

Appendix 1. Excluded Conditions Used to Define a Cohort of Births Within Guidelines According to Eligibility Criteria for Birth Center Birth and MAWS Indications for Discussion, Consultation, and Transfer of Care (MAWS Guidelines)¹ in this Study

Excluded conditions

Hypertension (pre-pregnancy)*

Diabetes (pre-pregnancy)[†]

General good health with uncomplicated prenatal course[§]

Two or more cesarean deliveries with low-transverse incision^{†§}

Prior cesarean with incision other than low-transverse incision^{†§}

One prior cesarean with low-transverse incision^{†‡}

Multifetal pregnancy^{†§}

Pre-eclampsia or persistent hypertension or suspected pre-eclampsia (hypertension and proteinuria in labor)^{†§}

Persistent polyhydramnios or oligohydramnios

Active labor >37 weeks gestation^{†§}

≥43 weeks gestation[†] or ≥42 weeks gestation[§]

Undiagnosed non-cephalic presentation at onset of labor[†]

Known non-cephalic presentation during active labor[§]

* Indication for Transfer of Care¹

† Indication for Consultation¹

‡ Outside criteria for Washington State licensed birth centers² (“low-risk maternal client”)

Appendix 2. Exclusions From Study Cohort, Not Within Guidelines or Outside Eligibility Criteria for State-Licensed Birth Center Birth in Washington State

Pregnancy and pre-existing conditions	All pregnancies* N=11,442 n (%)
No excluded pregnancy conditions (within guidelines)	10609 (92.7)
<u>Excluded conditions (pre-existing or pregnancy related) likely known at onset of labor:</u>	
Multifetal pregnancy	13 (0.11)
Pre-existing diabetes	9 (0.08)
Pre-existing hypertension	17 (0.15)
Polyhydramnios or oligohydramnios	19 (0.17)
Prior cesarean, no previous vaginal delivery	110 (0.96)
Prior cesarean, at least 1 prior vaginal delivery	162 (1.4)
Onset of labor >42wks	284 (2.48)
<u>Excluded conditions in the intrapartum period[†]</u>	
Gestational hypertension or pre-eclampsia	148 (1.29)
Singleton breech at delivery [‡]	38 (0.33)
Onset of labor <37 weeks	68 (0.59)
2 risk factors (no cases with >2 risk factors)	38 (0.33)

* Total n in this column exceeds 833 (100%) of excluded cases because 38 cases had >1 complication. For practicing midwives who documented at least 6 months of births, the median yearly number of patients “outside guidelines” was 2 (25th-75th percentile 1.2-3.2/year).

[†] We cannot identify timing of onset for conditions which could be unknown prior to the onset of labor (preterm labor, breech, hypertensive conditions during labor). MAWS Guidelines recommend Transfer of Care to hospital if any of these conditions present in the intrapartum period. Transfer rate was 62% for gestational hypertension/pre-eclampsia, 13% for preterm and 50% for breech. Of the singleton breech cases, 49% of these delivered in community, 47% delivered precipitously, or within 90 minutes of arrival. This suggests that the actual rate of planned, singleton breech delivery in this cohort is 0.9 in 1000.

[‡] Denominator is singleton pregnancies (N=11429)

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Appendix 3. Demographics and Clinical Characteristics of Low-Risk Cohort, by Actual Place of Birth

Characteristic	Birth at home (n=3906)	Birth at birth center (n=5248)	Birth at hospital (n=1455)
Age at delivery			
< 25 y	333 (8.5)	709 (13.5)	220 (15.1)
25-29 y	1124 (28.8)	1688 (32.2)	399 (27.4)
30-34 y	1504 (38.5)	1897 (36.1)	509 (35.0)
≥35 y	945 (24.2)	954 (18.2)	327 (22.5)
Pre-pregnancy BMI*			
< 25 kg/m ² (normal or underweight)	2485 (64.5)	3236 (62.4)	864 (60.0)
25-29 kg/m ² (overweight)	853 (22.1)	1202 (23.2)	332 (23.1)
≥ 30 kg/m ² (obese)	517 (13.4)	750 (14.5)	243 (16.9)
Race and ethnicity [†]			
Non-Hispanic White	3352 (85.9)	4317 (82.6)	1192 (82.6)
Hispanic or Latinx	183 (4.7)	313 (6.0)	85 (5.9)
Non-Hispanic Black	51 (1.3)	92 (1.8)	30 (2.1)
Asian or Pacific-Islander	113 (2.9)	189 (3.6)	37 (2.6)
Native American or Native Alaskan	15 (0.4)	53 (1.0)	9 (0.6)
Non-Hispanic other or mixed-race	186 (4.8)	262 (5.0)	90 (6.2)
Insurance payor [‡]			
Medicaid or Medicare [§]	1074 (27.9)	1606 (31.0)	412 (28.6)
Commercial or military	2211 (57.4)	3377 (65.1)	945 (65.5)
Self-pay or no insurance	570 (14.7)	202 (3.9)	86 (5.9)
Rural residence ^{**}	463 (12.0)	457 (8.8)	171 (11.9)
Parity			
Nulliparous pregnancy	764 (19.6)	1897 (36.1)	1170 (80.4)
Multiparous pregnancy	3142 (80.4)	3351 (63.9)	285 (19.6)
Multiparous with >4 prior births	364 (11.6)	187 (5.6)	21 (7.4)
Conditions known at onset of labor			
Gestational diabetes	127 (3.3)	168 (3.2)	45 (3.1)
Onset of labor ≥41w+4d	254 (6.5)	312 (5.9)	229 (15.7)

Data are n (%).

