

CURRICULUM VITAE

Andrew Joseph King, PhD

Research Assistant Professor of Critical Care Medicine
University of Pittsburgh

BIOGRAPHICAL INFORMATION

Business Address: University of Pittsburgh
Department of Critical Care Medicine
3550 Terrace Street, Suite 600
Pittsburgh, PA 15261

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EDUCATION AND TRAINING

Undergraduate:

2009 – 2013 University of Pittsburgh, Pittsburgh, PA BS, 2013 Bioinformatics

Graduate:

2013 – 2015 University of Pittsburgh, Pittsburgh, PA MS, 2015 Biomedical Informatics

2015 – 2018 University of Pittsburgh, Pittsburgh, PA PhD, 2018 Biomedical Informatics

Postgraduate:

2018 – 2021 University of Pittsburgh, Pittsburgh, PA Postdoc, Critical Care Informatics

APPOINTMENTS AND POSITIONS

Academic Appointments:

2013 – 2016 National Library of Medicine Pre-doctoral Fellow, University of Pittsburgh School of Medicine

2018 – 2020 National Library of Medicine Post-doctoral Fellow, University of Pittsburgh School of Medicine

2022 – Research Assistant Professor, Critical Care Medicine, University of Pittsburgh School of Medicine

Non-academic Appointments:

2015	Internship, Center for Health Informatics for the Underserved, Malawi, Africa
2015	Health Innovators Fellow, Jewish Healthcare Foundation, Pittsburgh, PA
2017	Health Innovators Fellow, Jewish Healthcare Foundation, Pittsburgh, PA

MEMBERSHIP IN PROFESSIONAL AND SCIENTIFIC SOCIETIES

American Medical Informatics Association (AMIA)	2013 – present
Association of Computational Linguists	2019 – present
Association for the Advancement of Artificial Intelligence	2019 – present
American Thoracic Society	2022 – present

HONORS

Best Student Poster, University of Pittsburgh Biomedical Informatics Training Program Retreat	2015
Martin Epstein Award and First Place in the Student Paper Competition, AMIA Annual Symposium	2015
Best Student Paper, University of Pittsburgh Biomedical Informatics Training Program Retreat	2016 & 2017
First Place in the Student Paper Competition, AMIA Joint Summits	2017
Nominated for the Distinguished Paper Award, AMIA Annual Symposium	2018
Best Focus Session Presentation, National Library of Medicine Informatics Training Conference	2019

PUBLICATIONS

Refereed research articles:

