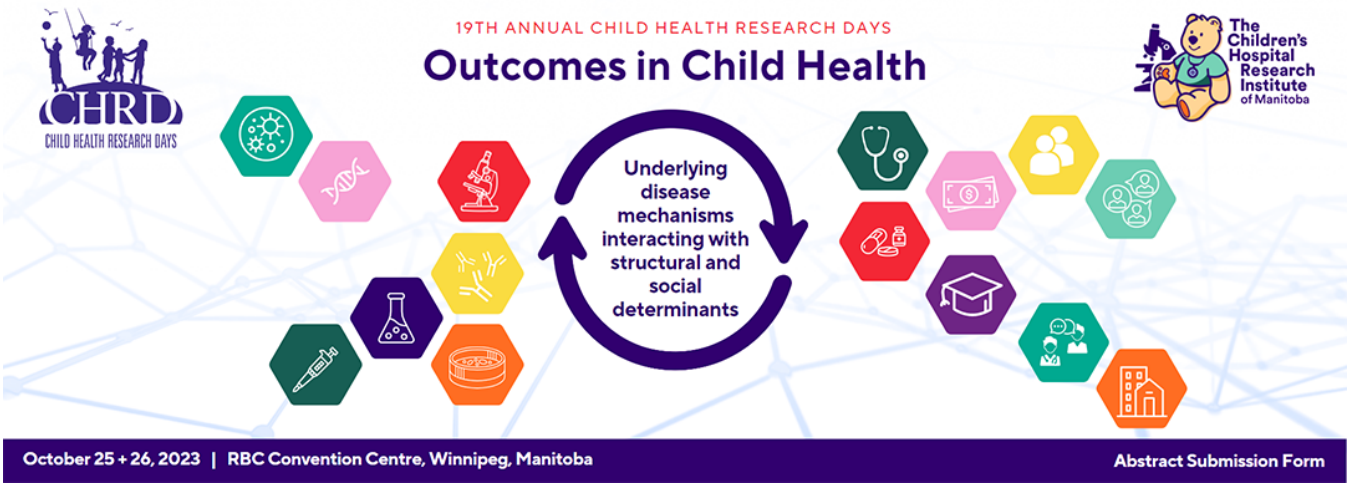

CHRD 2023: Abstract Submission Form

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Clinical

Role in the project
Design

Title
Validation of Maternal and Neonatal Data in the Canadian Discharge Abstract Database to Facilitate Long-term Outcomes Research of Individuals Born Preterm

Background
Discharge Abstract Database (DAD) collects data on all inpatient hospitalizations in Canada; however, its accuracy in collecting preterm-birth-related perinatal data remains unknown.

Objective
To validate perinatal data related to preterm birth in the DAD against the reference standard of the Canadian Neonatal Network (CNN) database.

Methods
All neonates born < 33 weeks gestational age (GA) admitted to the Neonatal Intensive Care Units (NICUs) in Winnipeg, Manitoba, between 2010 and 2022 and whose birth hospitalization data were linked between the DAD and CNN databases were included. A comprehensive list of maternal and neonatal variables relevant to preterm birth was chosen apriori for validation. For categorical variables, we calculated Cohen's weighted kappa (k); for continuous variables, we measured agreement using Lin's concordance correlation coefficient (LCCC).

Results
A total of 2084 neonates were included (GA: 29.4□2.4 weeks and birth weight: 1430□461g). Baseline maternal and neonatal variables showed substantial/almost perfect agreement or very good correlation in DAD [LCCC for GA (95% CI): 0.95 (0.95, 0.96); birth weight: 0.97 (0.96, 0.97); maternal age: 0.99 (0.99, 0.99); date of birth: 1.0; sex: k: 0.99 (0.98-0.99)]. In contrast, the accuracy of the maternal diagnoses, neonatal outcomes and interventions varied from very good to poor [for example, Cesarean section: k-0.90

(0.89-0.93), placenta previa: k-0.31 (0.15-0.49), neonatal sepsis: k-0.37 (0.31-0.42), bronchopulmonary dysplasia: k-0.26 (0.19-0.33), neonatal laparotomy: k-0.55 (0.43-067)].

Conclusion
Baseline maternal and neonatal variables were accurate in DAD, while some of the outcome variables were not.

