

Standardization of the Neonatal Intensive Care Unit Discharge Process

by

Andrea Shafer

Under Supervision of

Dr. Bridgitte Gourley, DNP, CRNP

Second Reader

Dr. Rebecca Wiseman

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Abstract

Background

Discharges are complex and any delay in discharge has significant impacts on NICU infants. Caring for infants in the NICU costs billions of dollars annually, with each day costing thousands of dollars. Accordingly, discharging these infants once they meet discharge criteria is vital for institutions to control expenses, but is also a quality and safety measure for these infants to successfully transition to home.

Problem

At a community hospital in Maryland a lack of a standardized discharge process contributed to increased discharge times and lengthy delays for NICU infants. If NICU infants were not discharged once medically stable, then the length of stay increased causing additional costs to the unit and hospital. Planning for discharge and after care of the infants is a key part of an effective process. This hospital had a significant need for a standardized discharge process, starting at admission and continuing through discharge.

Interventions

There are national recommendations for hospitals to focus on care that is timely and efficient. The American Academy of Pediatrics (AAP), the National Association of Neonatal Nurses (NANN) and the Agency for Healthcare Research and Quality (AHRQ) provide resources, programs, and toolkits for hospitals that wish to improve care transitions, including discharging the NICU infant once medically stable. The DNP student used the approach of a quality improvement initiative (QI) that involved developing and implementing a better-quality multidisciplinary discharge checklist into the electronic health record (EHR). The EHR checklist improved communication between the NICU team members in order to assure safe and cost-effective discharge of NICU patients. This change in workflow prompted staff members to address discharge planning during each shift and enhanced communication between NICU parents and staff.

Results

This intervention led to a post-implementation average length of stay decrease from 9.92 days to 8.97 days respectively. Also, the discharge time past three o'clock decreased from an average of 54.84% to 36.00%. The imbedded discharge checklist was utilized by 100% of NICU staff, which standardized and improved the discharge process and documentation for NICU infants less than 37 weeks gestation. NICU team members utilized the discharge checklist in their daily rounding and during shift change, which improved discharge readiness and communication.

Conclusions

This QI project, led by a DNP student in partnership with a community hospital in Maryland, decreased the average length of stay and discharge time post-implementation while improving communication of all team members. This was a promising tool to maximize discharge planning starting from admission to improve outcomes of NICU infants. The electronic discharge checklist has the potential to serve as an example of a standardized and effective communication tool, which optimized outcomes for NICU infants and health care teams.

DNP Project Manuscript

Overview and Background

Delayed discharge is an important issue experienced by healthcare providers worldwide (Rojas-Garcia, et al., 2018). Discharges that are delayed impact health care providers, staff, patients, families, healthcare costs and outcomes. Adverse events result from poor communication during transitions of care, inadequate discharge information, poor involvement of families and handoffs between providers (Rojas-Garcia, et al., 2018).

The World Health Organization (WHO) states 15 million premature babies are born before 37 weeks' gestation annually (WHO, 2017). In 2015 complications of prematurity in children under five years led to one million deaths worldwide (WHO, 2017). Infant mortality in the United States (U.S.) in 2015 was 5.9 per 1000 live births (Centers for Disease Control and Prevention [CDC], 2017). The second leading cause of U.S. infant mortality in 2015 was premature births (CDC, 2017). In 2016 one in ten newborns were born premature in the U.S., increasing risks of permanent lung disease, cerebral palsy, blindness and deafness (CDC, 2017). The WHO and CDC are committed to decreasing risks of morbidity and mortality, providing guidelines and interventions for improved care and collaboration for infants born premature.

The Institute of Medicine (IOM) found costs associated with prematurity rose to \$26.2 billion dollars annually (March of Dimes, 2015). Ineffective discharge planning in neonatal intensive care units (NICU) is a problem across the country. Caring for a premature infant costs thousands of dollars per day and is a significant financial burden on health care organizations (March of Dimes, 2015). Delays in discharge add to this cost. Identifying the cause of delayed discharge is an important step in quality improvement. Multiple transition points present opportunities for delayed discharge when standardized planning is not followed (Ingram et al.,

2017). A lack of standardization in the NICU discharge process has been identified as a potential patient safety issue by NICU staff in a community hospital in suburban, Maryland. Observations revealed varied discharge processes, resulting in delayed day of discharge past 3 o'clock in the afternoon. Discharge delays decrease effective and efficient patient care and increase hospital costs.

The discharge planning process is multifaceted and involves unit specific challenges. These challenges have limitations to general evidence-based solutions (Mallory, Osorio, Prato, DiPace, & Schmutter, (2017). Common barriers in the NICU discharge process found in the literature are delayed planning and gaps in communication (Sims, Jacob, Mills, Fett & Novak, 2006; O'Daniel & Rosenstein, 2008). Proactive discharge planning solutions use evidence-based standardized checklists and teaching tools, such as a discharge bundles, which are supported by The Joint Commission and American Academy of Pediatrics (AAP). For addressing communication issues there are solutions that focus on staff and family communication such as: Situation-Background-Assessment-Recommendation (SBAR), regular multidisciplinary patient-centered rounds, team huddles and daily goals sheets. Implementing a comprehensive discharge bundle should transition infants to home, meeting all discharge requirements and day of discharge time (Garg, Lee, Evans, Chen, & Shieh, (2015); Desai, Popalisky, Simon, & Mangione-Smith, (2015), (Appendix A, Evidence Table).

The purpose of this quality improvement (QI) DNP project was to streamline discharge planning, teaching and documentation in NICU through the use of an imbedded electronic health record (EHR) discharge bundle, based on evidence-based standardized practices and procedures to reduce the delay in discharge for infants born less than 37 weeks' gestation. The short-term goals of the QI project was to ensure that by September 2018, 100% of NICU staff were trained

using the discharge bundle items such as the standardized discharge checklist and revised flowsheets and notes, including discharge items in the EHR. The checklist included documentation of teach-back education, and other discharge requirements which were not consistently documented prior to the intervention. Standardizing the current discharge process shows improvement in discharge readiness, which should decrease length of stay (LOS) and discharge time. The long-term goals were to have 100% of the standardized discharge checklist revised and uploaded in the EHR by December 2018. Also, to have the revised checklist used daily by 100% of the staff by December 2018. Comprehensive discharge planning and teaching was implemented to prevent premature discharge and also prolonged stay in NICU infants. Discharge readiness reduces preventable readmissions, adverse events, and ensures smooth transition of healthcare providers care for NICU graduates.

Theoretical Framework

Afaf Meleis's Transition Theory became well-known in the 1990s after her research identified health care worker's well-being was enriched while assisting patients through illness, health and life transitions (Meleis, 2000). Meleis's research found similar outcomes with patients who were experiencing transitions, such as hospital discharge. The Transition Theory became a developing middle-range theory framed to support health progression by means of nursing interventions and social supports (Meleis, 2007). The Transition Theory prepares patients and families through various transitions, using on-going support, which improves well-being and quality care (Meleis, 2007). The theory can be used during single or multiple transitions and includes patients, families along with health care professionals who facilitate the transition (Meleis, 2007). This theory has been proven to be multi-faceted, shows connections and ease of

use all while being generalizable. Meleis Theory of Transition is a useful theory for delayed discharge planning in the NICU.

The Transition Theory's concepts are type of transition, property and pattern of transition, nursing therapeutics, readiness and awareness of discharge (Meleis, 2007). Transition is a recurring process where change is happening to the patient, family or health care worker. The theory can be analyzed through the interrelationship of concepts. Concepts are related to the transition experience during delivery of healthcare and how the concepts impact wellbeing of patients and families. Concepts related to delayed discharge are gaps in communication and delayed discharge teaching due to non-standardized routine.

