

Neonatal Feeding Program Update:

Early Successes of NG Tube Discharge Protocol Shows Promise

Until recently in the UPMC Newborn Medicine Program, neonatal intensive care unit (NICU) patients requiring a nasogastric tube (NG tube) to facilitate feedings or act as a bridge to self-feeding could not be discharged home until they could feed normally without the supplemental support of enteral feedings via NG tube.

In the past, sending patients home with an NG tube to be cared for and maintained by their parents or caregivers was seen as too complex and fraught with the potential for complications, such as aspiration, misplacement of the tube during changes, or suboptimal nutrition.

However, keeping some patients in the hospital when they could be discharged except for their temporarily requiring an NG tube was seen as detrimental for both the patient and family. Some of these patients are such that with close support, training provided for the family, and the added support of home nursing services, they may theoretically leave the hospital and continue their convalescence

and development in the comforting surroundings of their home without adverse outcomes.



“For these patients, we know they will do better medically, developmentally, and in terms of comfort if they can be at home with their families. This was our rationale for developing our NG tube discharge protocol and it is what drives our work

to find as many babies and families as possible that can benefit,” says **Arcangela Lattari Balest, MD**, who serves as the director of the Multidisciplinary Feeding Program within the UPMC Newborn Medicine Program.

The new NG tube discharge protocol went into effect in December 2020.

Protocol Detail Highlights

Above all other concerns, the one factor that ultimately determines whether or not an individual patient and family can be discharged home with an NG tube is safety.

“We are highly selective in determining which patients and families are most likely to succeed with this protocol, and do so while meeting our safety requirements,” says Dr. Balest. “Parents and caregivers must be fully committed to the learning process and the work that will be required once they get home with their infant. Our screening procedures and assessments of patient and family readiness are extensive. We leave nothing to chance.”

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Another key component of the program is that eligibility for the NG tube discharge protocol is independent of the underlying condition (e.g., neurological conditions, congenital heart disease) or the patient's reason for being in the NICU. There are currently no exclusionary conditions that would preclude an infant from the protocol, except if there is some form of craniofacial anomaly that makes it impossible to place an NG tube.

The majority of the reasons a case may not meet eligibility criteria fall into questions of commitment from the parents, their available resources for support, or their physical or emotional ability to care for their infant with an NG tube, and other requirements.

For example, because home health visits from a visiting nurse are essential for patient monitoring and family support, individuals that live in a distant or isolated geography with minimal or no home health care services available to them are excluded from the protocol.

“Our protocol entails very close follow-up support from home nursing services, case management, and the patient's NICU team working in collaboration with the family to ensure the safety, security, and well-being of the baby,” says Dr. Balest.

Infants must also pass an eight-point check list for inclusion in the protocol with criteria including tolerating bolus feedings, post-menstrual age greater than 42 weeks, and demonstration of adequate growth on enteral feeding.

Initial Case Examples and Successes

Since the beginning of the program, the Multidisciplinary Feeding Program has discharged four patients through the NG tube home feeding protocol with successful outcomes in all four cases and no discernible complications or adverse events.

The first case through the protocol was a premature infant delivered at 26-27 weeks gestational age and who also had an underlying genetic disorder. As Dr. Balest explains, this particular infant also had a history of necrotizing enterocolitis and struggled significantly with oral feeding. The family was highly motivated to avoid having to place a gastrostomy tube (G Tube), which would have required anesthesia and surgery. This made for an excellent candidate to take part in the NG tube home discharge protocol.



Another case through the protocol was a referral from an outside institution for a difficult feeding case in which a G Tube was being considered because of the infant's feeding challenges that were hypothesized to be due to oral aversion.

Not only was the Multidisciplinary Feeding Program team able to avoid having to place a G Tube in this case and avoid its accompanying surgical intervention, they were able to assess the infant's feeding needs, teach the family strategies to make feeding less stressful for this baby, and discharge them home in the new NG tube home feeding program after three weeks in the NICU.

With the first four cases through the program, all of the infants were able to transition to full oral feeding in less than 25 days post-discharge. None of the four infants had to be readmitted to the hospital for feeding concerns, nor were there any adverse events that required emergency medical care related to the NG tubes. Growth and food intake levels all progressed according to set plans by the medical teams caring for the infants.

Abstract Presentation

Dr. Balest and the team of collaborators responsible for developing and managing the new NG tube discharge protocol presented an abstract about their developmental work and initial experiences with the first four cases at The Children's Hospitals Neonatal Consortium annual symposium in November 2021.

