

Curriculum Vitae

Last Updated: 04/01/2024

PERSONAL DATA

Name: Michael D. Johnson, M.D., M.S.C.I

Birth Place: Davis County, Utah

Citizenship: United States

EDUCATION

<u>Years</u>	<u>Degree</u>	<u>Institution (Area of Study)</u>
2013 - 2015	M.S.	University of Utah (Health Services Research) Salt Lake City, UT
2007 - 2010	Resident	Mayo School of Graduate Medical Education (Pediatric and Adolescent Medicine) Rochester, MN
2003 - 2007	M.D.	Medical College of Wisconsin (Medicine) Milwaukee, WI
2000 - 2003	B.A.	Utah State University (Major: Environmental Biology; Minors: Russian & Chemistry) Logan, UT
1997 - 1998		Utah State University (Major: Environmental Biology; Minors: Russian & Chemistry) Logan, UT

BOARD CERTIFICATIONS

10/18/2010 - Present American Board of Pediatrics (Pediatrics), Certified

03/01/2008 - Present National Board of Medical Examiners, Certified

CURRENT LICENSES/CERTIFICATIONS

2010 - Present State License (UT) - Physician (MD)

UNIVERSITY OF UTAH ACADEMIC HISTORY

Pediatrics (Pediatric Emergency Medicine), 07/01/2010 - Present

07/01/2018 - Present Associate Professor (Clinical)

07/01/2012 - 06/30/2018 Assistant Professor (Clinical)

07/01/2010 - 06/30/2012 Instructor (Clinical)

PROFESSIONAL EXPERIENCE

Full-Time Positions

2018 - Present Associate Professor of Pediatrics, University of Utah, Salt Lake City, UT

2012 - 2018 Assistant Professor of Pediatrics, University of Utah / Primary Children's Hospital,
Salt Lake City, UT

2010 - 2012 Instructor in Pediatrics, University of Utah / Primary Children's Hospital, Salt Lake
City, UT

Part-Time Positions

2013 - Present Provider, Intermountain Healthcare, Salt Lake City, UT

Reviewer Experience

Peer reviewer for Journal of Asthma, Medical Principles and Practice, Academic Pediatrics, and Pediatric Emergency Care.

SCHOLASTIC HONORS

2004 - 2007 Medical School: Scott Scholarship
2004 Medical School: Summer Research Associate
2000 - 2003 B. A. Undergraduate: Magna Cum Laude, University Club Scholarship, Dean's List all semesters

ADMINISTRATIVE EXPERIENCE

Administrative Duties

2019 - Present Member of the IH Pediatric Respiratory Care Steering Council and Pediatric Respiratory Executive Committee. Review the evidence and feasibility of change in respiratory therapy practice and improvement efforts at other facilities, assisting with translation of successful initiatives across the Intermountain System through monthly meetings with other leaders in pediatric respiratory care across the IH system.

2017 - 2019 Member of the Asthma Work Group of the Intermountain Healthcare Pediatric Respiratory Development Team. Created to develop evidence-based practice standards for the care of children throughout Intermountain Healthcare. This group transitioned in 2019 to the IH Pediatric Respiratory Care Steering Council.

2017 - Present Director of Research, Division of Pediatric Emergency Medicine. Directly oversee all studies in the ED funded by PECARN, assist local researchers acting as site investigators for multicenter studies through the entire research cycle from grant preparation through study closeout, and provide mentorship and oversight for investigator-initiated studies by division members.

2014 - 2017 Project Leader of an initiative sponsored by Pediatric Specialty Services to improve the outcomes and reduce the cost of caring for children with acute asthma in the Primary Children's Hospital Emergency Department. Oversaw and led all aspects of investigation, development, and implementation of a comprehensive intervention that improved medication delivery and reduced the proportion of children hospitalized by one third.

2014 - 2016 In coordination with hospital nursing and physician leaders, developed an intervention to standardize pulse oximetry use in children with bronchiolitis, helping reduce alarm fatigue, increase parent comfort with discharge home, and emphasize the value of regular patient assessment.

2013 - 2017 Member of the Intermountain Healthcare Pediatric Respiratory Development Team, a group of physicians, nurses, respiratory therapists and administrators responsible for the care of children with asthma across Intermountain Healthcare including protocol development, nurse and physician education and quality assurance. Subsequently integrated in 2017 into the Pediatric Respiratory Development Team.

2011 - 2019 Member of the Respiratory Guidance Team at Primary Children's Hospital, a group of physicians, nurses, respiratory therapists and administrators responsible for the care of children with asthma and bronchiolitis in the hospital including protocol development, nurse and physician education and quality assurance. In 2019 the name of this group transitioned to the PCH Respiratory Guidance Council.

Professional Organization & Scientific Activities

2015 - 2016 Chapter Champion, American Academy of Pediatrics, AAP Medical Home Chapter Champions Program on Asthma, Allergy and Anaphylaxis. Utah Champion for this national AAP initiative focused on improved quality care of pediatric patients with asthma, including the facilitated implementation of national asthma guidelines within medical homes. Coordinated a new referral process using resources from Pediatric Specialty Services to screen and refer patients seen for asthma in the emergency departments of Primary Children's Hospital and Utah Valley Regional Medical Center with asthma home visiting education programs offered by the Salt Lake and Utah County Departments of Health.