Meleis's Theory of Transition was used to form an intervention to improve communication and reduce barriers to a timely NICU discharge. This theory produced an intervention by identifying relationships between the concepts. Evidence-based methods such as a standardized discharge policy and procedure utilizing checklists and tools reduced length of stay and delayed discharge. Quality early discharge planning using evidence based recommendations allowed infants to transition to home, improving well-being of the patient, family and healthcare workers. By utilizing a theory and standardized process, discharge planning and teaching allowed for improved communication, reduced costs and benefits family outcomes. The Theory of Transition was used in this practice problem to construct a sustainable intervention with proven positive outcomes for staff, families, and patients. Using evidence-based theory to form an intervention bundle including standardized discharge planning, checklists and teaching tools allowed health care workers a framework to impact patient care. Improved discharge planning with patient and family readiness improved satisfaction and patient outcomes in NICU.

Literature Review

Mechanisms to support standardization of NICU discharge are the focus of this review. The review begins with a general overview of evidence supported by the American Academy of Pediatrics (AAP) and the National Association of Neonatal Nurses (NANN), including guides and toolkits to improve discharges in NICU. This discussion is followed by studies that review tools, such as an electronic checklist to improve discharges. Finally, the review concludes with current evidence regarding items in discharge bundles that can be implemented in this practice change.

Proactive discharge planning in NICUs using best practices and tools is supported by AAP and NANN. Both national associations equip NICUs with policy statements and evidence-based guides to prepare NICU staff and parents for the discharge process (AAP, 2008; NAAN, 2014). The information from AAP and NANN provide an overview on care provided in the NICU but do not specifically address how to make the discharge process more efficient, effective, timely, and safer. The current state of research to improve the discharge process and optimize transitions is fragmented due to lack of evidence-based tools used in the NICU population. With the goal of improving care and transitions multiple studies have used research from adult populations to guide their quality improvement interventions (Shermont, Pignataro, Humphrey & Bukoye, 2016). There is clear evidence that standardized, and policy-driven procedure is key to effective discharge planning (AAP, 2008; Agency for Healthcare Research and Quality, 2013).

Research on discharge planning was found in a range of descriptive articles which used qualitative, quantitative and mixed methods studies (Evidence Table, Appendix A). Topics from the literature included aspects of discharge planning such as discharge preparation, standardized

checklists, parental preparedness and staff workflow. The analysis will be discussed in further detail under the following themes: guidelines and toolkits, electronic checklists and discharge care bundles.

Various studies have used national guidelines and toolkits to streamline NICU discharges, including *Transitioning Newborns from NICU to Home: A Resource Toolkit*, and *Baby Steps to Home: A Guide to Prepare NICU Parents for Home* (AHRQ, 2013; NANN, 2014; Wu et al., 2016). These toolkits are a result of collaborative research, however they focus on specific elements that need to be met before discharge. The toolkits are lacking guidelines for key procedures of the discharge planning system. These toolkits have been found to be beneficial if they are adjusted to meet the specific needs of the facility. Three highly-reliable interventions that have positive results are needs assessment tools, teach-back methodology and improving throughput (Stelfox et al., 2015; Wu et al., 2016). Reengineering the discharge process with the above guidelines and toolkits can be tailored to fit the needs of NICU infants and families. The toolkits have been shown to improve outcomes, coordination of care and have yielded evidence-based guidelines for practice change. AHRQ has ensured the quality of their toolkits by testing annually for validity, reliability and alignment with evolving evidence-based practice (Hussey et al., 2013).

Standardization of safe discharge practices in NICU includes a checklist, which often puts items in a sequence of steps for discharge preparation. The literature reviewed is consistent in recommending certain items to include in discharge checklists. Evidence-based interventions, such as patient education, open communication, home care, follow-up, medication safety, primary care and Length of Stay (LOS) are part of the discharge checklist. Current literature uses electronic checklists among adult populations, which has decreased provider workload, LOS,

communication failures, with improved staff satisfaction and family readiness for discharge (Drake & McBride, 2017; Gabriel 2017; Garg, Lee, Evans, Chen & Shieh, 2015; Kramer & Drews, 2017; Mandyam, Krishnan, Hooper-Evans & Shieh, 2016; Thongprayoon et al., 2016; White et al., 2014). Several limitations of the previous studies include, study designs lacked quality, checklists proved to have little supporting evidence, and checklists offered little generalizability to local factors. To alleviate these limitations, the checklist needed to be adapted to the facility utilizing the Theory of Transition. Further studies are needed to determine association with neonatal outcomes.

Recent literature has found bundled discharge interventions to be most effective (Auger et al., 2015; Mallory, Osorio, Prato, DiPace, & Schmutter, 2017; Shermont, Pignataro, Humphrey, & Bukoye, 2016; Fisher, Rosenbluth & Shaikh, 2013; Wu et al., 2016). A discharge bundle is a number of evidence-based practices that improve patient outcomes from hospital to home. Such items are: checklists, multidisciplinary education and rounds, needs assessment tools and teach-back (Mallory et al., 2017). Each site in the above study performed chart reviews and several safeguards to ensure internal validity (Mallory et al., 2017). Outcomes of these studies showed standardized discharge planning, improvement of discharge goal time, reduced post-discharge emergency room usage, improved teach-back and staff satisfaction. Overall parent satisfaction with discharge planning and education was high (Wu et al., 2016). Limitations and recommendations for future research would focus on adjusting implementation items to the specific needs of the population. Also, further studies could provide details on bundled implementation and analysis of improvements in their procedures for enhanced effectiveness of NICU discharge care bundles.

Discharge care bundles have shown positive outcomes and successful implementation that emphasize patient-centeredness and overall improved care. NICU discharge is a complicated, multi-faced approach, which needs to be customized to fit the unit, and supported by AAP and NANN's evidence. The NICU adapted best practices to form a standardized EHR discharge checklist to improve planning and documenting, which resulted in improved communication, safety, and education.

DNP Project Implementation

Description of Project

The purpose of this proposed quality improvement DNP project was to pilot a neonatal intensive care unit discharge bundle with the use of an evidence-based standardized electronic discharge checklist in infants born less than 37 weeks' gestation. Goals of this project were to improve the discharge process, documentation, and transitions-of-care in the NICU. This quality improvement (QI) project was designed and implemented for a local community hospital in Maryland with a 20 bed Level III NICU. This setting's inclusion criteria consisted of patients less than 37 gestational age. Exclusion criteria consisted of infants 37-42 weeks' gestation. The sample size varied as it depended on the unit census (max n=20) during the implementation phase.

Measures to Protect Human Subjects

This DNP project was protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) which, among other assurances, protects the privacy of patients' health information (Allen, 2013). Furthermore, the DNP student gained approval from both the University of Maryland Baltimore and the medical center's Institutional Review Boards (IRB) prior to implementation and data collection. The IRB determined that this project was QI and did

not include research on human subjects. As part of evaluating the effect of streamlining NICU discharge aggregated data from the EHR did not include patient or staff identifiers. All electronic files and data containing potentially identifiable information were protected by password to prevent access by unapproved users and were locked in the champion's office.

Procedures and Timeline

This proposed QI project was implemented over 14 weeks. During the first and second week the DNP student, project champions and IT specialists were informed and educated on the proposed implementation schedule, education, and training plan (Appendix C) and awaited the EPIC go-live of the EHR discharge checklist (Appendix D). The NICU discharge checklist previously existed in paper format and was analyzed based on current best practices and evidence based recommendations for care. This adapted list was then integrated into the EHR by the hospital information technology staff. During this time, the DNP student coordinated future dates for training with staff. During weeks three through five the DNP student and champions were on site for staff training and demonstration of competency of use of EHR checklist (Appendix G). At the end of week five 100% of staff were trained on the EHR checklist and future discharge bundle items. The DNP student and the champions were available through weekly in-person site visits and email for continuous feedback.

