Evaluating the Impact of Concentrated Standardised Parenteral Nutrition on Growth of Preterm Infants

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Background and Aim Concentrated standardised parenteral nutrition (CSPN) may reduce the delay in commencing parenteral nutrition (PN) in preterm infants compared with conventional individualised PN. Optimisation of early nutrition, with emphasis on earlier commencement of PN to include amino acids and addition of lipids within 24 hours of birth, ameliorates early postnatal growth failure. Cumulative nutritional deficit often seen in significantly preterm infants may lead to poor neurodevelopmental outcome. CSPN was introduced in our neonatal unit in December 2017 with the objective of improving early nutrition. The aim of this service evaluation was to assess the suitability of CSPN and its impact on the growth of preterm infants in our tertiary level neonatal unit.

Methods In December 2017, the neonatal PN provided was switched from individualised PN to CSPN based on a modified ‘SCAMP’ regimen. Retrospective and prospective growth parameter data was collected for infants receiving PN within 24 hours of birth born between September to November 2017 (individualised PN arm) and from September to November 2018 (CSPN arm). Infants were excluded if they died or transferred out of the local neonatal service before day 28 of life, or died before transitioning from PN to full enteral feeds. Weight and head circumference at birth, 28 days old and 36 weeks corrected gestation/discharge were converted to z scores using the LMS method. The Mann-Whitney test was used to compare continuous data. Annual PN expenditure, and wastage of ordered PN, before and after the switch to CSPN, was calculated using the pharmacy stock management system, pharmacist and finance records.

Results 20 infants (mean gestational age 28 weeks) and 21 infants (mean gestational age 29.6 weeks) were included in the CSPN and individualised PN groups respectively. There were no differences in demographic data of each group. CSPN was commenced earlier (median 8 hours old (n=20)) than individualised PN (median 25 hours old (n=19)), (U=42, p<0.0001). There was no statistical difference in the change in weight z score from birth at 28 days old (median -0.47 (n=20) CSPN vs -0.66 (n=19) individualised PN, U=178.5, p=0.75) and at 36 weeks corrected gestation/discharge (median -0.72 (n=20) CSPN vs -0.86 (n=21) individualised PN, U=106, p=0.7). There was insufficient data collected to analyse effect on head circumference. Replacing individualised PN with CSPN resulted in a 37% reduction in procurement costs, despite an increase in the wastage of ordered PN from 7.2% to 8.5%.

Conclusion A PN strategy using concentrated standardised PN can be implemented successfully in a tertiary neonatal unit setting in the United Kingdom and allows earlier commencement of PN. Use of CSPN appeared to have no adverse effect on weight gain, although small sample size may account for the lack of statistical significance in improvement of weight z score seen. Improved rates of head circumference documentation for our patients are required. Introducing CSPN resulted in a considerable reduction in procurement costs, and identifying strategies to minimise wastage of CSPN bags would further improve cost-effectiveness.

References

Medicines Optimisation in Action: The Development of a Dosing Schedule and an Extemporaneous Formulation of Pazopanib to Treat a Child with a Recurrent Desmoid Tumour of the Head and Neck

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Background International experts recommended pazopanib to treat a 9 year old boy with a recurrent desmoid tumour. The tumour had progressed, leading to blockage of the airway and dysphagia. The child had previously received three lines of intravenous chemotherapy as well as surgery and local radiotherapy. Treatment intent was to give an effective oral therapy with minimal side effects aiming to maintain a reasonable quality of life and prevent further life threatening respiratory compromise. As the child had an unsafe swallow, the drug would need to be given via a gastrostomy tube.

Pharmacy Input A literature review was completed to establish the evidence to support the use and dose of pazopanib to treat desmoid type tumours in children. Attempts made to find a commercial supply of pazopanib liquid yielded no results. In the absence of any data or experience from other principal children’s cancer centres in the UK, first principles were used to review the physico-chemical properties of the molecule. Given the highly insoluble nature of pazopanib, an extemporaneous formulation for a pazopanib suspension was developed using Orasweet®, by adapting a formula suggested by the University of Oklahoma. A risk assessment for the
preparation process was completed and a mini isolator was re-
commissioned for this purpose following appropriate testing by Quality Control. The Department of Pharmacology at Newcastle University were contacted to establish if therapeutic drug level analysis might be possible. Local approval for pazopanib use was obtained from the Drug and Therapeutic Group and an IFR was submitted to NHS England.

Challenges It was challenging to establish a dose regimen since the recommended paediatric dose from Phase I studies of pazopanib were dependent on the formulation used. Pharmacokinetic sampling was not possible as no assay had been developed in the UK. The lack of availability of any commercial or compassionate use liquid preparation meant that the only way of giving the drug to this child was to prepare an extemporaneous preparation, despite paucity of evidence to support the stability of the preparation. Funding was not approved by NHS England; local funding was agreed.

Outcome and Discussion The child commenced treatment with the suspension in October 2018, administered via the gastrostomy tube. By July 2019 the patient had completed 10 cycles of therapy. Treatment was well tolerated. Minor side effects included abdominal and leg pain, vomiting, and a change in hair colour. The patient has had a good clinical response and a recent scan has shown substantial improvements in morphological appearance and size of the tumour.

These results indicate that a locally prepared extemporaneous oral chemotherapy suspension can be successfully used to deliver treatment for a rare type of children’s cancer. Pharmacy colleagues from across the department collaborated to facilitate this novel treatment option.

REFERENCES