PROFESSIONAL COMMUNITY ACTIVITIES

2019 - Present Steering Committee Member, Pediatric Emergency Care Applied Research Network, I review and provide feedback on all research concepts proposed to be conducted in PECARN, vote on whether projects will be supported by PECARN, and serve as a member of the PECARN Respiratory Working Group and the Publications Committee, providing early support to respiratory research concepts and peer-reviewing PECARN manuscripts prior to submission to peer-reviewed journals.

2017 - Present Committee Member, Pediatric Emergency Care Applied Research Network, as an invited member of the PERN Asthma Work Group. The aim of this working group is to develop a truly international consensus on the conduct and reporting of clinical trials in children with severe acute exacerbations of asthma presenting to the emergency department, with a view to developing robust methodology for the conduct of multicentre randomised clinical trials.

2015 - Present Member, Intermountain KidsCare Clinics, I led a multidisciplinary quality improvement effort to adapt and implement a care process for children with acute asthma seen at KidsCare locations. We implemented this process as a pilot in February 2016 in the Taylorsville KidsCare and are currently reviewing process and outcomes data to determine suitability for translation across Intermountain KidsCare and Urgent Care locations.

2010 - Present Developer, Primary Children's Medical Center, of a diabetes protocol for patients admitted to the Rapid Treatment Unit.

2007 - 2010 Volunteer Physician, Salvation Army, Free Medical Clinic, Rochester, NY

2004 - 2005 Board Chairman, Medical College of Wisconsin, Saturday Clinic for the Uninsured, Milwaukee, WI

UNIVERSITY COMMUNITY ACTIVITIES

Division Level

- 2017 - Present Moderator & Facilitator, Pediatric Emergency Medicine, Journal Club - Physician lead responsible for soliciting review of peer-reviewed journals from division faculty and fellows, compilation of selected articles for presentation, moderation of discussion of articles in monthly Journal Club meetings, and facilitation of journal findings into clinical practice amongst division members.
- 2010 - 2017 Research Reviewer, Pediatric Emergency Medicine, Journal Club - Designated reviewer for all articles from a specific peer-reviewed journal charged with determining articles' relevance to pediatric emergency medicine, then summarizing and presenting these articles to the division faculty, fellows, and residents during our monthly conference.
- 2010 - Present Physician Participant, Pediatric Emergency Medicine, Quality Improvement and Patient Safety conference - active participant in this monthly conference where our division convenes with nursing staff to review important recent patient cases relevant to improving the safety and quality of patient care. The division equivalent of Morbidity and Mortality Conference.
- 2010 - Present Physician Scheduler, Pediatric Emergency Medicine, Rapid Treatment Unit (RTU) Physician Scheduling Committee - member of physician group that schedules all physician shifts, vacation, and call for the RTU physician group.

SERVICE AT AFFILIATED INSTITUTIONS

- 2015 - Present Developer, Intermountain Healthcare, of an adapted care process for the care of children with acute asthma in a community emergency department (Utah Valley Regional Medical Center) and a high-volume pediatric urgent care (Taylorsville KidsCare), leading all aspects of investigation, development, local team training, and implementation.
- 2015 Developer, Intermountain Healthcare, Intermountain Pediatric Emergency Collaborative, Pediatric Acute Asthma Order Set, used at all Intermountain Healthcare emergency departments to care for children with asthma.

CURRENT MEMBERSHIPS IN PROFESSIONAL SOCIETIES

American Academy of Pediatrics

FUNDING

Active Grants

- 09/01/23 - 08/31/27 Pediatric Emergency Care Applied Research Network (PECARN) Hospital Emergency Department Affiliate (HEDA) site
Principal Investigator(s): Michael D. Johnson
Direct Costs: \$143,064 Total Costs: \$193,136
University of California, Davis
Role: Site Principal Investigator
- 02/01/23 - 01/31/27 Derivation and Validation of the Pediatric Community-Acquired Pneumonia Severity (PedCAPS) Score
Principal Investigator(s): Michael D. Johnson
Role: Site Principal Investigator

08/01/21 - 03/31/25 Bedside Exclusion of Pulmonary Embolism in Children without Radiation Exposure (BEEPER)
Principal Investigator(s): Michael D. Johnson
Wayne State University
Role: Site Principal Investigator

Past Grants

04/08/22 - 04/07/23 BD Medical in-kind support with PIVO device
Principal Investigator(s): Michael D. Johnson
Becton Dickinson and Company
Role: Principal Investigator

04/01/22 - 03/31/24 Intravenous Magnesium: Prompt use for Asthma in Children Treated in the Emergency Department (IMPACT-ED) pilot trial.
Principal Investigator(s): Michael D. Johnson
Direct Costs: \$536,243 Total Costs: \$737,921
National Heart, Lung, and Blood Institute
Role: Principal Investigator

04/01/22 - 03/31/23 Improved Identification of Pediatric Disparities in Asthma Treatment
Principal Investigator(s): Michael D. Johnson
Role: Principal Investigator

