NATIONAL QUALITY FORUM

Measure Submission and Evaluation Worksheet 5.0

This form contains the information submitted by measure developers/stewards, organized according to NQF's measure evaluation criteria and process. The evaluation criteria, evaluation guidance documents, and a blank online submission form are available on the submitting standards web page.

NQF #: 0484 NQF Project: Perinatal and Reproductive Health Project

(for Endorsement Maintenance Review)
Original Endorsement Date: Oct 24, 2008 Most Recent Endorsement Date: Oct 24, 2008

BRIEF MEASURE INFORMATION

De.1 Measure Title: Proportion of infants 22 to 29 weeks gestation treated with surfactant who are treated within 2 hours of birth.

Co.1.1 Measure Steward: Vermont Oxford Network

De.2 Brief Description of Measure: Proportion of infants 22 to 29 weeks gestation treated with surfactant within 2 hours of birth among infants who were treated with surfactant.

2a1.1 Numerator Statement: Number of infants 22 to 29 weeks gestation treated with surfactant within 2 hours of birth

2a1.4 Denominator Statement: Number of infants 22 to 29 weeks gestation treated with surfactant at any time prior to discharge from the reporting hospital.

2a1.8 Denominator Exclusions: 1. Infants outside the gestational age range of 22 to 29 weeks.
2. Outborn infants admitted more than 28 days after birth.
3. Outborn infants who have been home prior to admission.
4. Infants not treated with surfactant.

1.1 Measure Type: Process
2a1. 25-26 Data Source: Administrative claims, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Registry, Paper Records
2a1.33 Level of Analysis: Facility

1.2-1.4 Is this measure paired with another measure? No

De.3 If included in a composite, please identify the composite measure (*title and NQF number if endorsed*):
N/A

STAFF NOTES (*issues or questions regarding any criteria*)

Comments on Conditions for Consideration:

Is the measure untested? Yes☐ No☐ If untested, explain how it meets criteria for consideration for time-limited endorsement:

1a. Specific national health goal/priority identified by DHHS or NPP addressed by the measure (*check De.5*):
5. Similar/related endorsed or submitted measures (*check 5.1*):
Other Criteria:

Staff Reviewer Name(s):

1. IMPACT, OPPORTUITY, EVIDENCE - IMPORTANCE TO MEASURE AND REPORT

Importance to Measure and Report is a threshold criterion that must be met in order to recommend a measure for endorsement. All

three subcriteria must be met to pass this criterion. See guidance on evidence.
Measures must be judged to be important to measure and report in order to be evaluated against the remaining criteria. (evaluation criteria)

1a. High Impact: H☐ M☐ L☐ I ☐
(*The measure directly addresses a specific national health goal/priority identified by DHHS or NPP, or some other high impact aspect of healthcare.*)

De.4 Subject/Topic Areas *(Check all the areas that apply)*: Perinatal
De.5 Cross Cutting Areas (*Check all the areas that apply)*: Care Coordination

1a.1 Demonstrated High Impact Aspect of Healthcare: Affects large numbers, A leading cause of morbidity/mortality, Frequently performed procedure, Patient/societal consequences of poor quality, Severity of illness

1a.2 If "Other," please describe:

1a.3 Summary of Evidence of High Impact *(Provide epidemiologic or resource use data)*:
Meta-analyses of randomized controlled trials show that surfactant replacement, given as prophylaxis or rescue treatment, reduces the incidence and severity of respiratory distress syndrome, air leaks, and mortality in preterm infants with surfactant deficiency (Engle 2008).
Prophylactic surfactant administration to infants of less than 30 weeks´ gestation reduces mortality, the frequency and severity of respiratory distress syndrome, air leaks, and the combined outcome of bronchopulmonary dysplasia and death compared with infants who receive placebo or rescue surfactant (Soll 2000). Early rescue surfactant (<2 hours from birth) given to infants of less than 30 weeks´ gestation reduces the frequency of adverse respiratory outcomes compared with later rescue surfactant (Yost 2000).

1a.4 Citations for Evidence of High Impact cited in 1a.3: 1. Engle WA,and the Committee on Fetus and Newborn. Surfactant-Replacement Therapy for Respiratory Distress in Preterm and Term Neonate. Pediatrics 2008;121:419-432.

2. Soll RF. Prophylactic synthetic surfactant for preventing morbidity and mortality in preterm infants. Cochrane Database Syst Rev. 2000;2:CD001079.

3. Yost CC, Soll RF. Early versus delayed selective surfactant treatment for neonatal respiratory distress syndrome. Cochrane Database Syst Rev.2000;2 :CD001456

1b. Opportunity for Improvement: H☐ M☐ L☐ I ☐
(*There is a demonstrated performance gap - variability or overall less than optimal performance*)

1b.1 Briefly explain the benefits (improvements in quality) envisioned by use of this measure:
For those infants treated with surfactant earlier treatment is beneficial in reducing morbidity and mortality.

