

# Parenteral intake of vitamins and trace elements in children on home parenteral nutrition: can we meet ESPGHAN<sup>1,2</sup> recommendations using fixed-dose multivitamin/trace element products?

## Experiences from a regional paediatric intestinal failure service

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### Background

ESPGHAN<sup>1,2</sup> guidelines set recommended quantities of parenteral vitamins and trace elements for children on home parenteral nutrition (HPN). Use of standard fixed-dose multivitamin/multitrace products makes tailoring individual intake of these nutrients challenging. Importantly, dosage of these products are based on an individual's body weight and are highly influenced by other factors including HPN composition and number of bags infused per week.

### Objective

The aim of this study was to assess parenteral vitamin and trace element intake in children receiving HPN

Table 1: Percentage of patients meeting ESPGHAN<sup>1,2</sup> recommended intakes

Vitamin A	100%
Vitamin D	0%
Vitamin E	100%
Vitamin K	0%
Zinc	100%
Copper	67%
Selenium	75%
Iodine	50%
Manganese	92%
Molybdenum	8%

### Methods

Average daily parenteral intake of vitamins and trace elements of the paediatric HPN cohort at Cambridge University Hospitals (CUH) was assessed and expressed as a percentage of ESPGHAN<sup>1,2,3</sup> recommendations. Where HPN was not meeting the child's full parenteral energy requirements, this was adjusted for. If ESPGHAN<sup>1,2</sup> stated maximum quantities, the percentage of this quantity was calculated.

### Results

- 12 patients aged between one and 14 years were included
- All children met recommended intakes of water soluble vitamins except for vitamin C (suboptimal in one case)
- In all patients, vitamin A was exceeded. Vitamins D and K were suboptimal
- The recommended intake of zinc was surpassed in all children, but below the maximum quantity advised
- Iodine was adequately supplied in 50%, copper in 67% and selenium in 75% of patients
- No patient exceeded the maximum recommended intake of vitamin E and chromium. Maximum dose of manganese was exceeded in one patient

### Conclusion

Licensed parenteral multivitamin/multitrace products in the UK provide fixed combinations of multiple micronutrients and are dosed based on weight, although recommended intakes are mostly expressed as fixed daily quantities. Consequently, meeting ESPGHAN<sup>1,2</sup> recommendations is challenging. Monitoring of serum concentrations of these nutrients is essential in this vulnerable patient population.

### References

1. ESPGHAN (2018) ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: Iron and Trace Minerals. *Clinical Nutrition* 37(6B): 2354-2359
2. ESPGHAN (2018) ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: Vitamins. *Clinical Nutrition* 37(6B): 2366-2378
3. ESPGHAN (2018) ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: Energy. *Clinical Nutrition* 37(6B): 2309-2314

