Anthem-Insured Birth Cohort Methods

David Goodman, MD, MPH
Megan Murphy, MS, SM

Anthem Definitions

Eligible Newborns [N=1,175,607]

To be an eligible newborn, the member must have had at least one entry in the enrollment and months file, in addition to at least one complete claim (with header and detail information) (n=2,821,639). Any member whose date of birth was listed between 2010 and 2014 was further assessed for eligibility (n=1,416,272). Type of insurance coverage (commercial or Medicaid) at time of birth was also evaluated and infants were assigned to the coverage group associated with their first enrollment month. If an infant was not enrolled in commercial or Medicaid insurance, if insurance type was missing or if an infant was assigned to both types of coverage at the time of their birth, the infant was was not considered eligible and was excluded (n=24,368; eligible n=1,391,904). Both infant and matched maternal claims were examined for evidence of newborn care within the 30 days following the infant's date of birth. If there was no evidence of newborn care within the 30 days following birth, infants were not considered eligible and were excluded (n=125,867; eligible n=1,266,037). Each infant's home zip code at the time of enrollment was utilized for assignment to neonatal intensive care regions (NICRs), so a valid zip code was required for inclusion. If a home zip code was unavailable, state and county information could be used to determine NICR assignment (n=2). If an infant was linked to two different NICRs at the time of birth, the assignment that agreed with the mother's entry was considered accurate (n=22). If there was no valid infant entry available, the mother's entry was utilized (n=68,671). If an infant was assigned to two different NICRs at the time of birth and assignment could not be verified with maternal information, the infant was excluded (n=3). Likewise, if there was no NICR assignment available, the infant was excluded (n=60,444). Eligible infants (n=1,205,590) who had evidence of a birthweight less than 500 grams in professional claims were identified with ICD-9 diagnosis codes 764xx, 7650x, 7651x and V2131. Any eligible infant flagged with one of these codes in any of the ten diagnosis fields on any eligible professional claim was excluded (n=499; eligible n=1,205,091) In addition, any eligible infant who was part of a multiple birth was identified with ICD-9 diagnosis codes V31xx-v37xx in any of the ten diagnosis fields on any eligible professional claim. Infants who were flagged as being part of a multiple birth were considered ineligible and were excluded (n=29,484; eligible n=1,175,607).

Newborn Inpatient Episode

The initial newborn inpatient episode was defined for all eligible newborns using eligible claims. Eligible claims included any claim with both header and detail information available with an allowed amount of $0 or more and status of approved, adjudicated or paid. Only service rendering type codes associated with hospital and physician claims were considered for the initial newborn inpatient episode. If the place of service associated with a claim was not coded as 21 (inpatient hospital), 23 (emergency room, hospital) or 24 (ambulatory surgical center) the claim was not considered for the initial newborn inpatient episode. All eligible newborn and matched maternal

claims made within 365 days after birth were examined for evidence of routine, intermediate and intensive newborn care using revenue codes associated with hospital claims and CPT codes associated with professional claims found in Table 1.

Table 1: Codes for Determining Initial Newborn Inpatient Episode

Classification	Source	Codes
Routine Care	Hospital Claims Professional Claims	Revenue Codes: 0170, 0171, 0179 CPT Codes: 99431-99435, 99460-99463
Intermediate Care	Hospital Claims Professional Claims	Revenue Codes: 0172, 0173 CPT Codes: 99298-99300, 99477-99480
Intensive Care	Hospital Claims Professional Claims	Revenue Codes: 0174, 0175 CPT Codes: 99294-99296, 99468-99469, 99471-99472

Infants were assigned to have the highest level of care documented through eligible claims for each day of their first year of life. If there was no evidence of care on a given day, that day was flagged as such. The first day of the initial newborn inpatient episode was the day of their birth and the last day of the initial newborn inpatient episode was determined to be the first instance in which the following two consecutive days did not have any evidence of care.