1b.2 Summary of Data Demonstrating Performance Gap *(Variation or overall less than optimal performance across providers)*:
[*For Maintenance – Descriptive statistics for performance results for this measure - distribution of scores for measured entities by quartile/decile, mean, median, SD, min, max, etc.*]
Delayed surfactant treatment occurs frequently and the proportion of infants treated within 2 hours of birth varies markedly among hospitals (Horbar 2004a). For 22 to 29 week gestation
infants born in 2006 and reported to the Vermont Oxford Network by 632 participating hospitals, 76% were treated with surfactant. Fourteen percent of all infants received the first dose of surfactant after 2 hours of age. Fewer than 4% of infants were first treated beyond 2 hours at the 25% of
hospitals with the lowest rates, whereas over 20% of infants were first treated beyond 2 hours at the 25% of hospitals with the highest rates (VON 2007 unpublished). In a cluster randomized trial conducted at 117 hospitals it was shown that a multifaceted intervention to promote evidence-based
surfactant therapy significantly reduced the proportion of infants receiving the first dose of surfactant more than 2 hours after birth (adjusted OR 0.35, 95% CI 0.24-..53) (Horbar 2004b).

1b.3 Citations for Data on Performance Gap: [*For Maintenance – Description of the data or sample for measure results reported*

in 1b.2 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included]
Horbar JD, Carpenter JH, Buzas J, et al. Timing of initial surfactant treatment for infants 23 to 29 weeks´ gestation: is routine practice evidence based? Pediatrics. 2004;113:1593 –1602.

Horbar JD, Carpenter JH, Buzas J, et al. Collaborative quality improvement to provide evidence based surfactant for preterm infants: a cluster randomized trial. BMJ. 2004;329:1004

1b.4 Summary of Data on Disparities by Population Group: [*For **Maintenance** –Descriptive statistics for performance results for this measure by population group*]
N/A

1b.5 Citations for Data on Disparities Cited in 1b.4: [*For **Maintenance** – Description of the data or sample for measure results reported in 1b.4 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*]
N/A

1c. Evidence (*Measure focus is a health outcome OR meets the criteria for quantity, quality, consistency of the body of evidence.*)
Is the measure focus a health outcome? Yes☐ No☐ If not a health outcome, rate the body of evidence.

Quantity: H☐ M☐ L☐ I☐ Quality: H☐ M☐ L☐ I☐ Consistency: H☐ M☐ L☐ I☐

Quantity	Quality	Consistency	Does the measure pass subcriterion1c?
M-H	M-H	M-H	Yes☐
L	M-H	M	Yes☐ IF additional research unlikely to change conclusion that benefits to patients outweigh harms: otherwise No☐
M-H	L	M-H	Yes☐ IF potential benefits to patients clearly outweigh potential harms: otherwise No☐
L-M-H	L-M-H	L	No ☐

Health outcome – rationale supports relationship to at least one healthcare structure, process, intervention, or service	Does the measure pass subcriterion1c? Yes☐ IF rationale supports relationship

1c.1 Structure-Process-Outcome Relationship *(Briefly state the measure focus, e.g., health outcome, intermediate clinical outcome, process, structure; then identify the appropriate links, e.g., structure-process-health outcome; process- health outcome; intermediate clinical outcome-health outcome)*:
Intermediate clinical outcome: improved respiratory status requiring lower ventilator support
Process: administration of surfactant within 2 hours. Process for identifying eligible cases, ordering, supplying, and administering surfactant
Structure: NICU team roles and responsibilities, pharmacy support

1c.2-3 Type of Evidence *(Check all that apply)*:
Systematic review of body of evidence (other than within guideline development)

1c.4 Directness of Evidence to the Specified Measure *(State the central topic, population, and outcomes addressed in the body of evidence and identify any differences from the measure focus and measure target population)*:
Studies of early vs late surfactant have been reviewed (see Cochrane review citations above). However, time windows have differed among studies and there is some controversy about the exact time limit beyond which a beneficial effect is reduced.

1c.5 Quantity of Studies in the Body of Evidence *(Total number of studies, not articles)*: The meta analysis: Yost CC, Soll RF. Early versus delayed selective surfactant treatment for neonatal respiratory distress syndrome. Cochrane Database Syst Rev.2000;2 :CD001456 included 4 studies

1c.6 Quality of Body of Evidence (*Summarize the certainty or confidence in the estimates of benefits and harms to patients*

across studies in the body of evidence resulting from study factors. Please address: a) study design/flaws; b) directness/indirectness of the evidence to this measure (e.g., interventions, comparisons, outcomes assessed, population included in the evidence); and c) imprecision/wide confidence intervals due to few patients or events): Conclusion from Yost meta-analysis: "Early surfactant administration significantly reduces the risk of key clinical outcomes including pneumothorax, PIE, chronic lung disease, and neonatal mortality. Given the efficacy of prophylactic surfactant therapy (Soll 1999), this meta-analysis suggests that early selective surfactant administration to intubated infants with early signs of RDS may be part of a clinical spectrum of improved outcomes with earlier treatment. The difficulty of judging which infant is at risk for surfactant deficiency continues. The meta-analysis would suggest that neonates with early respiratory distress should be given surfactant as early as possible."

1c.7 Consistency of Results across Studies *(Summarize the consistency of the magnitude and direction of the effect):* Results appear consistent in the 4 studies included in the meta-analysis although nto all outcomes were evaluated in all studies.

