NPPG
Neonatal & Paediatric Pharmacy Group

#NPPG2024 @EditorNPPG

30TH ANNUAL PROFESSIONAL CONFERENCE & EXHIBITION

ABSTRACTS

SHORT PAPER ABSTRACTS

SP01 Parents' and carers' preference for and interpretation of dosage instructions on paediatric medicines

Jessica Payne[1], *Asia Rashed*[2], *Andrew Wignell*[3], *Stephen Tomlin*[4], *Mandy Wan*[2]

[1]*Kingston Hospital, London,* [2]*Evelina London Children's Hospital, London,* [3]*Nottingham University Hospital, Nottingham,* [4]*Great Ormond Street Hospital, London*

Aim: There are no national standards to guide pharmacy staff on labelling dispensed paediatric medicines in the UK. A previous survey of hospital pharmacy staff reported considerable inconsistencies in how paediatric dosage instructions are communicated.[1] It also identified variability in how the amount of liquid medicine to administer is expressed, and that this variability, along with confusion between units of measurement, poses a potential risk factor for dosing errors.[1] This study aimed to explore parents' and carers' preferences for and interpretation of dosage instructions on dispensed paediatric medicines.

Method: An anonymous, paper-based, self-administered 9-item survey was conducted at 14 hospitals in England between March and April 2024. Each hospital received 25 questionnaires, which were distributed to a convenience sample of parents and carers (>18 years of age) during their child's hospital visit. To assess preferences, participants were asked to select from a choice of two or four medicine labels that presented the same dosage instruction with different expression. Their understanding was assessed by asking them to illustrate their answers on a pictogram of a syringe. Participants' demographics and educational characteristics were collected. Data were summarised using descriptive statistics. For group comparisons, the Mcnemar's, Chi-square and Fisher's exact tests were used. Analysis was conducted using Stata software.

Results: A total of 250 respondents (response rate = 71.4%) from 12 hospitals (including 3 district general hospitals) were included in the analysis. Of all respondents, 76% were female, 79.2% primarily spoke English, and 90.8% reported being very proficient in reading English. Respondents' preferences for dose expression differ between those from healthcare and non-healthcare backgrounds. Among those from non-healthcare backgrounds, 72.8% preferred "...ml" and 23.8% preferred "...ml (...mg)", compared to 46.9% and 40.6% of respondents from healthcare backgrounds, respectively ($p = 0.004$). Similarly, a greater proportion of respondents from non-healthcare backgrounds preferred the numeric expression of "1 tablet" (59.6% vs 33.3%; $p = 0.005$). For dosing frequency expression, 51.6% of respondents overall preferred "Give 5ml twice a day" as compared to "Give 5ml in the morning. Give 5ml in the evening" (25%), "Give 5ml in the morning and evening" (16%), and "Give 5ml two times a day" (7.4%).

Overall, 98.8%, 96.3% and 74.5% of the respondents marked the syringe image correctly when doses were expressed as "…ml" , "…ml (…mg)" and "…mg (…ml)", respectively ($p < 0.05$ for all pairwise comparison). The most common theme in the open-ended question on preferences was the need for clearer and simpler instructions (23% of all respondents).

Conclusion: The results of this study show a preference among parents and carers for '…ml' dosage instructions, and the use of simple wording for dosing schedules. The findings also suggest that how the amount of a liquid medicine to administer is expressed could influence parents' and carers' interpretation. This study underscores the need for standardising paediatric dosage instructions to support comprehension and appropriate use. Consideration of parents' and carers' preferences when developing labelling standards can improve the safe use of medicines for children.

References
Latheef F, Rashed A, Wignell A, et al. SP3 An exploratory study to characterise dosing instructions on dispensed paediatric medicines labels. BMJ Paediatrics Open 2024;8.

SP02 Implementation of standardised infusion concentrations with smart-pump technology and electronic prescribing systems

Jo Crook[1], Nanna Christiansen[2], Sara Arenas[2], Sukeshi Makhecha[3], Sian Bentley[3], Karen Turnock[2], Jo Perkins[2], Sian Gaze[2], Hannah Pontefract[4], Henal Gandhi[3], Bansri Bharania[1], Ben Wyness[1], Riya Patel[4], Mary Healy[3], Pam D'Silva[1], Andrew Nyman[2], Hammad Khan[3]

[1]Kings College Hospital NHS Foundation Trust, London [2]Evelina Children's Hospital, London [3]Royal Brompton Hospital, London [4]Guy's and St Thomas's NHS Foundation Trust, London

Context: Injectable medicines account for over a quarter of medication incidents reported, with errors occurring during the administration phase, in calculating infusion rates and programming pumps.[1] National recommendations to enhance the safety of high-risk injectable medicines for children advocate for the use of standardised infusion concentrations (SCs), and integration with 'smart-pump' technology (SMT) and electronic prescribing systems (EPRS).[2] Here we describe the implementation of SC infusions and the integration with SMT and EPRS, across three tertiary children's hospitals, including three paediatric intensive care (PIC) and two neonatal intensive care (NIC) units.

Key stakeholders included paediatric pharmacy teams, neonatal and paediatric multidisciplinary teams (MDT), SMT technologists, EPRS analysts, and SMT provider. SCs were proposed to align with national recommendations, with weight bands from 0 to 20 kg to accommodate a wide dose range, age and size of patient, aiming for standardisation across clinical specialty. Additional SC's for premature babies' 0-2kgs on NIC were proposed to enable their inclusion. Variable concentrations (VC) were agreed upon for cases where SCs might not be clinically appropriate.

Drug build principles and validation guides, including dose rounding and naming conventions for complex intravenous infusions for EPRS were agreed and aligned by the MDT. Prescriptions were then designed, configured, and validated on EPRS. Drug data, including concentration and dose limits (minimum and maximum), were configured on SMT and validated. A comprehensive education programme, including prescribing and administration simulations, were delivered to cross-site MDTs prior to implementation and EPRS "go-live".

59 drug SCs covering four weight bands (<1, 1-2, 2-5, 5-20 kg) were implemented and validated within SMT and EPRS for use across three PIC and two NIC units. 64 drug VCs including a choice of diluents were also implemented and validated as a second line option. 33 drug build queries by validators were discussed and resolved by the MDT and Epic analysts, including concentration mapping, dose rounding and dose button recommendations. On SMT validation 6 drugs required EPRS dose limit or rounding refinement. On "go-live" 21 SC infusions required further optimisation to ensure operability and safe prescribing within EPRS.

Lessons Learned: Aligning agreed paediatric drug build and validation principles for complex intravenous infusions within SMT and EPRS, including dose rounding and naming conventions enables a standardised approach for implementing SC across multiple sites. Enablers for SC implementation involved a collaborative approach between a variety of stakeholders, to ensure alignment and to maximize medication safety and usability. Barriers to implementation included resource limitations and time-scale to "go-live" which limited the ability to align completely with national recommendations and to complete optimisation of all infusions.

SC introduction was effectively integrated across three tertiary children's hospitals, supported by collaborative working and a comprehensive MDT education programme. Future projects include pump integration with EPRS to facilitate closed-loop drug administration and analysis of guardrail drug data. This project aligns with the national drive for safer paediatric medication practices and sets a precedent for future implementations.

References
[1] Keers N, Williams, SD, Cooke J, Ashcroft DM. Prevalence and Nature of Medication Administration Errors in Health Care Settings: A Systematic Review of Direct Observational Evidence. Annals of Pharmacotherapy, 2013:47(2),237–256.
[2] NPPG. Standardising intravenous infusion concentrations for neonates and children in the UK. A proposal for a national approach. 2023

SP03 Management of neonatal enterovirus in a 7-day old baby: A clinical pearl

Jessica Laxaman[1]

[1]Chelsea And Westminster NHS Foundation Trust, London

Situation: Maternal viral illness prior to delivery with headache, chills and pyrexia. Baby spiked a temperature within 2 hours of birth and was commenced on first-line antibiotic cefotaxime on the postnatal ward. Baby completed 5 days of antibiotics with no bacterial growth in the blood culture. However, the baby was admitted to NICU on day 7 of life with pyrexia, back-arching, and clinical seizures, with enterovirus found in the cerebrospinal fluid (CSF) viral panel.

Assessment of problem: At the time of presentation, there were no published guidelines for the management of neonatal enterovirus. A multidisciplinary team, including the neonatal team and infectious disease specialists, decided to initiate treatment with the antiviral drug Pocapavir. This drug was chosen due to its specific activity against enterovirus. However, its use posed a challenge as it is not licensed in any country for this indication and is only available through a compassionate use scheme for the treatment of serious enteroviral infections with potentially life-threatening disease, provided by the manufacturing company ViroDefense Inc in the United States.

How the pharmacy team contributed: The rotational pharmacist on the neonatal unit developed a plan and delegated to various members of the neonatal team. The senior pharmacists obtained approval from the hospital pharmacoeconomic board for its use in this patient, including the use of an unlicensed medicinal product, an individual funding request to receive this medication from the US and MHRA approval. Once the medication was secured, the neonatal pharmacist trained the medical and nursing team on its use.

As pharmacokinetic and virology samples were required during the treatment period, the pharmacist developed a plan for blood sampling and liaised with the pathology team to ensure timely collection and storage. Additionally, the pharmacist gathered information on the drug dosing and administration of the medication from the manufacturer and based on anecdotal guidance; Pocapavir is available in capsule formulation and required weighing the capsule contents to administer part of the dose to mix directly with breastmilk.

Outcome: The infectious markers normalised, the CSF viral panel after 7 days of treatment no longer detected enterovirus, and the baby's symptoms had resolved. The baby had tolerated treatment with Pocapavir and was discharged home, with outpatient follow-up stating full recovery.

Without contribution from the pharmacy team, the medication would not have been approved or obtained, the pharmacokinetic samples for the open-label study would not have been arranged and the patient would be at risk of error with incorrect dosing or administration.

Lessons learnt: The key lesson was the importance of communication within the MDT, particularly in an unprecedented situation requiring multiple stages to be completed in a matter of urgency. It highlighted the wider scope of a paediatric pharmacist in terms of procuring an unlicensed medication outside of the usual remit of practice, whilst applying knowledge of clinical understanding alongside medication safety and legality.

References

Zhang M, Wang H, Tang J ,et al. Clinical characteristics of severe neonatal enterovirus infection: a systematic review. BMC Pediatrics. 2021; 21: 127-139

Hincks J. Emergency Use of Investigational New Drug Pocapavir. ViroDefense. 2023

SP04 Evaluation of compliance with the KIDs list of contraindicated medicines

*Octavio Aragon Cuevas[1], **Aine Treacy**[2]*

[1]Alder Hey NHS F Trust, Liverpool, [2]Liverpool John Moores University, Liverpool

Background: The KIDs list was created in response to the increased susceptibility to adverse drug reactions during growth and development from birth to adolescence attributed to significant maturational changes in body composition and organ function (1). We aim to evaluate compliance with the Key Potentially Inappropriate Drugs in Paediatrics (KIDs) list (2) of selected contraindicated medicines in a tertiary paediatric hospital in the North-West of England.

Methods: This service evaluation focused on neonates and infants prescribed inappropriate drugs from the KIDs list between 26/10/22 – 16/10/23. Patient inclusion required alignment with the relevant contraindicated age bracket for each drug. Data was obtained from CMM dispensing software and collated in Microsoft Excel. Meditech Expanse EPMA was used to determine patient ages and reason behind drug choice. This information was used to ascertain if prescribing was inappropriate, and whether an alternative medication could have been used.

Key Findings: Out of the 13 drugs analysed, six (46%) were identified as potentially inappropriate: chloramphenicol, clarithromycin, codeine, ivermectin, loperamide and valproate. 34/1760 (1.9%) patients analysed were prescribed these drugs within a contraindicated age bracket. Chloramphenicol, clarithromycin, ivermectin and valproate all exhibited efficacy in managing their respective medical indications, with no documented adverse effects. Codeine was prescribed but not administered to the patient. Loperamide was prescribed in a contraindicated age bracket but not to treat infectious diarrhoea (contraindicated indication).

Conclusion: A small number of patients were prescribed these medicines within a contraindicated age bracket. There were no adverse effects reported stemming from this potentially inappropriate use, however, some children were exposed to the risk of developing harmful side effects from contraindicated medications. Alternatives were identified for each medication that are equally safe and effective. Targeted patient safety newsletters could be circulated within the Trust alerting prescribers of contraindicated paediatric medicines and available alternatives.

References

1. Kearns GL, Abdel-Rahman SM, Alander SW, et al. Developmental pharmacology-drug disposition, action, and therapy in infants and children. NEJM [Internet]. 2003;349(12):1157–67. Available from: https://pubmed.ncbi.nlm.nih.gov/13679531/
2. Meyers RS, Thackray J, Matson KL, McPherson C, et al. Key Potentially Inappropriate Drugs in Pediatrics: The KIDs List. JPPT [Internet]. 2020;25(3):175–91. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7134587/

SP05 Lights, camera and research action on medicine for children

Fan Cheng[1,2], *Stephen Tomlin*[1], *Orlagh McGarrity*[1,2]

[1]*Great Ormond Street Hospital, London,* [2]*UCL Great Ormond Street Institute of Child Health, London*

Introduction: In the European Union, 66% of medicines lack a well-researched paediatric dose upon market entry [1], resulting in up to 75% of Neonatal Intensive Care Unit babies receiving unlicensed medicines [2]. This is a stark contrast with the adult population, where unlicensed medicine usage is below 7% [3], and highlights the need for evidence-based paediatric medication. Paediatric medicines without specific licenses rely on high-quality evidence to support their use; however, a 2022 review revealed that only 14% of these medicines have such evidence [4]. This knowledge gap exposes children to potential efficacy and safety risks and impacts patients, clinicians, and their parents/carers in making informed evidence-based treatment decisions.

Patient and public involvement and engagement (PPIE) is an integral part of research. PPIE activities engage patients and the public (non-patients) to help with designing, prioritising, conducting, and disseminating research as well as promoting knowledge of the researched topic During a scoping exercise, young people (YP) recommended highlighting the inequality in evidence-based paediatric medicine to the public and provided insight into which format this might take. As a result, two clinical academic pharmacists collaborated with a production company to produce a short film (8 mins) to educate and inform patients and the public about the complexity of children's medicines and advocate for increased research.

Method: An engagement activity was conducted in late 2023 to gather inspiration from YP. They were informed about the challenges in paediatric medicine and contributed to the script inspiration. The production company developed and produced the script which underwent refinement with feedback from the YP's Advisory Group at a large tertiary paediatric centre, ensuring language and content resonated with the intended audience.

Result: To ensure wider impact, the team drafted a dissemination plan aiming to attract attention from the public to fulfil its purpose. A screening event was attended by esteemed guests including the Mayor of Camden and Islington, Trust executives and YP, and received words of support and encouragement from members of the British parliament, the Prime Minister and His Majesty The King. A subsequent roundtable discussion, involving politicians, clinicians and young people, explored avenues for youth involvement in medicine-related policymaking. This event also served as a platform for pharmacists and allied healthcare professions across London to showcase their research and gather feedback from attendees. The film received endorsements and dissemination support from the hosting centre and external stakeholders.

Conclusion: Involving patients and YP is pivotal in creating accessible content on complex research topics. Their participation increased their own scientific knowledge and brought interest in future engagement events. The film production, though resource-intensive, provided a sustainable way to engage the public, healthcare professions and researchers with research into paediatric medicine. The film has been invited to various research meetings as a medium to generate discussion in how research and healthcare professions work together to make medicine better for children. A shorter version of the film (2 mins) was made to help disseminating via social media to enhance public visibility.

References

1. Toma M, Felisi M, Bonifazi D, Bonifazi F, Giannuzzi V, Reggiardo G, De Wildt S, Ceci A, TEDDY European Network of Excellence for Paediatric Research. Paediatric medicines in Europe: the paediatric regulation—is it time for reform? Frontiers in medicine. 2021 Feb 2;8:593281.
2. Vieira VC, Costa RS, Lima RC, Queiroz DB, Medeiros DS. Prescription of off-label and unlicensed drugs for preterm infants in a neonatal intensive care unit. Revista Brasileira de Terapia Intensiva. 2021 Jul 5;33:266-75.
3. Weda M, Hoebert J, Vervloet M, Puigmarti CM, Damen N, Marchange S, Langedijk J, Lisman J, van Dijk L. Study on off-label use of medicinal products in the European Union. Publications Office of the European Union; 2019.a
4. van der Zanden TM, Smeets NJ, de Hoop-Sommen M, Schwerzel MF, Huang HJ, Barten LJ, van der Heijden JE, Freriksen JJ, Horstink AA, Holsappel IH, Mooij MG. Off-label, but on-evidence? A review of the level of evidence for pediatric pharmacotherapy. Clinical Pharmacology & Therapeutics. 2022 Dec;112(6):1243-53

Acknowledgements

The authors would like to acknowledge and thank their colleagues: Clare Dunn, Stuart Barter, Ofran Al-Mossawi, Kalindi Rajani, Sadhna Sharma, Keli Lambie, Paula Kelly, Snehal Bakrania, Isabel Clee, Dauda Bappa, Munsur Ahmed, Nikesh Gudka, Jennifer Milella

SP06 The use of project tools to create a paediatric medicines management training module

Poonam Lumb[1]

[1]*Imperial College Healthcare NHS Trust, London*

Context: Medicines management training (MMT) is mandatory for clinical staff. Before the Covid-19 pandemic, paediatric MMT was delivered in person by the Women's and Children's (W&C) pharmacy team. Post-pandemic, adult services designed an e-learning package and assessment to enable clinical staff to complete their MMT. Due to various factors, the W&C pharmacy team was unable to follow suit resulting in paediatric staff completing the adult e-learning package. Whilst this legally fulfilled criteria of completing the MMT, it is not ideal, as paediatric specific information was not covered leading to increased risk in relation to medicine safety and a missed opportunity for relevant training for paediatric clinical staff (PCS).

Purpose: This project aimed to work in collaboration with adult service partners to incorporate paediatric specific MMT programme content in an e-learning format on Learn®, the organisation's e-learning platform partner. The paediatric training content was based on feedback from key stakeholders, The NHS Enduring Standards and National Never Events big data that collates learning from key medication safety incidents nationally.

Strategies for Change: Several project tools were used to fruitful effect for the purposes of completion of this project including;

- SIPOC Project Outline – to ensure a clear vision was set out
- Project Scorecard including Key Performance Indicators – to ensure project completion and success of project phases
- Porter's Five Forces Model to demonstrate the need for the project
- Stakeholder Mapping and the Salience Model to identify and classify stakeholders and engagement – this was done to engage key stakeholders including paediatric nurse educators, key members of the pharmacy team and medical team and to highlight any stakeholders that would need further negotiation to make the project outcome successful.
- Appreciative Inquiry Methods were used in facilitation sessions to ensure relevant information was extracted for the purposes of paediatric medicines management content design
- RACI matrices to delegate responsibilities to team members
- Risk analysis to ensure any problems could be pre-empted, considered and acted upon
- Change management using Kotter's 8 Step Change Model and consequent options appraisal

Consequently, meetings were had with Senior Lead Pharmacists for Medicines Advisory, Governance and Safety and Clinical Services, Education & Training. Then adult and paediatric content was merged and taken to appropriate stakeholders including the Head of Core Skills and the Core Skills Governance Committee.

One of the key issues at this point was limited slide space for all key paediatric MMT topics and thus an interactive adjunct teaching session for PCS was designed and piloted amongst nursing staff and feedback collated.

Lessons Learned:

- This project has given me the opportunity to lead by example and advocate good practice within my organisation benefitting patients and PCS
- Project management tools can enhance the efficiency and efficacy of clinical targets within the NHS
- Written qualitative feedback from PCS with the new training format has been positive
- Medication error rates will be analysed at 6 months post roll out to investigate whether new training package has had an impact

SP07 Topical chlorhexidine use in neonates in United Kingdom

Nigel Gooding[1], *Sian Gaze*[2], *Rebecca Hinton*[3], *Bethany Johnson*[4], *Louise Bracken*[5], *Thomas Wyllie*[6], *Zoe Price*[7], *Suzannah Hibberd*[8], *Susan Kafka*[9]

[1]Cambridge University Hospitals NHSFT, Cambridge, [2]Guy's & St Thomas' NHS Foundation Trust. Evelina London - Children's Healthcare, London, [3]Manchester University NHS Foundation Trust, Manchester, [4]West Midlands Perinatal Network, Birmingham, [5]Alder Hey Children's NHS Foundation Trust, Liverpool, [6]University Hospital of Wales, Cardiff, [7]University Hospitals Bristol NHS Foundation Trust, Bristol, [8]University Hospital Southampton, Southampton, [9]NHS Greater Glasgow & Clyde

Aim: In October 2021, following UK withdrawal of chlorhexidine 0.05%, the Neonatal and Paediatric Pharmacy Group (NPPG) published recommendations on topical neonatal chlorhexidine use for skin cleansing prior to line insertion (1). This endorsed 0.5% chlorhexidine aqueous solution in babies <34 weeks gestation and < 7 days old and 2% chlorhexidine in alcohol in babies ≥34 weeks gestation and babies born <34 weeks gestation ≥7 days. Since publication, there's been no evaluation of whether these recommendations have been adopted into practice and whether chlorhexidine related skin burns still occur. This study reviews the current UK position relating to skin cleansing in neonates.

Method: In April 2024, a survey was sent to UK neonatal pharmacists and British Association of Perinatal Medicine (BAPM) members, examining skin cleansing products used, cohorts for product use and application technique.

A follow up survey was distributed in May 2024 to identify any chlorhexidine related burns reported between January 2022 - December 2023.

Results: 39 neonatal centres responded to the initial survey, with the following products used:

- Chlorhexidine 0.5% aqueous solution 27 centres (69%)
- Chlorhexidine 2% in alcohol 27 centres (69%)
- Chlorhexidine 0.05% aqueous solution 3 centres (8%)
- Chlorhexidine 0.5% in alcohol 3 centres (8%)
- Cetrimide 0.15% + chlorhexidine 0.015% 1 centre (3%)
- Octenisan 1 centre (3%)
- Water for injections 2 centres (5%)

36 different patient cohorts were identified for product use. Compared with NPPG recommendations (1), 8 (21%) centres use 0.5% chlorhexidine aqueous solution for babies <34 weeks gestation and <7 days old and 12 (31%) centres use 2% chlorhexidine in alcohol in babies ≥34 weeks gestation and babies born <34 weeks gestation 7 days or older.
3 main application techniques were identified. 22 (56.4%) centres use an applicator with dabbing technique; 11 (28.2%) centres use cotton swabs soaked in solution, excess removed and dabbing technique; and 3 (7.7%) centres use a wiping technique.
25 centres responded to the follow up survey.
8 (32%) centres reported skin burns occurring. A total of 32 incidents were reported from 7 centres with 1 centre unable to provide information.
The following products were used when a burn occurred:
<2% chlorhexidine aqueous solution (2 centres)
≥2% chlorhexidine alcoholic solution (5 centres – associated with applicator device in 4 centres)
Risk factors identified for burns included extreme prematurity (5 cases); application spillage (1 case); and transwarmer use (1 case).

Discussion: The survey showed variable practice, with local guidance using many different cohorts of babies to define product use. Few centres followed NPPG recommendations (1). Some variation may be due to difficulty in obtaining a 0.5% chlorhexidine aqueous solution.

The preferred dabbing technique was used in most centres for chlorhexidine application; however skin burns still occurred, particularly in extremely premature babies.

It's suggested that NPPG review current recommendations with BAPM and reappraise the current evidence. Guidance is also required to support the application technique, which is considered the most significant factor in reducing risk of burns (2), with encouragement to complete a Yellow Card report if a burn occurs.

References
1. Chlorhexidine for skin cleansing in neonates. Neonatal and Paediatric Pharmacy Group and British Association of Perinatal Medicine. Position Statement 21-01 (2021) Available from https://nppg.org.uk/chlorhexidine-for-neonates/
2. Chlorhexidine solutions: reminder of the risk of chemical burns in premature infants. Drug Safety Update 2014 8 (4): S3

SP08 Treatment of fungal ventriculitis with intraventricular amphotericin B in a neonate

Chloe Skelly[1]

[1]*LTHT, Leeds*

Aim: To treat invasive fungal ventriculitis in a pre-term infant with the use of intraventricular amphotericin B (Fungizone©).

Background: Our neonatal patient was born at a gestation age (GA) of 23+3. At a corrected gestational age (CGA) of 34+1 the patient was found to have Candida growth from a neck wound, penile and ear swabs. The patient had a history of ventriculitis, ventricular dilatation and cystic lesions within the brain. An MRI indicated that the lesions could be caused by Candida infection and the patient was started on fluconazole infusion at a dose of 12mg/kg once daily. After one week, a cranial ultrasound scan (CrUSS) showed increasing ventricular dilatation and fluconazole was switched to intravenous liposomal amphotericin B (Ambisome©) at a dose of 5mg/kg once daily. Candida antigen test was positive at >500pg/mL suggesting systemic infection and the cerebrospinal fluid was positive for Candida albicans sensitive to fluconazole and Ambisome©. On microbiology recommendation IV fluconazole was added, to continue for 4 weeks after the last positive CSF culture followed by a repeat MRI. This showed some improvement in parenchymal lesions but also new lesions and ongoing obstruction within ventricles. The case was discussed at MDT and the decision was made to commence intraventricular Amphotericin B via the ventricular access device (VAD). This was submitted to the Drug & Therapeutics group and approved.

Administration: Fungizone© was chosen as the preferred formulation for intraventricular therapy based on adult studies and other limited use in older children. We sought advice about dosing and administration from another hospital that had given Fungizone via the intraventricular route in an older child and they shared data with us. The literature was reviewed by the pharmacy infection team, neurosurgical team and microbiology to establish a safe starting dose that would be increased incrementally up to the maximum tolerated dose. Treatment was started at 0.01mg on day 1, increasing to 0.03mg on day 3, 0.06mg on day 5, then up to 0.1mg on day 7 (1, 2). Treatment was continued at 0.1mg every other day to assess tolerance and then gradually increased up to maximum of 0.5mg every other day. The maximum concentration found within the literature was 0.25mg/mL so we initially diluted volumes in 1mL (2). The volume within the VAD is approximately 0.5mL, therefore, a 1mL volume would flush through the VAD and into the ventricles. This volume was discussed with neurosurgeons and deemed acceptable based on expected intraventricular space within a neonate. At higher doses, we used a 2mL volume so as not to exceed 0.25mg/mL concentration.

Outcome: The patient tolerated therapy well. Anticipated side effects from the literature are nausea/vomiting and headache (1). The patient remained comfortable throughout therapy and did not show signs of pain or distress based on neonatal pain scoring systems. Unfortunately, while subsequent MRI scans do not show progression of disease and CSF cultures remain negative, cystic lesions remain. An MDT decision was made to stop therapy after 3 months.

References

1. Ho J, Fowler P, Heidari A, et al. Intrathecal Amphotericin B: A 60-Year Experience in Treating Coccidioidal Meningitis. Clinical Infectious Diseases 2017;Vol 64:pg 519-524
2. Wilson C, Nizet V, Maldonado Y, et al. Infectious Diseases of the Fetus and Newborn Infant. 2011

SP09 Oral liquid medicines – who is using what?

Andrew Wignell[1], *Helen Cooper*[2], *Jennifer Duncan*[3], *Mandy Wan*[2], *Andrea Gill*[3], *Stephen Tomlin*[4]

[1]*Nottingham University Hospitals NHS Trust, Nottingham,* [2]*Evelina Children's Hospital, London,* [3]*Alder Hey Children's Hospital NHS Foundation Trust, Liverpool,* [4]*Great Ormond Street Hospital NHS Foundation Trust, London*

Aim: Often associated with paediatric practice, oral liquid medicines (OLMs) are also commonly used in adults with difficulties swallowing tablets and capsules. While OLMs are generally prescribed in milligrams, they are usually measured in millilitres by patients/carers. Conversion from dose to volume is a known medication safety risk, as is availability of products containing the same drug in different concentrations; ten-fold overdoses leading to hospital admission have been reported1,2.
Relative usage of OLMs in children and adults has not been previously described, and data articulating the range of different concentrations of a drug used in clinical practice is limited. This study aimed to characterise national use of oral liquid medicines in adults and children.

Method: A dataset of all liquids dispensed in primary care in England between 1st February 2019 and 31st January 2020 was obtained from the NHS Business Services Authority. Data on single-drug OLMs were extracted for analysis. For each drug, the number of items and the range of concentrations were examined. Analysis was stratified by age group (under 18 and 18 years or over) and product license status. Data were summarised using descriptive statistics. Analysis was conducted using Microsoft Excel.

Results: 1,107,276,810 items were dispensed from FP10 prescriptions during the 12 month period, of which 44,224,505 (4%) were OLMs. 18,361,062 (41%) OLMs were dispensed for under 18s, and 25,863,443 (59%) for adults.

