Vitamin K injection – best prevention for newborns

An international comparison of intramuscular (IM) versus oral prophylactic regimens of vitamin K in Australia, Britain, Canada, Germany, New Zealand and Switzerland has shed new light on the incidence and epidemiology of hemorrhagic disease of the newborn (HDNB) in these countries. Data were obtained from the annual reports and program directors of the six national paediatric surveillance units that undertook studies on HDNB using the same case definition and case confirmation methods. All these units are members of the International Network of Paediatric Surveillance Units (INoPSU).

Background

HDNB, a serious problem due to the deficiency of vitamin K-dependent clotting factors (II, VII, IX and X), is classified according to the infant's age of onset.

- **Early (0 to 24 h):** associated with an impairment of vitamin K function by maternal medications (eg, anticonvulsants, antituberculous).
- **Classic (two to seven days):** all newborns are vitamin K deficient at birth due to minimal placental transfer of vitamin K. Classic HDNB is rarely seen with the correct use of vitamin K.
- **Late (three to eight weeks):** manifested secondary to cholestasis and inadequate vitamin K uptake or malabsorption (breast feeding, neonatal hepatitis, biliary atresia).

Rationale for vitamin K prophylaxis

Late HDNB occurs in five to seven of 100,000 live births without vitamin K prophylaxis and results in death or severe disability in 33% of affected newborns.

IM versus oral prophylaxis

- A single 1 mg dose of vitamin K_1 (phytonadione: a liposoluble vitamin K analog) (hereafter referred to as vitamin K) at birth prevents almost all cases of classic and late HDNB.
- Parental refusal and an alleged link between IM vitamin K and childhood cancers, such as leukemia, prompted the increased use of oral vitamin K prophylaxis.
- Several countries currently use multiple oral doses of vitamin K (Konakion MM: a mixed micellar preparation of vitamin K or Konakion, a liposoluble vitamin K) for prophylaxis.

Results of vitamin K prophylaxis

IM prophylaxis: Australia, Canada and New Zealand

Oral prophylaxis: Switzerland – (1995 to 2000) two-dose regimen: 2 mg at birth and at four days of age. Germany – (1993 to 1994) three-dose regimen: 1 mg at birth, at four to 10 days of age and at four to six weeks; (1995 to 1998) three-dose regimen: 2 mg at birth, at four to 10 days of age and at four to six weeks.

TABLE 1
Number of cases of late hemorrhagic disease of the newborn, 1995 to 2000

Unit	1995	1996	1997	1998	1999	2000	Total	Incidence rate*
Canada	–	–	1	3	0	1	5	0.37
Australia	1	3	1	1	0	3	9	0.60
New Zealand	–	–	–	2	3	4	9	5.25
Switzerland	3	4	4	3	4	3	21	4.06†
Germany	40 (1995-2000)						40	0.87
Britain	25 (1988-1990); 17 (1993-1994)						42	1.19

**Per 100,000 live births; †19 confirmed, two probable*

TABLE 2
Number of cases of late hemorrhagic disease of the newborn by type of vitamin K prophylaxis

Type of vitamin K prophylaxis	Canada	Australia	New Zealand	Switzerland*	Germany	Total
Not given	2	3	8	5	9	27
Intramuscular	2	3	1	0	0	6
Oral (Konakion MM)	0	3	0	13	9	25
Oral (Konakion liposoluble)	1†	0	0	1	19	21
Unknown	0	0	0	0	3	3

**Switzerland: 17 of 19 patients were exclusively breast-fed and 14 of 19 had hepatobiliary disease; †Canada: infant also had biliary atresia*

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IM and oral prophylaxis: United Kingdom – surveys in 1988 and 1993 showed an increased trend toward both oral prophylaxis and parental refusal.

Conclusions

Data from international surveillance illustrate the merit and importance of IM vitamin K prophylaxis.

