Peer Reviewed

Open Access to Neonatal Drug Development Education Modules

Mary A. Short MSN, RN

Critical Path Institute (C-Path) announces the launch of *Bridging the GAP: Empowering Neonatal Nurses in Drug Development for Neonates,* a comprehensive series covering the history of neonatal drug development, approaches to promote drug development for neonates, pharmaceutical industry decision-making processes, and strategies for advocating neonatal needs. (1) Developed in collaboration between its International Neonatal Consortium (INC) and the National Association of Neonatal Nurses (NANN), this series aims to empower neonatal nurses and interested neonatal health care professionals with the knowledge needed to actively participate in research and ensure better outcomes for our tiniest patients.

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"As an organization committed to advancing neonatal research and care, we recognize the vital role nurses and clinicians play in the hospital setting," said INC Executive Director Kanwaljit Singh, MD, MPH. "This collaboration with NANN represents a pivotal step forward in our mission to support and empower neonatal nurses and clinicians. By engaging them in developing these educational modules, we aim to enhance their understanding and involvement in neonatal clinical trials and drug development."

The modules aim to provide foundational knowledge on innovative, regulated medicines development for neonates, including pipeline decision-making factors and addressing neonatal needs within the current environment. Upon completion of the presentations and activity evaluations, participants can earn up to 4.5 FREE CE credits and 2.56 FREE pharmacology credits. NANN is an accredited provider of nursing continuing professional development recognized by the American Nurses Credentialing Center's Commission on Accreditation. The content is appropriate for AMA PRA Category 2 Credit. The presenters reflect the diversity of neonatal stakeholders, as illustrated in Figure 1, which outlines the module titles and the presenters involved.

Background:

Neonates are therapeutic orphans, underserved by the drug development community, and lag in the development of new, safe, and effective therapies. (2) Most NICU drugs are off-label, impacting their safety and efficacy evaluation. (3) Nurses play a vital role in administering medications and monitoring their effects but often lack a comprehensive understanding of clinical trials and drug development processes in the NICU. (4)

Critical Path Institute (C-Path) is an independent nonprofit established in 2005 as a public-private partnership in response to the FDA's Critical Path Initiative**.** C-Path's mission is to lead collaborations that advance better treatments for people worldwide**.** Globally recognized as a pioneer in accelerating drug development, C-Path has established numerous international consortia, programs, and initiatives that currently include more than 1,600 scientists and representatives from government and regulatory agencies, academia, patient organizations, including parent/family advocates, nursing organizations, disease foundations, and pharmaceutical and biotech companies. INC, established in 2015 as a public-private partnership within the construct of C-Path, advances the unmet drug development needs in the neonatal population. (5)

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INC conducted a multistakeholder (neonatologists, neonatal nurses, parents) survey to explore communication practices and stakeholders' perceptions and knowledge regarding the conduct of clinical trials in the NICU. Survey results indicated that most neonatologists (82%) responded that medications are insufficient to meet the needs of critically ill neonates and identified a knowledge gap for nurses regarding drug development. Degl et al. conclude that the engagement of nurses at all stages of neonatal research is suboptimal and indicates a need for nurses to be educated about research. (6) Beauman et al. report additional findings specific to nurse respondents from the multistakeholder survey. Nurses expressed a learning need because they historically lacked effective education to prepare them for competent participation in neonatal research, especially in informing study design. The authors recommend leveraging neonatal nurses' unique and essential role as key stakeholders from the onset of the study design to enhance the conduct of neonatal clinical research and improve care for premature and sick neonates. (4)

Bridging the Gap: Empowering Neonatal Nurses in Drug Development for Neonates

- Why are drugs for neonates not being developed? An opportunity for nurses to advocate for change - Mary A Short MSN, RN
- History of neonatal drug development – Robert M. Ward, MD, FAAP, FACCP, DABCP; Wakako Eklund DNP, APRN, NNP-BC, FNAAP, FAAN
- Regulatory realities: Considerations on the drug development process for trials in neonatology – Sandra Beauman, MSN, CNS, RNC-NIC (FDA permission for slides)
- A drug developers experience: Laura Fabbri PhD, Chiesi
- Introduction to regulated drug development- Gina Smith MPH, BSN, RN (with permission for slides from Norman W Barton MD, PhD)
- Understanding drug development today: Trends, impact on neonatal drug development opportunities- Christopher-Paul Milne DVM, MPH, JD
- Introduction to pipeline development – Thomas Miller PhD

INC welcomes neonatal nurse collaboration in the mission to accelerate the development of safe and effective therapies for neonates.
https://c-path.org/programs/inc/

Figure 1. Bridging the GAP: Empowering Neonatal Nurses in Drug Development for Neonates

"To address the survey findings, industry representatives held an education workshop on Pharmaceutical Drug Development for Neonates at the 2019 INC Annual meeting intended for all neonatal stakeholders, including academics, clinicians, and regulators. The INC Communication Workgroup updated the content for the recently launched education modules, emphasizing the significance of the information for nurses, but the content remains relevant to other neonatal healthcare professionals."