1c.8 Net Benefit *(Provide estimates of effect for benefit/outcome; identify harms addressed and estimates of effect; and net benefit - benefit over harms)*:
1.Surfactant replacement, given as prophylaxis or rescue treatment, reduces the incidence and severity of respiratory distress syndrome, air leaks, and mortality in preterm infants with surfactant deficiency.

a. Prophylactic surfactant administration to infants of less than 30 weeks´ gestation with a low rate of exposure to antenatal steroids reduces mortality, the frequency and severity of respiratory distress syndrome, air leaks, and the combined outcome of bronchopulmonary dysplasia and death compared with infants who receive placebo or rescue surfactant.

b. Early rescue surfactant (<2 hours from birth) given to infants of less than 30 weeks´ gestation with a low rate of exposure to antenatal steroids reduces the frequency of adverse respiratory outcomes compared with later rescue surfactant.

Source: Engle WA, and the Committee on Fetus and Newborn. Surfactant-Replacement Therapy for Respiratory Distress in Preterm and Term Neonate. Pediatrics 2008;121:419-432.

1c.9 Grading of Strength/Quality of the Body of Evidence. Has the body of evidence been graded? No

1c.10 If body of evidence graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias: N/A

1c.11 System Used for Grading the Body of Evidence: Other

1c.12 If other, identify and describe the grading scale with definitions: N/A

1c.13 Grade Assigned to the Body of Evidence: N/A

1c.14 Summary of Controversy/Contradictory Evidence: The current controversy relates to the use of early application of nasal CPAP in the attempt to reduce the need for endotracheal intubation and surfactant administration. There is now evidence that early CPAP application will reduce the need for intubation and surfactant administration. However, a substantial proportion of infants, particularly at the lower gestational ages will fail on early CPAP and go on to require intubation and surfactant.

1c.15 Citations for Evidence other than Guidelines*(Guidelines addressed below)*:
Colin J. Morley, M.D., Peter G. Davis, M.D., Lex W. Doyle, M.D., Luc P. Brion, M.D., Jean-Michel Hascoet, M.D., and John B. Carlin, Ph.D. for the COIN Trial Investigators
Nasal CPAP or Intubation at Birth for Very Preterm Infants. N Engl J Med 2008; 358:700-708.

SUPPORT Study Group of the Eunice Kennedy Shriver NICHD Neonatal Research Network
Early CPAP versus Surfactant in Extremely Preterm Infants. N Engl J Med 2010; 362:1970-1979

1c.16 Quote verbatim, the specific guideline recommendation *(Including guideline # and/or page #)*:
1.Surfactant should be given to infants with respiratory distress syndrome as soon as possible after intubation irrespective of

exposure to antenatal steroids or gestational age.

2.Prophylactic surfactant replacement should be considered for extremely preterm infants at high risk of respiratory distress syndrome, especially infants who have not been exposed to antenatal steroids.

1c.17 Clinical Practice Guideline Citation: Engle WA,and the Committee on Fetus and Newborn. Surfactant-Replacement Therapy for Respiratory Distress in Preterm and Term Neonate. Pediatrics 2008;121:419-432.

1c.18 National Guideline Clearinghouse or other URL: N/A

1c.19 Grading of Strength of Guideline Recommendation. Has the recommendation been graded? No

1c.20 If guideline recommendation graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias:

1c.21 System Used for Grading the Strength of Guideline Recommendation: Other

1c.22 If other, identify and describe the grading scale with definitions: N/A

1c.23 Grade Assigned to the Recommendation: N/A

1c.24 Rationale for Using this Guideline Over Others: AAP Committee on Fetus and Newborn is most authoritative source.

Based on the NQF descriptions for rating the evidence, what was the developer's assessment of the quantity, quality, and consistency of the body of evidence?
1c.25 Quantity: High 1c.26 Quality: High1c.27 Consistency: High

Was the threshold criterion, *Importance to Measure and Report*, met?
(*1a & 1b must be rated moderate or high and 1c yes*) Yes☐ No☐
Provide rationale based on specific subcriteria:

For a new measure if the Committee votes NO, then STOP.
For a measure undergoing endorsement maintenance, if the Committee votes NO because of 1b. (no opportunity for improvement), it may be considered for continued endorsement and all criteria need to be evaluated.

2. RELIABILITY & VALIDITY - SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)
Measure testing must demonstrate adequate reliability and validity in order to be recommended for endorsement. Testing may be conducted for data elements and/or the computed measure score. Testing information and results should be entered in the appropriate field. Supplemental materials may be referenced or attached in item 2.1. See guidance on measure testing.

S.1 Measure Web Page *(In the future, NQF will require measure stewards to provide a URL link to a web page where current detailed specifications can be obtained*). Do you have a web page where current detailed specifications for this measure can be obtained? Yes

S.2 If yes, provide web page URL: http://www.vtoxford.org/about/NQF

2a. RELIABILITY. Precise Specifications and Reliability Testing: H☐ M☐ L☐ I ☐

2a1. Precise Measure Specifications. (*The measure specifications precise and unambiguous.*)

2a1.1 Numerator Statement *(Brief, narrative description of the measure focus or what is being measured about the target population, e.g., cases from the target population with the target process, condition, event, or outcome)*:
Number of infants 22 to 29 weeks gestation treated with surfactant within 2 hours of birth

2a1.2 Numerator Time Window *(The time period in which the target process, condition, event, or outcome is eligible for inclusion)*:
From birth until time first dose of surfactant is received.

