

Development of an Antepartum and NICU Acuity Tool to Help You Meet the 2022 AWHONN Staffing Standards

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Staffing Standards Task Force

- In June 2019, a task force was convened to review the 2010 AWHONN Staffing Guidelines and update as needed.
- Task Force Members:
 - Cheryl Roth, 2019 AWHONN President, Co-Chair
 - Kathleen R. Simpson, Co-Chair, Member of the 2010 Guideline Development Team
 - Sandy Hering, Nurse Informaticist
 - Gay Landstrom, Nurse Executive
 - Audrey Lyndon, 2019 AWHONN Board Member
 - Janice Tinsley, Staff Nurse/Charge Nurse
 - Julie Zimmerman, AWHONN BOD Secretary/Treasurer, Nurse Leader
- AWHONN Staff Nurse Leader
 - Catherine M. Hill, Senior Director of Nursing Education, Research, and Practice

Staffing Standards Task Force

TIMELINE:

- ▶ June 2019 – Initial Staffing Task Force meeting
- ▶ August 2019 – Member Survey
- ▶ September – January 2019 – Evaluation of Survey, Literature Search
- ▶ January – April 2020 – Initial Draft of Standards
- ▶ May – April 2021 - COVID break
- ▶ Work Proceeds, re-evaluation of literature continuously forward
- ▶ January 2022 – Finalization of Standards Document, to publisher
- ▶ April 2022 – Stakeholders Summit
- ▶ May 2022 – Meeting with CMS
- ▶ May 2022 – Nursing Leadership Summit
- ▶ June 8, 2022 – Standards distributed to AWHONN members

(AWHONN, 2022)

“How a society treats its female population reflects the quality of life in that society. One can assess the overall human condition of a society by the amount of resources dedicated to the well-being, education, and equal civil status of women. Maternal mortality statistics are one of the most direct indicators of the importance governmental and nongovernmental institutions direct toward the well-being of women. Birth is in the most direct interest of a society. Ensuring safe pregnancy and safe birth should be a priority to the safety and protection of its citizenry just as important as internal law and order, border integrity, and disaster protection and response.”

Guy I. Benrubi, in “The Difficult Cesarean Delivery: Safeguards and Pitfalls”, 2021, Lippincott Williams & Wilkins.

Standards for Professional Registered Nurse Staffing for Perinatal Units: Content

- Executive Summary
 - Synopsis of Staffing Ratios
- Background
- Evidence
- Staffing by Patient Type and Clinical Situation
- Appendices

(AWHONN, 2022)

Executive Summary

Designed to support the adoption of Standards at the C-suite level

Background and Evidence

Strong evidence with over 1,000 articles reviewed.

- Introduction
 - Background
 - Ancillary and unlicensed personnel
 - Standards and guidelines from other organizations
- Principle-Based Staffing
- Nurse Staffing by States
- Nurse Staffing and Patient Outcomes
- High Quality Evidence Supports Standards

(AWHONN, 2022)

Patient Type or Clinical Situations

- Obstetric Triage
- High-Risk Antepartum Care
- During Labor
- During Labor with No Intervention/No Pain Relief
- During Labor Receiving Oxytocin
- During Labor with Regional Anesthesia
- During Labor with Medical or OB Complication
- During Vaginal Birth
- During Immediate PP Recovery (Vaginal) Mother and Baby
- During Cesarean Birth
- Post anesthesia Care After Cesarean Birth: Mother and Baby
- Mother-Baby Care
- Babies Requiring a Higher Level of Care
- Minimum Staffing
- Contingency Planning

(AWHONN, 2022)

Patient Type or Clinical Situations

Each patient type/clinical situation is described beginning with the background:

TABLE 2 STANDARDS FOR PROFESSIONAL REGISTERED NURSE STAFFING FOR PERINATAL UNITS BASED ON PATIENT TYPE AND CLINICAL SITUATION

Patient Type or Clinical Situation: *OB Triage*

Background

OB triage is a process that occurs in the ED and/or the perinatal unit. Many perinatal services have OB triage units or OB ED units designed specifically to evaluate pregnant women who present to the hospital for care. While labor at term, scheduled labor induction, or scheduled cesarean birth are the more common reasons pregnant women come to the hospital, many women present earlier in pregnancy with a variety of obstetric or medical complications (Angelini & Howard, 2014). There are no standards or guidelines for weeks of pregnancy that delineate whether a pregnant patient who presents for care at the hospital is seen in the OB triage unit or ED. Some units have policies and protocols for a greater than or equal to 20 weeks gestation time frame, while others will see women very early in pregnancy. Leaders in each institution determine the location for the OB triage process based on consideration of capacity, workflow, physical space, and staffing. Requirements for the OB triage process are the same regardless of the location in the hospital where it takes place. Ideally, there are written guidelines developed in collaboration with nurse and physician leaders of other departments that outline the appropriate unit to evaluate maternity patients based on obstetric and medical conditions, gestational age, labor status, presenting symptoms, and available health care personnel, including perinatal nurses (AAP & ACOG, 2017).