Table/Figure File
Tables.pdf

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Table 1: Baseline characteristics of the study cohort

	N= 2084
Gestational age (weeks), mean±SD (range)	29.4 ± 2.4 (21,32)
Birth weight (grams), mean±SD (range)	1430 ± 461 (1010,3160)
Male, N (%)	1168 (56)
Apgar score at 1 min, median [IQR]	6 [4,8]
Apgar score at 5 min, median [IQR]	8 [6,9]
SGA, N (%)	175 (8)
NICU length of stay (days), mean±SD (range)	51.2 ± 35.7 (0,220)
Maternal age, N (%)	29.8 ± 5.9 (14,46)
Gravidity, median [IQR]	2 (1,4)
Parity, median [IQR]	1 (0,2)
Smoking during pregnancy, N (%)	339 (16)
Substance use during pregnancy, N (%)	93 (5)
Pre-gestational hypertension, N (%)	76 (4)
Gestational hypertension, N (%)	240 (12)
Hypertension, N (%)	322 (16)
Pre-gestational diabetes, N (%)	94 (5)
Gestational diabetes, N (%)	133 (6)
Cesarean section, N (%)	1219 (59)
Placental abruption, N (%)	17 (1)
Placenta previa, N (%)	10 (1)
PPROM, N (%)	137 (7)
Cervical insufficiency, N (%)	13 (1)
Chorioamnionitis, N (%)	132 (6)
Multiples, N (%)	466 (22)

SGA-small for gestational age, NICU-neonatal intensive care unit, PPROM-Preterm premature rupture of membranes

Table 2: Validation of maternal and neonatal categorical baseline variables in DAD

	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	Kappa coefficient (95% CI)
Maternal baseline variables					
Smoking* (N=1449)	0.75 (0.70,0.81)	0.92 (0.91,0.94)	0.68 (0.63,0.73)	0.94 (0.93,0.96)	0.65 (0.59,0.70)
Substances use* (N=1449)	0.22 (0.13,0.31)	0.98 (0.97,0.99)	0.38 (0.24,0.52)	0.95 (0.94,0.96)	0.24 (0.15,0.35)
Pregestational hypertension (N=1368)	0.30 (0.20,41)	0.99 (0.99,1.00)	0.68 (0.52,0.84)	0.96 (0.95,0.97)	0.40 (0.28,0.51)
Gestational hypertension (N=1368)	0.40 (0.34,0.47)	0.98 (0.98,0.99)	0.91 (0.86,0.95)	0.85 (0.83,0.87)	0.51 (0.45,0.56)
Hypertension (N=1368)	0.43 (0.37,0.48)	0.99 (0.98,0.99)	0.81 (0.72,0.90)	0.80 (0.77,0.82)	0.21 (0.16,0.27)
Pre-gestational diabetes (N=1368)	1.00 (1.00,1.00)	0.23 (0.21,0.25)	0.09 (0.07,0.10)	1.00 (1.00,1.00)	0.04 (0.03,0.05)
Gestational diabetes (N=1368)	0.19 (0.13,0.26)	0.81 (0.79,0.84)	0.10 (0.06,0.14)	0.91 (0.89,0.92)	0.01 (-0.04,0.06)
Placenta previa (N=626)	0.89 (0.68,1.00)	0.95 (0.93,0.97)	0.20 (0.07,0.33)	1.00 (1.00,1.00)	0.32 (0.15,0.49)
Placental abruption (N=626)	0.76 (0.56,0.97)	0.91 (0.89,0.93)	0.19 (0.10,0.28)	0.99 (0.99,1.00)	0.27 (0.15,0.39)
PPROM (N=786)	0.84 (0.78,0.91)	0.77 (0.74,0.80)	0.44 (0.38,0.50)	0.96 (0.94,0.98)	0.45 (0.38,0.52)
Cervical insufficiency (N=635)	0.85 (0.65,1.00)	0.96 (0.95,0.98)	0.32 (0.17,0.48)	1.00 (0.99,1.00)	0.45 (0.27,0.63)
Chorioamnionitis (N=635)	0.42 (0.26,0.58)	0.98 (0.97,0.99)	0.58 (0.39,0.77)	0.97 (0.95,0.98)	0.46 (0.30,0.62)
Multiples (N=2001)	0.95 (0.93,0.97)	1.00 (0.99,1.00)	0.99 (0.98,1.00)	0.99 (0.98,0.99)	0.96 (0.95,0.97)