1. **King AJ**, Cooper GF, Clermont G, Hochheiser H, Hauskrecht M, Sittig DF, Visweswaran S. Using Machine Learning to Selectively Highlight Patient Information. *J Biomed Inform.* 2019 Dec;100:103327. PMID: 31676461; PMCID: PMC6932869; DOI: 10.1016/j.jbi.2019.103327
2. **King AJ**, Cooper GF, Clermont G, Hochheiser H, Hauskrecht M, Sittig DF, Visweswaran S. Leveraging Eye Tracking to Prioritize Relevant Medical Record Data: Comparative Machine Learning Study. *J Med Internet Res.* 2020 Apr 2;22(4):e15876. PMID: 32238342; PMCID: PMC7163414; DOI: 10.2196/15876
3. Tajgardo M, Cooper GF, **King AJ**, Clermont G, Hochheiser H, Hauskrecht M, Sittig DF, Visweswaran S. Modeling Physician Variability to Prioritize Relevant Medical Record Information. *JAMIA Open.* 2020 Dec 31;3(4):602-610. PMID: 33623894; PMCID: PMC7886572; DOI: 10.1093/jamiaopen/ooaa058
4. The UPMC REMAP-COVID Group, on behalf of the REMAP-CAP Investigators: Huang DT, McVerry BJ, Horvat C, Adams PW, Berry S, Buxton M, Clermont G, Garrard W, Girard TD, Haidar G, **King AJ**, Linstrum K, Malakouti S, Mayr FB, McCreary EK, Montgomery SK, Seymour CW, Weissman A, Angus DC. Implementation of the Randomized Embedded Multifactorial Adaptive Platform for COVID-19 (REMAP-COVID) trial in a US health system—lessons learned and recommendations. *Trials.* 2021 Jan 28;22(1):100. PMID: 33509275; PMCID: PMC7841377; DOI: 10.1186/s13063-020-04997-6
5. **King AJ**, Calzoni L, Tajgardo M, Cooper G, Clermont G, Hochheiser H, Visweswaran S. A simple electronic medical record system designed for research. *JAMIA Open.* 2021 Jul 31;4(3):ooab040. PMID: 34345801; PMCID: PMC8325484; DOI: 10.1093/jamiaopen/ooab040
6. Arabi YM, Gordon AC, Derde LPG, Nichol AD, Murthy S, Beidh FA, Annane D, Swaidan LA, Beane A, Beasley R, Berry LR, Bhimani Z, Bonten MJM, Bradbury CA, Brunkhorst FM, Buxton M, Buzgau A, Cheng A, Jong MD, Detry MA, Duffy EJ, Estcourt LJ, Fitzgerald M, Fowler R, Girard TD, Goligher EC, Goossens H, Haniffa R, Higgins AM, Hills TE, Horvat CM, Huang DT, **King AJ**, Lamontagne F, Lawler PR, Lewis R, Linstrum K, Litton E, Lorenzi E, Malakouti S, McAuley DF, McGlothlin A, McGuinness S, McVerry BJ, Montgomery SK, Morpeth SC, Mouncey PR, Orr K, Parke R, Parker JC, et al. Lopinavir-ritonavir and hydroxychloroquine for critically ill patients with COVID-19: REMAP-CAP randomized control trial. *Intensive Care Med.* 2021 Aug; 47(8):867-886. PMID: 34251506; PMCID: PMC8274471; DOI: 10.1007/s00134-021-06448-5
7. Visweswaran S, **King AJ**, Tajgardo M, Calzoni L, Clermont G, Hochheiser H, Cooper GF. Evaluation of eye tracking for a decision support application. *JAMIA Open.* 2021 Aug 2;4(3):ooab059. PMID: 34350394; PMCID: PMC8327376; DOI: 10.1093/jamiaopen/ooab059
8. REMAP-CAP Investigators, et al. Therapeutic Anticoagulation with heparin in critically ill patients with Covid-19. *N Engl J Med.* 2021; 385(9):777-789. PMID: 34351722; PMCID: PMC8362592; DOI: 10.1056/NEJMoa2103417
9. ATTACC Investigators, et al. Therapeutic anticoagulation with heparin in noncritically ill patients with Covid-19. *N Engl J Med.* 2021; 385(9):790-802. PMID: 34351721; PMCID: PMC8362594; DOI: 10.1056/NEJMoa2105911
10. Brant EB, Kennedy JN, **King AJ**, Gerstley LD, Mishra P, Schlessinger D, Shalaby J, Escobar GJ, Angus DC, Seymour CW, Liu VX. Developing a shared sepsis data infrastructure: a

systematic review and concept map to FHIR. *Npj Digit Med*. 2022;5:44. PMID: 35379946; PMCID: PMC8979949; DOI: 10.1038/s41746-022-00580-2

11. Griffin AC, He L, Sunjaya AP, **King AJ**, Khan Z, Nwadiugwu M, Douthit B, Subbian V, Nguyen V, Braunstein M, Jaffe C, Schleyer T. Clinical, Technical, and Implementation Characteristics of Real-World Health Applications Using FHIR. *JAMIA Open*. 2022 Oct 12;5(4):ooac077. PMID: 36247086; PMCID: PMC9555876; DOI: 10.1093/jamiaopen/ooac077
12. **King AJ**, Kahn JM, Brant EB, Cooper GF, Mowery DL. Initial development of an automated platform for assessing trainee performance on case presentations. *ATS Sch*. 2022;3(4):548-560. PMID: 36726701; PMCID: PMC9886197; DOI: 10.34197/ats-scholar.2022-0010OC
13. **King AJ**, Potter K, Seaman JB, Chiyka EA, Hileman BA, Cooper GF, Mowery DL, Angus DC, Kahn JM. Measuring performance on the ABCDEF Bundle during interprofessional rounds: interrater reliability of a nurse-based assessment tool. *Am J Crit Care*. 2023 Mar 1;32(2):92-99. PMID: 36854912; DOI: 10.4037/ajcc2023755
14. **King AJ**, Angus DC, Cooper GF, Mowery DL, Seaman JB, Potter KM, Bukowski LA, Al-Khafaji A, Gunn, SR, Kahn JM. A voice-based digital assistant for intelligent prompting of evidence-based practices during ICU rounds. *J Biomed Inform*. 2023 Oct;146:104483. PMID: 37657712; PMCID: PMC10591951; DOI: 10.1016/j.jbi.2023.104483
15. **King AJ**, Tang L, Davis BS, Preum SM, Bukowski LA, Zimmerman J, Kahn JM. Machine learning-based prediction of low-value care for hospitalized patients. *Intell Based Med*. 2023;8:100115. PMID: 38130744; PMCID: PMC10735238; DOI: 10.1016/j.ibmed.2023.100115