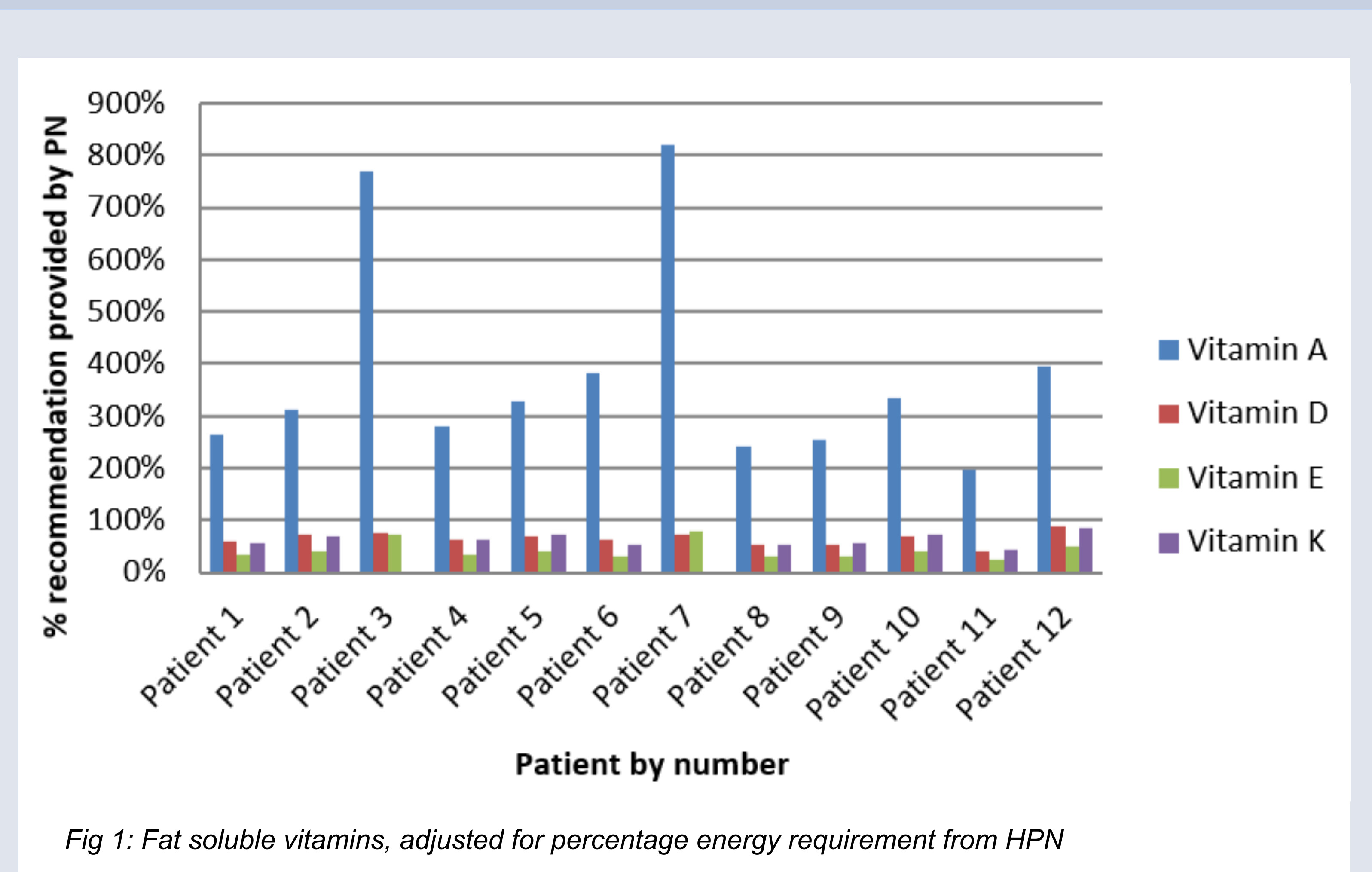


Fig 1: Fat soluble vitamins, adjusted for percentage energy requirement from HPN

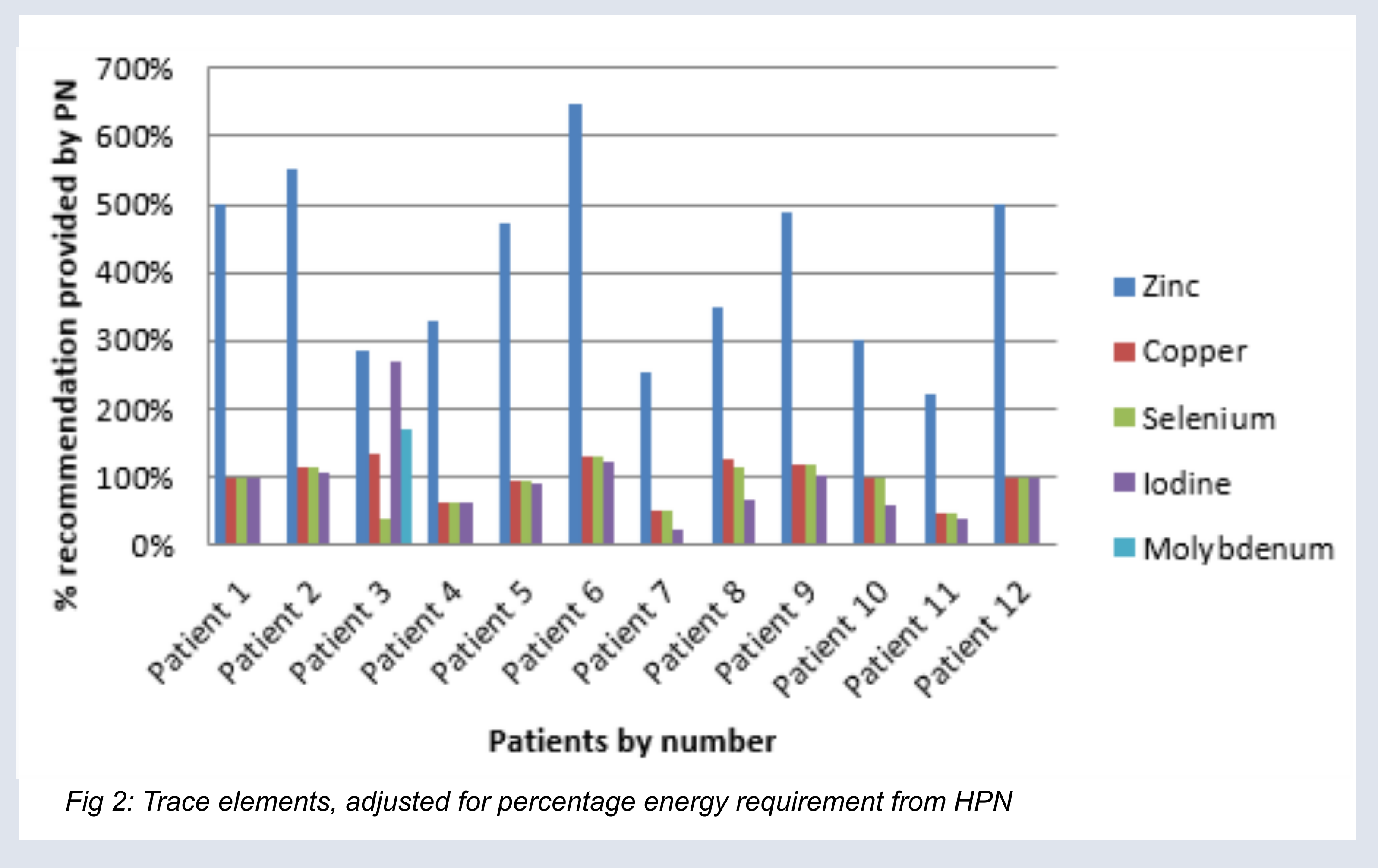


Fig 2: Trace elements, adjusted for percentage energy requirement from HPN