2a1.3 Numerator Details *(All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, codes with descriptors, and/or specific data collection items/responses*:
All eligible infants 22 to 29 weeks gestation who receive surfactant prior to discharge from the reporting hospital.

2a1.4 Denominator Statement *(Brief, narrative description of the target population being measured)*:
Number of infants 22 to 29 weeks gestation treated with surfactant at any time prior to discharge from the reporting hospital.

2a1.5 Target Population Category *(Check all the populations for which the measure is specified and tested if any)*: Children's Health

2a1.6 Denominator Time Window *(The time period in which cases are eligible for inclusion)*:
From birth until time first dose of surfactant is received.

2a1.7 Denominator Details (*All information required to identify and calculate the target population/denominator such as definitions, codes with descriptors, and/or specific data collection items/responses)*:
Any infant treated with surfactant whose gestational age is between 22 weeks, 0 days, and 29 weeks, 6 days and who is either:
(1) Born at the reporting hospital.
(2) Born at another hospital and admitted to the reporting hospital within 28 days of birth.

2a1.8 Denominator Exclusions *(Brief narrative description of exclusions from the target population)*:
1. Infants outside the gestational age range of 22 to 29 weeks.
2. Outborn infants admitted more than 28 days after birth.
3. Outborn infants who have been home prior to admission.
4. Infants not treated with surfactant.

2a1.9 Denominator Exclusion Details *(All information required to identify and calculate exclusions from the denominator such as definitions, codes with descriptors, and/or specific data collection items/responses)*:
See 2a1.8 above.

2a1.10 Stratification Details/Variables *(All information required to stratify the measure results including the stratification variables, codes with descriptors, definitions, and/or specific data collection items/responses)*:
The measure should be separately determined by birth location and whether the infant received continuous positive airway pressure (CPAP). Birth location strata include inborn infants, outborn infants and all eligible infants. CPAP strata are nested within birth location strata and include infants who received CPAP prior to endotracheal tube ventilation, infants who received CPAP after endotracheal tube ventilation and infants who did not receive CPAP.

2a1.11 Risk Adjustment Type *(Select type. Provide specifications for risk stratification in 2a1.10 and for statistical model in 2a1.13)*: Stratification by risk category/subgroup 2a1.12 If "Other," please describe:

2a1.13 Statistical Risk Model and Variables *(Name the statistical method - e.g., logistic regression and list all the risk factor variables. Note - risk model development should be addressed in 2b4.)*:
N/A

2a1.14-16 Detailed Risk Model Available at Web page URL (or attachment). Include coefficients, equations, codes with descriptors, definitions, and/or specific data collection items/responses. Attach documents only if they are not available on a webpage and keep attached file to 5 MB or less. NQF strongly prefers you make documents available at a Web page URL. Please supply login/password if needed:

2a1.17-18. Type of Score: Rate/proportion

2a1.19 Interpretation of Score *(Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score)*: Better quality = Higher score

2a1.20 Calculation Algorithm/Measure Logic*(Describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; aggregating data; risk adjustment; etc.)*:

1. Identify the population of eligible infants: all infants treated with surfactant prior to discharge whose gestational age is between 22 weeks, 0 days, and 29 weeks, 6 days, and who were born at or admitted to the hospital within 28 days of birth without having been discharged home.

2. Among the population of eligible infants:
   a. Determine whether the first dose of surfactant was administered within two hours of birth.
   b. Count the number of infants born in the hospital. This number will be the denominator for eligible inborn infants: DENOM INBORN.
   c. Count the number of outborn infants. This number will be the denominator for eligible outborn infants: DENOM OUTBORN.
   d. Count the number of all infants. This number will be the denominator for all eligible infants: DENOM ALL.
   e. Count the number of inborn infants who received the first dose of surfactant within two hours of birth. This number is the numerator for eligible inborn infants: NUM INBORN.
   f. Count the number of outborn infants who received the first dose of surfactant within two hours of birth. This number is the numerator for eligible outborn infants: NUM OUTBORN.
   g. Count the total number of infants who received the first dose of surfactant within two hours of birth. This number is the numerator for all eligible infants: NUM ALL.
3. Calculate the proportion of infants receiving surfactant within two hours of birth for the birth location strata:
   a. The measure for Inborn Infants is defined as:
      NUM INBORN/ DENOM INBORN
      This measure represents the proportion of inborn infants 22 to 29 weeks gestation treated with surfactant who received the first dose of surfactant within 2 hours of birth.
   b. The measure for Outborn Infants is defined as:
      NUM OUTBORN/ DENOM OUTBORN
      This measure represents the proportion of outborn infants 22 to 29 weeks gestation treated with surfactant who received the first dose of surfactant within 2 hours of birth.
   c. The measure for All Infants is defined as:
      NUM ALL/ DENOM ALL
      This measure represents the proportion of all infants 22 to 29 weeks gestation (inborn and outborn) treated with surfactant who received the first dose of surfactant within 2 hours of birth.

