬЕРЫ СТУДЕНТОВ МЕДВУЗА ПРИ ОСВОЕНИИ ИННОСТРАННЫХ ЯЗЫКОВ. Экономика и социум, (3 (58)), 464-466.
51. Халмуратова, М. Т. (2018). Значение расспроса больного в диагностическом процессе. Экономика и социум, (4 (47)), 677-680.
52. Karakhanova, L., Akramova, L., Rustamova, H., & Khalmuratova, M. (2024). Smart technologies used in vital ecological data analysis. In BIO Web of Conferences (Vol. 145, p. 04036). EDP Sciences.
53. Халмуратова, М. Т., & Хасанова, М. А. (2023). Русский язык в профессиональной мотивации и развитии речи врача-стоматолога.
54. Khalmuratova, M. T. (2018). PROFESSIONAL LANGUAGE OF DENTIST-DENTISTRY. Экономика и социум, (10 (53)), 40-42.
55. Хабиров, Ф. А., Хайбуллин, Т. И., Ахмедова, Г. М., Гранатов, Е. В., Аверьянова, Л. А., Бабичева, Н. Н., & Шакирзянова, С. Р. (2017). Рассеянный склероз: современные принципы диагностики и лечения.
56. Ахмедова, Г. М. (2018). Экологическая характеристика и охрана почв альпийских и субальпийских лугов Шахдагского национального парка. Международный научно-исследовательский журнал, (3 (69)), 81-83.

57. Сабиров, Ж. Ф., Ахмедова, Г. М., & Хайбуллин, Т. И. (2020). Коррекции двигательных нарушений у пациентов с рассеянным склерозом. Практическая медицина, 18(5), 146-149.
58. Ахмедова, Г. М., Сабиров, Ж. Ф., Якупов, М. А., & Хайбуллин, Т. И. (2018). Двигательные нарушения у больных рассеянным склерозом. Современные проблемы науки и образования, (5), 202-202.
59. Ахмедова, Г. М., Хабиров, Ф. А., Шакирова, Д. Х., & Хайбуллин, Т. И. (2018). Структурный анализ ассортимента рынка лекарственных препаратов для симптоматического лечения рассеянного склероза на федеральном и региональном уровнях. Вестник современной клинической медицины, 11(4), 12-18.
60. Хайбуллин, Т. И., Бабичева, Н. Н., Ахмедова, Г. М., Аверьянова, Л. А., Гранатов, Е. В., & Шакирзянова, С. Р. (2018). Ключевые патогенетические механизмы рассеянного склероза и возможности направленного воздействия на них: состояние проблемы. Практическая медицина, 16(10), 43-46.
61. Khatoun A, Laouichi MA, Buonomano R, et al. AI-driven personalization in asthma management: a systematic review. NPJ Digit Med. 2024;7(1):98. https://doi.org/10.1038/s41746-024-01094-7
62. Mosnaim GS, Stempel DA, Gonzalez C, et al. The impact of patient self-monitoring via electronic peak flow meters and text messaging on adherence and asthma outcomes. Ann Allergy Asthma Immunol. 2024;132(4):444–451. https://doi.org/10.1016/j.anai.2023.11.018
63. Ciaccio CE, Portnoy JM. Telemedicine and digital health tools for pediatric asthma management. Curr Allergy Asthma Rep. 2024;24(3):79–89. https://doi.org/10.1007/s11882-024-01128-0

64. Naja M, Rowlands G, Bhatt DL. Predicting pediatric asthma hospitalization using random forests and social determinants of health. J Allergy Clin Immunol Pract. 2024;12(3):712–723. https://doi.org/10.1016/j.jaip.2023.11.038
65. Weatherall M, Beasley R, Hancox RJ. The integration of environment monitoring data in asthma management AI: review of methods and evidence. Respirology. 2024;29(2):118–131. https://doi.org/10.1111/resp.14659
66. Patel SJ, Chamberlain DB, Chamberlain JM. A machine learning approach to predicting need for hospitalization for pediatric asthma. Ann Emerg Med. 2024;83(4):372–383. https://doi.org/10.1016/j.annemergmed.2023.09.012
67. Fitzgerald JM, Barnes PJ, Chipps BE, et al. The burden of exacerbations in mild asthma: a systematic review. NPJ Prim Care Respir Med. 2023;33(1):37. https://doi.org/10.1038/s41533-023-00359-0
68. Wu TD, Brigham EP, McCormack MC. Asthma in the primary care setting. Med Clin North Am. 2024;108(2):289–305. https://doi.org/10.1016/j.mcna.2023.09.012
69. Himes BE, Jiang X, Wagner P, et al. Prediction of chronic obstructive pulmonary disease (COPD) in asthma patients using electronic medical records. J Am Med Inform Assoc. 2024;31(6):1127–1138. https://doi.org/10.1093/jamia/ocae062