

has been using a smart-pump SCI library, interfaced with electronic infusion orders (Philips ICCA®). The incidence of infusion errors is unknown. This study aims to determine the frequency, severity and distribution of smart-pump infusion errors and to identify contributory factors to the occurrence of infusion errors.

**Methods** Programmed infusions are directly observed at the bedside. Parameters are compared against medication orders and auto-populated infusion data. Identified deviations are categorised as either medication errors or discrepancies. Five opportunities for error (OEs) were identified: programming, administration, documentation, assignment, data transfer. Error rates (%) are calculated as: infusions with errors; and errors per OE. Pre-defined definitions, multi-disciplinary consensus and grading processes are employed.

**Results** A total of 1023 infusions for 175 patients were directly observed on 27 days between February and September 2017. 74% of patients were under 1 year, 32% under 1 month. The drug-library accommodated 96.5% of all infusions. Compliance with the drug-library was 98.9%. 55 infusions had  $\geq 1$  error (5.4%); a further 67 (6.3%) had  $\geq 1$  discrepancy. From a total of 4997 OEs, 72 errors (1.4%) and 107 discrepancies (2.1%) were observed. Documentation errors were most common; programming errors were rare (0.32% OE). Errors are minor, with just one requiring minimal intervention to prevent harm.

**Conclusion** This study has highlighted the benefits of smart-pumps and auto-populated infusion data in the PICU setting. Identified error rates are low compared to similar studies.<sup>4</sup> The findings will contribute to the limited existing knowledge base on impact of these interventions on paediatric infusion administration errors.

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P20

## EVALUATION OF ANALGESIC DOSES PRESCRIBED POSTOPERATIVELY FOR OVERWEIGHT AND OBESE CHILDREN

<sup>1</sup>Nicola Husain, <sup>2</sup>Anushka Wadwa, <sup>1</sup>Nanna Christiansen\*. <sup>1</sup>Evelina London Children's Hospital; <sup>2</sup>King's College London

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**Aim** In England, 17% of children aged 2–15 are considered obese and a further 13% overweight.<sup>1</sup> Physiological changes associated with obesity affect pharmacokinetic and pharmacodynamic parameters which may necessitate paediatric drug dose alteration although few guidelines exist to support this in clinical practice. This study aimed to:

- determine the proportion of patients at a large paediatric hospital prescribed analgesics postoperatively who are obese or overweight

- evaluate how analgesics are currently prescribed for these overweight and obese patients
- determine whether doses are altered according to published recommendations
- determine whether clinical outcomes differ for overweight or obese children compared to non-overweight children

**Method** Postoperative paediatric inpatients aged 2–15 prescribed paracetamol, ibuprofen or morphine (or combination thereof) were included in the six-week prospective study. Demographic (age, weight, height, gender), prescription (drug name, dose, route, frequency) and clinical (surgical specialty, pain scores, paediatric early warning scores) information was collected from medical notes and drug charts. Patients with significant organ impairment or requiring intensive care were excluded.

Body-mass-index centile (BMI-C) was calculated for each child using a validated web-based calculator and used to classify patients as non-overweight (BMI-C <91), overweight (BMI-C  $\geq 91$  and <98) or obese (BMI-C  $\geq 98$ ). Prescribed paracetamol and morphine doses were evaluated against patients' total body weight (TBW) and ideal body weight (IBW) and ibuprofen doses were evaluated against patients' TBW and lean body mass (LBM)<sup>2</sup> according to published dosing adjustment recommendations<sup>2 3</sup> and compared against formulary dosing standards.<sup>4</sup> Clinical outcome data was used to evaluate pain control and clinical status.

**Results** BMI-C was calculated for 198 postoperative paediatric inpatients, and of these 142 (72%) were non-overweight, 27 (13.5%) were overweight and 29 (14.5%) were obese. Complete prescription and clinical data were available for 44 non-overweight, 22 overweight and 23 obese patients who were subjected to further analysis. Formulary dosing standards were 15 mg/kg for paracetamol, 5 mg/kg for ibuprofen and 0.1–0.2 mg/kg for morphine.<sup>[4]</sup> Mean postoperative oral paracetamol doses were 15.0 mg/TBW, 18.1 mg/IBW and 20.6 mg/IBW for non-overweight (n=43), overweight (n=22) and obese (n=23) patients respectively. Mean postoperative oral ibuprofen doses were 5.0 mg/TBW, 5.7 mg/LBM and 6.2 mg/LBM for non-overweight (n=37), overweight (n=16) and obese (n=21) patients respectively. Mean postoperative oral morphine doses were 0.14 mg/TBW, 0.17 mg/IBW and 0.18 mg/IBW for non-overweight (n=33), overweight (n=13) and obese (n=16) patients respectively. There was no significant difference in pain scores or paediatric early warning scores at 0-, 4- 12- and 24-hours post-surgery between the three cohorts.

**Conclusion** The proportion of patients in this study who were overweight or obese aligned with national prevalence data.<sup>[1]</sup> Children who were overweight or obese received higher doses of paracetamol, ibuprofen and morphine compared to non-overweight children, and doses of paracetamol and ibuprofen were greater than formulary dosing standards. This suggests that doses for obese or overweight children are not adequately adjusted according to IBW or LBM which may result in drug toxicity. Guidance for prescribers is needed to aid identification of patients who are overweight or obese and to guide appropriate dose adjustment.

