

## Follow-up after very preterm birth in Europe

Follow-up programmes aim to detect neurodevelopmental and health problems and enable early interventions for children born very preterm (<32 weeks of gestational age (GA)). Although the importance of postdischarge follow-up is widely acknowledged, recommendations differ regarding eligibility criteria, frequency, duration and content, especially for follow-up beyond early childhood.<sup>1-3</sup> We used data from a European cohort of children born very preterm to describe the use of routine follow-up services until 5 years of age.

The data were collected for the Effective Perinatal Intensive care in Europe and Screening to Improve Health in Very Preterm Infants studies, which constituted and followed up an area-based cohort of children born very preterm in 2011/2012 in 19 regions across 11 European countries.<sup>4</sup> Perinatal data were collected from obstetric and neonatal records, and parents completed questionnaires at 2 and 5 years of age. Out of 7900 live births, 6792 were discharged from neonatal care, of whom 6759 were alive at 5 years and 3635 (53.8%) participated in the study.

Based on a question on the use of routine follow-up services for children born very preterm in the 5-year parental questionnaire, we classified children as having never used follow-up, no longer using follow-up or still using follow-up services. We described associations with family sociodemographic characteristics and perinatal risks and estimated adjusted risks using multinomial regression models with robust variance estimators for clustered samples and inverse probability weights using baseline characteristics to account for study attrition bias.<sup>4</sup>

Of all children, 90.3% had used follow-up services, and 27.3% (10.9 to 58.4% by country) were still doing so at 5 years of age (table 1). Never using follow-up services was associated with maternal sociodemographic characteristics (younger age, low educational level and being born outside Europe) and lower perinatal risk. Continued follow-up at 5 years of age was related to perinatal risk factors (low GA, small for GA, bronchopulmonary dysplasia and male sex). Children with mothers born outside of Europe were less likely to continue follow-up. Adjustments for social and perinatal characteristics failed to explain differences between countries.

**Table 1** Family sociodemographic and perinatal factors associated with routine follow-up for children born very preterm, at 5 years of age

