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Pregnancy Course, Infant Outcomes, Rehospitalization, and Mortality among Women with Intellectual Disability

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Abstract

Background: Pregnant women with intellectual disability (ID) may have greater levels of comorbidity and decreased care access, social support, or ability to monitor their status and communicate needs, but few studies have examined their pregnancy course and outcome, and little is known about their longer-term maternal and infant health.

Objective: We compared pre-pregnancy characteristics, pregnancy outcomes, and rehospitalization <2 years after delivery among women with and without ID.

Method: We identified all women with ID and randomly selected a 10:1 comparison group of women without ID with singleton live birth deliveries in Washington State population-based linked birth-hospital discharge data 1987–2012. Multivariable regressions estimated adjusted odds ratios comparing pre-pregnancy characteristics. In cohort analyses, we estimated relative risks (RR) and 95% confidence intervals (CI) for outcomes.

Results: Women with ID (N=103) more often had gestational diabetes (RR 3.39, 95% CI 1.81–6.37), preeclampsia (RR 1.88, 95% CI 1.03–3.42), and inadequate prenatal care (RR 2.48, 95% CI 1.67–3.70). Their infants more often were small for gestational age (RR 1.78, 95% CI 1.10–2.89). Need for rehospitalization postpartum was not increased among women with ID or their infants.

Conclusion: Reasons for increased preeclampsia and gestational diabetes among pregnant women with ID are unclear. Barriers to inadequate prenatal care are multifactorial and warrant

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further study, with consideration that wellness during pregnancy and other times involves social, familial and clinical support systems responsive to each woman's needs.

Keywords

intellectual disability; pregnancy outcome; vital records; cohort study; epidemiology

INTRODUCTION

Using recent U.S. Census population estimates (1) and a recent prevalence estimate of 1% (2), approximately 745,000 women of reproductive age have an intellectual disability (ID). Prior studies of women with ID or intellectual and developmental disability (IDD, also including physical or sensory disabilities apparent during childhood that may affect ability/function without loss of mental capacity), suggest that women with ID experience challenges in daily life beyond those of women without ID due to many factors, including possible deficits in cognitive perception or communication abilities and decreased socio-economic status (3, 4), possibly resulting in decreased health care access or utilization of routine screening (3, 5–7), including prenatal care (8, 9). Self-awareness and monitoring of symptoms and signs (e.g. contractions) that motivate the seeking of care during pregnancy may be less present among women with ID, who often struggle to understand information provided during antenatal care (10). Obesity (11) and cigarette smoking (9, 12) may be more common in persons with ID, with potentially adverse consequences for the course of pregnancy in women with ID and their infants' health. Finally, providers often lack training in how to care for women with ID or relevant tools (e.g., visual teaching aids vs. text-based leaflets), and women may face systematic negative bias towards their pregnancies from clinicians or family (10).

Compared to other disabilities, there have been relatively few studies of pregnancy course and outcomes among women with ID and their infants (4, 9, 12–15) with few focused on U.S. populations (15) or longer term outcomes among infants (16–21). Some outcomes reported among women with ID include greater occurrence of preeclampsia, cesarean delivery, infant low birthweight, preterm delivery, neonatal intensive care unit (NICU) admission, and perinatal death (9, 12–14). Given the challenges of motherhood during infancy and early childhood, and that parent education may be inadequately adapted to the needs of women with ID (22), it is important to extend evaluation of outcomes beyond delivery in order to further understand and plan for appropriate care and support of these women and their children.

Using population-based linked vital records-hospital discharge data from Washington State, we compared pre-pregnancy characteristics of women with and without ID. Under the overarching hypothesis that women with ID and their infants may have increased risks of adverse outcomes due to possible lack of adequate prenatal care (likely at least partly due to providers' lack of relevant tools and training); potential deficiencies in health care access; difficulties in communicating needs or in compliance with/understanding of health care instructions, we then calculated the risks of selected pregnancy and delivery complications and outcomes among live-birth deliveries to women with ID relative to those of a

comparison group. We also examined longer term outcomes including mortality and the occurrence of maternal/infant rehospitalizations during the first 2 years post-delivery.