4. Among population of eligible infants in each of the birth location strata

(inborn, outborn, and all infants):
a. Identify whether each infant received nasal CPAP at any time prior to discharge.
b. For eligible infants who received nasal CPAP, identify whether the infant received nasal CPAP prior to or after having received positive pressure ventilation through an endotracheal tube.
c. Among eligible infants who did not receive nasal CPAP:
(1) Count the number of inborn infants. This will be the denominator for eligible inborn infants who did not receive nasal CPAP: DENOM INBORN NO CPAP.
(2) Count the number of inborn infants who received surfactant treatment within two hours of birth. This will be the numerator for eligible inborn infants who did not receive nasal CPAP: NUM INBORN NO CPAP.
(3) Calculate the proportion of inborn infants receiving surfactant within two hours of birth who did not receive nasal CPAP:
NUM INBORN NO CPAP / DENOM INBORN NO CPAP
This measure represents the proportion of inborn infants who did not have nasal CPAP and who were treated with surfactant within two hours of birth.
(4) Count the number of outborn infants. This will be the denominator for eligible outborn infants who did not receive nasal CPAP: DENOM OUTBORN NO CPAP.
(5) Count the number of outborn infants who received surfactant treatment within two hours of birth. This will be the numerator for eligible outborn infants who did not receive nasal CPAP: NUM OUTBORN NO CPAP.
(6) Calculate the proportion of outborn infants receiving surfactant within two hours of birth who did not receive nasal CPAP:
NUM OUTBORN NO CPAP / DENOM OUTBORN NO CPAP
This measure represents the proportion of outborn infants who did not receive nasal CPAP and who were treated with surfactant within two hours of birth.
d. Among eligible infants who received nasal CPAP prior to endotracheal tube ventilation (early CPAP):
(1) Count the number of inborn infants. This will be the denominator for eligible inborn infants who received early CPAP: DENOM INBORN EARLY CPAP.
(2) Count the number of inborn infants who received surfactant treatment within two hours of birth. This will be the numerator for eligible inborn infants who received early CPAP: NUM INBORN EARLY CPAP.
(3) Calculate the proportion of inborn infants receiving surfactant within two hours of birth who received early CPAP:
NUM INBORN EARLY CPAP / DENOM INBORN EARLY CPAP
This measure represents the proportion of inborn infants who received early CPAP and who were treated with surfactant within two hours of birth.
(4) Count the number of outborn infants. This will be the denominator for eligible outborn infants who received early CPAP: DENOM OUTBORN EARLY CPAP.
(5) Count the number of outborn infants who received surfactant treatment within two hours of birth. This will be the numerator for eligible outborn infants who received early CPAP: NUM OUTBORN EARLY CPAP.
(6) Calculate the proportion of outborn infants receiving surfactant within two hours of birth who received early CPAP:

NUM OUTBORN EARLY CPAP / DENOM OUTBORN EARLY CPAP
This measure represents the proportion of outborn infants who received early CPAP and who were treated with surfactant within two hours of birth.

e. Among eligible infants who received nasal CPAP after endotracheal tube ventilation (late CPAP):
(1) Count the number of inborn infants. This will be the denominator for eligible inborn infants who received late CPAP: DENOM INBORN LATE CPAP.
(2) Count the number of inborn infants who received surfactant treatment within two hours of birth. This will be the numerator for eligible inborn infants who received late CPAP: NUM INBORN LATE CPAP.
(3) Calculate the proportion of inborn infants receiving surfactant within two hours of birth who received late CPAP:
NUM INBORN LATE CPAP / DENOM INBORN LATE CPAP
This measure represents the proportion of inborn infants who received late CPAP and who were treated with surfactant within two hours of birth.
(4) Count the number of outborn infants. This will be the denominator for eligible outborn infants who received late CPAP: DENOM OUTBORN LATE CPAP.
(5) Count the number of outborn infants who received surfactant treatment within two hours of birth. This will be the numerator for eligible outborn infants who received late CPAP: NUM OUTBORN LATE CPAP.
(6) Calculate the proportion of outborn infants receiving surfactant within two hours of birth who received late CPAP:
NUM OUTBORN LATE CPAP / DENOM OUTBORN LATE CPAP
This measure represents the proportion of outborn infants who received late CPAP and who were treated with surfactant within two hours of birth.

2a1.21-23 Calculation Algorithm/Measure Logic Diagram URL or attachment:
URL
http://www.vtoxford.org/about/NQF%20Measure%200484.pdf

2a1.24 Sampling (Survey) Methodology. If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate):
Data for all eligible infants born during the reporting period are collected.

2a1.25 Data Source *(Check all the sources for which the measure is specified and tested*). If other, please describe:
Administrative claims, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Registry, Paper Records

2a1.26 Data Source/Data Collection Instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.*): Vermont Oxford Network Database

2a1.27-29 Data Source/data Collection Instrument Reference Web Page URL or Attachment: URL
http://www.vtoxford.org/about/network_db.aspx

2a1.30-32 Data Dictionary/Code Table Web Page URL or Attachment:
URL
http://www.vtoxford.org/tools/ManualofOperationsPart2.pdf

2a1.33 Level of Analysis (*Check the levels of analysis for which the measure is specified and tested)*: Facility

2a1.34-35 Care Setting *(Check all the settings for which the measure is specified and tested)*: Hospital/Acute Care Facility

2a2. Reliability Testing. (*Reliability testing was conducted with appropriate method, scope, and adequate demonstration of reliability*.)

2a2.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
The number of infants 22-29 weeks gestation born between 2006 and 2010 are shown below by gestational age and whether surfactant was received within 2 hours of birth.