Use of unlicensed rather than licensed products was more common in children: 165,936 unlicensed liquid items were dispensed for children and 75,462 for adults (0.9% and 0.29% of the total OLM items supplied for children and adults respectively).
Drugs which were common to the top 20 by items dispensed for both children and adults were amoxicillin, paracetamol, lactulose, sodium valproate, levetiracetam, nystatin and sodium picosulphate. 10 and 13 drugs within the top 20 for children and adults respectively were dispensed at two or more concentrations (range 1-8 concentrations for both groups).

For 54% and 49% of OLMs dispensed for children and adults respectively, two or more concentrations were in use. For children, the drug with the most different concentrations (13) was glycopyrronium bromide; and for adults phenobarbital sodium (11). There were stark differences between the number of concentrations of the same drug used in children versus adults. For example, 11 omeprazole concentrations were supplied to children, and 4 to adults. Even where the same number of concentrations was used in each patient group, the preferred concentration differs. For example, the same 4 furosemide concentrations were prescribed for both children and adults, but in children the most common concentration was 10mg/mL (55% of cases) and for adults 8mg/mL (51%).

Conclusion: Liquid medicines are commonly prescribed for both children and adults alike. The number of different concentrations being used for the same drug is of concern; patient safety would be significantly improved if concentrations could be standardised for both licensed and unlicensed OLMs. Given more OLM items are dispensed for adults in Primary Care than for children, this work must consider the needs of both patient groups.

References
1. General Pharmaceutical Council (2021). Patient safety spotlight: the risks of prescribing and supplying medicines to children. https://www.pharmacyregulation.org/regulate/article/patient-safety-spotlight-risks-prescribing-and-supplying-medicines-children.
2. Renwick CE, Makhecha S et al. Case series: propranolol liquid in the treatment of tachyarrhythmias in neonates and infants: potential for errors. Cardiology in the Young, 2022;33:482-484.

SP10 Automated eGFR across a children's hospital

Catriona Johnston[2], *Yincent Tse, Nicola Vasey[1], Nidhi Singhal[1], Andrew Heed[2]*

[1]Great North Children's Hospital, Newcastle Upon Tyne, [2]Newcastle Upon Tyne Hospitals NHS Trust, Newcastle Upon Tyne

Aim: Creatinine needs transforming into estimated glomerular filtration rate (eGFR) to be useful: for medication adjustments, to monitoring acute kidney injury, and to communicate severity of kidney disease to families. This has been standard practice in adult primary and secondary care for many years.

In 2019 our children's hospital adopted electronic patient records. Where a height is available within the last 6 months, eGFR is automatic generated using the Bedside Schwartz 2009 formula (1) which is internationally the most recognised and accepted for paediatric use. The result appears as a valve in an adjacent row to creatinine. We studied its utility.

Methods: Observational EPR study of eGFR measurements at our hospital of children 1 to 16 years between January 2022 and May 2023. Low eGFR was defined as <90 ml/1.73m2/min. In 2024, an online survey was sent to non-nephrology paediatric healthcare staff to gauge user understanding on how to assess kidney function in paediatric patients.

Project was approved as a service evaluation by institutional clinical effectiveness register.

Results: Over 17 months 41,286 creatinines were measured. Height was available for 28,215 (68%) creatinines so auto-generating eGFR for 5,264 children. 58% were during 4,309 in-patient episodes, remainder were out-patient samples. 59%, 24%, 9% and 9% of children had one, 2-4, 5-9 or ≥10 eGFR results respectively.

A quarter of eGFR measures were low with 13% 60-89, and 10% <60 ml/1.73m2/min. Low eGFR were most prevalent in nephrology (77%), intensive care (19%), cardiology/cardiac surgery (17%) and surgery (9%) samples.

Analysis of 1463 children with ≥3 eGFR measures showed substantial eGFR changes between best and worse valves during study period. Of 1313 children with best eGFR ≥90 ml/1.73m2/min, 21% had worse eGFR 60-89 and 8% <60.

We gauged clinician response to low eGFR using by reviewing random sample of 100 patients with eGFR <90 and only one or two measures. At follow up of minimum six months, in 74% creatinine was repeated, in 17% creatinine value was within range for age, 4% were adult sized adolescents, and no reason given in 4% which when later recalled returned normal eGFR.

A survey of non-nephrology healthcare staff (n=42, 45% consultants, 24% pharmacists) shows a knowledge gap with 55% still preferring creatinine over eGFR for assessing kidney function in children. 80% who answered were unable to correctly identify what eGFR is considered low and only 55% could correctly identify formula used.

Conclusion: With electronic patient records it is feasible to auto-generate paediatric height based eGFR in children of all subspecialties. Many had substantial changes in eGFR over 18 months. More education is required to upskill staff's understanding. The next step will be to study its utility to aid medication renal dose adjustments, to detect acute kidney injury, and families' understanding of eGFR.

Hospitals with electronic patient records should consider incorporating paediatric eGFR for all subspecialities, like in adult practice. However it is important to ensure staff education from inception.

References
1. Schwartz GJ, Muñoz A, Schneider MF, et al. New equations to estimate GFR in children with CKD. J Am Soc Nephrol. 2009;20(3):629-37.

POSTER PRESENTATION ABSTRACTS

P01 The impact of standard concentrations of intravenous infusion on patient safety

Mohammed Abou Daya[1], *Ka Wing Tong*

[1]*Barts Health NHS Trust, London,* [2]*University College London, London*

Introduction: Most paediatric intensive care units (PICU) currently use a traditional bespoke weight-based method for calculating the concentration of intravenous infusions using complex and highly variable approaches[1]. There are big variations in preparation methods across PICUs in the UK with over 150 methods identified, which can potentially increase the risk of error and subsequently impact patients' safety[1,2]. Approximately 54-56% of the errors that occur in PICUs are related to IV administration errors[3]. Standard concentrations of Infusions (SCI) is part of a global strategy to improve intravenous medication safety since it has been shown to potentially eliminate up to 27% of medication errors[1,4]. SCI has been recently implemented in a children's hospital in London in an attempt to reduce the risk of medication errors caused by complex calculations.

Aim: This project aims to look into the effect of standard concentrations of infusions on patient safety in comparison to conventional weight-based infusion concentrations. The primary objective was to identify the numbers and types of errors reported in PICU, specifically with regards to SCI. Secondary objectives were to assess the adherence of nurses to the local infusions policy and the time taken to prepare infusions.

Methodology:

1. All medication errors from 1 January 2023 to 30 June 2023 reported in a PICU regarding SCI were analysed retrospectively.
2. Ten nurses were observed during preparation of continuous infusions and data gathered using a data collection tool regarding adherence to the SCI policy and time taken to prepare infusions.
3. A questionnaire regarding the standard concentration approach was circulated to twelve healthcare professionals working on PICU, including nurses, doctors and and pharmacists to identify perceived effectiveness and patient safety.

Results: Two errors were identified during the study period, directly attributed to standard concentrations of infusions. Neither caused harm. The errors were 'incorrect preparation made' and 'supply issues', which were not considered to be directly associated with SCI.

Overall, the calculated percentage of adherence to the nine approved steps for IV infusion preparation was 89% and to the six standards of infusion was 95%. The mean time to prepare infusions as directly observed in preparation of ten infusions was 6.6 minutes ranging between 3 and 16 minutes. This is a significant reduction in time taken compared to a previous study analysing preparation of weight-based infusions which found an average of 12 minutes.

Twelve members of staff completed the questionnaires. 83.3% expressed that the standard concentration approach was more convenient and 91.7% expressed that it improved patient safety compared to the traditional weight-based calculation.

Conclusion: This project concluded that the standard concentration approach showed good nurses' compliance to the standards of IV infusion preparation. The nurses also managed to work more efficiently with SCI with the preparation time halved. Furthermore, the positive response of healthcare professionals and the lack of incidents being reported supports the implementation of SCI.

References

1) OSKARSDOTTIR, T., HARRIS, D., SUTHERLAND, A, et al. A national scoping survey of standard infusions in paediatric and neonatal intensive care units in the United Kingdom. J Pharm Pharmacol 2018, 70, 1324-1331.

2) MACKAY, M. W., CASH, J., FARR, F., et al. Improving Pediatric Outcomes through Intravenous and Oral Medication Standardization. The Journal of Pediatric Pharmacology and Therapeutics 2009, 14, 226-235.

3) ROSS, L. M., WALLACE, J. & PATON, J. Y. Medication errors in a paediatric teaching hospital in the UK: five years operational experience. Archives of Disease in Childhood 2000, 83, 492-497.

4) Daya MA, Alsohaimi A, Angadi UP 39 Impact of conventional weight-based concentrations of infusions on patient safety in PICU. BMJ Paediatrics Open 2024;8:doi: 10.1136/bmjpo-2024-NPPG.49

P02 Optimising Vancomycin Use: A Retrospective Audit of Neonatal Vancomycin Infusion Therapy

Christian Chadwick[1]

[1]*University Hospitals Sussex NHS Foundation Trust, Brighton*

Aim: The project aims to assess the effectiveness of a local protocol in achieving therapeutic Vancomycin levels when administered by intermittent infusion. Vancomycin is a frequently used antibiotic in neonatal critical care, requiring therapeutic drug monitoring to ensure treatment efficacy and prevent toxicity, however there is no standard approach to prescribing. Within this tertiary neonatal critical care unit there was anecdotal reporting of frequent suboptimal levels and prolonged time to achieve target levels.

Method: A retrospective audit was conducted reviewing 12 months of admissions to a level 3 neonatal critical care unit. Prescription records and vancomycin trough levels were included for all courses of vancomycin intermittent infusions. Vancomycin continuous infusions and single doses were excluded. The local protocol gave prescribing instructions based on corrected gestational age (CGA): < 29 weeks, 29-35 weeks or >35 weeks CGA. Data were analysed to identify proportion of vancomycin trough levels within the target range (10-20mg/L); proportion of courses with trough levels within target range for the duration of the course; and length of time from start of treatment to the first trough level within range.

Results: 659 doses of vancomycin were prescribed, forming 82 treatment courses. According to CGA these were: <29 weeks, 102 doses (15.5%) and 21 courses (25.6%); 29-35 weeks, 305 doses (46.3%) and 41 courses (50%); >35 weeks, 252 doses (38.2%) and 20 courses (24.4%).
190 vancomycin trough levels were taken: <29 weeks, 38 (20%); 29-35 weeks, 90 (47%); >35 weeks, 62 (33%).
Out of 190 vancomycin trough levels, 70 (37%) were within the target range. According to CGA these were: <29 weeks, 1 level in range (2.6%, n=38), levels below lower limit 100%; 29-35 weeks, 35 levels in range (39%, n=90), levels below lower limit 91%; >35 weeks, 34 levels (55%, n=62), levels below lower limit 82%.
Overall, 21(37%, n=82) courses had vancomycin levels between 10-20mg/L at each measurement during the course. According to CGA these were: <29 weeks, 1 course (4.8%, n=21); 29-35 weeks, 12 courses (29%, n=41); >35 weeks, 8 courses (40%, n=20).
38 courses (46%, n=82) had at least 1 level within target range: <29 weeks, 1 (4.8%, n=21); 29-35weeks, 19 (46%, n=41); >35 weeks, 18 (90%, n=20).
Average times to first level within target range: All infants, 31 hours; <29 weeks, 24 hours (n = 1); 29-35 weeks, 38 hours (n = 19, range 23 – 158); >35 weeks, 30 hours (n = 18, range 8 – 85).
Conclusion: The audit demonstrated that using vancomycin according to local protocol resulted in trough levels outside target range in a significant proportion of infants and treatment courses. Most trough levels outside the target range were below the lower limit. Following dissemination to stakeholders, three options for change were identified: updating the dosing protocol for intermittent infusions; changing practice to use continuous infusions of vancomycin; or changing practice to use teicoplanin as the glycopeptide antibiotic of choice. It was agreed to update the dosing protocol for vancomycin intermittent infusions. An audit is currently underway to evaluate the impact of this change.

P03 Review of clinical interventions made on parenteral nutrition prescriptions

Gabis Chana[1], *Amrita Garcha*[1], *Michelle Horan*[1]

[1]*Birmingham Women's & Children's NHS Foundation Trust, Birmingham*

Aim: To review the accuracy, completeness and appropriateness of parenteral nutrition (PN) prescribing following the implementation of a zero-tolerance PN prescribing policy.

Background: The Nutrition Support and Intestinal Failure Team (NSIFT) oversee PN provision and review patients at least weekly. NSIFT consists of clinical nurse specialists, pharmacists, dietitians and gastroenterology medics/consultants.

It was highlighted via auditing that significant time was being spent chasing teams for prescriptions to be completed, for pharmacy to meet external deadlines. In January 2024, a zero-tolerance prescribing policy, whereby all PN prescriptions much be completed by 10am, was implemented.

Method: A prospective audit was undertaken over 14 weeks from January to April 2024. Intensive care and gastroenterology patients were excluded as PN is prescribed differently.

The interventions made by PN pharmacists or NSIFT were documented and categorised:

1. Prescription interventions post-prescribing by parent team, completed by PN pharmacist at clinical verification.
2. Prescription interventions post-prescribing by parent team, completed by NSIFT at patient review.
3. Interventions/actions when PN not prescribed by 10am.

Results: Of a total of 374 PN prescriptions included, 32.4%(n=121) required clinical intervention before the prescription could either be sent to an external company (bespoke PN) or processed and dispensed in-house (standard bag PN).
The specialty breakdown was: 57.9%(n=70) paediatric/neonatal surgery, 28.9%(n=35) haematology/oncology/stem cell transplant, 10.7%(n=13) hepatology and 2.5%(n=3) urology.
The category breakdown was: 57.9%(n=70) category 1, 28.1%(n=34) category 2 and 14%(n=17) category 3.
The interventions were further grouped based on type of intervention.

Category 1 breakdown:
52.9%(n=37) Prescription not completed fully
15.7%(n=11) Micronutrients not amended with working weight
10%(n=7) Standard PN bag not specified
10%(n=7) Prescription not completed accurately
11.4%(n=8) Other

Of the above prescriptions that were not completed fully above, the reasons documented were:
29.8%(n=11) Blank prescription signed; assumed the same formulation was required
21.6%(n=8) New prescription sheet not completed fully
18.9%(n=7) One bespoke PN component changed; remaining prescription not completed
5.4%(n=2) Micronutrients not completed
24.3%(n=9) Other

Category 2 breakdown:
35.3%(n=12) Optimised PN calories
26.5%(n=9) Advised standard PN bag
11.8%(n=4) Advised to increase PN working weight
5.9% (n=2) Advised electrolyte changes
20.5%(n=7) Other

Category 3:
The 17 interventions were all pro-active actions made by contacting the parent team to ensure continuity of PN for these patients, due to clinical impact if PN was not ordered. All patients were able to continue optimal PN.

Conclusion: It is evident that a significant number of PN prescriptions required clinical intervention to ensure they were appropriate. There are clear knowledge gaps in PN prescribing by parent teams and this data highlights how valuable having specialist PN pharmacists and a dedicated nutrition team are. Education and training have already been provided to teams; doctors rotate frequently which makes it challenging to retain skills and knowledge. The hospital training modules for PN prescribing will also be updated accordingly.

The NSIFT strategy and model may need to be reviewed. Where there is a drive to maximise standardised PN nationally, parent teams will need greater support in selecting appropriate PN from an already vast portfolio of bags.

P04 How do parents and carers report dose information for liquid medicines?

*Sheatha Abumedi[1], Ovie Uwegba[1], Alastair Walczak[1], **Helen Cooper**[1]*

[1]Guy's and St Thomas' NHS Foundation Trust, Evelina London Children's Hospital, London

Aim: Liquid medicine doses are generally prescribed by doctors in milligrams (mg), however it is surmised that they are usually known and measured in millilitres (mL) by parents and carers. Labelling of liquid medicines by pharmacy professionals has been shown to be widely variable, with no agreed national standards[1]. Unclear communication to parents and carers on doses of liquid medicines is a known risk factor for medication errors, especially where changes in the concentration of the same drug occurs, with inadvertent overdosing and under-dosing being reported[2].

Other than anecdotally, there is a lack of published evidence on how parents and carers actually convey and understand the doses of liquid medicines. The aim of this work was to collect this data, and support the ongoing work on standardisation of concentrations, labelling and communication.

Method: This single-centre observational study was conducted over a 10 day period (June 2024) on two paediatric wards. Verbal answers from parents were collected by two pharmacy technicians as part the admission medicines reconciliation process that includes a conversation with the parents to ascertain the dose of each medicine their child is taking. For each oral liquid medicine (or tablets requiring manipulation into a volume of liquid), the dose descriptor (e.g. ml, spoonful, mg) expressed by the parents was recorded on a data collection form. Parents were also asked if they could confirm the dose in mg (or other units as appropriate) and their responses were collected. Data were summarised using descriptive statistics. Analysis was conducted using Microsoft Excel.

Results: 18 parents were approached during the data collection period, and all responses on those medicines within the inclusion criteria were included in the results. The total number of liquid medicines seen was 64, and the dose information was stated initially in millilitres for 63 out of 64 (98%) of these. The dose information in an alternative unit such as milligrams or micrograms, when prompted by the pharmacy technician, was subsequently stated by the parent for 15 out of 63 (24%) of the medicines. 1 medicine was excluded from this second/subsequent question on weight-based unit dosing due to it being a multivitamin, multi-ingredient preparation where knowledge of the mg content is accepted to be limited. In the majority of cases the parent replied that they either did not know the dose in mg (or other units) or would have difficulty calculating it.

Conclusion: The results support the largely anecdotal evidence that parents and carers report doses of liquid medicines in millilitres rather than a weight-based unit of measurement such as milligrams. Limitations of this work include the small sample size and time period. Future studies would collect data from multiple sites and care settings across the UK, and perhaps seek to ask the question why. With this greater amount of data we may be able to suggest and create standards for best communication methods on liquid medicines, to empower patients, parents and carers, and reduce errors caused by a lack of understanding.

References:

1. Latheef F, Rashed A, Wignell A*, et al.* SP3 An exploratory study to characterise dosing instructions on dispensed paediatric medicines labels. *BMJ Paediatrics Open* 2024;**8:**doi: 10.1136/bmjpo-2024-NPPG.3
2. Conn RL, Kearney O, Tully MP, et al. What causes prescribing errors in children? Scoping review. BMJ Open 2019;**9**:e028680. doi:10.1136/bmjopen-2018-028680

P05 Anti-epileptics in the ketogenic diet: do formulations make a meal of it?

Callum Harper[1], *Chris Paget*

[1]*Royal Manchester Children's Hospital (MFT), Manchester*

Aim: To assess the compatibility of paediatric-licensed (United Kingdom) oral liquid anti-epileptics (AEDs) with the ketogenic diet (KD).

Method: Review National Institute for Health and Care Excellence (NICE) [1] guidance to identify AEDs advocated for use in children.
Categorise each AED; UK Paediatric license? (Y/N), NICE endorsed in a KD-responsive* seizure type? (Y/N) licensed liquid-formulation (adults or paediatrics)? (Y/N).
*Ketogenic diet-responsive seizure type; tonic or atonic seizures, Lennox-Gastaut (LGS), Dravet's Syndrome (DS), Infantile spasms syndrome and Doose syndrome [2].
Generate a subset of AEDs that are licensed in paediatrics **and** have a licensed liquid formulation on the UK Market. From this subset, review the excipients for every product using the manufacturers summary of product characteristics (SPC) [3]. Categorise those containing calorie contributing carbohydrates [4] as ketogenic diet incompatible, and those without as compatible.

Results: 27 AEDs are currently endorsed by NICE [1] for use in paediatric epilepsy, 18 of which are recommended for use in a KD-responsive seizure type [1]. 13/18 had a paediatric licensed liquid formulation which led to 66 SPC's being analysed [3].

Excipients incompatible with ketogenic diet defined as per Ketogenic Dietitians Research Network factsheet [4].

Of the 18 KD-endorsed AEDs:

- 13 had a paediatric licensed liquid formulation [3] (cannabidiol, carbamazepine, clobazam, ethosuximide, fenfluramine, gabapentin, lacosamide, levetiracetam, oxcarbazepine, phenobarbital, rufinamide, sodium valproate and topiramate).
- 3 of the 13 had a mixture of KD compatible and incompatible formulations available on the UK market [3] which presents prescribing difficulties as procurement is often based on a cost and contract basis as none of these are category 1 AEDs. 17% of clobazam (3/17), 66% of ethosuximide (4/6) and 84% of gabapentin formulations were KD-compatible.
- **8/13 had no KD compatible liquid formulation** [3]. (carbamazepine, lacosamide, levetiracetam, oxcarbazepine, phenobarbital, rufinamide, sodium valproate and topiramate).

Conclusion: 62% (8/13) of oral liquid AEDs that hold a UK paediatric license and are NICE endorsed for use in a KD-responsive seizure type, have no marketed formulations that are free from calorie-contributing carbohydrates and thus suitable for children on the ketogenic diet.

Whilst clinicians should avoid using problematic formulations this can be incredibly difficult to achieve in practice due to generic prescribing, the variety of products on the market and the route of procurement within the NHS (which is based on cost and contracts rather than excipient content). As most AEDs are not category 1, brand prescribing is not a suitable suggestion to this problem.

The KD is an effective therapy for reducing seizures in drug-refractory epilepsy in children [1,2], however many of the AEDs recommended are not KD-compatible which results in the unlicensed manipulation of solid-dosage oral medicines to reduce carbohydrate intake. More work is required from medicines manufacturers to create anti-epileptic liquid formulations that are KD-compatible and with a more appropriate excipient composition for use in children.

References:

1. Jones KE, Howells R, Mallick AA, et al. NICE guideline review: Epilepsies in children, young people and adults NG217. *Archives of Disease in Childhood-Education and Practice*. 2023Dec 1;108(6):416-21.
2. Kossoff EH, Zupec-Kania BA, Auvin S, et al. Optimal clinical management of children receiving dietary therapies for epilepsy: Updated recommendations of the International Ketogenic Diet Study Group. *Epilepsia open.*2018Jun;3(2):175-92.
3. Medicines and Healthcare Products Regulatory Agency. MHRA Product Information. [online]. 2024. https://products.mhra.gov.uk (accessed 29 March 2024).
4. Ketogenic Dietitians Research Network. Ketogenic sweetener info sheet. [online]. 2020. www.kdrn.co.uk/wp-content/uploads/2022/07/Ketogenic-sweetener-info-sheet-2022.pdf (accessed 29 March 2024).

P06 Salbutamol weaning plans for asthma in Paediatric Emergency Departments – a service evaluation

Sukeshi Makhecha[1], *Meredith Robertson*[2], *Gracita Woods*[2], *Marie White*[2], *Ashira Simmons*[2], *Fiona Henley*[2], *Nina Somerville*[2], *Mark Butler*[2]

[1]*Royal Brompton & Evelina London Children's Hospital, London,* [2]*Evelina London Children's Hospital, London*

Background: Salbutamol weaning plans, 10 puffs, (1000 micrograms) of salbutamol every four hours in reducing doses over a few days (up to 6000 micrograms salbutamol a day) were introduced in emergency departments (ED) to facilitate quicker discharges (1). This, however, increases the risk of toxicity and also reinforces perceptions that salbutamol 'cures' asthma attacks and encourages salbutamol over-reliance (2).
In an attempt to move away from this we changed our guidelines and practices to include as needed salbutamol as part of discharge asthma action plans, in September 2020.

Aim: To evaluate a change in practice from using salbutamol weaning plans to as required salbutamol asthma plans for discharge.

Method: This was a retrospective service evaluation to assess a change in practice from salbutamol weaning plans to as required salbutamol in children aged 6-17 years with acute asthma between June 2019- January 2020 and June 2021 - January 2022.

Outcome measures included: 1) Readmission rates to the paediatric wards and 2) Reattendance rates of children presenting to the Paediatric ED for acute exacerbation of asthma, 3) salbutamol use and costs.

Results: 3/43 children ≥6 years were readmitted to the wards due to an asthma exacerbation between June 2019 – January 2020 and 2/54 between June 2021-January 22, with a p value of 0.014 using a one-way anova.
3/200 children ≥6 years reattended the paediatric ED for an acute exacerbation between June 2019 – January 2020 and 8/261 between June 2021-January 2022, with a p value of 0.018 using a one-way anova.
Salbutamol usage and cost was 370 (£555) between June 2019 – January 2020 and 421 (£631.50) between June 2021-January 2022.

Conclusions: There is a significant reduction (p- 0.014) in the readmission rate and a significant increase (p – 0.018) in the reattendance rate, with p value significance being <0.05, following the change in practice.
Additionally, there is an increase in the number and as a result cost utilisation of salbutamol following the change which can be explained by the increase in number of patients.
The differences can be attributed to an increase in health care utilisation in ED following COVID and difficulty in ability to access GP's easily resulting in an increase in attendances and reattendances post COVID.
The reduction in readmission rates post change in practice is reassuring, however, the increase in the reattendance rates was unexpected, although this is not concerning and shows the safety net advice being well-understood and followed by parents. This differs from the study by Connett et al (3) which showed a reduction in both readmission and reattendance rates though they included children <6 years without a confirmed diagnosis of asthma.
Overall our results are reassuring and show that salbutamol weaning plans can be safely replaced with as needed salbutamol discharge asthma action plans.

References

1. Levy ML, Fleming L, Goldring S, et al. Arch Dis Child 2021;106:730–731. Arch Dis Child 2021;106:730–731. doi:10.1136/archdischild-2020-321498
2. Cabrera CS, Nan C, Lindarck N, et al. SABINA: global programme to evaluate prescriptions and clinical outcomes related to short-acting β2-agonist use in asthma. Eur Respir J 2020; 55: 1901858 .doi.org/10.1183/13993003.01858-2019].
3. Connett G, Harper S, Raut B, et al. Arch Dis Child Epub ahead of print: doi:10.1136/ archdischild-2023-325703

P07 Hospital at home antibiotic prescribing practice

*Hassan Othman[2], **Mohammed Abou Daya**[1], Mildred Iro[1]*

[1]Barts Health NHS Trust, London, [2]UCL, London

Introduction: Care models like Hospital-at-Home (HAH) have emerged to ease the strain on healthcare systems. HAH enables acutely ill paediatric patients to receive specialised care and prescribed treatment at home. Many of these paediatric patients receive injectable antibiotics following local and national guidelines. Using a retrospective cohort design, our study evaluated this model at a large London paediatric hospital. We assessed clinician adherence to prescribing guidelines, the appropriateness of transitioning from intravenous to oral antibiotics, and the impact of involving a paediatric Infectious Disease consultant and specialist pharmacist in therapy.

Method: Data from 149 patients aged under 18 years who received injectable antibiotic therapy and were referred to the HAH service were analysed. Patients initially treated with oral or inhaled antibiotics were excluded. A descriptive analysis of the collected data, including age, WBC, CRP, temperature trends, advice from a paediatric ID consultant, prescribed antibiotics, and switch suitability based on UKPAS switch tool, was performed. Also, an independent review (blinded to the clinical team plan) was done by the paediatric ID consultant.

Results: The analysis involved 139 patients after exclusions. Suspected sepsis was the most common reason for admission (50%), followed by high temperature (24%). The working diagnosis remained suspected sepsis for 28% of the patients, while 19% had confirmed sepsis. Additionally, 17% were diagnosed with viral infections. The median temperature on presentation was 37°C. Among the 139 patients, 75% had a temperature below 38°C, and this percentage increased to 98% during HAH care. Elevated CRP levels (>5 mg/L) were observed in 61% of participants initially, but subsequent results showed decreasing levels in all participants. The bacterial culture positivity rate was low, with no bacteria isolated from 82% of cultured blood, sputum, CSF, nasal, and throat swabs. However, 18% of sputum, nasal, and throat swabs showed isolation of viruses in culture. The most prescribed antibiotic was Ceftriaxone (55%). Before HAH referral, 79% of participants were reviewed by a clinician, and 16% sought advice from a microbiologist or infectious disease specialist. Adherence to prescribing guidelines was 88%, in terms of choice and duration of antibiotic based on the documented indication (including suspected sepsis). However, only 4.3% of participants were switched to oral antibiotics after 48 hours of IVAB initiation, although the data suggested that 27% were suitable for therapy de-escalation. Furthermore, the paediatric ID consultant recommended either stopping or switching to an oral antibiotic for 5 out of 34 sampled patients (15%) due to improvements in clinical symptoms and biomarkers. Additionally, they suggested that antibiotic therapy could potentially be discontinued for 25 patients (74%) as their biomarkers had improved, but further evaluation was necessary.

Conclusion: This study showed that although we seem to have good adherence to antimicrobial guidelines at initiation, a significant proportion of therapy could potentially have been switched to oral or stopped completely. Improvements in antibiotic prescribing practices can be achieved by implementing a robust antimicrobial stewardship program. The active engagement of a multidisciplinary team, comprising a paediatric ID consultant, and pharmacist specialist, is vital in achieving these improvements.

