

Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Definition of Surgical Procedures

Excluded Canadian Classification of Health Interventions therapeutic intervention category
Compression procedures (CCI: 1.^.^34.^) (relevant CCP codes have already been excluded)
Control of bleeding (CCI: 1.^.^13.^) not associated with operative anesthesia (CCI: 1.ZZ.11.^ or CCP: 13.59/13.99)
Dialysis interventions (CCI: 1.^.^21 or CCP: 51.95 / 66.98) or perfusion of kidney (CCI: 1.PC.16 or CCP: 67.95)
Drainage interventions (1.^.^52.^) not associated with operative anesthesia (CCI: 1.ZZ.11.^ or CCP: 13.59/13.99) ^a
Dressing interventions (1.^.^14.^)
Exercise interventions (CCI: 1..^^.02.^)
Hyperthermy interventions (CCI: 1..^^.07.^)
Hypothermy interventions (CCI: 1..^^.06.^)
Immobilization interventions (1.^.^03.^) not associated with operative anesthesia (CCI: 1.ZZ.11.^ or CCP: 13.59/13.99)
Implantation or removal of internal device (per-orifice), stomach (CCI: 1.NF.53.CA and 1.NF.55.CA), artery (CCI: 1.KV.53.^ and 1.KV.55.^), vein (CCI: 1.KX.53.^ and 1.KX.55.^)
Insertion of simple intravenous line (CCI: 1.KX.53.^ or CCP: 50.93 or 50.96)
Management (CCI: 1.^.^54.^ or 1.^.^38.^) interventions
Manipulation interventions (CCI: 1..^^.05.^)
Mobilization interventions (CCI: 1..^^.04.^)
Newborn surgical procedures routinely performed without general anesthesia, specifically tongue tie (CCI: 1.FJ.72 or CCP: 37.91) or circumcision (CCI: 1.QD.89 or CCP: 76.00) in 0-90 day age category
Stimulation (CCI: 1.^.^09.^ or CCP: 17.92, 25.99, 90.41, 90.42, 90.44, 90.46, 90.49)
Therapeutic interventions on the digestive system NEC (CCI: 1.OZ.^.^)
Therapeutic interventions of the respiratory system (CCI: 1.GZ.^.^), including replacement of endotracheal tube (1.GJ.50.CA-NG)
Excluded Canadian Classification of Health Interventions therapeutic intervention category
Therapeutic interventions of the skin, subcutaneous tissue and breast (CCI: 1.Y.^.^.^ or CCP: 98.^) not associated with operative anesthesia (CCI: 1.ZZ.11.^ or CCP: 13.59/13.99)
Therapeutic interventions of the tooth or root of tooth (CCI: 1.FE.^.^./ 1.FF.^.^ or CCP: 35.^ / 36.^) not associated with operative anesthesia (CCI: 1.ZZ.11.^ or CCP: 13.59/13.99)
Therapy interventions (CCI: 1.^.^12.^)
Transfusion (CCI: 1.LZ.19.^) or apheresis (CCI: 1.LZ.20.^)

Abbreviations: CCI, Canadian Classification of Health Interventions; CCP, Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedure

^aNeurosurgical drainage procedures are excluded by these codes

Eligible surgical procedures were defined by Canadian Classification of Health Interventions (CCI) therapeutic intervention categories 1.AA.^.^ - 1.YZ.^.^ or Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedure (CCP) codes 14.^ to 98.^ in any incode field of the Discharge Abstract Database (DAD) and Same Day Surgery (SDS) database for each episode of care, except the following therapeutic interventions (when not indicated, relevant CCP codes have already been excluded).

eTable 2. Adjusted Odds of Early Developmental Vulnerability, a Multiple Challenge Index, or Major Domains in the Lowest Tenth Percentile for Demographic and Health Care–Related Factors in Children Exposed to Surgery (n = 2346) From Discordant Sibling Pairs

