

Lessons Learned from the 2023 UK Studyathon

OHDSI Community Call Jan. 23, 2024 • 11 am ET

n ohdsi



Upcoming Community Calls

Date	Topic
Jan. 23	2023 UK Study-A-Thon Lessons Learned
Jan. 30	Phenotype Phebruary Introduction
Feb. 6	Workgroup OKRs / Phenotype Phebruary Update 1
Feb. 13	Workgroup OKRs / Phenotype Phebruary Update 2
Feb. 20	Workgroup OKRs / Phenotype Phebruary Update 3
Feb. 27	Workgroup OKRs / Phenotype Phebruary Update 4



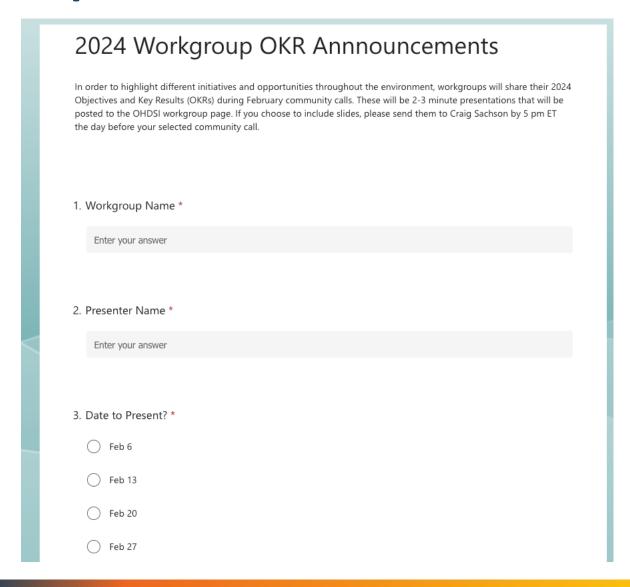




WG Leads: Please Sign Up For OKR Announcements

Currently Signed Up:

- FHIR + OMOP
- Generative AI and Analytics in Healthcare (GAIA)
- HADES
- Methods Research
- NLP
- Perinatal and Reproductive Health
- Registry
- Steering Group
- Health Equity
- Oncology
- CDM
- Medical Devices





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Three Stages of The Journey

Where Have We Been? Where Are We Now? Where Are We Going?







OHDSI Shoutouts!



Congratulations to the team of Xu Zuo, Yujia Zhou, Jon Duke, George Hripcsak, Nigam Shah, Juan Banda, Ruth Reeves, Timothy Miller, Lemuel Waitman, Karthik Natarajan, and Hua Xu on the publication of **Standardizing Multi-site Clinical Note Titles to LOINC Document Ontology: A Transformer**based Approach in the 2023 AMIA Annual Symposium Proceedings.

AMIA Annual Symposium Proceedings Archive



AMIA Annu Symp Proc. 2023; 2023: 834-843.

Published online 2024 Jan 11.

PMCID: PMC10785935

PMID: 38222429

Standardizing Multi-site Clinical Note Titles to LOINC Document Ontology: A Transformer-based Approach

Xu Zuo, M.S., ¹ Yujia Zhou, M.D., M.S., ¹ Jon Duke, M.D., ^{2,10} George Hripcsak, M.D., ^{3,10} Nigam Shah, Ph.D., ^{4,10} Juan M. Banda, Ph.D., ^{5,10} Ruth Reeves, Ph.D., ^{6,10} Timothy Miller, Ph.D., ^{7,10} Lemuel R Waitman, Ph.D., ⁸ Karthik Natarajan, Ph.D., ^{3,10} and Hua Xu, Ph.D., ^{9,10}