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Telemedicine Expansion and New Services in the UPMC Newborn Medicine Program

While the COVID-19 pandemic has forced a shift to and greater reliance on telemedicine or remote visits in order to keep patient care flowing as normally as possible, the UPMC Newborn Medicine Program has an extensive history using the platform to reach distant patients across UPMC's wide geographic territory.



Abeer Azzuqa, MD, associate professor of Pediatrics, is the director of neonatal telemedicine services for the UPMC Newborn Medicine Program and coordinates its services and new initiatives.

Telefeeding Program with UPMC Hamot

Developed and piloted in 2020, and launched as an official program in early 2021, a telemedicine feeding program consult service was initiated between the multidisciplinary feeding program of the UPMC Newborn Medicine and the neonatal intensive care unit (NICU) at UPMC Hamot in Erie, Pennsylvania.

Dr. Azzuqa collaborated with the leadership team of the multidisciplinary feeding program (**Arcangela Lattari Balest, MD**, a neonatologist and feeding specialist, **Sheryl Rosen, MA, CCC-SLP**, dysphagia lead, and occupational therapy colleagues **Kelly Fill, MOT, OTR/L**, and **Nicole Klasmier, CScD, OTR/L**) and UPMC Hamot to bring telemedicine consults for the program to its NICU staff and patients in Erie.

The multidisciplinary feeding program within the UPMC Newborn Medicine program and its NICUs is largely based on the concept and precepts of infant-driven or cue-based feeding. Its multidisciplinary nature brings together physicians, nursing, occupational therapy, speech-language pathology, and other disciplines to tackle the challenges associated with feeding difficulties in fragile NICU patients.

"UPMC Hamot delivers about 2,000 babies a year. Since our pilot began and the official program launched this year, we have been conducting one to three feeding consults a month with our colleagues in Erie. The multidisciplinary feeding program brings critical support and skills in dealing with complex feeding issues in neonates. Being able to do so through telemedicine to distant patients allows us seamlessly help care for these infants with no disruption in their local care," says Dr. Azzuqa.

Prenatal Telemedicine Visits for Patients With Fetal Anomalies

Once the full extent of the COVID-19 pandemic became visible, health care organizations of all variety made adaptations to continue patient care through one means or another. Telemedicine has been a crucial component of this care. One particularly vulnerable group of patients in need of uninterrupted medical care are expectant mothers whose unborn baby has been diagnosed with a fetal anomaly. The specialized care needed for these patients is time-sensitive and complex.

To provide remote access to the specialized services of the Center for Advanced Fetal Diagnostics (CAFD) at UPMC Magee, Dr. Azzuqa and colleagues quickly implemented telemedicine consults for patients in the early parts of the COVID-19 pandemic in 2020. The CAFD consults with more than 250 patients each year, all with complex fetal conditions and many who are a significant geographical distance from the Center's hub in Pittsburgh.

"Our initial experience has been positive, but certainly not perfect. Technical issues on the patient side presented some challenges or necessitating a switch to a phone or audio-only consult, but our patients generally expressed positive feedback about the visit process. Even with some technical issues, we had zero uncompleted consults. Moreover, once we initiated telemedicine consults for these patients, we saw zero missed appointments. We have some challenges to work out, and whether or not loosened telemedicine guidelines from regulatory bodies remain in effect after we end the COVID-19 pandemic is an unknown. However, we are confident that our initial experience points toward a longer-term use of telemedicine for these kinds of cases," says Dr. Azzuqa.

Reference

Bishop CE, Jackson LE, Vats KR, Azzuqa AA. Prenatal Neonatology Telemedicine Consultation for Patients With Fetal Anomalies During the COVID-19 Pandemic Era: Rapid Implementation and Lessons Learned. *J Perinatology*. 2020. doi.org/10.1038/s41372-020-00787-9.

Newborn Medicine Program Welcomes New Faculty Member Onome Oghifobibi, MD, MSc

Onome Oghifobibi, MD, MSc, joined the UPMC Newborn Medicine Program as an assistant professor of Pediatrics in July upon completion of his neonatal-perinatal fellowship at UPMC Children’s Hospital of Pittsburgh.



Dr. Oghifobibi earned his medical degree from the College of Medicine at the University of Benin in Edo State, Nigeria. He was awarded the honors of Best Graduating Student in Pediatrics and Pathology from the University. He then

earned a Master of Science Health Management from Oxford Brookes University in Oxford, United Kingdom, and a Distinction Award for his academic work.

Dr. Oghifobibi subsequently spent a year of training as a Senior House Officer in the Department of Pediatric General Surgery at the Great Ormond Street Hospital in London.

