
**ODJFS Methods for High Risk Care
Management Program Performance Measures
for
Neonatal Intensive Care Unit Infant Population**

SFY 2013

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OVERVIEW

The neonatal intensive care unit (NICU) infant population has been identified as a priority population that could benefit from intensive care management. While the managed care plans will have flexibility in which NICU infants will be targeted for high risk care management, the MCPs must care manage at least 40 percent of the infants who have been in the NICU for one week (7 days) or more at the high risk level. MCPs may choose to manage a greater percentage of NICU infants at a high risk level.

The following three measures will include only the neonatal intensive care unit (NICU) infant population: 1) Emergency Department Utilization Rate of Members in High Risk Care Management, 2) Inpatient Hospitalization Rate of Members in High Risk Care Management, and 3) Overall Medical Costs of Members in High Risk Care Management. **These measures will be calculated for informational purposes only.**

Exclusions

The following exclusion will apply to each of the three measures listed above:

- (1) Members with a traumatic or related event during the **evaluation period**. The following diagnosis codes will be used to determine the occurrence of a traumatic or related event:

ICD-9 Diagnosis Codes Used To Identify Traumatic or Related Events:
800-854, 860-871, 874.0-874.59, 885-887, 895-897, 900-915, 918, 920-959, 990-996, E80-E84, E88-E92, E96-E98

Transfers and Final Discharge

Direct transfers between hospitals will be identified by the following discharge status codes: 02, 05, 30, 43, and 66. ODJFS will evaluate transfers through all inpatient facilities to determine the final discharge date for the infant's episode of care. The final discharge from the NICU or other non-NICU inpatient facility will start the 180-day evaluation period. The following provides an example of how the final discharge date will be determined.

Final Discharge Identification			
Member	NICU Hospital Discharge Date (Transfer Code)	Transfer Hospital Discharge Date (Transfer Code)	Final Discharge Date Used for Evaluation
A	July 1, 2012 (02)	July 30, 2012 (01)	July 30, 2012
B	September 1, 2012 (01)	—	September 1, 2012
C	December 31, 2012 (02)	1. January 15, 2012 (02) 2. January 30, 2012 (01)	January 30, 2012

Data Sources

The sources of the data for calculating the measures are as follows:

- (1) MCP submitted encounter data
- (2) Fee-For-Service Claims
- (3) ODJFS' Managed Care Enrollment and Eligibility Data
- (4) Care management data submitted and accepted in the Care Management System (CAMS)

Identification Period

The time period used to identify infants with NICU discharge dates is July – December 2012. High-risk care management members discharged from the NICU between July 1, 2012 and December 31, 2012 will be included in the measures. The evaluation period will be the first six months (i.e., 180 days) after discharge. The following table provides examples of the evaluation period for the July – December 2012 identification period.

Identification Period: July – December 2012		
Member	Discharge Date	Evaluation Period (First Six Months After Discharge)
A	July 1, 2012	July 2, 2012 – December 28, 2012
B	September 1, 2012	September 2, 2012 – February 28, 2013
C	December 31, 2012	January 1, 2013 – June 29, 2013

Emergency Department Utilization Rate of NICU Infants in High Risk Care Management

Measure: *The difference between the expected and actual emergency department (ED) utilization rates for NICU infants in high risk care management.*

Two emergency department utilization rates will be calculated for each individual, one for the expected rate and one for the actual rate. The following describes the rate, numerator, and denominator criteria that will be used to derive the difference in emergency department visit rates.

Rate: The average number of emergency department visits per member.

Numerator: The number of emergency department visits during the first six months (i.e., 180 days) after discharge for each NICU infant who meets denominator criteria.

