RATES OF HOSPITAL REPORTING OF ADVERSE PREGNANCY OUTCOMES IN 2017

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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 2017, these included infants with birth defects, prematurity (less 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 the Department'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 to improve the completeness of case reporting.

METHODS

Seven hospitals are not included in this study for various reasons. Four out-of-state hospitals that are part of the Illinois Perinatal Network are not included because the number of births to Illinois

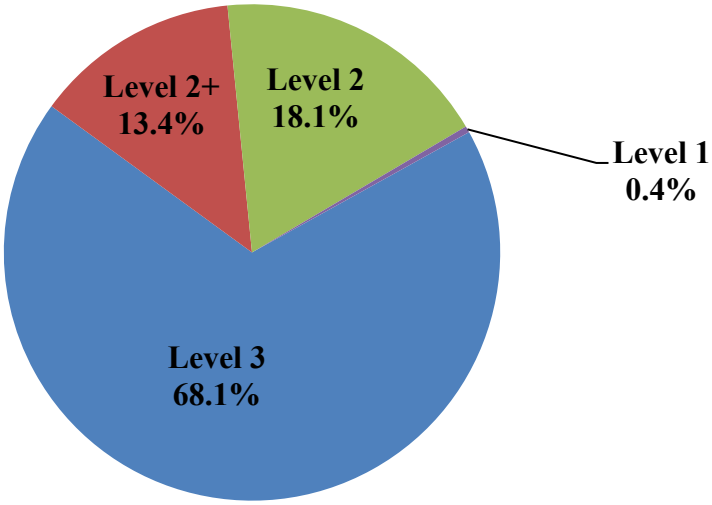
residents at those facilities is not available for this study period. Two Level 1 facilities are excluded due to the closing of the obstetrical units in early 2017. An additional hospital is excluded because no births take place there; it provides services to newborns transferred from delivery hospitals. Data for 2017 shows that 143,334 births took place at the 116 included Illinois Perinatal Network hospitals. The number of births is based on the number of 2017 birth certificates filed by Illinois hospitals with IDPH's Division of Vital Records. These 116 hospitals reported 9,691 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. For 2017, the case reporting rates ranged from 0.0% to 22.6% with the average being 6.8%; higher than the average 2016 case reporting rate of 6.3%. 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, 2017



Hospital Case Reporting Rates. When examining combined reporting rates by Level of care, the 23 Level 3 hospitals had the highest reporting rate at 9.8% (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 3.9% and 4.2% respectively (Tables 2 and 3). The eight Level 1 hospitals reported 2.9% of their births (Table 4).

For each level of care, there were varied ranges of reporting rates among hospitals. Among Level 3 hospitals the reporting rates by hospital ranged from 3.2% to 22.6%. Among level 2+

hospitals rates ranged from 1.6% to 7.2%, while among level 2 facilities the range was 0.0% to 12.6%. Among the level 1 hospitals rates ranged from 0.8% to 5.2%.

Table 1. Case Reporting Rates in 2017 for Level 3 Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate
3-1	136	4.3	**3-13**	201	6.2
3-2	888	7.7	**3-14**	357	16.8
3-3	158	7.8	**3-15**	429	10.2
3-4	644	22.6	**3-16**	166	11.8
3-5	392	16.9	**3-17**	299	15.1
3-6	442	20.7	**3-18**	79	4.6
3-7	238	11.0	**3-19**	179	6.0
3-8	300	8.1	**3-20**	268	10.3
3-9	245	7.1	**3-21**	431	16.8
3-10	276	6.9	**3-22**	116	9.8
3-11	38	3.2	**3-23**	226	9.3
3-12	90	3.6	***Combined***	***6,598***	***9.8***