Dr. Oghifobibi also trained as a research fellow at the University College London. His research involved translational studies assessing neuroprotective agents and therapies in conjunction with therapeutic hypothermia on a model of hypoxic-ischemic encephalopathy. While at University College London, Dr. Oghifobibi also was a specialty registrar in the neonatal intensive care unit caring for premature infants and those with complex medical and surgical needs.

In 2015, Dr. Oghifobibi arrived at UPMC Children’s and the University of Pittsburgh School of Medicine to complete his pediatric residency in the Accelerated Research Program, followed by a neonatal-perinatal fellowship, and postdoctoral associate as a Burroughs Wellcome Foundation Scholar in the Physician Scientist Incubator Program at the University of Pittsburgh.

“Growing up in the oil-rich South-South geopolitical zone of my home country, I observed that a large proportion of the population, a majority of whom lived in rural areas, were shackled by poverty, disease, and ignorance. Despite the fact that this resource-endowed region contributes substantially to the nation’s wealth, it also significantly contributed to the nation’s rising maternal, perinatal, infant, and under-five mortality rates, not to mention the plummeting life expectancy of men and women.

These experiences influenced my decision to study medicine, to reach out to these individuals and the nation as a whole, and to contribute to the fight against ignorance and disease,” says Dr. Oghifobibi.

Clinical and Research Priorities

As an attending neonatologist, Dr. Oghifobibi will spend the majority of his clinical time in the NICU at UPMC Children’s, but also will see patients in the NICU at UPMC Magee-Womens Hospital. He has a specific interest in treating neonatal patients who have neurological conditions and brain injuries.

Dr. Oghifobibi’s research priorities at UPMC Children’s will focus primarily on clinical research and translational studies. To further support his work in these areas, Dr. Oghifobibi will complete a master’s degree in Clinical Research at the University of Pittsburgh during his first two years as a faculty member in the Division. His initial investigatory focus will be developing and implementing policies to help reduce infant mortality in Allegheny County and beyond by collaborating with health care, governmental, and community resources to tackle challenges related to health care disparities and access to quality health care and improving perinatal and neonatal outcomes.

“These issues within the broader world of health care, and specifically in our local Pittsburgh region, are long-standing and complex, but we must not consider them intractable. Maternal-fetal outcomes in minority populations are tragically compromised in many ways with a variety of causes. We must find creative, durable, and multi-disciplinary means to correct these issues. I am looking forward to the collaborative work that will be possible at UPMC, the University of Pittsburgh, and with our network of community partners,” says Dr. Oghifobibi.

Highlights From the Precision Medicine World Conference



On September 23-24, 2021, more than 300 guests and visitors from all areas of precision medicine came together for the Precision Medicine

World Conference (PMWC), hosted by the Institute for Precision Medicine (IPM), a partnership of the University of Pittsburgh and UPMC. Industry and academic leaders spoke to the diverse crowd of health care professionals, researchers, scientists, and students.

While the meeting spanned numerous topics and discussed opportunities and barriers in precision medicine internationally, it also highlighted those areas where Pitt and UPMC are among the leaders in bringing precision care to patients.

In further evidence of the utilization of genomics in patients in real time, the conference focused a session on the use of whole genome sequencing to diagnose and treat newborns in neonatal intensive care units (NICUs) who may be afflicted with rare genetic syndromes or disorders. Stephen Kingsmore, MD, DSc, one of the pioneers in this area discussed his life's work, with **Thomas Diacovo, MD**, (above, left) chief of the UPMC Newborn Medicine Program,

and **Jerry Vockley, MD, PhD, FACMG**, (above, right) director of the Division of Genetic and Genomic Medicine in the Department of Pediatrics, and director of Center for Rare Disease Therapy at UPMC Children's Hospital of Pittsburgh. Drs. Diacovo and Vockley discussed the local approach at UPMC and the University of Pittsburgh to rapidly sequencing patients in-house in partnership with the UPMC Genome Center. Clinical data strongly support the value of implementing rapid sequencing of newborns in the NICU given that genetic diseases are the leading cause of infant mortality. Cost effectiveness to health systems has further been explored, demonstrating clear value and resulting in reimbursement in multiple states.