Women who present for OB triage represent an appreciable amount of patient volume and nurse staffing hours in many perinatal services. This number can range from a ratio of 1.2 to 1.5 to the overall birth volume (e.g., a perinatal center with 100 births per month can expect to see 120–150 women presenting for OB triage per month; a perinatal center with 500 births per month can expect to see 600–750 women presenting for OB triage per month). These numbers do not include patients scheduled for antepartum testing; however, some perinatal units also function as antepartum testing/procedure units caring for patients requiring nonstress tests, limited ultrasounds, and/or external versions. Some perinatal units do not have gestational age limits on patients who can be seen, so patients in early pregnancy are included, such as in an OB ED. In such situations when the OB triage unit functions as an antepartum testing/procedure unit or an OB ED and/or pregnant patients are seen earlier than 20 weeks gestation, the ratio of OB triage patients to births is much higher.

(AWHONN, 2022)

Patient Type or Clinical Situations

Then detailing existing standards and guidelines from professional organizations as the rationale for the 2022 Standards:

Existing Applicable Professional Standards and Guidelines

- The Emergency Medical Treatment and Labor Act (EMTALA) imposes specific obligations on health care providers who offer triage care (a) to perform a medical screening examination to determine whether an emergency medical condition exists (including both the mother and the fetus); (b) to provide necessary stabilizing treatment when an emergency medical condition exists; and (c) to stabilize the patient or, if the health care provider certifies that the

Staffing Standards

- **The initial triage process (10–20 minutes) requires 1 nurse to 1 woman presenting for care. This ratio may change to 1 nurse to 2–3 women as maternal-fetal status is determined to be stable, until patient disposition.**

(AWHONN, 2022)

Minimum Staffing

- ▶ 2 nurses are required in the hospital as minimum staffing, even when there are no perinatal patients; 2 nurses are needed to be able to safely care for a woman who presents with an obstetric emergency that may require cesarean birth (1 nurse circulator and 1 baby nurse, one or both of whom should have obstetric triage, labor, and fetal assessment skills; the baby nurse must be skilled in neonatal resuscitation as per the AAP and AHA [2021] Neonatal Resuscitation Program). A scrub nurse or obstetric/surgical technician should be available in the hospital or on call such that an emergency birth can be accomplished in a timely manner consistent with the patient's clinical situation. Another labor nurse should be called in to be available to care for any other patient who may present while the first 2 nurses are caring for the woman undergoing cesarean birth and during postanesthesia recovery period.

(AWHONN, 2022)

Contingency Planning

- ▶ A contingency plan for all shifts that may include an on-call system should be in place to cover situations when existing staffing is inadequate.
- ▶ Hospitals providing Level II, Level III, and Level IV neonatal services and maternity services should determine criteria for temporary diversion of patients when there is not capacity to accept and treat further patients.
- ▶ Elective procedures such as repeat cesarean birth for women not in active labor, elective labor inductions, postpartum tubal ligations, circumcisions, etc. should be deferred until there are adequate nurses to safely meet the needs of the service. This may also include discontinuing the oxytocin infusion for women having elective labor induction.

Appendices with Acuity Grids and Implementation Tools

- Appendix A: Perinatal Acuity Grids
- Appendix B: Nursing Staffing Gap Analysis Tool
- Appendix C: Predictive Labor-Birth-Recovery Unit Staffing Model Tool and Worksheets
- Appendix D: Temporary Nurse Staffing Contingency Plan Due to Unexpected Increases in Census and Acuity
- Appendix E: Example of an OB Overcapacity Trigger Grid
- Appendix F: Example of an OB Disaster Plan
- Appendix G: Example of a Neonatal Disaster Plan
- Appendix H: Examples of Nurse Staffing Assignment Grids by Hospital Level of Maternal Care

(AWHONN, 2022)

Perinatal Acuity Tool

Appendix A: Perinatal Acuity Grids

| Perinatal Acuity: Antepartum and Postpartum | | | | |
|---|------------------------|---|------|---------------|
| Level | Nurse-to-Patient Ratio | Type of Patient / Clinical Situation | Gaps | Nurses Needed |
| A | 2 to 1 | Critically ill, hemodynamically unstable | | |
| B | 2 to 2 | Birth (cesarean or vaginal) and immediate recovery period 30 to 60 min until the critical elements are met for both mother and baby, then 1 nurse to 1 mother-baby couplet (2 patients) in continuous bedside attendance for the remainder of the 2-hour recovery process | | |

(AWHONN, 2022)

Nursing Staffing Gap Analysis Tool

Appendix B: Nurse Staffing Gap Analysis Tool

| Date/Time | Summary of Current Staffing and Gaps | Yes/No | Gap: # of Nurses Needed |
|---|--|--------|-------------------------|
| Nurse-to-Woman Ratio Nurse-to-Baby Ratio | Patient Type/Clinical Situation | | |
| Antepartum | | | |
| 1 to 2–3 | women during nonstress testing | | |
| 1 to 1 | woman presenting for initial obstetric triage | | |
| 1 to 2–3 | women in obstetric triage after initial assessment and in stable condition | | |
| 1 to 3 | women with antepartum complications in stable condition | | |
| 1 to 1 | woman with antepartum complications who is unstable | | |
| 1 to 1 | continuous bedside attendance for woman receiving IV magnesium sulfate for the first hour of administration for preterm labor prophylaxis and no more than 1 additional couplet or woman for a nurse caring for a woman receiving IV magnesium sulfate in a maintenance dose | | |
| 1 to 2 | women receiving pharmacologic agents for cervical ripening | | |

(AWHONN, 2022)

Predictive Staffing Model Tool Templates

Appendix C: Predictive Labor-Birth-Recovery Unit Staffing Model Tool and Worksheets

For detailed instructions on how to gather and analyze these data to predict nursing hours needed for staffing and L&D, see: Simpson, K. R. (2015). Predicting nurse staffing needs for a labor and birth unit in a large volume perinatal service. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 44(2), 329–338.

