Development and validation of prediction models for fetal growth restriction and birthweight: an individual participant data meta-analysis

John Allotey,[1*] Lucinda Archer,[2] Dyuti Coomar,[1] Kym IE Snell,[2] Melanie Smuk,[3] Lucy Oakey,[1] Sadia Haqnawaz,[4] Ana Pilar Betrán,[5] Lucy C Chappell,[6] Wessel Ganzevoort,[7] Sanne Gordijn,[8] Asma Khalil,[9] Ben W Mol,[10,11] Rachel K Morris,[12] Jenny Myers,[13] Aris T Papageorghiou,[9] Basky Thilaganathan,[9,14] Fabricio Da Silva Costa,[15] Fabio Facchinetti,[16] Arri Coomarasamy,[1] Akihide Ohkuchi,[17] Anne Eskild,[18] Javier Arenas Ramírez,[19] Alberto Galindo,[20] Ignacio Herraiz,[21] Federico Prefumo,[22] Shigeru Saito,[23] Line Sletner,[24] Jose Guilherme Cecatti,[25] Rinat Gabbay-Benziv,[26] Francois Goffinet,[27,28] Ahmet A Baschat,[29] Renato T Souza,[25] Fionnuala Mone,[30] Diane Farrar,[31] Seppo Heinonen,[32] Kjell Å Salvesen,[33] Luc JM Smits,[34] Sohinee Bhattacharya,[11] Chie Nagata,[35] Satoru Takeda,[36] Marleen MHJ van Gelder,[37] Dewi Anggraini,[38] SeonAe Yeo,[39] Jane West,[31] Javier Zamora,[1,40] Hema Mistry,[41] Richard D Riley[2] and Shakila Thangaratinam[1,42] for the IPPIC Collaborative Network

[1]WHO Collaborating Centre for Global Women's Health, Institute of Metabolism and Systems Research, University of Birmingham, Birmingham, UK
[2]Centre for Prognosis Research, School of Medicine, Keele University, Keele, UK
[3]Blizard Institute, Centre for Genomics and Child Health, Queen Mary University of London, London, UK
[4]The Hildas, Dame Hilda Lloyd Network, WHO Collaborating Centre for Global Women's Health, University of Birmingham, Birmingham, UK
[5]Department of Reproductive and Health Research, World Health Organization, Geneva, Switzerland

[6]Department of Women and Children's Health, School of Life Course Sciences, King's College London, London, UK
[7]Department of Obstetrics, Amsterdam UMC University of Amsterdam, Amsterdam, the Netherlands
[8]Faculty of Medical Sciences, University Medical Center Groningen, Groningen, the Netherlands
[9]Fetal Medicine Unit, St George's University Hospitals NHS Foundation Trust and Molecular and Clinical Sciences Research Institute, St George's University of London, London, UK
[10]Department of Obstetrics and Gynaecology, Monash University, Monash Medical Centre, Clayton, Victoria, Australia
[11]Aberdeen Centre for Women's Health Research, Institute of Applied Health Sciences, University of Aberdeen, Aberdeen, UK
[12]Institute of Applied Health Research, University of Birmingham, Birmingham, UK
[13]Maternal and Fetal Health Research Centre, Manchester Academic Health Science Centre, University of Manchester, Central Manchester NHS Trust, Manchester, UK
[14]Tommy's National Centre for Maternity Improvement, Royal College of Obstetrics and Gynaecology, London, UK
[15]Maternal Fetal Medicine Unit, Gold Coast University Hospital and School of Medicine, Griffith University, Gold Coast, Queensland, Australia
[16]Mother-Infant Department, University of Modena and Reggio Emilia, Emilia-Romagna, Italy
[17]Department of Obstetrics and Gynecology, Jichi Medical University School of Medicine, Shimotsuke-shi, Tochigi, Japan
[18]Akershus University Hospital, University of Oslo, Oslo, Norway
[19]Hospital Universitario de Cabueñes, Gijón, Spain
[20]Fetal Medicine Unit, Maternal and Child Health and Development Network (SAMID), Department of Obstetrics and Gynaecology, Hospital Universitario, Instituto de Investigación Hospital, Universidad Complutense de Madrid, Madrid, Spain
[21]Department of Obstetrics and Gynaecology, Hospital Universitario, Madrid, Spain
[22]Department of Clinical and Experimental Sciences, University of Brescia, Italy
[23]Department Obstetrics and Gynecology, University of Toyama, Toyama, Japan
[24]Deptartment of Pediatric and Adolescents Medicine, Akershus University Hospital, Sykehusveien, Norway
[25]Obstetric Unit, Department of Obstetrics and Gynecology, University of Campinas, Campinas, Sao Paulo, Brazil
[26]Maternal Fetal Medicine Unit, Department of Obstetrics and Gynecology, Hillel Yaffe Medical Center Hadera, Affiliated to the Ruth and Bruce Rappaport School of Medicine, Technion, Haifa, Israel
[27]Maternité Port-Royal, AP-HP, APHP, Centre-Université de Paris, FHU PREMA, Paris, France
[28]Université de Paris, INSERM U1153, Equipe de recherche en Epidémiologie Obstétricale, Périnatale et Pédiatrique (EPOPé), Centre de Recherche Epidémiologie et Biostatistique Sorbonne Paris Cité (CRESS), Paris, France
[29]Department of Gynecology and Obstetrics, Johns Hopkins University School of Medicine, MD, USA
[30]Centre for Public Health, Queen's University, Belfast, UK
[31]Bradford Institute for Health Research, Bradford, UK