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Abstract Go to: >

The types of clinical notes in electronic health records (EHRs) are diverse and it would be great to standardize them to ensure unified data retrieval, exchange, and integration. The LOINC Document Ontology (DO) is a subset of LOINC that is created specifically for naming and describing clinical documents. Despite the efforts of promoting and improving this ontology, how to efficiently deploy it in real-world clinical settings has yet to be explored. In this study we evaluated the utility of LOINC DO by mapping clinical note titles collected from five institutions to the LOINC DO and classifying the mapping into three classes based on semantic similarity between note *titles* and LOINC DO codes. Additionally, we developed a standardization pipeline that automatically maps clinical note titles from multiple sites to suitable LOINC DO codes, without accessing the content of clinical notes. The pipeline can be initialized with different large language models, and we compared the performances between them. The results showed that our automated pipeline achieved an accuracy of 0.90. By comparing the manual and automated mapping results, we analyzed the coverage of LOINC DO in describing multi-site clinical note titles and summarized the potential scope for extension.

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OHDSI Shoutouts!



Congratulations to the team of Huzaifa Khan, Abu Saleh Mohammad Mosa, Vyshnavi Paka, Md Kamruz Zaman Rana, Vasanthi Mandhadi, Soliman Islam, Hua Xu, James C McClay, Sraboni Sarker, Praveen Rao, and Lemuel Waitman on the publication of **Mapping Clinical Documents** to the Logical Observation Identifiers, Names and Codes (LOINC) Document **Ontology using Electronic Health Record** Systems Structured Metadata in the 2023 AMIA Annual Symposium Proceedings.

AMIA Annual Symposium Proceedings Archive



AMIA Annu Symp Proc. 2023; 2023; 1017-1026.

Published online 2024 Jan 11.

PMCID: PMC1078591

PMID: 3822232

Mapping Clinical Documents to the *Logical Observation Identifiers, Names and Codes* (LOINC) Document Ontology using Electronic Health Record Systems Structured Metadata.

Huzaifa Khan, B.S., ^{1, 2} Abu Saleh Mohammad Mosa, Ph.D., ² <u>Vyshnavi Paka, M.S., ² Md Kamruz Zaman Rana, M.S., ² Vasanthi Mandhadi, M.S., ² <u>Soliman Islam, M.Sc., ² Hua Xu, PhD, ^{3, 4} James C. McClay, M.D., ² <u>Sraboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D. ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Lemuel R. Waitman, Ph.D., ² <u>Staboni Sarker, M.S., ⁵ Praveen Rao, Ph.D., ⁵ and Ph.</u></u></u></u></u></u></u></u></u></u></u></u></u>

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Abstract Go to

As Electronic Health Record (EHR) systems increase in usage, organizations struggle to maintain and categorize clinical documentation so it can be used for clinical care and research. While prior research has often employed natural language processing techniques to categorize free text documents, there are shortcomings relative to computational scalability and the lack of key metadata within notes' text. This study presents a framework that can allow institutions to map their notes to the LOINC document ontology using a Bag of Words approach. After preliminary manual value- set mapping, an automated pipeline that leverages key dimensions of metadata from structured EHR fields aligns the notes with the dimensions of the document ontology. This framework resulted in 73.4% coverage of EHR documents, while also mapping 132 million notes in less than 2 hours; an order of magnitude more efficient than NLP based methods.





OHDSI Shoutouts!



PUBLISHED 03 January 2024 DOI 10.3389/jpps.2023.12095

Congratulations to the team of Joel Swerdel and Mitchell Conover on the publication of Comparing broad and narrow phenotype algorithms: differences in performance characteristics and immortal time **incurred** in the *Journal of Pharmacy* & Pharmaceutical Sciences.





OPEN ACCESS

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Joel N. Swerdel, ☐ jswerdel@its.jnj.com

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Swerdel JN and Conover MM (2024), Comparing broad and narrow phenotype algorithms: differences in performance characteristics and immortal time incurred J. Pharm. Pharm. Sci 26:12095. doi: 10.3389/ipps.2023.12095

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Comparing broad and narrow phenotype algorithms: differences in performance characteristics and immortal time incurred

Joel N. Swerdel 12* and Mitchell M. Conover 12

¹Observational Health Data Analytics, Global Epidemiology, Janssen Research and Development, Titusville, NJ, United States, 2Observational Health Data Sciences and Informatics, New York, NY, United States

Introduction: When developing phenotype algorithms for observational research, there is usually a trade-off between definitions that are sensitive or specific. The objective of this study was to estimate the performance characteristics of phenotype algorithms designed for increasing specificity and to estimate the immortal time associated with each algorithm.

