Spring 2012

Improving Care and Outcomes for the Late Preterm Infant

Angela T. Houck
Regis University

Regis University
Rueckert-Hartman College for Health Professions
Final Project/Thesis

Disclaimer

Improving Care and Outcomes for the Late Preterm Infant

Angela T. Houck

Submitted as Partial Fulfillment for the Doctor of Nursing Practice Degree

Regis University

April 29, 2012

Improving Care and Outcomes for the Late Preterm Infant
Executive Summary

Problem

Globally, the late preterm infant (LPI) is the fastest growing and largest portion of infants born preterm. In the United States, the LPI accounts for 72% of the preterm infant population (March of Dimes, 2009). Consequently, their vulnerabilities as preterm infants have often been overlooked when they are admitted to a well-newborn nursery. Only in the last several years, has this population been identified as one requiring standardized management strategies that are tailored to their unique needs (Association of Women's Health, Obstetric and Neonatal Nurses [AWHONN], 2010). In 2010, AWHONN published a clinical practice guideline dedicated to the care of the LPI, the educational needs of their families, and the best practices identified for health care providers.

The literature revealed a wide variety of peer-reviewed articles related to pathophysiology, assessment, and recommendations for care of this diverse population. However, there was a gap in the literature related to utilizing an evidence-based program that evaluated the impact on neonatal intensive care unit (NICU) transfers or Pediatric unit re-admissions for this particular population. Therefore, the question posed became will a risk stratified treatment program utilizing AWHONNs *Assessment and Care of the Late Preterm Infant: Evidence-based Clinical Practice Guideline* reduce NICU transfers for a higher level of care and pediatric unit re-admissions within 10 days of life for the late preterm infant compared to the current treatment?

Purpose

In a rapidly changing health care environment, reimbursement for preventable NICU transfers and Pediatric unit re-admissions of the LPI may come under increasing scrutiny in the foreseeable future. The purpose of this capstone project was to compare the rates of transfer and re-admission prior to instituting the clinical practice guideline to those rates after instituting the guideline at a local regional medical center.

Goals

The goal of the project was to successfully implement all aspects of the clinical practice guideline in order to reduce NICU transfers by 10% and Pediatric unit re-admissions within 10 days of life by 5% for the LPI population.

Objectives

Project objectives included: instituting the clinical practice guideline after an intensive nursing education seminar; formulating a physician's order set and nursing care plan, developing a feeding plan for the breast and bottle feeding LPI; developing pre-delivery and discharge caregiver education materials, and collecting admission, transfer, and discharge data on every LPI born at a local regional medical center. A retrospective collection of the pre-intervention admission, transfer, and discharge data was analyzed for comparison.

Plan

The capstone project followed the Doctor of Nursing Practice process model described in Zaccagnini and White (2011). This model begins with the idea and follows nine phases from problem recognition to utilizing and reporting results. Weekly team meetings with a specific agenda were used to launch the program from inception to implementation. An evidence-based practice model was used to guide the steps for answering the process improvement question.

Outcomes and Results

While the LPI population increased from 2010 to 2011, Pediatric re-admissions decreased by more than 10%. NICU direct admissions were reduced, while transfers increased. Although the goal was only partially met, the implications for practice suggest the increased surveillance improved outcomes and reduced the likelihood an infant would require costly rehospitalization after discharge.

Acknowledgements

Improving Care and Outcomes for the Late Preterm Infant (Houck, 2012) could not have been possible without the tools provided by the Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN), a national nursing association that provides professional nurses critical information and support. The author would like to acknowledge AWHONN for its guideline which provided the backbone for this process improvement project.

Interprofessional collaboration is woven throughout the fabric of the late preterm infant project and the author thanks Team Purple, the staff of the Women's and Children's Division and facility leadership for embracing and supporting this effort across the continuum of the project, from inception to outcome.

Table of Contents

Copyright Page……..i
Executive Summary……ii
Acknowledgments……...iii
Introduction…….....1
Problem Recognition and Definition…… ...2
Theoretical Foundation…… 3
Project Significance and Scope……...…4
Review of Evidence……5
Background of the Problem…… ...5
Systematic Review of the Literature……...6
Project Plan and Evaluation……8
Market Analysis……..8
Driving/Restraining Forces.....11
Stakeholders and Project Team.....12
Cost-Benefit Analysis.....13
Vision/Mission.....13
Project Objectives and Goals.....14
Methodology.....15
Eight Challenges of the LPI.....16
Evaluation Plan.....20
Data Analysis Plan.....21
Threats to Reliability and Validity.....22
Project Findings and Results.....23
Direct NICU Admissions.....23
NICU Transfers.....25
Pediatric Re-admissions.....27
Answering the PICO Question.....29
Discussion.....29
Limitations.....29

Recommendations.....30
Implications for Change.....31
References.....33

List of Tables and Figures

Table 9
Table 1 9
Figures.....24
Figure 1 25
Figure 2 27
Figure 3 28

List of Appendices

Appendices....36
Appendix A-Conceptual Diagram....36
Appendix B-Systematic Review of the Literature....37
Appendix C-Agency Letter of Support....53
Appendix D-Budget and Resources....54
Appendix E-CITI Training Certificate....57
Appendix F-NIH Protecting Human Subjects Training Certificate....58
Appendix G-Logic Model….....59
Appendix H-Project Timeframe....60
Appendix I-IRB Approval Letter....61

Improving Care and Outcomes for the Late Preterm Infant

The American Academy of Pediatrics ([AAP], 2007) defines the late preterm infant as an infant born between 34 and 36.6 weeks gestational age. Currently, the late preterm infant (LPI) represents over 70% of all infants delivered prematurely in the United States (March of Dimes, 2009). The late preterm infant represents 9.1% of all live births in the United States. This constitutes a 14% increase in late preterm births in the past decade (Davidoff et al., 2006). Consequently, their vulnerabilities as preterm infants are often overlooked when they are admitted to a well newborn nursery. As a matter of fact, mortality rates for the LPI are three times greater than that of their full-term counterparts (Matthews & MacDorman, 2010). Fortunately, their vulnerabilities are relatively "predictable, preventable, and manageable" (Hubbard, Stellwagen & Wolf, 2007, p. 52).

By their very nature, infants are vulnerable because they cannot speak or make healthcare decisions for themselves (AAP, 2007). Jorgensen (2008) described the LPI as vulnerable due to the four U's: underestimated, unrecognized, unpredictable, and understudied. The LPI has been combined with the term population in medical care and in research studies. Only recently has this population been seen as one requiring standardized medical management strategies of their own and further research specific to this group of infants (Hubbard, et al., 2007; Jorgensen, 2008).

The purpose of this capstone proposal was multi-factored. The late preterm infant requires a higher level of care and surveillance than the term infant in order to mitigate complications related to being born early. A comprehensive, risk-stratified treatment program tailored to the needs of the late preterm infant may reduce neonatal intensive care unit (NICU)

admissions and pediatric re-admissions. The LPI initiative addressed the needs of this population and was evidence-based.

Problem Recognition and Definition

In 2005, The Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN) launched an initiative with goals that included developing a practice guideline to increase health care provider and consumer awareness regarding this growing population of vulnerable infants. In 2010, AWHONN published *Assessment and Care of the Late Preterm Infant: Evidence-based Clinical Practice Guideline* to provide educational resources to practitioners when caring for this vulnerable population. The late preterm infant has unique needs that require a different level of nursing care than their full-term counterparts. As mentioned, this population has been underestimated, unrecognized, unpredictable, and understudied. This qualifies the LPI as a vulnerable population in need of a collaborative plan of care and early primary care follow-up.

The eight elements of AWHONN's clinical practice guideline include gestational age assessment, thermoregulation, glucose homeostasis, respiratory status, infection surveillance, hyperbilirubinemia screening, feeding challenges and opportunities, and discharge and parental education (AWHONN, 2010). Typically, the LPI is admitted to a transitional or well-baby nursery and treated like their full-term counterpart, often to their detriment. Since these infants are known to be the great imposter, an LPI may do quite well for the first 24 hours. This honeymoon period may then be followed with the challenges of prematurity. Identifying and addressing these challenges was one of the preliminary and primary goals of the late preterm project.

Theoretical Foundation

AWHONN's conceptual model revolves around healthy outcomes for the late preterm infant, both short and long-term. Concepts inherent in this model include optimizing the LPI's physiologic functional status and care environment while recognizing nursing care practice and the family role in ensuring improved health outcomes for this vulnerable population (AWHONN, 2010). The visual model adapted from the clinical practice guideline is depicted in Appendix A and was used with permission from AWHONN. Using the best available evidence, the guideline expects to promote enhanced nursing knowledge of the LPI and the challenges inherent in being born three to six weeks early (AWHONN). By following the guidelines related to the eight largest challenges and problems these infants face, the purpose of the project and its proposed outcomes was to reduce transfers to the NICU for a higher level of care and re-admissions to the Pediatric Unit within 10 days of life. The bulk of the guideline and project proposal are nursing interventions aimed at reducing sequelae related to late preterm birth, thus improving outcomes (AWHONN).

The LPI may need transfer to the NICU for a higher level of care. This is usually related to temperature instability, hypoglycemia, and poor feeding. Eventually, weight loss may lead to dehydration and elevated bilirubin levels (Hubbard et al., 2007). If the LPI does well during the birth hospital stay and is discharged, a typical Pediatric re-admission is usually related to hyperbilirubinemia, failure to thrive, or sepsis. The program proposal aims to intercept or mitigate these common issues of the LPI in order to decrease direct NICU admissions or transfers for a higher level of care and Pediatric unit re-admission rates and to improve clinical outcomes.

Project Significance and Scope

A hospital in the east coast region of the United States, PRMC is a 375 bed Level I Trauma Center. Infant deliveries are approximately 2100 to 2200 annually. In 2010, there were 98 LPIs born at this facility. Of these, 22 LPIs were directly admitted to the NICU for a higher level of care. Of the remaining 76 LPIs in the baseline pre-intervention group, 14.5% or 11 of these infants were later admitted to the NICU for a higher level of care. Finally, 9.2% were re-admitted to Pediatrics within 10 days of their birth date (PRMC, 2010). The project would be comparing data for a period of six months pre-intervention to a period of six months post-intervention. The goal was to reduce 2011 LPI NICU transfers by 10% and Pediatric re-admissions by 5%. The overall goal was to reduce morbidity and mortality for this population in the communities served. The global impact of this late preterm initiative may also include a reduction in overall health care costs related to prematurity, especially if this practice guideline is widely accepted and adopted.

The outcomes are nurse, patient, and organization sensitive. Nurse-sensitive indicators include symptom reduction, enhanced patient/family knowledge, improved functional status, better collaboration among caregivers, and reduced length of stay and costs of care (Kleinpell, 2009). Organization-sensitive indicators also include costs of care reduction, shortened length of stay, and improved community relationships and trust. However, the most important outcomes are patient-sensitive. These include a reduced rate of re-admission to the hospital for preventable problems, improved quality of life as indicated by reduced morbidity and mortality, and improved patient/parental satisfaction and education (Kleinpell).

The purpose of this project proposal was to determine if utilizing a specific practice guideline for the LPI reduced costly hospitalization or re-hospitalization, thus reducing morbidity and mortality. Using the Problem, Intervention, Comparison, and Outcome (PICO) format utilized by many nursing researchers (Newhouse, Dearholt, Poe, Pugh & White, 2007) the question posed became: Will a risk-stratified treatment program utilizing AWHONNs *Assessment and Care of the Late Preterm Infant: Evidence-based Clinical Practice Guideline* reduce NICU transfers and Pediatric unit re-admissions within 10 days of life for this population?

Review of Evidence

Background

Because the LPI has garnered much attention in the literature over the past several years (AWHONN, 2010), several committees have formed to discuss the unique needs of this growing population. Among them, AWHONN, AAP, and the National Institutes of Child Health and Human Development have convened to assist health care professionals, families, and communities with recommendations, guidelines, and collaboratives aimed at reducing morbidity and mortality and improving outcomes for this population.

A growing body of global evidence is demonstrating that being born between 34 and 36.6 weeks gestation puts the infant at a higher risk for certain health complications than their full-term counterparts (AWHONN, 2010). According to Moster, Lei, and Markestad (2008) and Petrini et al. (2009), the LPI is at increased risk for short and long-term delays in neurobehavioral outcomes and other social consequences. Coupled with their immediate and their long-term risks, the LPI is considered a vulnerable population in need of their own standard

of care. As part of the project proposal's inception, one of the first steps in formulating the PICO question involved a systematic review of the current literature. This process provided the backbone of the proposal by revealing gaps in the literature.

Systematic Review of the Literature

A systematic review of the literature was conducted using six electronic databases including the Cumulative Index to Nursing and Allied Health Library (CINAHL®), Ovid MEDLINE®, PubMed®, Academic Search™ Premier, EBSCOhost®, and Google Scholar. Keywords included late preterm infant, near term infant, thermoregulation, respiratory distress, jaundice, hyperbilirubinemia, neonatal glucose, hypoglycemia, sepsis, infection, feeding, breastfeeding, discharge criteria, morbidity and mortality, and admission and re-admission. Articles were chosen based on seminal research beginning in January 2004 and included items to date for 2011. Of the 16,900 broad results using keywords late preterm or early term, the search was refined by cross-referencing to one of the eight elements of the AWHONN clinical practice guideline to the search line (e.g. late preterm infant and thermoregulation). This narrowed the search considerably to 697 articles related to delivering late preterm with one or more of the challenges or problems associated with an infant with a gestational age 34 to 36.6 weeks. The search was then limited to seminal articles and articles within a five to six year time frame. In the end, 108 articles were reviewed for content supporting the PICO question.

After examining abstracts, prospective, and retrospective studies were included as well as descriptive studies and clinical guidelines from professional organizations. Seminal articles, workshop summaries, and population studies were additionally reviewed and included in the systematic review of the literature. The United States Preventive Services Task Force (1994)

Guide to Clinical Preventive Services quality-of-evidence rating scale (AWHONN) was utilized to categorize the journal articles. Level I, II-1, II-2, II-3 and III are inclusive of randomized controlled trials to cohort studies without controls or randomization to expert opinion and descriptive studies. Since this is a vulnerable population, the majority of the studies were retrospective or prospective cohort or comparison studies without control populations. Many of the journal articles compared the late preterm infant to the term infant. Other articles compared pre and post-intervention results. As a result, the majority of the systematic review was indicative of quality of evidence ratings ranging from II-1 to II-3. There were two Level I articles and two Level III expert committee reports included.