09/01/20 - 06/30/21 Headache Assessment of Children for Emergent Intracranial Abnormalities (HEADACHE)
Principal Investigator(s): Michael D. Johnson
Direct Costs: \$639,805 Total Costs: \$975,704
Columbia University
Role: Site Principal Investigator

09/01/17 - 09/01/20 Automating Machine Learning Model Building with Big Clinical Data
Principal Investigator(s): Gang Luo
Direct Costs: \$911,684 Total Costs: \$1,338,394
National Institutes of Health
Role: Co-Investigator

09/01/17 - 08/31/20 Predicting Appropriate Admission of Bronchiolitis Patients in the Emergency Room
Principal Investigator(s): Gang Luo
Direct Costs: \$151,419 Total Costs: \$225,615
National Heart, Lung, and Blood Institute
Role: Co-Investigator

07/01/16 - 03/05/18 Predicting Appropriate Admission of Bronchiolitis Patients in the Emergency Room
Principal Investigator(s): Gang Luo
Direct Costs: \$151,419 Total Costs: \$225,615
National Heart, Lung, and Blood Institute
Role: Co-Investigator

01/01/09 - 06/30/10 The Role of Socioeconomic Status in the Risk of Invasive Pneumococcal Disease
Principal Investigator(s): Young Juhn
Direct Costs: \$6,134 Total Costs: \$6,134
Mayo Foundation for Medical Education and Research
Role: Investigator

CLINICAL STUDIES

2020 - Present	Site investigator for BEEPER (BE dside Exclusion of Pulmonary Embolism). A multisite observational study to determine patient characteristics that identify children at high risk of pulmonary embolism.
2020 - Present	Site investigator for HEADACHE (HEAD ache Assessment of Children for Emergency Intracranial Abnormalities). A multisite prospective cohort study determining what children with headache would benefit from neuroimaging.
2017 - Present	Holder of Food and Drug Administration (FDA) Investigational New Drug (IND) 133781 for the investigation of intravenous magnesium sulfate to treat severe acute asthma in children.
2015 - 2023	Principal Investigator of IMPACT-ED (Intravenous Magnesium: Prompt use for Asthma in Children Treated in the Emergency Department) , funded by the NHLBI as a multisite pilot trial with the Pediatric Emergency Care Applied Research Network (PECARN) to evaluate the ability of intravenous magnesium sulfate to reduce hospitalization in children with severe acute asthma.
2014 - 2015	Principal Investigator of "Direct concurrent examination of pediatric clinical asthma scoring systems", a novel approach to directly comparing pediatric asthma scoring instruments to improve selection and utilization of these instruments in clinical practice.
2012 - 2014	Site co-investigator for "Abusive Head Trauma (AHT) Probability Study" to develop a clinical prediction rule in patients with head trauma to help determine the probability of physical abuse.
2011 - 2014	Site co-investigator on "Progesterone for Traumatic Brain Injury in Children: Planning a Safety and Efficacy Trial", investigating the feasibility of studying the effect of progesterone administration on the outcome of pediatric traumatic brain injury.

TEACHING RESPONSIBILITIES/ASSIGNMENTS

Course Lectures

2021 - Present	Instructor, MDID 6650: Applied Community Health and Leadership -- Driving Change Using QI Methodology, School of Medicine, This course teaches quality improvement methodology to students pursuing degrees in the health sciences. It includes didactic and workshop elements to give an introduction to quality improvement methods and techniques.
2012 - 2018	Instructor, MS2015 Pediatrics Clerkship - Didactic Lecture - Toxicology, University of Utah, Teach a small group of medical students while in their pediatric rotation regarding pediatric aspects of toxicology, using content I originally developed for the course. Taught quarterly.

Clinical Teaching

2010 - Present	Directly supervised third year pediatric residents in their direct care of patients in the Rapid Treatment Unit, usually working with one resident to manage a unit of up to 20 patients while providing education and feedback.
2010 - Present	Directly supervised pediatric and family medicine residents in their clinical evaluation and treatment of patients in the Emergency Department.

2010 - Present Directly supervised subspecialty residents and fellows (Plastic Surgery and Otolaryngology) in their care of patients in the Emergency Department.

Laboratory Teaching

2011 - Present Assisted in teaching suturing methods to a group of undergraduate students participating as research associates in the Pediatric Emergency Department.

Mentoring/Advising

Fellow

2016 - Present Mentor, Sarah Becker, University of Utah, While Dr. Becker was a pediatric emergency medicine fellow, we designed a prospective study with pharmacology collaborators to obtain serum samples in children with severe acute asthma to create a pharmacokinetic model of intravenous magnesium sulfate. I mentored Dr. Becker in the design of the study, in her preparation of all study materials, in her implementation of the study in the PCH ED, and in her writing and publication of the study manuscript.

Trainee's Current Career Activities: Following fellowship Dr. Becker joined the faculty in our division with continued success in research. She participated in an international study of risk factors for pneumonia, is the site investigator of a PECARN trial of prehospital treatment of asthma, and is a site investigator on a grant application for a PECARN trial of prehospital teleconsultation.

Resident

2010 - Present Supervisor, University of Utah, Supervision of pediatric and visiting residents in the emergency department.