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Product Description:

"Consistent with our mission to elevate and transform neonatal care, NANN is grateful to bring forth this important collaboration with INC and give all neonatal nurses access to these outcome-improving modules," said NANN Executive Director Molly Anderson. "We know neonatal nurses have the expertise and knowledge to play an essential role in drug development that benefits their patients. NANN seeks out partnerships with organizations like INC that allow us to empower deepened nurse involvement with all aspects of care throughout their careers."

"The series includes access to seven on-demand video modules related to nurse-informed neonatal study design for drug development to provide context for the importance and implications for neonatal nurses. The NANN iLEARN site provides a platform for open access."

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NEW NANN/INC DIGITAL PRODUCT OUT NOW!

BRIDGING THE GAP:
EMPOWERING NEONATAL NURSES IN DRUG DEVELOPMENT FOR NEONATES

Free course *created for neonatal nurses to increase their knowledge on the need for additional neonatal drug therapies.*

YOU WILL LEARN...

- *Innovative, regulated medicine development for neonates*
- *Pharmaceutical industry pipeline decision making, including factors that influence Go/No-Go decisions*
- *Information to advocate for neonatal needs*

Figure 2. NANN Product Flyer

SCAN THE QR CODE TO LEARN MORE!

Examples of Risk Adjusted Net Present Value Factors

	ARDS	ROP	BPD	NEC
Well established translational model	-	+++	+/-	+/-
Likely evidence of target engagement in early PoC study	+++	+++	++	?
Target engagement predictive of clinical outcome	-	+++	-	?
Primary clinical outcome < 1 year CA	+++	+++	?	?
Homogeneous patient population	-	+	-	-
Harmonized regulatory pathway through full development	++	++	++	++
Strategic Alignment for Co	-	+++	+	+

Figure 3. Risk-Adjusted Net Present Value Examples

Why Aren't Drugs Being Developed for the Neonatal Population by the Innovator Community?

"With a background in both the NICU and the pharmaceutical industry, I bring a nuanced understanding of the critical need to elevate awareness surrounding neonatal drug development," said Mary Short, MSN, INC Communication Workgroup co-chair. "Through collaboration in research education, I am committed to fostering optimal engagement among nurses in neonatal clinical research, recognizing the pivotal role they play in advancing care for our most vulnerable patients."

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The module presents a brief overview of the unmet need for neonatal drug development and shares results from the INC survey that support the necessity of more optimal engagement of nurses in neonatal clinical research. Mary Short provides rational project goals while introducing the educational series. This series provides 0.25 CE and 0.06 pharmacology credits.

History of Developing Neonatal Drug Therapy: Nurses Play a Pivotal Role, Conversation on the History of Drug Development

"The goal is that the first child treated with a new medication will receive that medication based on prior well-controlled studies of the kinetics: how fast it's removed from the body, studies of the safety and efficacy. Those studies need to be conducted in children of similar gestational ages and with similar disorders so that the product can be provided to our small babies with the same quality and assurances as they are provided to adults. It is within reach. But we aren't there yet, and we have a way to go."

Dr Robet M. Ward FAAP, FACCP, DABCP, Professor Emeritus (Pediatrics), University of Utah, reviews the history of neonatal drug development and discusses why a different approach is needed. Wakako M. Eklund, DNP APRN NNP-BC FAANP FAAN, and Dr Ward discuss the importance of research education for nurses and the engagement of nurses in neonatal research. It provides 1.25 CE and 1.25 pharmacology credits.

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"It's vital to the advancement of neonatal therapies to engage nurses at all stages of NICU research and is vital for neonatal nurses to educate and prepare themselves for that type of en-

gagement."

Considerations On the Drug Development Process for Trials in Neonatology:

"Optimal use of data can assist in standardizing various similar studies, allowing systematic reviews. More powerful use of real-world data in defining normal values will be particularly useful in neonatology, where lab values and blood pressures, for instance, vary widely between gestational ages and disease states."

In 2022, a historic milestone occurred. More than 1,000 drugs and biologics have new information on pediatric use in labeling. (6) This achievement is largely due to the Pediatric Research Equity Act (PREA). Sandra Beauman, MSN, CNS, RNC-NIC, discusses why PREA has not benefited neonates as much as the older pediatric population. To enhance understanding of the importance of research, she presents examples of medication use with good intent that resulted in adverse outcomes. The module shares data on why pediatric studies failed and what could help improve the success of pediatric trials from an FDA review. The discussion includes the unique considerations for studies that include neonates. The FDA permitted the use of slides from the 2019 INC Annual Meeting. It Provides 0.5 CE and 0.13 pharmacology credits.

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A Drug Developer's Experience:

"The standard product development until marketing approval is not applicable in neonatology. Neonates are a population, not a single disease. We must design product development for each neonatal pathology, very often testing hypotheses and methodologies for the first time. We need ~~the~~ validation of measurements in neonatology. We need to select a primary endpoint acceptable by regulators and useful for future users. Furthermore, the number of secondary endpoints should be limited to not expose this fragile population to many additional measurements versus clinical practice and to not have confusing elements that could delay the product profile understanding."