* BMI, body mass index; 127 cases with missing initial BMI data

† 40 cases with missing race/ethnicity data

‡ 96 cases with missing insurance payor data

§ <1% of the study group had Medicare as payor

** 91 cases with missing zip code for rural/urban coding

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Appendix 4. Outcomes for All Birthing People Regardless of Risk Status (Whether They Did or Did Not Meet Eligibility Guidelines for Community Birth)

Outcomes for birthing person	All pregnancies (n=11442)	% (95% CI)
Hospital admission		
Any transfer, intrapartum or postpartum <6hrs	1989	17.4 (16.8–18.2)
Intrapartum transfer, birth occurred in hospital	1705	14.9 (14.3–15.6)
Subgroups:		
Nulliparas - intrapartum transfer, birth in hospital	1326 / 4104	32.3 (31.1–33.8)
Multiparas - intrapartum transfer, birth in hospital	379 / 7338	5.2 (4.7–5.6)
Postpartum transfer to hospital, <6 h	285	2.5 (2.2–2.8)
Hospital admission, >6 h – 6 wks after birth	117	1.0 (0.9–1.2)
Spontaneous vaginal birth	10733	93.8 (93.3–94.3)
Subgroups:		
Multiparas, all labor-after cesarean (LAC) – Spontaneous vaginal birth	241 / 272	88.6 (85.1, 92.1)
Multiparas, LAC with no prior vaginal birth – Spontaneous vaginal birth	84 / 110	76.4 (68.7, 84.1)
Multiparas, LAC with prior vaginal birth – Spontaneous vaginal birth	157 / 162	96.9 (93.7, 99.4)
Operative vaginal birth	101	0.9 (0.7–1.0)
Vacuum	73	0.6 (0.5–0.8)
Forceps	28	0.2 (0.2–0.4)
Cesarean birth (all pregnancies)	608	5.3 (4.9–5.8)
Subgroups:		
Nulliparas – Cesarean	507 / 4104	12.4 (11.4–13.4)
Multiparas, no history of cesarean – Cesarean	72 / 7066	1.0 (0.8–1.25)
All labor-after-cesarean (LAC) – Cesarean	29 / 272	10.7 (7.2–14.1)
LAC with no prior vaginal birth – Cesarean	25 / 110	22.7 (15.0–29.8)
LAC with prior vaginal birth– Cesarean	4 / 162	2.5 (0.6–5.4)
Interventions		
Epidural analgesia	1094	9.6 (9.0–10.1)
Episiotomy*	94	0.9 (0.7–1.1)
Delivery complications		
3rd or 4th degree laceration†	116	1.1 (0.9–1.2)
Any severe morbidity†	16	0.1 (0.1–0.2)
Physiologic birth‡	9626	84.1 (83.4–84.7)

* Data excludes all cesarean deliveries from population at risk for episiotomy and 3rd/4th degree laceration from the denominator

† Includes: uterine rupture, eclampsia, shock, pulmonary embolism, DVT, placenta accreta spectrum with hospital admission. No maternal deaths in the study population.

‡ Physiologic birth defined as per ACOG’s reVITALize definition except ARM allowed. Specifically, “physiologic birth” = spontaneous labor and spontaneous vaginal delivery without epidural, other pharmaceutical pain medication or augmentation of labor with oxytocin

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Appendix 5. Perinatal Outcomes for All Births, Regardless of Risk Status at the Onset of Labor (Including Births Outside Eligibility Criteria for Community Birth in Washington State)

Perinatal outcomes	All births (n=11455)	% or rate per 1000 births (95% CI)
Hospital admission of newborn		
Neonatal transfer to hospital, <6 h after birth	202	1.8 (1.5–2.0)
Hospital admission, >6 h- 6 wks after birth	266	2.3 (2.0–2.6)
Newborn birthweight classification*		
Small for gestational age (<10 th)	596	5.3 (4.9–5.7)
Large for gestational age (>90 th)	2096	18.6 (18.0–19.5)
Newborn complications		
NICU admission [†]	265	2.3 (2.1–2.6)
Severe perinatal morbidity or mortality [‡]	48	0.4 (0.3–0.5)
Exclusive breastfeeding at discharge from midwifery care (6 wks) [§]	10486	92.8 (92.3–93.2)
Perinatal death** (intrapartum + neonatal <7 d) ^{††}	10	0.87 (0.44–1.31)
Nulliparas only – perinatal death	5	1.22 (0.47–2.21)
Multiparas only – perinatal death	5	0.68 (0.27–1.23)
Intrapartum fetal death	6	0.52 (0.22–1.08)
Neonatal death (to <7 d postpartum)	4	0.35 (0.09–0.70)

* 185 cases with missing infant birthweight and restricted to live births

† Restricted to live births

‡ Includes any of: perinatal death, seizures, meconium aspiration syndrome, or septicemia with hospital admission

§ 159 cases with missing data for breastfeeding on discharge from care and restricted to live births

** Risk factors present in the excess perinatal mortality cases with pregnancies outside guidelines included: prior cesarean delivery, breech, and post term (>42 weeks).