Other sources included professional organizations such as the AAP, the American College of Gynecologists and Obstetricians (ACOG), AWHONN, and the March of Dimes (MOD). Another valuable source was seminal articles and their reference lists or bibliographies. A cross-reference was also completed using the systematic review results and bibliographies from landmark articles. The final systematic review contained 30 articles in peer-reviewed journals spanning eight years and encompassing a global perspective. The articles were then categorized into AWHONN's eight elements of care plus morbidity and mortality. Each category contained approximately five or six journal articles alphabetized by author.

The evidence revealed a gap in the literature related to initiating and following an evidence-based clinical practice guideline for the late preterm infant. The evidence reviewed demonstrated the problem, challenges, pathophysiology, and disease-specific interventions but failed to articulate how a comprehensive program can impact eventual outcomes. Initiating this program and evaluating the research will assist in filling this gap. As the clinical practice

guideline is replicated at other facilities, data from outcomes can be compiled for dissemination demonstrating whether the program is effective and successful in its goals. The systematic review of the literature is summarized in Appendix B.

Project Plan and Evaluation

Market Analysis

The market the LPI project identified was the community of people in childbearing age who deliver an infant between 35 and 36.6 weeks gestation at this facility. Currently, at PRMC infants less than 35 weeks gestational age are automatically admitted to the NICU. Therefore, the project was directed toward infants born between 35 and 36.6 weeks gestation. Ma et al., (2009) attribute the rise in the LPI population to a rise in pregnant women greater than 35 years of age, multiple gestations due to reproductive technologies, and an increase in medically indicated delivery associated with improved prenatal care. So, how should one meet the needs of this growing customer market?

MCur and Meyer (2006) suggested the nurse plays a powerful role in the marketing of health care and health promotion. According to their research, most people equate marketing with sales and promotion. However, sales and promotion are only one subset of the discipline of marketing. Marketing is about identifying customer needs and satisfying those needs, along with developing services and products that promote primary health care. Social marketing promotes healthy lifestyles and focuses on the benefits of the services a particular market promotes (Fortenberry, 2010).

In the case of the LPI, the four P's of the commercial marketplace (product, price, place, and promotion) become service, cost, delivery, and communication respectively. Service is what

the patient seeks as a benefit. The LPI will benefit from AWHONN's clinical practice guideline because each intervention was based on the unique needs of this population. This translates into the primary health care objectives of effectiveness and acceptability. The program should be effective and accessible to all. Costs were evaluated according to cost/benefit, income/expenditure, people, time, and effort (MCur & Meyer, 2006). The LPI proposal sought to reduce overall health care costs by reducing transfers and re-admissions to high-cost units such as NICU and Pediatrics. The outlay of costs for the facility was minimal, as this subset of infants has always been cared for, just in a different manner. The expenditures incurred were from planning, staff education, and printing of materials. An organizational assessment of strengths, weaknesses, opportunities, and threats (SWOT) assisted the facility in identifying existing resources and barriers to project implementation. The SWOT analysis offered an evaluation of AWHONNs clinical practice guideline as shown in Table 1. Primary strengths of the study included specificity of population parameters, an objective measurement tool, a dedicated and experienced team, and clear measurable objectives.

Table 1

SWOT Analysis, 2012

Strengths	**Weaknesses**	**Opportunities**	**Threats**
AWHONNs guidelines			
-Comprehensive -Population-based -Risk-based -Evidence-based -Timely and useful -Staff and parent focused -Easy and cost-effective to implement -Respected nursing association name recognition	-Minimal Level 1 randomized trials -Translation to other countries and their populations	-Applicable to all settings caring for the LPI -Relevant components are applicable in the home setting -Dissemination to endorse as the standard of care for the LPI	-Organizational reluctance to incorporate all aspects of the model

The delivery of care asks the questions of where, when, and how. The primary outcomes of this portion of the market plan include availability and accessibility. The product was available for the population and accessible for the intended population. The facility where this care was provided is an existing health care facility that offered the services without limitations. Access to care was made available to all who seek the service, and no LPI was denied services or treated differently than their cohorts. The final marketing strategy was communication, or the means by which the customer was educated and informed about the benefits of the service.

In the case of the LPI, the first exposure to the new service was at the obstetrician's office during prenatal visits. If the patient received no prenatal care, they received the education as part of their intake interview at the delivery center. The information for the service was also available on the facility website and on locally distributed pamphlets and media advertisement. These multiple access modalities were intentionally crafted to meet the diverse needs of this special population. The primary health care objectives for this strategy include equity and efficiency (MCur & Meyer, 2006). Personal selling and public relations were both means whereby the nurse was able impact the overall promotion of the product line. Nurses are in a unique position of holding the public trust; therefore the nurse can be an influential asset to the facility's community mission. MCur and Meyer state "Personal attributes of registered nurses, such as friendliness, approachability and confidence, can almost instantaneously influence the health beliefs and behaviors of community members" (p. 20). Competition in the health care market has propelled the bedside nurse toward being the face of healthcare. In this highly competitive health care market, the advanced practice nurse is a powerful influence in the marketing of health practices and promotions. The public has a high degree of trust and faith in

the nursing profession which is a catalyst for the profession to contribute toward the marketing of a unique product offering, a new mode of care, or an additional service. The advanced practice nurse has the knowledge and skills necessary to be a role model who can meet the needs of an increasingly demanding and astute health care consumer.

Driving/Restraining Forces

At this time, costs to enter the market were negligible since this facility has always treated the LPI population. However, the LPI was treated as a term infant and not specifically its own population with unique needs. Therefore, this was a realignment of services requiring little financial output except for staff education, parent education materials, and nursing costs related to nurse to patient ratio assignments. The initial outlay of costs has been $500 for materials and $10,000 for team meeting salaries. The costs for any additional staff are yet to be determined in this on-going project, as daily census will dictate staffing needs. Additional equipment, such as replacement diaper scales and stethoscopes would cost approximately $400 per year.

Market growth is getting larger each year with 72% of premature births being late preterm (MOD, 2009). Attracting and retaining customers was easy to begin with since this was the foundational customer base with no geographically close competition. Providing a unique and family-centered care plan will ensure continued success. Since this is a population of infants the United States (U.S.) would like to see reduced, it becomes a win-win situation because reducing this population means more infants are born full-term.

Technology requirements were minimal. No new equipment was required and the facility was already an award-winning wired facility (five years in a row) and recently identified as most connected by *U.S. News and World Report* (PRMC, 2011). Qualified staff was on

board, and 30% of the NICU registered nurse (RN) staff is nationally certified in low and high-risk neonatal intensive care nursing. Turnover is extremely low in the Women's and Children's department. Recruitment has not been problematic as it is a highly prized area to work and the department often has a waiting list for employment. Many of the NICU nurses were former nursery RNs who graduated to NICU care. The LPI population was cared for by both NICU and Nursery RNs, as the census indicated. However, unless admitted to NICU, the LPI was considered an Intermediate Care Nursery (ICN) infant. Community partnerships included the local health department and the local chapter of the March of Dimes. The March of Dimes chapter was a community resource that not only educated the public and professional staff, but worked with the facility to advocate for this population (Freshman, Rubino & Chassiakos, 2010).

Stakeholders and Project Team

The primary stakeholders were the late preterm infant, their family, the health care facility and team, and the community. An agency letter of support for the project is enclosed in Appendix C. Organizational stakeholders included the facility where the project was housed, the insurance companies including state insurance plans for children and Medicare and Medicaid, the local county and government organizations such as the health department, Women with Infants and Children program (WIC), and the regional March of Dimes chapter.

The principal team members required for this endeavor were the leadership team of divisional director, managers, and clinical nurse specialists. These were existing positions. A physician champion, the neonatologist, was also a current employee. In addition, the team consisted of a lactation specialist, speech pathologist, nutritionist, and staff nurses. All of these positions were currently held and have in the past been involved with caring for the late preterm

infant. Respiratory therapists and physical therapists were on call for these infants on an as needed basis as in the past. As a result, on a month to month basis the care might include the entire team for anywhere from six to 12 LPT infants. There was no plan to hire additional staff.

Cost-Benefit Analysis

The costs for implementing the late preterm infant initiative were relatively low compared to the benefits realized. The final cost for project implementation was $20,000. This included education, materials, supplies, equipment, and labor costs for educational classes. The four units were responsible for the wages and salaries of staff and for needed equipment. A balance sheet is included in Appendix D. The benefits, while reducing costly NICU transfers and Pediatric re-admissions which the hospital profits, will ultimately improve outcomes and patient satisfaction, thus further increasing future market share. The costs for this program was mitigated by the longer length of stay required for the late preterm infant. The initial outlay was recuperated with the first 20 LPI infants who were not discharged at 24 hours of age. The LPI was not discharged prior to 48 hours, which is the industry standard and allowable under the current insurance regulations.

Vision and Mission

A project of this scope begins with a vision, a mission, and values that underpin the proposal. Inherent in the nursing profession are the ethical principles that are the foundation of practice. These ethical principles drive the formulation of the vision and mission of the project, which in turn launches the building of the strategic and business plans (Chism, 2010). The researcher completed modules designed to protect human rights for research population subjects and for vulnerable subjects including infants and children (Appendix E and Appendix F).

The proposal Vision states: The facility will be the premier provider of Women & Children's Services for the communities served by utilizing best practices and evidence-based care in a safe environment, providing family-centered, interprofessional care, promoting positive bonding experiences, establishing a 'culture of always', engaging the community by modeling healthy and safe behaviors, respecting diversity, and cultivating excellence (PRMC, 2011). Thus, the proposal Mission is to provide the community fiscally responsible, evidence-based care that promotes health and well-being to infants and their caregivers in a safe family-centered environment. In these changing and challenging times for health care in general and health care organizations in particular, the mission and vision are challenging to develop, implement, and maintain in today's economic market.

Objectives and Goals

In this day of increasing health care costs and decreasing reimbursement rates from insurance plans, it behooves professionals to reorganize the way health care is delivered in this country. Cutler (2008) describes the current business model in health care as one that needs an overhaul. The Centers for Medicare and Medicaid Services (CMS) is spearheading a value-based purchasing structure whereby a portion of reimbursement is based on patient satisfaction and quality of care outcomes. This may reflect a two percent reduction in reimbursement to hospitals who receive CMS payment. Thirty-percent of that two percent will come directly from satisfaction scores and 70% of the remaining two percent will be derived from clinical outcomes related to quality (Poisker, 2011). One of those quality factors is re-admission for preventable diagnoses. Since the late preterm infant population is the largest segment of infants born prematurely, re-admission of this population poses a large portion of the health care dollars

expended on prematurity (Ramachandrappa & Jain, 2009). The goal of this program proposal was to reduce these costly transfers and re-admission while optimizing care at the bedside, recognizing and treating challenges early, and improving short and long-term outcomes. Appendix G depicts the Logic Model which demonstrates the project's scope, goals and objectives, and global outcomes.

Methodology and Elements of the Practice Guideline

After a divisional didactic presentation and skills practice session, nursing and ancillary staff took a post-test on content of the educational offering. Unit bulletin boards in Labor and Delivery, Mother/Baby, NICU, and Pediatrics highlighted the added concepts and content to the institutional care delivery system. An admission algorithm was utilized for labor and delivery staff for immediate care of the three populations of newly-born infants encountered in the facility. Direct NICU admissions included any infant less than 35 weeks gestational age and any infant needing immediate NICU care or stabilization. The Intermediate Nursing Care Unit included all infants between 35 and 36.6 weeks gestation, also known as the LPI. The Well-newborn Nursery included all infants 37 weeks gestational age or greater. The labor and delivery staff was also responsible for pre-delivery education related to the LPI for any infant identified between 35 to 36.6 weeks gestational age who was imminently delivering. This education included a hand-out regarding what to expect regarding late preterm infant challenges and problems.

The Intermediate Nursing Care Unit was a virtual space which already existed as NICU or Well-newborn Nursery beds. Depending on the staffing mix, variance table, and census, the infant was taken care of by a NICU nurse or a Mother/Baby nurse floating to NICU. Unless the

infant was a true NICU candidate, the infant was able to room-in with the parent. The nurse to patient ratio for this population was one to three or four patients per staffing guidelines. In other words, a NICU nurse cared for one critical NICU infant and one to two Intermediate Nursing Care Unit LPIs. In another scenario, the Mother/Baby nurse floating to NICU took care of two NICU feeder/grower infants and two LPIs. At this time, budgeting for additional LPI beds was not a possible solution, so existing beds had to be utilized. This was basically a realignment of an existing patient care population.

Once the LPI was admitted to the Intermediate Nursing Care Unit, they had their own physician's order set, distinctive crib card for easier identification, an individualized feeding plan, and specific discharge criteria and parental education plan. Education for the Women's and Children's Services staff was taught using AWHONNs (2010) *Assessment and Care of the Late Preterm Infant: Evidence-based Clinical Practice Guideline*. The practice guideline included a post-test of the content and an evaluation submitted for continuing education credits.

Eight Challenges of the LPI

Gestational age assessment. An accurate gestational age assessment helps determine the level of risk for morbidity and mortality among LPIs (Shapiro-Mendoza et al., 2006). The earlier the infant is born in the late preterm period, the greater the risk for complications. Another factor is the size of the infant. Plotting weight, length, and head circumference helped the clinician determine if there was intrauterine growth restriction (IUGR) or macrosomia. This can give the clinician a false sense of risk or security, depending on the size of the infant. Many IUGR infants are more mature than their measurements describe and many infants that are large for gestational age are more immature, as is the case of an infant of a diabetic mother (IDM).

Thermoregulation and glucose homeostasis. Cold stress and energy metabolism are frequent problems of the late preterm infant. LPIs have a large skin to surface area for heat loss, decreased subcutaneous and brown fat, a high metabolic rate, less glycogen stores, and immature energy pathways (Hubbard et al., 2007). Skin-to-skin contact immediately after birth, early and frequent feeding, and maintaining a neutral thermal environment (NTE) are fundamental strategies to reduce sequelae from hypothermia and hypoglycemia. Educating families about bathing, feeding, dressing and NTE, as well as temperature measurement, signs and symptoms of thermal and glucose instability, and when to call their pediatrician were paramount for this population. Family-centered care strives to keep the infant with the parents instead of in the nursery on a radiant warming table (AWHONN, 2010).

Respiratory status. Airway and breathing problems are more likely to occur due to immaturity of the lungs. Amniotic fluid clearance, alveolar expansion, and lung perfusion may be hindered by even a few weeks of immaturity (Hubbard et al., 2007). These infants are more prone to transient tachypnea of the newborn, respiratory distress syndrome, and persistent pulmonary hypertension. LPIs are at an increased risk for apnea, bradycardia, acute life-threatening events (ALTE), and Sudden Infant Death Syndrome (SIDS). The LPI rate of SIDS is 1.37 out of 1000 births compared to 0.67 in the term infant (Hubbard et al., 2007). Respiratory Syncytial Virus (RSV) risk factors include male gender, small for gestational age, and less than 35 weeks gestation.

