RATES OF HOSPITAL REPORTING OF ADVERSE PREGNANCY OUTCOMES IN 2016

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Theresa Sandidge, M.A.
Adverse Pregnancy Outcomes Reporting System

PURPOSE

The Illinois Department of Public Health's (IDPH) regulations require hospitals to report adverse pregnancy outcomes identified in Illinois residents during the newborn hospital stay. In 2016, these included infants with birth defects, prematurity (fewer than 31 weeks), serious congenital infections, intrauterine growth restriction, retinopathy of prematurity, those who had other serious conditions, and those who died during the newborn stay (Appendix 1). Rates of adverse pregnancy outcome reporting are calculated by IDPH's Adverse Pregnancy Outcomes Reporting System (APORS) to compare the number of adverse pregnancy outcomes each hospital reported to the number of live births at that hospital. The results are used to provide hospital-specific feedback that improves the completeness of case reporting.

METHODS

Four out-of-state hospitals that are part of the Illinois Perinatal Network are not included in this study because the number of births to Illinois residents at those facilities is not available for this

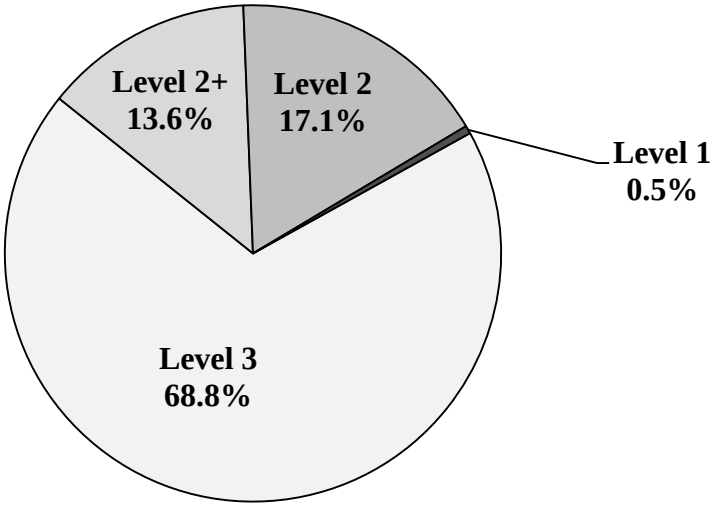
study period. An additional hospital is excluded because no births take place there; it provides services to newborns transferred from delivery hospitals. Data for 2016 show that 148,394 births took place at the 117 included Illinois Perinatal Network hospitals. The number of births is based on the number of 2016 birth certificates filed by Illinois hospitals with IDPH's Division of Vital Records. These 117 hospitals reported 9,307 cases to APORS using the database or paper forms provided by the program. Each hospital's case reporting rate was calculated as the percentage of reported cases among the total number of births at that hospital. The reporting rate for a hospital level was calculated as the number of cases reported by hospitals at that level divided by the total number of births at hospital at that level.

RESULTS

Overall Case Reporting Rates. In 2016, the case reporting rates ranged from 0.3 to 21.3 percent with the average being 6.3 percent; higher than the average 2015 case reporting rate of 5.7 percent. In Illinois, hospitals are certified at one of four levels, depending on the services they offer. The Level 3 facilities care for patients requiring the most complex care and operate a neonatal intensive care unit (NICU). The Level 2+ hospitals provide care to newborns at moderate risk and operate a Special Care Nursery (SCN) but not a NICU. Level 2 hospitals provide care to newborns at moderate risk, and have intermediate care nurseries, but do not operate a NICU or a SCN. Level 1 hospitals provide care to low-risk newborns and have only general care nurseries. Most APORS cases are reported by Level 3 facilities, with very few being born at Level 1 hospitals (Figure 1). Since mothers whose babies have known or suspected adverse outcomes are expected to deliver at Level 3 or 2+ hospitals, to assure their babies receive the appropriate care, the analyses of case completeness rates were reported

separately for each care level. If a baby is transferred between hospitals, the highest level facility is responsible for reporting the case.