†† 1 case with lethal fetal anomaly excluded

Appendix 6. Perinatal Outcomes, Crude and Adjusted Relative Risks by Planned Birth Setting (State-Licensed Birth Center vs. Home vs. State-Licensed Birth Center [Reference Group])

Outcomes	Planned home (n=4344)	Planned birth center (n=6265)	Relative risk	Adjusted relative risk*
Hospital admission of birthing person				
Intrapartum transfer, birth occurred in hospital	438 (10.1)	1017 (16.2)	0.62 (0.55–0.68)	0.89 (0.80–0.97)
Nullipara - intrapartum transfer	327 (30.0)	843 (30.8)	0.97 (0.87–1.06)	0.97 (0.86–1.06)
Multipara - intrapartum transfer	111 (3.4)	174 (4.9)	0.69 (0.55–0.87)	0.68 (0.54–0.84)
Postpartum transfer, ≤6 h	85 (2.0)	181 (2.9)	0.67 (0.51–0.87)	0.82 (0.62–1.06)
Late postpartum admission, >6 h – 6 wks	42 (1.0)	60 (1.0)	1.01 (0.66–1.57)	‡‡
Spontaneous vaginal birth	4170 (96.0)	5860 (93.5)	1.03 (1.02–1.03)	1.00 (0.99–1.01)
Operative vaginal birth	25 (0.6)	60 (1.0)	0.60 (0.33–0.86)	‡‡
Cesarean birth (all)	149 (3.4)	345 (5.5)	0.62 (0.52–0.73)	0.97 (0.81–1.16)
Cesarean nulliparas	125 (11.5)	310 (11.3)	1.01 (0.82–1.23)	1.02 (0.84–1.26)
Cesarean multiparas	24 (0.7)	35 (1.0)	0.74 (0.47–1.14)	‡‡
Interventions				
Epidural	282 (6.5)	671 (10.7)	0.61 (0.53–0.68)	0.92 (0.81–1.03)
Episiotomy	23 (0.5)	66 (1.1)	0.49 (0.28–0.85)	‡‡
Delivery complications				
3rd or 4th degree laceration†	33 (0.8)	68 (1.1)	0.68 (0.46–1.05)	‡‡
Physiologic birth‡	3867 (89.0)	5185 (82.8)	1.08 (1.06–1.09)	1.02 (1.00–1.03)
Hospital admission of newborn				
Neonatal transfer, ≤6 h after birth	64 (1.5)	125 (2.0)	0.73 (0.53–0.98)	0.79 (0.58–1.08)
Late neonatal admission, >6 h – 6 wks after birth	100 (2.3)	145 (2.3)	0.99 (0.79–1.33)	1.11 (0.87–1.49)
Newborn birthweight classification§				
SGA birthweight less than the 10 th percentile	194 (4.5)	354 (5.8)	0.78 (0.67–0.92)	0.89 (0.76–1.04)
LGA birthweight greater than the 90 th percentile	841 (19.5)	1086 (17.7)	1.11 (1.02–1.19)	1.01 (0.93–1.09)
Newborn complications				
NICU admission	94 (2.2)	143 (2.3)	0.95 (0.74–1.19)	1.17 (0.91–1.48)
Severe perinatal morbidity or mortality**	16 (0.4)	28 (0.4)	0.82 (0.49–1.56)	††
Exclusive breastfeeding at discharge from midwifery care (6 wks) ‡‡	4075 (94.4)	5669 (92.0)	1.03 (1.02–1.04)	1.02 (1.01–1.03)

Data are n (%) unless indicated otherwise. Bold indicates statistical significance.

SGA, small for gestational age. LGA, large for gestational age. BMI, body mass index.

* Models adjusted for parity, age ≥35 y, BMI ≥30 kg/m², rural residence, onset of labor ≥41w+4d, rural residence and insurance payor (commercial v. government v. self-pay/none). Subgroup models are adjusted for all covariates except parity.

† Cesarean deliveries excluded from denominator.

‡ Physiologic birth defined as per ACOG's reVITALize definition except ARM allowed. Specifically, "physiologic birth" = spontaneous labor and spontaneous vaginal delivery without epidural, other pharmaceutical pain medication or augmentation of labor with oxytocin

§ 153 cases with missing infant birthweight and restricted to live births

** Includes: any of perinatal death (to 7 days), or hospital admission with septicemia, meconium aspiration syndrome, seizures.

†† Statistical models are underpowered due to low cell counts

‡‡ 127 cases with missing data for breastfeeding on discharge from care and restricted to live births

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