Internal Teaching Experience

2015 Presentation to the Division of Emergency Medicine of proposed methods to improve the delivery of care to children with acute asthma in the Primary Children's Emergency Department.

2015 Presentation to the Division of Critical Care Medicine of proposed methods to improve the delivery of care to children with acute asthma in the Primary Children's Emergency Department.

2015 Presentation to the Division of Hospital Medicine of proposed methods to improve the delivery of care to children with acute asthma in the Primary Children's Emergency Department.

Additional Teaching Contribution

2018 Presented the methods I developed and used at Primary Children's Hospital to reduce asthma hospitalizations at the semi-annual Children's Hospital Association Pediatric Quality Conference in San Diego, California. I was among 13 semifinalists chosen from 110 entries from 60 hospitals to present at the conference. Full presentation is available at:
<https://www.childrenshospitals.org/Programs-and-Services/Quality-Improvement-and-Measurement/Pediatric-Quality-Award/2017/Reducing-Hospitalization-with-Nurse-Driven-Asthma-Treatment>

Continuing Education

CE Courses Taught

2007 - Present	Instructor in Pediatric Advanced Life Support (PALS), providing training to physicians, nurses, paramedics and other health professionals in Rochester, Minnesota and Salt Lake City, Utah.
2008	More Dreadful than Smallpox: Why we Immunize. CME presentation, Mayo Department of Pediatric and Adolescent Medicine.
2009	Everyone Hug a Tree: The Dependence of Human Health on Biodiversity. CME presentation, Mayo Department of Pediatric and Adolescent Medicine.
2010	More than Race and Poverty: Social Determinants of Health in Rochester. CME presentation, Mayo Department of Pediatric and Adolescent Medicine.
2010	A Reasoned Approach to Meconium Screening. CME presentation and systems based errors conference, Mayo Department of Pediatric and Adolescent Medicine.
2011 - Present	Yearly update in treatment, outcomes, and process changes for children with bronchiolitis and asthma.
2011	Diabetes and Mild DKA Protocol Inservice - presentation to providers and nursing staff prior to initiation of new protocol in the Rapid Treatment Unit.
2013	Hyperbilirubinemia - Let's Get to Know Each Other. Division of Pediatric Emergency Medicine Lunch and Learn presentation for physicians, nurses, and staff.
2015	Excellence in Treating Pediatric Acute Asthma, Utah Chapter AAP CME course, Utah Valley Regional Medical Center, Provo, Utah
2016	Excellence in Treating Pediatric Acute Asthma, Utah Chapter AAP CME course, Lakeview Hospital, Bountiful, Utah
2016	Excellence in Treating Pediatric Acute Asthma, Utah Chapter AAP CME course, Ogden Regional Medical Center, Ogden, Utah
2016	Excellence in Treating Pediatric Acute Asthma, Primary Children's Hospital Grand Rounds, Salt Lake City, Utah
2016	Death by a Thousand Powerpoints - a framework to effectively choose presentation tools to match information type, goal, and audience; Pediatric Emergency Medicine Lecture Series, Salt Lake City, Utah
2016	A Team Approach to Improve Asthma Treatment and Outcomes in a High-Acuity Pediatric Emergency Department
2016	Improving Asthma Health through Multidisciplinary Teams
2016	Coordinated ED Asthma Improvement for Children
2017 - Present	Facilitator, Journal Club, Division of Pediatric Emergency Medicine
2017	Presenter of Emergency Department Asthma Treatment Pathways to an 80-hospital collaborative engaged in a nationwide quality improvement initiative for pediatric ED asthma care.
2018	The Science and Art of Treating Asthma
2019 - Present	Run! Charts! How to survive a QI data flood. Taught to the faculty and fellows of the division of Pediatric Emergency Medicine as a part of quarterly course in QI methods.

2023 - Present

Quality Tools and Methods - Developing a Quality Improvement Project. Taught to Pediatric Emergency Medicine Fellows and faculty as part of a longitudinal quality improvement curriculum.