Materials and methods: We examined algorithms for 11 chronic health conditions. The analyses were from data from five databases. For each health condition, we created five algorithms to examine performance (sensitivity and positive predictive value (PPV)) differences: one broad algorithm using a single code for the health condition and four narrow algorithms where a second diagnosis code was required 1-30 days, 1-90 days, 1-365 days, or 1- all days in a subject's continuous observation period after the first code. We also examined the proportion of immortal time relative to time-at-risk (TAR) for four outcomes. The TAR's were: 0-30 days after the first condition occurrence (the index date), 0-90 days post-index, 0-365 days post-index, and 0-1,095 days post-index. Performance of algorithms for chronic health conditions was estimated using PheValuator (V2.1.4) from the OHDSI toolstack. Immortal time was calculated as the time from the index date until the first of the following: 1) the outcome; 2) the end of the outcome TAR: 3) the occurrence of the second code for the chronic health condition.





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Upcoming Workgroup Calls

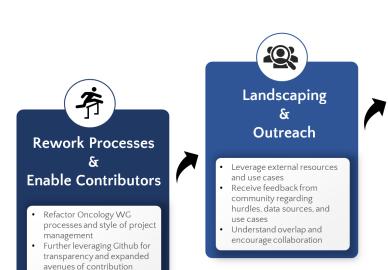


Date	Time (ET)	Meeting
Tuesday	12 pm	Common Data Model Vocabulary Subgroup
Wednesday	7 am	Medical Imaging
Wednesday	9 am	OMOP CDM Oncology – Outreach/Research Subgroup
Wednesday	12 pm	Latin America
Wednesday	4 pm	Vulcan/OHDSI Meeting
Thursday	9:30 am	Network Data Quality
Thursday	7 pm	Dentistry
Friday	9 am	Phenotype Development and Evaluation
Friday	10 am	GIS – Geographic Information System
Friday	11 am	Clinical Trials
Friday	11:30 am	Steering Group
Monday	10 am	Healthcare Systems Interest Group



Oncology Standards Maturity Effort (1 / 2)

2023: Outreach & Preparation



Focus on asynchronous development







Community sentiment towards effort **overwhelmingly positive**

- Viewed as worthwhile and impactful
- Many community members willing to contribute time and resources

Landscaping & outreach have shown **significant overlap** in:

- Implementation barriers and roadblocks experienced
- Data sources and variables of interest
- Use cases and interest in network research

Oncology Standards Maturity Effort (2 / 2)

2024: Collaborative Development

The stage is set!

A **Github Project** has been created with:

- An inventory of the outstanding work identified by the outreach efforts
- Documentation on project processes, methods and contribution mechanisms
- Tasks broken down into smaller "chunks" to enable many small, and often asynchronous, contributions (rather than singular large bodies of work)
- Plan: complete as much as we can, prioritized by use cases, in preparation for a new stable release

Who should get involved?

To achieve international and source-agnostic interoperability, specifically the harmonization of diverse data representations, a diverse group stakeholders, data sources and contributors is required.

Let's get to work!