Actual Rate Denominator Criteria: Infants must have : 1) been discharged from the NICU (revenue codes 174 and/or 175) between July 1, 2012 and December 31, 2012; 2) been 28 days of age or less upon admission date to the NICU, 3) been enrolled in the MCP upon admission date to the NICU; 4) been continuously enrolled in the MCP during the first six months (i.e., 180 days) after discharge; 5) were in high risk care management per CAMS (CAMS codes: 96/196) at some point during the first six months (i.e., 180 days) after discharge; and 6) had at least a 7 day stay during the NICU admission

Expected Rate Denominator Criteria: The denominator for the expected rate will be determined by matching NICU infants in the identification period (i.e., NICU patients who are in the actual rate denominator) to a comparable population that was not in care management in order to determine the expected rate. Please refer to the propensity-score based matching methodology in Appendix A for a detailed description of how the matched population will be identified.

Data Sources: Encounter Data
CAMS
ODJFS' Managed Care Enrollment Data

Codes to Identify Emergency Department Visits

UB-92 Revenue	AND	UB-92 Type of Bill
45x, 981		13x
<i>OR</i>		
CPT	AND	POS
10040 – 69979		23
<i>OR</i>		
CPT		
99281-99285		

Exclusions:

1. Any ED visit, as defined above, with the same member service date as a claim with a revenue center code of '456' (urgent care) or place of service code of '20' (urgent care), will not be counted as an ED visit for purposes of the numerator.
2. ED visits resulting in an inpatient stay (i.e., ED visits on the day prior to, or the same day, as the first day of an inpatient admission) will be excluded from the numerator. Inpatient stays are identified below.
3. Encounters for which the MCP paid zero dollars, or Medicaid paid zero dollars will be

excluded.

Codes to Identify Acute Inpatient Hospitalizations

UB-92 Type of Bill
111, 121, 411, 421

Inpatient Hospitalization Rate of NICU Infants in High Risk Care Management

Measure: *The difference between the expected and actual inpatient utilization rates for NICU infants in high risk care management.*

Two inpatient utilization rates will be calculated for each individual, one for the expected rate and one for the actual rate. The following describes the rate, numerator, and denominator criteria that will be used to derive the difference in inpatient utilization rates.

Rate: The average number of inpatient hospitalizations per member.

Numerator: The number of inpatient hospitalizations during the first six months (i.e., 180 days) after discharge for each NICU infant who meets denominator criteria.

Actual Rate Denominator Criteria: Infants must have : 1) been discharged from the NICU (revenue code 174 and/or 175) between July 1, 2012 and December 31, 2012; 2) been 28 days of age or less upon the NICU admission date, 3) been enrolled in the MCP upon admission date to the NICU; 4) been continuously enrolled in the MCP during the first six months (180 days) after discharge; 5) were in high risk care management per CAMS (CAMS codes: 96/196) at some point during the first six months (i.e., 180 days) after discharge; and 6) had at least a 7 day stay during the NICU admission.

Expected Rate Denominator Criteria: The denominator for the expected rate will be determined by matching NICU infants in the identification period (i.e., NICU patients who are in the actual rate denominator) to a comparable population that was not in care management in order to determine the expected rate. Please refer to the propensity-score based matching methodology in Appendix A for a detailed description of how the matched population will be identified.

Data Sources: Encounter Data
CAMS
ODJFS' Managed Care Enrollment Data

Codes to Identify Acute Inpatient Hospitalizations

UB-92 Type of Bill
111, 121, 411, 421

Exclusions:

1. Encounters on which the MCP paid zero dollars, or Medicaid paid zero dollars will be excluded.
2. Direct transfers between hospitals will be excluded (discharge status codes 02, 05, 30, 43, 65, and 66).

Overall Medical Costs of NICU Infants in High Risk Care Management

Measure: *The difference between the expected and actual medical costs for NICU infants in high risk care management.*

Two medical costs will be calculated for each individual, one for the expected cost and one for the actual cost. The following describes the rate, numerator, and denominator criteria that will be used to derive the difference in medical costs.

Rate: The average overall medical costs per member.