1- Detollenaere, J., Van Ingelghem, I., Van den Heede et al. 'Systematic literature review on the effectiveness and safety of paediatric hospital-at-home care as a substitute for hospital care', European Journal of Pediatrics, 2023, 182(6), pp. 2735-2757.
2- Knight, T., Harris, C., Mas, M., et al. 'The provision of hospital at home care: Results of a national survey of UK hospitals', Int J Clin Pract, 2021, 75(12), pp. e14814.
3- UK Health Security Agency (2024) Antimicrobial intravenous-to-oral switch: criteria for prompt switch. Available at: https://www.gov.uk/government/publications/antimicrobial-intravenous-to-oral-switch-criteria-for-early-switch (Accessed: July 2024).

P09 Improving paediatric ciclosporin dosing: The role of pharmacokinetic models

Fan Cheng[1,2], *Professor Claire Booth*[2,3], *Austen Worth*[2,3], *Rebecca O'Neill*[1], *Professor Joseph Standing*[2]

[1]Great Ormond Street Hospital, London, [2]UCL Great Ormond Street Institute of Child Health, London, [3]Department of Immunology and Gene therapy GOSH, London

Introduction: It is routine practice to perform therapeutic drug monitoring for drugs with a narrow therapeutic window, such as ciclosporin. Ciclosporin is regularly used for children undergoing haematopoietic stem cell transplant (HSCT) to prevent post-transplant complications[1]. Patients undergoing HSCT are at high risk of life-threatening fungal infections warranting the regular use of azole antifungals, which interact with ciclosporin. Azole antifungals, such as posaconazole, have been less studied in children under 2 years of age, and little is known about their degree of interaction with ciclosporin, exposing patients to toxicity or treatment failure. Ciclosporin is highly protein-bound (e.g. to albumin and haematocrit) and changes in serum creatinine were known to affect ciclosporin clearance.

The plasma drug concentrations help to describe the drug's exposure and other pharmacokinetic properties, which can be utilised to devise specific dosing for that individual. However, the individual results obtained cannot be generalised to inform the treatment of other children within that cohort. A pharmacokinetic model is a statistical approach that allows all therapeutic drug monitoring levels to be studied as a cohort, enabling factors that affect drug handling to be incorporated into the statistical model, providing tailored dosing for that specific cohort of patients. We have developed a model to describe the pharmacokinetic properties of ciclosporin, quantify its interaction with posaconazole using a pharmacokinetic model, and simulate dosing regimens.

Method: All children who received ciclosporin related to HSCT between 15th April 2019 and 1st June 2023 and had more than one ciclosporin level taken were included in the study. Patient demographics (age, weight, sex), treatment details (dose and dosing times of ciclosporin and posaconazole, days after HSCT), and laboratory results (ciclosporin plasma levels, creatinine, haematocrit, albumin) were recorded. Ciclosporin levels were measured using tandem mass spectrometry. Population pharmacokinetic modelling and simulation were undertaken using the first-order conditional estimation method with interaction (FOCEI) in NONMEM version 7.5.1. The study was approved by the London and Southeast Research Ethics Committee under reference no. 21/LO/0646.

Results: 3104 ciclosporin plasma levels were measured in 217 children (aged 6 weeks to 20 years old). 1200 measurements were without co-administered azole antifungals, 1248 levels with co-administered itraconazole, 396 with posaconazole, and 260 with voriconazole. The estimated pharmacokinetic parameters for ciclosporin are clearance = 46.3 (L/h/70kg), volume of distribution = 4150L/70kg and bioavailability = 40%. Creatinine, haematocrit, and CYP3A4 maturation were factors that affected ciclosporin pharmacokinetic properties and were included in the model. Posaconazole was estimated to reduce the clearance of ciclosporin by 15%. Dosing simulations were carried out to demonstrate the effect of different dosing regimens to establish more effective ciclosporin doses for children.

Conclusion: Pharmacokinetic modelling is a powerful tool for better understanding therapeutic drug monitoring data. Here we illustrate the patient safety potential of using this approach in a cohort of patients where drug-drug interaction can be quantified and may have critical implications for patient outcomes. Simulations based on the pharmacokinetic models can be used for drug dose adjustment, thereby personalising dosing for children.

References

[1] Carreras E, Dufour C, Mohty M, Kröger N. The EBMT handbook: hematopoietic stem cell transplantation and cellular therapies.

P10 Community paediatric medication lists for children with complex and palliative care needs

Ceri Gaskell[1], *Rachel Crampton*[1], *Alice Martin*[1], *Emma Heckford*[2], *Amanda Williams*[2], *Steven Wiltshire*[3], *Sarah Taylor*[4]

[1]*Bristol Royal Hospital for Children, Bristol,* [2]*Childrens Hospice South West, Bristol,* [3]*Jessie May, Hospice at Home, Bristol,* [4]*Sirona Care and Health: The Lifetime Service, Bristol*

Context, situation or problem: Children and young people have a risk of medication errors and those with complex and/or life limiting conditions have a higher risk due to polypharmacy, complex medication regimens, and frequent transitions of care, often with multiple organisations delivering care(1). Within the area local to our children's hospital we reviewed administration practice. Care providers include two community nursing teams and a hospice team who each used their own prescription lists and administration records. The creation of lists was a duplication of workload. None of the individual organisations nor the GP had a comprehensive oversight of the patients' full medication list because many children are being prescribed and supplied medications from both primary and secondary care. An improved process for sharing information about medicines when transferring between care settings is important(2)(3). The patient safety risks of this cross-organisational practice was a concern, so we came together to find a solution.

A new Community Paediatric Medication List (CPML) service was developed with collaboration between the tertiary children's paediatric palliative care team, the community nursing teams and the hospice team. 50 children with the highest need met our proposed inclusion criteria and parents/carers were offered the pilot service, a CPML maintained by the hospital pharmacists. The pharmacists compiled the patient's medication list by accessing multiple information sources. They carried out a medicines optimisation exercise and then widely circulated the CPML using local electronic health records. The CPML is used by the community teams to enable safe administration of medicines during their care delivery. It is an accurate medication history resource for all other healthcare professionals involved in delivering care. One day per week pharmacist time is dedicated to reviewing and updating the lists with an aim to ensure each list is updated at least monthly.

Conclusion: A review of the service was carried out after 2 years with family and healthcare professional questionnaires, and a focus group with parents/carers to explore issues raised further. This showed positive feedback from clinical teams using the lists who feel it has made the process of administering medicines in patient's homes and writing hospice drug charts more efficient and safer. Feedback from families has shown that for most parents/carers, the CPML has been helpful, improved care and has improved how parents communicate about medicines. It has also strengthened links between teams to enable better working and more seamless care for patients, and given complex patients the benefit of a regular specialist pharmacist review of their medication. The medicine optimisation exercise found many medication concerns that were all resolved. The main barrier to maintaining the lists has been communication and getting engagement from some parents/carers. There is also work to be done to ensure all relevant staff are aware of and can access the lists, and to expand their use to other teams involved in the care of these patients.

References
1. Together for short lives, Safe use of medicines, 2021, 3rd edition
2. NICE, Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes (nice.org.uk), 2015
3. Tse Y, Trivedi A, Mee A, et al, Improving the experience of obtaining repeat complex paediatric prescriptions in the UK, Archives of Disease in Childhood 2022;107:963-966

P11 Pharmacy provision within a neonatal operational delivery network

Nigel Gooding[1]

[1]*East of England Neonatal Operational Delivery Network, Cambridge*

Aim: To evaluate the pharmacy service in 17 units within a neonatal operational delivery network (ODN), with regards to workforce compared with Neonatal and Paediatric Pharmacist Group (NPPG) neonatal pharmacy staffing standards (1), GIRFT(2) and BAPM(3), use of technology, regional monograph use and training requirements.

Method: A Microsoft forms survey was sent to each of the 17 neonatal unit pharmacists in February 2024. The survey presented a series of questions regarding pharmacy workforce establishment, ward round attendance, non-medical prescribing activity, centralised intravenous additive service (CIVAS) provision, parent/carer administration schemes, use and suitability of electronic prescribing and medicines administration (EPMA) systems, infusion pumps and drug libraries, use of regional neonatal intravenous monographs and pharmacist training requirements.

Results: 16 units (94%) responded. One unit did not respond despite 2 follow up calls. Of the 16 units, 3 were Neonatal Intensive Care Units (NICU), 9 were Local Neonatal Units (LNU) and 4 were Special Care Baby Units (SCBU). Reviewed against NPPG staffing standards, the 16 units should have a combined total of 17.7 whole time equivalent (WTE) pharmacists. The survey showed that there were 5.71 WTE pharmacists in total for the region, a deficit of 11.99 WTE pharmacists.
1 unit (6%) had a pharmacist attend the daily ward round. 6 units (38%) had active non-medical prescriber pharmacists, undertaking a variety of prescribing tasks.
1 unit (6%) provided a CIVAS service for dinoprostone syringes.
5 units (31%) provided a medicine administration scheme allowing parents and carers to learn how to administer medicines before discharge.
EPMA is established in 6 units (38%), however EPMA only met the needs of the patient group and users in 4 (67%) of these units. In one unit, a combination of electronic and paper prescribing occurs.
Intravenous pump drug libraries are used in 5 (31%) units, with pharmacy involvement in maintenance in 3 (60%) of these units.
Regional intravenous monographs are used in 13 (81%) units. Of the 3 units not using the monographs, 2 units are currently planning introduction of the monographs into practice.
13 (81%) units responded that their pharmacy team would welcome teaching and/or peer review support from the ODN lead pharmacist and provided details on areas that they would like support.

Conclusion: The pharmacy workforce in neonatal units in the ODN is significantly under-resourced compared to the recommended national staffing standards. A business case template will be prepared to support units in improving their pharmacy staffing.

The other results have supported the ODN lead pharmacist in developing a work plan that includes, development of an ODN statement supporting procurement of EPMA systems appropriate for neonatal use, supporting development and maintenance of IV drug pump libraries, development of a WhatsApp group for regional pharmacists to provide a pharmacist support group, and a training plan to support the neonatal pharmacists.

References
1. Neonatal and Paediatric Pharmacy Group (NPPG). Pharmacy staffing standards for neonatal services. Sept 2022
2. NHSE. Neonatology: Getting it right first time (GIRFT) Programme National Speciality Report. April 2022
3. The British Association of Perinatal Medicine. Service and quality standards for provision of neonatal care in the UK. Nov 2022

P12 Accelerating safer administration of medicines to children in low resource settings

Sifan Hu[1], *Smita Salunke*[1], *Alka Mukne*[2], *Vandana Patravale*[3], *Pradeep Behera*[4], *K Bangarurajan*[5], *Esmerald Hermans*[6]

[1]Ucl School of Pharmacy, London, [2]Indian Pharmaceutical Association (IPA), India, [3]Society of Paediatric Medicines and Healthcare Initiative (PMHI), India, [4]Thetabeta Analgorithms Pvt Ltd (TBA), India, [5]Central Drugs Standard Control Organization (CDSCO), India, [6] J&J Innovative Medicines, Belgium

Introduction: Medication use in paediatric population is prone to dosing error as small dose volumes are required to be administered. Using safe and effective administration devices to ensure correct dose measurement is a key approach to secure paediatric medication safety. However, research conducted in high-, middle- and low-income countries have highlighted a huge gap between the needs of patients and what is available in the market [1-5]. To address these challenges, it is important to understand the pharmacotherapy needs of children living in resource-limited conditions for accurate dosing and find solutions that accelerate the development and adoption of administration devices with enhanced dosing accuracy. Hence, a workshop was held to understand the uptake of the already existing administration devices in low- and middle-income countries, and to assess the level of awareness of issues associated with use of administration devices as well as the need of innovative devices.

Method: The workshop was organised in partnership with the Indian Pharmaceutical Association (IPA), the Society of Paediatric Medicines and Healthcare Initiative (PMHI), and Thetabeta Analgorithm (TBA) at Scitech Centre in Mumbai, India on 4th March 2024. Experts from academia, industry, healthcare services and regulatory bodies were invited to attend [6].
The workshop consisted of a panel discussion where academic researchers shared findings of studies on the use of administration devices for paediatric medicines, followed by presentations on healthcare professionals (HCPs) and industry's perspectives on the challenges associated with the use and development of administration devices. Then, participants were divided into groups to discuss the procedural and operational challenges in relation to the administration of medicinal products to the paediatric population and propose constructive solutions. Participants' preferences for the proposed solutions were ascertained by voting. Lastly, an overview of regulatory guidance on administration devices was provided.

Results: 42 participants, including the speakers and organisers, from seven countries (Belgium, China, India, Japan, Nigeria and USA) attended the workshop. 50% of the participants were academic researchers, 31% were from industry, 12% were healthcare professionals and 7% were from regulatory agencies.

Findings of survey studies highlighted country-dependent usage of devices for administration of oral and inhaled paediatric medicines. From Indian HCPs' perspective, access, availability and affordability are the three main considerations for medication administration to children. From industry and regulator's perspectives, European device developers follow strict regulatory requirements surrounding accuracy, dose markings, and product labelling, whereas innovation of medical products in India is limited due to lower regulatory reliance and research priority is placed on simplifying the administration process.

The voting results highlighted variability in the scoring of potential solutions according to stakeholder group. Overall, the highest scoring solutions are device innovation and regulation harmonisation, with votes from all stakeholder groups. Academic researchers additionally favoured awareness raising.

Conclusion: Discussions and knowledge shared during this event showed the effectiveness of the workshop in fostering a deeper understanding of the issues regarding use and development of administration devices in low resource settings.

References
[1] Lian S, Liu Y, Xu L, Wang F, Zhang M, Salunke S, Walsh J, Zhao M. Survey-based investigation into the current use of paediatric medicines and administration devices in China. Eur J Pharm Biopharm. 2023;191:290-302.
[2] Saito J, Nakamura H, Walsh J, Yamatani A, Salunke S. A Survey to Understand Parent/Caregiver and Children's Views on Devices Used for the Administration of Oral Pediatric Medicines in Japan. Children (Basel). 2022;9(2):196.
[3] Abidi S, Talegaonkar S, Notani S, Pradhan V, Pokharkar V, Popli H, Walsh J, Salunke S. Stepping into small shoes: Gaining user perspective on appropriate administration devices for paediatric medication in India. Eur J Pharm Biopharm. 2023;191:247-258.
[4] Talegaonkar S, Chitlangia A, Pradhan V, More S, Salunke S. Uncovering caregiver concerns: 5 key issues that still remain unresolved in administration of oral medicines for children in India. Eur J Pharm Biopharm. 2023;187:166-174.
[5] Elisa Alessandrini, Jennifer Walsh, Esmerald Hermans, Smita Salunke, Putting children first: Understanding caregivers' and children's perspectives on the usability of oral and respiratory administration devices for paediatric medication, Eur J Pharm Biopharm, 2023; 190:35-46.
[6] 'Accelerating Safer Administration of Medicines to Children in Low Resource Settings', UCL News, 8 May 2024. Available at https://www.ucl.ac.uk/pharmacy/news/2024/may/accelerating-safer-administration-medicines-children-low- resource-settings

P13 Gentamicin dosing in pre-term neonates - are we getting it right?

Susan Kafka[1], *Lauren Williams*[1]

[1]*NHS Greater Glasgow and Clyde, Glasgow*

Background and aim: National guidance recommends the use of gentamicin as part of the antimicrobial management of suspected Early and Late onset sepsis in neonates (EoS and LoS) (1). Evidence and consensus on optimal dosing schedules in pre-term infants is sparse[(2)]. The West of Scotland Neonatal Monographs currently present a pragmatic recommendation for babies with corrected gestational age (CGA) < and ≥32 weeks(3).

The aim of this study is to review current dosing guidance for gentamicin in pre-term infants (32-34 weeks gestational age (GA)) in the treatment of suspected EoS and LoS in a tertiary neonatal unit. To identify the percentage of infants with high trough levels (defined as ≥2mg/L(3)) requiring adjustment of dosing intervals, and onward referral to audiology in order to inform review of current guidance.

Methods: All babies administered at least one dose of IV gentamicin within a tertiary Neonatal unit between 1st January and 30th June 2024 we identified using local digital information systems (DIS). Patient lists were filtered to identify babies with a GA 32+0 – 34+6 weeks at time of gentamicin administration. Trough gentamicin levels (GT) for each patient were extracted from laboratory reporting systems and babies with a high (≥2mg/L) or borderline (1.9mg/L) GT identified. Indication for gentamicin in each case was confirmed and where a high GT returned, onward referral to audiology confirmed in line with local guidance(2).

Results: 267 babies received at least one dose of IV gentamicin on the NICU between 1st January and 30th June 2024. Of these, 29 babies were in the CGA bracket 32+0-34+6 weeks. 3 babies were excluded from review, receiving only one dose of gentamicin with no therapeutic monitoring undertaken. Of the remaining 26 babies, 9 in total (34.6%) returned a GT ≥2mg/L following the first dose of gentamicin. 5/26 (19%) of babies had a borderline GT defined 1.9mg/L. Of the initial high GT 44% (4/9) were in babies with a GA 32+0-32+6 weeks, with numbers in the 33 week and 34 week GA groups declining to 3 and 2 respectively. Within the 32 week CGA group, a high GT accounted for 57% of all initial levels returned at this CGA. For 33 week and 34 week infants figures were 33% and 30% respectively. 100% of babies returning a high GT were referred to audiology follow up as per unit guidance(3) .

Conclusion: Preliminary results suggest current guidance(3) increases risk of high GT in babies 32-34 weeks CGA. Early GA appears to be a predisposing factor for high GT, indicating that review of the CGA bands in current local guidance(3) may be needed to reduce toxicity potential and burden of audiology referral in this population. Sample size in this study was small, and more data is required to determine significance of these findings to inform review. Future work should focus on multicentre approach across units utilising the same guidance (1) to ensure appropriate management of EoS and LoS is maintained in line with national recommendations(1) .

References
1. National Institute for Health and Care Excellence, 'Neonatal Infection: Antibiotics for prevention and Treatment': NG 195; 20th April 2021; accessed online 20/07/2024
2. Hollander EM, van Tuinen EL et al 'Evaluation of DOsisng Guidelines for Gentamicin in Neonates and Children', Antibiotics: 2023; 12 (810)
3. West of Scotland Neonatal Pharmacists Group; 'West of Scotland Neonatal Monograph: Gentamicin': Version 003; December 2017: accessed online via the Scottish Perinatal Network, 20/07/2024

P14 Comparison of dexamethasone with prednisolone for acute asthma in a paediatric emergency department

Sukeshi Makhecha[1] *Taran Kandola*[1,]

[1]*Evelina London Children's Hospital, London*

Context: Asthma and viral-induced wheeze are common causes of paediatric emergency department (ED) admissions, typically treated with oral prednisolone. However, prednisolone's bitter taste leads to poor adherence, prolonging hospital stays and increasing resource strain.

Dexamethasone, a more palatable alternative with a longer half-life, offers a single dose equivalent to a three-day course of prednisolone. This project is important because it would reduce unnecessary workload for nurses by removing the need for TTO pre-packs to be supplied out of hours.

Furthermore, medication safety would be increased by reducing the risk of prolonged steroid courses being unintentionally or inappropriately given post-discharge. Cost savings would be substantial as it would remove the need to supply prepack prednisolone as one bottle of dexamethasone would be used for multiple patients.

Lastly, improving steroid treatment adherence would reduce re-admissions and hopefully improve clinical outcomes for treating viral wheeze.

The following objectives were set out: 1. To evaluate the adherence rate to prednisolone 2. To evaluate the adherence rate to dexamethasone 3. To assess how many patients were being prescribed dexamethasone per Plan-Do-Study-Act cycle (PDSA).

Data collection involved a paper questionnaire designed and emailed to the paediatric emergency department. Adherence was noted on admission, and patient details were recorded with consent. Follow-ups occurred one-week post-discharge to assess adherence via telephone. Initial data collection in April 2023 depicted prednisolone adherence at 59% (n=128) with 100% of children who rejected prednisolone tolerating dexamethasone.

Two PDSA cycles were performed: Cycle 1 involved a stakeholder meeting and email communications about dexamethasone benefits, resulting in 10% prescription rates. Cycle 2 introduced a 30-minute teaching presentation to ED staff, increasing prescriptions to 45.5%.

Of 128 patients, 37 patients vomited prednisolone initially. On discharge, only 59% were adherent to a 3-day prednisolone course. By the second PDSA cycle, dexamethasone prescribing increased to 45.5% with 100% adherence at each stage. Nursing satisfaction was significantly higher, 100% compared to 10% with prednisolone.

Conclusion: The transition to dexamethasone significantly improved adherence and patient outcomes, aligning with CQUIN targets and enhancing overall care quality. Despite not achieving the 100% target, the project demonstrated significant progress and stakeholder support. Supply issues and guideline updates were identified as areas for further improvement. Ongoing data collection will focus on discharge times, readmission rates, and cost analysis to further validate dexamethasone's benefits in paediatric asthma management. This project underscores the importance of ongoing quality improvement and patient-centred care in clinical practice.

References
[1] National Institute for Health and Care Excellence. Asthma: diagnosis, monitoring, and chronic asthma management. 2021. Online. Available from: https://www.nice.org.uk/guidance/ng80/resources/asthma-diagnosis-monitoring-and-chronic-asthma-management-pdf-1837687975621 (Accessed on 04/08/2023)
[2] C. Pound et.al. British Medical Journal. Dexamethasone vs prednisolone for children receiving asthma treatment in the paediatric inpatient population: protocol for a feasibility randomised controlled trial. 2018. [Online]. Available from: https://bmjopen.bmj.com/content/bmjopen/8/12/e025630.full.pdf (Accessed 04/08/2023)
[3] D. Elkharwili et.al. British Medical Journal. Two regimens of dexamethasone vs prednisolone for acute exacerbations in asthmatic Egyptian children. 2020. Vol 27: 151-156. [Online]. Available from: file:///C:/Users/taran/Downloads/Elkharwili%20ejhpharm-2018-001707.pdf (Accessed on 04/08/2023)
[4] Royal College of Paediatrics and Child Health. Standards for children and young people in emergency care settings. 2012. [Online]. Available from: https://www.rcpch.ac.uk/sites/default/files/Standards_for_children_and_young_people_in_emergency_care_settings_2012.pdf (Accessed on 04/08/2023).

P15 Improving ciclosporin prescribing in haematopoietic stem cell transplant (HSCT) patients

Rebecca O'Neill[1], *Johanna Lee*[1], *Natalie Chan*[1]

[1]*Great Ormond Street Hospital, London*

Context, Situation and Problem: Acute graft versus host (aGvHD) is a potentially life-threatening complication in allogeneic haematopoietic stem cell transplantation (HSCT). Prophylaxis is essential and ciclosporin A (CSA) is usually first line.[1] Due to its narrow therapeutic window and individual variation, dose adjustment based on trough concentrations is essential to maintain ciclosporin within therapeutic range. Patients may be exposed to increased risk of toxicity if overdosed or allograft rejection if under dosed and therefore prior knowledge of variable dosing, drug interactions, monitoring and side effects is essential.2 The implementation of e-prescribing in paediatrics is complex and systems may be sub optimally designed to improve safety. In 2021-22, 14 DATIX incident reports were logged involving ciclosporin prescribing. Examples of prescribing errors include wrong doses, one which was a critical overdose. There is a clear need for improvement in prescribing practices, with the main aim of improving patient safety by reducing number of errors in prescribing of ciclosporin.

1st Plan-Do-Study-Act (PDSA) Cycle: Following a survey of junior doctors, measures were implemented to improve junior doctor's knowledge and confidence in prescribing (including single page crib sheet, teaching presentation at induction and attaching relevant guidance to EPIC prescribing system). Initial changes involved tracking of dose changes to improve visibility on single screen for prescribers. In addition, local standard operating procedure (SOP) advises dose changes in percentages and therefore a visual figure was added where dose changes are calculated electronically, to improve simplicity.

2nd PDSA cycle: Seven further ciclosporin prescribing errors were reported via DATIX between June 2022 and June 2023. Planning included reviewing feedback received by new cohort of Junior Doctors, and further suggestions were made for positive change to prescribing system. Further meeting was had with EPIC team to optimise and introduce changes based on feedback. Introduction of critical dose warning (including utilising a "hard-stop" functionality where doses were amended beyond 50%), trends of levels and creatinine. In addition, the "pop-up" warnings for interactions were made more robust.

Conclusions/Lessons learnt: Preliminary results have been positive – with only three DATIX incident reports (related to levels not being acted upon) since the implementation of changes in July 2023, with no errors in doses prescribed. Electronic prescribing systems have multiple mechanisms to support safe prescribing and a reduction in errors. There are questions about how to best implement these systems, and the above service improvement shows that optimisation of paediatric electronic prescribing system features does reduce dose errors and their effects on patients.[1] Pharmacists' involvement in testing these changes and validation is key. There is further work to be done, including yearly review of DATIX reports and a third PDSA cycle is underway with further changes. These are promising results to demonstrate how systems can be optimised for other drugs which require therapeutic drug monitoring e.g. vancomycin.

References
1. Sureda A et al. EBMT handbook. 2nd ed. Cham, Switzerland: Springer; 2019.
2. Westbrook J et al. Short- and long-term effects of an electronic medication management system on paediatric prescribing errors. Nat.Med. 2022: 179

P16 Management of steroid refractory graft versus host disease (SrGvHD): Use of Alpha-1-Antitrypsin (Respreeza©)

Rebecca O'Neill[1]

[1]*Great Ormond Street Hospital, London*

Graft versus Host Disease (GvHD) is a potentially life-threatening complication of allogeneic haematopoietic stem cell transplantation (HSCT). Despite the use of prophylaxis for GvHD, 40% of patients undergoing allogeneic HSCT may go on to require systemic steroids for acute GvHD. This can affect a multitude of organs include the gastrointestinal tract, skin and liver. Of these patients, roughly half will be resistant to steroid treatment, termed as steroid refractory GvHD (SrGvHD). Several immunosuppressive therapies have been attempted as second line but there is currently no consensus of treatment. There are usually marginal response rates and excessive toxicity, usually from infection. Second- and third-line therapies may be particularly difficult to obtain in paediatrics due to lack of commissioning and consensus.

Alpha-1-antitrypsin (AAT) is a protease inhibitor produced by the liver that inactivates several proteases from neutrophils and macrophages. Recently there has been further evidence published for the use of AAT, including induction of interleukin 10 (IL-10) and suppression of proinflammatory cytokines. Upon review of the literature, a case series of seven adult patients has been published demonstrating its use, but limited evidence available in paediatrics.

Respreeza® is licensed for maintenance treatment to slow progression of emphysema in adults with severe alpha1-proteinase inhibitor deficiency. Below is a brief outline of its use in a quaternary paediatric transplant centre.

Patient 1: 9 y/o female. Acute stage 4 gut GvHD (severe abdominal pain and blood), grade IV GvHD.

Patient had been on methylprednisolone for 3 weeks with no response. Unable to start Extracorporeal Photopheresis (ECP) due to multiple infections. Immunosuppression complicated by Prosterior Reversible Encephalopathy Syndrome (PRES), therefore ciclosporin had to be swapped to sirolimus. Alpha-1-Proteinase inhibitor started after worsening gut symptoms 3 weeks into steroid treatment, approved at local drugs and therapeutics committee. Had 7x twice weekly doses. Discharged once symptoms resolved on sirolimus, steroids 0.75mg/kg and mycophenolate mofetil. Supportive care (anti-fungals, anti-bacterial prophylaxis) were optimised to reduce risks of infection.

Patient 2: 13 y/o male. Acute gut GvHD stage 3 (confirmed by scope). Previous Skin GvHD. Managed on 2mg/kg methylprednisolone, ECP, Ciclosporin and MMF. Had 6 doses of AAT, initially approved for 8 doses but stopped early and swapped to ruxolitinib as patient's cytopaenias markedly improved.

Conclusions: The cases above highlight that treatment of SrGvHD is complex and challenging. The choice of treatment is often guided by "trial and error", risk of toxicity (e.g. preventing going up on dose of corticosteroids to limit toxicities and profiles of alternative therapies such as ruxolitinib). Often this is more challenging in paediatrics due to lack of enrolment into clinical trials and obtaining of newer available medication. This makes supply of medications against a robust pathway difficult for pharmacists and its treatment often involves novel therapies requiring individual evaluation. Optimising supportive care including anti-microbial prophylaxis is a key-role of pharmacists to improve the management of this complex cohort. Following local governance procedures to ensure robust scrutiny of evidence is essential.

References
1. Sureda A et al. EBMT handbook. 2nd ed. Cham, Switzerland: Springer; 2019.
2. Jenkins et al. Alpha-1-antitrypsin for the treatment of steroid-refractory acute-gastrointestinal graft-versus-host disease. (2017) 92: E610-611.
3. Magenau J et al. Alpha-1-Antitrypsin infusion for treatment of steroid-resistant acute graft-versus-host disease. Blood. (2018) 131;12: 1372
4. Electronic Medicines Compendium. Summary of product characteristics Respreeza 1000mg powder and solvent. Last updated May 2024.