Reviews, invited papers, proceedings of conference and symposia (full paper), books and book chapters:

16. **King AJ**, Cooper GF, Hochheiser H, Clermont G, Visweswaran S. Development and preliminary evaluation of a prototype of a learning electronic medical record system. *AMIA Annu Symp Proc*. 2015 Nov 5;2015:1967-75. PMID: 26958296; PMCID: PMC4765593 [**Best Student Paper**]
17. Uppal R, Mandava G, Romagnoli KM, **King AJ**, Draper A, Handen A, Fisher A, Becich MJ, Dutta Moscato J. How can we improve Science, Technology, Engineering, and Math education to encourage careers in biomedical and pathology informatics? *J Pathol Inform*. 2016 Jan 29;7:2. PMID: 26955500; PMCID: PMC4763503; DOI: 10.4103/2153-3539.175375
18. **King AJ**, Fisher A, Becich M, Boone D. Computer Science, Biology, and Biomedical Informatics Academy: outcomes from five years of emerging high school students into informatics research. *J Pathol Inform*. 2017 Feb 28;8:2. PMID: 28400991; PMCID: PMC5359992; DOI: 10.4103/2153-3539.201110
19. **King AJ**, Hochheiser H, Visweswaran S, Clermont G, Cooper GF. Eye-tracking for clinical decision support: A method to capture automatically what physicians are viewing in the EMR. *AMIA Jt Summits Transl Sci Proc*. 2017 Jul 26;2017:512-521. PMID: 28815151; PMCID: PMC5543363 [**Best Student Paper**]

20. **King AJ**, Cooper GF, Hochheiser H, Clermont G, Hauskrecht M, Visweswaran S. Using machine learning to predict the information seeking behavior of clinicians using an electronic medical record system. *AMIA Annu Symp Proc.* 2018 Dec 5;2018:673-682. PMID: 30815109; PMCID: PMC6371238 [***Distinguished Paper Nomination***]
21. Visweswaran S, **King AJ**, Cooper GF. "Integration of AI for Clinical Decision Support." In: Cohen TA, Patel VL, Shortliffe EH, editors. *Cognitive Informatics in Health and Biomedicine: Intelligent Systems in Medicine and Health: The Role of AI.* Springer. 2022;285–308. DOI: 10.1007/978-3-031-09108-7_10
22. Horvat CM, **King AJ**, Huang D. Designing and Implementing 'Living and Breathing' Clinical Trials – An Overview and Lessons Learned from the COVID-19 Pandemic. *Crit Care Clin.* 2023 Oct;39(4):717-732. PMID: 37704336; PMCID: PMC9935272; DOI: 10.1016/j.ccc.2023.02.002
23. **King AJ**, Kahn JM. The role of data science in closing the implementation gap. *Crit Care Clin.* 2023 Oct;39(4):701-716. PMID: 37704335; DOI: 10.1016/j.ccc.2023.03.005
24. **King AJ**, Higgins L, Au C, Malakouti S, Music E, Kalchthaler K, Clermont G, Garrard W, Huang DT, McVerry BJ, Seymour CW, Linstrom K, McNamara A, Green C, Loar I, Roberts T, Marroquin O, Angus DC, Horvat CM. Automatic population of the Case Report Forms for an international multifactorial adaptive platform trial amid the COVID-19 pandemic. *AMIA Jt Summits Transl Sci Proc.* 2024. *In press.* DOI: 10.1101/2023.09.19.23295797

