

Alireza Ebrahimvandi, PhD

Data Scientist · Clinical AI, LLMs, Model Validation and Monitoring, Forecasting, and Simulation

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SUMMARY

Data scientist with 10+ years in healthcare analytics and research, 6+ in health systems. Current work at UCSF Health spans validation and monitoring of clinical AI models, LLM-based summarization of inpatient notes, and forecasting and simulation for hospital capacity and patient flow. Previously built simulations that cut emergency department wait times by 2–4 hours and COVID-19 forecasts that outperformed external benchmarks.

Clinical AI · Machine learning · Large language models (LLMs) · LLM evaluation · Model validation and monitoring · Predictive modeling · Forecasting · Causal inference · Discrete-event simulation · System dynamics · Operations research · Python, R, SQL

EXPERIENCE

UCSF Health, Data Scientist

Apr 2022 – Present · San Francisco, CA

AI and machine-learning tools for patient care and hospital operations.

- Validate AI models for production use and monitor their performance after deployment; projects include Epic's 30-day readmission model, LLM-based cancer clinical-trial matching, 1-year admission and ED-visit risk models, and Inpatient Insights.
- Build and validate LLM-based summarization of inpatient notes, hospital course, and discharge instructions.
- Develop real-time bed-availability prediction models for the Patient Capacity Management Center.
- Build simulation frameworks that optimize patient flow and inform strategic decisions such as MRI capacity expansion.

University of Maryland Medical System, Healthcare Data Scientist

Dec 2019 – Apr 2022 · Linthicum Heights, MD

Process improvement and predictive analytics.

- Built discrete-event simulations that cut emergency department wait times by 2–4 hours.
- Developed COVID-19 hospitalization and ICU forecasting models that outperformed external benchmarks.
- Designed quasi-experimental studies to inform executive leadership on improving patient satisfaction.

Virginia Tech, Graduate Research Assistant

Aug 2016 – Dec 2019 · Blacksburg, VA

Doctoral research on infant mortality and preterm birth.

- Built system-dynamics and predictive models of infant mortality and preterm birth for a project funded by the Ohio Department of Medicaid.
- Applied machine learning to U.S. birth records to identify early signs of preterm birth; first-authored the resulting 2022 journal article and released the code on GitHub.
- Analyzed state-level variation in U.S. infant mortality from 2000 to 2015 and co-authored a data envelopment analysis benchmarking states' healthcare systems on birth outcomes.

EDUCATION

PhD, Industrial and Systems Engineering, Virginia Tech

Dissertation: Three Essays on Analysis of U.S. Infant Mortality Using Systems and Data Science Approaches

MS, Industrial and Systems Engineering, Virginia Tech

Concentration in Operations Research

SKILLS

Machine learning and AI	Large language models (LLMs), model validation and monitoring, neural networks, gradient boosting (GBM), Bayesian optimization, surrogate modeling
Programming	Python, R, SQL, C/C++, MATLAB
Statistics and causal inference	Quasi-experimental design, forecasting; SAS, Stata
Simulation and operations research	Discrete-event simulation (Simio, Arena, AnyLogic, FlexSim); system dynamics and group model building (Vensim, STELLA); data envelopment analysis; optimization (GAMS, CPLEX, LINGO)
Cloud, data, and BI	AWS (SageMaker, Lambda, CloudWatch), Spark, Tableau
Healthcare domains	Readmission, admission, and ED-visit risk; inpatient-note summarization; cancer clinical-trial matching; bed capacity and patient flow; emergency department operations; COVID-19 hospitalization and ICU forecasting; infant mortality and preterm birth

PUBLICATIONS

1. **Ebrahimvandi A**, Hosseinichimeh N, Kong ZJ. Identifying the early signs of preterm birth from U.S. birth records using machine learning techniques. *Information*. 2022;13(7):310. doi:10.3390/info13070310
2. Darabi N, **Ebrahimvandi A**, Hosseinichimeh N, Triantis K. A DEA evaluation of U.S. states' healthcare systems in terms of their birth outcomes. *Expert Systems with Applications*. 2021;182:115278. doi:10.1016/j.eswa.2021.115278
3. **Ebrahimvandi A**, Hosseinichimeh N, Iams JD. Understanding state-level variations in the US infant mortality: 2000 to 2015. *American Journal of Perinatology*. 2019;36(12):1271–1277. doi:10.1055/s-0038-1675835
4. Hosseinichimeh N, Kim H, **Ebrahimvandi A**, Iams JD, Andersen D. Using a stakeholder analysis to improve systems modelling of health issues: the impact of progesterone therapy on infant mortality in Ohio. *Systems Research and Behavioral Science*. 2019;36(4):476–493. doi:10.1002/sres.2563
5. Ghaffarzadegan N, Larson RC, Fingerhut H, Jalali MS, **Ebrahimvandi A**, Quaadgras A, Kochan T. Model-based policy analysis to mitigate post-traumatic stress disorder. In: *Policy Analytics, Modelling, and Informatics*. Springer; 2018:387–406. doi:10.1007/978-3-319-61762-6_17
6. Hosseinichimeh N, MacDonald R, Hyder A, **Ebrahimvandi A**, et al. Group model building techniques for rapid elicitation of parameter values, effect sizes, and data sources. *System Dynamics Review*. 2017;33(1):71–84. doi:10.1002/sdr.1575
7. Ghaffarzadegan N, **Ebrahimvandi A**, Jalali MS. A dynamic model of post-traumatic stress disorder for military personnel and veterans. *PLOS ONE*. 2016;11(10):e0161405. doi:10.1371/journal.pone.0161405 (covered by *Newsweek* and *Business Insider*)

PRESENTATIONS

System modeling of a health issue: the case of preterm birth in Ohio. Presented at: International Conference of the System Dynamics Society; 2019; Albuquerque, NM.

Predicting preterm birth using machine learning techniques. Presented at: INFORMS Annual Meeting; 2018; Phoenix, AZ.

Interstate analysis of variation in infant mortality, 2000–2014. Presented at: INFORMS Annual Meeting; 2017; Houston, TX.

HONORS

John White Graduate Student Award, Virginia Tech, 2018

Scholarship, System Dynamics Summer School, MIT, 2017

Second place, FlexSim Simulation Competition, Society for Health Systems, 2016