Does child have routine check-ups for children born very preterm at 5 years?	N	Reference: still in follow-up at 5 years			No, never		Not anymore	
		No, never	Not anymore	Yes, still	aRRR	95% CI	aRRR	95% CI
<b>Mother's age at delivery (years)</b>								
≤24	422	17.3	55.2	27.5	2.0	1.2 to 3.5	1.1	0.8 to 1.6
25–34	2057	9.2	63.0	27.8	ref		ref	
≥35	1098	6.8	67.2	26.0	0.7	0.5 to 1.2	1.0	0.8 to 1.3
<b>Parity at delivery</b>								
Multiparous	2156	8.3	63.6	28.1	ref		ref	
Nulliparous	1390	11.2	62.7	26.1	1.1	0.7 to 1.6	1.0	0.8 to 1.2
<b>Multiple birth</b>								
No (singleton)	2531	10.6	62.0	27.4	ref		ref	
Yes (twins or more)	1056	7.5	65.4	27.1	0.5	0.3 to 0.9	1.0	0.7 to 1.2
<b>Mother's educational level</b>								
Lower (ISCED levels 0–2: lower secondary or lower)	589	13.7	58.9	27.4	2.0	1.1 to 3.5	0.9	0.7 to 1.3
Intermediate (ISCED levels 3–5: upper or post-secondary, non-tertiary or short cycle tertiary)	1474	9.7	64.0	26.3	1.4	0.9 to 2.2	0.8	0.7 to 1.1
Higher (ISCED levels 6–8: bachelor degree or higher)	1478	6.3	66.3	27.4	Ref		Ref	
<b>Country of birth</b>								
Native	2857	8.9	63.5	27.6	Ref		Ref	
European born	238	7.7	63.9	28.4	0.9	0.4 to 2.0	0.8	0.5 to 1.2
Born outside Europe	476	13.3	61.9	24.9	2.5	1.4 to 4.2	1.4	1.0 to 1.9
<b>GA, completed weeks</b>								
<26	305	5.5	53.9	40.6	0.2	0.1 to 0.4	0.3	0.2 to 0.5
26–27	657	6.0	54.2	39.9	0.2	0.1 to 0.4	0.5	0.4 to 0.6
28–29	937	6.3	66.1	27.6	0.3	0.2 to 0.5	0.7	0.6 to 0.9
30–31	1688	13.8	66.2	20.0	Ref		Ref	
<b>Small for GA**</b>								
<3 centile	766	7.7	62.0	30.2	0.5	0.3 to 0.7	0.7	0.5 to 0.9
3–9 centile	417	11.0	59.3	29.6	1.0	0.6 to 1.6	0.7	0.5 to 0.9
≥10 centile	2404	10.2	63.8	26.0	Ref		Ref	
<b>Severe neonatal morbidity††</b>								
No	3141	10.4	63.5	26.1	Ref		Ref	
Yes	365	5.0	57.7	37.3	0.5	0.2 to 1.1	0.9	0.7 to 1.3
<b>Bronchopulmonary dysplasia</b>								
No	3034	10.7	64.4	24.9	Ref		Ref	
Yes	466	3.8	53.8	42.4	0.4	0.2 to 0.8	0.6	0.5 to 0.9
<b>Congenital anomaly</b>								
No	3292	9.9	62.7	27.4	Ref		Ref	
Yes	295	8.5	65.5	26.0	0.6	0.3 to 1.2	0.9	0.6 to 1.2
<b>Child sex</b>								
Male	1914	10.0	59.3	30.7	0.9	0.6 to 1.3	0.7	0.6 to 0.9
Female	1673	9.4	67.1	23.5	Ref		Ref	
<b>Country (region)</b>								
					(ref sample mean)		(ref sample mean)	
Portugal (Lisbon, Northern Region)	425	4.8	36.8	58.4	0.6	0.3 to 1.2	0.2	0.1 to 0.2
Belgium (Flanders)	259	12.8	40.5	46.7	3.6	2.0 to 6.3	0.3	0.2 to 0.4
Netherlands (Central Eastern)	146	6.3	52.2	41.5	1.7	0.7 to 4.1	0.5	0.3 to 0.7
France (Burgundy, Ile-de-France, Northern Region)	770	10.3	58.6	31.2	3.0	1.9 to 4.6	0.6	0.5 to 0.8
Denmark (Eastern Region)	151	10.8	62.5	26.7	6.3	2.9 to 13.8	0.9	0.6 to 1.4
Sweden (Greater Stockholm)	141	2.8	70.7	26.6	1.1	0.2 to 6.3	1.0	0.7 to 1.5
UK (East Midlands, Northern, Yorkshire and the Humber)	419	13.6	69.4	17.0	10.9	6.1 to 19.4	1.9	1.4 to 2.7
Germany (Hesse, Saarland)	266	21.5	65.4	13.0	21.1	11.3 to 39.4	1.9	1.2 to 3.1
Estonia (entire country)	133	0.0	87.2	12.8	0.0	0.0 to 0.0	2.6	1.6 to 4.2
Italy (Emilia-Romagna, Lazio, Marche)	691	4.5	83.2	12.3	4.5	2.3 to 8.7	2.5	1.9 to 3.3
Poland (Wielkopolska)	186	13.4	75.7	10.9	18.9	9.4 to 38.3	2.9	1.8 to 4.8

Inverse probability weights after multiple imputation were used for all analyses.

\*Using intrauterine charts modelled for the Effective Perinatal Intensive care in Europe cohort.

†Intraventricular haemorrhage grades III and IV, cystic periventricular leucomalacia, retinopathy of prematurity stages III–V or necrotising enterocolitis needing surgery.


aRRR, adjusted relative risk ratio; GA, gestational age; ISCED, International Standard Classification of Education.

This study provides novel data on use of routine follow-up services after preterm birth based on a population-based design and standardised questions on follow-up from diverse European regions. Limits

are reliance on parental recall and study attrition.

Children from socially disadvantaged families were more likely to never use follow-up services, corroborating previous

studies.<sup>5</sup> This is concerning, as these children are more vulnerable to the adverse neurodevelopmental consequences of preterm birth, and may benefit most from interventions. Variation between European countries in the percentage of children continuing follow-up at five persisted after accounting for perinatal risk factors, such as lower GA and neonatal morbidities. While differences are expected, given the heterogeneity in follow-up policies and programmes, the magnitude of these cross-country disparities, in tandem with marked social inequalities at follow-up entry, underscore the need for better evidence on optimal follow-up organisation and duration.