Immediate assessment and care of the infant in respiratory distress may include an NICU admission and oxygen administration. Transitional and on-going care of the stable LPI includes close monitoring for deterioration. Parental education focuses on no early discharge, early

follow-up care, knowing signs and symptoms of respiratory distress and when to call the pediatrician, and SIDS and RSV awareness. A car seat challenge test was also performed to assess airway stability while vertical (AWHONN, 2010).

Infection surveillance. It is unknown whether LPIs are at an increased risk of infection because of their immature immune systems. However, vigilance was important to prevent complications from possible sepsis. A limited diagnostic evaluation was indicated for infants whose mothers were positive for infection. A longitudinal population-based cohort study of LPIs demonstrated a 5.2 times higher rate of suspected or proven sepsis compared to term infants (Khashu, Narayanan, Bhargava & Osiovich, 2009).

Key nursing interventions included recognizing the LPI may be at a greater risk for sepsis and identifying risk factors, both maternal and neonatal. The practitioner should recognize the signs and symptoms of sepsis and intervene accordingly. Discharge teaching was a key factor in helping to prevent infections in this population (AWHONN, 2010).

Hyperbilirubinemia screening. The LPI has issues with balancing bilirubin production with bilirubin elimination (Hubbard et al., 2007). Multiple studies have demonstrated the LPI has a seven to 13-fold greater risk of being re-admitted for jaundice than term infants (Maisels & Kring, 1998).

The interventions included in the clinical practice guideline included assessing feeding adequacy and presence of jaundice in first 24 hours, bilirubin level assessment prior to discharge, plotting of bilirubin levels on a nomogram, and initiation of phototherapy if indicated. Ideally, parents were provided with written and verbal information about newborn jaundice. This information included signs and symptoms, how to contact the health care provider if jaundice

worsened, importance of hydration and feeding adequacy, and an early follow-up appointment date (AWHONN, 2010).

Feeding challenges and opportunities. The late preterm infant may be sleepier and have less energy than the term infant. Their tone may be low and their coordination less than smooth. If the infant is also experiencing cold stress, hypoglycemia, or increased jaundice levels they may have decreased energy for feeding. Suck, swallow, and breathing coordination may be inconsistent and dysrhythmic (Hubbard et al., 2007). Poor weight gain, dehydration, and failure to thrive may cause re-admission to Pediatrics within 10 days of life, especially around days five through seven when bilirubin levels peak.

Feeding would begin early and be often. The breast feeding infant would feed around the clock every two to three hours for a total of eight to 12 feedings per day. The feeding would be assessed using a valid tool, such as the LATCH score which grades the breast feeding on a zero to 10 scale for description of latch, adequacy of suck/swallow, type of nipple, condition of breast, and hold (e.g. cross-cradle, football). The infant would be assessed for daily weight gain and adequacy of output, both voiding and stooling. The bottle fed infant would be fed every three hours around the clock and should have intake of eight to 10 mL/kg per feeding. The LPI needs to be assessed for length of time for feeding, sleep/wake cycles, and potential complications as described. A lactation consult was mandatory and a speech pathology consult was ordered as needed (AWHONN, 2010).

Discharge criteria and parental education. Due to the volume and overwhelming nature of parental education and support required for the late preterm infant to adapt well to extra-uterine life, the AAP and ACOG in *Guidelines for Perinatal Care* (2007) have strongly

recommended the infant not be discharged early. The length of stay for the LPI would coincide with the normal vaginal and Caesarean section delivery stays for the mother of 48 to 72 hours, respectively (AAP/ACOG). An Obstetrician champion was needed in order for this protocol to work on a consistent basis, so mothers who requested early discharge could be educated from the beginning about the need for the infant to remain in the hospital for the full stay.

Parental education and support included pre-delivery and post-discharge education, as well as on-going teaching and role modeling throughout the hospital stay. The parents were taught about all eight elements of the challenges of the LTPI, including danger signals and community support systems. Family stress and adaptation theory suggested families could have a pile-up of stressors that may lead to maladaptation if not identified. Nursing's goal would be to support the parental role while providing care that emphasizes role attainment to assist the family in stress adaptation (LoBiondo-Wood, 2008).

Evaluation Plan

The late preterm infant (LPI) initiative focused on providing evidence-based nursing practice guidelines for nursing care and physician best practices for discharge of this vulnerable, diverse, and underserved population. The application of a Logic Model design for conceptual analysis provided the interprofessional team with a visual representation of how the program would progress over time (W.K. Kellogg Foundation, 2004; Zaccagnini & White, 2011). The Logic Model consisted of resources, constraints, activities, outputs, outcomes, and program impact.

The Logic Model and conceptual map guides program development, process change, and proposed outcomes. This systematic process helps the practitioner with the steps to achieve

success in problem-solving and needs assessments for the population and communities served (Zaccagnini & White, 2011). Because this is a vulnerable population, the ethical concepts of respect for persons, beneficence, and nonmaleficence provided the backbone to the protection of the patient and parents rights. Since no late preterm infant was denied this treatment plan and the guideline is the standard of care, the normal general consent to treat sufficed. Once these processes took place, the design of the study and its intent became clear and the project moved forward. The Logic Model for this project is depicted in Appendix G as a schematic rendering.

Data Analysis Plan

The outcome measurement for this project proposal included comparing a six-month span from January 1, 2010 through June 30, 2010 of NICU admissions, transfers, and Pediatric re-admissions to data after initiating the AWHONN clinical practice guideline. The expectation was that delivering evidence-based best practices would result in a reduction in transfer and re-admission rates. Retrospective data was collected on every LPI in the six-month time period for the percentage of direct admissions to NICU, transfers to NICU for a higher level of care, and re-admission within 10 days of birth to the Pediatric Unit at this facility. Retrospective and prospective data was then collected on every LPI from project initiation using the same data points. Every identified LPI received the care in the AWHONN clinical practice guideline; no late preterm infant was excluded from receiving this standard of care. After Regis University Institutional Review Board (IRB) approval, the project was initiated and data was collected for the time period September 15, 2011, through March 14, 2012. The timeline for the project is represented in Appendix H and Regis University IRB approval is noted in Appendix I.

Additional nominal, interval, and ratio data was collected and entered into an Excel spreadsheet. Interval and ratio data was collected for mean axillary temperature, respiratory rate, glucose, and total bilirubin values. Oxygen requirements and parental education dissemination was collected using yes/no formatting. Visual displays and representation of data included frequency charts and bar graphs for admission, transfer, and re-admission rates. The additional information was collected for further facility quality improvement initiatives and is not part of the research question related to volume of NICU transfers or Pediatric re-admissions.

Threats to reliability and validity

A small sample size could be a threat to the outcome data. In 2010, there were 98 LPIs at PRMC. In 2011, there have been 111 late preterm infants delivered. Loss to follow-up is another concern. In analyzing 2010 data, it was noted that five of the infants were from out of the geographical service area. Since this part of the state is a tourist destination, several families from out of town have delivered their infants at this facility; new parents were from over six surrounding states. These infants were not lost to follow-up if they were admitted to NICU, but could be lost if they were discharged and re-admitted to another Pediatric unit within 10 days of birth. The number of loss to follow up was quite small, so it did not skew the data in any significant way.

Miscalculation of gestational age is a final concern. Since even the best estimation of dates can be one to two weeks off, an accurate gestational age was essential to make all sure all candidates of the late preterm cohort were included. Unless the conception was *in vitro* or intrauterine insemination, most methods are slightly imprecise. For example, since the window of the LPI is 34 to 36.6 weeks, one week either way could either include an infant who was

really 38 weeks or exclude and infant who was really 34 weeks. A combination of gestational age calculation was utilized, including dates for last menstrual period and ultrasound, obstetric measurements during pregnancy, and a thorough gestational age physical exam after birth.

Project Findings and Results

Objectives for the LPI project included reducing NICU transfers for a higher level of care by 10% and reducing Pediatric unit re-admissions within 10 days of life for problems of late prematurity by 5% overall. For the team, the overall findings suggest the goals were partially met. The results indicated rates for direct NICU admissions of the LPI, transfers of LPIs on the pathway that required later admission to the NICU for a higher level of care, and Pediatric unit re-admissions within 10 days of life. In an in-depth analysis of the data, conclusions can be drawn about the relative success of instituting the LPI protocol at this facility.

Direct NICU Admissions

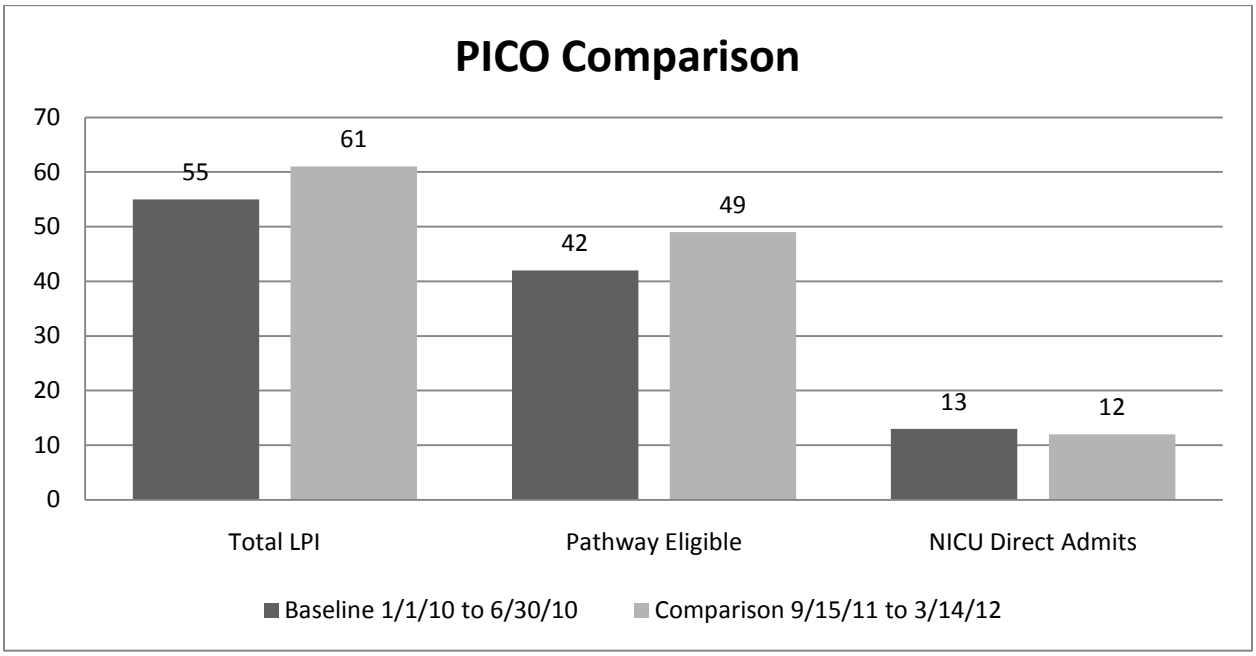
In 2010, baseline comparison data reflected a total of 55 LPIs born during the six-month data collection period of January 1 through June 30, 2010. Thirteen infants were directly admitted to the NICU which represents 23.6% of this population. Admitting diagnoses varied, and included, but were not limited to, respiratory distress requiring oxygen therapy, hypoglycemia requiring glucose infusions, and hypothermia or infection whereby the infant needed environmental support (incubator) and/or intravenous antibiotics. This type of therapy excluded the LPI from the proposed protocolized pathway. Since the pathway was not available at this time, the caregivers did not receive specific education or discharge instructions related to the LPI and their unique needs. During the LPIs NICU stay, the caregivers were provided with education that was either NICU directed or well-newborn directed.

In 2011, 61 LPIs were born during the data collection period from September 15, 2011, through March 14, 2012. This time period was chosen because the team awaited Regis University IRB) approval. Once granted, the project was implemented and data collection ensued. Twelve infants were directly admitted to the NICU which represents 19.7% of this cohort of infants. Admission diagnoses varied with the exception of hypothermia and hypoglycemia. Eighty-three percent of the direct admissions constituted infants needing oxygen therapy or antibiotic therapy; the remaining two infant admissions were due to physical or cardiac anomalies requiring NICU care. The reduction in hypothermia and hypoglycemia may be directly related to the pathway's inclusion of immediate skin-to-skin therapy coupled with early feeding in the delivery suites.

Although the project was not addressing direct admissions of the LPI to the NICU, the literature suggests a direct correlation between rehospitalization and NICU stays for the LPI. Studies suggest that when LPIs are cared for in a NICU setting, rehospitalization rates are lower (Moster, Lei, & Markestad, 2008; Petrini, et al., 2009). The reduction in direct NICU admissions was an unexpected benefit of the process improvement initiative and warrants further investigation. Figure 1 summarized the comparison and implementation data.