Blank Worksheets

| Data Point | Results |
|---|---------|
| Ratio of patient visits to births | |
| Average number of triage visits per birth (excluding presentation for birth) | |
| Average length of stay (LOS) for obstetric (OB) triage patients | |
| Average number of nursing OB triage hours per birth (excluding presentation for birth) | |
| Percent of total patients with LOS > 36 hours on labor unit (high-risk antepartum patients) | |
| Average LOS for high-risk antepartum patients on labor unit | |
| Average number of births on weekdays | |
| Average number of births on weekends | |
| Percentage of total patients with spontaneous labor | |

Temporary Nurse Staffing Contingency Plan Due to Unexpected Increases in Census and Acuity

Appendix D: Temporary Nurse Staffing Contingency Plan Due to Unexpected Increases in Census and Acuity

At times, despite the best predictions and contingency planning, the needs of the perinatal service temporarily exceed the nurse staffing resources available. Nurse staffing needs can change abruptly in the context of patient surges, emergencies, or disaster events. Some, but not all, perinatal services have an on-call system that can be activated; however, on-call nurses may not arrive for 30 to 60 minutes. A checklist or protocol may be useful in this context because several actions are needed as soon as possible to promote safe care including obtaining additional resources and reducing care demands. In these types of crisis situations, nurses are tasked with doing the best they can while focusing on the immediate needs of the patient. A checklist or protocol may include essential steps to be taken in various situations, contact information of team leaders, and a link to the contact information for other members of the perinatal team. This is a flexible framework that can be used and applied to individual perinatal services.

Communication

Once the charge nurse is made aware of or identifies the situation, communication with the nurse manager or manager on call is essential. Maintain communication between the staff nurses, charge nurses, nurse manager, nurse director, nurse-midwives, and physicians during the process. Maintain and update a list of contact information for the leadership team.

(AWHONN, 2022)

Overcapacity Trigger Grid

Appendix E: Example of an OB Overcapacity Trigger Grid

| Green | Yellow | Orange | Lavender | Purple |
|---|---|---|---|---|
| Beds Available -normal operation -business as usual -no patient holds | Bed Availability Near Census -L&D or MB bed availability is less than current patient census -Awaiting births and discharges -No holds | Bed Availability < Census -MB couplets holding in L&D for MB bed < 2 hours -medically indicated labor inductions holding in Triage < 2 hours -non-urgent (MFTI Priority 4), scheduled (MFTI Priority 5) waiting in lobby < 2 hours | SURGE Capacity -Active labor/epidural patients in triage and/or delivered holding in L&D > 2 hours-MFTI Priority 4 and 5 lobby wait time > 2 hours -MB at capacity -L&D 1-2 beds | Disaster Capacity -No L&D beds for emergency birth -No Triage beds -MFTI 1, 2, 3 priority waiting in lobby -All MB beds at capacity, including overflow and discharges |
| NOTIFICATIONS | NOTIFICATIONS -Providers notified to expedite discharges (OBs and PEDs) | NOTIFICATIONS -Providers notified to expedite discharges (OBs and PEDs) -OB directors -Administration representative | NOTIFICATIONS -CNO/CMO notified -Providers notified to expedite discharges (OBs and PEDs) -Coordinate with sister hospital about potential scheduled patient transfers | NOTIFICATIONS -CNO/CMO notified -Providers notified to expedite discharges (OBs and PEDs) -Coordinate with sister hospital for patient transfers/emergency privileges |
| ACTIONS OB Triage transfer to L&D: -L&D charge nurse evaluates and distributes admitted patients to L&D and Antepartum -Use L&D beds for inductions | ACTIONS OB Triage transfer to L&D: -Expedite births/discharges -Move outpatients to antepartum beds -L&D charge nurse evaluates bed capacity for elective inductions | ACTIONS OB Triage transfer to L&D: -Mobilize labor patients out of triage -L&D charge nurse evaluates rescheduling scheduled outpatients -Hold elective labor inductions | ACTIONS OB Triage transfer to L&D: -Hold elective inductions -Evaluate medically indicated labor inductions for hold -Discuss with physician director L&D transfer to MB: | ACTIONS OB Triage transfer to L&D: -Hold all Inductions -Hold all elective surgery -Discuss with CNO options for alternative units |

(AWHONN, 2022)

