2OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02/28/2023)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Sward, Katherine

eRA COMMONS USER NAME (credential, e.g., agency login): KATHYSWARD

POSITION TITLE: Professor

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE(if applicable) | Completion DateMM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| Lutheran Hospital School for Nurses, Moline, IL | RN | 1981 | Nursing |
| Westminster College, Salt Lake City, UT | BS | 1990 | Nursing |
| University of Utah, Salt Lake City, UT | MS | 1998 | Nursing informatics |
| University of Utah, Salt Lake City, UT | PHD | 2007 | Nursing, Informatics |

**A. Personal Statement**

I am a tenured Professor in the University of Utah College of Nursing, with joint appointment in the School of Medicine, Department of Biomedical Informatics (DBMI). As an informatics scientist, I served as Principal or Co-Investigator on multiple NIH extramural awards. My research focus area is Clinical Research Informatics.

I am experienced with data science approaches and computational modeling; and with informatics methods, workflows, and artifacts to support complex multi-center trials, reflected in part by my longstanding (> 15 yr) collaboration with the University of Utah Data Coordinating Center (DCC) where I serve as MPI in the Data Resource Center for the Helping End Addiction Long-term Effectiveness Research Network (HEAL ERN); and as co-investigator and informatics expert for the Utah Trial Innovation Center (TIC) and the Collaborative Pediatric Critical Care Research Network (CPCCRN). At the DCC, I work with study data managers and statisticians to support data management and analytics, and lead data harmonization for the NIH-funded Helping to End Addiction Long-term (HEAL) Initiative. I also lead DCC efforts to obtain research data directly from electronic health records, studies using decision support tools, and other technology used in research.

Recent research includes particular focus on informatics to support clinical and research use of real world data, particularly social and environmental influences on health. I have led projects integrating person-generated health data and patient reported outcomes from sensors and mobile apps into traditional research data and data from electronic health records. I co-direct (with Dr. Facelli) the University of Utah *Center of Excellence for Exposure Health Informatics* (CEEHI)*;* building on our recent NIH/NIBIB-funded PRISMS informatics center (U54EB021973) which used air quality sensors and pediatric asthma as the exemplar to develop an Exposure Health Informatics Ecosystem.

The following are ongoing and recently completed projects I would like to highlight:

U24TR004315 Dean, Dwyer, Sward, Watt (MPI) 09/23/2022-08/31/2027

NIH/NCATS, NINDS

*HEAL ERN: Data Coordinating Resource Center*

PL1HD105462 Dean (PI). Role: co-investigator, informatics lead 08/13/2021 – 8/12/2026

NIH / NICHD

*Collaborative Pediatric Critical Care Research Network (CPCCRN)*

PI-CD32-OPI Smid, Shakib (MPI) Role: co-investigator 6/2020 – 6/2026

CDC/Public Health Informatics Institute

MATernaL and Infant NetworK to Understand Outcomes Associated with Treatment for Opioid Use Disorder during Pregnancy (MAT-LINK).

2R01ES017431 Reilly (PI) Role: co-investigator 06/30/2019-07/01/2024

NIH / NIEHS

*TRP Channels and Air Pollution*

UL1TR002538 Hess, Dere (MPI): Role: BMI core 03/30/2018-02/28/2023

NIH/NCATS

*University of Utah Center for Clinical and Translational Science*

U24TR001597 Dean (PI) Role: co-investigator 07/01/2016-06/30/2023

NIH / NCATS

*Utah Trial Innovation Center*

U54EB021973-01 Sward, Facelli (MPI – contact PI) 09/30/2015-10/31/2020

PRISMS Informatics Platform - Federated Integration Architecture

The following publications that highlight my experience and qualifications:

