

March 2019. Inclusion criteria were original research studies identifying barriers and/or facilitators of medicines adherence in children (aged 0–18 years) and included all countries and languages. Exclusion criteria included review articles, editorials, conference papers, reports and studies in adults only. As a reliability measure, 5% of titles and abstracts were assessed independently by a second researcher. Quality assessment was performed on all included studies using the STROBE checklist for observational studies and Cochrane collaboration tools for randomised controlled studies and was checked by a second researcher.

**Results** Of 9,360 papers identified by the search, only 172 articles met the inclusion criteria. Most studies were conducted in the US (76), with 11 in the UK, six in Canada and the remaining 79 studies in various countries. Diseases studied included: HIV/AIDS (60), asthma (25), kidney or liver diseases and transplants (18), psychiatric disorders (12), inflammatory bowel disease (10), epilepsy (9) and others (38). Various tools were used to identify barriers and facilitators to medicines adherence. These included 131 studies which used individually designed questionnaires, 32 studies used validated questionnaires and the remaining 9 studies used patients' medical data. Forgetfulness and fear of side effects were the most common reported barriers to medicines adherence. Others reported barriers to adherence included family conflict, weak patient-provider relationships, stigma and discrimination, drug regimen complexity and lack of support from families. Factors reported to facilitate high rates of adherence included the linking of medicine taking with daily life routines, using reminders to avoid forgetfulness, a higher level of caregivers and parental education and good communication between healthcare professionals, patients and parents.

**Conclusion** The main findings of this systematic review show that children faced many and varied barriers to medicines adherence with different diseases. Using reminders to avoid forgetfulness and good communication between healthcare professionals, patients and parents were the most common facilitators. To achieve optimal adherence, healthcare providers need to be aware of these barriers and to consider the most appropriate facilitators to encourage patients to take their medicines as prescribed.

## REFERENCES

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P05

### AN AUDIT OF PROTON PUMP INHIBITOR PRESCRIBING, IN ADHERENCE WITH THE TRUST'S GUIDANCE, IN GASTRO-OESOPHAGEAL REFLUX DISEASE

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**Aim** The effectiveness of proton pump inhibitors (PPIs) have been demonstrated. Nevertheless, the choice of PPI that should be used is less absolute. The clinical effectiveness, availability of the formulation, co-morbidities, route of administration and lowest acquisition cost are all considerations that

should be accounted for when determining the appropriate therapy. Current Trust guidance recommends lansoprazole capsules and oral dispersible tablets as the first line PPI, unless other indications preclude its use. Other UK hospitals have audited PPI prescribing and their findings highlight that adherence upon deployment was poor.<sup>1 2</sup> This audit aims to assess if written outpatient prescriptions are adhering to the guidelines.

**Method** This study was conducted prospectively in the outpatient pharmacy, between February and March 2019. The defined data collection period was 5 weeks, which included a 1-week pilot study. The accumulation of data involved reviewing all outpatient prescriptions, whereby PPIs were prescribed, noting if the Trust's guidance on PPI prescribing was being adhered to. Data was collected via a structured pro forma to assess the percentage compliance against the three predetermined standards:

Standard 1 - Is the PPI prescribed appropriate?

Standard 2 - Is there a documented indication for the prescribed PPI?

Standard 3 - Is the dose appropriate for the patient?

**Results** There were a total of 84 prescriptions received from 13 different specialties. The age range of patients was 1 month to 16 years with a mean ( $\pm$  median) age of  $7.66 \pm 7$  years. The overall compliance with the Trust's guidelines for standards 1, 2 and 3 were 76%, 88% and 100% respectively. The infant and toddler age group (28 days – 23 months) showed the least compliance in standard 1, the choice of appropriate PPI (63%). The most common indication was gastro oesophageal reflux disease. Paediatric Gastroenterology received the greatest number of prescriptions over the data collection period. 12% of prescriptions did not have a documented indication and the most common PPI prescribed in the outpatient pharmacy was lansoprazole, which accounted for 64 (77%) of the prescriptions.

**Conclusion** The findings in this study are synonymous to that of other audits conducted in UK hospitals, where compliance with PPI guidelines were explored. Possible factors that could be attributed to the low levels of adherence are problems with implementation, lack of enforcement of the guidelines, patient/guardian preferences and presence of enteral feeding tubes. Clinicians should monitor their prescribing and where applicable, switch patients who are currently on omeprazole suspension, to lansoprazole oral dispersible tablets/capsules. This could lead to significant monetary savings for the Trust.

## REFERENCES

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P06

### IMPROVING RENAL FUNCTION MONITORING DURING CHEMOTHERAPY- A ROLE FOR CYSTATIN C?

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**Aim** Renal toxicity causes major morbidity following chemotherapy- abnormal iGFRs may be detected in up to 73.7% of patients.<sup>1</sup> Creatinine is universally used as a biomarker to track fluctuating function and to calculate surrogate glomerular filtration rate (GFR) in the form of estimating

equations.<sup>2</sup> 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.<sup>3</sup>

**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 m<sup>2</sup>) 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 m<sup>2</sup> and  $-20$  ml/min/1.73 m<sup>2</sup> respectively). All biomarkers and equations showed poor sensitivity to detect an abnormal iGFR either below 70 ml/min/1.73 m<sup>2</sup> or 90 ml/min/1.73 m<sup>2</sup>. 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 demonstrated<sup>4</sup>. 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.

## REFERENCES

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## 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).<sup>1</sup> 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