EDI Outcomes	Odds Ratio	95% Confidence Interval	P value
Early developmental vulnerability			
Age at EDI completion	0.36	0.26 to 0.50	<.0001
Female	0.53	0.43 to 0.66	<.0001
Mother's age at birth	0.96	0.94 to 0.97	<.0001
Eldest sibling status	0.88	0.71 to 1.09	0.2
Age at exposure, <2 vs. ≥ 2 years	0.86	0.69 to 1.06	0.2
Number of exposures, 1 vs. 2+	0.92	0.70 to 1.21	0.6
OHIP basic units, <8 vs. ≥8	0.88	0.53 to 1.48	0.6
Multiple challenge index			
Age at EDI completion	0.50	0.22 to 1.17	0.1
Female	0.39	0.20 to 0.73	0.003
Mother's age at birth	0.96	0.91 to 1.01	0.1
Eldest sibling status	0.75	0.45 to 1.26	0.3
Age at exposure, <2 vs. ≥ 2 years	0.56	0.32 to 1.00	0.05
Number of exposures, 1 vs. 2+	0.82	0.42 to 1.57	0.5
OHIP basic units, <8 vs. ≥8	1.29	0.39 to 4.28	0.7
<i>Major EDI Domains:</i>			
Language and cognitive development			
Age at EDI completion	0.27	0.15 to 0.49	<.0001
Female	0.38	0.24 to 0.59	<.0001
Mother's age at birth	0.97	0.93 to 1.01	0.09
Eldest sibling status	1.03	0.71 to 1.49	0.9
Age at exposure, <2 vs. ≥ 2 years	0.73	0.50 to 1.07	0.1
Number of exposures, 1 vs. 2+	1.09	0.67 to 1.78	0.7
OHIP basic units, <8 vs. ≥8	0.95	0.37 to 2.42	0.9
Physical well-being			
Age at EDI completion	0.44	0.29 to 0.69	0.0003
EDI Outcomes			
Female	0.67	0.50 to 0.88	0.005
Mother's age at birth	0.94	0.91 to 0.97	<.0001
Eldest sibling status	0.71	0.54 to 0.94	0.02
Age at exposure, <2 vs. ≥ 2 years	0.92	0.70 to 1.21	0.5
Number of exposures, 1 vs. 2+	0.94	0.66 to 1.33	0.7
OHIP basic units, <8 vs. ≥8	0.75	0.37 to 1.53	0.4
Social competence			
Age at EDI completion	0.33	0.19 to 0.58	0.0001
Female	0.43	0.29 to 0.64	<.0001
Mother's age at birth	0.95	0.92 to 0.99	0.007
Eldest sibling status	0.89	0.63 to 1.26	0.5
Age at exposure, <2 vs. ≥ 2 years	0.63	0.44 to 0.91	0.01
Number of exposures, 1 vs. 2+	0.80	0.51 to 1.23	0.3

OHIP basic units, <8 vs. ≥8	0.82	0.33 to 2.09	0.7
Emotional maturity			
Age at EDI completion	0.52	0.32 to 0.85	0.009
Female	0.38	0.26 to 0.55	<.0001
Mother's age at birth	0.99	0.96 to 1.02	0.6
Eldest sibling status	0.90	0.66 to 1.23	0.5
Age at exposure, <2 vs. ≥ 2 years	0.82	0.60 to 1.13	0.2
Number of exposures, 1 vs. 2+	0.93	0.62 to 1.39	0.7
OHIP basic units, <8 vs. ≥8	1.04	0.49 to 2.21	0.9
Communication and general knowledge			
Age at EDI completion	0.35	0.21 to 0.57	<.0001
Female	0.35	0.24 to 0.51	<.0001
Mother's age at birth	0.95	0.92 to 0.98	0.003
Eldest sibling status	0.82	0.60 to 1.13	0.2
Age at exposure, <2 vs. ≥ 2 years	0.82	0.59 to 1.13	0.2
Number of exposures, 1 vs. 2+	0.81	0.55 to 1.20	0.3
OHIP basic units, <8 vs. ≥8	1.03	0.48 to 2.19	1.0

Abbreviations: EDI, Early Development Instrument; OHIP, Ontario Health Insurance Plan

eTable 3. Characteristics of All Eligible Children Available From the EDI-ICES Database (n = 187 226)

	No surgery	Surgery
	N = 160,021	N = 27,205
Age at EDI completion, <i>mean ± SD</i>	5.68 ± 0.29	5.71 ± 0.30
Male, <i>No. (%)</i>	67,544 (42.2)	17,432 (64.1)
Newborn's gestation weeks at delivery, <i>mean ± SD</i>	39.16 ± 1.75	38.97 ± 1.96
Multiple births, <i>No. (%)</i>	1,426 (0.9)	280 (1.0)
Neighbourhood income quintile, <i>No. (%)</i>		
Missing	707 (0.4)	103 (0.4)
1	26,366 (16.5)	4,122 (15.2)
2	29,643 (18.5)	4,900 (18.0)
3	34,263 (21.4)	5,779 (21.2)
4	37,143 (23.2)	6,637 (24.4)
5	31,899 (19.9)	5,664 (20.8)
Aboriginal, <i>No. (%)</i>	1,553 (1.0)	239 (0.9)
Rural home location, <i>No. (%)</i>	16,548 (10.3)	3,134 (11.5)
Mother's age at birth, <i>median (IQR)</i>	30 (27-34)	30 (26-33)
Eldest child, <i>No. (%)</i>	9,295 (5.8)	1,685 (6.2)

Abbreviations: EDI, Early Development Instrument; SD, standard deviation; IQR, interquartile range

eTable 4. Adjusted Odds of Early Developmental Vulnerability, a Multiple Challenge Index, or Major Domains in the Lowest Tenth Percentile After Exposure to Surgery Before Primary School Entry for a Sensitivity Analysis

EDI Outcomes	Odds Ratio	95% Confidence Interval	P value
Overall, early developmental vulnerability	1.01	0.92 to 1.11	0.8
Multiple challenge index	1.02	0.80 to 1.31	0.9
Major EDI Domains:			
Language and cognitive development	0.91	0.77 to 1.08	0.3
Physical well-being ^a	1.05	0.93 to 1.20	0.4
Social competence ^a	0.96	0.82 to 1.12	0.6
Emotional maturity	0.94	0.82 to 1.09	0.4
Communication and general knowledge	0.90	0.78 to 1.04	0.2

^aNot adjusted for eldest sibling status due to lack of model convergence

Abbreviations: EDI, Early Development Instrument

Includes children who had Early Development Instrument-recorded behavioral, learning, or developmental problems (n = 11,220 sibling-pairs).