An OHDSI forum post contains an overview of the effort and relevant links : <u>t.ly/XbspZ</u>

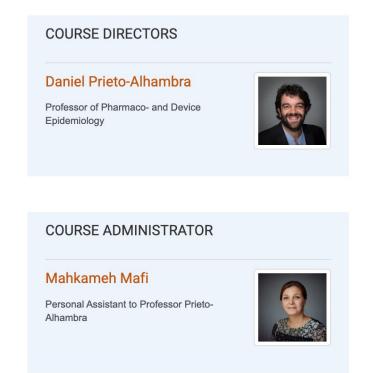
To supplement the documentation, there is a meeting scheduled tomorrow (Teams/Onc/Dev Vocab Subgroup) at this same time to give an overview and answer any questions. This will be recorded and linked in the documentation

Please see the "Getting Involved" section of the docs to #joinTheJourney



2024 Oxford Summer School: June 17-21

Oxford Summer School 2024: Real World Evidence using the OMOP Common Data Model







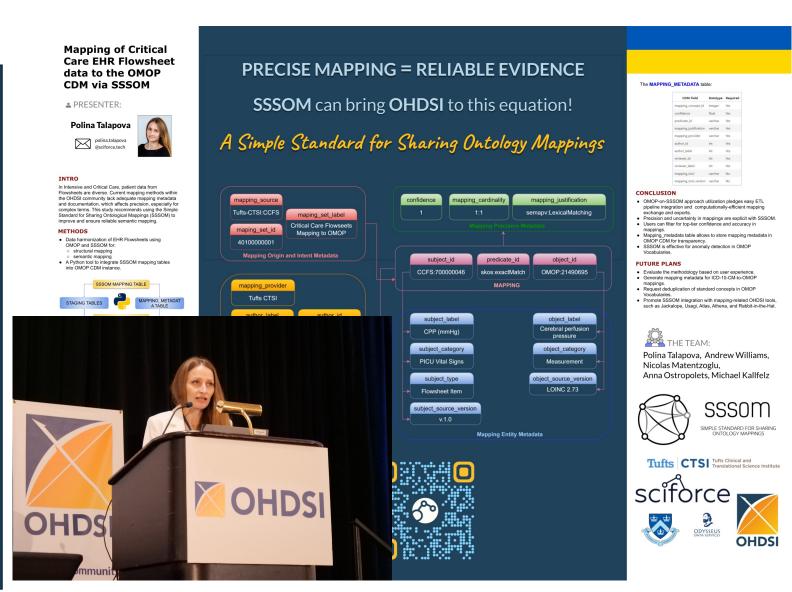


MONDAY

Mapping of Critical Care EHR

Flowsheet data to the OMOP CDM via SSSOM

(Polina Talapova, Andrew Williams, Nicolas Matentzoglu, Anna Ostropolets, Michael Kallfelz)



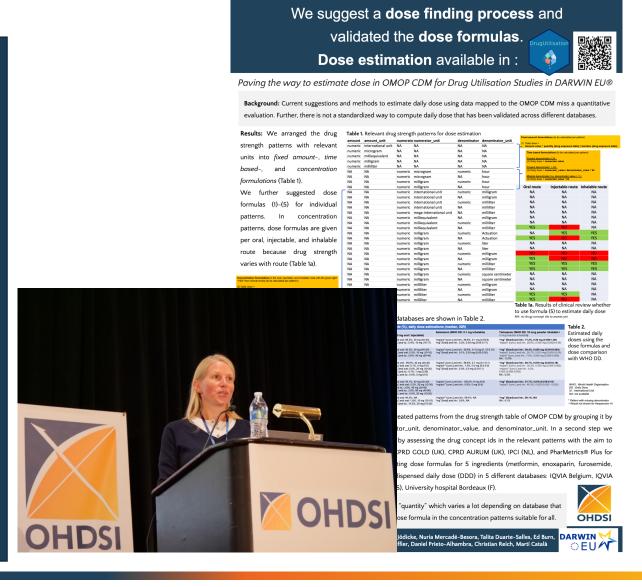




TUESDAY

Paving the way to estimate daily dose in OMOP CDM for Drug Utilisation Studies in DARWIN EU®

(Theresa Burkard, Kim Lopez-Güell, Artem Gorbachev, Annika M Jödicke, Nuria Mercadé-Besora, Talita Duarte-Salles, Maria de Ridder, Mees Mosseveld, Dani Prieto-Alhambra, Christian Reich, Marti Catala)