Figure 1: Percentage of APORS Cases Reported by Hospital Level



Hospital Case Reporting Rates. When examining combined reporting rates by level of care, the 23 Level 3 hospitals had the highest reporting rate at 9.5 percent (Table 1). This is expected given these hospitals care for the most complex cases and report the majority of cases to APORS. The combined reporting rates for Level 2+ and Level 2 facilities were 3.5 and 3.7 percent respectively (Tables 2 and 3). The nine Level 1 hospitals reported 2.8% of their births (Table 4).

For each level of care, there were wide ranges of reporting rates among hospitals. Among Level 3 hospitals the reporting rates by hospital ranged from 2.9 to 21.3 percent. Among level 2+

hospitals rates ranged from 1.6 to 6.6 percent, while among level 2 facilities the range was 0.3 to 11.5 percent. Among the level 1 hospitals rates ranged from 0.5 to 8.4 percent.

Table 1. Case Reporting Rates in 2016 for Level 3 Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate
3-1	261	9.7	**3-13**	522	19.6
3-2	456	11.0	**3-14**	383	19.9
3-3	281	8.1	**3-15**	321	21.3
3-4	183	15.1	**3-16**	115	11.7
3-5	318	8.2	**3-17**	206	9.4
3-6	283	6.8	**3-18**	259	11.9
3-7	85	3.3	**3-19**	923	7.8
3-8	162	5.1	**3-20**	337	14.6
3-9	188	5.8	**3-21**	38	2.9
3-10	91	5.0	**3-22**	361	17.2
3-11	239	9.7	**3-23**	240	10.3
3-12	150	4.4	***Combined***	***6,402***	***9.5***

Table 2. Case Reporting Rates in 2016 for Level 2+ Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate
2+-1	24	3.4	**2+-13**	20	1.5
2+-2	126	6.5	**2+-14**	33	2.4
2+-3	35	4.0	**2+-15**	61	4.6
2+-4	21	2.0	**2+-16**	19	1.0
2+-5	43	6.4	**2+-17**	25	1.9
2+-6	30	2.3	**2+-18**	124	4.2
2+-7	23	2.9	**2+-19**	75	6.6
2+-8	64	3.1	**2+-20**	115	4.6
2+-9	86	4.4	**2+-21**	119	5.1
2+-10	53	3.9	**2+-22**	38	3.5
2+-11	72	2.8	**2+-23**	30	2.1
2+-12	34	1.6	***Combined***	***1,270***	***3.5***

Table 3. Case Reporting Rates in 2016 for Level 2 Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate	Hospital	Cases	Rate
2-1	81	8.2	**2-22**	3	0.8	**2-43**	7	3.4
2-2	17	4.9	**2-23**	11	3.2	**2-44**	89	11.1
2-3	15	2.8	**2-24**	54	4.0	**2-45**	36	4.2
2-4	17	2.1	**2-25**	26	2.5	**2-46**	81	11.0
2-5	15	4.0	**2-26**	51	11.5	**2-47**	26	1.7
2-6	10	1.7	**2-27**	2	0.5	**2-48**	30	9.4
2-7	37	2.4	**2-28**	16	4.3	**2-49**	25	6.2
2-8	11	1.7	**2-29**	8	2.7	**2-50**	33	5.2
2-9	19	1.8	**2-30**	6	2.3	**2-51**	10	1.9
2-10	51	3.4	**2-31**	69	4.3	**2-52**	44	4.4
2-11	37	4.2	**2-32**	26	3.4	**2-53**	16	2.1
2-12	9	1.1	**2-33**	55	6.5	**2-54**	29	5.2
2-13	1	0.7	**2-34**	51	8.0	**2-55**	7	2.6
2-14	5	1.3	**2-35**	2	0.3	**2-56**	14	6.1
2-15	44	6.0	**2-36**	78	5.0	**2-57**	13	1.5
2-16	3	1.1	**2-37**	9	2.9	**2-58**	13	6.6
2-17	14	2.8	**2-38**	26	9.3	**2-59**	25	2.7
2-18	9	0.8	**2-39**	9	2.9	**2-60**	19	1.5
2-19	13	6.3	**2-40**	10	2.7	**2-61**	29	4.0
2-20	30	2.9	**2-41**	6	2.0	**2-62**	56	2.7
2-21	25	6.3	**2-42**	4	1.0	***Combined***	***1,587***	***3.7***