Very Low Birth Weight (VLBW) Newborns [N=12,086]

To be eligible for the VLBW newborn cohort, infants must already be an eligible newborn meeting the criteria described above. Any eligible newborn with a hospital claim including any of the DRGs listed in Table 2 in any of the five DRG fields were flagged as being VLBW.

Any eligible newborn who was not flagged using hospital claims was further examined for evidence of very low birth weight in professional claims; any eligible newborn with professional claims including any of the ICD-9 diagnosis codes listed in Table 2 in any of the ten diagnosis fields were flagged as being VLBW.

Table 2: Codes for Identifying VLBW Newborns

Source	Data Field	Codes
Professional Claims	AP-DRG APR-DRG	602, 603, 604, 606, 607 581, 588, 591, 593, 602, 603, 607, 608
Hospital Claims	ICD-9 Diagnosis Code	764.03-764.05, 764.12-764.15, 764.22-764.25, 764.92-764.95, 765.02-765.05, 765.12-765.15, V21.32-V21.33

Low Risk (LR) Newborns [N=1,110,517]

To be eligible for the LR newborn cohort, infants must already be an "eligible newborn." Any eligible newborn with hospital or professional claims including any of the ICD-9 diagnosis codes listed in Tables 2 and 3 in any of the ten diagnosis fields were excluded as being LR.

Table 3: Diagnosis Codes for Identifying LR Newborns

ICD-9 Diagnosis Codes				
74670	76503	77081	7452x	7685x
74686	76504	77084	7453x	7687x
74710	76505	77087	7457x	769xx
74711	76511	77088	7461x	7702x
74731	76512	77750	7473x	7702x
74731	76513	77751	7503x	7703x
74739	76514	77752	7511x	7733x
74741	76515	77753	7512x	7734x
75314	76521	77985	7535x	7747x
75672	76522	79902	7566x	7762x
75673	76523	5180x	7581x	7776x
75679	76524	7400x	7582x	7780x
76500	76525	7420x	7594x	7792x
76501	76526	7450x	7597x	V5881
76502	76527	7451x	7670x	

Any remaining newborn who was not already excluded from the low risk group, were excluded if hospital claims included any of the ICD-9 procedure codes listed in Table 4 in any of the five procedure fields. The remaining newborns were flagged as low risk.

Table 4: Procedure Codes for Identifying LR Newborns

ICD-9 Procedure Codes								
1	243	3179	3524	3722	4100	4594	5459	8674
17	309	3198	3525	3723	4104	4595	5461	8753
22	311	3199	3526	3725	4106	4601	5471	8842
34	313	3229	3534	3733	4131	4603	5491	8843
64	321	3239	3541	3749	4198	4610	5493	8852
66	340	3241	3542	3751	4199	4611	5498	8853
102	343	3249	3551	3766	4209	4620	5502	8961
109	351	3323	3552	3771	4225	4621	5503	9390
118	352	3324	3553	3774	4233	4623	5524	9627
124	360	3328	3554	3783	4239	4639	5539	9633
131	390	3393	3555	3794	4251	4676	5551	9656
139	415	3401	3561	3799	4284	4679	5569	9671
153	504	3404	3562	3835	4311	4680	5586	9672
159	537	3409	3562	3845	4319	4681	5587	9749
201	540	3421	3563	3864	4389	4682	5641	9901
203	544	3451	3571	3884	4516	4841	5661	9904
203	547	3452	3572	3885	4525	4842	5674	9905
204	554	3479	3573	3891	4526	5011	5689	9907
205	560	3491	3581	3892	4561	5012	5699	9914
206	562	3499	3582	3895	4562	5059	5717	9914
212	580	3501	3583	3897	4571	5131	5718	9915
214	996	3503	3584	3921	4572	5136	5721	9925
221	2754	3510	3591	3950	4573	5137	5722	9960
222	2762	3511	3592	3961	4574	5222	5783	9961
231	3129	3512	3594	3961	4576	5372	5786	9962
234	3169	3513	3596	3965	4579	5375	5788	9963
239	3172	3514	3699	3972	4591	5380	5799	9981
242	3173	3522	3721	3995	4593	5411	6529	

