

Measure Fact Sheet – The AHRQ-CMS Pediatric Quality Measures Program (PQMP)

Distribution of Temperatures for Low Birth Weight Neonates Admitted to Level 2 or Higher Nurseries in the First 24 Hours of Life

Measure Developer: Collaboration for Advancing Pediatric Quality Measures (CAPQuaM)

Numerator	Denominator	Exclusions	Data Source(s)
Continuous variable - Parameter of interest is the neonate's temperature taken upon admission to a Level 2 or higher nursery.	All infants born in a medical facility with birth weights less than 2500 grams and admitted to a level 2 or higher nursery within 24 hours of birth.	Neonates with comfort care; Neonates with anencephaly and/or neonates managed with hypothermia for therapeutic reasons for whom the decision was made prior to the first temperature being taken in the nursery.	Hybrid of medical records (paper or electronic) and administrative claims.

Measure Importance

Maintenance of temperature and prevention of hypothermia in low birth weight (LBW) babies are associated with better chances of survival.[1,2] Lower than desirable temperatures are associated with deaths before discharge from the hospital and intraventricular hemorrhage (IVH).[3] IVH is a significant cause of disability. The independent association of temperature with these outcomes persists even after controlling for a variety of key clinical variables, such as Apgar score.

Evidence Base for the Focus of the Measure[4]

The temperature of LBW infants varies based on the care they receive in the moments after birth. They are at high risk to lose body temperature, and very small babies need rapid and meticulous management of their temperature and environment. Our data from three hospitals in New York City show that every degree below 37 Celsius adds meaningful risk in a continuous fashion. This is consistent with a broad literature.[1] Consequential outcomes of hypothermia include death or IVH. Research has shown that health care organizations can improve their performance on this measure (temperature and patient outcomes).[5,6]

Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov
CENTERS FOR MEDICARE & MEDICAID SERVICES

Advantages of the Measure

- This measure addresses a key safety and quality gap in inpatient care for premature infants.
- This intermediate outcomes measure is closely associated with important long-term outcomes.
- This measure is highly feasible and based upon data that are readily available and easy to abstract.
- The measure treats temperature as a continuous variable, which appears to be how it behaves in terms of its relationship to important outcomes and also avoids artificially defining at what point "hypothermia" begins.
- Results from this measure can be illustrated clearly on cumulative incidence curves that can be readily compared visually and reported in table format (Table 1).

Table 1

Quantile	Estimated temperature (in Celsius)
99	37.9
95	37.3
90	37.1
75	36.8
50	36.4
25	36.0
10	35.4
5	35.0
1	34.1

N= 7553
Mean = 36.3
SD = 0.7
IQ RAnge = 0.80

These results may be presented as a cumulative distribution curve that highlights both the desirable range and the ideal temperature of 37^0 C. Curves may be shown simultaneously for rapid visual comparison of performance in different sites or populations (Figure 1).

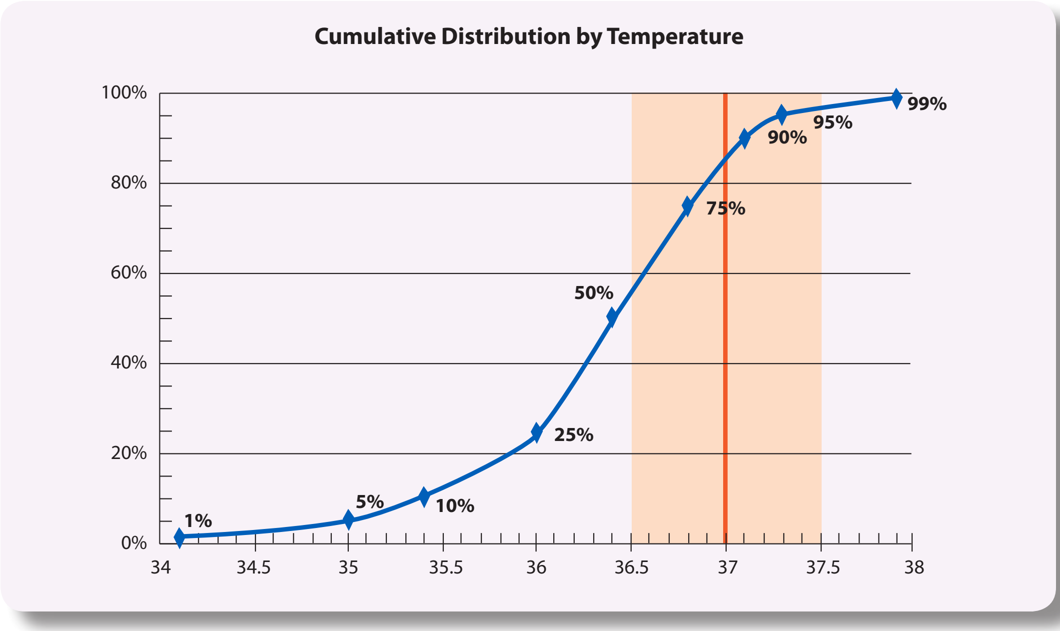

Figure 1. Distribution of temperatures in LBW neonates. Y-axis is cumulative distribution, in other words the percent of all low birth weight (LBW) neonates with that temperature or lower.

