Outcome at early school age in a Swiss national cohort of extremely preterm infants born between 2011 and 2018.

A retrospective population-based cohort study

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Background

- EPT = Extremely preterm (22+0 to 27+6 weeks GA)

- Survival rates of EPTs have improved significantly: 1 in 4 (in 1990s)[1] to 4 in 5 (in 2000s)[2]

- Morbidity remains high – developmental delays are common[3-5]

- Little international data on this age group[3,4]

- SwissNeoNet: Longitudinal follow-up database in Switzerland

[1]Doyle LW 2004, [2]Bell EF et al. 2022, [3]Pierrat et al. 2021, [4]Serenius et al. 2016, [5]Song 2023

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Study aim and design

Aim: To assess cognitive, motor and neurosensory outcomes at early school age

Design: Retrospective analysis of prospectively collected population-based data (2011–2018)

Participants: Live-born EPT children in Switzerland

Outcome measurement:

- Cognition: KABC-II: Fluid-Crystallized and Nonverbal Index (mean 100, SD 15)

- Motor: Cerebral palsy graded according to GMFCS

- Hearing/vision via reports and direct assessment

- Composite of all above: moderate to severe neurodevelopmental impairment

Statistics: Descriptive statistics and logistic regression models to identify risk factors

Results: Baseline characteristics

- Survival to early school age: 69.1%

  (n = 1599/2314)

- Follow-up rate: 72% of survivors

  (n = 1095)

Population overview

	FU5 no	FU5 yes	p
N	433 (28.3%)	1095 (71.7%)	
Gestational age (iqr)	26.6 (25.6–27.3)	26.4 (25.6–27.3)	0.25
Birth weight z-score	0.0 (–0.6 to 0.4)	–0.1 (–0.7 to 0.4)	0.07
Head circumference z-score	–0.6 (–0.6 to –0.6)	–0.6 (–0.6 to –0.6)	–
Sex male (%)	227 (52.4%)	570 (52.1%)	0.94
Multiple births (%)	142 (32.8%)	288 (26.3%)	0.01
Any antenatal steroids (%)	398 (92.8%)	1016 (93.1%)	0.90
Caesarean section (%)	346 (79.9%)	862 (78.8%)	0.68
Socio-economic status (iqr)	6 (4–8)	6 (4–7)	<0.01

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Results: Neurodevelopmental outcomes

- **Cognitive outcomes:**

  - Mean IQ: 88.9 (SD 17.9)

  - 12.4% had IQ < −2 SD

- Cerebral palsy (GMFCS ≥2): 3.8%

- Visual impairment (moderate to severe): 20.5%

- Hearing impairment (moderate to severe): 2.6%

- **Moderate to severe neurodevelopmental impairment (NDI): 35.2%**

Results: Predictors for moderate to severe NDI

- Severe intraventricular haemorrhage (IVH):

  Strongest predictor of NDI

  → aOR 4.4 (95% CI: 2.75–7.03)

Univariable and multivariable OR for moderate to severe NDI at age 5–6 years (preschool age)

Risk factor	Univariable		Multivariable	
	OR (95% CI)	p	OR (95% CI)	p
Gestational age	0.88 (0.78–0.98)	0.02	0.97 (0.85–1.11)	0.66
Birth weight z-score	0.88 (0.76–1.01)	0.08	0.91 (0.78–1.07)	0.24
Sex male	1.38 (1.08–1.78)	0.01	1.43 (1.09–1.88)	0.009
Multiple births	1.06 (0.8–1.41)	0.67	NA	NA
Any antenatal steroids	0.96 (0.59–1.56)	0.86	NA	NA
Caesarean section	0.93 (0.68–1.25)	0.62	NA	NA
Socio-economic status	1.09 (1.03–1.15)	0.001	1.12 (1.06–1.18)	<0.001
Severe IVH	4.54 (2.94–7.02)	<0.001	4.4 (2.75–7.03)	<0.001
Cystic PVL	6.09 (2.21–16.74)	<0.001	3.57 (1.18–10.81)	0.025
NEC stage ≥2	2.49 (1.37–4.52)	0.003	2.26 (1.2–4.27)	0.012
Mod.-severe BPD	1.73 (1.32–2.27)	<0.001	1.39 (1.03–1.9)	0.034
Severe ROP	2.94 (1.84–4.7)	<0.001	2.32 (1.37–3.93)	0.002
Late-onset sepsis	1.21 (0.89–1.65)	0.23	NA	NA

aOR, Odds ratio for unfavorable outcome, adjusted for GA, birthweight Z-score, sex, multiples, SES, IVH, PVL, NEC, BPD, ROP

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Conclusion

- Two-thirds of EPT children survive without moderate-severe impairment

- Limited international data show similar neurodevelopmental outcomes of EPT[3,4]

- Need for long-term support and surveillance

[3]Pierrat et al. 2021, [4]Serenius et al. 2016