Figure 1

PICO Comparison of Direct NICU Admissions



NICU Transfers

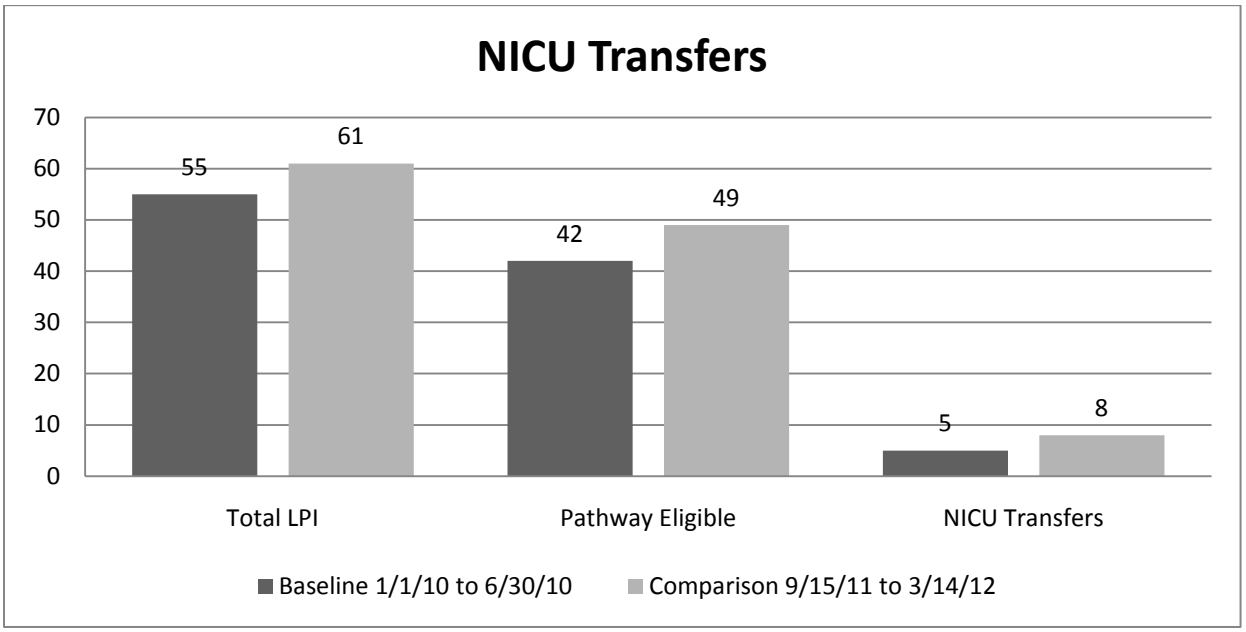
One of the two primary goals when implementing the LPI protocol was to reduce NICU transfers of the LPI for a higher level of care by ten-percent. An analysis of the 2010 six-month baseline data examined the remaining 42 infants that would have been eligible for the LPI protocol. During this time period, five LPIs or 11.9% of the cohort were transferred to NICU for a higher level of care. All five of these infants were admitted for multiple issues including feeding intolerance, hypothermia, cyanotic/apneic episodes, and/or infection. In analyzing this baseline data during the planning phase, the team focused on those issues that might be preventable. For example, feeding intolerance was a theme in four out of five of the LPI NICU transfers. To address this, an interprofessional sub-group formulated feeding plans specific to this population. Another focused intervention included a crib card reminding the caregiver to keep the infant dressed, wrapped, and head covered with a hat to avoid hypothermia.

After the implementation of the LPI proposal, the six-month period of data revealed a total of 49 LPIs eligible to receive care according to the developed pathway. During this time period eight infants were transferred to the NICU for a higher level of care. This represented 16.3% of the eligible cohort. This represented a 4.4% increase in NICU transfers from the baseline data. The goal was to reduce this rate by 10%; therefore the team was disheartened by this increase. However, after further analysis of the data, only one of these infants had multiple diagnoses warranting transfer to the NICU, unlike the baseline data where all five infants had multiple diagnoses. It has been postulated that the higher transfer rate was most likely related to the increased surveillance and strict discharge criteria of the pathway. Of the eight infants who were transferred to the NICU, none were re-admitted to Pediatrics in the 10 days after discharge from the unit. Figure 2 synopsizes the baseline and comparison data for the established time periods.

The primary admitting diagnosis of this cohort was cyanotic episodes and feeding intolerance. Six of the eight infants had cyanotic episodes related to feeding and coordination of suck, swallow, and breathing or choking events post-feeding. One infant had weight loss of greater than seven-percent related to poor, ineffective breastfeeding and one infant had three temperature decreases warranting a septic work-up and subsequently antibiotic therapy.

Figure 2

NICU Transfers



Pediatric Re-admissions

The second primary goal of the LPI project was to reduce Pediatric Unit re-admissions of the LPI within the first 10 days of life for problems related to late prematurity. During the 2010 baseline period, which extended ten days past the June 30, 2010 birth records to include those infants born at the end of the collection period, six were re-admitted to the Pediatric in-patient unit. This represented 14.3% of the LPI cohort that included 42 infants. The primary admitting diagnoses were failure-to-thrive, dehydration and weight loss, hyperbilirubinemia, and sepsis.

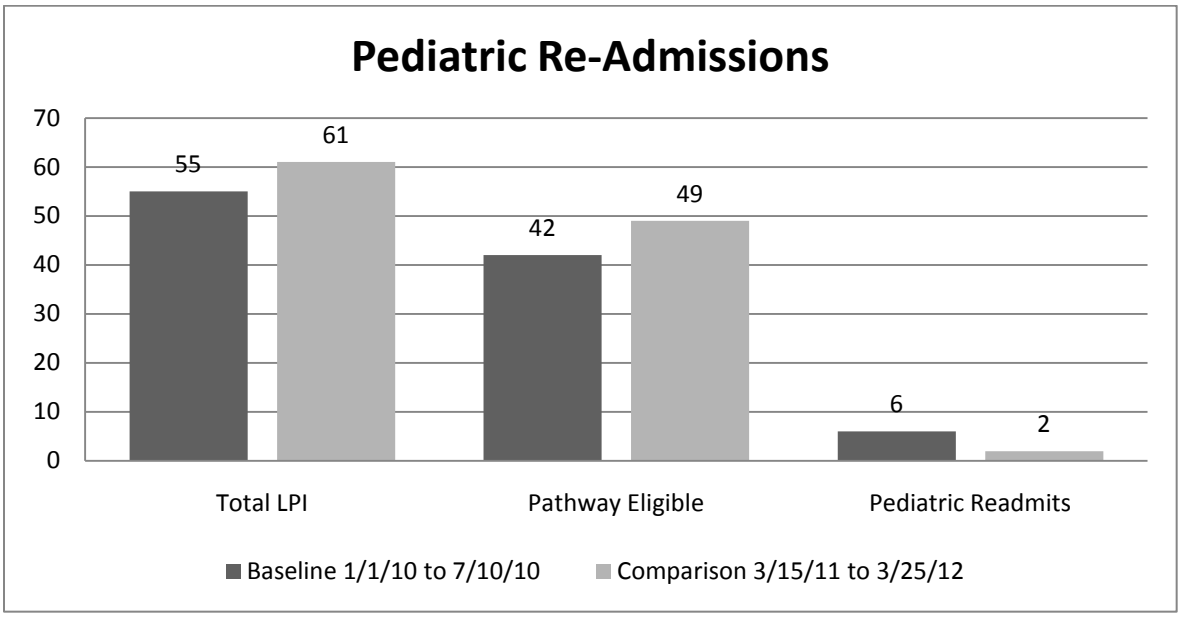
During the six-month comparison period, two infants (twins) were re-admitted to Pediatrics within 10 days of birth for hyperbilirubinemia and weight loss. Of the 49 eligible infants, these infants represent 4.1% of the cohort. Twin Two was re-admitted on day of life five for hyperbilirubinemia and an 11% weight loss from birth weight. Twin One was re-admitted on day of life six for seven hours of phototherapy then discharged with his twin brother on day of life seven. Controversy surrounds these re-admissions because the physician discharged these

twins against the pathway's strict criteria. Both infants had lost greater than seven-percent of their birth weight and were exclusively breastfeeding. The pathway feeding protocol states that infants who lose more than seven-percent of their birth weight and who are solely breastfeeding should supplement their feeding with pumped breast milk. According to the pathway, these infants should not have been discharged. The team can only speculate if whether the pathway had been followed these infants would not have been re-admitted.

The primary goal was met demonstrating a 10.2% overall decrease in rehospitalization or double the goal of five-percent. This represents a 66.6% decrease in the re-admission rate for this facility. Figure 3 summarizes the baseline and comparison data.

Figure 3

Pediatric Re-admissions



Answering the PICO Questions

The PICO question asked if an evidence-based clinical practice guideline can reduce NICU transfers and Pediatric re-admissions for the LPI. According to the data collected, the answer is a qualified yes. Transfer rates were 11.9% pre-intervention compared with 16.3% post-intervention, which while not statistically significant, could have been affected by improved vigilance and education of the staff. This increased awareness has helped labor and delivery staff in instituting proactive care that might impact decreasing direct NICU admissions. The number of LPIs sent directly to the NICU prior to the intervention was 13/55 or 23.6% compared to post-intervention rates of 12/61or 19.7%. However, due to the small sample size this was not statistically significant. The increased surveillance has assisted staff in determining infants at higher risk and intervening prior to discharge, thus possibly reducing the need for rehospitalization. Specific assessment skills geared toward the needs of the LPI direct nursing and parent care and discharge planning and educational needs.

The impact of the protocol on Pediatric unit re-admissions is encouraging. While the patient numbers are not large, dollar amounts for rehospitalization can be enormous. A typical hospital stay for a LPI can be three to 14 days and can even necessitate transfer to a tertiary care unit involving advanced transport teams and vehicles. A proactive evidence-based clinical practice guideline geared toward the LPIs needs may have a direct impact on some preventable health care issues related to this population and thus reduce health care expenditures.

Limitations

Two major limitations involve sample size and the project's timeframe. Due to the IRB approval process, the project's original one-year timeframe was reduced to six-months. As a

matter of course, this shorter timeframe meant a smaller sample size. Ideally, a one-year time frame would have been inclusive of cyclic birth trends and epidemiological time periods such as RSV season. The one-year time frame would have increased sample size to over the typically desired 100 subjects, giving the final results more power. For example, to achieve statistical power of 0.95 and a Cohen's *d* of 0.5, 105 subjects would have been ideal and sufficient to generalize results to the facility's population.

Another limitation involves geographic location of the project. The national average for LPI deliveries is approximately nine-percent and the facility's average is five-percent, which may be statistically significant. Therefore, are the final results indicative of the U.S. population and are they generalizable to all birthing facilities? The project was conducted in a facility with a Level IIIa NICU; many birthing facilities only have well-baby nurseries without the capacity to care for these infants beyond the routine newborn standard of care.

Recommendations

As the LPI population grows worldwide, it is imperative that a standard of care be established in order to deliver safe, cost-effective, and developmentally appropriate care. AWHONNs evidence-based clinical practice guideline provides a comprehensive plan inclusive of the variety of unique problems related to this cohort of infants. As the primary healthcare provider of the LPI during the hospital stay, the nursing profession is poised to be a powerful change agent. While the neonatologists and pediatricians make important treatment decisions, nurses are the constant bedside caregivers providing direct patient care that reflects the changing needs of the LPI on a day-to-day basis. Utilizing this perspective, nursing can make informed

practice changes by asking hospital administration and leadership to support initiatives based on sound evidence and research.

Other recommendations include birthing facilities to develop a pathway specifically designed for the LPI that includes specific discharge criteria and early community health care provider follow-up. One of the successful practice changes at PRMC was a discharge order set the neonatologists and pediatricians agreed upon. When the discharge plan deviated, the first re-admissions occurred.

A feeding plan that encompasses both the bottle fed and the breast fed infant is also imperative to success. Many of the challenges of the late preterm infant can be alleviated with a well-developed feeding plan, including avoidance of dehydration and weight loss, which often leads to hyperbilirubinemia. Jaundice was the largest single admission diagnosis for the project facility's rehospitalization rates in 2010. The same results were clearly demonstrated for PRMC during the twin Pediatric re-admission. Their feeding plan would have been re-evaluated during the original in-patient stay; however the infants were discharged against criteria. The twins' primary admission diagnoses included hyperbilirubinemia related to dehydration and weight loss secondary to inadequate intake.

Implications for Change

An overarching goal of the LPI project was to improve the delivery of evidence-based care for the LPI. One of the challenges for the future is keeping pace with new evidence and being able to implement practice changes in a timely, efficient manner. Often practice change comes after years of research only to be outdated once implemented. Advance practice nurses have a large role in getting best practices to the bedside. Family-centered care is fast becoming

the standard practice in many facilities; the LPI protocol is geared toward helping the infant and their family with optimal functioning.

As noted, there is a paucity of literature describing whether a pathway, such as AWHONNs, can improve outcomes and decrease morbidity. Continuing with this practice change and the data collection process at this facility over several more annual cycles will help determine if this initiative truly impacts direct NICU admissions, NICU transfers, and Pediatric unit re-admissions. While the initial results were promising, the data revealed further study was needed.

Conclusion

The subject of the late preterm infant has realized much public attention in the last few years. Over 390,000 late preterm infants were born in the U.S. in 2007 (March of Dimes, 2010). Instituting the LPI initiative at PRMC has improved clinical outcomes for our population by providing a standard of care directed towards the needs of this population. AWHONNs Evidence-based clinical practice guideline is poised to elucidate and educate health care providers and the public on this global threat to newborn health. Initiating this practice guideline is the right thing to do for the health and neurodevelopment of future generations.

References

American Academy of Pediatrics and the American College of Obstetricians and Gynecologists. (2007). *Guidelines for perinatal care.* Elk Grove Village, IL: American Academy of Pediatrics.

Association of Women's Health, Obstetric and Neonatal Nurses. (2010). *Assessment and care of the late preterm infant: Evidence-based clinical practice guideline.* Washington, D.C.: Author.

Chism, L. (2010). *The doctor of nursing practice.* Sudbury, MA: Jones and Bartlett Publishers.

Cutler, D. (2008). *The American health care system*. Retrieved from http://www.economics.harvard.edu/faculty/cutler/files/The%20American%20Healthcare%20System.pdf

Davidoff, M., Dias, T., Damus, K., Russell, R., Bettegowda, V., Dolan, S., Schwarz, R., Green, N., & Petrini, J. (2006). Changes in the gestational age distribution among U.S. singleton births: Impact on rates of late preterm birth, 1992 to 2002. *Seminars in Perinatology, 30(1),* 8-15.

Fortenberry, J. (2010). *Health care marketing: Tools and techniques*. Sudbury, MA: Jones and Bartlett Publishers.

Freshman, R., Rubino, L., & Chassiakos, Y. (2010). *Collaboration across the disciplines in health care.* Sudbury, MA: Jones and Bartlett Publishers.

Hubbard, E., Stellwagen, L., & Wolf, A. (2007). The late preterm infant: A little baby with big needs. *Contemporary Pediatrics, 24*(11), 51-58.

Jorgensen, A. (2008). Late preterm infants: Clinical complications and risks: Part two of a two-part series. *Nursing for Women's Health, 12*(4), 316-331.

Khashu, M., Narayanan, M., Bhargava, S., & Osiovich, H. (2009). Perinatal outcomes associated with preterm birth at 33 to 36 weeks' gestation: A population-based cohort study. *Pediatrics, 123,* 109-113.

Kleinpell, R. (Ed.). (2009). *Outcome assessment in advanced practice nursing.* New York: Springer Publishing Company.

LoBiondo-Wood, G. (2008). Theory of family stress and adaptation. In M. Smith & P. Liehr (Eds.). *Middle Range Theory for Nursing* (pp. 3054-3055 – 3227-3228). New York: Springer Publishing Company.

Ma, X., Huang, C., Lou, S., Lv, Q., Su, W., Tan, J., Wang, Y., Wang, X., Wu, M., Xu, T., Zhuang, M., Du, L., & the Provincial Collaborative Study Group for Late-preterm infants. (2009). The clinical outcomes of late preterm infants: A multi-center survey of Zhejiang, China. *Journal of Perinatal Medicine, 37*, 695-699.