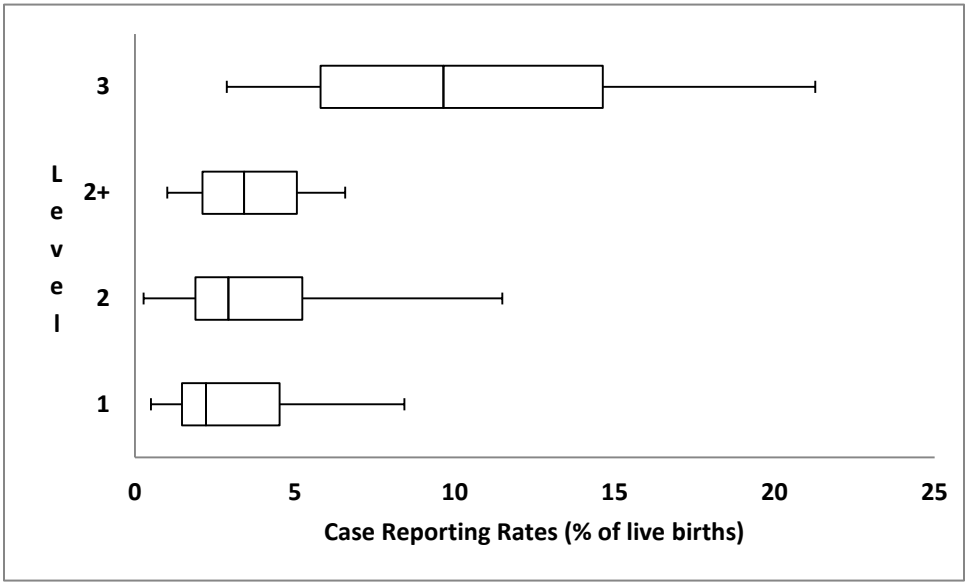
Table 4. Case Reporting Rates in 2016 for Level 1 Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate
1-1	1	0.5	**1-6**	8	8.4
1-2	4	2.1	**1-7**	4	2.1
1-3	5	2.3	**1-8**	11	5.3
1-4	1	0.8	**1-9**	9	3.7
1-5	5	2.2	***Combined***	***48***	***2.8***

DISCUSSION

Overall, combined case reporting rates by hospital level have increased in 2016 when compared with 2015 rates. However, variation between hospitals providing the same level of care remains a significant issue. The distributions of the reporting rates, by hospital level are illustrated using box and whisker plots[1] in Figure 2.

Figure 2: Distribution of Case Reporting Rates in 2016 by Hospital Level



Some variation is to be expected, even among hospitals providing the same level of care. Premature infants make up almost one-fourth of the cases reported to APORS. Hospitals serving populations where risk factors for prematurity are more prevalent[2] likely have more cases to report. Hospitals also have different practices in determining when to transfer infants; those that transfer more readily will have lower reporting rates. There is also the possibility that hospital

[1] For each level, the point furthest to the left is the lowest reporting rate. The left side of the box is the first quartile (25 percent of the reporting rates fall below this value). The center line is the median (middle value). The right side of the box is the third quartile (25 percent of the reporting rates fall above this value.)The point furthest to the right is the highest reporting rate.

[2] Risk factors for mothers to deliver early include African-American race, smoking, diabetes, high blood pressure, late start to prenatal care and multiple gestation.

nursery staffs do not identify and report every case to APORS. Therefore, APORS staff will continue to work with hospitals thought likely to be under-reporting. Under-reporting of cases by hospital nurseries is a particular problem because it means that the babies and families who need support when they go home may not receive it.