Although not shown in Figure 1, in our sample, the distribution of temperatures (the curves) varied by race and ethnicity, with non-Hispanic whites least likely to be too cool and black infants most likely to be too cool.

Levels of Aggregation Applicable to the Measure[7]

The measure was developed at the level of the hospital and is appropriate for comparison when sufficient sample size is available at the hospital, State, regional, and national levels, as well as by payer and provider organizations.

Reliability and Validity of the Measure

- The reliability of methods for assessing temperature is very high.
- The measure is designed for births to be identified using administrative/claims data and for the time values, temperature value, and clinical covariates to be abstracted from the medical record. Demographic variables may come from either.
- The measure was selected because it achieved very high face validity using the modified UCLA/RAND Delphi process.

Measure Testing

The measure developer tested performance of the measure using the New York State neonatal database. The database included reports from 61 sites: (1) 20 Level 2 nurseries; (2) 27 Level 3 nurseries; and (3) 14 Regional Perinatal Centers. The measure testing included all newborn infants from these facilities with a birth weight of 400-2499 grams whose temperature upon admission to the nursery was 29^0 C or higher.

Selected Results from Tests of the Measure[8]

- Results from studies involving neonates (N=7,553) from the 61 nurseries in New York State showed in-hospital deaths increased as admission temperatures decreased. Racial/ethnic differences were observed.
- A study of three diverse hospitals in New York City conducted by the team that developed the measure found that after controlling for other key variables, every degree of temperature loss below 37^0 C had the same impact on mortality as subtracting 200 grams from the birth weight.

Caveats

- This measure may have small sample sizes when multiple stratifications are performed. While the mean and standard deviation are highly sensitive to outlying values, the median and interquartile range is particularly robust and therefore valid with smaller sample sizes.

Related Measures

For other measures related to neonates developed under the CHIPRA Pediatric Quality Measurement Program, see www.ahrq.gov/chipra.

More Information

- AHRQ: CHIPRAqualitymeasures@ahrq.hhs.gov
- CAPQuaM: www.capquam.org; Lawrence C. Kleinman, MD, MPH, FAAP
- Coming soon: Link to measure details on the AHRQ Web site.

For more information about the PQMP, visit www.ahrq.gov/chipra

Notes

[1]Laptook AR, Salhab W, Bhaskar B. Admission temperature of low birth weight infants: predictors and associated morbidities. Pediatrics 2007;119(3):e643-9.

[2]Profit J, Gould JB, Zupancic JA, et al. Formal selection of measures for a composite index of NICU quality of care: Baby-MONITOR. J Perinatol 2011;31(11):702-10.

[3]Miller SS, Lee HC, Gould JB. Hypothermia in very low birth weight infants: distribution, risk factors and outcomes. J Perinatol. 2011;31(Suppl 1):S49-56.

[4]An evidence base comprises the breadth and rigor of studies demonstrating valid relationship(s) among the structure, process, and/or outcome of health care that is the focus of the measure. For example, evidence exists for the relationship between immunizing a child or adolescent (process of care) and improved outcomes for the child and the public. If sufficient evidence existed for the use of immunization registries in practice or at the State level and the provision of immunizations to children and adolescents, such evidence would support the focus of a measure on immunization registries (a structural measure).

[5]Cramer K, Wiebe N, Hartling L, et al. Heat loss prevention: a systematic review of occlusive skin wrap for premature neonates. J Perinatol 2005; 25:763-9.

[6]Lee HC, Ho QT, Rhine WD. A quality improvement project to improve admission temperatures in very low birth weight infants. J Perinatol 2008; 28:754-8.

[7]The Children's Health Insurance Program Reauthorization Act required measures developed under this program to "permit comparison of quality and data at a State, plan, and provider level." The measure developer identified the intended levels of aggregation and comparison as reported here.

[8]Kawachi I, Berkman, LF. Neighborhoods and Health. New York: Oxford University Press; 2003.

The Children's Health Insurance Program Reauthorization Act (CHIPRA) called for establishment of a Pediatric Quality Measures Program (PQMP) as a followup to identifying the initial core set of children's health care quality measures. This measure fact sheet was produced by the Agency for Healthcare Research and Quality, based on information provided by the AHRQ-CMS CHIPRA Collaboration for Advancing Pediatric Quality Measures (CAPQuaM), Icahn School of Medicine at Mount Sinai, which was funded by an AHRQ-CMS award. A listing of all submitted CHIPRA Centers of Excellence measures can be found at www.ahrq.gov/chipra. All CHIPRA COE-developed measures are publicly available for noncommercial use.

AHRQ Pub. No. 14(16)-P006-1-EF
March 2016