Maisels, M., & Kring, E. (1998). Length of stay, jaundice and hospital readmission. *Pediatrics, 101*, 995.

March of Dimes. (2009). PeriStats. Retrieved from http://www.marchofdimes.com

Matthews, T., & MacDorman, M. (2010). Infant mortality statistics from the 2006 period linked birth/infant death data set. *National Vital Statistics Report, 58,* 1-32.

MCur, M., & Meyer, S. (2006). The role of the registered nurse in the marketing of primary healthcare services, as part of health promotion. *Curationis, 29*(1), 10-24.

Moster, D., Lei, R., & Markestad, T. (2008). Long-term medical and social consequences of late preterm birth. *New England Journal of Medicine, 359,* 262-273.

Newhouse, R., Dearholt, S., Poe, S., Pugh, L., & White, K. (2007). *Johns Hopkins nursing - Evidence-based practice model and guidelines.* Indianapolis, IN; Sigma Theta Tau International.

Peninsula Regional Health System. (2011). *Peninsula Regional Medical Center*. Retrieved from www.peninsula.org

Petrini, J., Dias, T., McCormick, M., Massolo, M., Green, N., & Escobar, G. (2009). Increased risk of adverse neurological development for late preterm infants. *The Journal of Pediatrics, 154,* 169-176.

Poisker, K. (2011). *Value-based purchasing*. [Unpublished presentation]. Peninsula Regional Medical Center. Salisbury, MD

Ramachandrappa, A., & Jain, L. (2009). Health issues of the late preterm infant. *Pediatric Clinics of North America, 56,* 565-577. Doi: 10.1016/j.pcl.2009.03.009

Shapiro-Mendoza, C., Tomashek, K., Kotelchuck, M., Barfield, W., Weiss, J., & Evans, S. (2006). Risk factors for neonatal morbidity and mortality among "healthy" late preterm newborns. *Seminars in Perinatology, 30,* 54-60.

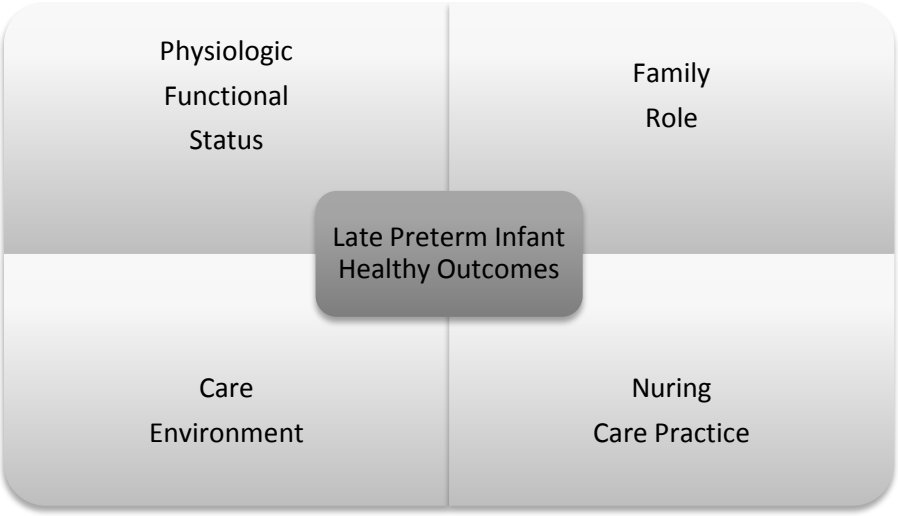
W.K. Kellogg Foundation. (2004). Logic *model development guide.* Battle Creek, MI: Author.

Zaccagnini, M., & White, K. (2011). *The doctor of nursing practice essentials: A new model for advanced practice nursing.* Sudbury, MA: Jones and Bartlett Publishing.

Appendix A

Conceptual Diagram

Adaptation of AWHONNs Conceptual Model for Optimizing Late Preterm Infant Outcomes



Note: Adapted from "AWHONNs Conceptual Model for Late Preterm Infant Care," by the Association of Women's Health, Obstetric, and Neonatal Nurses, 2010, *Assessment and Care of the Late Preterm Infant: Evidence-based Clinical Practice Guideline,* p.2.

Appendix B

Systematic Review of the Literature

Complications/Challenges/Problems of the LPI				
Article Title & Journal	Late preterm infants and risk for RSV. *Maternal Child Nursing, 34*(6), 378-384.	Complications of the late preterm infant. *Journal of Perinatal and Neonatal Nursing, 23*(1), 78-86.	Late preterm infants: Clinical complications and risk. *Nursing for Women's Health*	Health issues of the late preterm infant. *Pediatric Clinics North America, 56*, 565-577.
Author & Year	Coffman, S. (2009).	Darcy, A. (2009).	Jorgensen, A. (2008).	Ramachandrappa, A. & Jain, L. (2009).
Database & Keywords	CINHAL Bronchiolitis; Infant, premature; Infant, premature, diseases; Respiratory syncytial virus infections	CINHAL Complications; late preterm infant; near-term infant	CINHAL Late preterm, near term infant	Academic Search Premier Late preterm, near term infant
Research Design	Descriptive statistical epidemiological; Review of literature	Review of Healthy People 2010 goals; Review of AWHONN initiative; Discussion of LPI complications	Descriptive article	Descriptive epidemiological and etiological article; review of studies conducted for health issues of the LPI
Level of Evidence	Level III	Level III	Level III	Level III
Study Aim/Purpose	Description of risk for RSV in the LPI	Exploration of the complications of late preterm birth, Implications of LPT birth on care practices	Continuing Nursing Education (CNE) activity; Classification of neonates 34-36.6 weeks; description of risks for morbidity and mortality; physiology review; clinical complication discussion, integration of knowledge into nursing assessment and care	Highlight the **growing evidence** that these infants are not as healthy as first thought to be. Discuss admission and discharge criteria of these infants
Population Studied/Sample Size/Criteria/ Power	LPI 34-36.6 weeks gestational age	LPI 34 0/7 to 36 6/7 week gestation	LPI 34-36.6 weeks gestation	239 to 259 days gestation
Methods/Study Appraisal/ Synthesis Methods	Review of respiratory physiology; epidemiologic Pathophysiology of RSV; Impact of RSV & respiratory distress in the LPI; Prevention of RSV	Review of HP 2010 goals; distribution graphs for shifting gestational age; frequency of common morbidities of the LPI;	Review of clinical complications of the late preterm infant based on the 4 U's of LTPIs: unrecognized as premature; underestimated for morbidity & mortality; unpredictable timing of presentation; understudied and under researched population	Review studies related to respiratory issues, feeding difficulties, hyperbilirubinemia, hypothermia, hypoglycemia, infection, morbidity & mortality; long-term outcomes, economic burden and management of the LPI
Primary Outcome Measures and Results	AAP supportive nursing care guidelines for LPIs with RSV	The LPI had longer hospital says, higher hospitalization costs	Risk assessment strategy including a protocol and algorithm called the LPI	Appropriate recognition and management of the LPI; prevention of

	infection; Evidence-based recommendations regarding treatment; Prophylaxis programs for high-risk infants	and 3 times the costs of medical care in the first year of life. The re-hospitalization rate is twice that of term infants 17.7% as compared to 8.8% and readmission rates are 2-3 fold higher	RAP sheet. The LPI risk assessment rap sheet is a clinical algorithm that is a tool that uses the process of critical thinking for identifying, assessing and synthesizing risk factors	morbidity through low cost and low tech. interventions which should be a priority for pediatricians and neonatologists worldwide as problem is a global one.
Author Conclusions/ Implications of Key Findings	The need for nurses to critically assess the needs and to work toward prevention of RSV in the LTPI; Awareness of the current clinical practice guidelines for care of RSV	More research is needed. LPIs are NOT full-term infants and their care should not be defined based on the term infant. Further educational tools are needed along with advocacy.	Clear that LPI constitute a vulnerable population with emerging evidence of risk for long term neurodevelopmental issues. This will impact health care and health care costs over the long term.	Continued research and prevention of long-term neurodevelopment consequences.
Strengths/ Limitations	This article was an expert descriptive review of health complications common to the LPI focusing on RSV and its impact on health. The article was not a study or a cohort retrospective which limits its strength toward evidence-based practice review. However, the ethical nature of studying infants precludes many types of studies including RCTs	Excellent review and discussion of the LPI and HP 2010 goals; Excellent discussion about the economic implications-a population based study in California estimated a 49.9 million dollar cost savings if late preterm birth was prevented	In-depth review of complications and risk factors with a brief discussion about long term neurodevelopmental outcomes and the impact on school-aged children. Again, not a research study but a descriptive and statistical analysis of information that is available currently. Strong support from a nursing perspective via AWHONN & AAP	A nice bulleted synopsis of admission and discharge criteria. No real conclusions or recommendations offered.
Funding Source	Author disclosed that there were no financial relationships related to this article.	Author affiliation with University of Pennsylvania School of Nursing. No monetary value discussed.	None disclosed	Affiliation with Emory University School of Medicine
Comments	This article was an informative backdrop on the needs of the LPI in a respiratory sense and in an infectious control and prevention focus. It reviewed the literature related to morbidity studies in the LPI for respiratory causes.	Enlightening review of the economic impact of preterm birth.	Impressed with the risk assessment tool and with the discussion of the LPI as a vulnerable population	Appreciated the discussion on the increased frequency of induction, elective induction and high C-section rate as possible contributors to the increase in the LPI rate

Breastfeeding and Feeding Complications		
Article Title & Journal	Breastfeeding the late preterm infant. *Journal of Obstetric, Gynecologic, & Neonatal*	Breastfeeding management for the late preterm infant. *Clinical Lactation, 1*, 22-25.

	Nursing, 37, 692-701.	
Author & Year	Walker, M. (2008).	Walker, M. (2010).
Database & Keywords	CINHAL Breastfeeding, late preterm infant management guidelines	Academic Search Premier Late preterm, breastfeeding difficulties, jaundice, dehydration
Research Design	Systematic Review of Literature	Case study
Level of Evidence	Level III	Level II-3
Study Aim/Purpose	Describe breastfeeding protocols that are evidence-based from the California Perinatal Quality Care Collaborative and The Academy of Breastfeeding Medicine	Provision of specific strategies for working with the LPI and avoiding negative health outcomes
Population Studied/Sample Size/Criteria/ Power	Infants less than 37 completed weeks gestation	A 5 day old 35 week gestation female weighing 6 pounds, 6 ounces
Methods/Study Appraisal/ Synthesis Methods	Statistical review; evidence-based literature review	Case study review
Primary Outcome Measures and Results	Breastfeeding management guidelines that operate within the late preterm infant's special needs (Walker, 2008)	"Sara was born at 35 weeks weighing 6 pounds, 6 ounces. Her mother Anna was told that Sara was considered 'full term' because of her weight and was sent home early because she was so 'big and healthy.' Sara had a good latch but tired quickly at the breast. Three days later Sara was readmitted for high bilirubin levels and weight loss. Anna's milk supply was blamed and she was advised to start formula" (Walker, 2010, p. 22).
Author Conclusions/ Implications of Key Findings	Construct written individualized feeding plans; parental education and assessment of readiness	Breastfeeding strategies should aim to accomplish 3 goals: Prevent adverse outcomes, establish mother's milk supply, assure adequate milk intake.
Strengths/ Limitations	Evidence driven; excellent descriptive pictures for holding infant in neutral positions during feeding; unrealistic expectations of continuing breastfeeding beyond FMLA return to work; paucity of studies comparing solely breastfeeding LPI with breastfeeding with supplementation enhancing outcomes	Protocol driven; expert in her field. Did not include authors conclusions but did include 3 appendices of recommendations
Funding Source	None disclosed; Author is Executive Director of the National Alliance for Breastfeeding Advocacy	None disclosed
Comments	Protocol and practice driven article describing the challenges and solutions to breastfeeding and supplementation of the LPI	Updated version of prior article in 2008, but included an interesting and common case study

Hyperbilirubinemia				
Article Title & Journal	Hyperbilirubinemia in the late preterm infant. *Newborn and Infant Nursing Reviews, 7*(2), 91-94.	An evidence-based review of hyperbilirubinemia in the late preterm infant, with implications for practice: Management, follow-up, and breastfeeding support. *Neonatal Network, 26*(6), 395-406.	Evidence-based care management of the late preterm infant. *Journal of Pediatric Health Care, 25*(1), 44-49.	Hyperbilirubinemia and bilirubin toxicity in the late preterm infant. *Clinics in Perinatology, 33,* 839-852.
Author & Year	Hillman, N. (2007)	Smith, J., Donze, A. & Schuller, L. (2007).	Souto, A., Pudel, M. & Hallas, D. (2011).	Watchko, J. (2006)