METHOD

Identification of subjects

Hospital discharge records in Washington State include information about all hospitalizations in non-federal facilities and are linked to Washington State birth and fetal death certificates since 1987. After approval was received from the Washington State Institutional Review Board for this analysis (with waiver of consent), all women with International Classification of Disease, 9th revision (ICD-9) codes 317–319 indicating presence of ID in their hospital discharge record for a delivery (live birth, or fetal death 20 weeks gestation) 1987–2012 were identified in linked Washington State vital-hospital discharge records. If a woman had 1 delivery during that time, the first delivery on record, regardless of parity, was selected for study. Due to State-mandated restrictions, only women 18 years were included (N=108). For comparison, women with deliveries during the same years were randomly identified from among the remaining records in a 10:1 comparison:case ratio, frequency matched on delivery year; analyses were similarly restricted to comparison women 18 years old.

Fetal deaths comprised 2.8% (N=3) of deliveries to women with ID and 0.4% (N=4) of deliveries to comparison women; these were then excluded. The proportions of multiple gestation pregnancies were similar in both groups (1.9% of women with ID; 1.2% of comparison women). Because characteristics/outcomes of multiple gestation pregnancies differ from those of singleton pregnancies, these were also excluded (2 women with ID; 13 comparison women), leaving 103 women with ID and 1034 comparison women for analyses.

As described earlier (23), these records were linked using names, date of birth, birth certificate number (for infants), race/ethnicity, and gender to the 2 years of hospital discharge and death data after delivery to identify nonpregnancy-related rehospitalizations of women and infants after delivery, and to assess maternal and infant/child mortality during that time.

Outcome and covariate information

Outcome and covariate information was drawn from both the birth certificate and the linked hospital discharge record for the mother/infant delivery hospitalizations, including up to 9 ICD-9 diagnosis and procedure codes that were screened in combination with birth certificate information to identify selected conditions and outcomes.

Maternal demographic information from the birth certificate included age at delivery (18–19, 20–24, 25–29, 30–34, 35+ years); race/ethnicity (White, Black, Hispanic, Other [Asian, Native American, Pacific Islander]); marital status; and education (<12, 12, 13+ years). Pregnancy/delivery information included prenatal smoking status; Kotelchuck Summary Index of prenatal care (inadequate, adequate, intermediate, adequate+) (24); pre-pregnancy body mass index (BMI, <25, 25–<30, 30+ kg/m²); pregnancy weight gain (categorized using

Institute of Medicine criteria as appropriate, less than appropriate, excessive) (25); parity (0,1,2+ prior births); gravidity (0,1,2+ prior pregnancies); use of the State Women, Infants and Child (WIC) Nutrition Program services; labor induction or augmentation; and number of prior fetal deaths (0,1+). As paternal age may be associated with pregnancy outcome (26, 27), this information was also described (18–19, 20–24, 25–29, 30–34, 35–40, 40+ years) for women with, and without ID.

Maternal information from the hospital discharge record for the delivery hospitalization included length of stay (<3, 3+ days), discharge status (routine/home; short term care/other facility; home with Home Health Aide), and medical insurance (Medicaid/Medicare vs. private/other).

Pre-existing maternal conditions and pregnancy complications identified using a combination of birth certificate and/or diagnosis codes included chronic hypertension (ICD9 401–405, 642, 642.0–642.2, 642.7, 642.9); preeclampsia/eclampsia (ICD9 642.4, 642.5, 642.6, 642.7); established diabetes (ICD9 250, 362.0, 648.01, 648.02); gestational diabetes (ICD9 648.8, excluding women with established diabetes); labor induction (ICD9 659.0, 659.1, procedure codes 73.01, 73.1, 73.4, 96.49); and cesarean delivery (ICD9 669.7, 763.4, procedure codes 74, 74.1, 74.2, 74.4, 74.9).

