Metabolic Bone Disease of Prematurity: A new protocol for detection, diagnosis and treatment

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BACKGROUND

Metabolic bone disease of prematurity (MBDP) is the demineralisation of bones due to low calcium and phosphate levels in preterm infants.[1] MBDP usually presents between week 6-12 of life and may lead to rickets, fractures and poor growth.[1]

There is no consensus guiding MBDP management. A local protocol introduced in January 2017 recommends screening and treatment with 2mmol/kg/day of oral calcium and phosphate.

AIM

To evaluate protocol compliance, tolerability, and compare treatment rates with pre-protocol trends (described in prior study by Duffy et al).[2]

METHOD

A retrospective cohort study was conducted on infants born between February 2017 – January 2018 at either <28weeks gestation or birthweight <1000g. As per protocol, diagnostic testing was conducted on days 28, 42, 60 and at 36-weeks' corrected age for:

- Low phosphate <1.8mmol/L or
- High ALP >600units/L

Medical records were reviewed for pathology, dosing, and adverse effects. Infants with unavailable medical records and those transferred or deceased prior to day 28 were excluded.

RESULTS

Ninety-six of 116 (81.9%) preterm infants were identified as at risk of MBDP and 95 infants met inclusion criteria. Forty-one of 95 (43.2%) infants demonstrated abnormal pathology, all receiving treatment. (see Table 1).

Table 1. Demographics of treated infants

	n = 30 (Duffy et al)[2]		n = 41	
Gestational age (weeks)				
Mean ± SD	26.1 ± 1.4		26.2 ± 1.6	
Range	-		23.7 – 30	
Birthweight (g)				
Mean ± SD	729g ± 152g		758.7 ± 177.5	
Range	-		380 - 1187	
Gender	**n**	**%**	**n**	**%**
Male	13	43.3	23	56.1
Female	17	57	18	43.9

Forty of 41 (97.6%) treated infants were prescribed correct doses, with 36 (87.8%) prescribed treatment within 5 days of abnormal pathology.

Table 2. Compliance to serum analysis testing for eligible infants

	n = 95	%
Day 28 (±5 days)		
Phosphate and ALP	95	100
Day 42 (±5 days)		
Phosphate and ALP	79	83.2
Day 60 (±5 days)		
Phosphate and ALP	57	60
36-weeks' corrected age (±5 days)		
Phosphate and ALP	53	55.8

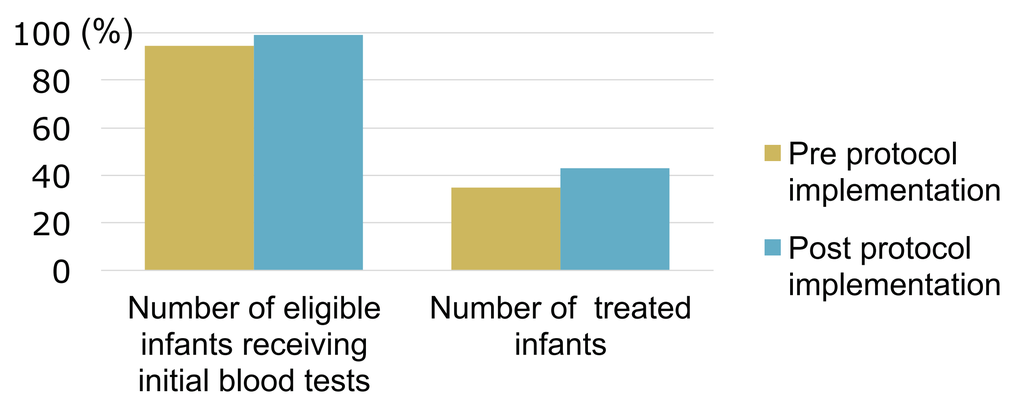
Seventy-nine of 95 (83.2%) infants were re-tested on day 42, 57 of 95 (60%) infants re-tested on day 60 and 53 of 95 (55.8%) infants re-tested at 36-weeks' corrected age (see Table 2).

DISCUSSION

Dosing and timing of treatment initiation following abnormal pathology complied with protocol. However, compliance to subsequent re-testing to assess treatment efficacy and to guide further treatment eligibility was not consistently observed. This may cause under-detection of MBDP in preterm infants.

Treatment appeared well-tolerated with nil documentation of adverse effects such as intestinal obstruction and nephrocalcinosis.

Figure 1: Prescribing data: pre vs post protocol implementation[2]



This study demonstrates that post protocol implementation:

- A higher percentage of eligible infants received initial blood tests (99% vs 94.5%)
- A larger proportion of preterm infants were treated for MBDP (43.2% vs 34.9%)
- Treatment duration was longer (40 vs 29 days)

CONCLUSION

The new protocol has shown promise in improving detection, diagnosis, and treatment for MBDP. Given the large proportion of preterm infants meeting treatment criteria, adherence to screening and treatment duration may require pharmacist vigilance. Further studies are required to investigate apparent increased treatment rates, duration, and long-term treatment outcomes.

REFERENCES

1. Rustico SE, Calabria AC, Garber SJ. Metabolic bone disease of prematurity. J Clin Transl Endocrinol. 2014 Sep; 1(3): 85-91
2. Duffy N, Jacobs S. Metabolic Bone Disease of Prematurity: Evaluation of Current Practices (unpublished report). 2016