1. Horvat CM, Fabio A, Nagin DS, Banks RK, Qin Y, Park H-J, Kernan KF, Canna SW, Berg RA, Wessel D, Pollack MM, Meert K, Hall M, Newth C, Lin JC, Doctor A, Shanley T, Cornell T, Harrison RE, Zuppa AF, Reeder RW, **Sward K**, Holubkov R, Noterrman DA, Dean JM, Carcillo JA. Mortality Risk in Pediatric Sepsis Based on C-reactive Protein and Ferritin Levels. *Pediatr Crit Care Med*. 2022 Sep. Online ahead of print.
2. Carcillo JA, **Sward K**, Halstead ES, Telford R, Jimenez-Bacardi A, Shakoory B, Simon D, Hall M. A Systemic Inflammation Mortality Risk Assessment Contingency Table for Severe Sepsis. *Pediatr Crit Care Med*. 2017 Feb;18(2):143-150. PMCID: PMC5291785
3. **Sward KA**, Newth CJL, Khemani RG, Page K, Meert KL, Carcillo JA, Shanley TP, Moler FW, Pollack MM, Dalton HJ, Wessel DL, Berger JT, Berg RA, Harrison RE, Doctor A, Dean JM, Holobkov R, Jenkins TL, Nicholson CE. Potential Acceptability of a Pediatric Ventilator Management Computer Protocol. *Pediatr Crit Care Med*. 2017 Nov;18(11):1027-1034. PMCID: PMC6108591
4. Newth CJL, Khemani RG, Jouvet PA, **Sward KA**. Mechanical Ventilation and Decision Support in Pediatric Intensive Care. *Pediatr Clin North Am*. 2017 Oct;64(5):1057-1070.

**B. Positions, Scientific Appointments, and Honors**

**Positions and Scientific Appointments (selected from past ~20 years)**

2020 - present Professor with tenure, College of Nursing, with joint appointment in the Department of Biomedical Informatics, University of Utah, Salt Lake City, UT (2022)

2016 - present Grant Application Reviewer, National Science Foundation

2015 - present Grant Application Reviewer, National Institutes of Health (NIH).
Standing member Clinical Informatics and Digital Health (CIDH) Study Section

2014 - present Grant Application Reviewer, Patient-centered outcomes research institute (PCORI)

2014 - 2020 Associate Professor with tenure, College of Nursing, University of Utah, Salt Lake City, UT

2011 - 2014 Grant reviewer, Agency for Healthcare Research and Quality (AHRQ)

2007 - 2014 Assistant Professor, College of Nursing, University of Utah, Salt Lake City, UT

2007 - 2022 Adjunct Faculty, Department of Biomedical Informatics, University of Utah, Salt Lake City, UT

1999 - 2007 Clinical Instructor, College of Nursing, University of Utah, Salt Lake City, UT

1998 - present Utah Nursing Informatics Nework (UNIN). Current role: President

**Honors**

2019 University of Utah Presidential Scholar, 2019-2022

2017 *Reed M Gardner* Award for Faculty Excellence, University of Utah Dept. of Biomedical Informatics

2017 Inducted as Fellow in the American Academy of Nursing

2014 Excellence in Scholarship and Research, University of Utah College of Nursing

2013 Award for Excellence in Mentoring, Sigma Theta Tau International Gamma Rho Chapter

2008 Award for Excellence in Teaching, Sigma Theta Tau International Gamma Rho Chapter

2007 Outstanding Doctoral Student, University of Utah College of Nursing

2006 Excellence in Teaching Award, University of Utah College of Nursing

**C. Contributions to Science**

1. **Clinical Research Informatics (CRI)** **and Clinical Decision Support (CDS)**

Clinical research is a complex, resource intensive endeavor comprised of a multitude of actors, workflows, processes, and information resources. Clinical research informatics (CRI), one of my primary research areas, is a subdomain of biomedical informatics focused on tools and methods that support and enable clinical and translational research. I contributed to and led the development and evaluation of clinical decision support (CDS) tools, computer protocols, and other evidence based tools that we implemented within clinical care and research studies. I led software testing efforts and usability studies, and examined clinician and patient human-computer interactions. Our contributions raised awareness about variability in clinical research and potential benefits of using informatics tools and methods to standardize and support clinical and translational research in children and adults; and about the critical importance of system designs that support human workflows.