PEER-REVIEWED JOURNAL ARTICLES

1. Craig, S.; Collings, M.; Gray, C.; Benito, J.; Velasco, R.; Lyttle, M. D.; Roland, D.; Schuh, S.; Shihabuddin, B.; Kwok, M.; Mahajan, P.; Johnson, M.; Zorc, J.; Khanna, K.; Fernandes, R.; Yock-Corrales, A.; Santhanam, I.; Cheema, B.; Ong, G. Y.-K.; Jaiganesh, T.; Powell, C.; Nixon, G.; Dalziel, S.; Babl, F. E.; Graudins, A. (2024). Analysis of guideline recommendations for treatment of asthma exacerbations in children: a Pediatric Emergency Research Networks (PERN) study. *Arch Dis Child*.
2. Craig, S.; Xu, Y.; Robas, K.; Iramain, R.; Yock-Corrales, A.; Soto-Martinez, M. E.; Rino, P.; Ricciardi, M. B. A.; Piantanida, S.; Mahant, S.; Ubuane, P. O.; Odusote, O.; Kwok, M.; Johnson, M. D.; Paniagua, N.; Fernandez, J. B.; Ong, G. Y.; Lyttle, M. D.; Gong, J.; Roland, D.; Dalziel, S. R.; Nixon, G. M.; Powell, C. V. E.; Graudins, A.; Babl, F. E. (2023). Core outcomes and factors influencing the experience of care for children with severe acute exacerbations of asthma: a qualitative study. *BMJ Open Respir Res*.
3. Tsze, D. S.; Kuppermann, N.; Casper, T. C.; Barney, B. J.; Richer, L. P.; Liberman, D. B.; Okada, P. J.; Morris, C. R.; Myers, S. R.; Soung, J. K.; Mistry, R. D.; Babcock, L.; Spencer, S. P.; Johnson, M. D.; Klein, E. J.; Quayle, K. S.; Steele, D. W.; Cruz, A. T.; Rogers, A. J.; Thomas, D. G.; Grupp-Phelan, J. M.; Johnson, T. J.; Dayan, P. S. (2023). Stratification of Risk for Emergent Intracranial Abnormalities in Children with Headaches: A Pediatric Emergency Care Applied Research Network (PECARN) Study Protocol. *BMJ Open*, 13(11), e079040.
4. **Johnson MD**, Barney BJ, Rower JE, Finkelstein Y, Zorc JJ (2023). Intravenous Magnesium: Prompt Use for Asthma in Children Treated in the Emergency Department (IMPACT-ED): Protocol for a Multicenter Pilot Randomized Controlled Trial. *JMIR Res Protoc*, 12, e48302.
5. Gray CS, Xu Y, Babl FE, Dalziel S, Powell CVE, Chong SL, Roland D, Lyttle MD, Fernandes RM, Benito J, **Johnson M**, Yock-Corrales A, Santhanam I, Schuh S, Cheema B, Couper J, Craig S, Pediatric Emergency Research Network (PERN) (2023). International perspective on research priorities and outcome measures of importance in the care of children with acute exacerbations of asthma: a qualitative interview study. *BMJ Open Respir Res*, 10(1).
6. **Johnson MD**, Yoo M, Nelson RE, Nielson AK, Allen L, Dudley N, Anderson B, Orme A, Mundorff M (2022). Nurse-Initiated Treatment Reduces Costs for Acute Asthma in a Pediatric Emergency Department. *Journal of Nursing & Interprofessional Leadership in Quality & Safety*, 5 (1).
7. Willer RJ, **Johnson MD**, Cipriano FA, Stone BL, Nkoy FL, Chaulk DC, Knochel ML, Kawai CK, Neiswender KL, Coon ER (2021). Implementation of a Weight-Based High-Flow Nasal Cannula Protocol for Children With Bronchiolitis. *Hosp Pediatr*, 11(8), 891-895.
8. Woodward S, Mundorff M, Weng C, Gamboa DG, **Johnson MD** (2021). Incidence of supraventricular tachycardia after inhaled short-acting beta agonist treatment in children. *J Asthma*, 58(4), 471-480.
9. Luo G, **Johnson MD**, Nkoy FL, He S, Stone BL (2020). Automatically Explaining Machine Learning Prediction Results on Asthma Hospital Visits in Patients With Asthma: Secondary Analysis. *JMIR Med Inform*, 8(12), e21965.
10. Kaiser SV, **Johnson MD**, Walls TA, Teach SJ, Sampayo EM, Dudley NC, Zorc JJ (2020). Pathways to Improve Pediatric Asthma Care: A Multisite, National Study of Emergency Department Asthma Pathway Implementation. *J Pediatr*, 223, 100-107.e2.
11. **Johnson MD**, Zorc JJ, Nelson DS, Casper TC, Cook LJ, Finkelstein Y, Babcock L, Bajaj L,

