

Original Publication

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Newborn Care Curriculum: The Late Preterm Infant in the Level II Neonatal Intensive Care Unit

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Citation: Aragona E, Conroy R. Newborn care curriculum: the late preterm infant in the level II neonatal intensive care unit. *MedEdPORTAL*. 2017;13:10657. https://doi.org/10.15766/mep_2374-8265.10657

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Abstract

Introduction: Late preterm births represent the largest category of preterm deliveries. Although these infants are frequently managed in normal newborn nurseries, they have an increased risk of readmissions and mortality. Thus, we designed this PowerPoint-based learning module to provide learners with a computer-based educational resource on late preterm infants in the level II neonatal intensive care unit. **Methods:** This module can be completed using the included pretest and posttest to assess for change in knowledge. The module should take approximately 20 to 30 minutes to complete. **Results:** Between May and June of 2016, members of the pediatric hospitalist division at Children's National Health System in Washington, DC participated in a study of the module as a self-directed learning tool and completed the pretest, posttest, and postmodule evaluation forms. There was an overall increase in knowledge, with an increase in posttest score from 64% to 94%. Furthermore, this module was well-received by learners, as 55% of learners agreed or strongly agreed that the material presented in the module would change their clinical practice, and 100% agreed or strongly agreed that the module increased their comfort with teaching on this topic. **Discussion:** Initial implementation of the module indicates it could be a valuable tool to address a perceived educational need in the area of late preterm infant care in the level II neonatal intensive care unit.

Keywords

Nursery, Pediatrics, Hospital Medicine, Newborn Care, Preterm Infant

Appendices

- Late Preterm Infant in the Level II NICU Module.pptx
- Presenter View Instructions.docx
- Pretest.docx
- Pretest with Answer Key.docx
- Posttest.docx
- Posttest with Answer Key.docx
- Module Evaluation.doc

All appendices are peer reviewed as integral parts of the Original Publication.

Educational Objectives

By the end of this resource, learners will be able to:

- Describe nursery care levels and understand which infants are appropriate for care at each level.
- Review physiologic differences between term and late preterm infants.
- Formulate management plans for common problems seen in late preterm infants.
- Evaluate late preterm infants appropriate for discharge and organize safe discharge plans.

Introduction

According to the National Center for Health Statistics, the rate of late preterm births rose 20% over 15 years until 2006. Occurring during approximately 7% of all births, late preterm infants represent the largest category of preterm deliveries.¹ Although late preterm infants are frequently managed in normal newborn nurseries and are close in gestational age and size to full-term counterparts, recent studies highlight that these infants are at risk of immaturity-related medical complications and represent up to one-third of neonatal intensive care unit (NICU) admissions.² Late preterm infants have increased mortality (up to three times higher than that of term infants) and are about twice as likely to be readmitted compared to term infants.³

Many late preterm infants are managed by pediatric hospitalists and other non-neonatologists in community settings. Several aspects of late preterm newborn care are delineated in knowledge and skills competencies as part of the Society of Hospital Medicine Pediatric Hospital Medicine Core Competencies.⁴ However, an anonymous, electronic survey sent to the American Academy of Pediatrics' Section on Hospital Medicine listserv to examine pediatric hospitalists' level of confidence on 18 newborn

care topics found that 63% of respondents were interested in receiving more education about the late preterm infant in the level II NICU. In the same survey, 94% of respondents noted interest in computer-based learning sessions.^{5,6}

Extensive literature on the late preterm infant already exists and includes book chapters in neonatology texts,⁷⁻⁹ guidelines,¹⁰⁻¹¹ and review articles.^{2,12-14} The literature reviews developmental physiology of newborns, sequelae of late preterm birth, and management strategies for these infants. There is also an abundance of research investigating therapies and outcomes in late preterm infants.¹⁵⁻¹⁷ Despite plentiful literature on the topic of the late preterm infant in the level II NICU, there is a dearth of both material created specifically for clinically practical and interactive educational purposes, and resources that comprehensively yet concisely describe late preterm infant physiology and consequences while providing relevant management recommendations. This independent module on the late preterm infant in the level II NICU was created for pediatric hospitalists as part of a larger curriculum in newborn care to address a perceived educational need.

Methods

This educational activity was developed to aid non-neonatologists in the care of late preterm infants. While focus was based on pediatric hospitalists' learning needs, other medical personnel such as nurses, medical students, residents, family medicine/general pediatric physicians, advanced practice providers, and others who care for newborns may benefit.

The goal for module development was to create a concise, interactive activity that could be accessed from home or at work in a newborn nursery when more information on late preterm infants is desired. The module itself is a PowerPoint slideshow with a script (Appendix A). The current electronic format was chosen because we recognized the ubiquitous presence of computers and, frequently, Microsoft PowerPoint in both homes and hospitals. Furthermore, PowerPoint enabled the use of animation which was employed to help keep the learner engaged.

After creating the initial module, the authors created a pretest (Appendix C), a pretest answer key (Appendix D), a posttest (Appendix E), and a posttest answer key (Appendix F). These tests included 10 multiple-choice questions that can be used to assess knowledge regarding the late preterm infant. A module evaluation (Appendix G) was also developed. The module evaluation used a five-point Likert scale (5 = *strongly agree*, 1 = *strongly disagree*).