Emergency/Disaster Planning

Appendix F: Example of an OB Disaster Plan

| Acuity Level | Patient Description | Action/Description |
|--|---|---|
| <p>Green/Low Acuity:</p> <p>Green patients moved first</p> | <ul style="list-style-type: none"> -Triage patients who are MFTI Level 5 or awaiting testing -Antepartum patients who are stable -Laboring patients prior to active labor without an epidural (ambulatory) -Delivered patients > 2 hours who are ambulatory with stable VS -Healthy newborns > 2 hours old who are stable with parent | <p>Horizontal: Patient moved ambulatory to designated area with supplies as appropriate; infants moved in crib with feeding supplies to designated area</p> <p>Vertical: Patient moved ambulatory to designated area with supplies as appropriate; infants carried with feeding supplies and transported to designated area.</p> |
| <p>Yellow/Medium Acuity:</p> <p>Yellow patients moved second</p> | <ul style="list-style-type: none"> -Triage patients who are MFTI level 3-4 -Antepartum patients requiring intermittent monitoring, stable VS -Laboring patients in active labor without epidural, may have IV infusing; oxytocin discontinued -Delivered patients 30 min to 2 hours post birth, stable VS -Healthy newborns 30 min to 2 hours old, stable VS | <p>Horizontal: Current respiratory support connected to portable oxygen tank for transport; IV pumps transported with patient via pole; transported ambulatory or in wheelchair to designated area; may need auscultation or fetal monitoring if electrical availability</p> <p>Vertical: Necessary IV pumps removed from pole for transport; those unable to manage stairs moved horizontally and then vertically as transport help is available</p> |

(AWHONN, 2022)

Sample Nurse Staffing Assignment Grids by Level of Hospital Level of Maternal Care

(AWHONN, 2022)

Maternal Level III (Labor-Birth-Recovery Unit)

| | | | | | |
|---|---|--|---|--|---|
| <p>Charge Nurse RN 20 years of experience; > 15 years as charge nurse, supervisor for 8 years</p> | <p>RN 1 25 years of experience</p> <p>1. Antepartum patient at 27 weeks gestation with COVID to be discharged today, needs NST prior to discharge. 2. Antepartum patient at 33 weeks gestation with preeclampsia 3. Antepartum patient at 28 weeks gestation with vaginal bleeding</p> | <p>RN 2 1 year of experience</p> <p>1. Labor patient at 36 weeks gestation with preeclampsia having induction with oxytocin, receiving IV magnesium sulfate, loading dose completed</p> | <p>RN 3 37 years of NICU experience</p> <p>Scheduled cesarean birth cases at 0930, 1130 & 1330; circulating baby nurse, available for birth attendance as baby nurse before and after OR cases nurse</p> | <p>RN 4 42 years of experience</p> <p>1. Labor patient having induction at 36 2/7 weeks gestation with monoamniotic/diamniotic twins</p> | <p>RN 5 23 years of experience</p> <p>1. Labor patient having elective induction with oxytocin at 39 weeks gestation, current fetal heart rate tracing Category II</p> |
| <p>RN 6 26 years of experience</p> <p>1. Multiparous woman at 38 weeks gestation at 6 cm laboring without an epidural</p> | <p>RN 7 25 years of experience</p> <p>Admission, preparation, and circulating for 39 2/7 weeks gestation repeat cesarean scheduled at 0930 and 39 weeks gestation primary cesarean birth for breech presentation scheduled at 1300</p> | <p>RN 8 38 years of experience</p> <p>1. Primiparous woman at 41 weeks gestation for misoprostol cervical ripening, no risk factors 2. NST's scheduled for am (2 Patients)</p> | <p>RN 9 4 years of experience</p> <p>1. Multiparous woman at 40 4/7 weeks gestation at 6 cm with labor epidural</p> | <p>RN 10 2 years of experience</p> <p>Coming in to work from 1100 to 1800 Circulating nurse for cesarean birth scheduled at 1130, 36 weeks gestation with hypertension, will be receiving IV magnesium Admission, circulating, and recovery for sulfate</p> | <p>RN 11 35 years of experience</p> <p>Coming in to work from 1110 to 1930 Will be assigned to OB triage and the first patient admitted from OB triage and afternoon NSTs as available</p> |
| <p>Other personnel: 2 OB techs; 2 CST; 1 International Board-Certified Lactation Consultant (IBCLC)</p> <p>Schedule: 4 NSTs (2 in am, 2 after 1500)</p> | | | | | |



Development of Antepartum and NICU Acuity Tools

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Acuity-based staffing
is key to optimal
nursing assignments.



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permission



Acuity

- “The severity of a hospitalized patient’s illness and the level of attention or service he or she will need from professional staff.”
(Tabers Online, 2022)





Acuity

- ❑ Acuity is not fixed.
- ❑ Acuity can change rapidly and require immediate recognition and intervention.
- ❑ The expertise of the nurse must be match to the needs of the recipient of care (ANA, 2020).





What acuity tools
are available?

- ❑ Simpson, K.R., 2013, Perinatal Acuity Tool – included in AWHONN Staffing Standards 2021 Appendix.
- ❑ Simpson, K.R., 2015, Predictive Labor-Birth-Recovery Unit Staffing Model Tool and Worksheets – also included in AWHONN Staffing Standards 2021 Appendix.
- ❑ Jones & Hall, 2022, Acuity-Based Staffing in Labor and Delivery Using Electronic Health Record Data. MCN, electronic.
- ❑ AWHONN MFTI (Ruhl, 2015a, 2015b)
- ❑ No other articles found on Literature Search using all iterations of: antepartum acuity tool or NICU acuity tool.



Nurse Driven Project



- ❑ Hospital where nurse-driven inquiry is encouraged, active research program and QI/EBP multidisciplinary team projects active and the norm.
- ❑ Level III High Risk Community hospital that delivers ~500 patients per month and has 28 NICU beds.
- ❑ Busy antepartum unit that has census that averages 4-12 patients, increasing acuity over past 10 years.
- ❑ Nurses felt need for equity in patient assignments and requested tool to assist in assessing acuity of patients on antepartum.