* 1. Morris AH, Horvat C, Stagg B, Grainger DW, Lanspa M, Orme J, Clemmer TP, Weaver LK, Thomas FO, Grissom CK, Hirshberg E, East TD, Wallace CJ, Young MP, Sittig DF, Suchyta M, Pearl JE, Pesenti A, Bombino M, Beck E, **Sward KA**, Weir C, Phansalkar S, Bernard GR, Thompson BT, Brower R, Truwit J, Steingrub J, Hiten RD, Willson DF, Zimmerman JJ, Nadkarni V, Randolph AG, Curley MAQ, Newth CJL, Lacroix J, Agus MSD, Lee KH, deBoisblanc BP, Moore FA, Evans RS, Sorenson DK, Wong A, Boland MV, Dere WH, Crandall A, Facelli J, Huff SM, Haug PJ, Pielmeier U, Rees SE, Karbing DS, Andreassen S, Fan E, Goldring RM, Berger KI, Oppenheimer BW, Ely EW, Pickering BW, Schoenfeld DA, Tocino I, Gonnering RS, Pronovost PJ, Savitz LA, Dreyfuss D, Slutsky AS, Crapo JD, Pinsky MR, James B, Berwick DM. Computer clinical decision support that automates personalized clinical care: a challenging but needed healthcare delivery strategy. *J Am Med Inform Assoc*. 2022 Sep 19:ocac143. Epub ahead of print.
	2. Khemani RG, Hotz JC, **Sward KA**, Newth CJL. The role of computer-based clinical decision support systems to deliver protective mechanical ventilation. *Curr Opin Crit Care*. 2020 Feb;26(1):73-81. PMCID: PMC8063512
	3. Furlong-Dillard JM, Miller BJ, **Sward KA**, Neary AI, Hardin-Reynolds TL, Jeffers G, Clay BA, Truong DT, Miller TA, Jones CE, Lambert LM, Bailly DK. The association between feeding protocol compliance and weight gain following high-risk neonatal cardiac surgery. *Cardiol Young*. 2019 May;29(5):594-601.
	4. Newth CJL, **Sward KA,** Khemani RG, Page K, Meert KL, Carcillo JA, Shanley TP, Moler FW, Pollack MM, Dalton HJ, Wessel DL, Berger JT, Berg RA, Harrison RE, Holubkov R, Doctor A, Dean JM, Jenkins TL, Nicholson CE, Eunice Kennedy Shriver National Institute for Child Health and Human Development Collaborative Pediatric Critical Care Research Network (CPCCRN). Variability in Usual Care Mechanical Ventilation for Pediatric Acute Respiratory Distress Syndrome: Time for a Decision Support Protocol? *Pediatr Crit Care Med.* 2017 Nov;18(11):e521-e529. PMCID: PMC5679099
1. **Data Standardization, Harmonization, & Exchange**

Data are a crucial element in clinical research, used for evaluating the study aims, and for internal decision making and study monitoring. Healthcare data vary widely between organizations, and may be stored in different formats and information models. Data standardization & harmonization bring heterogeneous data into a common format, allowing for collaborative research and large-scale analytics. Research data need to be described systematically in unambiguous language to be shareable and comparable. I have participated in national terminology harmonization efforts such as CDASH, CTCAE harmonization (NCI), Health eDecisions, and the NICHD pediatric terminology initiative. Our research has improved the use of consistent data artifacts and harmonization with national data and messaging standards in multi-center research networks.