During weeks six through twelve the NICU staff began using the EHR discharge checklist and completed charting discharge readiness items under the EHR checklist in EPIC. The DNP student was on-site weekly to assess the usability and functionality of the EHR checklist and for any needed process changes. During weeks eight through fourteen the DNP student was on-site collecting data through weekly chart audits and to measure adherence (Appendix E). Any identified roadblocks or barriers to this change were evaluated by the DNP student and staff

utilizing the Theory of Transition. Weeks thirteen and fourteen, the DNP student continued to collect weekly chart audits and assessed the practice change, addressed barriers and asked additional feedback from staff.

Data Collection

To measure the outcomes of this DNP QI project, the following mechanisms were used: EHR discharge documentation using audit tools and observations (Appendices E, F & G). Weekly data were collection and included the use of EHR discharge checklist by clinical staff (Appendix E). This tool was electronic and contained one flowsheet tab that corresponded to activities and procedures needed for discharge. The flowsheet named NICU Discharge had three sections which included: Newborn Screening, Newborn Discharge Preparation, and Metabolic Screen. Under each section there are several items listed for the clinical staff to complete before discharge (Appendix D). One strength in the NICU Discharge Checklist as a tool is that all items were identified as evidence-based in literature (AHRQ, 2013; “Hospital discharge of the high-risk neonate,” 2008; NANN 2014). Usability and evaluation of effectiveness were key reasons for the checklist redesign.

Data Analysis

Simple descriptive statistics (mean, median, mode, frequencies, and percentages) were utilized to analyze the implementation data for this QI project (Simpson, 2015). Data from pre-implementation was compared to post-implementation data to show average LOS and discharge time. This QI project used basic analysis to present the data in simple tables and graphs that are presented in a way to easily understand the data and show impact and outcomes of the project.

Sustainability

Improving quality while streamlining the discharge process was essential in this QI project. Pre-implementation data showed there was a clear need for discharge practice change. Post-implementation data analysis demonstrated positive outcomes, and the EHR checklist is now a part of everyday workflow in the NICU. The DNP student was the driving force to show stakeholders that the use of EHR discharge checklists were best practices. The goal of this DNP project was to improve the workflow through innovation and benefit to the organization and nurse stakeholders in the NICU. When stakeholders saw value they become invested in the change and promoted it. There is a need for continuous monitoring in the use of EHR discharge documentation, but this DNP project has a great potential for sustainability and spread.

Results

Several changes in practice were made in the NICU following the implementation of this project which included the imbedded electronic discharge checklist, updated flowsheets, and revised discharge tracking tools. Each helped to increase clear communication and tracking of information. The two tracking tools were a charge nurse discharge tracking tool and an updated unit clerk tool to track discharge time, which included reasons for the delayed discharge. Another change in practice included daily leadership rounds, which included reviewing the EHR discharge checklist and tracking tools. Currently, the EHR discharge checklist is an item discussed during shift change and this is also charted in the EHR. Staff adherence and use of the EHR discharge checklist, average discharge time, reasons for delayed discharge, and LOS are discussed monthly at the NICU quality and safety meeting. The implementation plan was slightly delayed from the initial timeline due to a hospital-wide EPIC upgrade. However, despite the delay, the implementation was successful and resulted in improved discharge planning, decreased LOS and discharge time for NICU infants.

The DNP student collected data weekly which included: time of discharge, adherence to the electronic discharge checklist, and the use of the discharge tracking tools. Data collected by the DNP student was entered into Microsoft Excel to run descriptive statistics. Pre-and post-implementation data that was collected and analyzed included time of discharge, and average LOS. Average LOS data was provided monthly by the finance department at the hospital. Excel was used to analyze pre- and post-implementation data and the t-test for two samples assuming equal variances was used, prior to the t-test, both samples were proven to have equal variances.

Pre-implementation data collected from August 2018 through mid-October 2018 included monthly average discharge time, which showed 54.84% delayed discharges in the NIUC. Post-implementation data collected from October 23, 2018 through January 31, 2019 showed that monthly discharge times decreased to 36.00%. Pre-implementation LOS revealed an average of 9.92 days. Post-implementation showed that monthly average LOS decreased to 8.97 days. Although the LOS in NIUC was decreased, it did not reach statistical significance through the use of a t-test ($P < 0.76$). However, the average monthly discharge time was found to be statistically significant through the use of the t-test ($P < 0.05$). Two bar graphs were created from the data sets in Excel to show the pre-post implementation data (Appendix H).

The anticipated outcomes of this intervention were decreases in LOS and discharge time, and improvement in communication between the multidisciplinary team members. The NICU providers have requested that IT transfer data from the discharge checklist into their discharge summary note. Also, the NICU is tracking their potential discharges daily by using a charge nurse tool that places name of potential discharges and then discusses the status of each infant during rounds, which has shown to improve discharge readiness.

There were a few unanticipated barriers during this QI project. Due to the EPIC upgrade, the electronic discharge checklist was not implemented until October 2018, due to a back-log of IT requests from the EPIC upgrade. However, this allowed time for the DNP student to be on the unit and discuss the upcoming workflow changes. An unintended consequence of the EHR discharge checklist was that the DNP student could not track when the discharge items were completed prior to the infant being discharged home, or if they were charted after the discharge. Another barrier during the weekly audit was that DNP student noted that some checklists were partially completed, but there was no explanation for why the items were left blank. This checklist was developed to encompass NICU infants with gestational ages ranging from 24-37 weeks' gestation, however not all of the flowsheet items are applicable to each infant. This was explained to NICU staff to document these fields by using not applicable (n/a) in the checklist.

The unanticipated outcome of improved communication between all members of the NICU team was observed by the DNP student. The NICU providers can now easily see which discharge items have been completed in the EHR discharge checklist. Using an EHR checklist enables team members to pull data from the checklist into their discharge notes. This functionality streamlines the discharge process and improves communication and safety for NICU patients. The discharge checklist is also reviewed during leadership rounds and is an item of discussion during staff handoff.

Overall, the staff and leadership have reported an improvement in communication and discharge planning, which has improved workload and quality of care in the NICU. Implementing a standardized electronic discharge checklist was little cost to the unit and hospital. Initially there was an increase in workflow for a few NICU staff members due to the IT requests and IT build of the checklist. However, the additional time spent on creating the

checklist, various IT requests, and workflow changes were anticipated and communicated in advance among all stakeholders of this QI project. There are no further anticipated costs or increase in workflow to the NICU staff members by continuing to use the EHR discharge checklist.

Discussion

A standardized evidence-based EHR discharge checklist and process is critical for hospitals to ensure safe transitions of NICU infants. The DNP student used evidence-based resources as well as stakeholders to develop a standardized discharge checklist that detailed items needed to be completed before discharge, or by three o'clock in the afternoon. The day of discharge is often overwhelming and sometimes uncertain. However, if discharge planning is started on admission, with coordination of care and a team-based approach, then day of discharge can be successful for all members involved. A standardized discharge checklist was revised using evidence-based resources needed to ensure that all relevant items were documented prior to discharge. Various studies used evidence-based tools and checklists for coordination of care and effective transitions, including discharge (Drake & McBride, 2017; Gabriel 2017; Garg et al., 2015; Mandyam et al., 2016; White et al., 2014). Coordinating discharge in the NICU often requires teamwork and interprofessional collaboration. The EHR discharge checklist in this QI project was also used for daily multidisciplinary rounding in the NICU.

