

**Why is the Electronic Health Record So Challenging
for Research and Clinical Care?
Appendix: List of Contributors**

Author	Position	Expertise	Years of experience	Section(s)
James Beinlich	Chief Data Information Officer, Penn Medicine	<ul style="list-style-type: none"> • Health information systems design and implementation • Data governance • Data integration • Clinical informatics 	18	7.2
Mary Regina Boland, PhD	Assistant Professor of Informatics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Biomedical Informatics • Data Mining, Electronic Health Records • Translational Informatics/Research • Precision Medicine 	13	5.2
Kathryn Bowles, PhD, FAAN, FACMI	Professor of Nursing and van Ameringen Chair in Nursing Excellence, University of Pennsylvania School of Nursing	<ul style="list-style-type: none"> • Building and testing clinical decision support using electronic health record data • Expert knowledge elicitation 	20	8.2
Yong Chen, PhD	Associate Professor of Biostatistics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Analysis of real-world data • Data privacy and confidentiality • Data integration and evidence synthesis 	16	6.2
Tessa Cook, MD, PhD, CIIP, FSIMM	Assistant Professor of Radiology, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Imaging Informatics • Artificial Intelligence • Natural Language Processing • Patient- and Family-Centered Care • Practice Transformation 	20	6.3, 9.1
George Demiris, PhD, FACMI	Penn Integrates Knowledge University Professor, University of Pennsylvania School of Nursing and Perelman School of Medicine	<ul style="list-style-type: none"> • Personal health informatics • Human factors • Participatory design • Aging and technology 	25	3.1
Michael Draugelis, BS	Chief Data Scientist, Penn Medicine	<ul style="list-style-type: none"> • Machine Learning • Decision Science • Data Engineering 	22	8.2, 9.5

Laura Fluharty, MPH	Senior Director, Clinical Research Operations and Research Entity Privacy Officer for Penn Medicine	<ul style="list-style-type: none"> • HIPAA and Research • Clinical Trial Operations • IT platforms to support clinical research operations 	14	6.3
Peter Gabriel, MD	Associate Professor of Clinical Radiation Oncology and Chief Oncology Informatics Officer University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Oncology Informatics • Clinical Informatics • Electronic Phenotyping • Data Warehouse Development • Ontologies and Standardized Terminologies 	15	5.1, 7.2
Robert Grundmeier, MD	Director of Clinical Informatics, Children's Hospital of Philadelphia	<ul style="list-style-type: none"> • Clinical research informatics 	20	5.4
William Hanson, MD	Chief Medical Officer, Penn Medicine	<ul style="list-style-type: none"> • Clinical informatics • Data governance • Data science • Electronic health records 	11	6.1
Daniel S. Herman, MD, PhD	Assistant Professor of Pathology & Laboratory Medicine, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Laboratory medicine • Biomedical informatics • Electronic health records • Machine learning • Clinical standardization and Harmonization 	17	4.2
Blanca E. Himes, PhD, ATSF	Associate Professor of Informatics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Secondary use of EHR data • Genomics • Data science 	14	9.2, 9.4
John H. Holmes, PhD, FACE, FACMI	Professor of Medical Informatics in Epidemiology, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Artificial intelligence • Machine learning • Clinical research informatics • Data integration • Human factors • Epidemiology 	40	1, 2, 10
Rebecca A. Hubbard, PhD	Professor of Biostatistics, University of Pennsylvania,	<ul style="list-style-type: none"> • Biostatistics • Bayesian methods • Aging and dementia • Cancer epidemiology 	15	9.2

	Perelman School of Medicine	<ul style="list-style-type: none"> • Health services research 		
Charles Kahn, MD, MS, PhD, FACR, FACMI, FSIIM	Professor and Vice Chair of Radiology, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Artificial intelligence • Clinical decision support • Ontologies • Knowledge representation • Imaging informatics • Diagnostic radiology 	32	5.3
Dokyoon Kim, PhD	Assistant Professor of Informatics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Biomedical Informatics • Data integration • Machine learning • Electronic Health Records • Translational Informatics 	15	7.1
Ross Koppel, PhD, FACMI	University of Pennsylvania Perelman School of Medicine and University at Buffalo, Jacobs' School of Medicine	<ul style="list-style-type: none"> • Usability • Human-computer interaction • Workflow analysis • Vendor-healthcare facility interactions 	42	3.2
Qi Long, PhD	Professor of Biostatistics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Statistical and machine learning methods • EHR, -omics and mHealth data • Missing data • Causal inference • Privacy and fairness • Bayesian methods 	20	4.1, 9.3
Nebo Mirkovic, PhD	Associate Director for Research Analytics, Penn Medicine	<ul style="list-style-type: none"> • Data warehousing • Data analysis • Clinical information systems 	10	6.3
Jason H. Moore, PhD, FACMI	Edward Rose Professor of Informatics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Artificial intelligence • Machine learning • Translational bioinformatics 	25	10
Jeffrey Morris, PhD	Professor of Biostatistics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Biostatistics, Genomics • Big Data 	21	7.1
Daniele Mowery, PhD	Chief Research Information Officer,	<ul style="list-style-type: none"> • Clinical/Translational Research Informatics 	15	6.3

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Marylyn Ritchie, PhD, FACMI	Professor of Genetics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Translational bioinformatics • Statistical genetics • Machine learning • Data integration 	21	8.1, 9.3
Ryan Urbanowicz, Meng, PhD	Assistant Professor of Informatics, University of Pennsylvania Perelman School of Medicine	<ul style="list-style-type: none"> • Machine learning • Biomedical informatics • Data science • Genetics 	9	4.1, 9.5