equations.² There is concern regarding the suitability of creatinine as a biomarker in this population, and it is proposed that cystatin C as a biomarker alone and also included in estimating equations may offer improved clinical suitability and accuracy.³

Methods In this prospective, longitudinal study over a period of 18 months, 132 combined isotope GFR (iGFR), creatinine and cystatin C measurements were taken from 48 paediatric oncology patients at a Northern Children's Hospital. Correlation and agreement analysis was performed for both individual biomarkers and estimating equations. Sensitivity data, along with ROC curve analysis was performed for all biomarkers and estimating equations. Data from three identified patients was isolated to examine individual patient variation over time.

Results Creatinine identified only 1/32 patients with an abnormal iGFR (<90 ml/min/1.73 m²) compared to cystatin C which identified 12/32. Creatinine values and both estimating equations failed to change significantly over a period of declining iGFR though cystatin C did show a significant inverse increase ($p<0.05$). Bland Altman analysis for both the creatinine and combined equation showed poor agreement (mean difference -64 ml/min/1.3 m² and -20 ml/min/1.73 m² respectively). All biomarkers and equations showed poor sensitivity to detect an abnormal iGFR either below 70 ml/min/1.73 m² or 90 ml/min/1.73 m². A transformation factor applied to the equations significantly improved the sensitivity and clinical applicability of all equations. The data from three individual patients failed to reveal any significant intra-patient relationships.

Conclusion Data from this study cannot support the use of creatinine or cystatin C as a single biomarker to monitor renal function in children undergoing chemotherapy. Newer cystatin C and creatinine combined equations, whilst offering statistical superiority, do not offer the clinical superiority to replace iGFR or provide a tool for accurate dose calculations. A transformation factor can be applied to the results gained from the estimating equations to significantly improve the detection of abnormal iGFR, though work in other patient cohorts is needed to support this. Previous work also supported the use of a transformation factor, though application of their transformation factor to this current cohort failed to replicate the 100% sensitivity findings previously demonstrated⁴. Three patients were identified from the cohort and their paired iGFR and estimated GFR were monitored prospectively, over a period of approximately a year. Significant variation was observed between iGFR and eGFR at each time point for all three patients and therefore personalisation of GFR estimation from baseline iGFR and demographic data could not be proposed. This requires exploration in a larger cohort with the possible inclusion of additional baseline variables.

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P07

PRESCRIBING PRACTICES IN NEONATAL HYPOGLYCAEMIA

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Aims Neonatal hypoglycaemia is a leading cause of admission of term babies to the neonatal unit (NNU).¹ Intravenous glucose solutions are used as a treatment strategy for patients with severe hypoglycaemia or patients that do not respond to enteral treatment. Varying concentrations of glucose including 10%, 12.5%, 15% and 20% are used for this treatment with $\geq 15\%$ only used via a central line. 10% and 20% glucose solutions are commercially available as pre-made bags, though 12.5% and 15% solutions are prepared at the bedside. We aimed to review prescribing practice for neonatal hypoglycaemia in infants requiring $\geq 12.5\%$ glucose and its impact on the patient's NNU course.

Methods Patients admitted to our tertiary NNU with hypoglycaemia between January 2018 and December 2018 inclusive were identified using an admission database. Patient information was retrospectively collected using Digital Health Records. Glucose requirements were reviewed, and patients requiring $>10\%$ glucose for hypoglycaemia treatment were identified. Subsequently, patients who died, received part of their care outside the Trust, were fluid restricted, received parenteral nutrition or had an alternative underlying diagnosis for hypoglycaemia such as a genetic or mitochondrial disorder were excluded. For included patients, a designated set of parameters including demographics, medical diagnoses, risk factors for hypoglycaemia, glucose load and fluid volumes were collected.

Results In total, 210 patient hypoglycaemic episodes were identified, of which 26 patients required treatment with $\geq 12.5\%$ glucose. Further exclusion against the defined criteria left 15 patients for review. The median number of risk factors for hypoglycaemia were 3, the most common being maternal labetalol use in pregnancy. Of the 15 included patients; 8 required 12.5% glucose (Group A), and 7 required escalation to 15% or 20% concentrations (Group B). 9/15 required a 2.5 ml/kg glucose bolus with the average length of time spent below <2.6 mmol/L of 7 hours. Glucose load was highest in Group B (15.39 mg/kg/minute) vs Group A (9.90 mg/kg/minute), $p=0.0013$, and a higher glucose load was associated with an increased length of time on intravenous fluids. Of the patients requiring $>12.5\%$ glucose, the median time to escalate from 12.5% to a higher concentration was 14.4 hours. Escalation of glucose enabled a reduction in intravenous glucose volumes. Patients who had escalation of treatment from 12.5% to 15% ($n=3$) had a median duration of intravenous fluid therapy of 14 days, compared to 5 days when escalating from 12.5% to 20% ($n=4$). 2 patients required re-escalation of treatment back to a higher glucose concentration; both had an underlying diagnosis of congenital hyperinsulinism. 8/15 patients had central access sited, consisting of 13 line insertions, with a complication rate (i.e. incorrect position or not working) of 31% ($n=4$).