- Increased incidence of late HDNB occurred when vitamin K prophylaxis was absent or given orally, especially if the infant had been exclusively breast-fed or had cholestasis.
- The ideal dose, timing and formulation for oral prophylaxis are unclear. Switzerland, with a comparative higher incidence of HDNB, is reviewing recommendations, while the United Kingdom, with an increased frequency of late HDNB, resumed national surveillance in 2001.
- Collaboration through INoPSU has shown that although HDNB is rare, no method of prevention is perfect.
- IM vitamin K prophylaxis is safe and the treatment of choice for the prevention of HDNB.

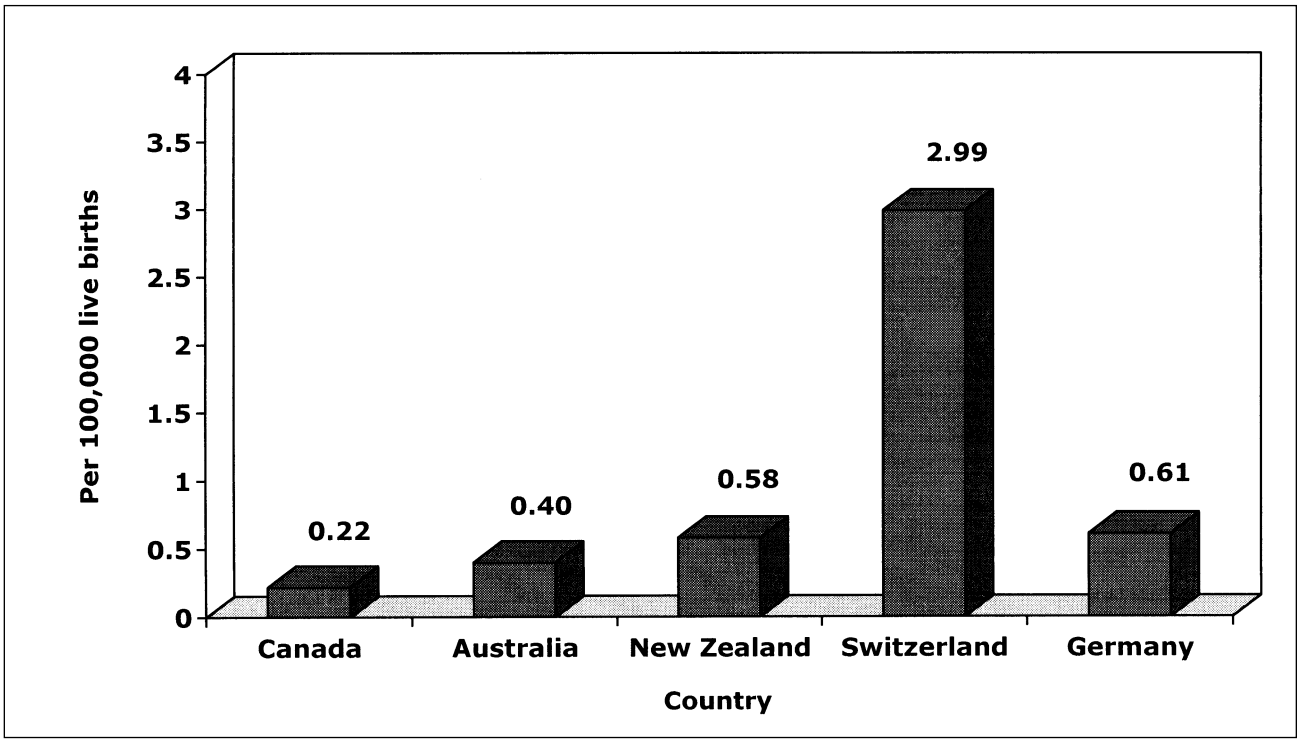

Figure 1) *Incidence rate of cases of late hemorrhagic disease of the newborn (includes only patients who received intramuscular or oral vitamin K prophylaxis)*

The Canadian Paediatric Surveillance Program (CPSP) is a joint project of the Canadian Paediatric Society and Health Canada's Centre for Infectious Disease Prevention and Control that undertakes the surveillance of rare diseases and conditions in children. For more information visit our Web site at <www.cps.ca/english/cpsp> or <www.cps.ca/francais/pcsp>.