Dr Laura Fabbri, PhD, Head of Real-World Evidence, Global Clinical Development R&D at Chiesi Farmaceutici, shares a drug developer's experience. Using a development program for a synthetic surfactant as a case study, she explains the phases of the drug development process, including requirements and stakeholders in each phase. Learn the impact of ethical requirements in study design, global regulatory requirements, and internal marketing considerations on this development program. It provides 0.5 CE and 0.38 pharmacology credits.

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Innovations and the Drug Development Cycle Process & Players:

Gina Calarco-Smith MPH, BSN, RN discusses the research and development ecosystem and its implications for neonates. Dr. Norman W. Barton, the original presenter at the 2019 INC industry education session, provides permission for the content use. Learn about the core competencies innovation networks use to address the challenges in drug development, including cycle times for knowledge and evidence generation, capital requirements, and risk mitigation. The presentation presents key factors for success in drug development, a communicated vision for value creation, talented, passionate researchers, and motivated groups with shared purpose and tenacity. It provides 0.5 CE and 0.13 pharmacology credits.

"Gina Calarco-Smith MPH, BSN, RN discusses the research and development ecosystem and its implications for neonates. Dr. Norman W. Barton, the original presenter at the 2019 INC industry education session, provides permission for the content use. Learn about the core competencies innovation networks use to address the challenges in drug development, including cycle times for knowledge and evidence generation, capital requirements, and risk mitigation. "

Understanding Drug Development Today: Trends, Impact on Neonatal Drug Development Opportunities:

"The risk appetite, if you will, is one of the things that has certainly been affected over the last few years by the opioid problem, as well as Covid… in the private sector uptake, derisking is very important, …take some of the risks out of the project, especially in a risky subpopulation like neonates."

"This module presents an overview of the contemporary landscape of drug development and its significant impact on neonatal drug development. Dr Christopher-Paul Milne provides insights into how global phenomena, such as the opioid epidemic and the COVID-19 pandemic, alongside novel therapies for diabetes, weight loss, targeted therapy, and gene therapy, influence the prospects of developing therapies specifically tailored for neonates. By examining the ripple effect of these developments, the module presents how allocating research resources may have unintended consequences for developing neonatal therapies."

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How Do Life Science Companies Make Portfolio Decisions? Implications for Pediatric / Neonatal Clinical Development Programs:

"One of the strategies that I often think about as a drug hunter is how can I strip out as much heterogeneity as possible from a patient population, or in some circumstances, avoid heterogeneous patient populations altogether because my probability of technical success intrinsically improves when studying a homogenous patient population."

"Dr Thomas F. Miller, Bayer Global Head, Acute, Chronic & Pediatric Disease Nucleus, provides a "behind the scenes" view of how life science companies make product development decisions impacting the selection of conditions and patients studied. Limited funds, staff, and time require prioritizing what products to move forward into development and clinical trials. The module introduces a quantitative approach, the Risk Adjusted Net Present Value. This value equation is presented as a fraction that looks at drivers of value/detractors of value."

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Supplemental Materials:

Glossary:

Enhancing neonatal outcomes through collaboration requires a shared language. Given the variance between clinical and pharmaceutical terminology, it is essential to bridge this gap. A glossary to aid the learner offers definitions of commonly used terms in pharmaceutical research, along with direct links to their respective sources.

Bibliography:

Learners seeking more in-depth information on the regulated drug development process and essential components of pediatric research can access a bibliography created for each module.

Optional Research Inquiries:

To evaluate the effectiveness of the learning modules and gauge personal perspectives on research-related education and communication practices in NICUs, the evaluation form for the learning module incorporates optional research inquiries. These questions delve into the significance of research in advancing neonatal care within NICUs, the current flow of communication in these environments, and the education and training neonatal personnel receive regarding the importance of neonatal research. Understanding these perspectives can enrich communication strategies within NICUs, foster greater engagement among neonatal staff and parents in discussions about neonatal clinical trials, and increase participation in neonatal research.

Enhancing Professional Development: Implications for Advancing Neonatal Therapies

Pharmaceutical research lags in the neonatal population. (7) Approval of new therapies tailored for neonates requires undertaking pharmaceutical research that meets regulatory standards. Optimal engagement of all members of the neonatal community may change the current paradigm. (6) *Bridging the GAP: Empowering Neonatal Nurses in Drug Development for Neonates* provides essential education to healthcare professionals. These modules serve to increase the awareness of both the challenges and the opportunities inherent in the development of safe and effective therapies for neonates. Enhance your ability to advocate for your patients by completing these modules.

As a neonatal community, let us equip ourselves with the knowledge and skills necessary to navigate the complexities of drug development and improve patient outcomes.

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Disclosure: *Mary Short serves as a co-chair for the International Neonatal Consortium Communications Work Group. Mary provides consultation services for pediatric drug development and has an interest in promoting multistakeholder engagement to improve the successful completion of pediatric research.*

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