The discharge process is very complex, especially in critical care environments. Often NICU care is multifaceted care, which is why discharge planning needs to start on the day of admission. This intervention demonstrated how a standardized approach to care and transitions improved outcomes for NICU patients and the health care system. This revised imbedded EHR discharge checklist improved collaboration of care, interprofessional team rounds, and ensured

necessary tasks were completed and documented prior to day of discharge. The EHR discharge checklist was useful for NICU providers as the completed checklist items were transferred to their discharge summaries. Unit leadership had access to review compliance of the discharge checklist items and could query reports. Clinical staff and unit leadership's satisfaction was overall favorable for continuing the use of this intervention. The unit leadership was motivated to continue using the electronic discharge checklist due to the successful outcome data, which identified both ALOS and discharge time decreased post-implementation.

Similar studies used QI approaches for their study design and focused on proactive discharge planning for NICU infants (Drake & McBride, 2017; Fisher et al., 2013; Mallory et al., 2017). Due to a small number of studies using neonatal populations, other useful studies were based on pediatric and adult inpatient units (Drake & McBride, 2017; Gabriel 2017; Garg et al., 2015; Kramer & Drews, 2017; Mandyam et al., 2016; Thongprayoon et al., 2016; White et al., 2014). Though the previous studies were useful to show similar design, this QI project's outcome metrics were based on the institution's quality metrics, such as discharge time and LOS. Overall the DNP's intervention showed similar results with other reports and studies (Gabriel, 2017; Garg et al., 2015; Kramer & Drews, 2017; White et al., 2014).

The overall strength of this project is the discharge checklist, revised to include all areas of discharge preparedness. The checklist was built for multidisciplinary use and encouraged a team-based approach to care. The discharge checklist was targeted to a specific patient population, infants less than 37 weeks, however it can be easily adapted to other populations and hospital units. Another strength was that this intervention was used in handoff, which was an effective approach to improve communication, discharge readiness, and neonatal outcomes. Leadership buy-in was important for sustainability of this project. Leadership rounds provided

visibility and desired support for this QI project. LOS and discharge time are NICU quality metrics and are tracked monthly, posted in the unit, and discussed in staff meetings by the unit leadership.

Limitations to this project included initial staff buy-in to this redesigned workflow. However, with time spent on the unit, discussions in staff meetings, and rounding led to frontline staff accepting this new workflow. Another limitation was the hospital's EPIC upgrade, which delayed the go-live date, the date for the NICU tool was impacted and delayed the EHR NICU discharge checklist. Additionally due to an increase in the number of requests to the IT department after the go-live date, the date for the NICU tool was impacted and delayed the EHR NICU discharge checklist. Due to the DNP student and stakeholder's open communication the checklist was imbedded in the NICU EHR within two weeks of the EPIC upgrade, which allowed adequate time for the intervention to impact care in the NICU. Data from the hospital was shared with the DNP student based upon hospital reporting timelines.

There are limitations to the generalizability of this project, due to it being designed for this particular hospital NICU environment. While the concept of the project may lend itself to replication in a different NICU, it would need to be customized based upon their work flow, population and unit needs. However, the ease of revising the previous discharge checklist and the successful imbedding into the EHR is a promising option for spread, because it showed improved outcomes. Other units can use this QI project as a template for their needed process change. There is further need for additional studies on using electronic, evidence-based interventions to streamline the discharge process, especially in the NICU environment.

Conclusion

In summary, this QI project resulted in a comprehensive discharge checklist that was effective in reducing average LOS and discharge time in the NICU. By utilizing an EHR discharge checklist, the discharge process was standardized and improved discharge readiness for NICU infants. This project was a successful QI project with sustainable outcomes. Care for NICU infant's is complex and multidisciplinary. The evaluation of an EHR discharge checklist showed positive outcomes for LOS and Time of discharge. While patients and staff satisfaction were not measured as part of this project, staff anecdotally shared their appreciation and noted that parents of the infants appreciated the process.

This intervention and DNP QI project took a paper discharge checklist and revised it using evidence-based research to improve the discharge preparation for NICU infants. By imbedding the discharge checklist into the EHR, this function will be able to last beyond the post-implementation phase. Unit leadership and staff have implemented the discharge checklist into everyday workflow. Through early identification of medical goals and discharge needs, team members can utilize this checklist to track tasks and ensure discharge tasks were completed to allow patients a timely discharge. Research has presented positive outcomes by using imbedded discharge checklists in various populations. Future research should focus on neonatal populations to improve strategies and methods to enhance the effectiveness of the discharge checklist and the discharge process.

A review of the literature supported the premise that using a discharge care bundle improved discharge readiness, this QI project piloted and implemented a revised discharge checklist into the EHR. However, future QI projects should focus on additional details regarding the discharge bundle, such as improved discharge teaching handouts for parents to enhance discharge planning. With the support of national organizations such as AAP, NANN, and AHRQ

health care professionals can continue to strive to improve NICU care through successful transitions, multidisciplinary care in a family-centered environment.

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Appendix A

Evidence Review Table

Evidence Based Practice Question (PICO(T): In infants less than 36 weeks in NICU, will standardization of the discharge planning process using a revised discharge checklist and tools (bundle) lead to improved discharge teaching, reduced delays and outcomes when compared to current discharge planning? (following the DNP project timeline)							
Author(s), year	Study objective/ intervention or exposures compared	Design	Sample (n)	Intervention	Outcomes studied (how measured)	Results	Level of Evidence Rating
Auger et al., 2015	Seamless Transitions and (Re) admissions Network: STARNet participants are experts in pediatric medicine and QI/research	AAP supported report regarding hospital-to-home transitions.	Advisory committee	<ol style="list-style-type: none"> 1. Review current knowledge regarding hospital-to-home transitions 2. Outline challenges of measuring/reducing readmissions 3. Address research gaps and provide measures for quality 	Reviewed examples of efforts/frame work for pediatric transitions: Solutions for Patient Safety; IMPACT; Pedi-BOOST; Children's Hospital Association	Provided potential hospital-to-home transition measures: health care utilization safe medication, Rx after discharge, caregiver assessment, Coordination of care, home health, etc.	VII B
Drake & McBride, 2017	Development of an acute medicine discharge checklist (AMDC) and a two-licensed day of discharge pause (DPP).	Qualitative Quality Improvement: Both the AMDC and the DPP were developed using the Plan-Do-Study-Act (PDSA) cycles.	From March-October 2015, 1125 patients N=1064 were evaluated using the AMDC/DPP	The AMDC was started on the day of admission. The AMDC was updated as needed, then the two days before discharge the AMDC was again utilized and on the day of discharge the DPP was initiated to review the AMDC for completeness.	Data collected was the rate of compliance with the tools, how many safety issues were found using the tools.	From the 1064 patients with completed (80%) AMDC/DDP, 147 patients, or 14% had patient safety issues identified before being discharged. By using the tools, 167 patients were identified as having safety concerns before they left the hospital/day of discharge. The tool showed a sustainability rate of 73% post intervention period (OCT 2015-JAN 2016). With reinforcement, the compliance went from 73% back to 81% from JAN-MAR 2016. Limitations: no p-value/statistical significance reported	VI B