[32]Department of Obstetrics and Gynecology, University of Helsinki and Helsinki University Hospital, Helsinki, Finland
[33]Department of Laboratory Medicine, Children's and Women's Health, Norwegian University of Science and Technology, Trondheim, Norway
[34]Care and Public Health Research Institute, Maastricht University Medical Centre, Maastricht, the Netherlands
[35]Center for Postgraduate Education and Training, National Center for Child Health and Development, Tokyo, Japan
[36]Department of Obstetrics and Gynecology, Juntendo University, Tokyo, Japan
[37]Department for Health Evidence, Radboud Institute for Health Sciences, Radboud University Medical Center, Nijmegen, the Netherlands
[38]Faculty of Mathematics and Natural Sciences, Lambung Mangkurat University, South Kalimantan, Indonesia
[39]University of North Carolina at Chapel Hill, School of Nursing, NC, USA
[40]Clinical Biostatistics Unit, Hospital Universitario Ramón y Cajal (IRYCIS), Madrid, Spain
[41]Warwick Medical School, University of Warwick, Warwick, UK
[42]Birmingham Women's and Children's NHS Foundation Trust, Birmingham, UK

*Corresponding author j.allotey.1@bham.ac.uk

Disclosure of interests

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Plain language summary

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Plain language summary

One in ten babies is born small for their age. A third of such small babies are considered to be 'growth-restricted' as they have complications such as dying in the womb (stillbirth) or after birth (newborn death), cerebral palsy, or needing long stays in hospital. When growth restriction is suspected in fetuses, they are closely monitored and often delivered early to avoid complications. Hence, it is important that we identify growth-restricted babies early to plan care.

Our goal was to provide personalised and accurate estimates of the mother's chances of having a growth-restricted baby and predict the baby's weight if delivered at various time points in pregnancy. To do so, first we tested how accurate existing risk calculators ('prediction models') were in predicting growth restriction and birthweight. We then developed new risk-calculators and studied their clinical and economic benefits. We did so by accessing the data from individual pregnant women and their babies in our large database library (International Prediction of Pregnancy Complications).

Published risk-calculators had various definitions of growth restriction and none predicted the chances of having a growth-restricted baby using our definition. One predicted baby's birthweight. This risk-calculator performed well, but underpredicted the birthweight by up to 143 g.

We developed two new risk-calculators to predict growth-restricted babies (International Prediction of Pregnancy Complications-fetal growth restriction) and birthweight (International Prediction of Pregnancy Complications-birthweight). Both calculators accurately predicted the chances of the baby being born with growth restriction, and its birthweight. The birthweight was underpredicted by <9.7 g. The calculators performed well in both mothers predicted to be low and high risk.

Further research is needed to determine the impact of using these calculators in practice, and challenges to implementing them in practice. Both International Prediction of Pregnancy Complications-fetal growth restriction and International Prediction of Pregnancy Complications-birthweight risk calculators will inform healthcare professionals and empower parents make informed decisions on monitoring and timing of delivery.

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