P17 Use of steroid inhaler to reduce local irritation from transdermal patch

Sarah Pedlow[1], *Chris Black*[1], *Louise McLoughlin*[1], *Claire Lundy*[1]

[1]*Belfast Health & Social Care Trust, Belfast, Northern Ireland*

Report of two paediatric cases where a steroid inhaler was trialled to reduce inflammation and skin irritation associated with transdermal patch.

Transdermal patches are a useful route for administration of medicines in paediatric patients; providing modified absorption profiles over longer time periods, bypassing variable gastrointestinal absorption and hepatic first-pass metabolism. Skin reactions are a common side-effect associated with a number of transdermal patches including Buprenorphine1. Irritation is proposed to be due to contents of the adhesive, the active drug can also contribute to skin irritation. Steroid cream to treat reactions of the skin typically reduces patch adhesion. Anecdotal reports2 in adult palliative care patients suggests potential for steroid inhaler to be used topically at the site prior to administration of the patch, to reduce patch site inflammation and skin irritation, without affecting adhesion. This further supported by a case report3 in literature of a steroid inhaler being used topically to decrease peristomal inflammation without affecting adhesion of the stoma bag.

Patient 1

Complex intestinal failure patient, aged 13 years, with difficult to control pain. Pain team recommended trial of oral morphine; which was switched to low dose Buprenorphine transdermal patch due to hypotension after oral dosing. The buprenorphine patch provided effective pain relief, and blood pressure was more stable due to the modified release profile. The patient however developed skin irritation at the patch adhesion site, which necessitated tissue viability team intervention and treatment with honey dressing. The clinical team, patient and his family were keen to try to continue with a transdermal patch if possible, due to the benefits experienced and limited therapeutic options available.

A trial of Clenil inhaler, applied topically to the skin, prior to the Buprenorphine patch was commenced. Local site irritation was reduced, with mild transient erythema present on patch removal. Treatment with the transdermal patch continued for several months, until the patient's pain resolved and the patch was no longer clinically indicated.

Patient 2

Complex neurodisability patient, aged 2 years, with skin irritation at site of Clonidine patch, clinical team had concerns regarding potential variability of gastrointestinal absorption with oral dosing and were keen to continue with patch as route of administration.

A trial of Clenil inhaler applied topically prior to Clonidine patch application was commenced. Site irritation reduced, but not sufficiently to allow patch to continue and patch was discontinued.

Both patient's parents were counselled to spray 2 puffs of a Clenil 100 microgram/puff inhaler, topically to the skin site where the patch is to be applied, from a distance of 10-20cm, and to allow to dry for a few minutes before patch application. The patch site should be clean and dry before applying the patch. General advice to rotate sites was also given, broken areas of skin should be avoided to minimise systemic absorption of beclomethasone.

Topical application of steroid inhaler to the skin prior to transdermal patch application may reduce site irritation, allowing transdermal route to continue to be used for some patients, therefore reducing need to switch to alternative route.

References

1. Vander Hulst K, Parera Amer E, Jacobs C, et al. Allergic contact dermatitis from transdermal buprenorphine. *Contact Dermatitis.* 2008;59(6):366-9.
2. Topical steroid to reduce local irritation from patch analgesics; anecdotal reports discussion thread. Available from: www.palliativedrugs.com
3. Boland J, Brooks D. Topical application of a beclometasone steroid inhaler for treatment of stoma inflammation. *Palliative Medicine.* 2012;26(8):1055-1056.

P18 A review of paediatric parenteral nutrition incidents

Sarah Pedlow[1]

[1]*Belfast Health & Social Care Trust, Belfast, Northern Ireland*

Aim: To identify key themes relating to clinical incidents occurring in paediatric patients treated with parenteral nutrition (PN). Strategies to reduce incidence were suggested, implemented and then evaluated to determine effectiveness.

Method: Analysis of clinical incidents relating to paediatric PN reported using the Datix incident reporting system before and after implementation of several interventions.
All paediatric inpatients treated with parenteral nutrition between September 2019 and December 2021 were included, from all clinical areas, across a dedicated children's hospital providing regional paediatric specialties.
The primary intervention was increased Pharmacist resource to the Paediatric Nutrition Support Team (NST), this aimed to provide time for development of training; and to improve patient care by improving communication with clinical teams by attendance at ward rounds and multi-disciplinary meetings.
A programme of training was carried out within the Paediatric Intensive Care.
An out-of-hours PN policy was introduced; restricting access to PN out-of-hours to only those babies or children where the benefit of starting PN out-of-hours clearly outweighs the risk associated with starting PN without guidance of, or monitoring by the NST.
Primary outcomes measured were the number and severity of clinical incidents (per 1000 PN days) before and after interventions were implemented. The severity of clinical incidents were categorised using the National Council for Medication Error
Reporting and Prevention (NCCMERP) Index for Categorizing Medication Errors Algorithm[1], an internationally recognised tool used in incident prevalence studies[2 3 4]. Secondary outcomes included the type of error, the stage of process where the error occurred (prescribing, dispensing, administration and monitoring), age of the patient, ward location, and role of the reporter.

Results: Before the interventions 11.15 incidents per 1000 PN days were reported, this reduced to 6.55 per 1000 PN days afterwards. No harm (NCCMERP Category A-C) incidents increased from 3.25 to 4.37 per 1000 PN days after intervention. NCCMERP

Category D incidents, where harm did not occur as result of an intervention or additional monitoring, reduced from 4.18 to 0.55 per 1000 PN days. Harm incidents (NCCMERP Category E-I) reduced from 3.72 to 1.64 per 1000 PN days. Statistical significance was demonstrated using chi-squared test (p=0.05). When the secondary outcomes were reviewed it was found that the majority of incidents were prescribing errors, 76.9% of which were an incorrect rate. A majority of incidents occurred in babies less than 1 year of age, and within the surgical ward. Most incidents were reported by nurses and pharmacists, mirroring the previously reported literature[4].

Conclusions: A reduction in both number and severity of clinical incidents reported relating to Parenteral Nutrition was observed after the interventions were introduced. Increased no harm incidents after intervention suggests overall increased reporting, and is reassuring of low threshold to report clinical incidents. Further training should be targeted to the surgical ward, as the clinical area with highest number of incidents reported. An electronic healthcare record system has been introduced within the Trust since; incident number and severity since go-live should be re-assessed to determine target areas to focus future interventions.

References
1. NCC MERP Index for Categorizing Medication Errors Algorithm. Available from: https://www.nccmerp.org/sites/default/files/algorColor2001-06-12.pdf
2. Mistry P, Smith RH, Fox A. Patient Safety Incidents Related to the Use of Parenteral Nutrition in All Patient Groups: A Systematic Scoping Review. *Drug Saf*. 2022;45(1):1-18.
3. Narula P, Hartigan D, Puntis JWL. The frequency and importance of reported errors related to parenteral nutrition in a regional paediatric centre. *e-SPEN, the European e-Journal of Clinical Nutrition and Metabolism*. 2011;6:131-134.
4. Zhu K, Gill A. Incidents involving paediatric parenteral nutrition. *Arch Dis Child*. 2020;105(9):25.

P19 Pharmaceutical waste – reducing costs, and going green?

Agnieszka Sadowska-Koszela[1], *Patrick To*

[1]*Guy's and St Thomas' Hospital GSTT Trust, London*

Disposal of medication waste is subject to legislation and regulated by the Environment Agency[1]. At our Trust, we are looking at ways to ensure that medicines are disposed of in the safest, most cost-effective, and greenest manner. Medicines must be segregated and disposed of in an appropriate coloured waste container [2] according to their classification: medical hazardous (cytotoxic and cytostatic) waste, medical non-hazardous waste (e.g. paracetamol liquid), non-pharmaceutically active (e.g. sodium chloride 0.9%). Containers of pharmaceutical waste are collected at the Trust and sent to an external waste management service for incineration.

Aims and objectives: To investigate the cost of disposal of medication waste at the Trust
- Monitor the weight of the contents of the non-hazardous wastage bins (blue bins)
- Review the cost of the disposal/incineration of pharmaceutical waste
- Investigate available options of recycling empty medicines containers

Method: Data was collected on the weight of full blue bins for a period of 28 days (20/06/2024 – 18/07/2024) in a tertiary hospital dispensary and compared with the weight of the same bin filled with empty 200mL bottles only. Medicines waste was collected on a daily basis during pharmacy working hours, and bins were sealed once full as per standard Trust process. Fully sealed bins were weighed by the lead pharmacy technician, and contained a mixture of medicines waste. Data was recorded on the data collection form. These were compared to the weight of a blue bin that was fully filled with 39 empty 200mL glass bottles, as this was felt to represent the weight of a bin with only glass bottles, the bin weighed 5.82kg.

Trust waste management was contacted to review the cost of disposal of non-hazardous medicines wastage and recycling, which were £1050/tonne and £240/tonne respectively.

Results: During this collection period, six bins of non-hazardous medicines waste were collected in the tertiary hospital dispensary with an average weight of 8.58kg per container (51.48kg of waste was collected in total).

51.48kg is equivalent to 0.051 tonne so the calculable cost of disposal of the waste is £53.55, and including the cost of one blue bin is £5.063 [3] so the disposal cost of the six full blue bins within 28 days was £83.91. Extrapolated over a year, this would amount to £1085.64 in medicines wastage disposal costs.

Conclusion: Glass bottles contribute a significant impact on the cost of medicines wastage. The weight and volume of glass bottles, impact the number of blue bins that can be filled before they are sealed and sent for disposal. Our data collection shows that a saving of £48.02/month (£576.24/year) could be expected as there would be a reduction in the number of bottles being sent for incineration, therefore reducing the weight and the number of blue bins used.

By utilising recycling facilities, there is an overall reduction of cost as recycling medication bottles is significantly cheaper than medicinal waste disposal. Future studies could show that this reduction would also benefit the green aspirations of our Trust.

References
1. 'Disposing of medicines' [Internet] Page last updated: 23 February 2023 Available from: https://www.cqc.org.uk/guidance-providers/adult-social-care/disposing-medicines
2. Trust Medicine Policy 'Code of practice for supply, storage and disposal of medicines'. Guy's and St Thomas' NHS Foundation Trust, version V5.2. Effective from 01 September 2018. Document location: Intranet folder, live version stored
3. NHS SUPPLY CHAIN (Maidstone), [Internet], Available from: https://my.supplychain.nhs.uk/Catalogue

P20 Innovative home milrinone infusion service for a paediatric patient

Sadhna Sharma[1], *Katrina Ford*[1], *Denis Buckley*[1], *Heart and Lung Transplant Team*[1]

[1]*Great Ormond Street Hospital, London*

Introduction: Heart failure in children is a progressive condition that can be illustrated by symptoms that include poor growth, oedema, fatigue, and exercise intolerance. Over time this will worsen, with the child experiencing decline in health and increased hospital admissions. In end-stage heart failure, the symptoms become refractory to oral medications thus leading to the child becoming dependent on IV treatment. Milrinone is a potent inhibitor of phosphodiesterase type III. It improves cardiac output through its positive inotropic effects with little chronotropic effect, and it reduces afterload due to its vasodilation properties. Home milrinone therapy in adults was first reported over 30 years ago. Home intravenous (IV) inotropic therapy has been suggested as a benefit to support patients awaiting heart transplant, but to date, there is limited data on the use of home inotropic therapy in children. We have successfully trialled home milrinone in a 12-year-old patient.

Context: A 12-year-old was admitted to the cardiac unit at the end of 2022 due to worsening oedema and exercise intolerance secondary to Fontan failure due to severe systemic right ventricular dysfunction. During his 10-month admission there were multiple attempts to wean the patient off inotropic support, but this was unsuccessful due to fluid accumulation, rising NT-proBNP, reduced mixed venous saturations etc. There was a broad agreement that home milrinone was in the best interest of the patient. Although there are many technical aspects to consider when providing home milrinone, the group consensus was that none of these are unachievable.

Several multi-disciplinary team meetings (MDTs) took place to discuss the logistics. Numerous pharmacy-specific logistical challenges were encountered, the first being the manufacturing of milrinone. The appropriate concentration and stability information was established with the clinical and technical services pharmacists. Arrangements were made with the manufacturing unit to supply milrinone batches weekly. Parents collected and stored this in the refrigerator at home with no adverse events. The patient needed a home IV pump, after exploration of various options with the cardiology team, it was decided that the best approach would be to have the palliative care team lend the family a pump. Training and information packs on this pump were created and training with the nurse specialists and carers were organised.

Conclusion: Continuous milrinone infusion is a life-saving therapy for children who are awaiting heart transplant. Home milrinone therapy offers multiple benefits for the children and their families, along with cost savings and capacity relief for hospitals. Although home milrinone therapy carries risks, it is imperative to highlight the rarity of this. Furthermore these can be reduced through excellent communication, extensive family training and close follow-up. The pharmacy department, as part of the collaborative, multidisciplinary team, has an important role in supporting home milrinone therapy by infusion. For the patient, the pharmacy team played a key role in solving the logistical challenges associated with taking a medication that had previously been used only in the ICU and moving into an outpatient setting.

References
1. Xue A, Dersch-Mills D, Tsang C, Greenway SC. Pharmacy Support of a Pediatric Patient Receiving Milrinone at Home. Can J Hosp Pharm. 2016;69(5):415-9.
2. Curley M, Liebers J, Maynard R. Continuous Intravenous Milrinone Therapy in Pediatric Outpatients. J Infus Nurs. 2017;40(2):92-6.
3. McCloskey WW. Use of intravenous inotropic therapy in the home. Am J Health Syst Pharm. 1998;55(9):930-5; quiz 53-4.
4. Cesario D, Clark J, Maisel A. Beneficial effects of intermittent home administration of the inotrope/vasodilator milrinone in patients with end-stage congestive heart failure: a preliminary study. Am Heart J. 1998;135(1):121-9.

P22 Implementing smart pumps and standard infusions in paediatric care: A scoping review

Adam Sutherland[1], *Sharon Lau*[2], *Sara Arenas-Lopez*[3,4]

[1]*School of Pharmacy & Medical Sciences, University Of Bradford,* [2]*Manchester University NHS Foundation Trust,* [3]*Evelina London Children's Hospital,* [4]*School of Pharmacy, Kings College London*

Background: Intravenous medication processes are error prone. As many as 1% of all IV medication administrations are associated with a potentially harmful error due to complex processes. Children are at higher risk in part due to their reliance on weight-based infusions.[1] Recommendations to mitigate these errors include Standard Concentration Infusions (SCIs) and use of "Smart Pumps".[2] There are recommendations for paediatric standard concentrations in the UK but a framework for their implementation is not defined.[3] This scoping review aimed to explore the global literature relating to the implementation and outcomes of SCIs and smart pumps in paediatric practice.

Methods: The primary question was "How are infusions and smart pumps implemented in paediatric practice?" We searched Embase and Medline from inception to September 2023 for the scoping review methodology. Titles and abstracts were reviewed against inclusion criteria (paediatric or neonatal care, reporting infusions (including SCIs) and/or pumps as the intervention, in English) by SL. A 10% sample of each group of titles and abstracts was reviewed for quality by AS. Data pertaining to context (participants and setting), mechanism (technology and evaluators) and outcome (quantitative, qualitative and economic measures) were extracted and entered into a proforma developed by AS and SL. Data was reviewed and validated independently by SAL.

Results: 37 papers met the inclusion criteria.

36 studies were set in high-income countries and one in a middle-income country (Brasil). 23 studies were set in critical care and transport services, 13 in secondary paediatric hospital services (ED, theatres) and one in a community hospital. Most studies were audit or QI. All studies were observational and 27 used prospective methods. There were no clinical trials.

SCIs were identified in five papers, and use of smart pumps in 19. Eight papers studied CPOE and electronic drug calculators. Two studies reported quantitative drug concentrations, and three studies reported the use of prefilled syringes. Methods of delivery of infusions were not stated in the remaining studies. Guidelines were reported within the context of smart pump use.

Clinical outcomes were only reported in nine studies – eight on medication errors (variation in infusion concentration, guideline compliance), one study reported haemodynamic events. Four studies reported economic outcomes but these were not generalisable. The remaining studies reported operational outcomes around design and implementation only.

Conclusions: This review has demonstrated that there is a lack of robust study of SCIs and Smart Pumps in paediatric practice. Where they are used it is mainly in developed countries and specialist centres. There was no standard intervention description which made comparison between studies difficult. There were several studies where SCIs were implemented BECAUSE of Smart Pumps, but there are no comparative studies to suggest interventions are dependent. There has been no economic assessment of SCIs or smart pumps in paediatrics to support the further development of these systems. There is a need for systems-focussed study of both SCIs and smart pumps in a range of paediatric settings in order to support implementation across the spectrum of paediatric care.

References

1. Sutherland, A., et al., The impact of drug error reduction software on preventing harmful adverse drug events in England: a retrospective database study. BMJ Open Quality, 2022. 11(3): p. e001708
2. Sutherland, A., et al., Developing Strategic Recommendations for Implementing Smart Pumps in Advanced Healthcare Systems to Improve Intravenous Medication Safety. Drug Safety, 2022. 45(8): p. 881-889.
3. RCPCH and NPPG, Standardising intravenous infusion concentrations in children in the UK | RCPCH. 2021.

P23 Co-production of a values and behaviours framework for a pharmacy department

Alison Tennant[1], *Tayebah Abbasi*[1]

[1]*Birmingham Women's and Children NHS Trust, Birmingham*

Problem: Staff survey and exit interviews indicated that staff perceived there was a lack of support and lack of opportunities within the department.

Solution: To engage staff in identifying what the actual issues were, what barriers to progression were perceived, what culture they wanted within the department and how it might be achieved.

Method: Starting with the Simon Sinek 'Why?' question we held workshops with the whole department on what motivated them to come to work and what they perceived the issues to be. We asked three questions, Why do you come to work, How do you think Pharmacy is seen by the Trust, How would you like Pharmacy to be seen? From the feedback wordles were created that were shared with the teams.

The next step was to hold further workshops for groups to create posters describing the culture that they wanted within Pharmacy. The posters consisted of an outline of a person and a mirror for the face. The premise being that how should each of us behave to create the culture we wanted. Nine posters were created that were displayed in the department.

The words on the posters were pulled together into a spreadsheet to create themes. These became Problem Solving, Accountable, Compassionate and Team working. One of the ATOs used to be a graphic designer so he worked with some of the staff to visualise how this could be displayed around the department. They came up with the Pharmacy PACT Prescription. They created a poster that looked like a prescription. This poster was reproduced in A1 and displayed around the Department.

Outcome: The PACT model is now used as the framework for initiatives such as Star of the month, learning from excellence etc. We also hold education sessions under each theme e.g. all QI training is badged as Problem solving, we have shared the accountability ladder and discussed how we take accountability for our own actions. It is too early to see the impact on indicators in the staff survey but exit interviews have improved and HR concerns have decreased.

References
Sinek, S. (2011). Start with why. Penguin Books.

P24 Does standardised parenteral nutrition provide adequate electrolytes for children on paediatric intensive care?

Sarah Whiteley[1]

[1]*Leeds Teaching Hospitals NHS Trust, Leeds*

Aim: Standardised parenteral nutrition (PN) is preferred over bespoke PN as it eliminates many risks and requires less resource to produce1. Children weighing 2.5kg-5kg typically receive Numeta G16 and children weighing 5-20kg typically receive Numeta G192, both containing electrolytes at fixed quantities. This audit aims to discover if these two standardised bags provide adequate electrolytes for patients on paediatric intensive care (PICU). Patients on PICU have various underlying presentations that may affect their electrolyte requirement such as acute kidney injury, diuretic requirement, or tumour lysis syndrome. While the purpose of PN is to provide nutrition2, electrolyte requirements can direct prescribing decisions regarding which PN regimen to choose.

Method: This is a retrospective audit whereby all patients managed with Numeta G16 or Numeta G19 while on PICU in 2023 were included in the study. As it is possible to give both enteral and intravenous (IV) electrolyte corrections of potassium, magnesium, calcium, phosphate and sodium on PICU3, the total number of electrolyte corrections administered whilst on standardised PN, according to the medication chart, was recorded for each patient. Where a patient was switched from a standard bag to a bespoke regimen the reason for the switch was recorded.

Results: Sixteen patients prescribed Numeta G16 were included. One patient required no electrolyte corrections. Patient 16 was commenced on bespoke PN initially to prescribe without potassium or phosphate due to renal failure, but later changed to Numeta G16. Three patients had to change to bespoke PN: Patient 11 changed for additional sodium requirements; Patient 16 changed to reduced lipid PN; Patient 2 changed to bespoke but no reason was documented. Thirteen patients prescribed Numeta G19 were included. All patients required electrolyte corrections. Patient 7 was started on bespoke PN without potassium or phosphate due to renal failure, but later switched to Numeta G19. They were then switched back to bespoke PN due to requiring a high number of potassium corrections. Four other patients changed to bespoke PN: Patient 1 changed for increased potassium requirements and to manage high blood glucose levels; Patient 11 changed to an adult PN standard bag due to not enough volume in Numeta G19 to meet calorie requirements; Patient 12 changed to give more phosphate due to lack of adequate intravenous access and line time to run IV phosphate separately; Patient 5 changed to reduce calcium and lipid content.
The most frequent electrolyte correction given was potassium. This may be due in part to most patients being managed on diuretics. The second most frequent was magnesium, with calcium and phosphate requiring relatively few corrections.

Conclusion: Most patients tolerated standardised PN with 5 out of 29 patients requiring a switch to bespoke PN for electrolyte management. This shows that from an electrolyte management standpoint, standard bags are suitable for most PICU patients where administration of electrolyte corrections is possible. Further auditing to compare these findings to PICU patients on enteral feeds and a similar study of non-PICU patients on PN where electrolyte corrections aren't as practical may be useful.

1. References
1.Royal Pharmaceutical Society, Neonatal and Paediatric Pharmacist Group. Improving practice and reducing risk in the provision of parenteral nutrition for neonates and children. A report from the Paediatric Chief Pharmacists Group: London; 2011 Nov [Accessed 20 October 2024]. Available from: https://www.rpharms.com/Portals/0/RPS%20document%20library/Open%20access/Hospital%20Pharmacy%20Hub/minimising-risk-pn-children-%286%29.pdf
2. 2. Iglesias N. Standard parenteral nutrition guide for paediatric and neonatal children. Leeds Teaching Hospitals NHS Trust: Leeds; 2023 Jul [Accessed 20 October 2024]. Available from: https://www.leedsformulary.nhs.uk/docs/Standardised%20PN%20guide%20for%20children%202023.pdf?UNLID=81151394020241027165115
3. 3. Brooks, T. Guideline for electrolyte replacement on PICU. Leeds Teaching Hospitals NHS Trust: Leeds; 2022 Jan [Accessed 20 October 2024]. Available from: https://www.leedsformulary.nhs.uk/docs/PICU%20Electrolytes.pdf?UNLID=811513940202410271651 5

P25 Development of high strength 50mg/2ml hydroxocobalamin injections to treat Cobalamin C deficiency

Sam Whiting[1]

[1]*University Hospitals Bristol & Weston NHS Foundation Trust, Upper Maudlin Street, Bristol*

Situation: Cobalamin C deficiency is a metabolic disorder where individuals are given hydroxocobalamin injections to overcome this deficit. Treatment leads to improved survival and abates some clinical symptoms. Biochemical markers include a raised serum homocysteine and methylmalonic acid levels. There is currently no optimal dosing for the drug in this condition, although several papers suggest higher dosages lead to better outcomes.

In the UK, the highest strength of hydroxocobalamin obtainable is 10mg in 2mls. In a paediatric setting this preparation limits the dosage to 10mg daily as multiple intramuscular (IM) injections are seldom tolerated.

Working with our production unit and quality assurance (QA) departments a higher strength 50mg in 2ml syringe was developed. The regional QA laboratory tested the product to allow the expiry extension to 35 days once made.

Each batch of 100 produces a yield of 84 syringes, which is released by QA 7 days after manufacture, provided it passes sterility tests and compounding checks as per MHRA Rules and Guidance for Pharmaceutical Manufacturers and Distributors. The syringes are then dispensed and couriered to three patients. Gradually all patients were given the full 50mg IM injection. Two patients tolerate taking 50mg daily, and the third takes 50mg every other day.

All patients were consented to this treatment in a pharmacist led clinic and prescribed and monitored jointly with the metabolic consultants. Biochemical changes symptomatic of disease were monitored regularly.

Conclusion: A strong relationship was shown between the higher strength 50mg in 2ml hydroxocobalamin injections and lower homocysteine and methylmalonic acid levels. Patients fully accepted the formulation change and had improved tolerability compared to the previous 10mg in 2ml strength.

Discussions are ongoing to extend the expiry of the syringes further so more patients could benefit from other centres.

References

1) Sloan JL, Carrillo N, Adams D, et al. Disorders of Intracellular Cobalamin Metabolism. 2008. Seattle (WA): University of Washington, Seattle; 1-42

2) Matos IV, Castejón E., Meavilla S., et. al, Clinical and biochemical outcome after hydroxocobalamin dose escalation in a series of patients with cobalamin C deficiency, Molecular Genetics and Metabolism, 2013; 109: 360-365.

3) Scalais E, Osterheld E, Geron C, et al. Parenteral hydroxocobalamin dose intensification in five patients with different types of early onset intracellular cobalamin defects: Clinical and biochemical responses. Journal of inherited metabolic disease. 2019: Jul 1;49(1):70-79.

4) Dionisi-Vici C., Martinelli D., Ceravolo F., et al, Optimizing the dose of hydroxocobalamin in cobalamin C (cblC) defect, Molecular Genetics and Metabolism, 2013; 109: 329-330

P26 Improving training and competency assessment of chemotherapy prescribers on the EPIC beacon system

Munsur Ahmed[1]

[1]*Great Ormond Street Hospital, London*

Context and Problem: The transition to the EPIC Beacon system within our Trust has significantly altered the training and competency assessment of prescribers in Systemic Anti-Cancer Therapy (SACT). Previously, a hybrid system of paper-based and electronic prescribing (chemocare) was employed, which relied on real-time prescribing for live patients under supervision. This approach was limited by the availability of specific patient cases, restricting the ability to evaluate prescribers across a wide range of scenarios. The new EPIC Beacon system, however, offers functionalities that allow the use of test patients for comprehensive competency assessments.

Intervention: We implemented a three-stage training and competency assessment process. Initially, prescribers underwent basic functionality training conducted by an Associate Specialist, which provided access to full system capabilities upon successful completion. Following this, a Specialist Haemato-Oncology pharmacist provided in-depth training on the clinical and technical aspects of chemotherapy prescribing and administration, and the practical aspects of chemotherapy prescribing. This phase concluded with an assessment involving multiple scenario-based prescribing tasks. Additionally, prescribers required to administer intrathecal chemotherapy received supervised training.

Strategy for Change: To simulate diverse clinical scenarios, we created a set of 15 test patients in the ACE environments (ACE1 and ACE5 hyperspace and hyperdrive) representing various age groups and cancer types. Each test patient was associated with 10-15 scenario questions encompassing multiple tasks and reflecting different prescribing challenges within protocol courses and cycles. This setup allowed simultaneous training of up to 15 prescribers without overlap, facilitating group training sessions. The test patients were programmed to reset to their default status nightly, ensuring readiness for subsequent assessments.

Measurement of Improvement: Group training proved more efficient compared to individual ad hoc training, although accommodating new or late recruits still demanded significant pharmacy resources. Over time, we expanded the pool of pharmacy trainers to alleviate time pressures. Allowing prescribers to practice on the test system before assessment introduced new challenges, including the need for timely availability of pharmacy assessors and delays in assessment completion by prescribers. To address these issues, we allocated protected time for completing the final accreditation process, including signing clinical trial delegation logs and ensuring a valid Good Clinical Practice (GCP) certificate.

Outcomes: Since the implementation of the EPIC system in April 2019 till July 2024, 117 prescribers have been trained and added to our SACT register, including 82 senior doctors, 8 non-medical prescribers, and 27 consultants. Only two trainees required a second assessment.

Conclusion: The structured training and competency assessment workflow established with the EPIC Beacon system ensures safe and effective chemotherapy prescribing and administration. Utilizing test scenarios in the ACE environment allows comprehensive competency evaluations through a variety of clinical scenarios. The ACE functionality supports simultaneous training and assessment of multiple users, proving efficient and maintainable. This approach has successfully enhanced the training quality and competency assurance of chemotherapy prescribers within our Trust.

P27 Could prescribing minor ailments pharmacists relieve pressure from paediatric accident and emergency departments?

*Octavio Aragon Cuevas[1], **Lauren Breen**[2]*

[1]Alder Hey NHS F Trust, Liverpool, [2]Liverpool John Moores University, Liverpool

Background: Minor ailments (MA) are conditions that usually last for a short period of time and can be managed without medical intervention (1). Children are particularly susceptible to minor ailment conditions due to their developing immune systems and close contact with other children (2). MAs need to be treated in an appropriate setting, by an adequately trained healthcare professional (HCP). Prescribing pharmacists could reduce pressures on paediatric A&E by treating MAs (3).