Surfactant	Gestational Age							
with 2 hours	22	23	24	25	26	27	28	29
Yes	1204	8485	16524	18531	20464	21255	21438	18238
No	99	551	1179	1536	2135	3313	4801	5829

2a2.2 Analytic Method *(Describe method of reliability testing & rationale)*:
The number and percent of eligible infants who receive surfactant within two hours of birth are reported, along with Network mean values and the 25th and 75th percentile values for all hospitals in the Network. Statistics are reported for all eligible infants and by gestational age, birth weight category and birth location. Measure values can also be stratified by birth location and by whether the infant received nasal CPAP prior to being ventilated.

2a2.3 Testing Results *(Reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
N/A

2b. VALIDITY. Validity, Testing, including all Threats to Validity: H☐ M☐ L☐ I ☐

2b1.1 Describe how the measure specifications *(measure focus, target population, and exclusions)* are consistent with the evidence cited in support of the measure focus (*criterion 1c)* and identify any differences from the evidence:
Research shows the efficacy of early surfactant therapy (within two hours of birth) as compared to later administration (see, e.g., Soll RF, "Early versus delayed selective surfactant treatment for neonatal respiratory distress syndrome," Cochrane Database of Systematic Reviews, 1999, 4; Suresh GK and Soll RF, "Overview of Surfactant Replacement Trials," Journal of Perinatology (2005), 25, S40-S44).

2b2. Validity Testing. (*Validity testing was conducted with appropriate method, scope, and adequate demonstration of validity.)*

2b2.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
Data for member hospitals from 2006 to 2010 are summarized below.

Birth Year	Number of Hospitals	Minimum Infants	Maximum Infants
2006	625	1	232
2007	671	1	211
2008	736	1	239
2009	798	1	229
2010	827	1	187

2b2.2 Analytic Method *(Describe method of validity testing and rationale; if face validity, describe systematic assessment)*:
Comprehensive business rules have been implemented in software applications so that each record submitted is tested for consistency, completeness and accuracy. Submitted records with errors must be corrected before data are finalized and reports of the measures are provided to hospitals.

2b2.3 Testing Results *(Statistical results, assessment of adequacy in the context of norms for the test conducted; if face validity,*

describe results of systematic assessment):
There is an annual assessment of item definitions by the Network Database Advisory Committee. The annual assessment results in modifications to the definitions for measures. Expert advisors to the registry directors provide recommendations for measure improvement and clarification of item criteria.

POTENTIAL THREATS TO VALIDITY. (*All potential threats to validity were appropriately tested with adequate results.*)

2b3. Measure Exclusions. (*Exclusions were supported by the clinical evidence in 1c or appropriately tested with results demonstrating the need to specify them.*)

2b3.1 Data/Sample for analysis of exclusions *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
Infants outside the gestational age range and infants do not receive surfactant treatment.

2b3.2 Analytic Method (*Describe type of analysis and rationale for examining exclusions, including exclusion related to patient preference)*:
Exclusions are enforced by business rules that assure database integrity.

2b3.3 Results *(Provide statistical results for analysis of exclusions, e.g., frequency, variability, sensitivity analyses):*
The following table shows the number of infants, number of records excluded and percent excluded for birth years 2006-2010.

Birth Year	Number of Infants	Number Excluded	Percent Excluded
2006	33,917	7485	22.1%
2007	36,420	7972	21.9%
2008	38,533	8469	22.0%
2009	39,357	8523	21.7%
2010	38,222	8418	22.0%

2b4. Risk Adjustment Strategy. (*For outcome measures, adjustment for differences in case mix (severity) across measured entities was appropriately tested with adequate results.*)

2b4.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
Reported data are stratified by birth location and whether the infant received nasal CPAP prior to being ventilated. Statistics are also reported by gestational age (completed weeks). Data are not risk adjusted.

2b4.2 Analytic Method (*Describe methods and rationale for development and testing of risk model or risk stratification including selection of factors/variables)*:
Recommendations have been published for early administration of surfactant in premature infants with respiratory distress. See paragraph 2b1.1 above.

2b4.3 Testing Results *(Statistical risk model: Provide quantitative assessment of relative contribution of model risk factors; risk model performance metrics including cross-validation discrimination and calibration statistics, calibration curve and risk decile plot, and assessment of adequacy in the context of norms for risk models. Risk stratification: Provide quantitative assessment of relationship of risk factors to the outcome and differences in outcomes among the strata)*:
The number of infants receiving surfactant prior to discharge and percent receiving surfactant within two hours of birth are shown below by gestational age for infants born between 2006 and 2010.

Gestational Age (completed weeks)	Number of Infants Receiving Surfactant	Percent Receiving Surfactant Within 2 Hours
22	1303	92.4%
23	9036	93.9%
24	17703	93.3%
25	20067	92.3%
26	22599	90.6%
27	24568	86.5%

28	26239	81.7%
29	24067	75.8%
23		
24		
25		
26		
27		
28		
29		

2b4.4 If outcome or resource use measure is not risk adjusted, provide rationale and analyses to justify lack of adjustment: Early surfactant administration is an important quality measure for premature infants with respiratory distress sysdrome. Monitoring the timing of surfactant administration will provide helpful information for improving the quality of care for these infants.