Fisher, Rosenbluth & Shaikh, 2013	Pedi BOOST	QI guide designed to facilitate the implementation, evaluation and maintenance of the Pedi-Boost Toolkit, adapted from Project BOOST for use of discharge procedures and processes in pediatric populations.	Guide	Better Handoff to Home through Safer Transitions Implementation Guide	Improve the quality of care through safer transitions in the discharge process.	Wu et al., (2016) describes one study that uses the BOOST framework in multiple Children's hospitals. Implementation guide: adapted from Project BOOST developed and adapted for pediatric use.	VII B
Gabriel, 2017	Using a standardized daily discharge goal checklist to decrease discharge time and improve patient satisfaction	Qualitative study design	N=65 medical inpatients	N=36 a goal checklist was provided to Intervention group; N=29 no checklist.	Patient satisfaction and decreased time from medically stable/ready for DC; actual discharge; improved discharge education	LOS/time from when patients were ready for DC and actual discharge was 2.2 and 5.4 hours between intervention/control group. Overall patient satisfaction was reported as high for both groups and statistically similar with a p value of (p>0.05). Limitations, needs further analysis/data.	VI B
Garg, Lee, Evans, Chen, & Shieh, 2015	Development and Evaluation of an Electronic Health Record–Based Best-Practice Discharge Checklist for Hospital Patients	Cluster randomized trial using two teams were randomized each month to use the EHR checklist. The content of the checklist was best-practices from a comprehensive literature search and relevant resources.	N=60 participating physicians at Stanford University Medical Center with 700 interns/residents and 2100 medical staff.	Evidence –based checklist was implemented into the EHR and could be found using a smart-phrase. Residents could use the smart-phrase anywhere in the patient's chart, including the daily flowsheet/notes.	A survey was sent to 109 residents and had 76 participants (69.7% response rate). Survey included usefulness of checklist, interest in using an EHR checklist and increased use. Improved collaboration between providers and	In phase IV: July-Nov 2013, results were 23 EHR checklist users and 12 paper users (p=0.019) and higher checklist integration with work flow (p=0.014), usefulness of checklist (p=0.041) and discharge confidence (p=0.029), discharge efficacy (p=0.056). Increasing EHR checklist was correlated with usefulness (r=0.87, p<0.001), confidence (r=0.81, p< 0.001) and efficiency (r=0.87, p< 0.001).	II B

					other team members. Improved quality of patient care and safety.		
Ingram et al., 2017	Does family-centered neonatal discharge planning reduce healthcare usage?	Qualitative before and after study analyzes effects of the intervention during two 11 month periods before and after implementation.	N=245 families, infants without major anomalies born at 27-33 weeks' gestation admitted to a NICU participating unit and their families. Phase 1 and 2.	Family centered discharge packet was given to increase the parents' involvement in care and to understand their baby's needs, progress and estimated discharge date.	Measurement by a Perceived Maternal Parenting Self-Efficacy (PMPS-E) scores, infant length of stay (LOS) and healthcare utilization for eight weeks post discharge.	Families reported the Train-to-Home packet/program improved understanding of infant's progress and prepared them for discharge. PMPS scores did not improve statistically, but the number of post-discharge visits to a ED decreased from 31% to 20% with a statistically significant reduction of healthcare expenditures. In both studies infants were discharge home more than 3 weeks before their estimated discharge date (EDD) and no increase in LOS occurred. Limitations: no p-value/statistical significance reported	VI B