Preprint publications:

Proceedings of conference and symposia (abstracts) and other publications:

25. **King AJ.** *The Development and Evaluation of a Learning Electronic Medical Record System.* Doctoral Dissertation, University of Pittsburgh. 2018. Available from: <http://d-scholarship.pitt.edu/35223/>
26. **King AJ**, Visweswaran S, Hochheiser H, Clermont G, Cooper GF. Insights from a dissertation on the development of a Learning Electronic Medical Record System: data-driven, context-aware learning. *AMIA Annu Symp Proc.* 2020 Mar 4;2019.
27. **King AJ**, Malakouti S, Music E, Kalchthaler K, Holton J, Quinn K, Clermont G, Marroquin O, Angus DC, Horvat C. Computable case reporting for multicenter clinical trials and registries. In: Poster abstracts from fourth annual public meeting: Mobilizing computable biomedical knowledge (MCBK 2021). *Learn Health Sys.* 2022;6:e10300.
28. **King AJ**, Mowery DL, Cooper GF, Kahn JM. Natural Language Processing to Computationally Generate Feedback on the Quality of Trainees' Oral Case Presentations in the Intensive Care Unit. *Am J Respir Crit Care Med.* 2022;205:A2449.
29. Griffin A, He L, Sunjaya A, **King A**, Khan Z, Douthit B, Nwadiugwu M, Subbian V, Braunstein M, Ngyen V, Jaffe C, Schleyer T. Major characteristics of Fast Healthcare Interoperability Resources (FHIR) apps: A pilot study. *AMIA Annu Symp Proc.* 2022.

30. **King AJ**, Kahn JM. Reply to Discourage Paint-By-Numbers Presentations. *ATS Sch.* 2023 Mar 30;4(1):100-101. PMID: 37089685; PMCID: PMC10117397; DOI: 10.34197/ats-scholar.2022-0140LE

Publications as a named collaborator:

31. Angus DC, et al. Effect of Hydrocortisone on Mortality and Organ Support in Patients With Severe COVID-19: The REMAP-CAP COVID-19 Corticosteroid Domain Randomized Clinical Trial. *JAMA.* 2020 Oct 6;324(13):1317-1329. PMID: 32876697; PMCID: PMC7489418; DOI: 10.1001/jama.2020.17022
32. REMAP-CAP Investigators, et al. Interleukin-6 receptor antagonists in critically ill patients with Covid-19. *N Engl J Med.* 2021 Apr 22;384(16):1491-1502. PMID: 33631065; PMCID: PMC7953461; DOI: 10.1056/NEJMoa2100433
33. REMAP-CAP Writing Committee for the REMAP-CAP Investigators, et al. Effect of Convalescent Plasma on Organ Support-Free Days in Critically Ill Patients With COVID-19: A Randomized Clinical Trial. *JAMA.* 2021 Nov 2;326(17):1690-1702. PMID: 34606578; PMCID: PMC8491132; DOI: 10.1001/jama.2021.18178
34. REMAP-CAP Writing Committee for the REMAP-CAP Investigators, et al. Effect of Antiplatelet Therapy on Survival and Organ Support-Free Days in Critically Ill Patients With COVID-19: A Randomized Clinical Trial. *JAMA.* 2022 Apr 5;327(13):1247-1259. PMID: 35315874; PMCID: PMC8941448; DOI: 10.1001/jama.2022.2910
35. Writing Committee for the REMAP-CAP Investigators, et al. Long-term (180-Day) Outcomes in Critically Ill Patients With COVID-19 in the REMAP-CAP Randomized Clinical Trial. *JAMA.* 2023;329(1):39-51. PMID: 36525245; PMCID: PMC9857594; DOI: 10.1001/jama.2022.23257
36. Writing Committee for the REMAP-CAP Investigators, et al. Effect of Angiotensin-Converting Enzyme Inhibitor and Angiotensin Receptor Blocker Initiation on Organ Support-Free Days in Patients Hospitalized With COVID-19: A Randomized Clinical Trial. *JAMA.* 2023 Apr 11;329(14): 1183-1196. PMID: 37039790; PMCID: PMC10326520; DOI: 10.1001/jama.2023.4480
37. REMAP-CAP Investigators, et al. Simvastatin in Critically Ill Patients with Covid-19. *Engl J Med.* 2023 Dec 21;389(25):2341-2354. PMID: 37888913; PMCID: PMC10755839; DOI: 10.1056/NEJMoa2309995