Database & Keywords	CINHAL Hyperbilirubinemia; jaundice; near-term; late preterm; bilirubin	CINHAL Late preterm infant, newborn, neonate; near term, near-term infant; hyperbilirubinemia; jaundice, unconjugated hyperbilirubinemia; full-term or term infant; emergency room or unit or department readmission or rehospitalization, bilirubin encephalopathy, kernicterus	Academic Search Premier Late preterm, evidence-based care management, PICO questions	Academic Search Premier Jaundice, kernicterus
Research Design	Descriptive	Level 3: Case study and literature review	Case presentation	Descriptive statistical review
Level of Evidence	Level III	Level III	Level II-3	Level III
Study Aim/Purpose	Exploration of normal bilirubin metabolism and alterations seen in the LPI. Explore the causes of kernicterus and the increases susceptibility in the LPI.	Outcomes of hyperbilirubinemia in the late preterm infant	To answer 4 evidence-based PICO questions comparing LPI to term complications; overall growth from breastfeeding versus bottle feeding; EBP guidelines for infants both LTPI and term born to HBsAg+ mothers; RSV prophylaxis for the LTPI cohort as part of routine care or not	Review Kernicterus Registry Data; Discuss AAP treatment guidelines; identification of risk factors for marked hyperbilirubinemia and/or kernicterus in the LPI
Population Studied/Sample Size/Criteria/ Power	34-36.6 weeks gestation	A 36.3 week infant weighing 7 pounds, 2 ounces; <37 weeks gestation but >33 completed weeks	A 2 week old male born at 35 weeks gestation weighing 4 pounds, 8 ounces.	34-36.6 weeks gestation infants
Methods/Study Appraisal/ Synthesis Methods	Review of pertinent literature	PICO format EBP search: "Are late preterm infants at greater risk than term infants for ED visits, hospital readmissions, and neurologic deficits secondary to unconjugated hyperbilirubinemia?"	Case presentation including history of present illness, newborn and medical history, pertinent maternal and family history, developmental history, review of systems, physical examination and follow-up. The case study also answered the 4 identified PICO questions.	Review of Kernicterus Registry Data; Review of peer-reviewed journal articles; Assessment of hour-specific bilirubin tool
Primary Outcome Measures and Results	Treatment and prevention practices	11 studies were reviewed for validity, reliability, applicability and level of evidence. The 11 studies included 8 level 2 retrospective cohort or case control	PICO 1: Case study results for cold stress, respiratory distress, hypoglycemia, sepsis, feeding difficulties, hyperbilirubinemia, cognitive delays	Use of BiliTool for assessment of risk

		studies or population based case studies, 1 2+ case-control prospective study and 2 Level 3 studies that were retrospective chart review or population-based case series.	included transient tachypnea and a NICU admission. PICO 2: thriving with no breastfeeding or jaundice issues. PICO 3: Infant received both HBIG and HB vaccine. Did not meet criteria for RSV prophylaxis but parental education provided.	
Author Conclusions/ Implications of Key Findings	Close-follow up during hospital stay and immediately after through peak periods of increased bilirubin loads	Data strongly indicate that LPI are at increased risk for rehospitalization. Prospective studies are needed and additional population-based studies are needed to determine incidence of hyperbilirubinemia. Future research is needed for optimal discharge timing and breastfeeding support.	Consistent follow-up care, weekly weight checks, and up-to-date immunizations. Special considerations while hospitalized as a newly born patient.	A shortened hospital stay is not recommended for the LPI. Early discharge follow-up is strongly reinforced. Assessment of bilirubin level before discharge, at follow-up visit and at peak level of 5-7 days of age is recommended.
Strengths/ Limitations	Excellent review of the pathophysiology of jaundice and its effect on the blood-brain barrier. Short article geared more toward physicians than nurses.	Over 800 articles were found and those outside the age range were eliminated, their field narrowed to 34 articles. They then used only original studies. Limitations included no RCTs or meta-analyses found. 11 studies were identified with only one prospective study.	Excellent integration of evidence with a real case of a LTPI that was transferred to a NICU for a higher level of care. No overt limitations.	Excellent use of Registry Data. Sources are experts in the field of neonatal jaundice (e.g. Bhutani, et al). Large reference list of relevant studies to date. Not a research study, but could have been a cohort study with use of Registry data.
Funding Source	None identified. Affiliated with the Division of Neonatology, Cincinnati Children's Hospital Medical Center	None identified.	"None to report"	No financial funding disclosed. Affiliated with the University of Pittsburgh School of Medicine
Comments	The article was dense with metabolism of bilirubin which is difficult at best to understand the normal progression, then to add alterations it became above my understanding.	I particularly enjoyed this article because it was a nice template for my current systematic review results. I, too, am not finding any RCTs or meta-analyses and am mostly finding retrospective and cohort studies. The authors make the point that their PICO question did not lend itself to RTCs, so	Excellent source of working through a PICO question and disseminating results.	Nice gateway article to other articles of studies and experts, as well as data sources.

		they were not surprised at their results. This affirms for me my lack of results in this domain.		

Outcomes				
Article Title & Journal	Neonatal outcomes in a population of late-preterm infants. *The Journal of Maternal-Fetal and Neonatal Medicine, 23*(S3), 116-120.	Late preterm birth is a risk factor for growth faltering in early childhood: a cohort study. *BMC Pediatrics, 9*(71),	Optimizing care and outcomes for late preterm (near-term) infants: A summary of the workshop sponsored by the National Institute of Child Health and Human Development. *Pediatrics, 118,* 1207-1214.	The clinical outcomes of late preterm infants: A multi-center survey of Zhejiang, China. *Journal of Perinatal Medicine, 37,* 695-699.
Author & Year	Picone, S. & Paolillo, P. (2010).	Santos, I., Matijasevich, A., Domingues, M., Barros, A., Victora, C. & Barros, F. (2009).	Raju, T., Higgins, R., Stark, A. & Leveno, K. (2006).	Xiaolu, M., Chunxiang, H., Shouzeng, L., Qin, L., Weidong, S., Jiarong, T., Youcheng, W., Xinxin, W., Mingyuan, W., Ting, X., Manli, Z., Lizhong, D. & the Provincial Collaborative Study Group for Late-preterm infants. (2009).
Database & Keywords	Academic Search Premier Late preterm, epidemiology, complications, outcomes	Academic Search Premier Late preterm, epidemiology, complications, outcomes	Academic Search Premier Prematurity; low-birth weight; preterm birth; near-term infant; late-preterm infant; seizures; kernicterus; respiratory distress syndrome; apnea; sudden infant death	Academic Search Premier Cesarean section; late preterm; outcome; respiratory distress syndrome; transient tachypnea
Research Design	30 month retrospective analysis population cohort study	Population-based birth prospective cohort study	Workshop of experts	Historical retrospective cohort study
Level of Evidence	Level II-3	Level II-2	Level III	Level II-2
Study Aim/Purpose	Evaluating respiratory, metabolic, infections, neurologic systems and disease patterns of the LPI	Assess the effect of late preterm birth over growth outcomes, assessed when children were 12 and 24 months old	Workshop of definitions and terminology; epidemiology; etiology; biology of maturation; clinical care; surveillance; and public health aspects of LTPIs. Knowledge gaps identified and research priorities listed.	To explore birth rate, delivery mode, medical problems, requirement of respiratory support and acute outcomes of late preterm infants in Zhejiang province in eastern China.
Population Studied/Sample Size/Criteria/	34+0/36+6 days weeks gestation to a comparison of	Late preterm 34-36.6 and term 37-42.6 weeks were compared for	Panel suggested designating 34 0/7 weeks to 36 6/7 weeks	11 tertiary hospitals were recruited. Clinical data from

Power	33+0/33+6 days weeks gestation infants; 484 total infants	weight/age, length/age and weight for length z-scores; 3285 births with 371 LPIs (11.3%)	(239-259th day) as "Late-Preterm Infants"	every nursery admission was collected and analyzed from January to December 2007. 44,362 infants of which 8.9% were preterm and 6.2% were late preterm.
Methods/Study Appraisal/ Synthesis Methods	Mode of delivery, Apgar score, need for resuscitation at birth, respiratory, metabolic, neurologic disease, infections, brain & kidney US results, maternal risk factors associated with preterm birth, hospital stay and number of admissions to NICU	Z-scores below -2 were considered underweight, stunting and wasting. Singleton newborns with adequate weight for gestational age at birth, successfully followed up either at 12 or 24 months were analyzed and adjusted odds ratios with 95% CI calculated through logistic regression	Workshop, symposium of neonatal and obstetric issues	
Primary Outcome Measures and Results	LPI infants accounted for 8.4% of total (n=417); 33 week infants accounted for 7.9% of total (n=67); Mode of delivery was 80% C-sect; LOS 7.5 days; 17% NICU admissions for LPI; pPROM, oligohydramnios and previous C-sect were most maternal factors; The LPI is more prone to respiratory, metabolic and germinal matrix hemorrhage, but no increase in renal or genital issues.	Prevalence: 12 months LPI underweight 3.4% Stunting 8.7% Wasting 1.1% Term underweight 1.0% Stunting 3.4% Wasting 0.3% Prevalence: 24 months LPI underweight 3.0% Stunting 7.2% Wasting 0.8% Term underweight 0.8% Stunting 2.9% Wasting 0.4% 2.57 times higher at 12 months; 3.36 times higher at 24 months for underweight 2.35 times higher at 12 months; 2.30 times higher at 24 months for stunting 3.98 times higher at 12 months; 1.87 times higher for being wasted	The panel underscored the importance of educating HCP and parents about the vulnerability of LPIs and that these infants require diligent evaluation, monitoring, referral and early return appointments for post-natal and long-term follow-up. A research agenda was also suggested for the scientific community.	C-section rate: LPI versus whole population 64.9% vs. 58.2% 1/5th of nursery admissions were LPI of whom 63.8% were delivered by C-section Respiratory distress 42.1% Hyperbilirubinemia 17.6% Hypoglycemia 8.7% Sepsis 5.9% LPI had more Pneumonia, TTN and RDS and needed CPAP or Mechanical ventilation more than term infants Mortality rate 0.8% vs. 0.4%
Author Conclusions/ Implications of Key Findings	LPI represent physiologically immature respiratory, metabolic, neurological and immunological	LPI grow faster than children born at term, but they are at increased risk of underweight and stunting in the first 2	Preterm birth rate has been increasing over the past two decades and up to 2/3 can be attributed to the LPI population.	Late preterm infants are associated with very high C-section rates and have more medical problems and

	systems.	years of life. FTT may put them at increased risk for morbidity in childhood and chronic diseases later in life		poorer short-term outcomes that term infants in China.
Strengths/ Limitations	Sample size; probably would have compared the LPI with the term neonate and not the 33 week infant alone.	Sample size; low rates of refusal and loss to follow-up; prospective cohort design allows for assessment of temporal relationships Confounded by maternal self-reports, reduced precision from low rates of LPIs; observation and detection bias, only 2 comparable studies for comparison	N/A	Sample size; strong epidemiological evidence Only collected data from tertiary hospitals-selection bias; all data collected retrospectively that was not from a standardized database so some data was missing. The authors recommend a prospective trial to assess the impact of the high C-section rate on overall health.
Funding Source	None declared	Wellcome Trust, WHO	Authors declare no financial relationships; Workshop sponsored by NICHD/NIH	National Natural Science Foundation of China (grant number 30711120575 & 30672265)
Comments	Represents a global view of the issue (Rome, Italy).	Was one of only a few prospective studies and was conducted in Southern Brazil. Showed global view and included nice charts for easy review	Seminal article as impetus for change	Another excellent study supporting the problems of the LPI and on a global scale.

Glucose and Thermoregulation of the LPI		
Article Title & Journal	Glucose metabolism in the late preterm infant. *Clinics in Perinatology, 33,* 853-870.	Cold stress and hypoglycemia in the late preterm ("near –term") infant: Impact on nursery of admission. *Seminars in Perinatology, 30,* 24-27.
Author & Year	Garg, M. & Devaskar, S. (2006).	Laptook, A. & Jackson, G. (2006).
Database & Keywords	Academic Search Premier Neonatal hypoglycemia, late preterm infant, hyperinsulinism	Academic Search Premier Late preterm infant, thermoregulation, hypothermia, hyperthermia
Research Design	Descriptive article	Descriptive & statistical article
Level of Evidence	Level III	Level IIII
Study Aim/Purpose	Questions: How low a glucose concentration is too low? Which glucose concentration causes brain damage? How long should it be low before we encounter irreversible brain damage?	What is the correct nursery for LPIs to be admitted after birth?
Population Studied/Sample Size/Criteria/ Power	34 to 36.6 weeks gestation	34-37 week gestation
Methods/Study Appraisal/ Synthesis Methods	Incidence, pathophysiology, definitions, hyperinsulinism, clinical presentation, detection of brain injury, neuronal injury, interventions targeted	Reviewed study done in 2005 of a hospital that delivers 16,000 births year and looked at their quarterly data for admission rectal temperatures

	at hypoglycemia, prevention of neurologic impairment, future investigations	among 196 consecutive newborns in L&D and upon admission to the Newborn nursery. Scatter-gram of admission temperatures included based on birth weight and gestational age.
Primary Outcome Measures and Results	Galvanize increasing investigations targeted at LPI outcomes.	48.4% of newborns admitted to the Newborn nursery were <36.5º C., but only 27% of them were below 36.5º C. in L&D demonstrating how quickly these infants lose heat. Hypoglycemia approaches 10-15% of the LPI population.
Author Conclusions/ Implications of Key Findings	The time is ripe to conduct a well-controlled, adequately powered prospective study on LPIs who present with hypoglycemia	Summary points: LPI may be cared for in different settings within hospitals following birth. The LPI is often assessed and cared for as if the infant is term. However, such assumptions are often incorrect. Cold stress and hypoglycemia are very common in the LPI especially soon after birth, during the early transition period of adaptation. The risk for cold stress and hypoglycemia for the LPI extends through the first day of life. Close monitoring of temperature should be performed, hypothermia prevented, since cold stress can lead to worsening hypoglycemia among LPIs
Strengths/ Limitations	Causal conditions box; brain injury diagrams: intracellular consequences of hypoglycemia and brain neurochemical changes in response to hypoglycemia	Succinct, stayed focused on objectives and used reliable sources. Too brief, could have expanded on the methods of heat loss prevention.
Funding Source	Grant from NIH (HD33997 & HD25024)	None identified
Comments	Questions at beginning of article still remain to be answered. There has been no consensus on what threshold or cut-off value is ideal in the neonatal population.	Looking for a definitive answer for where these infants should be cared for or a nurse patient ratio, but article did not offer a firm expert opinion.