APORS has developed a number of tools over the years to encourage complete and timely reporting by hospitals. APORS' electronic case reporting system, launched in 2013 and currently used by the majority of hospitals, aides in case identification by flagging babies with specific conditions documented on the birth certificate. When documented, conditions such as prematurity, death prior to birth certificate completion, birth defects, and Hepatitis B exposure cause a case to be generated and placed in the hospital's electronic reporting queue. While not all conditions can be identified from the birth certificate, this system does help hospitals identify some of the cases that need to be reported.

Additionally, APORS provides ongoing education and support to hospitals in a number of ways. Hospital specific education is provided on an ongoing basis to train new hospital reporters, and periodically to recap APORS reporting requirements for existing hospital staff. Since 2017, APORS has held frequent statewide educational webinars throughout the year to provide up-to-date reporting information and to allow an open question-and-answer forum between hospital reporting staff and APORS staff. Hospital reporting staff have 24-hour access to a dedicated SharePoint site online where they can access manuals, training videos and other materials. APORS also provides an email address to hospitals that is shared by several APORS staff, so that APORS can respond promptly to hospital reporting questions and other concerns. Finally,

timeliness reports are provided periodically to hospitals throughout the year to assist with assessment of timely and complete reporting. APORS plans to maintain these supports and to develop new approaches as needed to further assist with case identification.

Appendix 1
Conditions for APORS Hospital Nursery Reporting

Gestational age less than 31 completed weeks (based on physician's assessment)

Multiple birth, triplets or higher order

Infant death (before discharge from the newborn stay) Expiration after showing signs of life including breathing; heart beat; pulsation of the umbilical cord; or definite movement of voluntary muscles. May have a zero APGAR score. A birth certificate should be issued.

Prenatal drug exposure

Diagnosis of a positive toxicology for any drug (except marijuana or drugs administered during labor and delivery)
Signs of drug toxicity or withdrawal (in the infant)
Children of mothers who admit to illicit drug use during pregnancy (except marijuana)

Birth defect or congenital anomaly *(except as listed below)*

Congenital pigment anomalies (stork bites, Mongolian spots etc.)	*Peripheral pulmonic stenosis (PPS)*	*Skin tag*
Dacrostenosis	*Persistent fetal circulation*	*Syndactyly*
Incomplete or redundant penile foreskin	*Polydactyly*	*Tongue tie*
Isolated choroid plexus cyst	*Preauricular sinus*	*Two-vessel cord*
Isolated simian crease	*Prenatal diagnosis of hydronephrosis, caliectasis or pelviectasis*	*Umbilical hernia*
Patent ductus arteriosus (PDA)	*Sacral dimple with visualized base or post-natal imaging ruling out problem*	*Undescended testes*
Patent foraman ovale (PFO)		*Vascular harmatomas (small or insignificant birth marks, port wine stains, strawberry nevi etc.)*

Serious congenital infections *(Excludes: Hepatitis C or HIV exposure, neonatal candidiasis (thrush), conjunctivitis, dacrocystitis, infective mastitis and omphalitis, and HIV)*

Chlamydia	Hepatitis B (disease or prenatal exposure)	Rubella
Confirmed septicemia (sepsis)	Herpes	Syphilis (disease or exposure to active disease)
Cytomegalovirus	Listeriosis	Tetanus neonatorum
Gonococcal conjunctivitis neonatorium	Meningitis	
Group B streptococcus	Necrotizing enterocolitis leading to surgery	

Endocrine, metabolic or immune disorders

Combined immunity deficiency	Hypothyroidism

Blood disorder

Coagulation defects	Constitutional aplastic anemia	Hereditary hemolytic anemia	Leukemia

Other conditions

		IVH grade III or IV
Bronchopulmonary dysplasia	Endocardial fibroelastosis	Neurofibromatosis
Cerebral lipidoses	Erb's palsy	Occlusion of cerebral arteries
Chorioretinitis	Fetal alcohol syndrome	Retinopathy of prematurity
Conditions leading to ECMO	HIE leading to cooling treatment	Strabismus
Conditions leading to > 72 hours on a ventilator	Intrauterine growth restriction leading to SGA	Seizures