Antepartum Acuity Tool first draft

| Antepartum Scoring Sheet | | Rm: | Patient Name : | Date: | Shift: | | | |
|-----------------------------------|---------------|---------------------------|------------------------------|-------------------------------|---------------------------|-------------------|----------------|---------------------|
| | 0 | 0.5 | 1 | 2 | 3 | 4 | 6 | 8 |
| Status | Stable | | | Unstable | | | | |
| Vital Signs (not r/t Mag) | Routine | | every 2 Hrs | every 1 hour | more frequent than hourly | | | |
| Respiratory Status | Routine | O2 Sat monitoring | On O2@2L or less | High flow O2 to maintain sats | Requires multiple RT txs | | | |
| Fetal Monitoring | | Tones | Toco only or NST | Continuous | | | | |
| (Twins) | | | Tones or toco only | NST | | Continuous | | |
| Contraction Status | rare | irritability | > irritability | with decels | with cervical change | | | |
| Bleeding | no | | spotting/minimal | moderate/stable | | >1 pad per hour | | |
| Uncontrolled Pain | | | requires frequent assessment | | | | | |
| Medications | | | | | | | | |
| PO - # administration times/shift | 0-2 per shift | 3 to 4 admin times | 4 to 12 per shift | >12 per shift | | | | |
| IV - # administration times/shift | 0 per shift | 1-2 times per shift | | 4 IV meds/shift | 5-6 IV meds/shift | | | |
| IV lines | none | saline lock or 1 IV line | multiple IV lines | central line/PICC/port | | arterial line | | |
| Magnesium (PEC) | | | | Hours 2+ stable (q1hr VS) | | Hours 2+ unstable | Mag first hour | |
| Magnesium (PTL/NP) | | | Hours 2+ stable | | | | Mag first hour | |
| Blood Products | | | | | | Admin blood | | Massive Transfusion |
| Emotional Support | | non-English speaking | Family issues | Patient always on light | bereavement | | | |
| Diabetes | | diet only - carb counting | BSBG routine | more freq BSBG ordered | Insulin drip/hourly BSBG | | | |
| Telemetry | | | stable cardiac | | unstable cardiac | | | |
| Labs | <4 draws/day | | >4 draws/day | | | | | |
| Infectious Disease | | | PPE - minor | Complete gown and glove | COVID | | | |
| PP Recovery | | | | hemodynamically unstable | VS q 1 hr or less | | | |
| Direct Admit | | | | | | Admission | | |
| Totals | 0 | | | | | | | |
| | | | | | | | Total | |
| Nurse Using Scoring Tool: | | | | | | | | |



Antepartum Acuity Tool process

- ❑ First iteration – used by Supervisors and Director to confirm appropriateness of assignments; multiple changes made.
- ❑ Total assignment score of ≤ 10 determined.
- ❑ Second iteration – scored by RN taking care of patients and Supervisor/Director. Scoring discussed at Daily Antepartum Interdisciplinary Rounds.
- ❑ Adjustments made with input of team members.
- ❑ Content Experts from around US contacted re: willingness to evaluate tool. Content Experts sent tool and rated:



Antepartum Acuity Tool

- ❑ Dr. Curt Bay, Statistician, consulted re: methodology and minimum number of data points needed for evaluation.
- ❑ Team met to discuss tool and evaluations needed.
- ❑ Content Experts from around US identified to assess content validity.
- ❑ Content Experts asked by email to evaluate the current tool.
- ❑ Concensus met
- ❑ Interrater Reliability testing done with two nurses and a supervisor scoring each antepartum patient each shift for two weeks, scores compared.



Antepartum Acuity Tool final

| Antepartum Scoring Sheet | | Rm: | Patient Name : | Date: | Shift: | | | |
|---------------------------------|-----------------------|---------------------------|---|--|--|---|----------------|---------------------|
| | 0 | 0.5 | 1 | 2 | 3 | 4 | 6 | 8 |
| MEWT score (Vital signs) | 0/within normal range | | One parameter outside of normal range (BP>155/105 or <80/45, P>110, R>24, T>100.4, O2Sats<93, FHR>160, altered mental status, disproportionate pain.) | Two parameters outside of normal range OR Severe Hypertension Protocol initiated | >2 parameters outside normal range or 1 severe trigger, BP>160/110, P>130, R> 30, O2<90, MAP<55, nurse concern | | | |
| Respiratory | Routine | O2 Sat monitoring | On O2@2L or less | High flow O2 to maintain sats | Requires multiple RT txs | | | |
| Monitoring | | Tones | Toco only or NST | Continuous | Difficult to monitor/often intervention needed | | | |
| (Twins) | | | Tones or toco only | NST | Continuous | Difficult to monitor. Often intervention needed | | |
| Contracting | rare | irritability | > irritability | with decels | with cervical change | | | |
| Bleeding | no | | spotting/minimal | moderate/stable | >1 pad per hour | | | |
| Uncontrolled Pain | | | requires frequent assessment | | | | | |
| Medications | | | | | | | | |
| # administration times/shift | 0 per shift | 1-2 times per shift | 4 times per shift | > 5 times per shift | meds q 1-2 hours, increased nursing time at bedside | | | |
| IV lines | none | saline lock | 1 IV line | multiple IV lines | central line/PICC/port | arterial line | | |
| Magnesium (PEC) | | | | Hours 2+ stable (q1hr VS) | | Hours 2+ unstable | Mag first hour | |
| Magnesium (PTL/NP) | | | Hours 2+ stable | | | | Mag first hour | |
| Blood Products | | | | | | Blood Administration | | Massive Transfusion |
| Diabetes | | diet only - carb counting | BSBG routine | more freq BSBG ordered | Insulin drip/hourly BSBG | | | |
| Labs | <4 draws/day | | >4 draws/day | | | | | |
| Infectious Disease | | | PPE - minor | Complete gown and glove | COVID | | | |
| Other | | | | Social Issues | | Direct Ante Admission | | |
| Totals | | | | | | | Total | |