The initial module was assessed through its use in the pediatric hospitalist division at Children's National Health Care System containing attendings, fellows, and advanced practitioners. The module was distributed as part of a study on a newly developed newborn care curriculum between May and June 2016. Although the module was included in this more comprehensive newborn care curriculum, it was independent of the other educational activities. During this pilot period, volunteer participants took the pretest, viewed the PowerPoint slideshow in the presenter-view format, took a posttest, and completed the module evaluation. Results were compiled for author review, and minor adjustments were made in response to pretest and posttest scores and the recommendations made in the evaluations.

There were no prerequisites for this module, but a basic understanding of newborn physiology is considered helpful. Developers recommend learners view the PowerPoint using the presenter-view feature of PowerPoint. Presenter view instructions are provided in Appendix B. While viewing the slideshow, learners should read the script in the notes section. Completion of the module through self-directed learning should take approximately 20 to 30 minutes.

While this learning activity has only been evaluated in a self-study format, developers also considered small-group teaching when creating this module. If time permits, it is recommended that instructors distribute the pretest questions prior to presenting the PowerPoint using the script provided. Learners

should then be encouraged to complete the posttest. It is estimated that application of the full module for small-group teaching will take approximately 45-60 minutes depending on the engagement level of small-group learners. It is also possible for instructors to tailor more relevant teaching by using the pretest as a learner needs assessment and then focus the module presentation accordingly. In either situation, the posttest can be used to both assess for understanding and provide feedback to learners. The module evaluation can provide instructors with guidance for use with future learners.

Results

This module was evaluated by 11 members of the Children's National Health Care System pediatric hospitalist division. Of these, 82% reported providing newborn care in their current clinical duties. Pretest scores averaged 64%. Posttest scores showed improvement to 94% after completion of the module ($p < .0001$).

Results from the module evaluation were generally positive and are presented in the [Table](#).

Table. Evaluation Results ($N = 11$)

Item	Agree/Strongly Agree	Average Score ^a
This learning activity met the stated learning objectives.	100%	4.55
Material presented in this learning activity was relevant to my clinical practice.	91%	4.45
Material presented in this learning activity will change my clinical practice.	55%	3.55
Material presented in this learning activity increased my comfort with teaching about this topic.	100%	4.27
This learning activity would be useful for small-group teaching.	91%	4.27
Format of this learning activity was appropriate for my learning needs.	100%	4.36
The format of this learning activity would be more effective with an audio narration.	73%	4.00

^aFive-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*).

Participant comments noted the quality of the information provided and reflected support for the concise module format. Representative participant comments included the following:

- “Excellent discussion of management of common level II NICU problems and concerns in late preterm infants; concrete, practical.”
- “Easy to follow, not too long.”
- “Clinically-relevant information useful in day-to-day management.”
- “Right level of detail. Will be really useful in teaching.”

Technically related recommended changes to the learning activity were made prior to submission. The authors also made minor edits to the pre- and posttest questions to ensure that they accurately reflected the learning objectives of the module. Ultimately, the tests are similar but the knowledge-based and behavior-based questions now assess learning objectives in slightly different ways.

Discussion

Based on a small-scale preliminary study, this module provides a concise, user-friendly, effective learning tool for newborn care providers. One Hundred percent of learners agreed the format was appropriate for their learning needs. Additionally, 91% of learners agreed or strongly agreed that this learning activity would be useful for small-group teaching, and all agreed or strongly agreed that the module increased their comfort with teaching on the topic.

Of note, the majority of volunteers who completed the module and evaluation currently provide newborn care. It is likely that the module will be of even greater value to providers needing “refreshers,” such as pediatric hospitalists who are beginning to fill roles in newborn medicine after several years removed from such practices.

The ultimate goal of implementation of this learning module is to improve overall patient care delivery to

late preterm infants in the level II NICU, given the prevalence of late preterm births, the increased morbidity and mortality in this population, and the fact that non-neonatologists are frequently managing these neonates. While it was outside the scope of the pilot study to assess for actual behavioral changes, more than half of pilot learners agreed or strongly agreed that the material presented in the module will change their clinical practice.

Future steps to improve the module may include the creation of an audio version and/or the development of a module compatible with smartphones to enable on-the-go learning. In addition, as web-based learning gains popularity due to its ease in providing timely and effective educational opportunities, the authors will consider designing e-simulation scenarios to allow learners to synthesize materials learned during this module. These scenarios could also be used to assess for behavioral changes after viewing the module.

Limitations

Evaluation of the benefits of this learning module was limited by the small number of participants and narrow practice focus of the participants. Future studies should seek a larger study group and learners at different levels of training. While this module was developed with features allowing for small-group teaching and 91% of survey participants agreed or strongly agreed this would be useful in this way, this learning setting has not been critically evaluated. Another limitation of the module is its brevity, which restricts the amount of information that could be included, and necessitates the presentation of material in a didactic, rather than an interactive, case-based style. The goal of the teaching design was to create a 20- to 30-minute focused instructional modules. While the information provided in the module stands alone as an instructional element, it is possible that the module could be used in a broader blended learning curriculum using active learning to increase learner-knowledge acquisition.

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Acknowledgments

We thank Anjali Iyengar, MD, for providing neonatology review of module content.

Disclosures

None to report.

Funding/Support

None to report.

Ethical Approval

No, I have read the stated policy and attest that this submission does not contain data from research activities requiring ethical approval.

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Received: May 12, 2017 | **Accepted:** November 25, 2017 | **Published:** December 11, 2017