Special Care Day

Special care days were classified as intermediate and intensive based on revenue codes associated with hospital claims and CPT codes associated with professional claims described in Table 5. Infants were assigned to have the highest level of care documented through eligible claims for each day of their initial inpatient episode. If there was no evidence of care or if they were flagged as having routine care on a given day, that day was not tabulated as a special care day. All intermediate care days during the initial inpatient episode were summed to yield the total number of intermediate care days; all intensive care days during the initial inpatient episode were summed to yield the total number of intensive care days; all intermediate and intensive care days during the

initial inpatient episode were summed to yield the total number of special care days; and the ratio of the sum of all intensive care days to the sum of all intermediate and intensive care days during the initial inpatient episode was tabulated as the percent intensive special care days.

Table 5: Codes for Identifying Special Care Days

Classification	Source	Codes
Intermediate Care	Hospital Claims Professional Claims	Revenue Codes: 0172, 0173 CPT Codes: 99298-99300, 99477-99480
Intensive Care	Hospital Claims Professional Claims	Revenue Codes: 0174, 0175 CPT Codes: 99294-99296, 99468-99469, 99471-99472

NICU Admission

A NICU admission was flagged when an infant had one or more of the following claims available with a date of service falling within the initial inpatient episode: an intermediate special care day identified in eligible professional claims; or an intensive special care day identified in eligible hospital or professional claims. CPT codes associated with professional claims and revenue codes associated with hospital claims used to identify a NICU admission are displayed in Table 6 below.

Table 6: Codes for Identifying NICU Admission

Classification	Source	Codes
Intermediate Care	Professional Claims	CPT Codes: 99298-99300, 99477-99480
Intensive Care	Hospital Claims Professional Claims	Revenue Codes: 0174, 0175 CPT Codes: 99294-99296, 99468-99469, 99471-99472

Imaging Event

Imaging events were tabulated using eligible professional claims with a date of service that fell within the infant's initial inpatient episode. The CPT codes found in Table 7 were used to identify chest x-rays, abdominal films, MRIs and head ultrasounds.

Table 7: Codes for Identifying Imaging Events

Source	Imaging Category	CPT Codes
Professional Claims	Chest X-Ray	71010, 71020
	Abdominal Film	74000, 74010, 74020, 74022
	MRI	70551, 70552, 70553
	Head Ultrasound	76506

Localization Indices

Localization indices were determined for all NICRs using infants with any special care days during the initial newborn inpatient episode. Infants were assigned to a home NICR based on their home zip code when assessing eligibility, so all newborns with any special care days during the initial inpatient episode had a home NICR assignment. Hospital NICRs were assigned based on the zip code associated with the hospital where a newborn received the majority of their special care. Hospital claims were considered as the primary data source for zip code where care was delivered. All special care days assigned using hospital claims were tabulated by a tax identifier and the identifier with the greatest number of special care days was assigned to that newborn. Professional claims were considered only for infants who did not have any hospital claims associated with special care days available during the initial newborn inpatient episode. Professional claims were also tabulated by a tax identifier and the identifier with the greatest number of special care days was assigned to the newborn. Tax identifiers were linked to zip codes and these zip codes were linked to hospital NICRs. When tax identifiers could not be linked to zip codes, hospital NICRs were flagged as missing. Infants with a valid hospital NICR were classified as having agreement or disagreement between their home NICR and their hospital NICR. Localization indices were calculated as the percentage of home and hospital NICRs that were in agreement, whereby the count of infants whose home and hospital NICRs agreed was divided by the count of all infants with a hospital NICR assignment, in agreement or disagreement with the home NICR.