- Chamberlain JM, Grundmeier RW, Webb M, Alpern ER, Pediatric Emergency Care Applied Research Network (PECARN) (2020). Intravenous Magnesium in Asthma Pharmacotherapy: Variability in Use in the PECARN Registry. *J Pediatr*, 220, 165-174.e2.
12. Luo G, He S, Stone BL, Nkoy FL, **Johnson MD** (2020). Developing a Model to Predict Hospital Encounters for Asthma in Asthmatic Patients: Secondary Analysis. *JMIR Med Inform*, 8(1), e16080.
 13. Craig S, Babl FE, Dalziel SR, Gray C, Powell C, Al Ansari K, Lyttle MD, Roland D, Benito J, Velasco R, Hoeffe J, Moldovan D, Thompson G, Schuh S, Zorc JJ, Kwok M, Mahajan P, **Johnson MD**, Sapien R, Khanna K, Rino P, Prego J, Yock A, Fernandes RM, Santhanam I, Cheema B, Ong G, Chong SL, Graudins A, Pediatric Emergency Research Networks (PERN). (2020). Acute severe paediatric asthma: study protocol for the development of a core outcome set, a Pediatric Emergency Research Networks (PERN) study. *Trials*, 21(1), 72.
 14. Luo G, Stone B, Nkoy FL, He S, **Johnson MD** (2019). Predicting Appropriate Hospital Admission of Emergency Department Patients with Bronchiolitis: Secondary Analysis. *JMIR Med Inform*, 7(1), e12591.
 15. Becker SM, Job KM, Lima K, Forbes TJ, Wagstaff J, Tran NK, Sherwin CM, Nelson DS, **Johnson MD**, Rower JE (2019). Prospective study of serum and ionized magnesium pharmacokinetics in the treatment of children with severe acute asthma. *Eur J Clin Pharmacol*, 75(1), 59-66.
 16. Luo G, **Johnson MD**, Nkoy FL, He S, Stone BL (2018). Appropriateness of hospital admission for emergency department patients with bronchiolitis: Secondary analysis. 2018;20(11):1–10. doi:10.2196/10498. *J Med Internet Res*, 20(11), 1-10.
 17. **Johnson MD**, Zorc JJ (2018). What Is the Role for Magnesium to Treat Severe Pediatric Asthma Exacerbations? *Clin Pediatr Emerg Med*, 19(1), 61-68.
 18. **Johnson MD**, Nkoy FL, Sheng X, Greene T, Stone BL, Garvin J (2016). Direct concurrent comparison of multiple pediatric acute asthma scoring instruments. *J Asthma*, 54(7), 741-753.
 19. Rower JE, Liu X, Yu T, Mundorff M, Sherwin CM, **Johnson MD** (2016). Clinical pharmacokinetics of magnesium sulfate in the treatment of children with severe acute asthma. *Eur J Clin Pharmacol*, 73(3), 325-331.
 20. Stanley RM, **Johnson MD**, Vance C, Bajaj L, Babcock L, Atabaki S, Thomas D, Simon HK, Cohen DM, Rubacalva D, David Adelson P, Bulloch B, Rogers AJ, Mahajan P, Baren J, Lee L, Hoyle J, Quayle K, Charles Casper T, Michael Dean J, Kuppermann N, Pediatric Emergency Care Applied Research Network (PECARN). (2017). Challenges Enrolling Children Into Traumatic Brain Injury Trials: An Observational Study. *Acad Emerg Med*, 24(1), 31-39.
 21. Liu X, Yu T, Rower JE, Campbell SC, Sherwin CM, **Johnson MD** (2016). Optimizing the use of intravenous magnesium sulfate for acute asthma treatment in children. *Pediatr Pulmonol*, 51(12), 1414-1421.
 22. Luo G, Stone BL, **Johnson MD**, Nkoy F (March 2016). Predicting Appropriate Admission of Bronchiolitis Patients in the Emergency Room: Rationale and Methods. *JMIR Res Protoc*, 5(1), 1-9.
 23. Luo G, Nkoy FL, Stone BL, Schmick D, **Johnson MD** (2015). A systematic review of predictive models for asthma development in children. *BMC Med Inform Decis Mak*, 15, 99.
 24. **Johnson MD**, Urm SH, Jung JA, Yun HD, Munitz GE, Tsigrelis C, Baddour LM, Juhn YJ. (August 2012). Housing data-based socioeconomic index and risk of invasive pneumococcal disease: an exploratory study. *Epidemiol Infect*, 141(4), 880-7.
 25. Nader NS, Bahn RS, **Johnson MD**, Weaver AL, Singh R, Kumar S. (December 2010). Relationships between thyroid function and lipid status or insulin resistance in a pediatric population. *Thyroid*, 20(12), 1333-9.
 26. **Johnson MD**, Nader NS, Weaver AL, Singh R, Kumar S (2010). Relationships between 25-hydroxyvitamin D levels and plasma glucose and lipid levels in pediatric outpatients. *J Pediatr*,

ADDITIONAL PUBLICATIONS

Letters

1. **Johnson MD, Zorc JJ**, Pediatric Emergency Care Applied Research Network (PECARN). (2020). Reply. [Letter to the editor]. *J Pediatr*.

POSTER PRESENTATIONS

- | | |
|------|---|
| 2019 | Pharmacodynamics of intravenous magnesium sulfate in children treated for acute asthma |
| 2017 | Changes in Physician-level Variability in Hospitalization Following Implementation of a Standardized Care Process for Children with Acute Asthma |
| 2017 | Intravenous Magnesium for Status Asthmaticus in the Emergency Department: Variation in Treatment and Outcomes Using the PECARN Registry |
| 2016 | Incidence of Supraventricular Tachycardia after Beta-2 Agonist Treatment in Children |
| 2016 | Reduced Hospital Admissions for Acute Asthma through a Synthesis of Evidence in a High-Acuity Pediatric Emergency Department |
| 2014 | Patient Factors Associated with Prolonged Hospital Length of Stay in Children Hospitalized with Bronchiolitis |
| 2010 | Real Property Data and the Risk of Infectious Disease |
| 2004 | Determination of the Enantiomers of Methadone and its Major Metabolite in Pediatric Urine and Plasma by HPLC/MS/MS. Student Summer Research Presentation, Department of Pediatrics, Medical College of Wisconsin. |

ORAL PRESENTATIONS

Meeting Presentations

National

- | | |
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| 2022 - Present | I was a presenter at Issues in Pediatrics, a national conference sponsored by Primary Children's Hospital and Intermountain Health to provide up-to-date training on pediatric topics to providers across the spectrum of pediatric healthcare. |
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Local/Regional

- | | |
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| 2020 | Presented at Research in Progress, sponsored by the University of Utah Department of Pediatrics and Woman and Child Institute |
| 2007 | DHA/ARA Supplementation of Infant Formula and Cognitive Outcomes. Evidence Based Medicine Lecture Series, Mayo Department of Pediatric and Adolescent Medicine |
| 2007 | Cultural Medicine Practices. Presented to the Olmsted County Public Health Department |

Invited/Visiting Professor Presentations

National

2023 WHAT NEXT? When asthma treatment fails in the emergency department

Local/Regional

2017 Improving Asthma Health Through Multidisciplinary Teams. Utah Society for Respiratory Care annual meeting, Ogden Utah.