Infant outcomes from the birth certificate included gestational age (20 - <37, 37–<42, 42–45 weeks), birthweight (250 - <2500, 2500–<4000, 4000+g); size for gestational age (<10th percentile/small [SGA], 10th – 90th percentile/appropriate, >90th percentile/large) based on state distributions of birthweights in birth data for the same years; neonatal intensive care unit (NICU) admission; and breastfeeding initiation.

Length of infant delivery hospitalization (<3, 3–5, 6+ days) was assessed from the hospital discharge record. Infant conditions identified by birth certificate in combination with hospital discharge diagnoses included congenital malformations (ICD 740–759); and fetal distress (ICD 656.3, 768.2–768.4).

Levels of missing data were <5% for most variables and similar for women with and without ID (calculations restricted to study years when variables were present on the birth record); levels were <10% for maternal education, prenatal care index, labor augmentation, gestational age, size for gestational age, and NICU admission. Exceptions were paternal age (25% and 6% for women with and without ID, respectively), BMI (12% and 8%, respectively), WIC Program participation (15% and 7%, respectively), and gestational weight gain (12% in each group).

As the peripartum, neonatal, and early infant years are important for the mother and child, we examined maternal/infant rehospitalization (nonpregnancy-related) and mortality information during the 2 years post-delivery obtained from the hospital discharge and death records including: occurrence of any rehospitalization (yes/no), number of rehospitalizations (0, 1, 2+), and death.

Analyses

Frequency distributions of pre-pregnancy characteristics were tabulated. To assess the magnitude and direction of differences in selected pre-pregnancy characteristics of women with, and without ID, we estimated odds ratios (OR) and 95% confidence intervals (CI) in cross-sectional analyses using multivariable logistic regression, with *a priori* adjustment for delivery year, and then additionally adjusted for maternal age. Prior fetal death was evaluated only among women with prior pregnancies. In cohort analyses, we then compared the occurrence of adverse outcomes during pregnancy, rehospitalization, and mortality < 2 years postpartum among deliveries to women with and without ID using multivariate Poisson regression with robust standard errors to account for common outcomes (28) and estimated relative risks (RR) and 95% CI. We adjusted *a priori* for maternal age and parity (based on recognized associations with pregnancy outcomes) and delivery year (to account for frequency-matching and possible temporal changes in reporting). Other factors assessed using important effect changes for possible confounding in these estimates included marital status, race/ethnicity, prenatal smoking, and insurance status; all estimates are adjusted for maternal age, delivery year, and parity unless otherwise shown. RR estimates for the length of the delivery hospitalization were additionally adjusted for delivery method. Potential effect modification was assessed by likelihood ratio statistics and examination of stratum-specific results for important differences. RRs for cesarean delivery were calculated among all women, and among those without prior deliveries. Analysis of labor augmentation was restricted to vaginal deliveries. Maternal education was not present on the birth certificate <1992; BMI, pregnancy weight gain, and Women Infant Child (WIC) Nutrition Program participation information was present for 2003 or later. During years for which these variables were available, data were missing for similar proportions of women with ID and comparison women. Analyses were conducted using Stata Version 15 (Stata Corp., College Station, TX).

RESULTS

Of the 103 deliveries identified to women with ID, 13% occurred 1987–1989; 45% were in 1990–1999; and 42% were in 2000–2012 (data not shown). Maternal ages were younger among deliveries to women with ID than for comparison women (Table 1). The likelihoods that women with ID were <25 years (OR 2.94, 95% CI 1.95–4.44), unmarried (OR 7.55, 95% CI 4.58–12.45), smoked prenatally (OR 1.97, 95% CI 1.21–3.22), had Medicaid/Medicare insurance (OR 13.29, 95% CI 6.87–25.71), or participated in the WIC Nutrition Program (OR 2.79, 95% CI 1.09–7.18), were increased. Women with ID more often had no prior pregnancies or births. Maternal age-adjusted results for paternal age suggest that pregnancies of women with ID were more often fathered by men 40 years old than for women without ID (OR 3.42, 95% CI 1.32–8.87).

