

Long-Term Survival and Neurodevelopmental Outcomes of Very-Preterm Infants Born in Canada Between 2009-2016

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INTRODUCTION

Since 1995 all tertiary level neonatal intensive care units in Canada work together as the Canadian Neonatal Network (CNN) to improve the outcomes of preterm children.

Developed in liaison with CNN, the Canadian Neonatal Follow-Up Network (CNFUN) is a national collaboration between follow-up programs across Canada directed to improve neurodevelopmental outcomes of preterm infants.

Quality improvement practice changes adopted across CNN participating sites have led to increases in neonatal survival and decreases in neonatal morbidity.

We are still to understand if the adopted practice changes have also impacted the longer-term neurodevelopmental outcomes of these children.

AIM

The objective of this study was to determine if rates of death and neurodevelopment impairment at 18-21 months corrected age (CA) have changed over time among Canadian infants born <29 weeks of gestation.

We hypothesized that quality improvement practice changes that led to improvements in neonatal outcomes, also led to reduced long-term mortality and neurodevelopmental impairment.

METHODS

Inclusion criteria: Neonates born at <29 weeks GA, admitted to level-III NICUs . April 2009 December 2016 Seen CNFUN program at 18-21 months CA.

Exclusion criteria: Infants moribund on admission or with life-threatening congenital anomalies. Cohort restricted to sites with neurodevelopmental outcomes on ≥70% of survivors.

Outcomes Primary: Death/sNDI at 18-21 months CA
Secondary: Death or NDI, death, sNDI, NDI, Components of NDI

Impairment	sNDI (1 or> of the following)	NDI (1 or> of the following)
Motor	CP* with GMFCS** level 3,4& 5	CP with GMFCS level ≥1
	Bayley III*** Motor CS <70	Bayley III Motor CS<85
Cognitive	Bayley III Cognitive CS <70	Bayley III Cognitive CS <85
Language	Bayley III Language CS <70	Bayley III Language CS <85
Hearing	Hearing aid or cochlear implant	Sensorineural/mixed hearing loss
Vision	Bilateral visual impairment	Uni-bilateral visual impairment

sNDI: significant neurodevelopmental impairment , NDI: neurodevelopmental impairment

Outcomes were compared between
Epoch 1: 2009-2012. Epoch 2: 2013- 2016

RESULTS:

Study population included 4426 children.
Epoch 1: 1895 (43%) and Epoch 2: 2531(57%).

Outcomes by Epoch + odds ratio from Epoch 2 to Epoch 1

Outcome	Epoch 1 n (%)	Epoch 2 n (%)	Adjusted OR (95%CI)
Death or significant NDI	602 (31.8)	756 (29.9)	0.86 (0.75, 0.99)
Death or NDI	1051 (55.5)	1345 (53.1)	0.89 (0.79, 1.01)
Death at any time before follow-up	322 (17.0)	420 (16.6)	0.88 (0.74, 1.04)
Significant NDI	280 (17.8)	336 (15.9)	0.87 (0.73, 1.04)
NDI	729 (46.3)	925 (43.8)	0.90 (0.79, 1.03)
Cerebral palsy	94 (6.1)	114 (5.5)	0.88 (0.66, 1.17)
Bayley Motor composite score <70	100 (6.9)	111 (6.0)	0.86 (0.65, 1.14)
Bayley Cognitive composite score <70	45 (3.0)	79 (4.1)	1.36 (0.93, 1.99)
Bayley Language composite score <70	169 (11.6)	217 (11.8)	1.02 (0.82, 1.27)
Bayley Motor composite score <85	313 (21.6)	379 (20.6)	0.94 (0.79, 1.12)
Bayley Cognitive composite score <85	195 (13.2)	311 (16.0)	1.25 (1.03, 1.53)
Bayley Language composite score <85	528 (36.2)	664 (36.1)	1.00 (0.86, 1.15)
Hearing loss			
- Hearing aid or cochlear implant	39 (2.6)	28 (1.4)	0.50 (0.31, 0.82)
- Sensorineural/mixed hearing loss	105 (7.1)	103 (5.0)	0.70 (0.53, 0.92)
Visual impairment			
- Bilateral visual impairment	19 (1.4)	11 (0.6)	0.38 (0.18, 0.80)
- Uni- or bilateral visual impairment	22 (1.6)	14 (0.7)	0.42 (0.22, 0.83)

*Gestational age, sex, small for gestational age, multiple pregnancy (non-practice related variables)

CONCLUSION

Significant reductions in rate of death or sNDI, and in visual and hearing impairment, were identified between Epoch 2 to Epoch 1. An increase in poor cognitive outcome rates requires further study.