2b5. Identification of Meaningful Differences in Performance. (*The performance measure scores were appropriately analyzed and discriminated meaningful differences in quality.*)

2b5.1 Data/Sample *(Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
In 2010 reports were sent to 850 hospitals, and the measure was applicable for 28,617 infants.

2b5.2 Analytic Method *(Describe methods and rationale to identify statistically significant and practically/meaningfully differences in performance)*:
Results for hospitals are stratified by birth location and whether the infant received nasal CPAP prior to being ventilated. The distribution of 2010 overall results among hospitals for key percentiles was analyzed univariately.

2b5.3 Results *(Provide measure performance results/scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:
The hospital distribution of 2010 results among 850 hospitals for specific percentiles is shown below.

Percentile	Percent Surfactant within 2 Hours
10th	60.0
25th	77.9
50th	90.5
75th	97.9
90th	100.0

2b6. Comparability of Multiple Data Sources/Methods. (*If specified for more than one data source, the various approaches result in comparable scores.*)

2b6.1 Data/Sample *(Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
N/A

2b6.2 Analytic Method *(Describe methods and rationale for testing comparability of scores produced by the different data sources specified in the measure)*:
N/A

2b6.3 Testing Results *(Provide statistical results, e.g., correlation statistics, comparison of rankings; assessment of adequacy in the context of norms for the test conducted)*:
N/A

2c. Disparities in Care: H☐ M☐ L☐ I☐ NA☐ (*If applicable, the measure specifications allow identification of disparities.*)

2c.1 If measure is stratified for disparities, provide stratified results *(Scores by stratified categories/cohorts)*: N/A

2c.2 If disparities have been reported/identified (e.g., in 1b), but measure is not specified to detect disparities, please explain:
N/A

2.1-2.3 Supplemental Testing Methodology Information:
URL
http://www.vtoxford.org/about/NQF%20Measure%200484.pdf

Steering Committee: Overall, was the criterion, *Scientific Acceptability of Measure Properties*, met?
(*Reliability and Validity must be rated moderate or high*) Yes☐ No☐
Provide rationale based on specific subcriteria:

If the Committee votes No, STOP

3. USABILITY

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)

C.1 Intended Purpose/ Use *(Check all the purposes and/or uses for which the measure is intended)*: Public Reporting, Quality Improvement (Internal to the specific organization), Quality Improvement with Benchmarking (external benchmarking to multiple organizations)

3.1 Current Use *(Check all that apply; for any that are checked, provide the specific program information in the following questions)*: Public Reporting, Quality Improvement with Benchmarking (external benchmarking to multiple organizations), Quality Improvement (Internal to the specific organization)

3a. Usefulness for Public Reporting: H☐ M☐ L☐ I ☐
(*The measure is meaningful, understandable and useful for public reporting.*)

3a.1. Use in Public Reporting - disclosure of performance results to the public at large *(If used in a public reporting program, provide name of program(s), locations, Web page URL(s)).* If not publicly reported in a national or community program, state the reason AND plans to achieve public reporting, potential reporting programs or commitments, and timeline, e.g., within 3 years of endorsement: [*For Maintenance – If not publicly reported, describe progress made toward achieving disclosure of performance results to the public at large and expected date for public reporting; provide rationale why continued endorsement should be considered.*]
Performance results are made available to the members of the Vermont Oxford Network at: https://nightingale.vtoxford.org
Participants in the Vermont Oxford Network may access a fully featured Internet reporting system (Nightingale), as well as printed reports, which document patient characteristics, treatment practices, morbidity, mortality, and length of stay for the institution. The reports also track performance over time, comparing the institution's performance to that of the Network as a whole and with subgroups of similar institutions.

Vermont Oxford Network members may make their performance available to the public at their discretion

3a.2.Provide a rationale for why the measure performance results are meaningful, understandable, and useful for public reporting. If usefulness was demonstrated (e.g., focus group, cognitive testing), describe the data, method, and results: Early rescue surfactant, given within 2 hour of birth, in infants less than 20 weeks gestation has been shown to reduce the frequency of adverse respiratory outcomes. Measuring and reporting the rate of surfactant treatment within 2 hours of birth allows care providers to identify low rates of treatment an opportunities for improved practices.

3.2 Use for other Accountability Functions (payment, certification, accreditation). If used in a public accountability program, provide name of program(s), locations, Web page URL(s): N/A

3b. Usefulness for Quality Improvement: H☐ M☐ L☐ I ☐
(*The measure is meaningful, understandable and useful for quality improvement.*)

3b.1. Use in QI. If used in quality improvement program, provide name of program(s), locations, Web page URL(s):
[*For Maintenance – If not used for QI, indicate the reasons and describe progress toward using performance results for improvement*].
Performance results are used for quality improvement by the members of the Vermont Oxford Network: http://www.vtoxford.org/about/membership.aspx. Participants in the Vermont Oxford Network may access a fully featured Internet reporting system (Nightingale), as well as printed reports, which document patient characteristics, treatment practices, morbidity, mortality, and length of stay for the institution. The reports also track performance over time, comparing the institution's performance to that of the Network as a whole and with subgroups of similar institutions.