Women with ID more often had inadequate prenatal care (RR 2.48, 95% CI 1.67–3.70) (Table 2). They also had increased risks of gestational diabetes (RR 3.39, 95% CI 1.81–6.37), and preeclampsia (RR 1.88, 95% CI 1.03–3.42). Because bedrest, medication, and close follow-up are advised for preeclampsia, and women with ID may have less comprehension of instructions, we attempted to examine whether women with ID had

greater risk of progression to eclampsia; too few women progressed to eclampsia for analysis.

Among nulliparous women, relative to comparison women, those with ID had increased risk of cesarean delivery (RR 1.43, 95% CI 1.00–2.03). Women with ID more often had delivery hospitalizations of 3+ days, relative to comparison women (RR 1.27, 95% CI 1.03–1.58, additionally adjusted for delivery method); this was more marked for vaginal (RR 1.72, 95% CI 1.09–2.72), than cesarean deliveries (RR 1.14, 95% CI 0.96–1.34) (data not shown). There is a suggestion that women with ID were more likely to be released from the hospital under the care of a Home Health Aide. Women with ID were no more likely than comparison women to be rehospitalized <2 years of delivery. Maternal deaths were too rare to assess, occurring in 2 or fewer cases or comparison women.

Infants of women with ID had increased risk of low birthweight (RR 1.85, 95% CI 0.90–3.79) and of being SGA (RR 1.78, 95% CI 1.10–2.89) (Table 3). The RR for malformations among infants of women with ID was 1.70 (95% CI 0.99–2.92); after additional adjustment for paternal age, it was 1.97 (95% CI 1.10–3.50, data not shown). They were also more likely to not have been breastfed (RR 2.68, 95% CI 1.31–5.45). Infants of women with ID were more likely to have delivery hospitalizations of ≥6 days (RR 4.47, 95% CI 2.42–8.25). Infant deaths during the first 2 years of life were uncommon, occurring in approximately 2% and 1% of women with, and without ID, respectively (data not shown).

DISCUSSION

Pregnancy among women with ID has not been as well-studied as many other types of disabilities. However, despite widely varying inclusion criteria across studies, many findings are generally consistent. Women with ID more often smoked (3, 9, 12) and were younger at delivery (9, 12) compared to women without ID. Increased smoking may be related to a lack of understanding of adverse effects of prenatal smoking, or possibly to smoking as a means to reduce increased stress levels reported by this population (22, 29). Women with ID may be younger at delivery due to lack of contraception information or access to routine health care (5–7, 30), or inability to comprehend health recommendations as they are routinely provided (10). Unlike some other studies (9, 11, 31), we did not observe greater obesity in women with ID. With this exception, our results are consistent with reports of women with IDD indicating a greater proportion of affected women are on public insurance (8, 32), and have longer hospital stays after delivery (32).

Not unexpectedly (12), women with ID in our study were more often unmarried than were comparison women, but there is little other information in previous studies about the fathers of their children, although one study indicated that a greater proportion of fathers named on birth records of women with IDD than in the general population were ≥18 years (8). Although women with ID in our study were nearly 3 times more likely than comparison women to be <25 years old, they were 3 times as likely to have pregnancies fathered by men ≥40 years. The cause of this discrepancy is unclear. Although women with disabilities (33, 34), including those with ID (35), are more vulnerable to sexual assault, we have no information about the women's pregnancy intention and our results should be viewed with

caution, given our limited numbers and the discrepancy in proportions of missing data between groups.