Methods: Approximately 10% of patients visiting A&E at a tertiary paediatric centre were reviewed for one week of each season from 31/10/2022 to 31/07/2023. A data collection form was created to collate information about paediatric A&E visits and whether they could have been prevented by visiting a MA trained prescribing pharmacist. MAs included were extracted from the Care at The Chemist Scheme Liverpool 2021 and included acute bacterial conjunctivitis, allergy, athlete's foot, cold sores, constipation, contact dermatitis, cough, diarrhoea, headache, pain, and temperature, head lice, infant colic, mouth ulcers, nappy rash, nasal congestion, oral thrush, sore throat, teething, threadworm and warts and verrucae.

Results: Of the 495 patients' cases reviewed, 76 (15%) could have been handled entirely by a MA prescribing pharmacist. All of these preventable visits were treated with medicines readily available in the community pharmacy and no investigations were needed that would not have been accessible to a community or primary care pharmacist. The most common MAs that presented to paediatric A&E were headache/pain/fever (34%) and allergy/hayfever (19%).

Conclusion: It would be beneficial for a MA prescribing pharmacist to be employed in paediatric A&E. They could consult with patients, give them treatments and advice and improve health literacy amongst families thus reducing current and future waiting times. The percentage of patients that could have been safely and competently seen by a MA prescribing pharmacist could be even higher if Pharmacy First paediatric indications were to be included. Future research should include the calculation of financial and time savings that employing a MA prescribing pharmacist in A&E could lead to. It should also include Pharmacy First paediatric indications to ascertain the full scope of practice a MA prescribing pharmacist could have in a paediatric A&E department.

References

(1) Pillay N, Tisman A, Kent T et al. The Economic Burden of Minor Ailments on The NHS in the UK. The Journal of Consumer-led health. 2010;3:105-116.
(2) Community Pharmacy England (2022). Minor Ailments Service. Available from: https://cpe.org.uk/lpcs-and-local/locally-commissioned-services/en8-minor-ailments-service/ [Date accessed: 20/10/2023].
(3) Pharmacy Research UK (2014). Community Pharmacy Management of Minor Illness. Available from: https://pharmacyresearchuk.org/wp-content/uploads/2014/01/MINA-Study-Final-Report.pdf [Date accessed: 20/10/2023].

P28 Evaluation of dosing sets for gentamicin and amikacin in EMPA for paediatric patients

*Octavio Aragon Cuevas[2], **Irin Jose**[1], Kate Shemilt[1], Andrew Taylor[2]*

[1]Liverpool John Moores University, Liverpool, [2]Alder Hey NHS Foundation Trust, Liverpool

Background: Paediatric patients are more vulnerable to medication errors and the adverse drug reactions that can result from the medication errors (1) 5. The aim of this research was to evaluate whether the addition of dosing sets for intravenous (IV) gentamicin and amikacin into an EPMA system will help reduce medication error rates thus improving patient safety.

Method: The study was a before and after audit where data was collected retrospectively through documentation reviews. Data including age, weight, dose prescribed, utilisation of the dosing set or not and indication was obtained from an electronic prescribing and medicines administration (EPMA) system at a large tertiary paediatric hospital. A total of 200 prescriptions (100 before and 100 after) were analysed and compared against Trust guidelines to determine clinical accuracy.

Key Findings: Integration of dosing sets to EPMA systems significantly reduced medication errors. Error rate went from 14/100 (14%) to 6/100 (6%) after implementation of dosing sets for IV gentamicin and amikacin; this was found to be statistically significant (p=0.021). Dosing errors (miscalculated doses and frequency) were the most common medical error that was detected from the erroneous prescriptions. Surgical prophylaxis was the indication with the highest incidence of errors both pre and post implementation (70% and 43% respectively).

Conclusion: Dosing set implementation has the potential to significantly reduce medication errors in the paediatric population, however there can be some setbacks to dosing sets such as prescribers selecting the wrong dosing set from drop down lists (2). Further research including a larger sample size and variation of EPMA systems need to be conducted to further support the positive impact of dosing sets.

References
(1) Kaushal R. Medication errors and adverse drug events in paediatric inpatients. JAMA 2001;285(16):2114-20. doi:10.1001/jama.285.16.2114. Available from: https://pubmed.ncbi.nlm.nih.gov/11311101/
(2) Gates PJ, Meyerson SA, Baysari MT, et al. The Prevalence of Dose Errors Among Paediatric Patients in Hospital Wards with and without Health Information Technology: A Systematic Review and Meta-Analysis. Drug Safety. 2018.Vol16;42(1):13–25. Available from: https://link.springer.com/article/10.1007/s40264-.018-0715-6

P29 Kapsule Kids

Snehal Bakrania[1], *Sadhna Sharma*[1]

[1]*Great Ormond Street Hospital, London*

Background: Liquid medication is often the default choice in paediatric prescriptions due to the assumption that it is easier to administer in children. There are several setbacks to relying on liquid medication including shortages of raw materials, cost, and harm to the environment. Evidence suggests children as young as three can safely swallow tablets and capsules, leading to successful initiatives like Pill School at Evelina London Children's Hospital and the KidzMed project at Great North Children's Hospital. 1,2 Following suit, Great Ormond Street Hospital (GOSH) implemented a similar program to train post-heart and lung transplant patients to take pills, aiming to transition lifelong medication recipients to more sustainable formulations. There is an average of 20 heart and/or lung transplant patients at GOSH per year who require expensive medications, often for their lifetime. We focussed on this population for a trial of our changes.

Intervention: Transplant medications that were included consisted of tacrolimus, mycophenolate mofetil (MMF), paracetamol and co-trimoxazole. Eligible patients were identified by a Multidisciplinary Team. Training was conducted by the ward pharmacist and ward Medicines Management Technician using techniques outlined on the KidzMed training platform, Evelina's Pill School protocol and through development of our own pill information booklet for patients. The Cardiac Ward pharmacist would explain the aims of Kapsule Kids to the patient and their parents/carers post-transplant. Upon agreeing to participate, the patient's take-home medicines were prescribed as pills and dispensed to the ward soon after to facilitate early training in the controlled environment of the ward prior to discharge.

Outcomes: In the project period, 5 patients successfully transitioned to pills. Projected savings below are based on transitioning 10 patients a year and include 1 year's supply of tacrolimus and MMF and a 6-week supply of co-trimoxazole (from then provided by local pharmacy). Clinically, patients and families were reassured that swallowing pills is safe and may improve compliance due to poor palatability of some liquid medications. This also helped address concerns regarding national co-trimoxazole liquid shortages. From this project, our projected savings were 329 kgCO2e per year, equivalent to driving 972 miles in an average car and £258,255. Socially, pills are easier to transport and store, and have longer expiry dates once opened. Therefore, transitioning to pills improves long term independence and saves time for ward nursing staff through drawing fewer liquid medicines. This also reduced the need for MMF liquid which carries teratogenic risks to pregnant staff.

Key learning point: There are many benefits to training patients on how to take pills from an early onset including improved adherence, cost savings, better continuity of care and is more environmentally sustainable. Simply asking patients if they would like to attempt taking pills can lead to patient engagement. Easing parent and carer anxiety and finding an acceptable vehicle of delivery are the keys to encouraging children to transition. Creating a safe and comfortable environment with room for an open discussion has been the main driver for empowering the patient through and has provided us the success to sustainability.

References

1. Rashed AN, Terry D, Fox A, Christiansen N, Tomlin S. Feasibility of developing children's Pill School within a UK hospital. Archives of Disease in Childhood. 2021;106(7):705-8
2. Tse Y, Vasey N, Dua D, Oliver S, Emmet V, Pickering A, et al. The KidzMed project: teaching children to swallow tablet medication. Archives of Disease in Childhood. 2020;105(11):1105-7.

P30 Opinions on ePMA: The point of view of staff on NICU pre-rollout

Cerys Bicknell[1], *Thomas Wyllie*[1]

[1]*Cardiff And Vale University Health Board, Cardiff*

Context: Electronic Prescribing and Medicines Administration (ePMA) will be launched in the neonatal unit in Summer 2025. ePMA involves the transition from paper drug charts to a digital system and aims to make the processes of prescribing, reviewing, transcribing and administering medication safer, easier and more efficient.

Aim: To gather the thoughts and opinions of neonatal staff about the implementation of ePMA in order to manage expectations, tailor training and enable a smooth digital evolution.

Method: A Microsoft forms survey was produced and sent out to all consultants, trainees, advanced neonatal nurse practitioners (ANNPs), senior nurses and practice educators, and a QR link to the survey was posted around the neonatal unit. Questions included both closed and open questions, giving the staff member opportunities to elaborate their thoughts. The survey was live for one week and was completed by 42 members of staff before results were analysed.

Results: 67% of staff who completed the survey believe that ePMA will be a positive step for patient care, and 67% believe that ePMA will help to reduce the number of prescribing and/or administration errors.

71% of staff have no experience of using ePMA before, highlighting the importance of pre-implementation training sessions for all staff.

The biggest concerns staff highlighted in the survey were: a lack of computers/ IT resources for staff, slow internet connection, training, and overcoming attitudes against change. The clinical issues highlighted were concerns over the ability to prescribe unlicensed medications/doses, and the issue of weight-based and gestation-based dosing which can vary significantly in a neonatal unit.

Discussions: This study shows that although overall neonatal staff believe that ePMA is a positive change, there is a lack of confidence that the system will be suitable for a neonatal environment, with some staff members averse to the upcoming changes. Staff believe that ePMA will help to reduce medication errors, which is in concordance with a systematic review that looked at 25 studies analysing the effect of ePMA on medication error rate, demonstrating that 23 studies showed a relative risk reduction of between 13 and 99% (1).

To overcome staff concerns, the ePMA team have employed a pharmacist to solely focus on the configuration of ePMA for paediatrics. Learning will be taken from other paediatric hospitals across the UK that have already adopted ePMA, as well as national guidance and recommendations following an error of a 10x overdose of an anticoagulant in a child shortly after ePMA implementation (2).

Next Steps: The survey will be repeated just before and after implementation to understand if the actions taken have improved staff opinions of ePMA, confidence in transitioning to digital systems, as well as attitude towards change.

References

1. Ammenwerth E, Schnell-Inderst P, Machan C, et al. The effect of electronic prescribing on medication errors and adverse drug events: a systematic review. J Am Med Inform Assoc. 2008 Sep-Oct;15(5):585-600.
2. Weight-based medication errors in children, HSSIB. 2024. Available at: https://www.hssib.org.uk/patient-safety-investigations/weight-based-medication-errors-in-children/ (Accessed: 18 July 2024).

P31 The Pharmacy Technician within a children's hospice: Building new roles

Louise Bradshaw[1], *Susan Williams*[2]

[1]*Ty Gobaith Children's Hospice, Conwy,* [2]*Hope House Children's Hospice, Oswestry*

Background: Hope House children's hospice supports seriously ill children by offering respite, symptom management and end of life care across their two hospices which cover Shropshire, Cheshire, Powys, and North Wales. Combined the hospice's reach approximately 260 families and employ around 146 staff to deliver specialist care.

Context: The hospices are primarily nurse led with a visiting GP and access to a consultant in paediatric palliative medicine to provide support. Nursing staff were undertaking all tasks relating to medicines management, with nominated staff to complete medicines reconciliation, training, and auditing. Medicines are rated the highest risk area within care delivery, and with shortages in nursing staff the hospice identified a need for specialist support within this area and proposed the introduction of a pharmacy technician.

The first part time pharmacy technician role was advertised in 2019 and within a few months it became apparent that a full-time role would be required, this was then replicated across both sites. The role would encompass medicines reconciliation, training and education, medicines optimisation (including incident analysis), auditing, procurement, and counselling.

To understand the impact of the pharmacy technician role within the hospice a questionnaire was sent to a selection of care team staff to evaluate how the role had been received, whether it was felt to be beneficial and any ideas for future development, alongside this a deep dive of interventions made by the technicians at both sites was undertaken.

Conclusion: The introduction of the pharmacy technician role has enabled nursing staff to utilise their skills more effectively and focus on providing expert care to the hospice residents. Professionals and families have a dedicated point of contact for medicine support and the hospice team have access to the pharmacy technician's specialist knowledge and skills.

The role of the technician has expanded since its introduction in 2019. Two full time posts ensure there are safe and effective medicine management processes in place. The role is now embedded into the hospice and is a fundamental part of the hospice care team.

In the future there is potential for further development of the technician role within the hospice setting which could continue to enhance the service. As far as we are aware Hope House Hospices are the only children's hospices that employ pharmacy technicians. It would be good to see more healthcare settings benefiting from the implementation of roles such as these by investing in the right person with the right specialised skill set to carry out the right job.

P32 Are cardiac infants on parenteral nutrition at greater risk of intestinal-failure associated liver-disease?

Teresa Brooks[1], *Alix Rhodes*[1]

[1]*Leeds Teaching Hospitals NHS Trust, Leeds*

Aim: The aim was to see if there was a specific association with intestinal failure associated liver disease (IFALD) in infants with congenital heart disease (CHD) whilst on parenteral nutrition (PN).

Parenteral nutrition is commonly provided to infants with CHD due to feeding delays associated with clinical status. IFALD is well-documented with liver cholestasis affecting up to 15.7% of all infants with short-term PN (≤1month), 60.9% in long-term PN (≥2months) (1). CHD can be associated with liver dysfunction (2) which could hinder hepatocytes from secreting bile, resulting in cholestasis. The aim was to see if there was a specific association with IFALD in infants with CHD whilst on PN.

Method: A retrospective review was conducted looking at patients less than 1 year of age with CHD on PN for greater than 14 days between 2017-2023. The enteral feeding status was noted and baseline and peak bilirubin levels, with percentage of conjugated bilirubin were reviewed.

Results: 46 episodes of PN were included in the data collection. 59% of PN were in the neonatal period (≤28 days), of this 96% had a bilirubin peak within 14 days of PN, these were not deemed as IFALD, but likely neonatal jaundice. 4% (n=1) had a bilirubin peak at day 35 of PN and high percentage conjugated bilirubin, reflecting a case of cholestasis.
41% of PN episodes were in infants (>28 days). In this cohort 84% had no rise in bilirubin against baseline or remained in reference range. 16% (n=3) had a bilirubin peak after 14 days, 2 patients had no conjugated bilirubin screen, whilst one had a high percentage of conjugated bilirubin.
In 82% of episodes enteral feeds were started within 14 days of starting PN.

Conclusion: There was a high frequency of possible neonatal jaundice in the cohort making definite conclusions hard to determine. Discounting these cases, only 4% of PN episodes lasting >14 days developed elevated total bilirubin and/or high percentage of conjugated bilirubin suggesting a possible link to IFALD. Compared to the frequency of PN cholestasis in the literature (15.7-60.9% (1)) this is low, suggesting CHD may not be associated with a greater risk of IFALD.

Additional consideration needs to be given to protective factors in place impacting on results seen. Over the past 5 years lipid emulsion within the Leeds Children's Hospital have change to primarily SMOFlipid 20% or ClinOleic, which is known to decrease plasma bilirubin levels (3), therefore reducing patients meeting the threshold for cholestasis diagnosis. Also, the majority of patients were commenced on enteral feeds within the first 14 days of PN, which is known to stimulate the entero-biliary axis and protect against IFALD. (4)

References

1. Lauriti G, Zani A, Aufieri R, Cananzi M, Chiesa P, Eaton S, Pierro A. Incidence, Prevention, and Treatment of Parenteral Nutrition–Associated Cholestasis and Intestinal Failure–Associated Liver Disease in Infants and Children. Journal of Parenteral and Enteral Nutrition 2013;70-85
2. Reiter F, Hadjamu N, Nagdyman N, Zachoval , Mayerie J, De Toni E, Kaemmerer H, Denk G. Congenital heart disease-associated liver disease: a narrative review. Cardiovascular Diagnosis and Therapy 2021;11(2):577-590
3. Goulet O, Antebi H, Wolf C, Talbotec C, Alcindor L.G, Corriol O, Lamor, M, Colomb-Jung V. A new intravenous fat emulsion containing soybean oil, medium-chain triglycerides, olive oil, and fish oil: A single-center, double-blind randomized study on efficacy and safety in pediatric patients receiving home parenteral nutrition. J. Parenter. Enter. Nutr. 2010;34:485–495
4. Hartman C, Shamir R, Simchowitz V, Szimonetta L, Cai W, Decsi T, ESPGHAN/ESPEN/ESPR/CSPEN working group on pediatric parenteral nutrition. ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: Complications. Clinical Nutrition 2018;37(6 Pt B):2418-2429

P33 Over/under prescribing of anti-reflux medication in infants with cardiac diagnoses affecting weight gain?

Teresa Brooks[1], *Alix Rhodes*[1]

[1]*Leeds Teaching Hospitals NHS Trust, Leeds*

Aim: The aim was to see if there was evidence of over and under prescribing of reflux medication once a child less than 1 year with a cardiac shunt dependent diagnoses has been discharged from hospital despite a close outpatient follow up by clinicians, and whether there was any relationship with patient growth.

Gastroesophageal reflux disease (GORD) is common in infants with congenital heart disease (CHD) which is linked with poor growth and aspiration pneumonia in this cohort (1). Symptom management involves optimisation of enteral feeds and provision of pharmaceutical agents to support with gastric emptying and reduction of gastric acidity (2). Proton pump inhibitors (PPI) and prokinetic agents are often used as the first line treatment, but there are concerns they are commonly inappropriately and/or over-prescribed (3), which can be detrimental to patient care due to risks of cardiotoxicity.

Method: A retrospective review was conducted looking at shunt dependant infants discharged from a regional children's cardiac unit between 2020-2023. Growth, presence of reflux symptoms and anti-reflux medication prescribed were recorded at discharge from hospital and 3-months post-discharge. Medication doses were reviewed against the British National Formulary for Children (BNFc) (4).

Results: 94 patients included in the discharge data. 23 patients were readmitted into hospital or died before the 3-month point, leaving 71 patients to be included in the 3-month data.
At discharge 30% (n=28) had reflux symptoms, 29% (n=8) of these had suboptimal anti-reflux prescriptions. Whilst 70% (n=66) had no reflux symptoms, and only one of these had suboptimal medication.
At 3 months 28% (n=20) had reflux symptoms, and 70% (n=14) of these had suboptimal anti-reflux prescriptions. Whilst 72% (n=51) had no reflux symptoms, and 11% (n=6) of these had suboptimal medication.
Overall, 24% (n=17) of infants had poor growth across the 3 months, with 35% (n=6) of these having a period reporting reflux symptoms and not on optimised anti-reflux medication.

Conclusion: Reports of GORD symptoms and poor growth is common in infants with shunt dependant cardiac diagnoses. Treatment of GORD with pharmaceutical agents is high, but there is strong evidence of over-prescribing and under-prescribing, which increased over time post discharge. The lack of optimisation of reflux management could be linked with poor growth. Regular medication review from a specialist pharmacist at the point of discharge from hospital and in the outpatient setting would support both the symptom management of GORD and appropriate provision of potentially cardiac toxic medications.

References
1. M. Glassman, D. George, and B. Grill, "Gastroesophageal reflux in children: clinical manifestations, diagnosis, and therapy" Gastroenterology Clinics of North America 1995;24:1:71–98
2. Indramohan G, Pedigo TP, Rostoker N, et al. Identification of Risk Factors for Poor Feeding in Infants with Congenital Heart Disease and a Novel Approach to Improve Oral Feeding. Journal of Pediatric Nursing 2017;Jul-Aug:35:149-154
3. Naunton M, Peterson GM, Bleasel MD. Overuse of proton pump inhibitors. J Clin Pharm Ther 2000;25:333-40
4. British National Formulary for Children (BNFc) Access15/1/24

P34 Do we meet the external bespoke parenteral nutrition ordering deadline following process improvements?

Gabis Chana[1], *Amrita Garcha*[1]

[1]*Birmingham Women's & Children's NHS Foundation Trust, Birmingham*

Aims:

1. To assess if there was an improvement in meeting the external bespoke PN ordering deadline following the pharmacy process being streamlined in August 2023 (data set 1).
2. To assess if the implementation of a soft zero-tolerance policy to PN prescribing in January 2024 improved bespoke PN orders being sent on time (data set 2).

Method: Data was collected from the pharmacy PN key performance indicator (KPI) spreadsheet. For KPIs, on each day that bespoke PN orders are sent, the time that the last order was sent and the total number of bespoke orders sent are recorded.
This data was collated and analysed for two periods of time: Data set 1: September to December 2023; pharmacy procedures to clinically screen and send the bespoke PN orders was streamlined.

Data set 2: February to May 2024; a soft zero tolerance policy for PN prescribing, with a deadline of 10:00 for PN to be prescribed by, was implemented across the hospital.
Results was compared to baseline data collected in an audit conducted over 12 months in 2021/2022, where on average orders were sent by the deadline 77.8% of the time.

Results: Data set 1
Bespoke PN orders were sent on 82/84 days of the audit period; orders were sent on time on 84.1%(n=69) days. A total of 1238 orders were sent (average 15 orders/day). Following the process improvement of clinical screening, there was a marked improvement by 6.3%.

Data set 2
Bespoke PN orders were sent on 83/84 days of the audit period; orders were sent on time on 84.3%(n=70) days. A total of 961 orders were sent (average 12 orders/day). The improvement in meeting the deadline was sustained from data set 1.

Conclusion: There was a notable improvement with the percentage of orders sent on time when the bespoke ordering process was streamlined in pharmacy.
The implementation of the zero-tolerance policy for PN prescribing, with a 10:00 deadline for prescriptions to be completed, did not significantly impact the percentage of orders sent on time. It is worth highlighting, that during the month of May 2024 there were multiple new staff members training in the pharmacy PN service. If May data was not included, 90.0% of orders were sent on time, which would have been a 5.9% increase from data set 2 and a 12.2% increase from baseline data.

The data will be fed back to pharmacy and clinical teams to highlight the impact of the changes implemented in the service.

P35 The management of tacrolimus used for brachial plexus regeneration

Sherry Cheong[1]

[1]*Imperial College Healthcare NHS Trust, London*

The patient was presented with a right-sided axillary stab wound with 100% division of the axillary artery with the vein intact. There were multiple nerves divided around the arterial transection site. The vascular team has repaired the artery and the patient has since been put on aspirin. The plastic team then repaired the brachial plexus in the same operation. The median and lateral cords of the brachial plexus have been repaired. However, the ulnar, medial antebrachial cutaneous, medial brachial cutaneous and musculocutaneous nerves will need to re-grow from the point of injury. Axons grow at the speed of 1mm/day [1]. The recovery potential will reduce tremendously if re-innervation cannot be achieved by 18 months [2].

Following stabilisation (recovery in PICU, wound washouts, chest drain and hand therapy), a reconstructive surgery consultant has discussed the use of systemic tacrolimus at sub-immunosuppressive doses used in specialist nerve centres for nerve injuries of this extent. Tacrolimus has been shown to promote nerve regeneration by approximately 20%, with demonstrable increases in the diameter and number of axons [3].

The consultant has asked for advice in terms of monitoring and further dosing advice. I have asked for the patient to be on Adoport capsules as it is the most widely available preparation used in the trust, although for its immunosuppressive properties instead. The consultant has asked for a start dose of 0.5mg BD, and we have agreed to aim for a level ranging 3-5 ng/mL, a target range commonly used in rheumatic conditions instead and a maximum dose of 1mg BD. The consultant has asked for 3 – 6 months and tacrolimus will be stopped for any signs of intolerance. I have asked for a list of pre-treatment screenings and checked for drug interactions.

The study is ongoing. The patient was fully counselled on the side effects and safety-netted. Following a low level (<1 ng/mL), the dose was increased to 0.75mg BD and the therapeutic drug monitoring level resulted as 1.1 ng/mL. This is further increased to 1mg BD dosing with levels pending from weekly monitoring. #

References
1 Geuna S, Raimondo S, Fregnan F, Haastert-Talini K, Grothe C. In vitro models for peripheral nerve regeneration. Eur J Neurosci. 2016;43:287–96.
2 Isaacs, Jonathan. Major Peripheral Nerve Injuries. Hand Clinics. 2013;29(3):371–82.
3 Daeschler SC, Feinberg K, Harhaus L, Kneser U, Gordon T, Borschel GH. Advancing Nerve Regeneration: Translational Perspectives of Tacrolimus (FK506). Int J Mol Sci. 2023;24(16):12771.

P36 Improving compliance with safe prescribing standards on paediatric wards

Beca Dafydd-Best[1]

[1]*Cardiff And Vale University Health Board, Caerdydd*

Context: Paediatric medication errors are one of the most important threats to patient safety with errors affecting up to 13% of paediatric prescriptions. Errors are up to three times more likely to cause harm in children compared to adults and can have lethal consequences1. Poor prescribing was identified as a causative factor for over 50% of medication related Datix submitted from the paediatric wards.

Aim: To increase compliance with the eight safe prescribing standards to 100% by May 2024

Method: Eight safe prescribing standards were chosen and adapted from an earlier quality improvement project conducted on the neonatal ward. These prescribing standards were identified using The Delphi methodology. Ten medication charts were randomly selected every week and their compliance to the eight safe prescribing standards were recorded.

Baseline data was collected over four consecutive weeks. The first intervention involved the presence of a paediatric pharmacist in the morning handover meeting three days a week. This allowed prescribers to be verbally reminded of the prescribing standards on a regular basis and provided an opportunity for questions regarding the prescribing standards or discussion with any problems faced. Data was then collected for a further four weeks. The second intervention was a bi-weekly award for prescriber of the week where the prescriber who had demonstrated good compliance with the eight prescribing standards would receive a certificate and a chocolate bar. This certificate could be used as evidence in junior doctor portfolios.

Result: An increase in compliance was seen with all eight standards following both the first and second interventions. The average percentage compliance at baseline was 57%. Following the first intervention this increased to 73% which was then further increased to 78%. The baseline data showed that the standard with the worst compliance was “Units, micrograms and nanograms written in full” which only had 14% compliance. The compliance increased to 69% following the first intervention and 75% following the second intervention, demonstrating an overall increase of 61%.

The standards with the highest percentage compliance at baseline were completion of signature and liquid medications prescribed in mg. At baseline the compliance for these standards were 90% and 92% respectively. The percentage compliance for both standards increased to 98% and 100% following the first intervention. Following the second intervention the compliance with signature increased to 100%. The compliance for liquid meds prescribed in mg actually decreased to 98% as one out of the 40 charts reviewed did not meet this standard.

Conclusion: Despite the improvements made during this project, the target to increase compliance with the eight safe prescribing standards to 100% by May 2024 was not met. Further work is needed to find effective, sustainable interventions. Future work could include individual prescribing support/feedback, a prescribing do’s & don’t quick guide and/or a paediatric nurse “Good Prescribing Champion”.

References
Conn R, Fox A, Carrington A, et al. Prescribing errors in children: why they happen and how to prevent them. The Pharmaceutical Journal 2023;301:7973

P37 A quality improvement study analysing the compatibility of intravenous medicines in neonates

Lauren Daniels[1], *Sally Ogden, Charlotte King*

[1]*Liverpool Women's NHS Foundation Trust, Liverpool*

Background: In a neonatal intensive care setting patients are often on multiple intravenous (IV) medications. Patients currently require several points of intravenous access to receive certain intravenous medications due to limited compatibility data. By examining intravenous medications with no or limited data on y site compatibility we hope to be able to limit the number of intravenous access points to reduce infection risk and improve the number of intravenous medications that can run through access lines when no alternative intravenous access is available.

Objective: A quality improvement project to examine the potential for two intravenous medications with limited to no data regarding compatibility with each other to run through a single lumen in a neonate if no other IV access available.

Setting: Tertiary Neonatal Unit in North West of England

Method: A compatibility chart was created that examined information about intravenous medications commonly used in a neonatal intensive care unit. Where data was unavailable regarding compatibility between two medications, pH's and additional information about compatibility was determined. The chart was reviewed by a neonatal pharmacist, a neonatal consultant, and a paediatric trainee. The charts alongside a standardised proforma were shared amongst neonatal staff. Intravenous medications that had been determined to have no information regarding compatibility between one another but were thought to be safe were coded as yellow. Medicines with known incompatibilities were coded as red and those with known compatibility data, green. If a decision was made to run the medicines coded yellow due to limited access, data was collected for changes in colouration of IV line, changes in pressure, increase/decrease in medication doses, deterioration in the neonate due to the introduction of the medications or site reactions.

Results: Data was collected from March 2023 and is currently ongoing. To date 104 proformas have been completed, 3 were unable to be included due to missing information. There have been no adverse reactions or deteriorations in the neonates relating to the medication compatibilities to date. Three sets of medications have been determined to be safe to run with one another if no alternative access; vancomycin and ciprofloxacin, metronidazole and vancomycin, and morphine sulfate and ciprofloxacin. There were 33 proformas for vancomycin and ciprofloxacin with one mild skin reaction, 13 proformas for ciprofloxacin and morphine sulphate with no reactions, and 12 proformas for vancomycin and metronidazole with no reactions.

