

## Letter to the Editor

# Do children requiring long-term warfarin therapy present a bleeding risk during routine immunisation?

Key words: Immunisation; warfarin; bleeding risk; vaccination; children; paediatric

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Dear Editor,

We report the findings of original research investigating the bleeding risk associated with immunising children with CHD on long-term warfarin. Advances in paediatric medicine have resulted in the increased use of long-term warfarin therapy for the management of cardiac abnormalities in children.<sup>1,2</sup> Long-term warfarin therapy is difficult to manage in the paediatric population, particularly in children less than 1 year of age,<sup>3–5</sup> and may contribute to immunisation hesitancy in parents. As immunisation is the safest, most effective way to protect children from preventable illnesses, The National Health and Medical Research Council (NHMRC) recommends that all children should be vaccinated, including those with bleeding disorders;<sup>6</sup> however, there is little clinical evidence to determine the risk of major bleeding during immunisation in anti-coagulated children. This retrospective clinical audit investigated the risk of immunisation-related bleeding in children receiving warfarin therapy due to an underlying cardiac abnormality. The audit reviewed data over an 8-year period at The Royal Children's Hospital, Melbourne, Australia, and was approved by the institution's Human Research Ethics Committee (34013A).

At the Royal Children's Hospital Immunisation Service, 193 immunisations, each treated as an independent event, were administered to children on long-term warfarin therapy during the study period; 67.4% of children were male (n = 130). The mean age at the time of immunisation was 6.9 years ( $\pm 0.514$ ). Cardiac diagnosis included the Fontan procedure (n = 109), cardiomyopathy (n = 51), pulmonary hypotension (n = 13), mechanical valve replacement (n = 11), and "other" cardiac abnormalities (n = 9).

The mean warfarin dose pre-immunisation was 3.0 mg (range 1–10 mg); 87% of children had a target therapeutic range of 2.0–3.0. The mean international normalised ratio pre-immunisation was 2.3 ( $\pm 0.53$ ); 69.4% of international normalised ratio results were within the child's nominated target therapeutic range at the time of immunisation (n = 134); 20.2% were sub-therapeutic (n = 39); and 10.4% were supra-therapeutic (n = 20). Table 1 presents target therapeutic range achievement in the month before immunisation according to age categories. There were no instances of major bleeding recorded within 48 hours after immunisation.

This study suggests that immunisation does not pose a significant bleeding risk to children on warfarin therapy. This is of significant importance not only due to the recent rise of children on warfarin but

Table 1. Target therapeutic range achievement related to age within 1 month before immunisation.

Age (years)	n (%)	Target therapeutic range (n (%))	Sub-therapeutic (n (%))	Supra-therapeutic (n (%))	Mean international normalised ratio
≤1	16 (8.3)	9 (56.3)	4 (25)	3 (18.7)	2.5
>1–5	65 (33.7)	49 (75.4)	5 (7.7)	11 (16.9)	2.5
>5–10	66 (34.2)	48 (72.7)	16 (24.3)	2 (3)	2.3
>10–15	23 (11.9)	18 (78.3)	2 (8.7)	3 (13)	2.4
>15–18	23 (11.9)	10 (43.5)	12 (52.2)	1 (4.3)	2.1

also due to the common perception that vaccination may cause an adverse event in this population. The findings of this study should be communicated appropriately by clinicians to parents, or those responsible for the care of children on warfarin therapy. Furthermore, although this study included patients with cardiac abnormalities, the mean international normalised ratio (2.3) reflects the levels recommended in recent literature for the majority of infants and children requiring warfarin.<sup>2,6</sup> It is, therefore, reasonable to extrapolate these findings to children on warfarin therapy with non-cardiac indications.

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### Conflicts of Interest

None.

### Ethical Standards

This research was reviewed and approved by the Royal Children's Hospital, Melbourne Higher Research Ethics Committee (34013A).

*Emma K. Thursky, Anna N. Eason, Emily I. Blake,  
Emily M. Kitson, Cassandra Choy, Hollie S. Nosworthy*  
Department of Nursing  
The School of Health Science  
The University of Melbourne, Melbourne  
Victoria, Australia

*Sonja Elia*  
Immunisation Service  
Royal Children's Hospital, Melbourne  
Victoria, Australia

*Fiona Newall, Sophie Jones*  
Clinical Haematology  
The Royal Children's Hospital, Melbourne  
Victoria, Australia

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