We observed an increased risk of gestational diabetes among women with ID, unlike some other studies of women with IDD (14, 32, 36), although a slightly, but not statistically significantly greater level of gestational diabetes in women with disabilities in general has been reported (37). We also observed increased preeclampsia, consistent with some (14, 32), but not all (12) studies of women with ID or IDD that have examined this. Both gestational diabetes and preeclampsia require close monitoring and may require medication or dietary changes during pregnancy; given that prenatal educational tools are often inadequate for women with ID who may have difficulty comprehending or responding to care instructions as routinely presented (10), effective communication during pregnancy between a woman, her family, and those supporting her care is critical.

We observed that women with ID were more than twice as likely to have inadequate prenatal care relative to comparison women, generally consistent with previous findings among women with ID (9) or IDD (8). Given our results suggest women with ID have increased risk of gestational diabetes, and that their infants are more likely to be SGA (outcomes potentially ameliorated by prenatal interventions), efforts to identify reasons for lack of appropriate care are warranted. Despite often receiving inadequate prenatal care, women with ID were more likely to be WIC Program participants, possibly because enrollment is based on income and does not require concurrent prenatal care (although WIC offices may often be co-located with prenatal care providers). Increased WIC Program participation, but decreased breastfeeding among women with ID seems paradoxical, given one Program goal is breastfeeding promotion. It is possible counselors, providers, and possibly family members may assume women with ID are unable to manage breastfeeding successfully, or lack appropriate training or tools to educate and support breastfeeding in this population.

Unlike some other studies of women with ID, we did not find increased risks of low birthweight (14) or preterm delivery (9, 13, 14). We did observe an increased risk of having an infant who was SGA, as observed in some (13), but not all (12) prior studies that have examined this. It is possible this finding was due to placental insufficiency from increased prenatal smoking, preeclampsia, or infant malformations among women with ID in our data.

Our results suggest an increased risk of congenital malformations among infants of women with ID, similar to that reported in the single other study we could find that examined this (13). Intergenerational transmission of ID-related birth defects may play a role in this, as may greater levels of smoking in women with ID.

The longer delivery hospitalizations of women with ID and their infants may be due to many factors, likely including the time necessary to conduct parenting competency evaluations by social workers, identify and educate available family or other support team members, or locate additional social support services. Tailored and appropriate information and materials and establishment of self- and infant care support mechanisms are important (38), but may be lacking in many instances for women with ID (9) or IDD (30, 39).

Limitations

Small numbers limited our analyses of several variables, and our lack of longer follow-up data precluded our ability to evaluate outcomes in women and infants 2 years post-partum. Given that our study period encompassed several decades, additional analyses restricted to more recent data from larger states may better reflect current outcomes. It is also a limitation that hospital discharge data included only non-federal hospitals however, a great majority (96%) of deliveries occur in non-federal facilities, so this is unlikely to have impacted our results. Health registry data in some regions may be able to leverage information from outpatient clinics (9), or school records in addition to inpatient and birth/death registries, thereby expanding the range of longer term outcomes that may be examined beyond those we were able to include (mortality, nonpregnancy-related hospitalization). We were also restricted to evaluation of only women who were 18 years, and thus our results are not generalizable to younger women with deliveries.

The use of ICD9 codes to measure some outcomes is a limitation, although the use of linked birth-hospital discharge records provides greater accuracy than either of these resources alone (40). At the time data were collected, we were restricted to use of these selected codes for identification of women with ID, and do not have the scope of intellectual disability conditions utilized in some other studies. It is also possible that our assessment of rehospitalizations among subjects was incomplete due to possible migration out of state; we have no information about rehospitalizations that occurred in other states among women/infants, however, it is unlikely that migration occurred disproportionately between women with and without ID, as U.S. Census data indicate the great majority of Washington residents who move stay within the state and that few cite health concerns as reason for a move (41). However, deaths to residents are identified regardless of location, so under-ascertainment of mortality due to migration did not occur.