PROFESSIONAL ACTIVITIES

TEACHING

Teaching assistant for graduate courses:

2014 Symbolic Methods in Artificial Intelligence

2015 & 2016 Human Computer Interaction and Evaluation Methods
 2017 Foundations of Translational Bioinformatics

Invited lectures:

06/2022 Interactive Keynote: Data. Talk presented at: NIH Office of Data Science Strategy, Coding it Forward Civic Digital Fellows Welcome Day. Online. [Invited Keynote Lecture]

06/2018 & 06/2019 Evaluation Metrics. Guest lecture for CoSBBI and iBRIC summer research programs.

04/2018 Reimagining Electronic Medical Records as Context Aware Information Resources. Guest lecture for Carnegie Mellon University 67-308 Innovation Studio: Healthcare Information Systems

08/2015 & 11/2016 My path to graduate school and the development of a Learning Electronic Medical Record. Guest lecture for University of Pittsburgh BIOSCI 1540 Computational Biology

Mentorship and Supervision of Trainees and Students:

2022 Mentor of Elizabeth Bair. Generating Summaries of Oxygen Therapy Decisions from Transcribed Oral Presentations of ICU Patients.

2019 Mentor of Pablo Coen-Pirani. Developing an Electronic Health Record App using the FHIR Data Standard.

2018 Mentor of Adelle Fernando. Speech recognition and natural language processing of ICU rounding presentations from a simulation study.

2018 Mentor of Samuel Samayamuthu. The sequence of viewing patient data on an electronic medical record system from a simulation study.

2017 Mentor of Anila Narayana. Exploring the Human Genome: A Search for the Eczema Gene. Presented at California State Science Fair.

2016 Mentor of Anibal Tornes Blanco. Evaluating multiple classifier methods for patient specific result prediction in Learning Electronic Medical Records (LEMR). Presented at Duquesne University Summer Undergraduate Research Symposium.

2015 Mentor of Arushi Bandi. Using Natural Language Processing to improve the prediction of relevant Data in Electronic Medical Records. Presented at University of Pittsburgh Cancer Institute Academy Annual Retreat.

RESEARCH**Past grant support:**

Years	Grant Number and Title	Role and Effort	Source and Total costs
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07/2019 – 06/2021	Loan Repayment Program	Principal investigator	Agency for Healthcare Research and Quality, n/a
08/2020 – 06/2022	A Voice-Interactive Virtual Assistant	Principal investigator, 75% effort	Pittsburgh Health Data Alliance, \$300,000

Presentations and invited lectures:

03/2023	A Voice-based Digital Assistant for Intelligent Prompting of Evidence-based Practices. Presented at University of Pittsburgh Department of Critical Care Medicine CRISMA Weekly Conference. Pittsburgh, PA.
07/2021	Computable Case Reporting for Multicenter Clinical Trials and Registries. Talk presented at Annual Meeting of Mobilizing Computable Biomedical Knowledge Community. Online.
09/2020	The Development and Evaluation of a Learning Electronic Medical Record System. Talk presented at Wake Forest Center for Biomedical Informatics. Online.
01/2020	A Guide to FHIR Starting. Presented at University of Pittsburgh Department of Critical Care Medicine Biostatistics and Data Management Core Speaker Series. Pittsburgh, PA.
06/2019	Using Machine Learning to Highlight Relevant Patient Data in a Learning EMR. Talk presented at: National Library of Medicine Informatics Training Conference. Indianapolis, IN.
05/2017	Learning Cycle of a Learning Electronic Medical Record. Poster presented at: University of Michigan—University of Pittsburgh Collaborative Scholarship Meeting. Cleveland, OH.
02/2017	Rethinking the EMR. Presented at University of Pittsburgh Department of Critical Care Medicine CRISMA Weekly Conference.
08/2016	Using a Low-Cost Eye Tracking Device to Automatically Label Information Usage Patterns. Poster presented at: DBMI Annual Training Program Retreat. Pittsburgh, PA. [Best student poster]
11/2015	Understanding Blood Transfusion Workflow in a Malawi Central Hospital and Recommendations for Implementing a Laboratory Information Management System. Poster presented at: BGSA Annual Symposium. Pittsburgh, PA.
08/2015 & 11/2016	My path to graduate school and the development of a Learning Electronic Medical Record. Guest lecture for University of Pittsburgh BIOSCI 1540 Computational Biology
08/2015	Training a Learning Electronic Medical Record. Poster presented at: DBMI Annual Training Program Retreat. Pittsburgh, PA.
06/2015	Development and Evaluation of a Prototype of a Learning Electronic Medical Record System. Poster presented at: National Library of Medicine Informatics Training Conference. Bethesda, MD