2016 Improving Asthma Health Through Multidisciplinary Teams. Utah Children's Care Coordination Network. October 2016.

2015 Your Mind is Playing Tricks on You, or, How a Nobel Prize Changed How our ED Treats Asthma. Bonneville Exchange Club, Bountiful, UT.

Grand Rounds Presentations

2023 Social Determinants of Health and the Risk of Asthma Hospitalization after Treatment in the Emergency Department

2016 Excellence in Treating Pediatric Acute Asthma. Primary Children's Hospital Grand Rounds

2016 Excellence in Treating Pediatric Acute Asthma. Ogden Regional Medical Center Pediatric Grand Rounds.

2016 Excellence in Treating Pediatric Acute Asthma. Lakeview Hospital Pediatric Grand Rounds.

2015 Excellence in Treating Pediatric Acute Asthma. Utah Valley Regional Medical Center Pediatric Grand Rounds.

2010 Impact of Real Property Data as a Socioeconomic Measure on Risk of Infectious Disease. Mayo Clinic. Department of Pediatric and Adolescent Medicine.

OTHER SCHOLARLY ACTIVITIES

Additional Research/Scholarship Contributions

2015 - Present Assembled and led a team of local urgent care clinicians to develop and implement a care process for children with acute asthma at a pediatric urgent care (Taylorsville KidsCare) with high volumes of patients treated and hospitalized for asthma. Led all aspects of the project including gathering of baseline data, analysis of data, adaptation of a tertiary ED treatment process to local conditions and data, implementation of the process in February 2016, and analysis of outcomes. The process was adopted by physicians and nurses at the PCH ED, and was then adapted as a care process for use by all urgent care sites throughout the Intermountain Health system in 2023.

2015 - Present Developed guidelines for the care of children with bronchiolitis requiring high flow nasal cannula oxygen titled "High-Flow Nasal Cannula (HFNC) for Viral Lower Airway Disease 0-36 Months". These guidelines are implemented at Primary Children's Hospital and Riverton Hospital in the emergency department, hospital units, and intensive care units. Implementation of these guidelines resulted in reduced and standardized use of this treatment at both hospitals. available at: <https://teamspace.intermountain.net/spaces/BronchiolitisGuidanceTeam/Documents/Forms/AllItems.aspx?RootFolder=%2fspaces%2fBronchiolitisGuidanceTeam%2fDocuments%2fHFNC%20Orders%20and%20Algorithm&FolderCTID=0x01200000FED7DC1A46EB458AFE65504204A1AD>

- 2015 - Present Assembled and led a team of emergency department clinicians to develop and implement a care process for children with acute asthma at a community hospital (Utah Valley Regional Medical Center) with high volumes of patients treated and hospitalized for asthma. Led all aspects of the project including gathering of baseline data, analysis of data, adaptation of a tertiary ED treatment process to local conditions and data, planning for implementation of the process, and adaptation of the process for a new electronic medical record system. This then served as a model for the care of acute asthma in any community hospital emergency department within the Intermountain Healthcare system with implementation of a standard order set and care process in 2020. This was then selected by Intermountain Health as a quality improvement goal for the system in 2022, and I led a collaborative team to develop and implement an active clinical decision support tool in the electronic medical record in fall 2023 to improve the timely delivery of asthma care in all 21 EDs in the Intermountain Health system.
- 2015 Developed an updated guideline for the care of children with acute asthma used in all emergency departments across Intermountain HealthCare titled "IPEC Pediatric Asthma Guideline". available at:
<https://m.intermountain.net/lists/all%20kr%20documents/dispform.aspx?id=4321341>
- 2014 - Present Developed a process to implement rational use of pulse oximetry in children with bronchiolitis hospitalized at Primary Children's Hospital titled "Spot Check Oximetry Monitoring for Patients with Bronchiolitis". The staff education curriculum I developed was viewed by every nurse and respiratory therapist at Primary Children's Hospital. I directly presented education to all staff in the Emergency Department, coordinated improvements in the electronic charting system to help monitor uptake of the guideline, and monitored patient safety and outcomes following implementation. This project was followed by a 25% reduction in the percentage of children with bronchiolitis hospitalized from the ED and a 5% improvement in the percentage of children discharged within 24 hours after hospitalization for bronchiolitis. available at:
<https://documents.intermountain.net/pcmc/Documents/Spot%20Check%20Oximetry%20Monitoring%20Bronchiolitis%20Patients%20PCH%20Staff%20Education.pdf>
- 2013 - 2014 Developed guidelines for rational use of pulse oximetry in children with bronchiolitis hospitalized in the hospital short stay unit. I led a committee of nurses, respiratory therapists, and hospitalist physicians to implement these guidelines. I crafted an educational curriculum and directly provided staff education to every nurse and respiratory therapist working in the unit. The materials I developed were the foundation for later expansion of this effort to all hospital units and the emergency department.