Our reliance on ICD codes to identify ID is a limitation. The prevalence of ID has been estimated at approximately 1% among adult women based on 2005 U.S. Census data (2). Although the general fertility rate is lower among women with IDD than in the general population (4), we did not identify all women with ID who had deliveries during the study period. Our window for identifying women with ID consisted only of the delivery hospitalization; additional information from prior hospitalizations, outpatient or emergency department visits, or clinical assessments would have improved ascertainment (42). It is likely that some women with ID were included among the comparison subjects or that some cases with these ICD9 codes are unaffected, situations that would have biased our results towards the null. It is also a limitation that some results (e.g., BMI, weight gain, breast feeding) are based on variables available only in recent years of data and may not be relevant to earlier times. However, the use of these data allowed a population-based perspective and included all women with deliveries, regardless of where delivery occurred, race/ethnicity, or other factors often associated with lack of participation in research studies (43).

Although the ICD9 codes we used were consistent with those used in some health registry-based studies of women with ID (9, 13), they were not as comprehensive as those used by some others, and we were unable to include further codes encompassing IDD. A limitation

in all of these studies is that none of these strategies sufficiently captures information about the severity and range of disability a woman may experience.

Conclusion

Each woman's level of understanding and ability, the presence of other possible comorbidities, and her family/social support environment all play critical roles in her health and that of her infant. Assessment of all these factors is important for rendering appropriate care specific to her needs. Given our finding of less than adequate prenatal care occurrence among this population of pregnant women with ID, further efforts to identify barriers to appropriate prenatal care may help reduce adverse pregnancy outcomes such as preeclampsia, gestational diabetes, and of SGA in infants that we observed.

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Table 1.

Characteristics of women with and without intellectual disabilities (ID) who had singleton live birth deliveries in Washington State, 1987–2012.

Characteristic	Women with ID ^a (N=103)	%	Women without ID ^a (N=1034)	%	OR ^b	95% CI	OR ^c	95% CI
Maternal age (years)								
18–19	12	11.7	69	6.7	0.91	0.46–1.83	--	--
20–24	45	43.7	237	22.9	1.0	Reference	--	--
25–29	22	21.4	311	30.1	0.37	0.22–0.64	--	--
30–34	15	14.6	275	26.6	0.29	0.16–0.53	--	--
35–53	9	8.7	142	13.7	0.33	0.16–0.71	--	--
Maternal age <25 years	57	55.5	306	29.6	2.94	1.95–4.44	--	--
Paternal age (years)								
17–19	3	3.9	21	2.2	1.06	0.29–3.89	1.02	0.27–3.79
20–24	20	26.0	149	15.3	1.0	Reference	1.0	Reference
25–29	9	11.7	266	27.3	0.25	0.11–0.57	0.43	0.18–1.01
30–34	23	29.9	267	27.4	0.64	0.34–1.21	2.12	0.97–4.60
35–39	10	13.0	165	17.0	0.45	0.20–0.996	1.66	0.67–4.14
40–68	12	15.6	105	10.8	0.85	0.40–1.82	3.42	1.32–8.87
Race/ethnicity								
White	85	83.3	786	78.0	1.00	Reference	1.00	Reference
Black	4	3.9	37	3.7	1.01	0.35–2.89	0.84	0.29–2.48
Hispanic	5	4.9	86	8.5	0.54	0.21–1.37	0.45	0.18–1.15
Other	8	7.8	79	9.8	0.75	0.35–1.60	0.76	0.36–1.65
Unmarried	74	73.3	258	25.0	8.52	5.34–13.58	7.55	4.58–12.45
Smoked prenatally	29	29.6	148	14.9	2.43	1.51–3.90	1.97	1.21–3.22
Maternal education (years) ^d								
<12	22	31.0	127	16.8	0.75	0.43–1.31	0.70	0.40–1.24
12	49	69.0	630	83.2	1.00	Reference	1.00	Reference
13+	4	5.6	434	57.3	0.04	0.01–0.11	0.05	0.02–0.14
<12 years education ^d	22	31.0	127	16.8	2.23	1.30–3.82	1.49	0.84–2.64
Gravidity								
0	51	50.5	293	28.9	1.00	Reference	1.00	Reference
1	21	20.8	293	28.9	0.41	0.24–0.70	0.47	0.27–0.82
2+	29	28.7	429	42.3	0.39	0.24–0.63	0.49	0.29–0.81
No prior pregnancies	51	50.5	293	28.9	2.52	1.67–3.81	2.07	1.34–3.21
Parity								
0	71	68.9	399	39.2	1.00	Reference	1.00	Reference
1	15	14.6	348	34.2	0.24	0.14–0.43	0.27	0.15–0.50
2+	17	16.5	272	26.7	0.35	0.20–0.61	0.43	0.24–0.77
No prior births	71	68.9	399	39.2	3.44	2.23–5.33	2.93	1.86–4.62