SERVICE

University service:

2015 Co-Director, Computer Science, Biology and Biomedical Informatics Site of the UPMC Hillman Summer Academy

National service:

2019 – 2021 Vice Chair, Intensive Care Informatics Working Group, American Medical Informatics Association

OPEN-SOURCE SOFTWARE

SimpleEMRSystem: a rapidly deployable and readily customizable electronic medical record (EMR) user interface for supporting laboratory-based research studies of EMR design and usability.

EyeBrowserPy: eye (gaze) tracking in your browser, plus area of interest analysis code.

PatientPy: patient state construction from clinical databases for machine learning.

MEDIA
News, newspapers, and blogs:

- 03/28/2023 Daily Nurse. Checklist Prompters Support ICU Round. [Online] Available from: <https://dailynurse.com/checklist-prompters-support-icu-rounds/>
- 03/22/2022 Pittsburgh health data alliance. From Concept to Clinic: How the PHDA Makes Research a Reality. Pittsburgh Health Data Alliance Blog. Weblog. [Online] Available from: <https://healthdataalliance.com/blog/concept-clinic-phda-makes-research-reality/>
- 12/01/2021 Pittsburgh health data alliance. Project Spotlight: Aviva (update). Pittsburgh Health Data Alliance Blog. Weblog. [Online] Available from: <https://healthdataalliance.com/blog/project-spotlight-aviva-update/>
- 11/25/2020 Pittsburgh health data alliance. Project Spotlight: Aviva. Pittsburgh Health Data Alliance Blog. Weblog. [Online] Available from: <https://healthdataalliance.com/blog/project-spotlight-aviva/>
- 08/01/2018 Department of Biomedical Informatics. "Pitt DBMI Doctoral Student Andy King Uses Eyetracking to Study Navigation of the Electronic Medical Record."

- Informatics Today. Autumn 2018. Available from:
<https://www.dbmi.pitt.edu/node/54159>
- 07/18/2012 Barney G. King of the road: Pitt student bikes cross-country for charity. The Pitt News. Available from: <https://pittnews.com/article/14036/archives/king-of-the-road-pitt-student-bikes-cross-country-for-charity/>
- 05/07/2012 Pittsburgh's Action 4 News. Pitt student to bike 3,900 miles on Journey of Hope. Available from: <https://www.wtae.com/amp/article/pitt-student-to-bike-3-900-miles-on-journey-of-hope/7456485>

Podcast appearances:

- 01/05/2023 Initial Development of an Automated Platform for Assessing Trainee Performance on Case Presentations. Scholarly. Available from:
<https://scholarly.transistor.fm/episodes/initial-development-of-an-automated-platform-for-assessing-trainee-performance-on-case-presentations>

Social media:

- X/Twitter @AndyKingPhD
- Website <https://www.andrewjking.com/>
- GitHub <https://github.com/ajk77>
- ORCID <https://orcid.org/0000-0002-9809-0563>
- LinkedIn <https://www.linkedin.com/in/andrewjking-phd/>
- ResearchGate https://www.researchgate.net/profile/Andrew_King2
- Google Scholar <https://scholar.google.com/citations?hl=en&user=uR9TO14AAAAJ>