Numerator: The total medical costs during the first six months (i.e., 180 days) after discharge for each infant who meets denominator criteria. Medical costs will be calculated using encounter data during the evaluation periods. Medical costs will include all costs reported on encounters that were paid either on a fee-for-service schedule or as part of a capitation risk-sharing arrangement. For those encounters which are part of a capitation payment arrangement, the MCP must shadow price the encounter to the amount the MCP would have paid to the provider if the capitation arrangement did not exist per the encounter data EDI companion guides. The member's medical costs will include both payment amounts paid on a fee-for-service basis and shadow priced by the MCP. Only Medicaid medical costs will be included (i.e., third party payments will **not** be included).

Actual Denominator Criteria: Infants must have : 1) been discharged from the NICU (revenue codes 174/ and/or 175) between July 1, 2012 and December 31, 2012; 2) been 28 days of age or less upon the NICU admission date , 3) been enrolled in the MCP upon admission date to the NICU; 4) been continuously enrolled in the MCP during the first six months (180 days) after discharge; 5) were in high risk care management per CAMS (CAMS codes: 96/196) at some point during the six months (i.e., 180 days) after discharge; and 6) had at least a 7 day stay during the NICU admission

Expected Rate Denominator Criteria: The denominator for the expected rate will be determined by matching NICU infants in the identification period (i.e., NICU patients who are in the actual rate denominator) to a comparable population that was not in care management in order to determine the expected rate. Please refer to the propensity-score based matching methodology in Appendix A for a detailed description of how the matched population will be identified.

Adjustments: All adjustments will be performed at the plan level. The plan's final rates will be adjusted for a medical cost trend factor. See Appendix B for the adjustment methodology.

Data Sources: Encounter Data
Fee-For-Service Claims
CAMS
ODJFS' Managed Care Enrollment Data

Example:

Adjust for Inflation (Individual-Level Calculation)

Category of Service	Actual Costs: July-December 2012	Inflationary Factor	Adjusted Actual Costs: July-December 2012
Person A			
Pharmacy	\$619	3.0%	\$600
Inpatient	\$3,158	5.0%	\$3,000
Outpatient	\$404	1.0%	\$400
Emergency Department	\$250	0.0%	\$250
Professional	\$255	2.0%	\$250
TOTAL	\$4,668		\$4,500

Appendix A: Matching Methodology

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As described above, an expected rate will be calculated for the NICU measures. In order to determine the expected rate for these measures in the absence of care management, a propensity score-based matching analysis will be performed to identify a non-care management population for purposes of comparison. Historical data will be used to identify a comparable population that was not in care management in order to determine the expected rate. Additional information regarding this matching is provided in the following section. Since differences in patient mix may exist for each MCP, matching will be performed at the MCP level.

Data Sources

The sources of data for calculating the expected improvement factor will be as follows:

- (1) MCP submitted encounter data
- (2) ODJFS' Managed Care Enrollment data
- (3) CAMS Enrollment data

Propensity Score-Based Matching Statistical Analysis

For purposes of determining the expected rates, a plan's care management NICU population will be matched to a non-care management NICU population using historical data. The following table provides the time periods that will be used for the July – December 2012 identification period for the non-care management and care management NICU population.

Non-Care Management NICU Population	Care Management NICU Population
July 1, 2011 – December 31, 2011	July 1, 2012 – December 31, 2012

A propensity-score based matching will be performed to select a non-care management population, using historical data, that has similar characteristics to those in the care management population during the identification period. The following describes this matching process.

1. Covariate Identification

Covariates will be identified for each member. The following provides a description of each of the covariates and the methods that will be used to identify the covariates. Covariates will be assigned using a binary scoring methodology. Members will be assigned a '1' for the covariate value if the covariate condition was met or a '0' if the covariate condition was not met.

Table 1 provides a list of the covariates and the method that will be used to identify each covariate.