Characteristic	Women with ID ^a (N=103)	%	Women without ID ^a (N=1034)	%	OR ^b	95% CI	OR ^c	95% CI
Any prior fetal deaths ^e	15	45.5	166	33.4	1.74	0.85–3.57	1.94	0.84–4.06
Pre-pregnancy BMI ^f								
<25.0	9	32.1	151	49.3	0.40	0.16–1.01	0.43	0.16–1.10
25.0–29.9	12	42.9	78	25.5	1.00	Reference	1.00	Reference
30.0+	7	25.0	77	25.2	0.60	0.22–1.60	0.53	0.19–1.48
Medicaid/Medicare	92	89.3	381	36.9	14.74	7.77–27.96	13.29	6.87–25.71
WIC program participant ^f	19	70.4	134	42.4	3.23	1.37–7.61	2.79	1.09–7.18

^aNumbers may not sum to total due to missing values.

^bAdjusted for delivery year (continuous). For dichotomous variables, reference category is opposite status.

^cAdjusted for delivery year (continuous), maternal age (<20,20–24,25–29,30–34,35+), except for maternal age (adjusted for delivery year only). For dichotomous variables, reference category is opposite status.

^dData available for 78 women with, and 794 women without ID with deliveries 1992 or later.

^eAmong 33 women with, and 506 women without ID with deliveries before 2003 who had prior pregnancies only.

^fData available for 32 women with, and 339 women without ID with deliveries 2003 or later.

Table 2.

Pregnancy outcomes and need for rehospitalization among singleton live birth deliveries to women with and without intellectual disability (ID), in Washington State, 1987–2012.

	Women with ID (N=103)	%	Women without ID (N=1034)	%	RR ^a	95% CI
<i>Prenatal care/pregnancy conditions</i>						
Appropriate weight gain ^b						
Appropriate	4	14.3	96	32.1	1.00	Reference
Less than appropriate	6	21.4	53	17.7	1.15	0.51–2.60
Excessive	18	64.3	150	50.2	1.24	0.91–1.68
Prenatal care index						
Adequate	30	34.5	468	50.2	1.00	Reference
Inadequate	27	31.0	115	12.3	2.48	1.67–3.70
Intermediate	13	14.9	151	16.2	0.96	0.57–1.64
Adequate plus	17	19.5	199	21.3	0.86	0.54–1.35
Gestational diabetes ^c						
No	90	88.2	979	95.8	1.00	Reference
Yes	12	11.8	43	4.2	3.39	1.81–6.37
Preeclampsia/eclampsia						
No	90	87.4	976	94.4	1.00	Reference
Yes	13	12.6	58	5.6	1.88	1.03–3.42
<i>Delivery characteristics</i>						
Labor induction						
No	79	76.7	775	75.0	1.00	Reference
Yes	24	23.3	259	25.0	0.85	0.59–1.24
Labor augmentation ^d						
No	89	87.3	808	83.1	1.00	Reference
Yes	13	12.7	164	16.9	0.76	0.42–1.37
Delivery type						
Vaginal	71	68.9	771	74.6	1.00	Reference
C-section	32	31.1	263	25.4	1.23	0.91–1.68
Delivery type (1 st delivery) ^e						
Vaginal	46	64.8	290	72.7	1.0	Reference
C-section	25	35.2	109	27.3	1.43	1.00–2.03
Delivery hospitalization days ^f						
0–2	58	56.3	758	73.3	1.0	Reference
3+	45	43.7	276	26.7	1.44	1.17–1.78
Discharge status						
Routine/home	97	94.2	1013	97.8	1.0	Reference
Short term/other facility	1	1.0	2	0.2	2.45	0.26–23.42