Morbidity and Mortality				
Article Title & Journal	The implications of late-preterm birth for global child survival. *International Journal of Epidemiology, 39,* 645-649.	Effect of late-preterm birth and maternal medical conditions on newborn morbidity risk. *Pediatrics, 121*(2), e223-e232.	CDC Congressional testimony prematurity and infant mortality: What happens when babies are born too early? *Subcommittee on Health Committee on Energy and Commerce United States House of Representatives*	Delivery indications at late-preterm gestations and infant mortality rates in the United States. *Pediatrics, 124*(1), 234-240.
Author & Year	Osrin, D. (2010).	Shapiro-Mendoza, C., Tomashek, K., Kotelchuck, M., Barfield, W., Nannini, A., Weiss, J. & Declercq, E. (2008).	Callaghan, W.M., M.D., MPH; 5/12/2010	Reddy, U., Ko, C., Raju, T. & Willinger, M. (2009).
Database & Keywords	Academic Search Premier Infant morbidity, infant mortality, late preterm infant	Academic Search Premier Infant morbidity, infant mortality, late preterm infant	Academic Search Premier Late preterm, infant mortality, born early	Academic Search Premier Infant mortality; preterm; preterm infants
Research Design	Review of 8 cohort-	Utilized a	Congressional	US Birth Cohort-linked

	bases studies and their findings	retrospective comparison cohort population-based review of birth and death records from 1998-2003	testimony	birth/death files
Level of Evidence	Level III	Level II-2	Level III	Level III:
Study Aim/Purpose	To review the current literature to assess implications for morbidity, mortality and health care	Comparison of LTPI and Term infants with and without selected maternal medical conditions and assessed the independent and joint effects of these exposures to newborn morbidity risk	Discussion on Challenges around infant prematurity and its impact on mortality	Characterization of delivery indications for LPT births and their potential impact on neonatal and infant mortality rates
Population Studied/Sample Size/Criteria/ Power	34-36.6 weeks gestational age compared to term infants	26,170 LPI (34-36 weeks) and 377,638 term infants (37-41 weeks)	Premature infants less than 37 weeks gestational age	3,483,496 singleton births total (292,627 LTPIs or 8.4%)
Methods/Study Appraisal/ Synthesis Methods	Gouyon, et al population-based data set of 150,000 infants 34-41 weeks; Sharpiro-Mendoza et al retrospective 26,170 LPI with 377,638 term infants; Kramer et al population-based 88,867 infants respiratory RR for LPI; McIntyre et al 250,000 retrospective 34-40 weeks; Khashu et al, 33-36 week cohort retrospective study; Alexander et al 33-36 week using vital statistic data base to retrospectively analyze race in LTP birth; Tomashek et al differences in mortality between LTPI and term singletons	Eight selected maternal medical conditions were assessed: hypertensive disorders, diabetes, antepartum hemorrhage, lung disease, infection, cardiac disease, renal disease and genital herpes in relation to newborn morbidity.	Background; current research and challenges	Categorized delivery indications as follows: 1) Maternal medical conditions 2) Obstetric conditions 3) Major congenital anomalies 4) Isolated spontaneous labor: vaginal delivery without induction and without associated medical/obstetrical factors 5) No recorded indication
Primary Outcome Measures and Results	Gestation specific mortality rates are unknown although it appears that low-income countries fare worse.	LPIs were 7 times more likely to have newborn morbidity than term infants (22% vs. 3%). The newborn morbidity rate doubled for each gestational week under 38 weeks. LPIs that were born to mothers with any maternal condition	Addressing public health challenges	Of the 292,627 LPIs, the first 4 categories accounted for 76.8% and the remaining were classified as no recorded indication. The neonatal and infant mortality rates were significantly higher when no recorded indication was known.

		were at higher risk than term infants. LPIs that were exposed to antepartum hemorrhage and hypertensive disorders were especially vulnerable.		
Author Conclusions/ Implications of Key Findings	Think about low intensity home and hospital interventions that could improve survival of the LPI	LPI and maternal factors are independent risk factors for neonatal mortality but combined they greatly increase the risk compared to term infants with or without exposure.	Prevention of preterm birth is a public health priority/Funding	A total of 23% of LPIs had no recorded indication for delivery noted on birth certificates and had higher mortality rates.
Strengths/ Limitations	Reviewed seminal studies; studies in this population are limited.	Study builds on their other studies; applied a new more specific case definition; large population; multiple years of data; better detection of accurate maternal data. Limited to routinely collected data, no insight into decisions (timing of delivery, etc.), misclassification issues, coding errors, inconsistent reporting of gestational age, chronic versus pregnancy related distinguish ability.	CDC and NIH research/Call to action	Large cohort size; reduced selection bias, and ability to examine sub-populations. Inaccuracies in gestational age estimates underreporting of medical diagnoses, obstetric complications and congenital anomalies.
Funding Source	The Wellcome Trust (081052/Z/06/Z).	No financial relationships identified.	N/A	No identified funding source noted.
Comments	A nice editorial of the studies that I have found and included in my systematic review.	Strong data collection methods using statistical software. Excellent use of graphs, charts and ICD-9 coding. Easy to read morbidity Figure data at a glance. Strong use of references.	I included this testimony because of its timeliness to my project topic	What this study adds section was very interesting: 1 in 5 LPIs did not have an indication for delivery on their birth certificate. IOM and Surgeon General call to action for further research to understand this significant public health problem.

Guidelines and Protocols for Management				
Article Title & Journal	Staff nurses working together to improve care for late-preterm	Development of a clinical pathway for near-term and	Managing "healthy" late preterm infants. *Pediatrics*	Guidelines for the late preterm infant. *The Clinical Advisor, 2,*

	infants. *Newborn and Infant Nursing Reviews, 9*(3), 139-142.	convalescing premature infants in a level II nursery. *Advances in Neonatal Care, 6*(3), 150-164.	*International, 51,* 720-725.	61-64.
Author & Year	Baker, B., Mcgrath, J., Lawson, R., Liverman, T. & Cohen, S. (2009).	Campbell, M. (2006).	Ishiguro, A., Namai, Y. & Ito, Y. (2009).	Mohl, D. (2010).
Database & Keywords	CINHAL, Staff development, late-preterm infant, thermoregulation, discharge teaching	CINHAL Late premature infant, near-term infant, premature infant, convalescing premature infants, clinical pathway, critical pathway, discharge planning, hospital readmission, intermediate care nursery, Gordon's functional health patterns, standardized physician orders	Academic Search Premier Apnea, hypoglycemia, prematurity, preterm, SIDS	Academic Search Premier Late preterm infant, parent education, discharge teaching
Research Design	Descriptive qualitative article with example of process improvement data and staff survey	Descriptive article for process improvement; mapping and pathway included	Prospective cohort study comparison and control group	Descriptive statistical analysis
Level of Evidence	Level III	Level III	Level II-1	Level III
Study Aim/Purpose	Describe efforts to improve care by staff nurses. Provides an example of how EBP can be used as a strategy to help staff members work together to solve patient care problems and improve outcomes.	Describes the design, implementation, and evaluation of EBP multidisciplinary clinical pathway specific to the LPI and premature infant	To determine the risks facing late preterm infants admitted to nursery rooms and to establish a management strategy.	Descriptive with recommendations for parent teaching and discharge education
Population Studied/Sample Size/Criteria/ Power	Example used n=159 and 131 chart reviews for 2008 for infants 34-36 completed weeks	Viable infants less than 37 weeks gestation with a focus on moderately preterm infants 32-36 weeks.	210 LTPI and 2648 term infants were assessed.	34 0/7 to 36 6/7 weeks gestation infants
Methods/Study Appraisal/ Synthesis Methods	Chart review	Literature review, needs assessment, identifying and implementing a pathway	Infants 35-36 completed weeks were of interest weighing >2000 grams admitted to a nursery room were evaluated according to the chart review.	Explaining increased risks
Primary Outcome Measures and Results	Identified clinical issues, analyzed current practices from birth to discharge and compared them with AWHONNs LPI initiative	Developed a pathway that addressed the needs of the late preterm infant and patient education and discharge planning for this population.	Higher admission rates than term infants at birth and after birth from the nursery room to the NICU. The admission rates due	Parental teaching points and suggested guidelines for primary care

			to apnea increased with decreasing gestational age. 24.3% of infants born at 35 weeks had hypoglycemia requiring NICU admission for no other reason than prematurity compared to 14.1% at 36 weeks.	
Author Conclusions/ Implications of Key Findings	Use of EBP to support the LPI is improving outcomes in their population.	Development of this critical pathway was time consuming and a team effort. Keeping practice current was challenging. Allowed examination of own practice.	The management strategy for LTPI should be individualized.	Close surveillance, follow-up and referral. More research is needed to substantiate appropriate primary care guidelines for the LPI.
Strengths/ Limitations	Short and to the point, needed further input from staff about the survey they participated in and what challenges they faced in changing practice.	This was an excellent example of a grassroots effort to change practice and gave a template about initiating such a project. Limitations included formal and prospective testing of pathway.	Strong support of need for further studies of this group of infants; confirmation of prior research related to the LPI and hypoglycemia. Limitations included focus only on problems that needed additional management.	Use of references; easy to read for the bedside nurse. Just touches on issues, not in-depth.
Funding Source	None identified	None identified.	None noted.	None noted.
Comments	Support for use of EBP to drive practice change.	Offered clear pathway example, table of care plan elements, based on a nursing theory (Margory Gordon's functional health patterns), and offered a tool for variance tracking, an example of discharge orders, quantitative data on process indicators.	Statistical methods using CI, RR and Cochran-Mantel-Haenszel test. Comparing apnea risk to SIDS risk. Jaundice described in other articles as biggest reason for readmission.	Further support of individualized care for this population.

Epidemiology		
Article Title & Journal	"Late-preterm" infants: A population at risk. *Pediatrics, 120,* 1390-1401.	So, he's a little premature…What's the big deal? *Critical Care Nursing Clinics of North America, 21*, 149-162.
Author & Year	Engle, W., Tomashek, K., Wallman, C. & the Committee on Fetus and Newborn. (2007).	Verklan, M. (2009).
Database & Keywords	Academic Search Premier Late preterm, near-term, moderate preterm, morbidity, mortality, readmission	CINHAL LPI, sepsis, hyperbilirubinemia, respiratory distress, hypoglycemia, thermal instability, feeding difficulties

Research Design	Clinical Report	Descriptive study using qualitative and quantitative measures
Level of Evidence	Level III	Level III
Study Aim/Purpose	Define late preterm, recommend a change in terminology from near term to late preterm, present characteristics of late preterm infants that predispose them to higher risk of morbidity and mortality than term infants, and propose guidelines for the evaluation and management of these infant after birth.	Description of epidemiology, etiology of the LPI and why the infant is at increased risk for complications and the need for emergency department visits after hospital discharge and what is currently known regarding neurodevelopmental outcomes are also presented.
Population Studied/Sample Size/Criteria/ Power	34 0/7 to 36 6/7 weeks gestation infants.	34 weeks, 0 days through 36 weeks, 6 days gestation. (34 weeks was chosen as the cut-off because antenatal steroids to facilitate fetal lung development are typically not given after 33.6 weeks)
Methods/Study Appraisal/ Synthesis Methods	Statistical and conventional definitions of weeks gestation, completed weeks gestation; late preterm definition, most frequent complications of prematurity during birth hospitalization in LPI; rates of readmission after birth hospitalization of the LTPI (from 6 Kaiser Permanente hospitals)	Birth rates, gestational age distributions, in-depth discussion of complications associated with LTPI: thermal instability, respiratory distress, hypoglycemia, feeding difficulties, hyperbilirubinemia and sepsis. Emergency department visits and neurodevelopmental outcomes are also discussed.
Primary Outcome Measures and Results	LPIs are immature; LPIs are at greater risk of morbidity and mortality than term infants; risk factors have been identified for rehospitalization or neonatal mortality among LPIs; collaborative counseling by both obstetric and neonatal clinicians about outcomes of LPT birth is warranted unless precluded by emergent conditions.	What makes the infant high risk needs to be taken into account the full clinical picture rather than just an arbitrary birth weight.
Author Conclusions/ Implications of Key Findings	Gaps in knowledge identified, clinical implications discussed, and research implications reviewed. Recommended minimum criteria for discharge identified and listed.	Because the LPI constitutes such a large portion of the premature infant, even a small increase in their birth rates constitutes a large impact on short and long term health care costs. Despite recommendations from AAP and AWHONN, the LPI still gets discharged early.
Strengths/ Limitations	Report is thorough and demonstrates need and definitions well. Again, need research since there is a paucity of studies. Cites 80 other articles.	In depth discussion of risk factors; lack of information and studies to affirm suppositions.
Funding Source	None identified	None identified.
Comments	Seminal article that is the basis for many subsequent articles and retrospective studies and guideline articles.	M. Therese Verklan is an expert that I have had the privilege of meeting at a conference. Her work with the late preterm population is impressive. She is affiliated with the University of Texas Health Science Center, School of Nursing.

Miscellaneous				
Article Title & Journal	Respiratory morbidity in late preterm births. *Journal of the American Medical Association, 304*(4), 419-425.	Unstudied infants: Outcomes of moderately premature infants in the neonatal intensive care unit. *Arch Dis Child Fetal Neonatal Ed, 91*, F238-F244.	Perinatal outcomes associated with preterm birth at 33 to 36 weeks' gestation: A population-based cohort study. *Pediatrics, 123*, 109-113.	Weight for gestational age affects the mortality of late preterm infants. *Pediatrics, 123*, e1072-e1077.
Author & Year	Hibbard, J. The Consortium on Safe	Escobar, G., McCormick, M., Zupancic, J.,	Khashu, M., Narayanan, M., Bhargava, S. &	Pulver, L., Guest-Warnick, G., Stoddard,

	Labor. (2010).	Coleman-Phox, K., Armstrong, M., Greene, J., Eichenwald, E. & Richardson, D. (2006).	Osiovich, H. (2009).	G., Byington, C. & Young, P. (2009).
Database & Keywords	Academic Search Premier Late preterm infant, respiratory, morbidity, mortality	CINHAL Late preterm infant, admission rates, re-admission rates	Academic Search Premier late preterm, near term, morbidity, outcomes	Academic Search Premier birth weight, gestational age size, infant mortality, neonatal mortality, premature infants
Research Design	Retrospective collection of data from 19 hospitals of 233,844 deliveries between 2002 and 2008 across the U.S.	Prospective cohort study including retrospective chart review and telephone interviews after discharge.	Population-based cohort study.	Retrospective cohort study
Level of Evidence	Level II-3	Level II-2	Level II-2	Level III
Study Aim/Purpose	To assess short-term respiratory morbidity in the LPI compared with term births in a contemporary cohort of deliveries in the U.S.	To measure in-hospital outcomes and readmission within three months of discharge of moderately preterm infants.	Compare mortality and morbidity of LPI to those born at term.	Compare neonatal and infant mortality rates of SGA, AGA, LGA late preterm, early term and term newborns. Determine the relative risk of neonatal and infant death for each WGA category. To examine causes of neonatal and infant death.
Population Studied/Sample Size/Criteria/ Power	Charts were abstracted for all neonates with respiratory compromised admitted to a NICU and LPT births were compared with term births in regard to resuscitation, respiratory support and respiratory diagnosis.	Prospective cluster sampling targeted 850 eligible infants, randomly selected. 677 families completed interviews. Infants 30-34 weeks gestation from 10 hospitals discharged alive from 2001-2003.	April 1999 to March 2002 all singleton births between 33-40 weeks from British Columbia Perinatal Database Registry divided into 33-36 weeks and 37 to 40 weeks cohorts. 6381 LPI and 88,867 term	Linked birth and death data for all infants from Utah born between 1999 and 2005 with a GA≥34 weeks. 343,322 newborns ≥34 weeks
Methods/Study Appraisal/ Synthesis Methods	A multivariate regression analysis compared infants at each gestational week, controlling for factors that influence respiratory outcomes.	Excluded major malformations and congenital anomalies. Infants within target gestational age. Parents given a study packet and asked to give a follow-up interview three months post discharge. Stata statistical software using bivariate comparisons.	Compared mortality and morbidity data and associated maternal factors between the 2 groups. 95% CI. P value of <.05 was significant. Statistical analysis using x2 test for significant differences in the proportions of perinatal characteristics. Used PEPI for Windows.	Calculated neonatal and infant mortality rates for each GA/birth weight stratum and estimated mortality rate ratios using AGA term infants as the reference. ICD-9 codes were used to classify cause of death.
Primary Outcome Measures and Results	RDS, TTN, pneumonia, respiratory failure, & standard oscillatory ventilator support.	Overall readmission rate was 11.3% but varied across centers (6.0 to 18.2%). Infants who experienced	Perinatal mortality 8 times greater, neonatal mortality 5.5 times greater and infant mortality 3.5 times	LPT SGA infants were ~44 times more likely than term AGA infant to die in their first month and 22 times