NICU Acuity Tool

- Discussion of Antepartum Acuity Tool in daily rounds prompted discussion re: current NICU Acuity Tool.
- Home-grown NICU acuity tool used, in EPIC.
- Nurses and Supervisors reported wide variations in scoring; need for revisions and study for content validity and interrater reliability.



NICU Acuity Tool as used initially (Pg 1)

| NICU Acuity Scoring | Patient Name : | | Date: | Shift: |
|--|--|---|---|---|
| | 1 point each | 2 points each | 3 points each | 4 points each |
| Respiratory Status | *Room Air | *Hood *Post CPAP x 24 hrs *High flow nasal cannula <2L | *CPAP/SiPAP *NAVA *High flow nasal cannula >2L *Noninvasive ventilator assistance needs NiPPV | *High frequency/ Oscillator *Vent (x24 hours post removal) |
| | | | *Stable conventional vent | *Unstable conventional vent |
| | | *O2 adjustment <2/hour | *O2 adjustment >2/hour | *iNO |
| | | *Nasal Cannula | | *Chest tubes |
| Cardiac Status | | | | *Cardiopulmonary resuscitation or acute pulmonary cardiac arrest *Post-code care |
| | | | | *Invasive monitoring (art line BP monitoring, external ventricular drain) |
| IV Monitoring | *PIV - TKO or Saline lock | *1-2 peripheral lines *TPN *Monitoring for hypoglycemia, dextrose rate <8 | *Titration of IV drips *Hypoglycemia requiring dextrose bolus (ie, 200 mg/kg) over 24 hours *IV fluids needed for resuscitation (eg hypotension) totaling >25 ml/kg over 24 hours | *PICC, Broviac *Umbilical lines >3 solution changes in a 12 hour period |
| Medications | *1-2 oral/other meds in 12 hrs | *3-4 oral/other meds in 12 hrs | *>5 oral meds in 12 hrs | *>5 meds/boluses in 12 hrs |
| | | | *1-2 IV meds in 12 hours *1-2 boluses in 12 hours | *Vasoactive/ sedation drips *Prostaglandin or insulin drips *Hypotension on vasopressor support (dopamine, dobutamine, epinephrine) |
| | | | *3-5 IV meds in 12 hours *IVIG infusion *3-5 boluses in 12 hours | |
| Apnea/ Bradycardia/ Desaturations | *Resolving apnea, bradycardia, desats with self recovery | *Requires intervention every 2-3 hours | *Requires intervention every hour | *Frequent apnea, bradycardia, desats requiring stimulation |
| Nutrition | *Nipple feed <15 min or gavage feed (70% of feeding is po/ 30% gavage feeding) | *Nipple feed >15 min or gavage feed (50% of feeding is po/ 30-90% gavage feeding) | *All gavage (starting to nipple/ 90% gavage feeding) *NPO | *Repogle to suction |
| | | *Nurse assisted breastfeeding/ po feed for < 30 min or 1-2 times in 12 hours | *Nurse assisted breastfeeding/ po feeds for >30 min or > 2 times in 12 hours | *TPN |



NICU Acuity Tool as used initially (Pg 2)

| | | | | |
|---|------------------------------------|--|--|---|
| Teaching Support | *1-2 hours in 12 hours | *2-3 hours in 12 hours | *>3 hours in 12 hours | *>4 hours in 12 hours |
| Lab Draws by RN | *1-2 in 24 hours | *1-2 in 12 hours | *3-4 in 12 hours | *>4 in 12 hours |
| Transfusions | | | *1 transfusion in 12 hours | *>2 transfusion in 12 hours |
| | | | *transfusion for anemia of prematurity, nonacute physiology | *Exchange transfusion |
| Infant Weight | | *<1500 grams | *<1000 grams | *<700 grams |
| Isolation | | | *Isolation per unit norm (not requiring 1:1) | *Isolation requiring 1:1 |
| | | *Fussy baby *Seizure precautions *Declining dose of oral medication in a clinically stable neonate (taper of opioid replacement therapy) | *Abstinence score >7 *Initiation or escalation of opioid replacement therapy | |
| Irritable Baby or NAS | | | | *Inconsolable baby |
| Procedures (MRI/CT/LP/PICC/Lines/etc.) | | | *Assist with procedure <1 hour (list procedure: IV restarts, extubation, radiology, chest tube insertion, UAC/UVC lines, etc.) | *Assist procedures > 1 hour (List procedures) |
| Other | *Language Barrier | *Phototherapy (bank OR blanket) | *Phototherapy (both bank AND blanket) *Jaundice requiring IVIG administration | *Seizures (EEG, video EEG) |
| | *Developmental bath | *Spitty Baby | *Ostomy care (any type) | *New admission |
| One to One | | | | *Whole body cooling |
| | | | | *ECMO |
| | | | | *post-op care |
| Thermoregulation | *Open crib (for at least 24 hours) | *Radiant warmer | *Isolette | *Admission |
| Totals | | | | |