* 1. Gouripeddi R, **Sward K**, Cummins M, Eilbeck K, LaSalle B, Facelli JC. Reproducible Informatics for Reproducible Translational Research. *J Clin Transl Sci*. 2020;4(S1):66-67. doi:10.1017/cts.2020.221
	2. Kalsy M, Lin J, Bray B, **Sward K**. Role of nursing informatics in the automation of pneumonia quality measure data elements. *Comput Inform Nurs*. 2018 Oct;36(10):475-483.
	3. **Sward** **KA**, Rubin S, Jenkins TL, Newth CJ, Dean JM; Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Collaborative Pediatric Critical Care Research Network (CPCCRN). Case Study: Semantic annotation of a pediatric critical care research study. *Comput Inform Nurs*. 2016 Mar;34(3):101-4. PMCID: PMC4788017
	4. Guo JW, **Sward** K, Beck S, Wong B, Staggers N, Frey L. Using a content analysis to identify study eligibility criteria concepts in cancer nursing research. *Comput Inform Nurs.* 2014 Jul;32(7):333-342.
1. **Translational Research, Data Science, & Health Outcomes**
I participate extensively in multidisciplinary research teams. Our findings highlight informatics methods, including system science and implementation science approaches, which support research rigor and reproducibility, data quality, and complex analytics.
	1. Luo G, **Sward** **K**. A roadmap for optimizing asthma care management via computational approaches. *JMIR Med Inform*; 2017 Sep 26;5(3):e32. PMCID: PMC5635229
	2. Yang R, Wang H, Edelman LS, Tracy EL, Demiris G, **Sward KA**, Donaldson GW. Loneliness as a mediator of the impact of social isolation on cognitive functioning of Chinese older adults. *Age Ageing*. 2020 Jul 1;49(4):599-604.
	3. Luo G, Stone BL, Koebnick C, He S, Au DH, Sheng X, Murtaugh MA, **Sward KA**, Schatz M, Zeiger RS, Davidson GH, Nkoy FL. Using Temporal Features to Provide Data-Driven Clinical Early Warnings for Chronic Obstructive Pulmonary Disease and Asthma Care Management: Protocol for a Secondary Analysis. *JMIR Res Protoc*. 2019 Jun 6;8(6):e13783. PMCID: PMC6592592
	4. Lyons AM, **Sward KA**, Deshmukh VG, Pett MA, Donaldson GW, Turnbull J. Impact of computerized provider order entry (CPOE) on length of stay and mortality. *J Am Med Inform Assoc*. 2017 Mar 1;24(2):303-309. PMCID: PMC5391723
2. **Exposure Health Informatics and Person-Generated Health Data**
Informatics methods and tools support the use of sensors, mobile devices, ecological momentary assessments, electronic health record data, and other emerging and innovative data sources into clinical and translational research. Incorporation of environmental data, physiological data, behavioral data, and social determinants with more traditional research and clinical data provides a broad picture of *exposures* to factors contributing to health and illness. I co-lead a multi-disciplinary collaboration of investigators developing an ecosystem for integrating, harmonizing, and curating diverse data-intensive datasets and conducting research on such infrastructure (University of Utah Center of Excellence for Exposure Health Informatics).
3. Li K, **Sward K**, Dneg H, Deng H, Morrison J, Habre R, Franklin M, Chiang Y-Y, Ambite JL, Wilson JP, Eckel SP. Using Using dynamic time warping self-organizing maps to characterize diurnal patterns in environmental exposures. *Sci Rep.* 2021 Dec 15;11(1):24052. PMCID: PMC8674322
4. Moore J, Goffin P, Meyer M, Lundrigan P, Patwari N, **Sward K**, Weise J. Managing in-home environments through sensing, annotating, and visualizing air quality data. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*. September 2018 Article No.: 128 https://doi.org/10.1145/3264938.
5. Lundrigan P, Min KT, Patwari N, Kasera SK, Kelly K, Moore J, Meyer M, Collingwood SC, Nkoy F, Sonte B, **Sward K**. EpiFi: An in-home IoT architecture for epidemiological deployments. *2018 IEEE 43rd Conference on Local Computer Networks Workshops (LCN Workshops)*, Chicago, IL, USA, 2018, pp. 30-37.
6. Gouripeddi R, Lundrigan P, **Sward K**. Exposure Health Informatics Ecosystem. In: Phillips KA, Yamamoto DP, Racz L, Eds. *Total Exposure Health*. 1st ed. CRC Press; 2020. pp. 233-78.

**Complete List of Published Work in My Bibliography:**

<https://www.ncbi.nlm.nih.gov/myncbi/katherine.sward.2/bibliography/41244085/public/>

ORCID: https://orcid.org/0000-0002-6568-4031