**Anna-Veera Seppänen** <sup>1,2</sup>, **Elizabeth S Draper**,<sup>3</sup> **Stavros Petrou**,<sup>4,5</sup> **Henrique Barros**,<sup>6</sup> **Lazaros Andronis**,<sup>7</sup> **Sung Wook Kim**,<sup>4,5</sup> **Rolf F Maier**,<sup>8</sup> **Pernille Pedersen**,<sup>9</sup> **Janusz Gadzinowski**,<sup>10</sup> **Jo Lebeer**,<sup>11</sup> **Ulrika Ådén**,<sup>12,13</sup> **Liis Toome**,<sup>14,15</sup> **Arno F J van Heijst**,<sup>16</sup> **Marina Cuttini** <sup>17</sup>, **Jennifer Zeitlin** <sup>1</sup>, **SHIPS Research Group**

<sup>1</sup>Université de Paris, CRESS, Obstetrical Perinatal and Pediatric Epidemiology Research Team, EPOPé, INSERM, INRA, F-75004 Paris, France

<sup>2</sup>Sorbonne Université, Collège Doctoral, F-75005 Paris, France

<sup>3</sup>Department of Health Sciences, University of Leicester, Leicester, UK

<sup>4</sup>Warwick Medical School, University of Warwick, Coventry, UK

<sup>5</sup>Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK

<sup>6</sup>EPIUnit-Instituto de Saúde Pública da Universidade do Porto, ISPUP, Porto, Portugal

<sup>7</sup>Division of Clinical Trials, University of Warwick Warwick Medical School, Coventry, UK

<sup>8</sup>Children's Hospital, University Hospital, Philipps University Marburg, Marburg, Hessen, Germany

<sup>9</sup>Department of Neonatology, Hvidovre Hospital, Hvidovre, Denmark

<sup>10</sup>Department of Neonatology, Poznan University of Medical Sciences, Poznan, Wielkopolskie, Poland

<sup>11</sup>Department of Primary and Interdisciplinary Care, Disability Studies, Faculty of Medicine and Health Sciences, University of Antwerp, Antwerpen, Belgium

<sup>12</sup>Department of Women's and Children's Health, Karolinska Institutet, Stockholm, Sweden

<sup>13</sup>Neonatal Unit, Karolinska University Hospital, Stockholm, Sweden

<sup>14</sup>Department of Neonatal and Infant Medicine, Tallinn Children's Hospital, Tallinn, Estonia

<sup>15</sup>Department of Pediatrics, University of Tartu, Tartu, Estonia

<sup>16</sup>Department of Neonatology, Radboud University Medical Center, Nijmegen, The Netherlands

<sup>17</sup>Clinical Care and Management Innovation Research Area, Bambino Gesù Children's Hospital, IRCCS, Rome, Italy

**Correspondence to** Anna-Veera Seppänen, Université de Paris, CRESS, Obstetrical Perinatal and Pediatric Epidemiology Research Team, EPOPé, Inserm, INRA, F-75004 Paris, France; anna-veera.seppanen@inserm.fr

**Twitter** Lazaros Andronis @Epopé\_Inserm

**Collaborators** SHIPS Research Group: Belgium (J Lebeer, I Sarrechia, P Van Reempts, E Bruneel, E Cloet, A Oostra, E Ortibus); Denmark (K Boerch, P Pedersen); Estonia (L Toome, H Varendi, M Männamaa); France (PY Ancel, A Burguet, PH Jarreau, V Piarat, A Nuytten); Germany (RF Maier, M Zemlin, B Misselwitz, L Wohlers); Italy (M Cuttini, I Croci, V Carnielli, G Ancora, G Faldella, F Ferrari); The Netherlands (A van Heijst, C Koopman-Esseboom); Poland (J Gadzinowski, J Mazela, A Montgomery, T Pikula); Portugal (H Barros, R Costa, C Rodrigues); Sweden (U Aden); United Kingdom (ES Draper, A Fenton, SJ Johnson); EFCNI (S Mader, N Thiele, JM Pfeil); Health Economics team (S Petrou, SW Kim, L Andronis); Inserm Coordination (J Zeitlin, A M Aubert, C Bonnet, R El Rafei, AV Seppänen).

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### ORCID iDs

Anna-Veera Seppänen <http://orcid.org/0000-0001-5615-0639>

Marina Cuttini <http://orcid.org/0000-0002-3284-6874>

Jennifer Zeitlin <http://orcid.org/0000-0002-9568-2969>

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