Caesarean section (N=2084)	0.98 (0.97,0.99)	0.93 (0.91,0.94)	0.95 (0.94,0.96)	0.97 (0.96.0.98)	0.91 (0.89,0.93)
Neonatal baseline variables					
Sex (N=2078)	0.99 (0.99,1.00)	0.99 (0.99,1.00)	0.99 (0.99,1.00)	0.99 (0.99,1.00)	0.99 (0.98,0.99)
SGA (N=1417)	0.87 (0.81,0.93)	0.99 (0.98,0.99)	0.88 (0.82,0.94)	0.99 (0.98,0.99)	0.86 (0.81,0.91)

SGA- Small for gestational age, PPROM-Preterm premature rupture of membranes, PPV- Positive predictive value, NPV- Negative predictive value, *-during pregnancy

Table 3: Validation of maternal and neonatal continuous variables

	LCCC (95% CI)
Maternal baseline variables	
Maternal age (N=1970)	0.99 (0.99,0.99)
Gravidity (N=1891)	0.97 (0.96,0.97)
Parity (N=1891)	0.97 (0.97,0.98)
Number of abortions (N=1422)	0.85 (0.83,0.86)
Neonatal baseline variables	
Gestational age (N=1422)	0.95 (0.95, 0.96)
Birth weight (N=2077)	0.97 (0.96,0.97)
Birth date (N=2082)	1.00
Apgar score at 1 min (N=1944)	0.98 (0.98,0.98)
Apgar score at 5 min (N=1946)	0.96 (0.95,0.96)
Neonatal outcome variable	
NICU length of stay (N=2084)	0.88 (0.87,0.89)

LCCC- Lin's Concordance Correlation Coefficient

Table 4: Validation of neonatal outcome categorical variables (N=2084)

	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	Kappa coefficient (95% CI)
NEC (N=2084)	0.85 (0.78,0.93)	0.98 (0.98,0.99)	0.69 (0.60,0.78)	0.99 (0.99,1.00)	0.75 (0.68,0.82)
Gastrointestinal perforation	0.51 (0.37,0.65)	1.00 (0.99,1.00)	0.76 (0.61,0.90)	0.99 (0.98,0.99)	0.60 (0.48,0.73)
Mild IVH	0.62 (0.59,0.68)	0.91 (0.89,0.92)	0.54 (0.49,0.59)	0.93 (0.92,0.94)	0.50 (0.45,0.55)
Severe IVH	0.73 (0.66,0.80)	0.87 (0.68,0.89)	0.30 (0.26,0.35)	0.98 (0.97,0.98)	0.36 (0.31,0.42)
Any IVH	0.66 (0.61,0.70	0.97 (0.96,0.98)	0.85 (0.81,0.88)	0.91 (0.90,0.92)	0.68 (0.64,0.72)
PVL	0.50 (0.36,0.64)	1.00 (1.00,1.00)	0.96 (0.88,1.00)	0.99 (0.98,0.99)	0.65 (0.52,0.78)
Sepsis	0.46 (0.40,0.52)	0.91 (0.90,0.93)	0.43 (0.38,0.49)	0.92 (0.91,0.93)	0.36 (0.30,0.42)
Meningitis	0.50 (0.01,0.99)	0.99 (0.99,0.99)	0.09 (0.00,0.20)	1.00 (1.00,1.00)	0.15 (-0.04,0.33)
PDA	0.81 (0.77,0.85)	0.98 (0.98,0.99)	0.93 (0.91,0.96)	0.95 (0.94,0.96)	0.83 (0.80,0.86)
ROP	0.61 (0.56,0.66)	0.96 (0.95,0.97)	0.79 (0.74,0.83)	0.92 (0.90,0.93)	0.63 (0.59,0.68)
BPD	0.48 (0.38,0.59)	0.92 (0.91,0.93)	0.22 (0.16,0.28)	0.97 (0.97,0.98)	0.26 (0.19,0.33)
Seizures	0.41 (0.24,0.58)	1.00 (1.00,1.00)	0.72 (0.52,0.93)	0.99 (0.99,0.99)	0.51 (0.35,0.68)
Death (N=1881)	0.70 (0.62,0.78)	1.00 (0.99,1.00)	0.97 (0.93,1.00)	0.97 (0.97,0.98)	0.80 (0.74,0.86)
Pneumothorax	0.78 (0.70,0.86)	1.00 (0.99,1.00)	0.98 (0.94,1.00)	0.99 (0.98,0.99)	0.86 (0.81,0.92)
RDS	0.82 (0.79,0.84)	0.54 (0.50,0.56)	0.65 (0.63,0.68)	0.73 (0.70,0.76)	0.35 (0.32,0.39)
Neonatal thrombosis (N=1368)	0.39 (0.19,0.59)	0.99 (0.99,1.00)	0.90 (0.71,1.00)	0.99 (0.98,1.00)	0.54 (0.98,1.00)
SIP	0.74 (0.56,0.92)	0.99 (0.99,1.00)	0.50 (0.33,0.67)	1.00 (0.99,1.00)	0.59 (0.44,0.74)
DCC (N=1198)	0.74 (0.56,0.92)	0.99 (0.99,1.00)	0.50 (0.33,0.67)	1.00 (0.99,1.00)	0.59 (0.44,0.74)
Chest compression	0.50 (0.36,0.64)	0.99 (0.99,1.00)	0.63 (0.48,0.78)	0.99 (0.98,0.99)	0.55 (0.42,0.67)
Congenital anomalies	0.85 (0.81,0.90)	0.74 (0.72,0.76)	0.29 (0.26,0.33)	0.98 (0.97,0.98)	0.32 (0.28,0.36)
UTI	0.85 (0.72,0.99)	1.00 (0.99,1.00)	0.74 (0.59,0.90)	1.00 (1.00,1.00)	0.79 (0.67,0.91)
Resuscitation medications	0.42 (0.22,0.61)	0.90 (0.89,0.92)	0.05 (0.02,0.08)	0.99 (0.99,1.00)	0.02 (0.02,0.11)