Kramer & Drews, 2017	Systematic review of electronic checklists that are used in health care systems.	Qualitative 15 studies were included: most common was pre-post implementation (N=11), four experimental studies	Nine studies involved record review to assess impact of the intervention (e-checklist); three studies used observational methods; three studies were simulator-based interventions/studies (three included participant survey)	Four types of e-checklists were evaluated in the 15 studies: unstructured laundry list, criteria of merit, sequential checklist and flowchart/diagnostic. With each type of checklist, the characteristics, benefits, requirements/limitations were examined.	Majority of studies reviewed/measured the clinician adherence pre/post implementation (human performance), measure of operator reliability; three measured the impact on patient outcomes.	<p>Fourteen of the fifteen studies showed a benefit of using an e-checklist with either/both clinical outcomes/adherence outcomes).</p> <p>Benefits included: user satisfaction, significant improvement in clinical documentation, mixed benefit with data capture/no change in workflow/performance.</p> <p>-One study showed 80% adherence, reduced costs, no increase in infection rate.</p> <p>-Another study showed 95% of staff felt checklist was useful.</p> <p>-Two studies reported in positive changes in clinical outcomes.</p> <p>Limitations: no p-value/statistical significance reported. Most of studies were in Anesthesiology.</p>	V B
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Mallory, Osorio, Prato, DiPace, & Schmutter, (2017)	Pilot Project IMPACT: implementing a Transition Bundle, Hospital to Home for NICU patients	Quality Improvement-research collaboration project	N=2601 patients; 1394 post-discharge follow up phone calls. Four pilot sites: Mission St. Joseph's Hospital, Rockville Memorial, University of Minnesota, Children's Hospital of Providence, Yakima Valley Memorial Hospital	Groups developed and implemented site specific potentially better practices (PBP) with their discharge planning. 1. easy to use toolkit 2. restructure multidisciplinary rounding/oral and written communication tools 3. revise family education tools 4. measure and analyze staff and patient satisfaction 5. analyze and improve communication/documentati on of providers/transfers into community/pediatrics	Measurement was through self-assessment and staff/family surveys PDSA framework-monthly conference calls/family phone calls	Patient phone contact rates were 69% throughout the study. Teach-back assessment and documentation improved from 18% to 82%. Pediatric discharge bundle was implemented and had positive benefits in all process measures and family home care/patient satisfaction. Limitations: Variation in successful implementation of technology-based support/education for families, due to internet access among facilities. no p-value/statistical significance reported.	IV B
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Mandyam, Krishnan, Hooper-Evans & Shieh, (2016)	Implementing a standardized provider-centered discharge checklist into the EHR.	Qualitative QI project with intervention/control groups with randomization of what teams would receive reminders to use the smart phrase.	N=269 Intervention group (60%) patient encounters; N=179 Control group (40%) encounters during pilot timeframe.	Implement a standardized discharge checklist into the EHR/EHR that was provider centric. Created a dot-phrase/smart phrase in EHR.	This pilot testing focused on receiving qualitative feedback on the discharge checklist from participating providers. Five-week period where data was collected on which group used the EHR discharge checklist.	Intervention group had 269 encounters, were more likely to consult with pharmacists for medication education than control group (30% versus 14% of encounters; $p<0.001$). No significant differences in LOS from either group. Intervention group voiced they liked viewing and editing the discharge checklist in their notes. However, the intervention group stated that early/am task reminders would be helpful in their discharge planning.	V B
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Shermont, Pignataro, Humphrey, & Bukoye, (2016)	Reducing Pediatric Readmissions: implementing a discharge bundle with patient/family teach-back methods	Quality Improvement process: implementing a discharge bundle with patient/family teach-back methodology to reduce unplanned readmissions of 7 and 30 days post discharge.	Patients 16 Inpatient units participated in study, two inpatient units were piloted using PDSA over six months. Hospital wide dissemination occurred over seven months.	Phase 1: 2 units (pilot) Phase 2: 5 units (RCA done at this time) Phase 3: 7 units Phase 4: 2 additional, 16 total/data management and analysis team roll out. Intervention was a discharge bundle combined with patient/family teach-back; standardized handoff for providers/staff. PDSA model 1. matching Med-Rec from EHR to discharge summary 2. Family verbalization of contacts for care/pediatrician/lactation/community resources 3. Verbalization of complete discharge plan (family) 4. Scheduled follow-up appts for patient.	Ten patients and families were interviewed per week, prior to discharge on each unit to evaluate compliance of bundle.	3044 patients (1701 in the pre-intervention/pilot sample, 1343 in post-intervention sample) were readmitted within seven days post-discharge. Readmissions over 30 days were 5900. Regression analysis showed decline in readmissions over study, 7-day readmission rate with ($p < 0.05$). Monthly 7-day readmission rate was reduced by 0.37 %, from 4.18% pre-intervention/3.18% post-intervention. Thirty-day readmission rate decreased 1.07 % points from 9.85% to 8.78% ($p < 0.05$). Study period improved bed-capacity. Total days saved on all 16 in-patient units 795 days.	IV B
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Stelfox et al., 2015	Systematic review of studies that assessed the discharge process among ICUs/facilitator s/ barriers of care.	<p>N=224 articles were reviewed; original research studies (n = 131, 58%) case series (n = 51, 23%), cohort (n = 35, 16%), or cross-sectional (n = 29, 13%) designs.</p> <p>The non-original research articles (n = 93, 42%) narrative reviews (n = 26, 12%), guideline/policy documents (n = 25, 11%), opinion pieces (n = 23, 10%), and editorials (n = 19, 8%).</p>	Study population/# of articles N=126 adult; pediatric N=12; neonatal N=72; not reported N=14	<p>Review included four phases during care: patient readiness; planning for discharge; execution of discharge; and post-discharge follow-up. Most articles focused on the IOM quality-of-care dimensions/patient centeredness. Fewer focused on efficiency, timeliness, equality of care during DC. N=48 articles focused on Standardizing the DC process; N=49 focused on planning for DC; N=35 focused on timelines of DC (time of day/delay in DC). N=10 looked at delays in DC.</p> <p>*****N=11 articles including NICU looked at Guidelines and checklists to standardize DC. N=1 looked at pt. questionnaires.</p>	<p>This systematic review found themes and factors that were summarized as N= counts and proportions operating Statistical Package for Social Sciences (SPSS). Quantitative studies were assembled by outcome measures. Methodologic and contextual factors (setting, population, phase of discharge) were assessed to explain variability in study results. Qualitative studies were assessed by identifying the key outcomes and themes presented by each report. Non-research articles were assessed by</p>	<p>This systematic review found many common themes that included: complete/accurate information to facilitate DC; family needs; role of educating pt.'s/families; facilitators and barriers to care; use of guidelines/policies to standardize practice. Forty-seven tools were evaluated for readiness. QI is needed to “reengineer” the structure/process of pt. DC.</p> <p>Limitations: no p-value/statistical significance reported.</p>	V B
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					recognizing the key themes. Analysis focused on finding the connection of key concepts between articles and filtering them to identify core topics.		
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Thongprayoon et al., 2016	Effects of an electronic checklist and outcome on the provider workload, errors and their performance.	Simulation-based QI study that was piloted at an academic tertiary hospital.	Twenty-One Intensive Care Unit providers participated and each completed checklist on six ICU patients.	Twenty-One providers completed checklists on 126 patients. Three using an electronic checklist and three using identical paper checklists.	The outcomes measured for the 21 providers were workload using the NASA-TLX (task load index), checklist errors and time to complete the checklist.	Results generated 63 electronic and 63 paper checklists. The median NASA-TLX score was 39 for the electronic checklists assessed and 50 for the paper checklists (p=0.005). Median checklist errors were as follows, 5 for the electronic group and 8 for the paper lists (p=0.003). The time to complete showed no statistical difference in time (p=0.76). Study concluded that electronic checklists significantly reduce provider error and workload and should be implemented in ICUs.	VI B
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White et al., 2014	Using quality improvement to standardize and optimize discharge efficiency	Quality Improvement initiative to reduce patient discharge to two hours of meeting all criteria. The goal was set at 80%.	Data was collected from July 2011 through April 2013, 7121 inpatient general pediatric admissions of which approximately 58% were patients admitted with one of the 11 study diagnoses.	The discharge criteria for 11 targeted diagnoses were embedded in EHR admission order sets. Providers could amend the criteria as a patients' clinical course progressed during their hospital stay. Nurses were expected to monitor patient status and place an EHR time-stamp to indicate when patient met discharge goals. If the patient didn't leave within two hours of meeting discharge goals, nurses documented the reason for delay.	The outcome measures were median and mean LOS and readmission rates before and after the QI implementation. The reason for prolonged discharge was transportation and parent/patient factors. Overall satisfaction with the care remained unchanged. The most common provider aspect of delay was variability in clinical decision-making.	Patients who were discharged within the set two-hour window significantly improved from 42% to 80% within the 18 months. The LOS decreased from 1.56 to 1.44 days; $p=0.01$), with no increased in readmission rates (4.60% to 4/21%, $p=0.24$).	VI B
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Wu et al., 2016	Quality Improvement collaborative to improve pediatric discharges.	QI project to assess impact on the efficiency of pediatric discharges using the framework from Better Outcomes for Older Through Safe Transitions (BOOST), Project Re-Engineered Discharge (RED) - Agency for Healthcare Research and Quality (AHRQ) and Institute for Healthcare Improvement (IHI).	Eleven tertiary-care facilities from the following states: CA, OH, CO, IN, NY, NU and DC from 2011-2012	Interventions were from a change package developed by a panel of experts. PDSA model was used by each facility. -Discharge planning and throughput -Improve throughput -Arrange post-discharge treatment -Communicate post-discharge plan to family/caregivers -Post-discharge support -Quality of d/c instructions -Follow-up phone call	Overall there was a significant decrease in discharge-related care failures, from 34% to 21% at the end of the year (p<0.05).	Improvements: Decrease in discharge related failures from 34-21%. Significant improvement in family perception of readiness for discharge from 85% to 91% (p<0.05). No improvement in 72 hour and 30 day readmission rates (4.5%, 6.3%, P=0.05). Limitations: additional studies need to evaluate which interventions are more effective, reduce readmissions and assess generalizability to other facilities and populations.	IV B
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Rating System for Hierarchy of Evidence

Level of the Evidence

Level of the Evidence	Type of the Evidence
I (1)	Evidence from systematic review, meta-analysis of randomized controlled trials (RCTs), or practice-guidelines based on systematic review of RCTs.
II (2)	Evidence obtained from well-designed RCT
III (3)	Evidence obtained from well-designed controlled trials without randomization
IV (4)	Evidence from well-designed case-control and cohort studies
V (5)	Evidence from systematic reviews of descriptive and qualitative studies
VI (6)	Evidence from a single descriptive or qualitative study
VII (7)	Evidence from the opinion of authorities and/or reports of expert committees

Melnyk, B.M. & Fineout-Overholt, E. (2014). *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed.). New York: Lippincott, Williams & Wilkins.

Rating Scale for Quality of Evidence

- A: High – consistent results with sufficient sample, adequate control, and definitive conclusions; consistent recommendations based on extensive literature review that includes thoughtful reference to scientific literature
- B: Good – reasonably consistent results; sufficient sample, some control, with fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
- C: Low/major flaw – Little evidence with inconsistent results; insufficient sample size; conclusions cannot be drawn

Newhouse, R.P. (2006). Examining the support for evidence-based nursing practice. *Journal of Nursing Administration*, 36(7-8), 337-40.