Performance results are also used by participants in the Vermont Oxford Network's Quality Improvement Collaboratives: http://www.vtoxford.org/quality/nicq/nicq.aspx

3b.2. Provide rationale for why the measure performance results are meaningful, understandable, and useful for quality improvement. If usefulness was demonstrated *(e.g., QI initiative),* describe the data, method and results:
Early rescue surfactant, given within 2 hour of birth, in infants less than 20 weeks gestation has been shown to reduce the frequency of adverse respiratory outcomes. Measuring and reporting the rate of surfactant treatment within 2 hours of birth allows care providers to identify low rates of treatment an opportunities for improved processes for identifying eligible cases, and for ordering, supplying and administering surfactant, with the outcome of improved respiratory status requiring lower ventilator support and ultimately reduced morbidity and mortality.

Overall, to what extent was the criterion, *Usability*, met? H☐ M☐ L☐ I ☐
Provide rationale based on specific subcriteria:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

4a. Data Generated as a Byproduct of Care Processes: H☐ M☐ L☐ I ☐

4a.1-2 How are the data elements needed to compute measure scores generated? *(Check all that apply).*
Data used in the measure are:
generated by and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition, Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims), Abstracted from a record by someone other than person obtaining original information (e.g., chart abstraction for quality measure or registry)

4b. Electronic Sources: H☐ M☐ L☐ I ☐

4b.1 Are the data elements needed for the measure as specified available electronically *(Elements that are needed to compute measure scores are in defined, computer-readable fields)*: ALL data elements are in a combination of electronic sources

4b.2 If ALL data elements are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources:

4c. Susceptibility to Inaccuracies, Errors, or Unintended Consequences: H☐ M☐ L☐ I ☐

4c.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measurement identified during testing and/or operational use and strategies to prevent, minimize, or detect. If audited, provide results:
A manual of operations for the registry is published annually, with definitions and criterial clearly operationalized for the measure. Comprehensive business rules are implemented in software to verify records for consistency, completeness and accuracy. A definitive process is in effect to assure that the measure is not reported until data are complete and correct. Hospital contacts must verify that data for all eligible infants are submitted prior to finalization.

4d. Data Collection Strategy/Implementation: H☐ M☐ L☐ I ☐

A.2 Please check if either of the following apply (*regarding proprietary measures*):
4d.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues *(e.g., fees for use of proprietary measures)*:
Patient identifiers are not collected in the registry. Confidentiality for each hospital member is strictly maintained. Procedures in place assure reasonable confidence that data are complete and accurate. There are no specific fees for this measure, although members of the Vermont Oxford Network pay an annual membership fee.

Overall, to what extent was the criterion, *Feasibility*, met? H☐ M☐ L☐ I ☐
Provide rationale based on specific subcriteria:

OVERALL SUITABILITY FOR ENDORSEMENT

Does the measure meet all the NQF criteria for endorsement? Yes☐ No☐
Rationale:

If the Committee votes No, STOP.
If the Committee votes Yes, the final recommendation is contingent on comparison to related and competing measures.

5. COMPARISON TO RELATED AND COMPETING MEASURES

If a measure meets the above criteria and there are endorsed or new related measures (either the same measure focus or the same target population) or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure before a final recommendation is made.

5.1 If there are related measures *(either same measure focus or target population)* or competing measures *(both the same measure focus and same target population*), list the NQF # and title of all related and/or competing measures:

5a. Harmonization

5a.1 If this measure has EITHER the same measure focus OR the same target population as NQF-endorsed measure(s): Are the measure specifications completely harmonized?

5a.2 If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden:

5b. Competing Measure(s)

5b.1 If this measure has both the same measure focus and the same target population as NQF-endorsed measure(s): Describe why this measure is superior to competing measures *(e.g., a more valid or efficient way to measure quality);* OR provide a rationale for the additive value of endorsing an additional measure. *(Provide analyses when possible)*:

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner): Vermont Oxford Network, 33 Kilburn St, Burlington, Vermont, 05401

Co.2 Point of Contact: Beth, Anderson, banderson@vtoxford.org, 802-865-4814-237

Co.3 Measure Developer if different from Measure Steward: Vermont Oxford Network, 33 Kilburn St, Burlington, Vermont, 05401

Co.4 Point of Contact: Beth, Anderson, banderson@vtoxford.org, 802-865-4814-237

Co.5 Submitter: Beth, Anderson, banderson@vtoxford.org, 802-865-4814-237, Vermont Oxford Network
Co.6 Additional organizations that sponsored/participated in measure development:
Co.7 Public Contact: Beth, Anderson, banderson@vtoxford.org, 802-865-4814-237, Vermont Oxford Network

ADDITIONAL INFORMATION
Workgroup/Expert Panel involved in measure development Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development. N/A
Ad.2 If adapted, provide title of original measure, NQF # if endorsed, and measure steward. Briefly describe the reasons for adapting the original measure and any work with the original measure steward: N/A
Measure Developer/Steward Updates and Ongoing Maintenance Ad.3 Year the measure was first released: 2008 Ad.4 Month and Year of most recent revision: 10, 2011 Ad.5 What is your frequency for review/update of this measure? Annual Ad.6 When is the next scheduled review/update for this measure? 09, 2012
Ad.7 Copyright statement: Copyright © 2011 Vermont Oxford Network, Inc.
Ad.8 Disclaimers:
Ad.9 Additional Information/Comments:
Date of Submission (*MM/DD/YY*): 10/17/2011