	Women with ID (N=103)	%	Women without ID (N=1034)	%	RR ^a	95% CI
Home - HHA care ^g	5	4.9	18	1.7	2.30	0.81–6.53
Post-delivery events						
Rehospitalized < 2 years of delivery						
No	87	84.5	880	85.1	1.0	Reference
Yes	16	15.5	154	14.9	0.91	0.56–1.47
Number of rehospitalizations <2 years of delivery						
0	87	84.5	880	85.1	1.0	Reference
1	13	12.6	143	13.8	0.79	0.47–1.35
2+	3	2.9	11	1.1	2.57	0.64–10.38

^aRR estimated from Poisson regression with robust standard errors, adjusted for birth year, maternal age, parity.

^bData available for 32 women with, and 339 women without disabilities with deliveries in 2003 or later.

^cAmong 102 women with, and 1022 women without disabilities who did not have established diabetes.

^dRestricted to 71 women with, and 771 women without disabilities with vaginal deliveries.

^eRestricted to 71 women with, and 399 women without disabilities with no prior deliveries.

^fAdditionally adjusted for method of delivery.

^gReleased to home under care of Home Health Aide/health care service organization.

Table 3.

Infant outcomes and need for re-hospitalization among singleton infants of women with and without ID with deliveries in Washington State, 1987–2012.

	Women with ID (N=103)	%	Women without ID (N=1034)	%	RR ^a	95% CI
Infant						
Fetal distress						
No	90	87.4	914	88.4	1.00	Reference
Yes	13	12.6	120	11.6	0.85	0.51–1.43
Birthweight (g)						
2500–3999	94	91.3	993	96.3	1.00	Reference
<2500	9	8.7	38	3.7	1.85	0.90–3.79
Gestational age (weeks)						
37–<42	88	92.6	959	94.3	1.00	Reference
<37	7	7.4	58	5.7	1.28	0.60–2.76
Size for gest age						
Small	18	19.1	90	8.9	1.78	1.10–2.89
Appropriate	71	75.5	817	81.1	1.00	Reference
Large	5	5.3	101	10.0	0.68	0.28–1.66
NICU admission ^b						
No	26	86.7	310	93.4	1.00	Reference
Yes	4	13.3	22	6.6	1.91	0.71–5.15
Malformation						
No	89	86.4	959	92.7	1.00	Reference
Yes	14	13.6	75	7.3	1.70	0.99–2.93
Infant being breastfed ^b						
Yes	22	68.8	295	89.4	1.00	Reference
No	10	31.3	35	10.6	2.68	1.31–5.45
Delivery hospitalization ^c days						
<2 days	57	60.6	772	78.5	1.00	Reference
3–5 days	23	24.5	183	18.6	1.19	0.86–1.65
6+ days	14	14.9	29	2.9	4.47	2.42–8.25
Post-delivery events						
Renospitahzed						
No	89	86.4	939	90.8	1.0	Reference
Yes	14	13.6	95	9.2	1.47	0.86–2.53
No. of rehospitalizations						
0	89	86.4	939	90.8	1.0	Reference
1	9	8.7	76	7.4	1.23	0.63–2.39
2+	5	4.9	19	1.8	2.32	0.82–6.60

^aRR estimated from Poisson regression with robust standard errors, adjusted for birth year, maternal age and parity.

^bData available for 32 women with, and 339 women without disabilities with deliveries in 2003 or later.

^cAdditionally adjusted for type of delivery.

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