Appendix B

Pre- Implementation Questionnaire

Survey Monkey ® Questions-Pre-Implementation (N=22)							%
1. Do you address the discharge checklist daily with parents and staff?	Yes						40.91%
	No						27.27%
	Depends on Census						4.55%
	Other						36.36%
2. How do you document your status update/completed items form your discharge checklist?	In EPIC						54.55%
	On whiteboard						18.18%
	On paper checklist						0% %
	Other						27.27% %
3. Would a standardized process aid in the discharge process?	Yes						95.45%
	No						4.55%
4. When do you start addressing/discussing discharge needs?	On Admission						50.09%
	When the provider is discussing discharge/2-3 days of discharge						4.55%
	When the discharge order is written						0%
	It depends on census						0%
	Other						36.36%
5. I am satisfied with the current discharge process overall? (0 low, 10 high)		60.00%	40.00%	0.00%	0.00%	0.00%	
	0-3	3	2	0	0	0	
	3-6	27.27%	9.09%	27.27%	9.09%	27.27%	
		3	1	3	1	3	
	7-10	25.00%	0.00%	50.00%	25.00%	0.00%	
6. Do the providers discuss discharge readiness on daily rounds?	Yes						52.38%

No	19.05%
Other	28.57%

7. Would adding discharge readiness tasks in EPIC assist with viewing completed checklist items/improve communication?

Yes	86.36%
No	0%
Other	13.64%

8. How do you document the parent education teach-back, or understanding of teaching?

EPIC	77.27%
Note	9.09%
I don't	0.00%
Sometimes	4.55%
Verbally	
Other	9.09%

9. What is one area that you see needs improvement with the current discharge process?

See comments below

Question Comments:

1. Depends on where the baby is in their stay, how close they are to discharge
 It depends on the gestational age of infant and infants medical status
 If the parents are here on nightshift and the infant is within a week or so of going home, otherwise I don't because a lot of information the parents seem not able to retain if done too early.
 It depends on gestational age of baby
 During nights- we may not see any parents
 If the parents are present during my shift and my assignment allows time for this.
 Depends on the gestation of the baby. Would not start this on a 24 weeker
 It depends on the baby. If new micro, no. Baby on RA and POing some, yes if parents present

2. EPIC and on the white board
 Kardex
 EPIC and Kardex
 In EPIC AND on the Whiteboard
 Kardex
 EPIC and new white boards

4. Depends on patient status, if a 23-24weeker i do not address on admission, if a 32-35 weeker i start on admission.
Generally on admission depending on gestational age and medical status
On admission except for micros, probably when baby is weaning out of isolette/getting off resp. support.
Depends on gestational age and condition of infant.
General discharge goals on every baby on admission, but specifics would depend on gestational age.
Depends on admission date, expected loss
At admission for a full term/low acuity infant only
It depends on the infants status

5. Difficult to figure out what circle to complete, I give the discharge process a 8
It works when everyone starts the process asap
like a detailed written guide on teaching needed, PKU etc.

6. Yes, but sometimes the rush to "normalize" the patient makes for a hectic discharge
I work nights but on the days I have worked, they seem to address readiness if the infant is getting close to going home.
I work nightshift and do not attend rounds.
sometimes
I work nights, but it appears they do from info I get from bedside report
Yes when appropriate

7. It depends and on how it is set-up and ease of use.
Well covered in bottom part of sbar
Completed tasks are on EPIC and people still don't pay attention to it

8. How do you document the parent education teach-back, or understanding of teaching?
In Epic under education, it isn't a flowsheet or note

9. Having staff document teaching in epic
Make it easier to tailor to individual patient. Not all patients need the same things and yet we have to chart on many things which may not be applicable.
It is difficult to keep track of completed teaching as some nurses are not doing it or charting it as completed.
Having all nurses discuss discharge each shift

Multi-disciplinary education (PT, OT, SLP should be included in standard process/checklist for all babies with therapy orders)

It would be helpful if education on discharge begins on admission. Some nurses do this but not all.

Parents being prepared and on time for discharge. Parents visiting enough for extended periods of time that they are comfortable with cares and do well with feeding their babies.

it can take a long time for the providers to write the orders, monitor training.

The Providers should be the ones to go over the discharge instructions with the parents. This would allow the staff to address other any unfinished educational needs.

it would be great if the videos that were viewed would flow into a report that we could look at and then document.

teaching needs to be address and documented before dc day and pictures need to be addressed before discharge day

PEOPLE DON'T DO TEACHING ON A REGULAR BASIS AND THEY DON'T DOCUMENT WHAT'S BEEN DONE. Every day a parent comes in, they are taught something, so it should be documented.

More iPads More electronic-interactive teaching Less paper

Seeing all the discharge teaching that was done and what needs to be done all on one page

Discharge Planning needs to be addressed EVERY day. If there is something that can be done for discharge, it should be. A discharge class for parents might be helpful.

communication

Parents not present on a consistent daily basis to prepare for discharge

Appendix C

Training and Education Plan

Topics/Tasks/Roles and Responsibilities	Objectives/Deliverables	Method of Instruction	Time Spent	Method of Evaluation
Champion training and DNP student role	<p>Oversee the implementation of the project</p> <p>Address barriers to IT implementation of EHR Checklist</p> <p>Provide expertise and support to staff</p> <p>Ensure patient privacy is protected during implementation and during audits</p> <p>Participate in staff and leadership meetings</p> <p>Ensure Quality Committee is updated on project status</p> <p>DNP student will provide deliverables, tasks and timeline for the project</p> <p>Review proposed EHR Discharge Checklist and documentation with unit leadership</p>	In person	1-2 hours	Feedback
Staff training	<p>Present a PowerPoint presentation and go-by of step-by-step use of EPIC EHR checklist</p> <p>Staff will be checked off in Competency assessment on use of tool/EHR Checklist in EPIC</p> <p>Staff will understand project aim and plan</p> <p>Staff will participate in PDSA cycles</p>	<p>In person and email using PowerPoint presentation</p> <p>Using audit/competency check off</p>	30+ min then weekly emails	Feedback in person and through emails

Post-Implementation plan	DNP student will continue to coach project for sustainability. Continue to assess, compile and analyze data for sustainability, barriers and successes.	In person and email Using audit forms and Survey Monkey ®	Weekly	Feedback
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Appendix D

EHR Discharge Checklist

group Add LDA + LDAAvatar Cascade Add Col Insert Col Hide Device Data Compact Log File Reg Doc Graph Detail Gg to Date Values Refresh Legend Chart Correction Data Validate Log Lines

NICU & Newborn Intal... NICU PCS **NICU Discharge** Newborn Transition Fl... IV Assessment Blood Administration NB PCS NICU/Newborn Admissio... Hearing Screen Newborn Intake/Output NICU Adr... NICU Discharge

Accordion Expanded View All

Admission (Current) from 10/20/2018 in NICU

	10/20/18	10/21/18	10/23/18	Last Filed
	1421	1853	2100	2200
Newborn Screening				
Critical Congenital Heart Defect Test Result			pass	pass
Hearing Screen Date		10/21/2018		10/21/2018
Hearing Screen, Left Ear		passed		passed
Hearing Screen, Right Ear		passed		passed
Eye Exam Date				
Eye Exam Follow Up Date				
RSV Prophylaxis Synaxis Form				
Car Seat Testing Results				
Newborn Discharge Preparation				
Birth Certificate Completed				
Affidavit of Parentage Completed				
Pediatrician's Name				
Home Monitor				
Home Monitor Teaching Completed				
Home Health Needed?				
Prescriptions/Supplies given				
Prescriptions/Medications Validation				
Parent/Guardian Vaccine Consent	Obtained to giv...			Obtained to ...
Two Month Imm. Consent				
Circumcision Consent				
Circumcision Date Completed				
Metabolic Screening				
Metabolic Screen Date				
Metabolic Screen Form Number				
Metabolic Screen Date #2				
Metabolic Screen Form Number 2				
Metabolic Screen Date #3				
Metabolic Screen Form Number #3				
Metabolic Screen Date #4				
Metabolic Screen Form Number #4				

10/23/18 2200
Critical Congenital Heart Defect Te...
Select Single Option (F5)
pass
failed
failed, need to repeat
medical override (NICU)
other (see comments)
Comment (F5)