	36.5% admitted to NICU; 28.8% had respiratory compromise compared with term of 7.2% NICU admission with 15.6% respiratory compromise.	assisted ventilation for at least 72 hours, African American infants, male infants and infants with chronic lung disease were more likely to be readmitted.	greater in the preterm group. Maximum risk of death in the preterm group was in the first few days of life. Respiratory morbidity 4.4 times greater, infections 5.2 times greater in preterm than term. Hospital stays 142 vs. 57 hours preterm to term. Chorioamnionitis, hypertension and pPROM greatest in premature group.	more likely to die in their first year.
Author Conclusions/ Implications of Key Findings	In a contemporary cohort, LPT birth, compared with term birth was associated with increased risk of RDS and other respiratory morbidity.	Moderate prematurity may have an impact on obstetric interventions and we should not base our assumptions on low birth weight.	Increased morbidity and mortality associated with LPI has been underestimated until recently. Need further studies.	Being SGA substantially increases the already higher mortality of LTPI and early term newborns.
Strengths/ Limitations	Large sample size, representative population; comparable to CDC data; multivariate logistic regression model; Limited to NICU admission for respiratory issues, did not assess individual morbidity such as sepsis or NEC which could cause respiratory compromise	Large sample size, randomization, prospective nature and statistical analysis methods. Sample hospitals may not be representative. Low frequency of certain measured events and may have excluded infants who were transferred.	First large population-based study to assess morbidity and mortality in a large cohort with preset variable definitions. 3 year period of data. Lack of stratification of certain variables based on underlying diseases. Base morbidity data on weeks rather than grouping.	Large sample size. 6 years of data. Supports prior findings. Suggests several areas for further research. Reliance on birth and death data may include misclassifications. May not be generalizable outside of Utah populations.
Funding Source	Intramural Research Program of the Eunice Shriver Kennedy National Institute of Child Health and Human Development, NIH.	Agency for Healthcare Research and Quality.	None identified.	None noted.
Comments	Excellent article on short-term morbidity.	Was a great study but just outside of my population, although it included 34-34.6 week infant, I also needed up to 37 weeks for my data.	Support of the recent drive to treat these infants as late preterm infants rather than near term infants.	Weight for GA classification provides insight and gestational age assessment needed for correct categorization.

Appendix C:

Agency Letter of Support

Lifestages
Health Services For Women & Children
PENINSULA REGIONAL MEDICAL CENTER

August 9, 2011

Cris Finn, PhD, RN, FNP, MS, MA, FNE
Assistant Professor
Loretto Heights School of Nursing
Regis University
3333 Regis Blvd. Mail Code G-8
Office 318 Carrol Hall
Denver, CO 80221-1099

Dear Dr. Finn,

Angela Houck has been exploring a process improvement project in our "late preterm newborn population. I am aware of this study and have given her permission to continue with this project.

If you have any questions, please feel free to contact me at (410) 543-7502.

Sincerely,

Regina Kundell

Regina Kundell, MS, NEA-BC, APRN-BC
Director, Women's and Children's Services

Appendix D

Balance Sheet and Income Statement

This automated form is made available compliments of CCH Business Owner's Toolkit

Assets

Current Assets:				
Cash			$17,480	
Accounts Receivable		$0		
Less:	Reserve for Bad Debts	0	0	
Merchandise Inventory			1,033	
Prepaid Expenses			1,000	
Notes Receivable			0	
	Total Current Assets			$19,513
Fixed Assets:				
Vehicles		0		
Less:	Accumulated Depreciation	0	0	
Furniture and Fixtures		0		
Less:	Accumulated Depreciation	0	0	
Equipment		964		
Less:	Accumulated Depreciation	487	487	
Buildings		0		

Less:	Accumulated Depreciation	0	0	
Land			0	
	Total Fixed Assets			487
Other Assets:				
Goodwill			0	
	Total Other Assets			0
Total Assets				$20,000
	Liabilities and Capital			
Current Liabilities:				
Accounts Payable			$2,520	
Sales Taxes Payable			0	
Payroll Taxes Payable			0	
Accrued Wages Payable			17,480	
Unearned Revenues			0	
Short-Term Notes Payable			0	
Short-Term Bank Loan Payable			0	
	Total Current Liabilities			$20,000
Long-Term Liabilities:				
Long-Term Notes Payable			0	

Mortgage Payable	0	
Total Long-Term Liabilities		0
Total Liabilities		20,000
Capital:		
Owner's Equity	0	
Net Profit	0	
Total Capital		0
Total Liabilities and Capital		$20,000

Appendix E

Protection of Human Subjects: CITI

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report
Printed on 6/9/2011

Learner: Angela Houck (username: houck383)
Institution: Regis University
Contact Information 8839 Peerless Road
Whaleyville, Maryland 21872 USA
Department: Student
Phone: 410-352-5732
Email: houck383@regis.edu

Social Behavioral Research Investigators and Key Personnel:

Stage 1. Basic Course Passed on 06/09/11 (Ref # 6129860)

Required Modules	Date Completed	
Introduction	06/05/11	no quiz
History and Ethical Principles - SBR	06/05/11	4/4 (100%)
The Regulations and The Social and Behavioral Sciences - SBR	06/06/11	5/5 (100%)
Assessing Risk in Social and Behavioral Sciences - SBR	06/06/11	5/5 (100%)
Informed Consent - SBR	06/06/11	5/5 (100%)
Privacy and Confidentiality - SBR	06/09/11	5/5 (100%)
Regis University	06/09/11	no quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

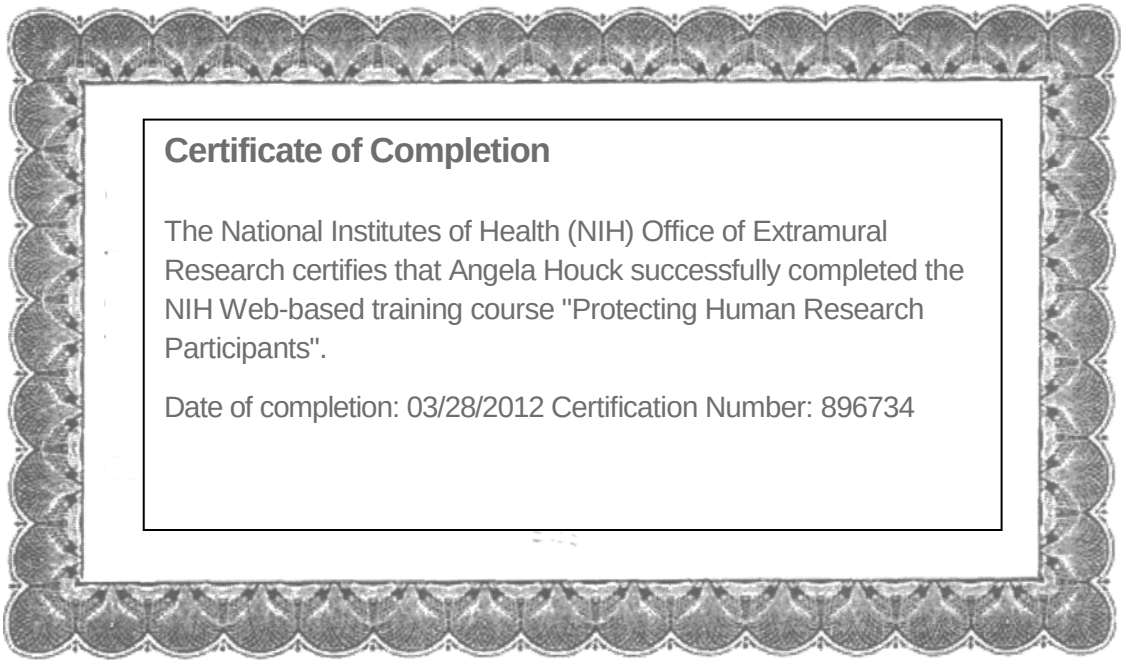
Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

Return

Appendix F

Protection of Human Subjects: NIH

National Institutes of Health



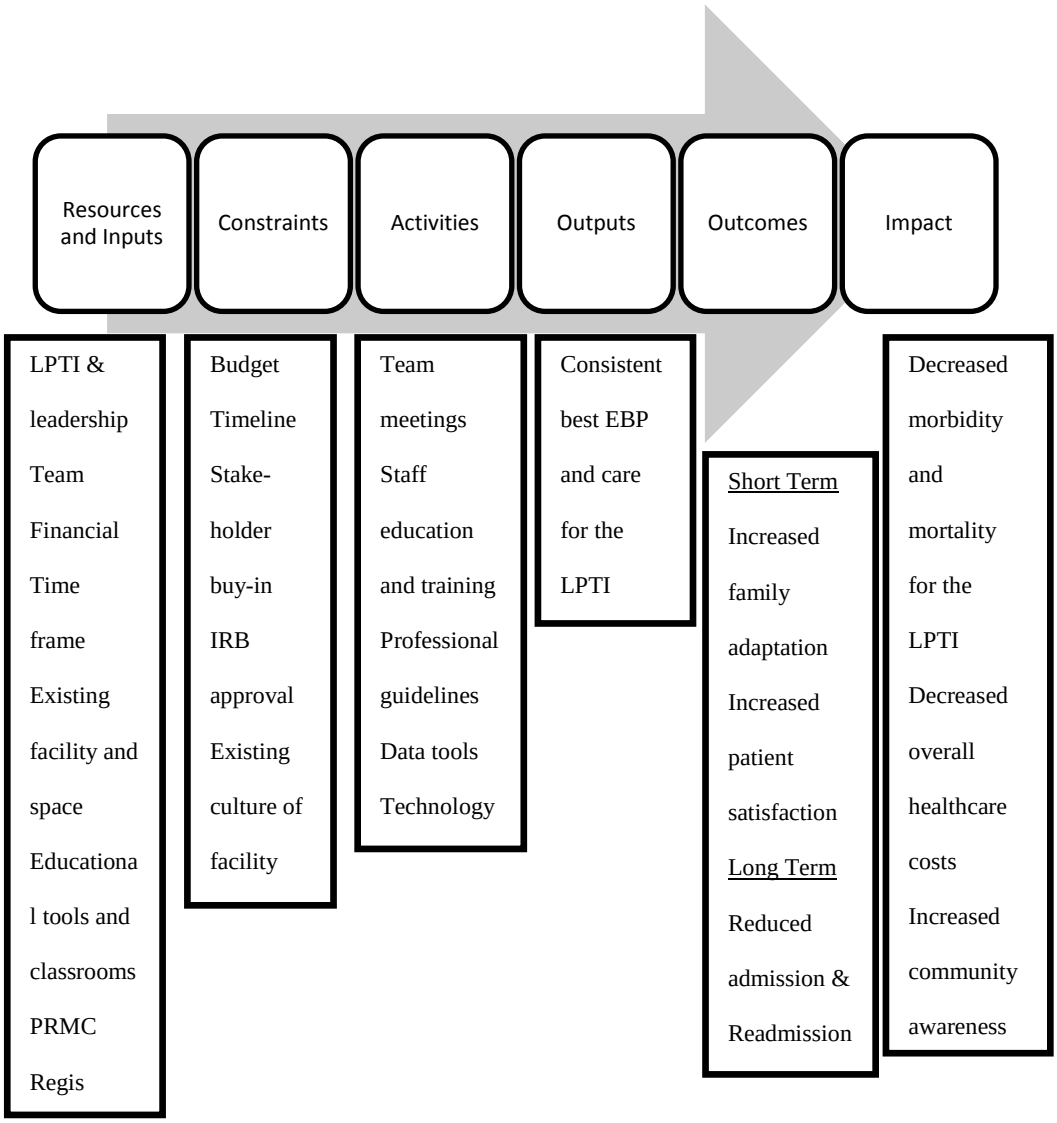
Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that Angela Houck successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 03/28/2012 Certification Number: 896734

Appendix G

Logic Model



Appendix H

Project Timeline

DNP Project Process Model	September 2010	December 2010	January 2011	April 2011	May 2011	June-August 2011	September 2011- April 2012	April 2012-May 2012
Step 1 Problem Recognition	Identified Need, PICO, Literature Review	Literature Review						
Step 2 Needs Assessment	Identifying sponsors & stakeholders	Needs Assessment; ID Population; Scope of Project	Team Selection; Desired Outcomes; Resources					
Step 3 Goals, Objectives & Mission Statement			Goals, Objectives & Mission Statement			Mission Statement, Organizational Assessment; Cost-benefit		
Step 4 Theoretical Underpinnings	Theoretical Underpinnings, Supportive Theories	Change theory						
Step 5 Work Planning					Project Proposal & Tools			
Step 6 Evaluation Planning				Logic Model; Evaluation Plan				
Step 7 Implementing						IRB submission; Monitoring plan; Identifying threats/barriers	IRB approval, Monitoring plan until Project closure	
Step 8 Data							Data	
Step 9 Results							Quantitative Data	Written, oral & electronic dissemination

Appendix I

IRB Approval Letter

REGIS
UNIVERSITY

Academic Affairs Academic Grants

3333 Regis Boulevard, H-4 Denver, Colorado 80221-1099

303-458-4206 303-964-3647 FAX
www.regis.edu

IRB - REGIS UNIVERSITY

September 14, 2011

Angela Houck 8839 Peerless Road Whaleyville, Maryland 21872

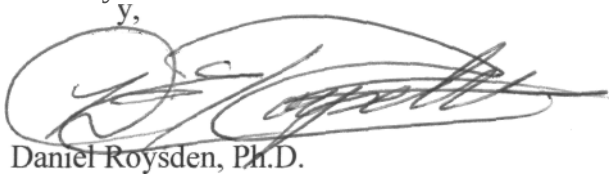
RE: IRB #: 11-271 Dear Angela:

Your application to the Regis IRB for your project "Optimizing Care for the Late Preterm Infant" was approved as exempt on September 14, 2011.

The designation of "exempt," means no further IRB review of this project, as it is currently designed, is needed.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval.

Sincerely,



Daniel Roysden, Ph.D.

Chair, Institutional Review Board cc: Cris Finn **JESUIT UNIVERSITY**