Table 2. Case Reporting Rates in 2017 for Level 2+ Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate
2+-1	106	5.6	**2+-13**	21	1.8
2+-2	107	6.2	**2+-14**	21	2.1
2+-3	68	6.3	**2+-15**	35	2.4
2+-4	38	6.6	**2+-16**	42	2.4
2+-5	127	7.2	**2+-17**	26	2.5
2+-6	52	3.8	**2+-18**	36	2.7
2+-7	85	3.8	**2+-19**	25	3.1
2+-8	65	4.1	**2+-20**	73	3.1
2+-9	52	4.1	**2+-21**	37	3.1
2+-10	118	4.4	**2+-22**	66	3.5
2+-11	47	5.2	**2+-23**	40	3.7
2+-12	11	1.6	***Combined***	***1298***	***3.9***

Table 3. Case Reporting Rates in 2017 for Level 2 Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate	Hospital	Cases	Rate
2-1	41	8.4	**2-22**	5	1.2	**2-43**	37	5.0
2-2	41	10.6	**2-23**	5	2.0	**2-44**	41	7.5
2-3	48	5.1	**2-24**	5	2.1	**2-45**	10	2.6
2-4	50	5.6	**2-25**	5	2.2	**2-46**	10	4.0
2-5	50	8.3	**2-26**	6	1.6	**2-47**	11	2.2
2-6	52	4.0	**2-27**	6	5.0	**2-48**	11	3.8
2-7	53	3.9	**2-28**	7	2.1	**2-49**	11	6.6
2-8	55	6.8	**2-29**	8	1.1	**2-50**	12	1.1
2-9	58	6.2	**2-30**	8	1.1	**2-51**	13	7.3
2-10	60	4.1	**2-31**	8	2.3	**2-52**	14	2.0
2-11	71	4.3	**2-32**	8	4.6	**2-53**	15	1.1
2-12	72	11.6	**2-33**	9	2.8	**2-54**	15	3.1
2-13	79	5.3	**2-34**	23	6.1	**2-55**	16	1.1
2-14	82	12.6	**2-35**	25	2.6	**2-56**	16	2.0
2-15	95	4.2	**2-36**	26	1.7	**2-57**	16	2.6
2-16	154	12.3	**2-37**	26	3.2	**2-58**	16	4.9
2-17	0	0.0	**2-38**	27	3.7	**2-59**	18	4.9
2-18	2	1.6	**2-39**	28	3.7	**2-60**	19	8.1
2-19	4	1.9	**2-40**	31	4.8	**2-61**	22	3.8
2-20	5	0.8	**2-41**	32	6.5	**2-62**	22	7.0
2-21	5	1.1	**2-42**	35	4.3	***Combined***	***1,755***	***4.2***

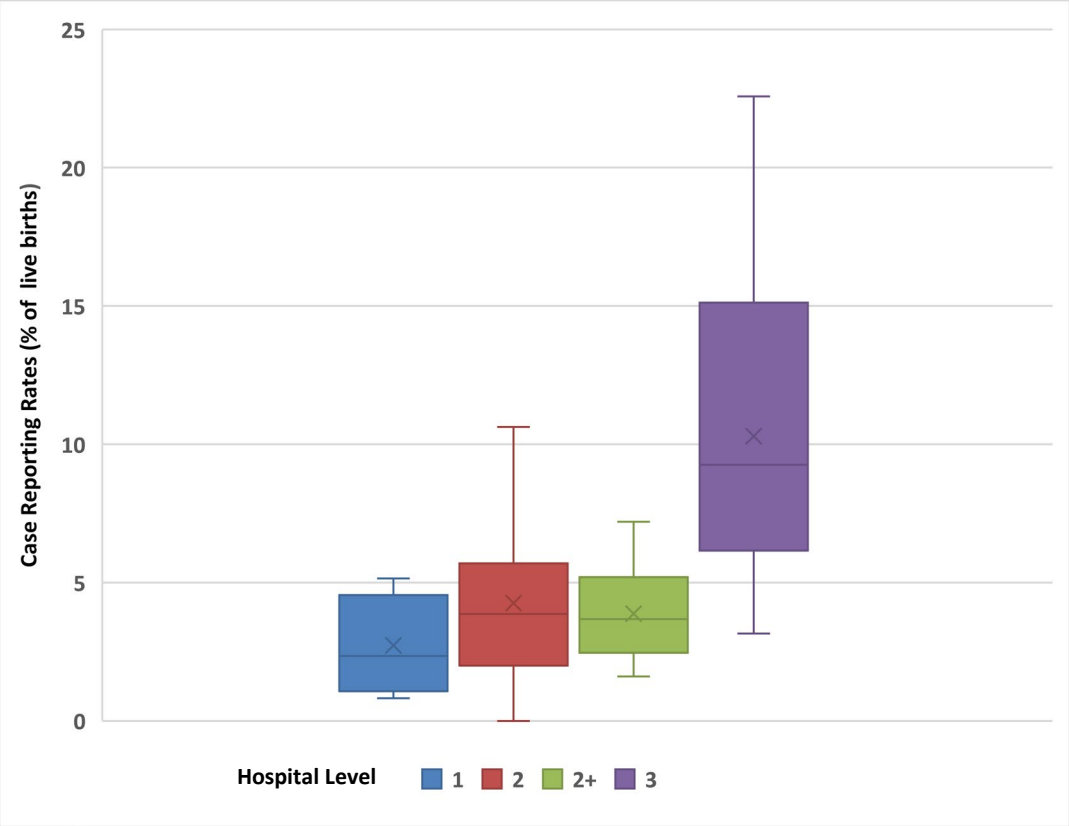
Table 4. Case Reporting Rates in 2017for Level 1 Hospitals