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## P21 SCURVY DURING HOME PARENTERAL NUTRITION

Natalia Iglesias, Elena Cernat, Jennifer Trippett\*. *Leeds Teaching Hospitals NHS Trust*

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**Introduction** Degradation of ascorbic acid due to oxygen presence in parenteral nutrition (PN) is well documented.<sup>1</sup> Although patients on home parenteral nutrition (HPN) are routinely monitored for some vitamin deficiencies, plasma vitamin C is rarely measured in this population.

We report a case of clinical vitamin C deficiency in a patient with severe dysmotility for whom the only source of nutrition was parenteral nutrition with continuous infusion over 24 hours.

**Methods** A 6 years old girl with severe gastrointestinal dysmotility following a fundoplication tolerated no enteral feed and could not have time off PN due to hypoglycaemic episodes. She presented with gingival bleeding and epistaxis and also complaining of pain on her arms and shoulders. A clotting was requested which showed prolonged INR and she was treated with IV vitamin K. An x-ray of her wrist and shoulder showed osteopenia but no other abnormalities. Vitamin C measurement was requested.

**Results** Plasma vitamin C was low at 3.5 micromol/L (26.1–84.6) which confirmed the diagnosis of scurvy. She was treated with 3 doses of Pabrinex<sup>®</sup> over 3 days (providing total of 450 mg vitamin C). 100 mg of ascorbic acid were also added to her PN, providing double the baseline amount. Plasma vitamin C measured after two weeks had risen to normal at 45 micromol/L. Her bleeding and pains resolved over a few days. During the next year plasma vitamin C was measured every three months and remained within reference range. She remained clinically well with no recurrence of bleeding. Due to methodology limitations, the amount of vitamin C in the PN bag could not be tested. Therefore we decided to measure plasma vitamin C in two other patients that had PN as the only source of nutrition and given over 12 hours. In both cases the result was within the reference range at 58.7 and 38 micromol/L respectively. Published literature<sup>2</sup> suggests that temperature contributes to vitamin C degradation. The PN fluid would have been at room temperature for around 24 hours for the patient that developed scurvy, compared to half this time in the other two.

**Conclusions** This case highlights that there is a significant risk of vitamin C degradation due to the oxygen present within the PN bag. However, the fact that for the other 2 patient's plasma vitamin C was normal suggests that presence of oxygen alone might not be enough to cause vitamin C insufficiency. Temperature might be a contributing factor to vitamin C degradation, as has been shown with enteral feed.<sup>3</sup> From these cases we concluded that measurement of vitamin C during HPN would be indicated not only if there were suggestive symptoms, but should also be added in to routine monitoring

in any patient with a 24 hour infusion time and extremely restricted enteral intake.

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## P22 DEVELOPING A PHARMACOLOGY MODULE FOR THE PAEDIATRIC NON-MEDICAL PRESCRIBING COURSE

Farrah Khan\*. *London South Bank University*

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**Introduction** Demand from local NHS stakeholders identified a gap for a taught education course tailored to the niche requirements of paediatric healthcare staff wishing to become non-medical prescribers. This was seen as an excellent opportunity to review and develop the pharmacology module within the Non-medical Prescribing (NMP) course by giving it a paediatric focus.

**Aim** To develop a pharmacology module with an emphasis on paediatric prescribing that meets the professional requirements of the General Pharmaceutical Council (GPhC), the Nursing and Midwifery Council (NMC) and the Health Care Professions Council (HCPC).

**Method** Knowledge of curriculum design and structure was utilised in developing the paediatric pharmacology module. This ensured that the underpinning theory of prescribing medicines safely for children was delivered at the right academic level. The content, delivery and learning outcomes were dictated by the Prescribing Competency Framework for All Prescribers (RPS, 2016).<sup>1</sup> But the cognitive teaching and learning methods arose from the rigid expectation to meet the regulatory requirements of each professional body. To ensure consistency across the whole NMP programme, the structure of the pharmacology module assessments (both formative and summative) was kept the same. The summative (final) assessments consisted of a multiple choice question (MCQ) paper requiring the students to answer a total of twenty MCQs, with the pass mark set by the regulatory bodies at 80%; a drug calculations paper consisting of five questions with a 100% pass mark; and a 5 minute information giving OSCE (objective structured clinical examination). The whole module was looked at a fresh from a paediatric perspective. The content and timetable were compiled and reviewed jointly by a paediatric pharmacist and a paediatric nurse. Both were experienced academics already teaching on the NMP course. While some of the lectures were delivered by in-house university academic staff, the majority of the sessions were delivered by specialist paediatric guest lecturers who were actively working in their respective clinical fields. This ensured that the knowledge imparted to students was practical, current and relevant to prescribing for children.

**Results** All students had to be practising in paediatrics for a minimum period of two years and have evidence of studying at level 6 (graduate level) or equivalent. The target audience consisted of allied healthcare professionals specialising in paediatrics, including nurses, pharmacists, optometrists,