To learn more, view the presentations below; please utilize pmwc2021pitt as the access code:

Dr. Empey: vimeo.com/showcase/8904520?video=621191687

Dr. Kingsmore; vimeo.com/showcase/8904520?video=624040830

Dr. Diacovo; vimeo.com/showcase/8904520?video=624040660

Dr. Vockley; <https://vimeo.com/showcase/8904520?video=624041785>

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More About the Multidisciplinary Feeding Program of the UPMC Newborn Medicine Program

The Multidisciplinary Feeding Program has evolved its approach to one based largely on the concepts of infant-driven or cue-based feeding, moving away from more traditional quantity-based measures of feeding success. The evolution of the program began in earnest more than five years ago and has included numerous programmatic changes and quality improvement initiatives to improve infant feeding success, safety, and patient and family satisfaction. The multidisciplinary approach of the program combines the expertise of neonatal physicians and nurses, occupational and speech-language pathologists, gastroenterology specialists, and other disciplines to optimally manage the challenges associated with feeding difficulties in fragile NICU patients.

Arcangela Lattari Balest, MD, a neonatologist and feeding specialist in the Division of Newborn Medicine, and **Sheryl Rosen, MA, CCC-SLP**, dysphagia lead for the program, have helped to spearhead many of the changes and evolution of feeding practices for NICU babies at UPMC Children's Hospital of Pittsburgh and UPMC Magee-Womens Hospital. Other members of the team, including occupational therapy colleagues **Jamie Scheller, OTR/L**, and **Nicole Klasmier, CScD, OTR/L**, and speech pathologist **Lynn Golightly, MS, CCC-SLP**, have been instrumental in championing the transition to infant-driven feeding approaches. The combined collaborative efforts of the team during the last several years has fundamentally reshaped and improved the approach to infant feeding in the UPMC Newborn Medicine Program.

New Study Examines Genetic Role in Preterm Labor and Stillbirth



UPMC Newborn Medicine Program researcher, **Thomas A. Hooven, MD**, assistant professor of pediatrics and scholar at the Richard King Mellon Foundation Institute of Pediatric Research led a study which has found that a genetic

regulator plays a critical role in allowing group B Streptococcus (GBS) to enter the bloodstream, which can trigger adverse responses leading to preterm labor and stillbirth.

The study, “Genome-Wide Fitness Analysis of Group B Streptococcus In Human Amniotic Fluid Reveals A Transcription Factor That Controls Multiple Virulence Traits,” was published in March in the journal *PLOS Pathogens*.

The research team from the Hooven Laboratory focused on a single GBS gene that encodes a transcription factor the team named MrvR. The MrvR transcription factor was found to be a key component for GBS resistance to human amniotic fluid. Dr. Hooven’s team discovered that

MrvR contributes to the development of chorioamnionitis — infection of the placenta, fetal membranes, and fetus — which can lead to preterm labor, stillbirth, and other complications.

In addition to colleagues from the University of Vermont, University of Maryland, University of Wisconsin, New York University School of Medicine, and Georgetown University School of Medicine, Dr. Hooven was joined by Mary F. Keith, DO, MS, and postdoctoral researcher Kathyayini Parlakoti Gopalakrishna, MBBS, PhD, both members of the UPMC Newborn Medicine Program and the Hooven Laboratory.

Reference

Dammann AN, Chamby AB, Catomeris AJ, Davidson KM, Tettelin H, Pijkeren JPV, Gopalakrishna KP, Keith MF, Elder JL, Ratner AJ, Hooven TA. Genome-Wide Fitness Analysis of Group B Streptococcus in Human Amniotic Fluid Reveals a Transcription Factor That Controls Multiple Virulence Traits. *PLOS Pathogens*. 2021 March 8; <https://doi.org/10.1371/journal.ppat.1009116>.

UPMC Newborn Medicine Faculty and Fellows Present at PAS 2021

UPMC Newborn Medicine Program faculty and fellows gave a number of lectures and presented research posters at the 2021 Pediatric Academic Societies annual conference in May 2021. Below is a summary of the activity from the research teams. More information, including the full abstracts and author lists are available at the PAS website for interested readers and attendees.

Presentations

Surfactant: A Fascinating 40-Year History From Bench Research to Saving Premature Neonates.

Presented by Vignesh Gunasekaran, MD – Neonatal-Perinatal Fellow
Publication #: 1310-PL-QA.2

Determining the Heterogeneity of Maternal Milk Immunoglobulin A Antibacterial Response

Presented by Chelsea Johnson, MD – Neonatal-Perinatal Fellow
Publication #: 4750-PP-L.12

Analysis of Umbilical Cord Blood Cultures in Premature

Chorioamnionitis-Exposed Infants
Presented by Natasha Ahn, MD, MPH – Pediatric Resident
Publication #: 4730-PL-L.3

Posters

Analysis of Umbilical Cord Blood Cultures in Term Chorioamnionitis-Exposed Infants

Presented by Kathleen Schwabenbauer, MD
Poster Board #: 1709
Publication #: EP-195.1709

Reduced Central Line Days and Length of Stay Following Implementation of a Quality Improvement Bundle for Necrotizing Enterocolitis

Presented by Zoya Mahmood – Undergraduate Student Researcher
Publication #: EP-227.2156

Effect of Delayed Cord Clamping on Serial Blood Pressures Within the First 72 Hours of Life

Presented by Sapna Shah, MD
Poster Board #: 1606
Publication #: EP-188.1606

UPMC Newborn Medicine Program Welcomes New Neonatologist Paris Ekeke, MD, MS

The UPMC Newborn Medicine Program is pleased to welcome **Paris Ekeke, MD, MS**. Dr. Ekeke joined the UPMC Newborn Medicine Program in May.