Total Score 0

Nurse Using Scoring Tool:

| LEVELS | TOTAL POINTS | STAFFING RATIO |
|----------------------------|--------------|--|
| Neonatal 2 (Low Acuity) | 0-12 points | 1:3-4 ratio (Continuing Care) |
| Neonatal 3 (Medium Acuity) | 13-17 points | 1:2-3 ratio (IMC) |
| Neonatal 4 (High Acuity) | 18-25 points | 1:2 with low or medium as second patient (INT) |
| | >26 points | 1:1 status |





NICU Acuity Tool

- ❑ Team met to discuss tool and evaluations needed.
- ❑ Content Experts from around US identified to assess content validity.
- ❑ Content Experts asked by email to evaluate the current tool, using same content validity index as used for the Antepartum Tool.





NICU Acuity Tool

- ❑ Team met to discuss content validity feedback.
- ❑ Smaller workgroup of volunteers met to create new version with the feedback on content experts.
- ❑ Revised tool sent to content experts for further scoring of tool for content validity.
- ❑ Tool evaluated for interrater reliability with two nurses and a supervisor scoring each of 9 patients each shift, scores compared.



| | 0 | 1 | 2 | 3 | 4 |
|---|-----------|--|--|---|--|
| Respiratory | *Room air | | *Hood *Post CPAP x 24 hrs *High flow nasal cannula <2L *O2 adjustment <2/hour *Nasal Cannula *stable trach care | *CPAP/BiPAP *NAVA *High flow nasal cannula >2L *NAVA/NIPPV *Stable conventional vent *O2 adjustment >2/hour | *High frequency/ Oscillator *Vent (x24 hours post removal) *Unstable conventional vent *iNO *Chest tubes *Trach post-op days 1-7 |
| Cardiac Status | N/A | | | | *Cardiopulmonary resuscitation or acute pulmonary cardiac arrest *Post-code care/cardiac arrest x24 hours *Invasive monitoring (art line BP monitoring, external ventricular drain) *Arrhythmia requiring IV meds, defib or cardioversion |
| IV Monitoring | No IV | *PIV - TKO or Saline lock | *1-2 peripheral lines *TPN | *Hypoglycemia requiring dextrose infusion rate >8 mg/kg/min *Titration of IV drips | *PICC/Broviac *Umbilical lines *>3 solution changes in a 12 hour period |
| Medications (not to include scanning for breastmilk or formula) | None | *1-2 oral/other meds in 12 hrs | *3-4 oral/other meds in 12 hrs *1-2 IV meds in 12 hours | *1-2 boluses in 12 hours *>5 oral meds in 12 hrs *3-5 IV meds in 12 hours *3-5 boluses in 12 hours *IVIG infusion | *>5 meds/boluses in 12 hrs *Vasoactive/ sedation drips(ie: hypotension on vasopressor support such as dopamine, dobutamine, epinephrine) *Prostaglandin or insulin drips |
| A/B/Desat | None | *Resolving apnea, bradycardia, desats with self recovery | *Requires intervention every 2-3 hours | *Requires intervention every hour | *Frequent apnea, bradycardia, desats requiring stimulation |
| Nutrition | | *All gavage (starting to nipple/ 90% gavage feeding) | *Nipple feed <15 min or gavage feed (>50% PO and remainder gavage) | *Nipple feed >15 min or gavage feed (< 50% PO and remainder gavage feeding) *Nurse assisted breastfeeding/ po feed for < 30 min or 1-2 times in 12 hours | *Repogle to suction *NPO |

| | 0 | 1 | 2 | 3 | 4 |
|----------------------------------|----------|---|---|---|---|
| Transfusions | N/A | | | *1 transfusion in 12 hours for acute etiology | *>2 transfusion in 12 hours *transfusion of blood products in setting of severe acute etiology or manifestation (eg: exchange transfusion, DIC) |
| Infant Weight Gestational age | Term AGA | Late preterm | *≤1500 grams 31-34.6 weeks | *≤1000 grams 27-30.6 weeks | *≤700 grams 22-26.6 weeks |
| NAS/ESC | N/A | | *Declining dose of oral medication in a clinically stable neonate (taper of opioid replacement therapy) *NAS score average <8 | *NAS score average >8 *Initiation or escalation of opioid replacement therapy | *Rescue dose therapy *NAS >12 |
| Procedures | N/A | | *Assist with procedures totaling <1hr (IV start, extubation, CT tube insertion, PICC insertion, etc) | *Assist with procedures totaling >1hr (admission, septic workup, mult IV starts) | |
| Neuro | N/A | *Mild neonatal encephalopathy that is stable (not actively monitoring or treating) *Seizure precautions (including for NAS/withdrawal) | *Mild neonatal encephalopathy that is acute requiring monitoring (EEG) *Declining dose of antiseizure medications in a neonate no longer having seizures | *Moderate to severe neonatal encephalopathy that is stable (not actively cooling) *Rewarming after whole body cooling *Seizures requiring initiation or escalation of antiseizure treatment | *Moderate to severe neonatal encephalopathy that is acute and needing treatment (aEEG, whole body cooling) *Seizures or treatment of seizures that necessitates continuous monitoring (aEEG/EEG) |
| Other | N/A | *Language Barrier | *Phototherapy (bank OR blanket) *Wound care minor *G-tube care | *Phototherapy (both bank AND blanket) *Ostomy care (any type) *Wound care major | |