WEDNESDAY

Generating
Synthetic Electronic
Health Records in
OMOP using GPT

(Chao Pang, Xinzhuo Jiang, Nishanth Parameshwar Pavinkurve, Krishna S. Kalluri, Elise L. Minto, Karthik Natarajan)



Generating Synthetic Electronic Health Records in OMOP using GPT

Results

Chao Pang¹, Xinzhuo Jiang¹, Nishanth Parameshwar Pavinkurve¹, Krishna S. Kalluri¹, Elise L. Minto¹, Karthik Natarajan¹
¹Columbia University Irving Medical Center, Department of Biomedical Informatics

This work focuses on synthetic data generation and demonstrate the capability of training a GPT model using a patient representation derived from CEHR-BERT, enabling the generation of patient sequences that can be seamlessly converted to the OMOP data format bi-direction.

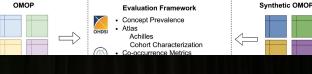
Current approach: Bag of Word + GAN Model

GAN • F

- Use cases of synthetic EHR data

 Phenotype algorithm validation
- Prediction research
 Tool development
- External validation
 Training and education
- Training and education
 Debiasing the the source data
- Counterfactual dataset

lethods – Framework



• Co-occurrence Metrics

Concept Prevalence Co-occurrence Metrics General-product General-produc

Machine Learning Performance Metrics

Target Cohorts	Real data		p P ⁰ ability cutoff P (%)	Top K concepts with the h	K ^o ighest probabilities
raiget colloits	Real data	Top P = 95%	Top P = 100%	Top K = 100	Top K = 300
HF Readmission	Pre = 25.7	Pre = 27.6	Pre = 28.4	Pre = 30.7	Pre = 26.5
	AUC = 65.7	AUC = 69.2	AUC = 65.9	AUC = 68.1	AUC = 64.9
	PR = 39.3	PR = 45.7	PR = 41.8	PR = 47.8	PR = 39.3
Hospitalization	Pre = 5.6	Pre = 5.2	Pre = 7.3	Pre = 2.8	Pre = 6.3
	AUC = 75.3	AUC = 77.1	AUC = 68.3	AUC = 87.0	AUC = 78.7
	PR = 19.5	PR = 21.4	PR = 16.5	PR = 22.1	PR = 24.6
COPD Readmission	Pre = 34.5	Pre = 37.8	Pre = 47.2	Pre = 26.4	Pre = 34.5
	AUC = 74.2	AUC = 76.4	AUC = 74.1	AUC = 75.9	AUC = 68.8
	PR = 83.8	PR = 84.4	PR = 67.2	PR = 90.3	PR = 80.2
Afib Ischemic Stroke	Pre = 8.7	Pre = 10.2	Pre = 10.4	Pre = 16.6	Pre = 10.8
	AUC = 84.0	AUC = 78.9	AUC = 70.7	AUC = 77.1	AUC = 76.8
	PR = 48.5	PR = 41.2	PR = 39.1	PR = 50.5	PR = 38.5
CAD CABG	Pre = 7.1	Pre = 4.1	Pre = 4.4	Pre = 7.2	Pre = 4.0
	AUC = 88.4	AUC = 81.5	AUC = 52.9	AUC = 75.6	AUC = 79.0
	PR = 55.9	PR = 25.2	PR = 4.3	PR = 38.5	PR = 24.1

Conclusions

- First framework generated longitudinal synthetic EHR data using OMOP CDM.
- Designed an innovative patient representation by incorporating temporal information which allowed for an
 accurate reconstruction of patient medical timeline as compared to state of art methods.
- Comprehensive evaluation procedures showed that the synthetic data preserved the fundamental patient characteristics of the real population.