Table 1—Covariates	
Covariates	Identification Method
Age at Discharge	
Number of weeks	Member's date of birth will be used to identify the member's age at discharge.
Gender	
Male Female	Members flagged as 'M' in the recipient file will be classified as Male. Members flagged as 'F' will be classified as Female.
Race/Ethnicity	
White Black Other	Members flagged as '1' will be classified as White. Members flagged as '2' will be classified as Black. All others will be classified as Other.
Region	
Northwest West Central Central Northeast Northeast Central East Central Southeast Southwest	Member's region per the enrollment data.
Birth Weight	
< 750 grams 750 – 999 grams 1,000 – 1,250 grams 1,251 – 1,500 grams 1,501 – 1,750 grams 1,751 – 2,000 grams 2,001 – 2,250 grams 2,251 – 2,500 grams > 2,500 grams	Condition code in the encounter data.
Month of Discharge	
January February March April May June July August September October November December	The member's date of discharge from the NICU.
Congenital Anomalies	
Central Nervous System Cardiovascular Respiratory Other	Primary diagnosis code in the encounter data. Please see Table 2 for a list of the diagnosis codes for each congenital anomaly.

Table 2 provides a list of the primary diagnosis codes that will be used to identify each congenital anomaly.

Table 2—Congenital Anomalies Primary Diagnosis Codes	
Congenital Anomaly	Diagnosis Code
Central Nervous System	740-742
Cardiovascular	745-746
Respiratory	747-748
Other	090.0 - 090.9, 237.70 - 237.72, 282.0 - 282.9, 286.0 - 286.9, 287.3, 330.1, 334.1, 334.2, 343.0 - 343.9, 345.6, 356.3, 362.60 - 362.66, 363.20, 377.16, 378.0 - 378.9, 653.7, 658.8, 733.3, 743, 744, 749, 750-759, 760, 771.0 - 771.2

Matching Populations

Propensity scores will be derived in order to match the care managed and non-care managed NICU populations. The propensity score is used to reduce biased results and control for multiple confounders simultaneously by ensuring that comparable populations are evaluated.

The covariates discussed in the previous section will be used to determine a propensity score for each member. Logistic regression will be used to calculate the propensity score. The equation used for the logistic regression is as follows:

$$\Pr(Y_i = 1) = \frac{1}{1 + \exp[-(\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_k X_{ik})]}$$

where $\Pr(Y_i = 1)$ is the propensity score, the β s are parameters to be estimated, and the Xs are the covariates.¹

After using logistic regression to determine a propensity score for each member, members will be matched using a greedy algorithm. A greedy algorithm will be used to match cases (i.e., care management NICU members) to controls (i.e., non-care management NICU members).² Once a case and control are matched, the matches will not be reconsidered. Therefore, subsequent matches will be determined on what is currently available.

The two populations' propensity scores will be used to match the populations. Matching on propensity scores has been shown to create a "covariate balance" such that the matched population will be similar for all the covariates included in calculating the propensity score.³ This matching methodology makes "best" matches first (i.e., matches on the highest digit match) and then matches on successive "next-best" matches. This is done in a top-down sequence until no more matches can be made.

¹ Linden, A., Adams, J.L., and Roberts, N. (2005). "Using propensity scores to construct comparable control groups for disease management program evaluation." *Disease Management Health Outcomes*. 13(2): 107-115.

² The care management NICU members will be identified during the report period. A pre-baseline period will be used to match those NICU members who were not in care management.

³ Parsons, L.S. (2001). "Reducing Bias in Propensity Score Matched-Pair Sample Using Greedy Matching Techniques." Paper 214-26. Proceedings of the Twenty-Sixth Annual SAS Users Group International Conference. Cary (NC): SAS Institute Inc.

A Greedy 5→1 digit match will be used for purposes of matching the populations. The Greedy 5→1 digit match means that the populations will first be matched on the propensity score out to the fifth decimal place. For those that did not match, the populations will then be matched on the propensity score out to the fourth decimal place. This will continue down to a 1-digit match.