Hospital	Cases	Rate	Hospital	Cases	Rate
1-1	3	1.8	**1-6**	1	0.8
1-2	2	0.8	**1-7**	5	2.6
1-3	12	5.2	**1-8**	1	2.1
1-4	7	3.8	***Combined***	***40***	***2.9***
1-5	9	4.8			

DISCUSSION

Overall, combined case reporting rates by hospital level increased in 2017 when compared with 2016 rates. However, variation among hospitals providing the same level of care remains a theme. The distributions of the reporting rates by hospital level are illustrated in Figure 2 using box and whisker plots[1]. The box plot for Level 3 hospital reporting is tall with a long upper whisker, suggesting quite different reporting rates among the Level 3 hospitals.

Figure 2: Distribution of Case Reporting Rates in 2017 by Hospital Level



[1] For each hospital level, the shaded box represents the middle 50% of rates for that level. The whiskers extending upwards or downwards represent the upper and lower 25% of rates respectively. The median (middle) point is shown by the line that that divides the box into two parts. Half of the rates are greater than or equal to the median, while half are less.

Levels 2 and 2+ hospitals are noted to have similar median reporting rates, but display different distributions around that median point, with Level 2 hospitals appearing to exhibit a greater level of variance overall. The eight Level 1 hospitals, show unevenness among the four sections, indicating some variance.

Some variation in reporting is to be expected among hospitals, even those providing the same level of care. Because 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. The large number of level two facilities in comparison with other levels, may play a role in the variance in reporting among Level 2s. Level 3 hospitals may specialize in treating specific conditions, which could further contribute to reporting variances. Future, more focused studies are needed to both examine factors thought to influence reporting and to identify additional inherent reasons accounting for the differences in reporting. One possible contributing factor among all levels of hospitals that APORS strives to minimize is underreporting, which occurs when hospital nursery staffs do not identify and report every case to APORS.

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 used by the majority of hospitals, aides in case identification by flagging babies with specific conditions

[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.

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.

APORS conducts quality control checks on a regular basis to identify hospitals that display changes in reporting patterns, or report cases late. APORS specifically reaches out to these hospitals to offer support in an effort to improve reporting practices. The Level 2 hospital reporting zero cases in 2017 had been offered training and assistance over a series of months, for example.

Additionally, APORS provides other 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 to periodically recap APORS reporting requirements for existing hospital staff. Since 2017, APORS has held statewide educational webinars several time per 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, webinar recordings and other materials. APORS also provides prompt follow-up and support to hospital staff through the use of a dedicated email address hospitals can use to communicate questions and concerns to the APORS team. Finally, quality control 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 so that babies and families are provided the assistance needed after leaving the hospital.

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

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