| | 0 | 1 | 2 | 3 | 4 |
|---------------|-----|---|----------------------------------|----------------------------------|--|
| 1:1 | N/A | | | | *Peritoneal dialysis *CRRT (poss 2:1) *ECMO (poss 2:1) *Bereavement *Post-op care x24 hours *Whole body cooling x24 hours |
| Developmental | N/A | *Developmental bath *Child life involvement/term playtime assistance | *Kangaroo Care (1 person assist) | *Kangaroo care (2 person assist) | *4 handed care |

| LEVELS | TOTAL POINTS | STAFFING RATIO |
|----------------------------|--------------|--|
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| Neonatal 3 (Medium Acuity) | 13-17 points | 1:2-3 ratio (IMC) |
| Neonatal 4 (High Acuity) | 18-25 points | 1:2 with low or medium as second patient (INT) |
| | >26 points | 1:1 status |

Scale: RN1 & RN2

ICC

Case Processing Summary

| | | N | % |
|-------|-----------------------|-----|-------|
| Cases | Valid | 125 | 42.1 |
| | Excluded ^a | 172 | 57.9 |
| | Total | 297 | 100.0 |

<0.5: poor reliability
 0.5 - 0.75 moderate reliability
 0.75 - 0.9 good reliability
 >0.9 excellent reliability

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| 0.938 | 2 |

Intraclass Correlation Coefficient

| | Intraclass Correlation ^b | 95% Confidence Interval | | F Test with True Value 0 | | | |
|------------------|-------------------------------------|-------------------------|-------------|--------------------------|-----|-----|-------|
| | | Lower Bound | Upper Bound | Value | df1 | df2 | Sig |
| Single Measures | .882 ^a | 0.837 | 0.916 | 16.011 | 124 | 124 | 0.000 |
| Average Measures | 0.938 | 0.911 | 0.956 | 16.011 | 124 | 124 | 0.000 |

Two-way random effects model where both people effects and measures effects are random.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

Scale: RN1 & RN2 & Supervisor & Director

| Case Processing Summary | | | |
|-------------------------|-----------------------|-----|-------|
| | | N | % |
| Cases | Valid | 21 | 7.1 |
| | Excluded ^a | 276 | 92.9 |
| | Total | 297 | 100.0 |

ICC

<0.5: poor reliability
 0.5 - 0.75 moderate reliability
 0.75 - 0.9 good reliability
 >0.9 excellent reliability

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| 0.926 | 4 |

Intraclass Correlation Coefficient

| | Intraclass Correlation ^b | 95% Confidence Interval | | F Test with True Value 0 | | | |
|------------------|-------------------------------------|-------------------------|-------------|--------------------------|-----|-----|-------|
| | | Lower Bound | Upper Bound | Value | df1 | df2 | Sig |
| Single Measures | .757 ^a | 0.596 | 0.878 | 13.443 | 20 | 60 | 0.000 |
| Average Measures | 0.926 | 0.855 | 0.967 | 13.443 | 20 | 60 | 0.000 |

Two-way random effects model where both people effects and measures effects are random.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.



NICU Acuity Tool Interrater Reliability

- ❑ Excellent participation, very few missing data points
- ❑ Variety of patients studied
- ❑ Most patient were across whole two weeks
- ❑ Observation: Math errors, missing indicators on some patients



Reliability

Scale: TotalRN1 TotalRN2 TotalSup

Case Processing Summary

| | | N | % |
|-------|-----------------------|-----|-------|
| Cases | Valid | 227 | 90.1 |
| | Excluded ^a | 25 | 9.9 |
| | Total | 252 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| 0.983 | 3 |

Intraclass Correlation Coefficient

| | Intraclass Correlation ^b | 95% Confidence Interval | | F Test with True Value 0 | | | |
|------------------|-------------------------------------|-------------------------|-------------|--------------------------|-----|-----|-------|
| | | Lower Bound | Upper Bound | Value | df1 | df2 | Sig |
| Single Measures | .950 ^a | 0.937 | 0.960 | 57.431 | 226 | 452 | 0.000 |
| Average Measures | 0.983 | 0.978 | 0.986 | 57.431 | 226 | 452 | 0.000 |

Two-way random effects model where both people effects and measures effects are random.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.



Summary

- ❑ The Antepartum Acuity Tool has excellent Content Validity and good/excellent Interrater Reliability.
- ❑ The NICU Acuity Tool has excellent Content Validity and excellent Interrater Reliability.
- ❑ These tools can be used to assess patient acuity and utilized to make patients assignments.
- ❑ Tools may have to be moderated based on the clinical setting for each individual hospital, but if modified, CV and IRR may be altered.
- ❑ More studies are needed to validate these tools in the clinical setting.
- ❑ Tools are needed to establish acuity in the L&D and Couplet Care settings.



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