2. Calculation of Expected Rate

Once the matched non-care management population is identified, an expected rate will be determined using this population. The time period used to identify the matched non-care management population infants will be NICU discharge dates between July-December 2011. Non-care management members discharged from the NICU between July 1, 2011 and December 31, 2011 will be used to calculate the expected rate. The first six months (i.e., 180 days) following discharge will be used as the evaluation period. The following table provides examples of the evaluation periods that would be evaluated for the July – December 2011 identification period for the non-care management population.

Identification Period: July – December 2011		
Member	Discharge Date	Evaluation Period (First Six Months After Discharge)
A	July 1, 2011	July 2, 2011 – December 28, 2011
B	September 1, 2011	September 2, 2011 – February 28, 2012
C	December 31, 2011	January 1, 2012 – June 18, 2012

As previously noted, the expected rate is determined using the **matched non-care management population**.

Appendix B: Medical Cost Trend Effect Determination

Data Sources

The source of data for calculating the medical cost trend effect will be as follows:

- (1) MCP submitted encounter data
- (2) Fee-For-Service Claims

ODJFS will adjust for medical cost trend in the *Overall Medical Costs of Members in High Risk Care Management* measure. This trend is comprised of two primary components: 1) an overall inflationary factor in medical costs; and 2) advances in treatment technologies (e.g., newer, more effective and appropriate pharmaceuticals or procedures may be introduced over time) which drive medical costs. ODJFS will capture trending of cost per claim by categories of service to determine an individual factor for each category of service. The cost per claim will be derived from encounter data. These categories of service include: 1) pharmacy, 2) inpatient, 3) outpatient, 4) emergency department, and 5) professional. The pharmacy category of service will be derived from all data in the pharmacy file. The inpatient, outpatient, and emergency department categories of service will be identified using the codes in the following table.

Description	CPT	UB-92 Revenue
Outpatient	92002, 92004, 92012, 92014, 99201-99205, 99211-99215, 99217-99220, 99241-99245, 99341-99345, 99347-99350, 99384-99387, 99394-99397, 99401-99404, 99411, 99412, 99420, 99429, 99455, 99456	051x, 0520-0523, 0526-0529, 057x-059x, 082x-085x, 088x, 0982, 0983
Inpatient	99304-99310, 99315, 99316, 99318, 99324-99328, 99334-99337 99221-99223, 99231-99233, 99238, 99239, 99251-99255, 99291	0118, 0128, 0138, 0148, 0158, 019x, 0524, 0525, 055x, 066x 010x, 0110-0114, 0119, 0120-0124, 0129, 0130-0134, 0139, 0140-0144, 0149, 0150-0154, 0159, 016x, 020x, 021x, 072x, 080x, 0987
Emergency Department	99281-99285	045x, 0981

Any claim/encounter that is not categorized as pharmacy, inpatient, outpatient or emergency department will be included in the professional category of service

For claims/encounters where multiple categories of service are identified, the following hierarchy will be used to identify the category of service.

1. Pharmacy
2. Inpatient
3. Emergency Department
4. Outpatient
5. Professional

In addition, ODJFS will perform an evaluation on the NICU population data submitted by the MCPs in high risk care management to account for advances in treatment technologies as a potential cost driver. High costs driven by advances in treatment technologies will be handled on an individual basis. One of two options will be applied: 1) costs will be shadow priced or 2) costs will be eliminated from the medical cost trend effect evaluation. For example, if a more

costly treatment replaces an existing treatment, then the cost of the advanced treatment will be shadow priced to the cost of the existing treatment. However, if the advanced treatment is identified as a new treatment with no prior existing comparable treatment, then the cost for the advanced treatment will be removed from the cost trend effect evaluation since no comparable treatment exists. Each member's costs will be adjusted, by category of service, for the medical cost trend.

ODJFS will perform a retrospective comparison of the cost from the expected period to the actual period. Medical cost trend adjustment factors will be applied to each category of service: pharmacy, inpatient, outpatient, emergency department, and professional. The following time periods will be assessed for calculating the medical cost trend effects:

Expected Period: July 1, 2011 – December 31, 2011

Actual Period: July 1, 2012 – December 31, 2012