Contact: CEHR-BERT@lists.cumc.columbia.edu

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THURSDAY

Comparing concepts extracted from clinical Dutch text to conditions in the structured data

(Tom M. Seinen, Jan A. Kors, Erik M. van Mulligen, Peter R. Rijnbeek)

The information difference Comparing concepts extracted from clinical Dutch text to conditions in the structured data between coded conditions and ♣ PRESENTER: Tom Seinen Unlocking valuable hidden information in clinical parratives is crucial for clinical their related clinical notes research and practice. This study focuses on assessing the semantic similarity between coded conditions and extracted concepts A. Concept extraction framework English language processing in healthcare. Data: Integrated Primary Care Information (IPCI) Dutch general practitioner EHR Concept extraction: MedSpacy with Dutch C. Semantic similarity between Setup: We applied the concept extraction framework to clinical notes related to (text and ontology-based) embeddings were Percentages of similar and related concept over all conditions

Methods Extra

Concept extraction framework:

- Proprocessing:
 - Lowercase
 Remove numbers
- · SpaCy dutch tokenization
- QuickUMLS concept extraction
 Dutch Snomed CT +
 - Patient preferred term
- Medspacy context extraction
- Dutch context rules

otation:

- 2000 code occurrences
 200 different codes
- Embeddings:
- · Text-based embeddings (4)
- · Ontology-based embeddings (4)

Similarity thresholds:

- Similar concepts
 - From 1 SD from the max (1)
- To the max (1)
 Related concepts
 - . From 1 SD from the median

To 1 SD from the max (1)

· Codes occurring > 100k times

- 317 different ICPC condition codes
- 317 different ICPC condition
- 29 million condition occurrences
- 110 million notes
- 429 million extracted concepts

Future steps

Concept extraction framework:

- Adding more Dutch synonyms from
- Comparison to other concept
- extraction frameworks
- Try the same for another languag



Tom Seinen, Erik van Mulligen, Jan Kors, Peter Rijnbeek Department of Medical Informatics Erasmus MC, The Netherlands



















FRIDAY

Finding a constrained number of predictor phenotypes for multiple outcome prediction

(Jenna M Reps, Jenna Wong, Egill A. Fridgeirsson, Chungsoo Kim, Luis H. John, Ross D. Williams, Patrick Ryan)

Title: Finding a constrained number of predictor phenotypes for multiple outcome prediction

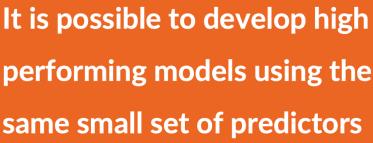
♣PRESENTER: Jenna M. Reps

- · Can we perform a large-scale characterization study to identify a constrained set of predictors that generally discriminate whether a patient will develop a future outcome?
- If so, we can use these predictors to predict 100s or 1000s of outcomes

METHODS

- 1. We used six OMOP CDM databases (MDCR, MDCD, CCAE, JMDC, Germany and Australia).
- 2. We investigated candidate covariates consisting of conditions/drugs (grouped using the hierarchy) that are recorded in the 1-year prior to target cohort

performing models using the same small set of predictors



RESULTS



(constrained LR/GBM) often performed similarly to the models that had thousands of candidate predictors (best case LR) and did better than models trained using only age/sex predictors (worse-case LR).



EXPLORE YOUR RISKS

WhatllHappenToMe.org



Jenna M Reps¹, Jenna Wong², Egill A. Fridgeirsson³, Chung Kim⁴, Luis H. John³, Ross D. Williams³, Patrick Ryan