10/23/18 12:11 PM

Appendix E
EHR Audit Tool

Audit done by: _____

Date: _____

Chart # /name/admit date	Estimated Gestation Age (EGA) of NICU infant	Use of EHR Discharge Checklist Yes=1, No=2, N/A=3	Was the discharge checklist used on day of Admission=1/0, Used after admission, but before discharge-2, Used only on day of discharge=3	Day and Time of Discharge	Notes and Comments:
1					
2					
3					
4					
5					
6					
7					
8					

Appendix F

Charge Nurse
Potential NICU Discharges

Date: _____

Potential Discharge Date	Pt Name	Discharged Home Y/N Notes or comments below:	
		Discharge Time	Reason for D/C time past 1500

Note: this tool will be for the project champions/Charge Nurses to fill out which NICU infants are eligible/have the potential for discharge POC: Tara Stoudt, Andrea Shafer (DNP student)

Appendix G

Competency check-off for Clinical Staff

RN #	Correct Use and Demo of EHR Discharge Checklist in EPIC Yes=1, No=2	Notes:
1		
2		
3		
4		
5		
6		
7		
8		

Appendix H
Results Tables and Graphs

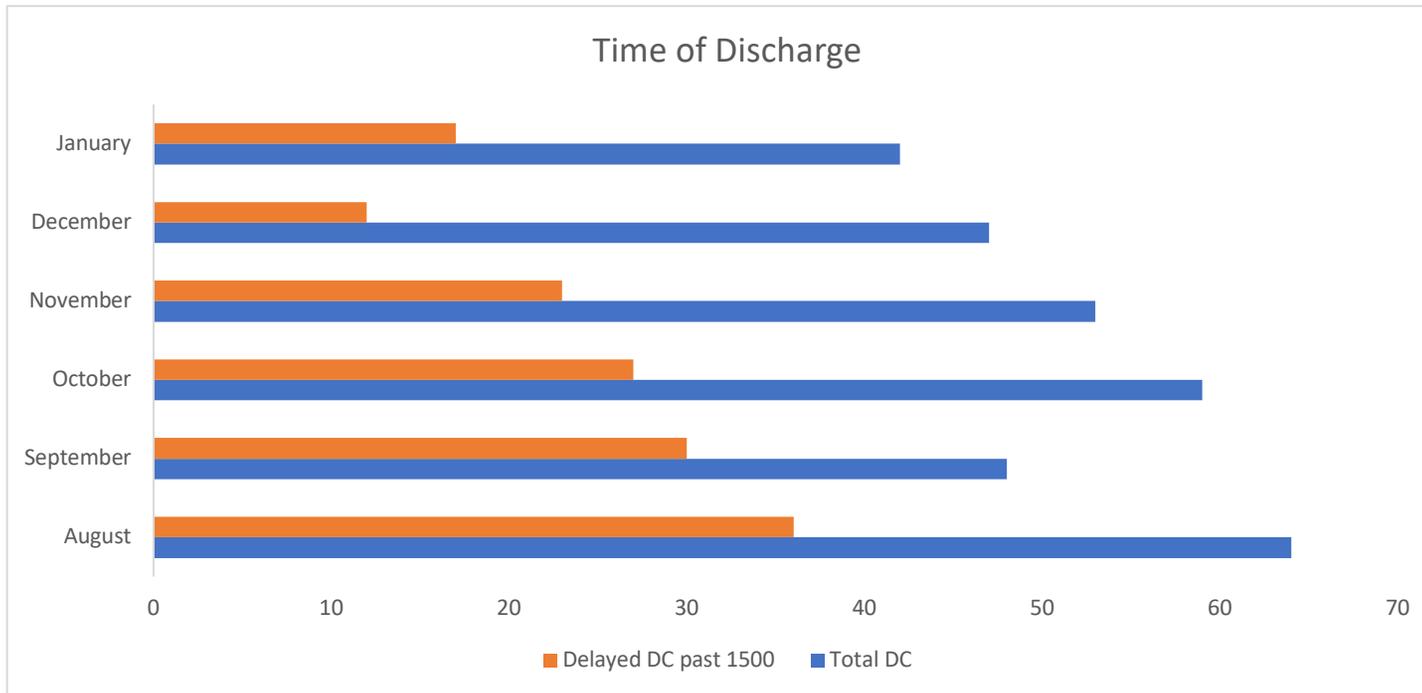


Figure 1. Total Discharges and Goal Discharges

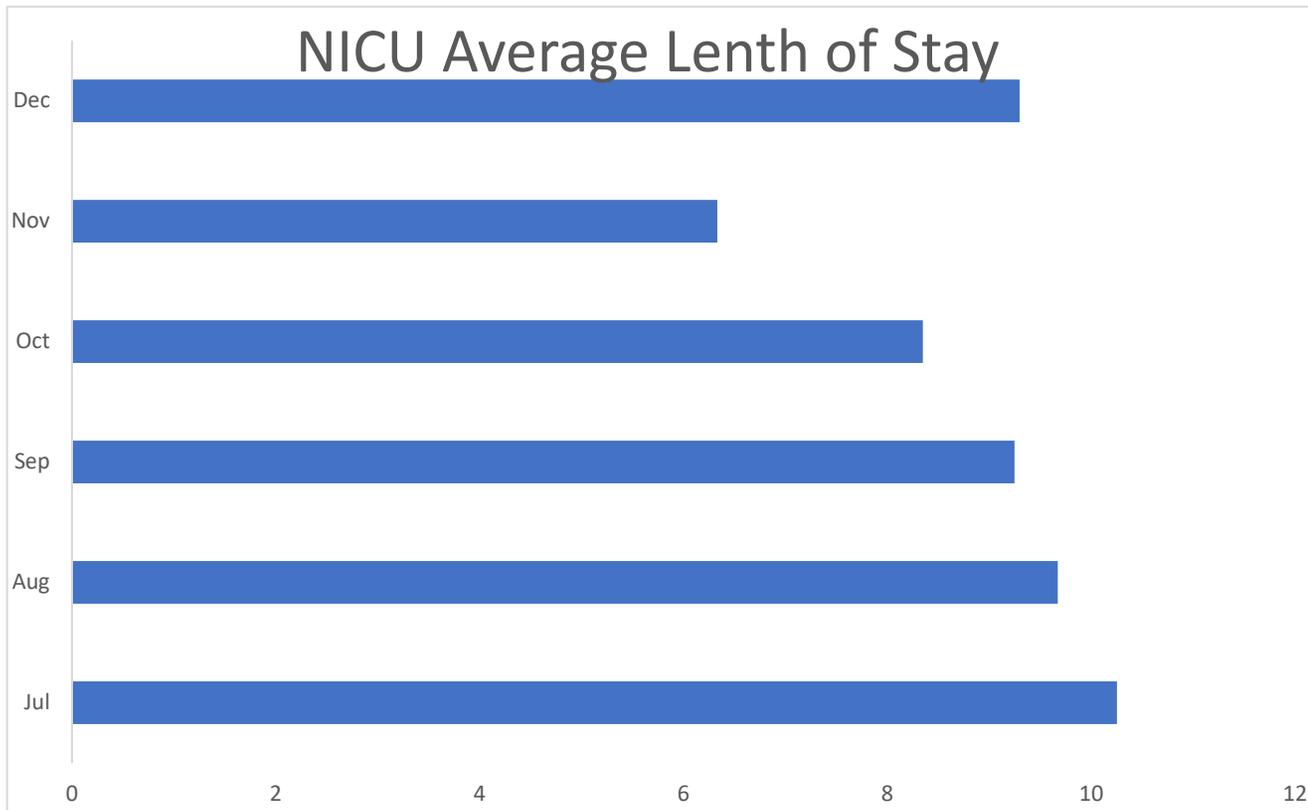


Figure 2. ALOS Pre and Post-Implementation