Conclusion: The study highlights that many IV infusions, may be safe to run together when no other IV access is available if they have similar pHs and no known safety concerns even in the absence of proven compatibility data.

P38 Introduction of a medication request system for specialist medications in a children's hospital

Rosemary Dempsey[1], *Suzannah Hibberd*[1], *Daniel Bradley*[2]

[1]*Southampton Children's Hospital, Southampton, 2University Hospitals Southampton NHS Foundation Trust, Southampton*

The introduction of a specialised medication request system at a Children's Hospital addresses critical safety and efficiency issues in the prescription process for ongoing medications, eg immunosuppressants, which are unavailable via general practitioner (GP) prescriptions.

The system aims to enhance patient and carer experiences whilst ensuring the safe handling of medication requests (MRs). Prior to this intervention, outpatient MRs were communicated through multiple channels, including telephone messages left with secretaries, specialist nurses, or ward staff. This fragmented approach posed safety risks due to unclear information about who was requesting the medication and what medications were needed. Additionally, prescriber unfamiliarity with the patients medications further increased the risk of errors.

To mitigate these risks, a Microsoft Form was developed to streamline the MR process. The form was designed for parents/carers to complete before the clinic appointment, ensuring all essential information for safe review and prescribing was collected. Information requested included patient identifiers, requesters contact details, appointment dates, and the ability to collect medication at the appointment or specialist clinic. Frequently prescribed medications were pre-populated into the Form, including brand and dose details with an option to free-type any additional medications needed.

Upon completion, the Form automatically populated a spreadsheet accessible to pharmacists at the Children's Hospital. Notifications of new MRs were sent via email and Teams , ensuring timely awareness among the relevant Pharmacists. Patients/families in two specialist clinics were sent the hyperlink and QR code for the form, subsequently it was sent to other patients requiring medications not available through other means. Prescribers annotated the spreadsheet once requests were actioned.

Since implementation of this system, 170 MRs have been processed.. This intervention has improved the organisation of MRs, reducing the volume of fragmented messages thereby enhancing the availability of required information enabling accurate prescribing, whilst supporting primary prescribers in specialist clinics to work in a controlled, distraction-free environment. Patient/family feedback has been overwhelmingly positive, with users finding the Form easy to use, reporting that the system had improved the medication ordering process. However, some challenges, such as difficulties in finding the link, confirming Form receipt, and the need to input detailed patient and medication information, were identified, solutions for these issues are being.

Feedback from specialist nurses and secretaries reported the system took time to embed into practice, initially increasing workload, but ultimately led to a more streamlined process. The system's reliance on a single individual to prescribe medication was noted, wider access by the pharmacy team will help ensure that requests can be actioned as required.

Families using the form suggested further improvements including the implementation of a confirmation receipt , streamlining the input process for patient details, and enhancing the accessibility of the form hyperlink.

In conclusion, the implementation of a dedicated medication request system has significantly improved the organization and safety of the prescribing process at the Children's Hospital. Ongoing challenges and suggestions for improvement will be continuously reviewed and incorporated to further enhance the system's effectiveness and user satisfaction.

P39 A review of on-call pharmacist requests from the paediatric intensive care unit

Carys Evans[1], *Susie Gage*

[1]*UHBW, Bristol*

Background: The trust provides an out of hours pharmacy service to all paediatric, adult, maternity and oncology wards via an on-call pharmacist. Feedback from on-call pharmacists reports anxiety and time consuming phone calls from the Paediatric Intensive Care Unit (PICU), despite some paediatric training for the junior on-call pharmacists. This results in an increased financial burden for the trust, alongside a decrease in the pharmacists' workplace satisfaction.

Context: A review conducted of the calls received from PICU to the on-call pharmacists from the last year will investigate trends or themes over a year-long period. Each call within this period has been categorised with regards to the type of query asked and whether the query could have been resolved during working hours. This data will aid the identification of quality improvement interventions, which could be implemented in the future to reduce financial impact, improve staff confidence and improve staff well-being in junior on-call pharmacists.

The data collection period was between 1/7/23 and 30/6/24. The data was reviewed from the on-call log, which details each call received and is logged onto an Excel spreadsheet. The logs were filtered by ward to isolate the data to PICU calls, which were assessed individually and categorised. The type of query was categorised as one of the following: supply request, missing medication, clinical query, non-clinical query and discharge request. Clinical query was subdivided into; stability, compatibility, dosing query, administration advice and calculations.

The total number of calls received from PICU to the on-call pharmacist between 1/7/23 and 30/6/24 were 50. The majority (62%) of calls were requests to supply medications, and at least 42% of these could have been managed within normal working hours. Lost items (14%), discharge medicine requests (4%) and non-clinical queries (4%) were less frequent. 16% of calls were classified as clinical queries, which equates to 8 calls. Of these 8 calls, 3 were compatibility assessment queries, 2 were dosage advice requests and there was 1 call each for stability assessments, calculations and administration advice. At least 56% of all calls were deemed to be avoidable, with some outcomes being unable to ascertain with the information provided in the written logs.

Lessons learned: The data collection and theming has revealed that more than half of all calls were avoidable. Further teaching to PICU staff regarding the appropriate ordering of medication during working hours, how to locate medication out of hours (by using the locate drug finder database) and where to look for compatibility information needs to be highlighted.

Also, feedback could be given to the on-call pharmacist team regarding the actual content of calls received from PICU, rather than the perceived high speciality calls. Often the medications have already been screened by the specialist PICU pharmacy team.

Future work could include investigating how often a paediatric pharmacist is contacted out of hours to give on-call advice, and to collate this in order to provide further teaching to on-call pharmacists and PICU staff.

P40 Development of network guideline, using rivaroxaban for primary thromboprophylaxis, in fontan circulation

Susie Gage[1], *Clara Danielson*[2], *Jack Gibb*[1]

[1]*Bristol Royal Hospital for Children (UHBW Trust), Bristol, England,* [2]*Noah's Ark Children's Hospital for Wales, Cardiff, Wales*

Background: The Fontan procedure or total cavopulmonary connection was first described in 1971 by Francis Fontan, a French cardiac surgeon. The aim of the Fontan operation is to secure reliable systemic and pulmonary blood flow in patients with only one functional ventricle, ensuring that only deoxygenated blood goes to the lungs and oxygenated blood is pumped to the body. People with a Fontan circulation are at risk of developing blood clots, so life-long anticoagulant therapy is required. (1)

Situation: Across our Congenital Heart Disease Network (CHDN) there are 107 patients with Fontan circulations on warfarin, with an average additional 8 patients annually. Warfarin monitoring requires regular significant costs of INR monitoring; multidisciplinary team time managing the results, cost of Coaguchek® machine, testing strips, inpatient management, when initiating warfarin and subsequent admissions, when results are significantly out of range. In many cases, being on warfarin adversely affects patients and their families' quality of life.

There is huge variability and a lack of consensus internationally regarding anticoagulation regimens. The American College of Cardiology details the use of novel oral anticoagulants and acknowledges their use in children for thromboprophylaxis with Fontan circulations. (2) Rivaroxaban is a direct factor Xa inhibitor and is licensed in the United Kingdom (U.K.), from term neonates, for treatment and prevention of venous thromboembolism. The UNIVERSE study evaluated the use of rivaroxaban in children with Fontan circulation. (3) It demonstrated similar safety and efficacy profile to that of aspirin. It is licensed in the United States for use as thromboprophylaxis in children 2 years and older, who have undergone the Fontan procedure. (4) It's main advantage is that it doesn't require routine monitoring.

Rivaroxaban was proposed as an alternative to replace warfarin as the first line anticoagulant for primary thromboprophylaxis in Fontan patients within the CHDN. An interprofessional meeting was held between level 1 and level 2 cardiac centres: involving pharmacists, cardiologists, cardiac nurse specialists (CNS) and haematologists. A guideline and patient information leaflet were developed and edited with feedback shared to all relevant hospital and CHDN governance and special interest groups, including the Paediatricians with an expertise in Cardiology.

Conclusion: Since approval of the guideline, existing warfarin patients around the CHDN have been contacted and asked to consider a switch to rivaroxaban. Formulary applications have been written and there are ongoing discussions with General Practitioners for future shared care prescribing. Education has been provided to healthcare professionals, signposting them to the guideline and patient resources.

We are currently in the early implementation of the guideline; however, this has demonstrated an excellent example of collaborative working across professions and in the CHDN and we hope to see significant benefits soon. Being the first in the U.K. to make this change, it is an example to other CHDNs.

Future work identified includes monitoring the impact of this change for patients via feedback, assessing bed days saved, quantifying the CNS resource reallocation, financial savings and sustainability impact of no testing. We aim to share lessons learnt and innovations with other CHDNs.

References
(1) Sandeep N, Booker P.D. The Fontan Circulation. Continuing Education in Anaesthesia Critical Care & Pain 2008;Vol 8:26–30. Available from: https://doi.org/10.1093/bjaceaccp/mkm047
(2) Alsaied T, Possner M, Van den Eynde J, et al. Anticoagulation Algorithm for Fontan Patients. American College of Cardiology 2023. Accessed 2024 July 18. Anticoagulation Algorithm For Fontan Patients - American College of Cardiology (acc.org)
(3) McCrindle B, Michelson A, Bergen A, et al. Thromboprophylaxis for Children Post-Fontan Procedure: Insights from the UNIVERSE Study. Journal of the American Heart Association 2021;Vol 10. https://doi.org/10.1161/JAHA.120.021765
(4) U.S Food and Drug Administration. FDA Approves drug to treat, help prevent types of blood clots in certain paediatric populations 2021 December 20. Accessed 2024 July 18. FDA approves drug to treat, help prevent types of blood clots in certain pediatric populations | FDA

P41 A review of Levosimendan usage on PICU to aid guideline development

Susie Gage[1]

[1]*Bristol Royal Hospital for Children (UHBW Trust), Bristol*

Background: PICU requested development of a Levosimendan guideline, previously, national and international protocols have been utilised. Levosimendan is indicated for the short-term treatment of acutely decompensated, severe chronic heart failure in situations where conventional therapy is not sufficient, and in cases where inotropic support is considered appropriate. (1)

Prior to guideline development, a review of Levosimendan usage was undertaken, by downloading a list of patient's details, from the Pharmacy dispensing system. This provided 5 patient's details, who had received Levosimendan in the previous 5 years, in our institution. Their PICU admissions were reviewed, using the PICU electronic system.

Each patient's records were reviewed and assessed for the following: age, weight, PICU admission day and extracorporeal membrane oxygenation (ECMO) day number if had ECMO, the indication for Levosimendan, who was involved in the decision-making process, if a loading dose was used, the infusion rate given, if Milrinone infusion rate was reduced and if the patient survived that PICU admission.

Context: The age of the patients when they received Levosimendan ranged from 24 days old to 16 years old with a weight range of 3.5kg to 56kg. The patients had Levosimendan on day 1 to day 32 of their PICU admission. Out of the 5 patients who received it, 3 patients were on ECMO, and the other 2 patients were agreed ECMO candidates. The patients on ECMO had Levosimendan on day 2, 4 and 11 of ECMO support.

The indications included aiding ECMO wean, severely dilated left ventricular (LV), poor right ventricular function (VF) with worsening cardiac output. The documentation of who made the decision to start Levosimendan varied from Cardiac Anaesthetist or Surgeon, Cardiologist, Intensivist, Transplant Centre or a combination of all the above.

3 out of the 5 patients had a loading dose administered. The maintenance infusion rate varied from 0.1 micrograms/kg/minute for 2 patients, to 0.2 micrograms/kg/minute for 2 patients and 1 patient started at 0.1 then increased to 0.2 micrograms/kg/minute. There was no consensus with those on or off ECMO, having a loading dose or different infusion rates. 3 patients who were on Milrinone had it reduced prior to starting Levosimendan, 1 patient didn't have it reduced and 1 patient was not on a Milrinone infusion. 3 of the patients sadly died during their PICU admission (2 on ECMO), 1 patient went on to have a successful heart transplant and 1 patient is being regularly followed up in clinic.

Lesson learned: Further presentation and discussion are required to gain consensus for guideline finalisation. Content to include indication, stakeholders involved in the decision-making process, loading dose be given depending on risk stratification if on or off ECMO, what infusion rates should be used, the criteria for adjusting rates and consideration as to what to do with Milrinone infusion running simultaneously and prior to Levosimendan. Further exploration of total days of ECMO support and when decannulation attempts occurred. Additionally, consideration of differing practice at our 2 referring heart transplant centres; one that advocates its use and the other that doesn't.

References
(1) Summary of Product Characteristics. Levosimendan. simdax-spc.pdf Accessed 2024 July 19th

P42 Evaluating medicine bottle rulers for governance of controlled drug storage

Viraj Gandhi[1], *Stephen Tomlin*

[1]*Great Ormond Street Hospital, London*

Medicine Bottle Rulers (MBRs) are validated tools designed to estimate liquid volumes accurately, thus avoiding repeat liquid measuring, leading to losses over time. Over the past 24 months, MBRs have been implemented to facilitate daily liquid-controlled drug (CD) checks. Despite their benefits, the implementation has been met with several issues, such as the availability of brand-specific MBRs (MBRs are only valid for that specific bottle, which would be brand/strength specific), compliance and, in turn, general uptake.

Aim: This study aimed to evaluate MBR usage and user perception 24 months post-implementation and simultaneously identify barriers to their continued use for daily CD checks.

Method: A longitudinal audit was conducted using an online survey at three intervals post implementation: 9-months (n=25), 16-months (n=13), and 24-months (n=27). The survey measured the frequency of MBR usage, speed of CD checks, discrepancies, ease-of-use, and usefulness. Qualitative data was also collected to understand specific issues and user experiences.

Results:

Frequency of MRB Use

- Used every time: Usage dropped from 60.0% (9Months) to 44.4% (24Months).
- Sometimes used: Usage increased from 20.0% (9 months) to 44.4% (24 months).

Speed of CD Checks

- Consistently, participants found MRB use speed-up checks: 76.0% (9 Months), 76.9% (16 months), and 77.8% (24 months).

Reduction of Discrepancies

- “Perceived effectiveness” in reducing discrepancies decreased from 54.2% (9 Months) to 44.0% (24 Months).
- Responses stating, they found no reduction in CD discrepancies increased from 41.7% (9 months) to 56.0% (24 months).

Ease of Use

- The majority found MRBs easy to use. 92.0% (9 months) to 81.5% (24 months).

Usefulness Rating

- Mode Averages: 9Months: "Somewhat-useful" 24%; 16Months- "Somewhat-useful" 54%; 24Months "Very-useful" 33%
- "Extremely useful" ratings decreased from 16.0% (9 Months) to 7.4% (24 Months).

Discussion and Conclusion: The results indicate a trend of decreasing consistent usage and divided perceptions of the effectiveness of MBRs. While MBRs speed up CD checks and are easy to use, significant concerns about their accuracy, availability, and visibility persist. These issues hinder their full adoption and effectiveness in reducing discrepancies in liquid CDs. Addressing these concerns through education and distributing MBRs is essential to enhance user satisfaction and overall utility in clinical practice.

The study highlights the critical need to address barriers to using MBRs effectively. User feedback suggests that concerns about accuracy (despite them being validated) should be investigated. Further research is recommended to compare MBR accuracy against hand measurements and other methods. The study also emphasises the importance of understanding user attitudes and experiences over time, which can provide valuable insights into the tool's long-term viability and real impact on CD governance.

Overall, the findings suggest that while MBRs have the potential to improve the efficiency of liquid CD checks, their current implementation needs to meet user expectations. Enhanced training and broader availability for different brands may address some identified issues, leading to better user compliance and satisfaction.

P43 Parenteral nutrition for a patient with tyrosinaemia type 1

Jessica Girvin[1]

[1]*Cardiff And Vale University Health Board, Cardiff, Cardiff*

Introduction: Providing parenteral nutrition (PN) for patients with metabolic conditions is a rare but challenging task (a). Amino acid sources available have a set mixture of amino acids, Vamin 18 EF is the product used in our aseptic unit. There are no bespoke amino acid products available in the UK (however, are available in Canada and America). PN has been given to patients with tyrosinaemia type 1 in the past but there is little literature and no guidance on this (a). Patients with tyrosinaemia have impaired degradation of tyrosine, an amino acid; indicated by a tyrosine level above 200micromol/L (with a target treatment range 200-400micromol/L). Tyrosinaemia Type 1 is caused by a deficiency in fumarylacetoacetate hydrolase (b).

Situation: The patient was known to have Tyrosinaemia Type 1; treated with a low tyrosine diet and nitisonone. He was 8 years old and weighed 25kg. The patient was referred for PN following formation of an ileostomy, after which the patient had a high output stoma and was unable to tolerate enteral dioralyte. The metabolic team advised the PN should have minimal protein and given for a maximum of 7 days. They advised to do a dry blood spot tyrosine level after 3 days of PN and that a level >800micromol/L would cause (reversible) side effects and the PN should be stopped. A dry blood spot tyrosine level was advised to be used, as plasma levels would take too long to be analysed (even though this would be more accurate).

After commencing PN the patient's calories were increased sequentially over 3 days as per local guidelines, but with the minimum protein allowed within the limits of stability. This was facilitated by keeping the PN volume below the patient's fluid requirement and running fluids alongside. As the lipid and glucose calories were increased over the 3 days, the minimum stable fluid increased and so the amount of Vamin 18 EF had to be increase slightly. The Vamin 18 EF content (tyrosine equivalent) was: day 1 83ml (19g), day 2 111ml (26g), day 3&4 139ml (32g). The patient's tyrosine level decreased following introduction of PN. Dry spot tyrosine levels (micromol/L): 2 days prior to commencing PN 237, day of commencing PN 310 and day 3 of PN 204. From the dietetic history, the patient was non-adherent to a low-protein diet and the patient being placed nil by mouth may have functionally decreased the amount of tyrosine they were having. The PN was stopped after 4 days as the patient pulled out their central line; the patient had also tested positive for norovirus and this was likely the cause of the high output from the ileostomy.

Conclusion: This case describes a tyrosinaemia patient who received PN for a very short period of time; extrapolation of these findings to long-term PN use would be inappropriate. However, this case does show that, in the absence of bespoke amino acids, a standard amino acid mix was given to a patient with tyrosinaemia, short-term, without causing raised tyrosine levels.

References

(a) Kaluzny L, Szczepanik M, Siwinska-Mrozek Z, et al. Parenteral nutrition in patients with inborn errors of metabolism--a therapeutic problem. Eur Rev Med Pharmacol Sci. 2014;Jun 15;18.

(b) Alsharhan H, Ficicioglu C. Disorders of phenylalanine and tyrosine metabolism. Translational Science of Rare Diseases. 2020;Jan 1;5(1-2):3-58.

P44 Creation and evaluation of standardised parenteral monographs within a neonatal operational delivery network

Nigel Gooding[1], *Stephanie Aldridge*[1]

[1]*Cambridge University Hospitals NHSFT, Cambridge*

Aim: To evaluate use of regional neonatal standardised parenteral monographs following introduction in March 2023

Method: In 2017 the neonatal operational delivery network (ODN) consulted with neonatal MDT staff, identifying a need to develop regional standardised parenteral monographs, supporting units without access to such a resource. Work was led by a NICU pharmacist, with agreement on monograph format achieved. The project involved all regional pharmacists writing and reviewing monographs. The monographs were agreed to be hosted on the Medusa NHS Injectable Medicines Guide website.

Despite a number of monographs being written, lack of dedicated resources meant the project stalled temporarily. However in 2022, the ODN funded pharmacist time to complete the project. By March 2023, 96 monographs had been published with units accessing using a specific Medusa Trust log-in, thus supporting recommendations from the NPSA(1) and GIRFT neonatology report(2).

In February 2024 a Microsoft Forms survey, was sent to MDT staff in 14 neonatal units using the monographs (the 3 NICU's had not implemented use). The survey evaluated if monographs were being used, barriers to use, ease of access, meeting user needs and comparison with previous resources.

Results: 11 units (7 LNU's and 4 SCBU's) responded to the survey, with 35 responders, comprising of 6 (17%) pharmacists, 24 (69%) nurses and 5 (14%) doctors.
27 (77%) responders were actively using the monographs. Reasons from the 8 people not using the monographs were lack of awareness of monographs, not actively prescribing or administering medications and unaware of how to access.
26 (96%) of responders using the monographs found them easy to access. The 1 responder indicating access difficulties, commented that this was due to the slow speed of the Trust network, rather than actual access.
24 (89%) responders indicated that monographs met their needs. 3 responders indicated that they would like information on TPN compatibility, more preparation information and use of intramuscular injections.
19 (70%) responders had used in-house monographs previously. Compared to the previous monographs, users found:
- Ability to find information in the new monographs much better (5, 26%), better (7, 37%), or about the same (7, 37%).
- Access to the new monographs was much better (5, 26.3%), better (5, 26.3%) or about the same (9, 47.4%).
- Amount of information in the monographs was much better (5, 26.3%), better (10, 52.6%), about the same (3, 15.8%) or worse (1, 5.3%).
Feedback from users was that the new monographs were easier to read, better referenced, kept up to date, clearly presented in tabular format, standardised, more informative and comprehensive. There was one comment that previous in-house monographs included additional useful information.

Conclusion: Survey feedback was mostly positive with most users indicating that monographs were an improvement on any previous in-house resources used. Ease of access to the monographs is good. The ODN lead pharmacist will look at how the monographs can be introduced into the 3 regional NICU's, promote use and work with other ODN lead pharmacists to develop this further as a national standard resource.

References
1. NPSA: (2007 Promoting safer use of injectable medicines: Patient Safety Alert 20:NPSA/2007/20: National Patient Safety Agency
2. NHSE Neonatology. Getting it right first time (GIRFT) Programme National Speciality Report. April 2022

P45 Voriconazole for aspergillosis in an extremely preterm infant: A case report

Rebecca Hastings[1], *Sophie Jeffery*[2]

[1]*North Bristol NHS Trust, Bristol,* [2]*University Hospital Bristol and Weston, Bristol*

Background: A 24-week twin presented on day 12 of life with fungal skin lesions. Aspergillus fumigatus grew on culture swabs. High morbidity and mortality in extremely low birth weight infants has been reported with Aspergillus infection.1 It is also associated with increased hospital stay and higher financial burden.1 Mycology at North Bristol NHS Trust advised for a minimum of 6 weeks treatment with voriconazole.

Assessment of the problem: Evidence to determine appropriate dosing and therapeutic drug monitoring of voriconazole in extremely preterm infants is very limited. There is no readily available monograph for this drug in the Neonatal Formulary or BNFC, for example. A search was carried out to explore case reports in the primary literature. Based on anticipated changes to volume of distribution and clearance in preterm infants, a starting dose of 6mg/kg 12 hourly was chosen in this case; this resulted in subtherapeutic levels, and the frequency was increased to 8 hourly.2 To avoid subtherapeutic dosing, a starting dose of 6mg/kg 8 hourly was used. After 5 days of treatment, serum levels were 7.05mg/L. Frequency was reduced to 12 hourly, and serum levels dropped to 2.82mg/L. Appropriate levels were deemed to be in the range of 2-5.5mg/L. Small changes were made to dosing throughout the course in accordance with TDM. 6 weeks into the course, levels unexpectedly rose to 7.17mg/L. On assessment of clinical picture and blood results, there was correlation with a drop in albumin at this time and an intravenous to oral switch. Estimated protein binding of voriconazole is ~58% (in adults).3 Other trends in levels were difficult to detect.

Pharmacy Contributions: The neonatal pharmacist was key in the safe utilisation of voriconazole in this infant. They were able to source dosing information from the primary literature and advise on dosing in accordance with serum levels. Advice was given to the nursing team on formulation and methods needed to safely administer voriconazole, with limited information available in the literature. The pharmacist was able to advise on interactions, for example the neonate received a short course of flucloxacillin during their treatment, which had the potential to reduce voriconazole levels; checks of serum levels were completed. The timely actioning of subtherapeutic levels was also key in the success of treatment in this case. Weekly liver function tests and biochemistry were taken to assess for potential side effects and remained static throughout treatment.

Outcome: Voriconazole was used successfully in this case to eradicate the Aspergillus infection. Dosing based on therapeutic drug monitoring was key in achieving therapeutic serum levels throughout the prolonged course. Adjustments to dosing were often in accordance with an increase in working weight. 12 hourly frequency was maintained throughout the course. The infant was discharged home at term corrected age, fully-fed with no respiratory support.

Conclusion: This was a difficult case to manage, however with input from the neonatal pharmacist, voriconazole was used successfully to eradicate an otherwise potentially fatal systemic fungal infection. Further work is needed to determine safe dosing of voriconazole in preterm infants.

References
1. Weimer K, Smith P, Puia-Dumitrescu M & Aleem S. Invasive fungal infections in neonates: a review. Paediatric Research. 2021; 91: 404-412.
2. Intravenous voriconazole therapy in a preterm infant. American College of Clinical Pharmacology. 2012; 25: 893-898. 3. Voriconazole SPC - Voriconazole Pfizer 200 mg powder for solution for infusion - Summary of Product Characteristics (SmPC) - (emc) (medicines.org.uk) - accessed 5.7.24

P46 Auditing insulin management after implementation of new guidance in a level 3 NICU

Suzannah Hibberd[1], *Melody Chan*[1]

[1]*Southampton Children's Hospital, Southampton*

Background: Hyperglycaemia in extremely preterm infants can impact morbidity and mortality. To treat this, whilst optimising nutritional intake, insulin infusions are used widely on neonatal units.[1] In February 2024, a new neonatal insulin monograph was introduced in response to an audit that illustrated poor adherence, with only 18% of patients reaching target blood glucose levels (BGL) within 6-12hours of starting insulin. The new monograph made changes to recommended practice including starting insulin at a higher rate of 0.05units/kg/hr, rather than a range of 0.02-0.05units/kg/hr; and included comprehensive guidance regarding monitoring and rate titration, requiring clinicians to consider trends in BGL.

Aim: To audit neonatal insulin management against new local guidance and compare the results with previous audit results.

Method: All patients started on insulin infusions after implementation of the guidance were retrospectively audited. Data was collected to assess the following standards:

100% of patients with two consecutive BGL of ≥12mmol/L are initiated on a continuous intravenous insulin infusion.
100% of patients are started on 0.05units/kg/hr of insulin.
100% of patients have BGL measured hourly for the first 4 hours of starting insulin or until BGL are stable.
100% of patients have insulin titrated correctly in line with guidance.
100% of patients reach a BGL of 3-10mmol/L within 6-12 hours of initiating insulin.

Results: 15 patients were audited with 17 episodes of insulin treatment. 53% of patients were born extremely preterm, 33% very preterm, 7% moderate-late preterm and 7% term.
71% were started on insulin after two consecutive BGL of ≥12mmol/L. The recommended starting rate of insulin was used in 65% of cases. Initial BGL monitoring was completed correctly 29% of the time. Insulin was titrated correctly 91% of the time. 71% of patients had BGL within range by 6-12 hours of starting insulin.

Discussion: Implementation of the new monograph was accompanied by extensive communication with clinical teams and new electronic prescription templates using the new starting rate of insulin and with the titration table attached. 71% of patients were started on insulin correctly in relation to BGL, an improvement on the 47% previously found. Using the specified starting rate has increased by 15%, likely due to the new guideline using a fixed starting rate rather than a range. Previously, 18% of patients reached the required range within 6-12 hours of starting treatment, this audit saw an improvement to 71%. This may be due to the higher starting rate, which wasn't used beforehand albeit part of the recommended range, and the prescriptive titration table allowing quicker titration of insulin when BGL were changing. This enhanced guidance on titration reflects the increased improvement of titration of insulin in patients from the previous 4.5%. Initial blood glucose monitoring is still only 29% and whilst better than the 0% found previously, the level is still low and therefore further investigation into this area is required.

Limitations included the small patient cohort and lack of engagement with clinical staff for feedback. Staff engagement should be undertaken before further revisions of the insulin monograph and re-auditing.

References
1. Morgan C. The potential risks and benefits of insulin treatment in hyperglycaemic preterm neonates. Early Hum. Dev. 2015;91:655-659.

P47 A CAMHS clinic for adolescent resistant depression: An evaluation from the clinician's perspective

Rachel Hogan[1], *Anthony James*[1,2]

[1]*Oxford Health NHS Foundation Trust, Oxford,* [2]*University of Oxford, Oxford*

Aim: Major depression is common in adolescents and is associated with wide ranging impairments and is a risk factor for future psychopathology, suicidal attempts, and completed suicide(1,2). In the UK, the National Institute for Health and Care Excellence (NICE) guidance on the management of depression in children and young people(3) uses a stepped-care model, including psychological and pharmacological strategies. However, apart from a single sentence that mentions "intensive psychological therapy and augmentation of an SSRI with an antipsychotic", clear recommendations guiding clinicians on options beyond the use of SSRIs is absent. For adolescents who have not responded to medication and psychotherapy, a rigorous evidence base is lacking, leaving clinicians unsupported and fuels varying practice.