v the predictors





Opening: Research Information Specialist at UNC



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Full Time/Part

FTE

Full-Time Permanent

	Research Informat	ics Specialist			
★ Home		Tes specialist			
Q Search Jobs	■ Bookmark	this Posting	Print Preview	◆ Apply for this Job	
Careers At Carolina Notifications	Please see Special Inst	ructions for more details.			
→ Log In /Create Account	Working hours are Mo	nday-Friday, 8:00 am – 6:00 pm E	ST with flexibility available wit	hin that window.	
? Help					
Working at Carolina	Posting Information Posting Information				
	Department	TraCS Institute-429801	Position Summary	* Consult with and collaborate with researchers to ensure programming work aligns with project needs. * Develop ETL (extract, transform, and load) and data integration processes to support common data models (OMOP, PCORnet) using appropriate technology. Python, or R). * Carefully following UNC's regulatory and governance policy to ensure data integrity and security. * In collaboration with IDSci team, identify potential enhancements in current workflows and data architecture. * Implement quality assurance strategies, such as data validation and peer code review.	
	Career Area	Information Technology			
	Posting Open Date	12/13/2023	1 osition Summary		
	Application Deadline	01/30/2024			
	Open Until Filled	No			
	Position Type	Permanent Staff (EHRA NF)			
	Working Title	Research Informatics Specialist		* Write and maintain up-to-date supporting doct * Provide technical leadership and direction for	
	Appointment Type	EHRA Non-Faculty	Minimum Education and Experience	Т	
	Position Number	20060002		M - 2 - 110 2 - 2 - 2 - 2	
	Vacancy ID	NF0007640		Master's and 1-2 years' experience; or Bachelors and 2-4 years' experience; or will accept a combination of related educati	
	Full Time/Part		Requirements		

This position requires two or more years of relevant work experience and:

Required * Expert-Qualifications, * Past ex

Competencies, and Experience

- * Expert-level knowledge of SQL programming, data modeling, and relational database systems such as Oracle, Microsoft SQL Server, MySQL, etc.
- * Past experience working with health care data in an analytic capacity, particularly electronic health record and/or claims data.
- * Demonstrable past experience in scoping technical projects in terms of length of time, competencies and cost. Individual will be expected to manage multiple projects at once while delivering high-quality work on time.
- * Excellent written and oral business communication skills. Public speaking at meetings and conferences may be required. The ability to clearly convey technical concepts to non-technical clients is a must.







Opening: Data Steward at EBMD

Description

Are you looking for a job where you can make a difference and work in a non-profit?

Would you like to be a part of an ambitious and international organisation on the cutting edge of science?

Then this position might be right up your alley.

The EBMT is a non-profit medical and scientific organisation which hosts a unique patient registry providing a pool of data to perform studies and assess new trends.

OUR MISSION

Save and improve the lives of patients with blood-related disorders.

The Registry

Holding the **data of over half a million patients**, the EBMT registry is the **starting point for all studies** carried out through the EBMT working parties. The department focuses on data collection processes, data quality monitoring, and maintenance of the database.

YOUR MISSION

Responsible for collecting, collating, and evaluating issues and problems with data and enforcing data usage policies.

RESPONSIBILITIES AND TASKS

Data Stewardship:

- Design, implementation and testing of new data collection processes including data collection forms (DCFs) development.
- Take care of the mapping of new items from DCFs to the OMOP CDM
- Providing input on data quality reports
- Check and clean data on request and ad hoc.
- Data retrieval including designing data reports and data report running.
- Carry out computerized system validation activities.
- Supporting consolidation/harmonization of data
- Creating standard data definitions, and maintain a consistent use of data assets across the organization
- Documenting data policies and data standards







Where Are We Going?

Any other announcements of upcoming work, events, deadlines, etc?

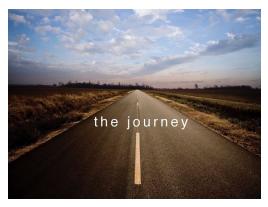






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#JoinTheJourney



Jan 23: 2023 UK Study-a-Thon Lessons Learned





Dani Prieto-Alhambra

Professor of Pharmaco- and Device Epidemiology, Oxford University



Jennifer Lane

NIHR Clinical Lecturer in Trauma and Orthopaedic Surgery, Barts Bone and Joint Health, Queen Mary Univ. of London



Katherine Donegan

Head of Epidemiology, MHRA



Annika Jodicke

Senior Researcher in Pharmacoepidemiology, University of Oxford





The weekly OHDSI community call is held every Tuesday at 11 am ET.

Everybody is invited!

Links are sent out weekly and available at: ohdsi.org/community-calls