Dr. Ekeke earned her medical degree from The Ohio State University, followed by a pediatric residency at Northwestern University and the Lurie Children's Hospital of Chicago. Dr. Ekeke then traveled to Pittsburgh, where she completed her neonatal-perinatal fellowship at UPMC Children's Hospital of Pittsburgh. While at the University of Pittsburgh, Dr. Ekeke also earned a master's degree in epidemiology from the University of Pittsburgh Graduate School of Public Health.

Prior to returning to UPMC Children's, Dr. Ekeke was a practicing neonatologist at Akron Children's Hospital in Ohio.

"What initially attracted me to the neonatal-perinatal fellowship in the UPMC Newborn Medicine Program was its volume of cases and patient acuity. Having as broad a range of cases in my training as possible was highly important so that when I eventually went out into practice, I had the experience and confidence to handle any clinical scenario that presented itself," says Dr. Ekeke. "My experience as a fellow, the quality of my education, and the relationships and resources available to clinicians and researchers practicing and studying at UPMC Children's was what led me to come back. I'm excited to return to Pittsburgh and my clinical practice and research priorities."

Dr. Ekeke's research interests are largely devoted to better understanding health care disparities, the social determinants of health, and the effects of prenatal stress on neonatal outcomes.

A portion of Dr. Ekeke's research at UPMC Children's will involve epidemiologic studies to understand determinants and consequences of adverse pregnancy outcomes as part of the Pittsburgh Study.



About The Pittsburgh Study

The Pittsburgh Study is a community-partnered study to find out what works to help children thrive. The study will follow children in Allegheny County from birth through high school.

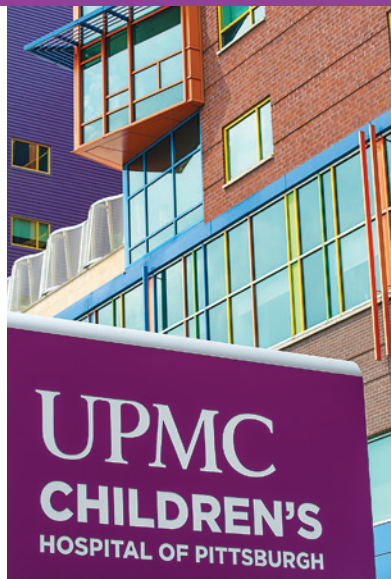
The goal of this ambitious, longitudinal investigation is to determine optimal ways to provide children the support they need to graduate from high school on time, healthy, and thriving.

Ultimately, it is the hope that the Pittsburgh Study leads to programs and systems that parents, teachers, and service providers can use to improve children's lives — in Pittsburgh and beyond.

This is the largest community-partnered intervention study to follow children over time.

The Pittsburgh Study will identify strengths in children, families, schools, and neighborhoods by partnering with communities and community organizations. The study will measure health and social influences on child well-being. With a history of cutting-edge research and a fast-growing technology sector, Pittsburgh is the ideal location for a study to transform children's health. The Pittsburgh Study is made possible by the generous support of The Shear Family Foundation, The Grable Foundation, and the University of Pittsburgh School of Medicine Department of Pediatrics.

Affiliated with the University of Pittsburgh School of Medicine and ranked among the nation's best children's hospitals by *U.S. News & World Report*.



About UPMC Children's Hospital of Pittsburgh

Regionally, nationally, and globally, UPMC Children's Hospital of Pittsburgh is a leader in the treatment of childhood conditions and diseases, a pioneer in the development of new and improved therapies, and a top educator of the next generation of pediatricians and pediatric subspecialists. With generous community support, UPMC Children's Hospital has fulfilled this mission since its founding in 1890. UPMC Children's is recognized consistently for its clinical, research, educational, and advocacy-related accomplishments, including ranking 15th among children's hospitals and schools of medicine in funding for pediatric research provided by the National Institutes of Health (FY2019) and ranking on *U.S. News & World Report's* Honor Roll of Best Children's Hospitals (2021-22).