Quality & Value Improvement Projects

- 2023 - Present Urgent Care Pediatric Acute Asthma Care Process - led a team to create and implement a care process for the care of children with asthma in urgent care settings across the Intermountain System of >100 urgent care sites. This built on our prior work in 2015 with a pilot process at one child-only urgent care. The goal of the care process is to provide appropriately intensive treatment at the child's site of presentation, reducing the need for transfer and representation.

- 2022 - Present Pediatric Emergency Department Acute Asthma Care Process. After success in developing and implementing a pilot care process at the PCH ED, I led the development and translation of an adaptation of the care process for use in every ED across Intermountain system.
- 2022 - Present Pediatric Emergency Department Acute Asthma Alert. To aid the adoption of the care process and to improve timely delivery of asthma care, I led a team to develop, test, pilot, and implement a clinical decision support tool to suggest orders and present the asthma care process to clinicians in emergency departments across Intermountain Health.
- 2021 - Present American Academy of Pediatrics Value in Pediatrics Bronchiolitis High Flow Implementation Pause project site. I was the site lead for implementation of a bundle of process improvements to reduce and focus the use of High Flow Nasal Cannula oxygen therapy in children severely ill with bronchiolitis.
- 2020 - Present Pediatric Emergency Department Bronchiolitis Care Process. I led a team of physicians, nurses, respiratory therapists, and quality specialists to develop and pilot a new care process for the care of children with bronchiolitis in the Emergency Department, followed by implementation across Intermountain system.
- 2018 - Present American Academy of Pediatrics Value in Pediatrics asthma coach - As a coach in a national project by the American Academy of Pediatrics to improve asthma care delivery across more than 80 hospitals, I coached teams of physicians at 6 hospitals to improve asthma care. Through analysis of data from all sites, we helped define the features of sites that were able to deliver asthma care efficiently.
- 2016 Translation of ED acute asthma care process to general EDs and urgent care - Soon after developing and implementing the care process for children with asthma at Primary Children's Hospital, I recruited similar clinical teams of nurses and physicians from the ED of a community hospital (Utah Valley Medical Center) and from a pediatric urgent care (Taylorsville KidsCare) which both care for large numbers of children with asthma. I led these teams through a quality improvement process similar to what we completed at Primary Children's Hospital, analyzing their baseline data to craft customized treatment processes that were evidence-based, were sensitive to local patterns of care delivery, and addressed specific areas of improvement. For the community hospital, we aimed to decrease hospitalizations; for the urgent care, we aimed to decrease transfers to hospitals after treatment. We successfully implemented the urgent care process in 2016 and saw rapid uptake in acceptance of the process among nurses and physicians as well as consistent use of the care process.

2016 - 2017

Primary Children's Hospital Emergency Department acute asthma care process. Recognizing that Primary Children's Hospital had a high admission rate for children with asthma in comparison with peer children's emergency departments nationally, hospital and emergency department leadership prioritized a project to examine and improve the care delivered to children with asthma. I led a team of nurses, nurse practitioners, physicians, respiratory therapists, and quality improvement professionals to develop and implement a new care process for children with asthma with the goal to decrease the time from patient arrival to treatment and decrease hospitalization. I was directly responsible for the accuracy of our data, creation of the new care process, the methods used to implement the care process, in-person presentations to hospital stakeholders to facilitate acceptance of the process, and the measurement of our progress. Implementation of this care process decreased the time to treatment and reduced the percentage of children hospitalized by one third without any increase in ED returns after discharge. This reduced the overall cost of caring for children with asthma at Primary Children's Hospital by one fourth.

2013 - 2014

ED and Hospital pulse oximetry initiative. Pulse oximetry is a mode of monitoring commonly used in respiratory disease but prone to falsely alarm, possibly increasing hospitalization for children with bronchiolitis from the ED and increasing patient length of stay in hospitalized children. This prompted a reexamination of our use of pulse oximetry at Primary Children's Hospital. In 2013, I worked with a small group of physicians, nurses, and respiratory therapists in the Rapid Treatment Unit at Primary Children's Hospital to develop and implement pilot guidelines for the rational use of pulse oximetry. After demonstrating that we could use these new guidelines for the majority of children hospitalized for bronchiolitis with no adverse events, we expanded implementation in 2014 to both the ED and all hospital units. In our pilot work, more than 80% of children with bronchiolitis were safely monitored with intermittent rather than continuous pulse oximetry. Implementation of these guidelines in the ED and all hospital units was followed by a 25% reduction in the percentage of children hospitalized with bronchiolitis from the ED and a 5% improvement in the percentage of hospitalized patients discharged within 24 hours. The guidelines we developed at Primary Children's Hospital were then adopted at Riverton Hospital and incorporated into the Bronchiolitis Clinical Practice Guideline approved by the Intermountain Corporate Pediatric Practice Committee and used throughout Intermountain Healthcare