With the aim of supporting CAMHS outpatient clinicians in the management of this patient group, a Child and Adolescent Mental Health Service (CAMHS) pharmacist and consultant Child and Adolescent Psychiatrist set up a pilot clinic for resistant depression, based upon on a consultative model.

The clinic accepts referrals from CAMHS consultants who retain clinical responsibility for the patient throughout. Adolescents with Major Depressive Disorder, with and without comorbidity (with the following exceptions: schizophrenia, substance use disorder, underweight eating disorder) who have failed to respond to at least two antidepressants, with evidence of psychosocial (Brief Interpersonal Therapy) and/or psychological therapy (CBT, IPT) are referred. An online referral proforma is used to capture background information to determine patient eligibility. Eligible patients and their parent/carer then complete an online Development and Wellbeing Assessment (DAWBA)(4), which is shared with the clinician in advance of the scheduled consultation. During the consultation, all aspects of care are considered (psychosocial, psychological and pharmacological). A written consultation summary is provided, and a follow up consultation offered.

Method: A survey using an anonymous questionnaire has enabled an evaluation of the service from the clinician's perspective. A sample of clinicians were contacted to provide feedback using an anonymous questionnaire (first and last five of 23 referrals).

Results: Seven responses were received. The following areas were all rated highly: referral process, use of the DAWBA, consultation format, post-consultation communications.

All clinicians rated the recommendations as being "extremely useful" and one or more of medication recommendations were followed by all respondents. While attempts were made to follow psychological intervention recommendations, they this was not always possible to implement due to the young person not agreeing or long wait times for specialist therapies. Most clinicians reported they were "very likely" to refer another patient to the clinic. Ideas for improving the clinic were also sought. Including a psychologist and having the option to meet with the patient were suggested.

Conclusion: The clinic has been well received and possible to deliver within existing resources. The use of a consultative model worked well and enabled the sharing of ideas and the formation of individualised treatment plans.

However, a limitation is that an evaluation of patient outcomes and costing of the service are missing. This is planned as a future development with a consulting arm alongside a research and evaluation arm.

References

1. DeFilippis M and Wagner KD. Management of Treatment-Resistant Depression in Children and Adolescents. Pediatr Drugs 2014;16:353–361
2. Zisook S, Lesser I, Stewart JW, et al. Effect of Age at Onset on the Course of Major Depressive Disorder. Am J Psychiatry 2007; 164:1539–1546
3. National Institute for Health and Care Excellence. Depression in children and young people: identification and management. NICE guideline [NG134]. Published: 25 June 2019, Accessed at: https://www.nice.org.uk/guidance/NG134
4. Goodman R, Ford T, Richards H, et al. The Development and Well-Being Assessment: Description and initial validation of an integrated assessment of child and adolescent psychopathology. J Child Psychol Psychiatry 2000;41:645-55

P48 To evaluate piperacillin/tazobactam (PipTaz) administration in paediatric haematology/oncology at Nottingham University Hospital (NUH)

Devansh Khanderia[1], *Andrew Wignell*[1]

[1]*Nottingham University Hospital, Nottingham*

Introduction/Aim: Historically the children's hospital has always given PipTaz by direct injection ("bolus"). However, as per Microbiology advice all wards are to administer this as an infusion. As the largest users of PipTaz the haematology/oncology (H/O) ward has been significantly affected. Due to preparation and administration times being longer with infusions, coupled with high acuity and nursing shortages, the ward continue to give it as a bolus.

H/O patients are often admitted to other wards where they receive PipTaz as an infusion, compared to a bolus injection on the H/O ward. This inconsistency in care has caused disagreements between patient/families and nursing staff.

We're exploring the option of using a continuous infusion of PipTaz over 24 hours via elastomeric pumps. The 18g strength is equivalent to the maximum dose of 4.5g 6-hourly which is suitable for patients >50kg.1 Our aim was to see how many H/O patients were suitable to have this dose.

Another aim was to look at line access, as patients often require other IV medication, this would determine if a continuous infusion is appropriate. We also looked at the time taken to prepare bolus doses of PipTaz.

Methodology: The coding team were asked to provide data of patients admitted to the H/O ward for febrile neutropenia from Jan 2022 – March 2024.
Digital Health Records systems were used to obtain the line access and number of lumens for each patient. Their weights were also documented to calculate PipTaz doses.

Results: 86 patients were admitted to E39 from January 2022 to March 2024 with a diagnostic code of febrile neutropenia. 20% (17/86) of patients were suitable to have the 18g dose of PipTaz. 71% (12/17) of these patients had ≥2 lumens available.
The average preparation time for a bolus dose of PipTaz was ~9 mins.

Discussion/Conclusion: The data suggests that 20% of patients admitted with febrile neutropenia were eligible to have PipTaz as an 18g dose over 24 hours, with 71% of them having suitable line access.

The key reason to using a continuous infusion regimen of PipTaz is that it maintains a drug concentration above the MIC for a longer time between dosing intervals, and a higher trough concentrations, compared to bolus regimens.2-3 Another benefit would be for patients on elastomeric devices to be discharged home, which would free up bed space.

Over 24 hours, the bolus regimen would take longer to prepare than a pump, as it is administered 4x a day. By using pumps, we could free up ~30mins of nursing time per day. This time could be utilised to administer short intermittent infusions of PipTaz to the other patients.

For patients needing lower doses of Pip/Taz we could look at dose banding, which would require a wider range of pumps.

Limitations include how patients were coded, as the data doesn't include patients admitted for other indications, where PipTaz might be used if they spike temperature. Theoretically, this would increase our sample size, which is another limitation. The launch of EPMA should capture these patients.

References
(1) BNFC. Piperacillin and tazobactam . 2024; Available at: https://bnfc.nice.org.uk/drugs/piperacillin-with-tazobactam/.
(2) Felton TW, Goodwin J, O'Connor L, et al. Impact of Bolus dosing versus continuous infusion of Piperacillin and Tazobactam on the development of antimicrobial resistance in Pseudomonas aeruginosa. Antimicrobial Agents Chemotherapy 2013;57(12):5811-5819.
(3) Lodise TP, Jr., Lomaestro B, Drusano GL. Piperacillin-Tazobactam for Pseudomonas aeruginosa Infection: Clinical Implications of an Extended-Infusion Dosing Strategy. Clinical Infectious Diseases 2007;44(3):357-363.

P49 Adherence to NICE guidelines regarding the administration of parenteral nutrition in neonates

Maria Konstantinou[1]

[1]*Alder Hey Children's Hospital, Liverpool*

Aim: NICE guidelines recommend that once a neonatal patient is eligible for parenteral nutrition (PN), it should be administered within 8 hours [1]. Therefore, the aim for this audit is to assess whether neonatal patients at our Trust receive parenteral nutrition within the required timeframe and determine whether the Trust is compliant to national guidelines.

Method: The data was collected retrospectively for 40 neonatal patients that received PN in 2022. The patients were randomly selected and included both pre-term and term neonates up to 28 days of life. Neonates that were already established on PN before transferring to our Trust were excluded from the data analysis. The electronic medical notes documented from different healthcare professionals and the electronic medicines administration record (MAR) were used to collect the required data including:

- Patient's age
- Gestational age
- Date & time the decision was made to commence PN
- Date & time PN was administered
- Reasons for delay in administration

All the information was collected on a spreadsheet in Microsoft Excel which had then undergone pseudo-anonymisation. The findings were then manually analysed, and results were shared with members of the pharmacy and dietetics department along with a recommended action plan.

Results: A total of 34 neonatal patients who received PN during their admission including neonates with gestational ages at birth range from 32+5 to 41+0 were included in the data analysis. A total of six patients were excluded from the data analysis as they were already established on PN prior to transfer.

The data collected for this audit showed that only 14.7% of the patients received PN within 8 hours. From the 85.3% patients that did not receive PN within 8 hours, for a proportion of 31% the decision to commence PN was made out-of-hours. This was expected as standardised PN bags are not available for use out-of-hours when the hospital's aseptic unit is closed. However, for 58.6% of the patients that did not receive PN within 8 hours, the decision was made during working hours. Although PN was ordered for those patients, a delay in the administration with unknown reasons was observed.

Conclusion: In conclusion, the data collected and analysed for this audit indicates that our paediatric Trust is not compliant with the NICE guidelines that recommends the administration of neonatal parenteral nutrition within 8 hours [1]. In order to improve the quality of our services, it is suggested that standardised neonatal bags are accessible out-of-hours and explore further the reasons PN is administered late even though it is delivered to the wards on time.

References

1. National Institute for Health and Care Excellence (NICE). Neonatal parenteral nutrition [Internet]. www.nice.org.uk. 2020. Available from: https://www.nice.org.uk/guidance/NG154

P50 Adequacy rate of laboratory monitoring parameters for parenteral nutrition in neonates, central Brazil

*Laura Carvalho Silva Pureza[1], Ana Lúcia da Silva[1], Ítala Letícia Meneses dos Santos[1], Thayron Rhangell Lima dos Santos[1], Barbara Silva Carvalho[1], Nathalie De Lourdes Souza Dewulf[1], **Angela Ferreira-Lopes** [1], Ana Cristina Bento Silvestre[1]*

[1]School of Pharmacy, Federal University of Goiás, Goiânia, Brazil

Aim: The purpose of this study was to evaluate the adequacy of laboratory monitoring parameters for Parenteral Nutrition (PN) therapy in hospitalized preterm neonates.

Method: Preterm neonates receiving PN in the neonatal intensive care unit (NICU) during the second semester of 2022, at a tertiary university hospital in Goiás state, central Brazil, were included in this study. The adequacy of laboratory parameters was assessed by comparing the real-life practices at the institution with guidelines published by NICE (2020) and ESPGHAN (2021). To gain a deeper understanding of the adequacy, the laboratory parameters were grouped by organs and systems but also electrolytes according to ESPGHAN guidelines, resulting in 20 items: cardiovascular (lactate), endocrine (glucose, glucose variability, vasopressin, osmolarities), hematological (platelet and leukocyte count, fibrinogen), hepatic (ASAT, bilirubin, C-reactive protein, procalcitonin, prothrombin time, INR, transthyretin in serum), renal (creatinine, urea, protein in serum), and respiratory (pH, paCO2, PaO2/FiO2 ratio); and nonelectrolytes. The NICE guidelines included 11 items: cardiovascular (lipogram), endocrine (glucose), hepatic (ASAT, ALAT, alkaline phosphatase, gamma-glutamyl transferase), respiratory (pH), and electrolytes (calcium, chloride, potassium, sodium, phosphate). Daily laboratory parameter data were collected from clinical records, covering all periods of PN use. The adequacy rate was determined based on the type and frequency of laboratory parameter measurements. Microsoft® Excel® was used for descriptive analyses. This study was approved by the Research Ethics Committee (CAAE 61367022.7.0000.5083).

Results: Among the 13 preterm neonates included in this study, 7 had low birth weight, and 6 very low birth weight. All neonates began PN within 48 hours of birth, with an average duration of 5 days (ranging from 2 to 8 days). A statistically significant difference was observed in the overall adequacy rate of laboratory parameters proposed by NICE (32.2%; CI95% 25.1-40.2) compared to ESPGHAN (52.3%; CI95% 46.3-58.3). Stratified analysis by organs and systems showed significant differences in the adequacy of laboratory parameters related to the cardiovascular system (15,4%; CI95% 4.3-42.2 vs. 92.3%; CI95% 66.7-98.6) and respiratory system (53,8%; CI95% 29.1-76.8 vs. 92.3%; CI95% 79.7-97.4), when comparing NICE with ESPGHAN guidelines, respectively. No significant differences were observed in the adequacy of hepatic (38.5%; CI95% 26.5-52.0 vs. 39,6%; CI95% 30.1-49.8) and endocrine (46,2%; CI95% 23.2-70.9 vs. 23.0%; CI95% 13.7-36.1) parameters. Hematological (57,7%) and renal (64,1%) adequacy rates were calculated according to ESPGHAN parameters. The electrolyte adequacy rate was 21,5% based on NICE guidelines.

Conclusion: A high frequency of non-compliance with laboratory parameters used to monitor preterm neonates undergoing parenteral nutrition therapy was observed in a tertiary university hospital in central Brazil. These results underscore the need for protocol improvements to align with the real-life practices at the institution.

References
1. National Institute for Health and Care Excellence (NICE). Neonatal parenteral nutrition. NICE guideline [NG154]. 2020.
2. Moltu, SJ, Bronsky, J, Embleton, N, et al. Nutritional management of the critically ill neonate: a position paper of the ESPGHAN committee on nutrition. Journal of pediatric gastroenterology and nutrition, 2021; 73(2): 274-289.

P51 Can appropriate use of Pharmacy First service alleviate pressure in paediatric emergency departments?

Fiona MacDonald[1], *Andrea Gill*[1], *Louise Bracken*[1], *Fiona O'Brien*[2], *Octavio Aragon Cuevas*[1]

[1]*Alder Hey Children's NHS Ft, Liverpool,* [2]*Royal College of Surgeons Ireland, Dublin, Ireland*

Aim: Pharmacy First was introduced in the UK on 31/01/24. It gives pharmacists the right to prescribe medications for seven ailments with specific age restrictions(1). It is anticipated that the introduction of this programme may free up GP appointments and help reduce hospital visitations for minor ailments(2). Six of the seven minor ailments are frequently seen in paediatrics .

Method: The electronic patient records of patients visiting the Emergency Department (ED) in a paediatric hospital in Northwest England on a Monday and a Sunday of the same week in the autumn and winter of 2022, and summer of 2023, were reviewed. The following data were collected; the reason for visitation (Pharmacy First ailment or not), whether the ailment could have been resolved by a Pharmacy First consultation without involvement of another healthcare professional (HCP), actual diagnosis, action taken, if any actions taken in the hospital would not be accessible to a community-based pharmacist, age of patient, date of visit, and time of visit. Whether or not the patient could have been treated by a community pharmacist outside of the Pharmacy First service, was also assessed. The project was registered as a clinical audit (number 6990).

Results: 60 patients left before seeing a clinician so were excluded from the analysis. Of the other 987 paediatric patients reviewed, 43 patients (4.4%) presented with one of the seven Pharmacy First indications. 3 patients out of the 43 would have required another HCP to treat their condition. The most common Pharmacy First indications were sore throat 20 (46.5%) and earache 18 (41.9%). There were no cases of uncomplicated UTI, insect bites or shingles. There were 17 (39.5%) Pharmacy First presentations both in autumn and winter, while summer presentations were lower with 9 (20.9%).

A further 105 (10.6%) patients who presented at the ED could have been treated by a community-based pharmacist over the counter (OTC). The most common of these presentations were minor injuries and wounds (48.6%), gastroenteritis (22.9%), viral illness (10.5%) and constipation (10.5%).

453 (45.9%) patients visited the ED outside of regular community pharmacy hours (9:00am to 6:00pm). 57 out of 148 (39%) patients treatable in a community setting (combined OTC and Pharmacy First) visited the ED during those hours. The remaining 91 (61%) patients who were treatable in a community setting presented to the ED during community pharmacy working hours.

Conclusion: This data shows that whilst there was not a large number of patients presenting with Pharmacy First indications, 15% of ED presentations could have been treated in the community, either with OTC treatments or via the Pharmacy First service. The majority of these children presented despite community pharmacies being open and available for them. Increasing awareness of Pharmacy First and OTC services could help alleviate some pressure in paediatric ED in UK hospitals.

References

1. NHS. NHS England» Pharmacy First [Internet]. www.england.nhs.uk. Available from: https://www.england.nhs.uk/primary-care/pharmacy/pharmacy-services/pharmacy-first/
2. Gov.uk. Pharmacy First: What You Need to Know - Department of Health and Social Care Media Centre [Internet]. healthmedia.blog.gov.uk. 2024. Available from: https://healthmedia.blog.gov.uk/2024/02/01/pharmacy-first-what-you-need-to-know/

P52 Audit analysing hospital paediatric omeprazole liquid prescribing against gastro-oesophageal reflux disease trust guidelines

Miss Harkiran Kaur Nahal[1], *Mrs Joanna Hurcombe*

[1]*University Hospitals Derby and Burton, Burton On Trent, UK*

Aim: To assess whether current usage of omeprazole liquid adheres to local Gastro-oesophageal reflux disease (GORD) Trust guidelines in paediatric areas in a district general hospital [1]. Inappropriate omeprazole liquid prescriptions have significant cost implications for the Trust in comparison to cost-effective alternatives [2].

Method: Audit criteria included: - Omeprazole liquid prescriptions from all paediatric wards and paediatric outpatient prescriptions from one Trust site dated 1st January 2023 to 31st January 2024.

- Children aged 0-16 years.

- Diagnosis or suspected diagnosis of GORD/reflux.

Data was obtained from an electronic prescribing system (MediTech) history and dispensing records before being anonymised. Information sources for data examination included electronic medical notes and outpatient prescriptions. 22 were generated from the audit criteria of which 6 had absent data e.g., weight. A data collection tool was utilised after a pilot study for 5 prescriptions was successful and results were collated on an excel spreadsheet for analysis. Given the small sample size there was no necessity for data sampling.

Data was reviewed against three audit standards below, target adherence (100%).

- Appropriate prescriptions of omeprazole liquid following the Trust 'GORD management of paediatric full clinical guideline'.

- Appropriate trials of first-line treatments per Trust GORD guidelines prior to prescribing omeprazole liquid e.g., Gaviscon Infant sachets.

- Appropriate prescribed formulations for the route of administration required (e.g., oral/nasogastric tube/percutaneous endoscopic gastrostomy tube).

Results: Poor compliance was highlighted for all 3 standards. The audit indicated 25% (n=4) prescriptions were correctly prescribed omeprazole liquid against standard 1. Thus, omeprazole liquid overuse and guideline non-adherence is presented for 75% of audited prescriptions. During the audit a large cost saving of £1658.94 was calculated from inappropriate omeprazole liquid prescriptions as the guideline alternatives totalled £124.56. Hence, a decrease in prescribing is crucial.

23% (n=5) prescriptions had a confirmed trial of Gaviscon Infant sachets prior to PPI treatment per standard 2. Linked with standard 1 this shows an apparent lack of guideline knowledge. One case was trialled on both Gaviscon Infant and omeprazole liquid which is not clinically advisable. Here the initial trial of Gaviscon Infant monotherapy is crucial prior to initiating PPIs to avoid overtreatment. The Summary Care Record (SCR) was inaccessible due to consent requirements; however, future use is advised for a more accurate pre-admission history.

For standard 3, 37% (n=7) prescriptions had an appropriate formulation for administration, excluding 3 of the audited prescriptions which lacked data. For those with an enteral tube a liquid was documented as most suitable as enteral tube size data was absent. Hence, the risk of tube blockage from dispersible formulations is avoided.

Conclusion: To conclude, a significant overprescribing of omeprazole liquid was observed with 75% of prescriptions not adhering to local guidelines and notably an achievable cost saving (£1658.94). This audit demonstrates the need for further prescriber education surrounding GORD management and alternative treatment options, with the benefit of significant future cost saving. A re-audit is recommended in 12 months by the future trainee pharmacist.

References

[1] University Hospitals of Derby and Burton (UHDB). Gastro-Oesophageal Reflux Disease - Management of - Paediatric Full Clinical Guideline - Derby and Burton. Reference no.: CH CLIN G 150/Aug 20/v001.1; 2020.

[2] National Institute for Health and Care Excellence [NICE]. Clinical Knowledge Summaries. GORD in children [online] [Accessed 3rd March 2024]. Available from: https://cks.nice.org.uk/topics/gord-in-children/

P53 Assessing minitablet acceptability in children in low and middle-income countries (LMICs)

Soniya Notani[1], *Smita Salunke*[1]

[1]*University College London, London*

Introduction: Minitablets have been recognized as a promising dosage form for children (1). There is a lack of evidence-based data on the acceptability of minitablets, specifically regarding their size and quantity, ease of handling, administration, packaging choices, particularly from LMICs. Therefore, this study aimed to explore user perspectives from LMICs on the use of minitablets compared to conventional tablets for children.

Methods: A descriptive cross-sectional study was conducted a Pan-India with parents of children aged 0-12 years using a paper-based survey. Parents were recruited from schools and hospitals. The questionnaire assessed socioeconomic status, health conditions, perceived swallowability, types of minitablets (e.g., Oro-dispersible), administration methods, packaging preferences, ease of handling, and willingness to use minitablets over conventional tablets. Various minitablet sizes (1.5mm to 12mm), quantities (5 to 200), and packaging types (stick pack, sachets, capsules, unit dose dispenser) were shown to parents.

Findings: In all 60 parents participated, 52% from middle/upper middle class and 48% from lower middle class. 45% reported their children as healthy/acutely ill, while 55% had chronic conditions/were recovering from surgery. Regarding prior experience with medicine, 60% of parents had used liquids for children aged 1-8, while 40% had used tablets or capsules for ages 2-11.

67% were willing to give 1.5 mm tablets to children aged 2-8, 26% reported 3mm tablets for those aged 6-11, and 7% opted for 4mm tablets for children aged 9-12. Parents of chronically ill children mostly chose 3mm and 4mm tablets, whereas parents of healthy children preferred 1.5mm tablets.

Regarding the ease of handling minitablets, 30% of parents found 1.5mm tablets challenging, while other sizes were reported easy to handle. Socioeconomic factors influenced this: 70% of lower middle-class parents found 1.5mm tablets easy to handle, compared to 40% of upper middle-class parents.

For types of minitablets, 55% preferred those that melt on the tongue, and 45% preferred those that dissolve in water. Among children recovering from illness, 57% favoured melt-on-tongue minitablets, while 56% of healthy children preferred minitablets that dissolve in water.

For administering minitablets with soft food, 46% of parents with children aged 1-8 used chocolate, ice cream, milk, or jelly; 33% used juice/water for ages 1-5; and 21% used dal (lentil soup) or rice for ages 5-12. Over 50% of lower-income parents used various strategies to encourage medicine intake, while more than 80% of higher-income parents reported their children eventually accepted tablets after initial resistance.

Conclusion: This study underscores that acceptability of dosage forms is multifaceted, influenced by socioeconomic status, parental education, affordability, prior experience, ease of use, cultural relevance, and the availability of support and training. Factors such as tablet size, the number of minitablets to be administered at once, the child's health condition, packaging design, and ease of handling minitablets outside the package are pivotal in shaping preferences and practices. Socioeconomic status and parental education affect administration strategies. Significant gaps were found in correlating tablet features with number and size, food use, and socioeconomic factors. Understanding these preferences helps pharmacists educate parents and caregivers on effective minitablet administration.

References

1. Zuccari G, Alfei S, Marimpietri D, Iurilli V, Barabino P, Marchitto L. Mini-Tablets: A Valid Strategy to Combine Efficacy and Safety in Paediatrics. Pharmaceuticals (Basel). 2022 Jan 17;15(1):108. doi: 10.3390/ph15010108. PMID: 35056165; PMCID: PMC8779937.

P54 Cancer pain management in children referred to palliative care: is methadone safe alternative?

Bhumik Patel[1], *Renee McCulloch*[1]

[1]*Great Ormond Street Hospital, London*

Background: Pain management in children / babies with complex pain relies on the use of long-acting analgesics given in liquid form. Morphine is the first line enteral opioid analgesic in paediatric care. Until 2021, children initiated on morphine, unable to swallow solid dose forms were converted from liquid

forms of short acting morphine to morphine sulphate modified release granules. MST granules were discontinued in 2021, leaving a gap in treatment options in children requiring background analgesia, particularly in unstable pain phases requiring rapid dose titration and low weight infants for whom patch formulations are neither suitable nor safe. Methadone is a potent opioid analgesic with good oral bioavailability. Prescribing methadone in children has previously been limited to a third line option due to its complex pharmacokinetic profile, poor conversion data and concerns related to toxicity. We describe a case series of paediatric patients with cancer pain where methadone has been used successfully as a first line long-acting opioid.

Methods: A case note review of children, managed by a specialist paediatric palliative care team, commenced on methadone as a first line long-acting analgesic between August 2021 to September 2023, was conducted. Starting doses, conversion factor, effectiveness and signs of toxicity are reported.

Results: Of 23 patients commenced on methadone two required dose reduction following methadone initiation due to sedation. Mean conversion factor from an oral morphine equivalent to methadone was 10.8 Oral Morphine Equivalent (OME) : 1mg methadone. Range of methadone starting dose was 0.03 - 0.2mg/kg/day. Time to first dose increment varied between 1 and 14 days. Effective analgesia was achieved in all cases and methadone was used without requirement to further rotate opioid.

Conclusions: Methadone can be safely used as first line long-acting opioid in children with complex pain. Prescribing, titration and monitoring is required by specialist paediatric palliative care physicians. Further data to verify methadone's pharmacokinetic profile in children and babies is required.

P55 Metabolic bone disease of prematurity – are we getting the supplementation wrong?

Courtney Preston[1], *Gayoung Moon*[2] *and Mohammed Shueb Ahmed*[2]

[1]*Chelsea And Westminster NHS Foundation Trust, London,* [2]*King's College, London,*

Metabolic bone disease of prematurity (MBDP) is characterised by skeletal demineralisation (due to inadequate phosphate and/or calcium and potentially worsened by insufficient vitamin D).[1],[2] At its most severe, MBDP can cause fragility fractures during routine handling.[1]

Providing phosphate supplementation without calcium can result in secondary hyperparathyroidism, bone loss and worsening MBDP.[1] However, phosphate is often prescribed alone in response to a raised alkaline phosphatase (ALP) in practice.

Local guidance was published January-23 to advise on the prevention, investigation, monitoring and treatment of MBDP. Guidance stipulated that calcium and phosphate should be provided together and that parathyroid hormone (PTH) and vitamin D levels should be tested where ALP ≥ 600. The aim of this audit was to ascertain if this new guidance is being followed.

This was a single-centre audit carried out at a level-3 neonatal unit. Prescription analysis program Qliksense was used to retrospectively screen patients prescribed one or more of enteral calcium, phosphate or colecalciferol in the first 6 months from guideline publication (February – July-23 inclusive). The patients' electronic records were retrospectively assessed for exclusion criteria (ALP < 600, ALP ≥ 600 prior to February-23 or patient transferred to the trust already on supplementation). Data collected included: supplementation prescribed, PTH results and vitamin D results. This method was then repeated for the subsequent 6-month period (August-23 – January-24 inclusive).

For the first 6-month period, 52 patients were screened, 32 patients remained after exclusion. Of these, 9 were prescribed both calcium and phosphate (28.1%), 22 were prescribed just phosphate (68.8%) and 1 patient was prescribed only colecalciferol (3.1%). A PTH level was reported for 12 patients (37.5%) – 10 of these (83.3%) had at least one raised PTH (≥ 8.5 micromol/L). A vitamin D level was reported for 24 patients (75.0%) – 22 of these had at least one deficient or insufficient result (91.7%).

In the subsequent 6-month period, 47 patients were screened, 25 remained after exclusion. Of these, 11 were prescribed both calcium and phosphate (44.0%), 11 were prescribed only phosphate (44.0%) and 3 were prescribed only colecalciferol (12.0%). A PTH level was reported for 12 patients (48.0%) – 7 of these (58.3%) had at least one raised PTH. A vitamin D level was reported for 16 patients (64.0%) – 14 of these had at least one deficient or insufficient result (87.5%).

Co-prescribing of calcium and phosphate was relatively low, occurring less than half the time, though did improve in the second 6-month period (from 28.1% to 44.0%). Similarly, less than half of patients had a PTH level, however this did also improve (from 37.5% to 48%). Vitamin D level testing decreased from 75.0 to 64.0%. The high percentage of raised PTH in those that had a level reported suggests that secondary hyperparathyroidism may be going undetected.

This audit does not capture the full clinical picture and hence non-adherence to the guideline does not necessarily indicate inappropriate management. However, adherence is lower than expected and there is room for improvement in local MBDP prevention and management.

References

1) Chinoy A, Mughal MZ, Padidela R. Metabolic bone disease of prematurity: causes, recognition, prevention, treatment and long-term consequences. Archives of Disease in Childhood Fetal and Neonatal Edition 2019;104

2) Embleton ND, Moltu SJ, Lapillonne A, et al. Enteral nutrition in preterm infants (2022): a position paper from the ESPGHAN Committee on Nutrition and invited experts. Journal of Pediatric Gastroenterology and Nutrition 2023;76:248-268.

P56 Review of specialist HaemOnc/BMT hours on-call service in a tertiary paediatric hospital, London

*Lamia Samrin-Balch[1], **Heena Popat**[1]*

[1]Great Ormond Street Hospital, London

Background: Great Ormond Street Hospital (GOSH) has a comprehensive paediatric Haematology, Oncology, and Bone Marrow Transplant (BMT) department, treating children with cancer from infancy to adolescence across London. Some high-risk patients, such as those with high-count leukaemia or spinal cord masses, require urgent chemotherapy. Historically, chemotherapy from the cytotoxic unit was only available during pharmacy hours. A 2016 cancer peer review identified the need for a safer, quality-assured method for preparing emergency chemotherapy Out-of-Hours (OOHs), moving away from ward-level preparation by nursing staff.