Conclusion A small proportion of neonates with hypoglycaemia require escalation of intravenous fluids to $\geq 12.5\%$ glucose to achieve normoglycemia. When this escalation is required, prompt central line insertion should be considered to avoid delay and allow for administration of $\geq 15\%$ glucose. Ongoing work with the Neonatal Pharmacy Team aims to reduce the

length of hypoglycaemic episodes and shorten treatment duration for babies.

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P08 TEN-FOLD MEDICATION ERRORS IN A TERTIARY PAEDIATRIC HOSPITAL

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Aim To perform a retrospective analysis of tenfold medication errors between the 1st January 2017 and the 31st December 2018 and identify contributing factors.

Method Information from all tenfold medication errors reported to the Ulysses system between 1st January 2017 and 31st December 2018 which met the criteria was inputted into a data collection sheet. Information gathered included the age of the patient, the time the error occurred, the location within the hospital, the point in the medication process the error occurred, the drug involved and the NCC-MERP category of harm assigned to the error. Reports were excluded if they were repeated entries or if they did not meet the criteria for a tenfold medication error. The total number of medication errors reported per month and the total number of admissions per month was also identified. Once data collection was complete, these errors were qualitatively analysed and compared with those of a previous audit using errors reported from 1st January 2013 to 31st December 2014.

Results Tenfold errors were most likely to be reported in the Critical Care areas (34.4% of tenfold errors being reported over the two-year period). Prescribing was the most common origin of error accounting for 54.3% of tenfold errors in 2017 and 51.7% in 2018. The most common category of harm assigned was category B (no harm – error did not reach patient) with a total of 40.6% of the errors reported. The age group with the highest number of errors reported was 29–364 days with 39.3% tenfold medication errors reported over the two-year period. Morphine was the most common drug involved accounting for 13.8% of errors reported.

Conclusion The findings from this report mirror the results from the previous audit performed in 2014 in respect to error origin and patient age. Tenfold prescribing errors have more chance of being intercepted before reaching the patient due to there being more steps in the process before administration, therefore it is less likely that errors that originate at prescribing will reach the patient. Tenfold administration errors were more likely to reach the patient and therefore to cause harm. Morphine was the most reported drug in both 2017/18 and the 2013/14 audit suggesting that more work needs to be done on the safe use of opioids. Critical Care was the location with the highest number of errors reported, patients in this area often require complex medication regimes increasing the likelihood of being involved in a medication error.¹

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P09 A SURVEY OF THE NPPG GROUP CONCERNING MEDICATION ADMINISTRATION PROBLEMS AMONG CHILDREN AND YOUNG PEOPLE AGED 0 TO 18 YEARS OLD

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Aim To identify issues encountered by pharmacy healthcare professionals with regards to problems that they have experienced, complaints received, queries and feedback by the patients or parents or caregivers in terms of medication administration for children and young people aged 0 to 18 years old.

Method An online survey using the Online Surveys tool was devised to obtain healthcare professionals' perspective regarding medication administration problems encountered by parents, caregivers or paediatric patients when administering or taking their medication at home. The survey was sent to the members of the Neonatal and Paediatric Pharmacists Group (NPPG), who represent different geographical areas within the UK and further afield. Informed consent was obtained from participants. This study was reviewed and approved by the Life and Health Sciences Ethics Committee, Aston University.

Results 37 pharmacists and 1 technician completed the survey. The majority of the respondents 23/38 were currently practicing in England, with 6/38 respondents being registered pharmacists outside the UK, 1/38 was practicing in Northern Ireland, 3/38 within Scotland and 4/38 were practicing in Wales. 71.1% of the respondents strongly agreed that parents or caregivers require further training when it comes to medication delivery to their children. In addition, when asked about their concerns regarding prescribed medication to children aged between 0 to 18 years old, respondents expressed a different level of concern regarding each age group. Regarding neonates, the main concern was the suitability of the prescribed formulation and the ability of the parents to accurately measure and administered a low dose volume. In contrast, for children aged between 28 days to 12 years, the common concerns were associated with palatability, which will further reflect upon child compliance and the parent or caregiver's ability to understand medication instructions and administration. Finally, for older aged children, adherence was a common concern. Furthermore, liquid formulations (suspensions (60.5%), solutions (55.3%) and injections (44.7%)) were predominantly used among children aged 0 to 18 years old within both in and outpatients setting. Overall, the majority of the respondents expressed that counselling time between the patient and pharmacists and the need to provide further training and educational material to parents and young people is an important issue to improve understating in regards medication use.

Conclusion The findings suggest that medication administration problems occur frequently among paediatric patients, and the nature of these problems varies among each age group. Medication training for both parents and young people could be a key factor to help reduce this problem. Future research is needed to investigate and gain insight into personal experiences with medication use and administration from a parent and/or young person's perspective. This will help to highlight the current problem in the UK and further develop potential interventions to reduce medication administration errors by