PPV- Positive predictive value, NPV- Negative predictive value, NEC- Necrotizing enterocolitis, IVH- Intraventricular hemorrhage, PVL-Periventricular leukomalacia, PDA- Patent ductus arteriosus, ROP- Retinopathy of prematurity, BPD-Bronchopulmonary dysplasia, RDS-Respiratory distress syndrome, UTI -Urinary tract infection, SIP- Spontaneous intestinal perforation, DCC-delayed cord clamping.

Table 5: Validation of neonatal procedures

	Sensitivity (95% CI)	**Specificity (95% CI)**	**PPV (95% CI)**	**NPV (95% CI)**	**Kappa Coefficient (95% CI)**
Blood transfusion	0.88 (0.85,091)	0.98 (0.98,0.99)	0.95 (0.93,0.97)	0.96 (0.95,0.97)	0.88 (0.86,0.91)
Mechanical ventilation	0.91 (0.89,0.94)	0.47 (0.44,0.51)	0.49 (0.46,0.52)	0.91 (0.46,0.52)	0.33 (0.29,0.36)
Ventriculoperitoneal shunt insertion	1.00 (1.00,1.00)	0.99 (0.99,1.00)	0.56 (0.32,0.81)	0.99 (0.98,1.00)	0.45 (0.26,0.65)
Tracheostomy (N=2084)	1.00 (1.00,1.00)	1.00 (1.00,1.00)	0.25 (0.00,0.67)	1.00 (1.00,1.00)	0.40 (-0.14,0.94)
Gastrostomy (N=958)	0.67 (0.29,1.00)	0.99 (0.98,0.99)	0.25 (0.04,0.46)	1.00 (0.99,1.00)	0.36 (0.10,0.62)
Laparotomy (N=2084)	0.51 (0.38,0.66)	0.99 (0.99,1.00)	0.61 (0.47,0.76)	0.99 (0.98,0.99)	0.55 (0.43,0.67)
PDA ligation (N=2084)	0.89 (0.80,0.99)	1.00 (1.00,1.00)	0.92 (0.83,1.00)	1.00 (1.00,1.00)	0.91 (0.84,0.97)
Peritoneal drainage (N=1198)	0.50 (0.29,0.70	1.00 (1.00,1.00)	0.85 (0.65,1.00)	0.99 (0.99,1.00)	0.62 (0.43,0.81)

PPV- Positive predictive value, NPV- Negative predictive value, PDA-Patent ductus arteriosus.