To address this, a specialist OOH service was introduced, including a Specialist Pharmacist (SP) and technical staff to facilitate chemotherapy manufacturing. The scope also expanded to support clinical queries via the on-call pharmacist. The 2019 introduction of the Epic, an electronic patient record system added complexity in chemotherapy verification and rescheduling, further reinforcing the need for this service.

Aim: This review aims to evaluate the specialist OOH service as a unique offering to GOSH's cancer/BMT department. It will assess whether the service is justified by evaluating the types and appropriateness of calls received, as well as identifying potential areas for improvement.

Method: Retrospectively analysed calls received by the SP between 18/02/2023-27/4/2024. The calls were logged by the SP using an online data collection tool. Although this service began in 2017, an alternative tool was used prior for documentation therefore excluded. Each query was categorised by type, required specialist input, day of the week, and instances of OOH chemotherapy preparation. This data was reviewed for trends.

Results and Discussion: During the 13-month period, 149 calls were made to the SP. The specialist OOH team came in ten times to make emergency chemotherapy. Calls were more frequent over the weekend (61%), correlating with the longer absence of ward-based pharmacists and the cytotoxic unit. Approximately 71% of calls were appropriate and required specialist input. Chemotherapy-related calls, including advice and verification, constituted of 61% of the total calls. These calls included delayed chemotherapy cycles, pre-chemotherapy checks and re-screening with the current clinical picture. A large fraction of calls (28%) involved supportive care, most of which (75%) required specialist knowledge for example modifying hydration for a fluid-overloaded patient on cyclophosphamide. However, along with missing chemotherapy, this category also had the most calls which were not deemed to require specialist input. This highlights the training gaps for the junior pharmacists on-call. One key limitation is the online data collection tool, as it relies on the information the pharmacist provides. Additionally, this review will help develop the tool further and streamline the process for the SP.

Conclusion: Managing queries for cancer/BMT patients is challenging due to complexity of their conditions and requires expert knowledge. The results demonstrate the need for an OOH specialist service to ensure this input, minimising chemotherapy delays and risks from ward-level preparation, plus developing a more robust data collection tool along with improved training for junior staff.

References

1. NHS Improving Quality. NHS services—open seven days a week: every day counts. 2013. Seven Day Services (england.nhs.uk) (accessed 20 June 2024)

2. Cheeseman MP, Rutter P. On-call hospital pharmacy services in NHS England: service provision and documentation of medicines advice calls. European Journal of Hospital Pharmacy 2016 Jan;23(1):11-15

P57 Dexmedetomidine prescribing and administration for sedation within a paediatric ICU

Riddhi Jayesh Shah[1], *Steve Tran*

[1]*Imperial College London, London*

Aim: To audit compliance with new Paediatric Intensive Care Unit (PICU) guideline for sedation with dexmedetomidine.

Method: Patients prescribed dexmedetomidine were identified by running an IntelliSpace Critical Care and Anaesthesia (ICCA) report from June 2022 to May 2024. Data were collected retrospectively from prescription charts and added to an Excel spreadsheet and anonymised.

Audit Standards[1]:

1. 100% of prescriptions are prescribed and administered as 0.2-1 microgram/kg/hour.
2. 90% of prescriptions are administered for ≤72 hours.
3. 100% of prescriptions that were administered for >72 hours were weaned.

The audit was registered with The Trust. No ethics approval was required.

Results: Thirty-four patients were prescribed dexmedetomidine between June 2022 and May 2024. One patient was excluded because a dose was not administered.

23/33 (70%) of prescriptions were prescribed as 0.2-1 microgram/kg/hour. 9/33 (27%) of patients were prescribed higher ranges of up to 1.5 micrograms/kg/hour and in one patient dexmedetomidine was not prescribed as a range.
12/33 (36%) of patients were administered higher doses of up to 2 micrograms/kg/hour including 7 where the prescription was correctly prescribed as a maximum of 1 microgram/kg/hour.
25/33 (76%) of prescriptions were prescribed for ≤72 hours.
Of the eight patients who received Dexmedetomidine for >72 hours, two patients remained on dexmedetomidine slightly longer due to planned extubations. Of the six remaining patients, four had oral clonidine weans and one had a weaning regime of intravenous dexmedetomidine due to poor oral absorption. One patient did not receive any weaning medications due to concerns regarding over-sedation on non-invasive ventilation after ventilation liberation. These weaning decisions were based on clinical status and consultant discretion.
14/33 (42%) of patients received dexmedetomidine for less than 24 hours, patients were switched prior to planned extubations.

There did not appear to be a clear correlation between longer use of dexmedetomidine and high withdrawal scores or Cornell paediatric delirium scores.
Five patients had single-agent dexmedetomidine infusion for sedation, the remaining were sedated with either fentanyl or morphine in a 50:50 split. Twelve patients received an additional sedative agent.

Conclusions: Audit shows compliance to the standards were not met. A third of the patients required higher doses of up to 2 micrograms/kg/hour of dexmedetomidine. Studies have supported the safety of higher doses of up to 2 micrograms/kg/hour[2]. Other hospital guidelines recommend dose ranges of 0.1-1.4 micrograms/kg/hour as a continuous infusion[3].

There were 6 patients who had valid reasons for longer durations. Other hospital guidelines have suggested that in most cases treatment should not exceed 72 hours however this may be extended to 7 days at consultant discretion provided that there has been a benefit from the initial 72 hours of treatment and it has led to successful reduction in doses of other sedative agents[3]. An update of our guidelines in line with usual practice seems appropriate.

Limitations include not being able to correlate higher doses of dexmedetomidine to being over sedated as sedation is subjective. A point of consideration includes whether weaning protocols need to be standardised considering side effect profiles.

References
1. Local Clinical Guideline- Sedation, patient comfort, weaning, withdrawal and delirium in PICU. Version 1. June 2022
2. Thompson R.Z, Gardner B, Autry E.B, et al. Survey of the Current Use of Dexmedetomidine and Management of Withdrawal Symptoms in Critically ill Children. J Pediatr Pharmacol Ther 2019;24:16-21.
3. External Clinical Guideline- Dexmedetomidine for continuous sedation in paediatric critical care. Version 1. April 2024

P58 Retrospective audit on the prescribing of aspirin in paediatric cardiac patients

*Tsz Yan Alice Fong[1], **Sadhna Sharma**[1]*

[1]Great Ormond Street Hospital, London

Aim: To review the compliance of prescribing and long-term management of aspirin. This retrospective audit aims to review the data in accordance with the anticoagulation guideline for paediatric cardiac patients post-surgical intervention.

Method: Electronic records of patients were searched using keywords such as "aspirin, cardiology, cardiothoracic, cardiac ward." Data was collected between September 2022 to July 2023.

Data retrieved was then processed based on data integrity and the inclusion and exclusion criteria set by the "Anticoagulation Guideline for Cardiac Patients"[1] available on the trust intranet. Each medication note for each patient was then reviewed, to investigate the indication and duration.

Results: Among the indications included in the guideline, there are three instances that require low-dose aspirin as an antiplatelet: RV-PA conduits using Hancock or Perimount bioprostheses or Contegra, which require a 3-month course after conduit replacement. Kawasaki disease requires high-dose aspirin for its treatment and maintenance. After the inclusion/exclusion criteria was applied, 88 patients were identified[1,2,3,4].

Aspirin was frequently prescribed for staged palliation, specifically the Norwood procedure, with 33 patients undergoing this procedure and being prescribed aspirin for its antiplatelet effects. Overall, 65 out of 88 patients (73.86%) were prescribed aspirin as indicated within the guideline. However, 23 patients (26.14%) were prescribed aspirin off-indication. Among these 23 patients, 8 were related to cardiac catheterisation, and 5 were associated with major artery repair, including the aorta and pulmonary artery.

Over 90% of the doses were prescribed in accordance with the guideline. For those doses not prescribed per the guideline, they were still within the licensed range for antiplatelet dosing.

Out of 88 patients, 18 required a set duration for their aspirin therapy, but only one patient met the target duration specified in the guideline. Only 5 patients were clearly documented within their records reasons for changes to their aspirin course length.

Conclusion: The audit revealed several key points regarding the prescribing and administration of aspirin in patients undergoing staged palliation and other procedures. Firstly, it was observed that majority of prescriptions (73.86%) adhered to the guidelines. However, a significant proportion (26.14%) were prescribed off-indication, highlighting a potential area for improving adherence to prescribing guidelines or for guidance to be updated to match current practice.

The high compliance rate (92.05%) is commendable. Nonetheless, the few deviations, although within the licensed range for antiplatelet dosing, suggest a need for enhanced documentation.

One contributing factor to dosing discrepancy could be the transitioning of care after discharge. When patients are discharged to primary or secondary care, dosing appeared to continue as it was during hospitalisation despite patient weight change, potentially leading to sub-optimum dosing. Protocol updates along with continuous education on improving documentation and follow up is needed within the department to meet audit standards.

References

1. Gupta WR, Taylor A, Moenkemeyer F, et al. Anticoagulation guideline for Cardiac patients. Internal Guideline, Great Ormond Street Hospital, 2023.
2. Schrör K. Aspirin and Platelets: The Antiplatelet Action of Aspirin and Its Role in Thrombosis Treatment and Prophylaxis. Semin Thromb Hemost 1997; 23: 349-356. DOI: 10.1055/s-2007-996108.
3. Li JS, Yow E, Berezny KY, et al. Clinical Outcomes of Palliative Surgery Including a Systemic-to-Pulmonary Artery Shunt in Infants With Cyanotic Congenital Heart Disease. Circulation 2007; 116: 293-297. DOI: 10.1161/CIRCULATIONAHA.106.652172.
4. Zheng X, Yue P, Liu L, et al. Efficacy between low and high dose aspirin for the initial treatment of Kawasaki disease: Current evidence based on a meta-analysis. PLOS ONE 2019; 14: e0217274. DOI: 10.1371/journal.pone.0217274.

P59 An audit reviewing compliance to Venous Thrombosis (VT) Rivaroxaban guideline

James Smith, *Susie Gage*

Introduction: Rivaroxaban is an oral anticoagulant and selective direct inhibitor of factor anti Xa. It is licensed for use in term neonates and children up to 18 years old for VT. (1) Prior to the use of rivaroxaban, standard treatment was with subcutaneous therapeutic enoxaparin, which required training, monitoring and often was not well tolerated by patients. Rivaroxaban has the benefit of not requiring regular monitoring.

After rivaroxaban licensing, a guideline was developed by a multidisciplinary team, using evidence from the EINSTEIN-Jr trial, to guide the prescribing and administration, within the trust and the surrounding region. (2) Anticoagulants have been highlighted as a major cause of adverse events and hospital admissions, so their safe prescribing and administration are critical. (3) This audit will review the use of rivaroxaban within the hospital, to ensure that it complies with the guideline. (4)

Methods: Patients, who had rivaroxaban dispensed between the 1st April 2023 and the 31st March 2024, were identified using the Pharmacy dispensing system. The electronic medical records were then reviewed, to identify the indication for rivaroxaban.

Patients' exclusions were those having rivaroxaban for primary thromboprophylaxis for a Fontan circulation and those patients who did not have a full scanned set of medical notes.

The audit standards included 100% of patients should have a haematology review documented in the medical notes, 100% of patients were prescribed the correct dose as per guideline, 100% of patients had the correct baseline blood tests, including full blood count, clotting factors, electrolytes and creatinine within 5 days of rivaroxaban being initiated.

In addition, a review of the rivaroxaban formulation supplied to each patient; granules or tablets was documented.

Results: A total of 28 patients were identified for this audit between the 1st April 2023 and the 31st March 2024; 2 patients were excluded as they did not have full scanned medical notes and 5 patients had Fontan circulation. A total number of 21 patients were included in the audit.

95% had a haematology review documented in the medical notes, 100% of the patients received the correct dose as per the guideline. 78% had all the correct baseline monitoring conducted. Of the 22% of patients that did not have the correct baseline monitoring within 5 days of initiating rivaroxaban, all of these received this monitoring within 7 days of initiating rivaroxaban.

62% of the patients were supplied Rivaroxaban granules for oral suspension, 38% were supplied tablets as either 5 mg, 15mg or 20mg tablets.

Conclusions: The audit showed that largely patients' VT treatment with rivaroxaban, complied with the guideline, giving assurance that medical teams are referring appropriately and requesting the correct monitoring for a drug that is deemed high risk. These findings will be presented to the haematology team with recommendations for improvements in baseline monitoring and appropriate timeframes. Further work identified will be assessing the different medical teams using rivaroxaban and the counselling provided on discharge.

References
(1) Bayer PLC. Xarelto (Rivaroxaban) 20mg film-coated tablets summary of product characteristics. Electronic Medicines Compendium [Internet]. 2023 [cited 2024 July 17]. Available from: https://www.medicines.org.uk/emc/product/2793/smpc
(2) Male C, Lensing A, Palumbo J, et al. Rivaroxaban compared with standard anticoagulants for the treatment of acute venous thromboembolism in children: a randomised, controlled, phase 3 trial. The Lancet Haematology 2020;7 e18-e27
(3) NHS National Patient Safety Agency. Actions that can make anticoagulation safer [Internet]. 2007 [cited 2024 July 15]. Available from: www.npsa.nhs.uk/health/ alerts/formats?contentId=3092; accessed 2.4.07
(4) Moppett J, Knott A, Gage S. Use of rivaroxaban in neonates and children following venous thrombosis. Internal trust guideline. 2022

P60 Numeta or not to Numeta – that is the question?

Elaine Spencer-Clegg[1], *Andrea Gill*[1], *Andrew Lilley*[1]

[1]*Alder Hey Children's NHS Foundation Trust, Liverpool*

Aim: Standard parenteral nutrition (PN) should generally be chosen over individualised PN in newborn babies, including very low birth weight (VLBW) premature neonates[1]. Numeta G13%E[2] and Numeta G16%E[3] are concentrated standard 'All-in-one' bags of PN licensed for neonates. In May 2021, a decision was made to transition from individualised PN (separate aqueous and lipid bags) to Numeta G13%E and Numeta G16%E for all neonates <5kg requiring PN in our hospital. Regular monitoring by a specialist dietitian or pharmacist, at least twice a week, was maintained for all babies, with the flexibility to revert to individualised PN if appropriate.

Numeta G13%E is indicated for preterm neonates and suitable for babies weighing up to 2.5kg. Presently, most babies in our hospital requiring specialised neonatal intensive care are transferred back to their local Neonatal Intensive Care Unit (NICU) post-surgery. Construction, however, is underway of an on-site NICU. In preparation for this, a retrospective audit was conducted to evaluate the success of the introduction of Numeta G13%E in our preterm neonates, with the aim of determining its appropriateness for the forthcoming NICU and any cost savings achieved.

Method: Trust Clinical Audit registration was completed. All babies prescribed Numeta G13%E were reviewed via their electronic prescribing records by a specialist pharmacist. Data including initial weight, gestational age at birth, day of life at initiation, duration of Numeta G13%E, and reasons for discontinuation were recorded. In addition, the total cost of Numeta G13 was compared to that of individualised PN.

Results: Over a 3-year period, 129 babies commenced Numeta G13%E. Median weight, gestational age at birth and day of life at initiation were 2kg (range 0.5-2.5), 33 weeks (range 22-40) and 7 days (1-138) respectively. 42 (33%) babies were transferred back to their local NICU and lost to follow up. Of the remaining 87 babies:

- 50 babies (57%) continued Numeta G13%E until full enteral feeding was achieved or a transition to Numeta G16%E was warranted due to their weight exceeding 2.5kg.
- 25 babies (29%) necessitated a shift to individualised PN due to anomalous blood test results or fluid restrictions.
- 3 babies (3%) discontinued due to loss of central access.
- 9 babies (10%) died during treatment.

The median duration of treatment with Numeta G13%E was 7 days (range 1-60 days).

When stratified by birth weight categories, 'Low Birth weight' (LBW <2.5kg), 'Very low birth weight' (VLBW <1.5kg-1kg) and 'Extremely low birth weight' (ELBW <1kg), only babies in the LBW category remained on Numeta G13%E until achieving full enteral feeding or necessitating Numeta G16%E (50/76 (66%) babies). Most ELBW and LBW babies transferred back to their local NICU (26/37 (70%) babies).

Conclusion: Numeta G13%E has been successfully introduced in our large children's hospital and did not require a change to individualised PN in 57% of babies. The use of Numeta G13%E has resulted in a cost saving of in excess of £45,000. Further work is required to determine if Numeta G13%E is a viable long-term option for our VLBW and ELBW babies.

References

1. Riskin, A, Picaud J, Shamir R, et al. ESPGHAN/ESPEN/ESPR guidelines on pediatric parenteral nutrition: Standard versus Individualized Parenteral Nutrition, Clinical Nutrition, 2018;37(6),2409–2417.
2. Numeta G13%E preterm, emulsion for infusion - summary of product characteristics (SmPC). Available at: https://www.medicines.org.uk/emc/product/7400/smpc#gref (Accessed: 08 July 2024).
3. Numeta G16%E emulsion for infusion - summary of product characteristics (SmPC) Available at: https://www.medicines.org.uk/emc/product/7398 (Accessed: 08 July 2024).

P61 Tick-tock, waste-block: Expiry date stickers saving money and the planet

Usamah Vakil[1], *Kirsty Robertson*

[1]*Great Ormond Street Hospital, London*

Aim: This audit, conducted in the Intensive Care Unit (ICU), focused on evaluating the utilisation of expiry date stickers on opened bottles of liquid medicine. The primary goal is to assess compliance among nurses in applying expiry dates on medication bottles, as the absence of these labels makes it impossible to determine when a bottle was opened (and therefore when it expires), resulting in unnecessary waste.

Method: Data was collected across three ICUs every other week over a three-month period. Excel was used to document the number of liquid medicine bottles which did not have an expiry sticker attached and which had to be discarded. The drug name and strengths were also documented. The gold standard of practice, against which audit data would be compared, would be a 100% compliance rate, i.e., there would be zero open bottles without an expiry sticker attached. In order to determine the cost implication, the Trust dispensing system was used to identify the medicine contract price which was multiplied by the number of bottles wasted.
In order to determine the estimated carbon emission associated with the waste medicine, an accurate drug weighing scale was used to take precise measurements of outer packaging, unopened bottle, empty bottle and the lid. The data from the most commonly wasted medicine, with the emission conversion factors obtained from the government website (1), were input into the emissions formula provided by the Centre for Sustainable Healthcare. The data was extrapolated for the full number of wasted bottles to calculate the overall estimated carbon emission.

Results: Over the three months of this audit, a concerning total of 267 bottles of liquid medicine were wasted due to the lack of expiry date stickers, equating to £7439.00. Expanding on this value would equate to an annual waste of over £30,000.
The emissions data gathered, over the three month audit, resulted in an estimated carbon footprint of 53.76 KgCO2e, largely equivalent to driving 170 miles by car

Conclusion: To address this issue, a poster detailing the significant cost impact was created, along with instructions on how to prevent future waste by applying stickers to the bottles. The poster was strategically placed in areas frequently accessed by nurses, and an email communication was sent to all ward staff to raise awareness and promote good practice. The continual supply of expiry date stickers is overseen by the medicines management technician (MMT) and they are stored in the most convenient areas for use by nurses.

Over the next three months, a continuation of the audit will be undertaken following the same method. A comparison of data will be made to establish whether the above interventions have had significant impact on practice and subsequently waste, cost and carbon emission, and whether further interventions are necessary. What can be concluded from this project is the benefit of ICU based MMTs, who are perfectly placed for dedicated data collection, conducting a proactive approach to medicine management and through promoting a culture of waste reduction.

References
1. Greenhouse gas reporting: conversion factors 2024 [Internet]. GOV.UK. Available from: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024

P62 Dosage instructions on community dispensed paediatric medicine labels: A cross-sectional study

Mandy Wan[1], *Isabel Ang*[2], *Asia Rashed*[1], *Andrew Wignell*[3], *Stephen Tomlin*[4]

[1]*Evelina London Children's Hospital, London,* [2]*Oxford University Hospitals NHS Foundation Trust, Oxford,* [3]*Nottingham University Hospitals NHS Trust, Nottingham,* [4]*Great Ormond Street Hospital NHS Foundation Trust, London*

Aim: The label on dispensed medicines provides important instructions for patients to take their medicines safely and effectively. Yet, a recent UK survey reported considerable inconsistencies in how hospital pharmacy professionals communicate paediatric dosage instructions.[1] This may lead to misinterpretation and administration of a wrong dose. Little is known about the labelling practice in community pharmacy where professionals play a key role in continuation of care, but may not have the same level of knowledge and experience on paediatric medicines as those working in hospital.[2 3] This study aimed to examine the dosage instruction wording on paediatric medicine labels dispensed by community pharmacies.

Method: This single-centre cross-sectional study evaluated patients' own drugs (PODs), defined as medicines that patients have obtained in the community setting and brought into hospital. Data collection was conducted across four paediatric hospital wards over 4 weeks (October - November 2022). A single researcher collected information from the dispensed medicine labels on PODs (oral dosage forms only), including drug name, dosage form, dosage instruction, and details of the community pharmacy. The data collection form was developed and piloted on a sample of 10 PODs and refined for better utility. No patient identifiable data was collected. Data were summarised using descriptive statistics. Analysis was conducted using R Statistical Software (version 4.0.2; R Core Team 2021).

Results: A total of 210 dispensed medicine labels including 88 different drugs (112 drug-dosage form combinations) were analysed. These labels were from 70 community pharmacies, representing 50 different independent and chain pharmacies, across 14 UK counties and Gibraltar. Overall, 36.2% of the dosage instructions omitted the instruction verb (e.g. give, take). Twelve (5.7%) were considered ambiguous with generic instruction (e.g. “as directed”), used Latin abbreviations for dosing frequency, missing dose quantity or unit of measurement. Nine (4.3%) dosage instructions expressed the amount to administer only in “mg” or ‘mcg”. For the 62 dosage instructions specifying the amount to administer as whole tablets or capsules, 82.3% did not include the word to reflect the dosage form (e.g. “Take one ……”). Among the 129 dosage instructions specifying a volume of liquid medicine to be administered, 55.8% were expressed as “…ml”, 13.2% as “…ml (…mg)”, 13.2% as “…mg (…ml)”, and 11.6% as “…spoonful(s)”. For medicines requiring ≥3 doses per day (n=57), 79% expressed the timing in frequency terms (e.g. “……three times per day”) and only 15.8% used explicit timings or intervals (e.g. “……at 8am, 2pm, 8pm”, “……every 4-6 hours”).

Conclusion: This study provides further evidence that pharmacy professionals use different units of measurement and time descriptors to express dosage instructions.[1] The current practice in the community setting is suboptimal. The development of national standards for labelling dispensed medicines could support pharmacy staff across all sectors in providing consistent, clear, and explicit paediatric dosage instructions to improve medication safety for children.

References

1. Latheef F, Rashed A, Wignell A, et al. SP3 An exploratory study to characterise dosing instructions on dispensed paediatric medicines labels. BMJ Paediatrics Open 2024;8.
2. Rashid A, Duffett M. Medications for children: A survey of community pharmacists. J Pediatr Pharmacol Ther 2016;21(3):213-223.
3. Brown S, Oliveri L, Ohler K, et al. Identification of errors in pediatric prescriptions and interventions to prevent errors: A survey of community pharmacists. J Pediatr Pharmacol Ther 2019;24(4):304-311.

P63 Dexmedetomidine - how is it being used in UK paediatric practice?

Andrew Wignell[1], *Jo Crook*[2], *Andrea Gill*[3]

[1]*Nottingham University Hospitals NHS Trust, Nottingham* [2]*Kings College Hospitals NHS Trust, London* [3]*Alder Hey Children's Hospital NHS Foundation Trust, Liverpool*

Aim: Dexmedetomidine is a selective alpha-2 agonist with sedative and analgesic/anaesthetic-sparing properties1. Anecdotally, dexmedetomidine is increasingly used off-label in paediatric settings, including outside of intensive care via the intravenous and intranasal routes. Although there is published evidence supporting this use2,3,4, there is currently no consensus on the safe use of dexmedetomidine in children; if given incorrectly it has potential for serious harm. This study aimed to characterise use of dexmedetomidine in paediatric practice in the UK and identify any safety concerns.

Method: An online survey was created using Microsoft Forms, and distributed by email to Neonatal and Paediatric Pharmacy Group and Association of Paediatric Anaesthetists of Great Britain and Ireland members. The survey remained open for three weeks.

Respondents were asked whether dexmedetomidine is used in children at their centre, and if so, via which route and for which indications. The existence of local guidelines, and policies for monitoring and staffing levels/competency during administration were probed; as were safety incidents and associated learning.

Results: 87 responses were received from 69 UK centres; duplicate answers were merged prior to analysis. 32 (46%) centres reported dexmedetomidine use. Of these, 24 (75%) utilise dexmedetomidine for procedural sedation (PS) via intranasal administration of the licensed IV infusion (IVI) solution; 6 (19%) employ it for PS via IVI outside of Paediatric Critical Care (PCC); and 16 (50%) use it via IVI for sedation within PCC. Additionally, two centres reported buccal use for PS, and another via IVI during cardiac surgery.

19 (79%) of centres using intranasally for PS have a guideline, of which 17 (89%) stipulate monitoring parameters and 12 (63%) specify staffing requirements for administration. Intranasal use is generally confined to theatres, surgical/medical admission/day case areas and radiology suites; with administration on general wards occurring in four centres.
4 (67%) centres using via IVI outside of PCC have a guideline, all of which stipulate monitoring parameters; three also specify staffing requirements.
9 (56%) centres using via IVI within PCC have a guideline, of which 6 (38%) detail monitoring requirements. 4 (25%) PCC units using dexmedetomidine have a Drug Error Reduction Software (DERS) drug library entry for the drug.
Four centres reported safety incidents/concerns associated with dexmedetomidine use, including two “Look-Alike-Sound-Alike” (LASA) errors, where dexmedetomidine was given intravenously instead of the intended dexamethasone. The other concerns identified were inadvertent co-administration of enteral clonidine during dexmededetomidine IVI in PCC, and cardiovascular instability due to rapid dose escalation via IVI in PCC.
No centres have additional storage requirements for dexmedetomidine, although one is considering treating as a controlled drug to reduce unregulated movement between clinical areas.

Conclusion: Dexmedetomidine is widely used off-label in UK paediatric practice, most commonly via intranasal administration for PS. The majority have a local guideline for intranasal PS, but not all stipulate monitoring or staffing requirements. The lack of an appropriate DERS entry in 75% of PCC use and LASA errors are a concern. Further work is needed to standardise use of dexmedetomidine nationally, including development of safe practice and monitoring guidance.

References
1) Martindale Pharma. Dexmedetomidine 4 micrograms/ml solution for infusion SmPC. 2023 [cited 2024 Jul 16]. Available from: https://www.medicines.org.uk/emc/product/13640/smpc .
2) Jun JH, Kim KN, Kim JY et al. The effects of intranasal dexmedetomidine premedication in children: a systematic review and meta-analysis. Canadian Journal of Anesthesia. 2017;64:947-961.
3) Hayden JC, Breatnach C, Doherty DR, Healy M, Howlett MM, Gallagher PJ, Cousins G. Efficacy of α2-Agonists for Sedation in Pediatric Critical Care: A Systematic Review. Pediatr Crit Care Med. 2016;17:e66-75.
4) South East London Children’s Hospital formulary Dexmedetomidine monograph date; [cited 2024 Jul 16]. Available from: http://www.clinibee.com.

P64 Potential colchicine toxicity highlighting the differing dosing information for pericardial diseases

Samantha Wilkinson[1]

[1]*University Hospital Southampton, Tremona Road, SO16 6YD*

An infant admitted to the paediatric intensive care unit (PICU) for acute bronchiolitis was discovered to have worsening pericardial effusion on a background of chronic pericardial effusion. The patient was started on colchicine and after two days treatment, demonstrated possible signs and symptoms of toxicity.

On admission to PICU an echocardiogram was performed and showed a significant pericardial effusion, the cardiology team were consulted and suggested starting colchicine. Before admission the patient was treated with ibuprofen, prednisolone, and a course of colchicine at 0.5mg once daily due to features suggestive of inflammation and pericardial thickening on the echocardiograms. A pericardial drain was inserted three months prior to admission to drain the effusion which then reaccumulated. The effusion was present post-surgical intervention to close a ventricular septal defect.

The patient received four doses of colchicine at 1mg twice daily over the weekend before a pharmacist reviewed the patient on Monday. On review, the pharmacist noted the high dose of colchicine for this indication and age and checked for any signs of adverse effects. The patient had several features suggestive of colchicine toxicity: escalating inotrope requirement with cardiac instability, metabolic acidosis present on the blood gas, hyperpyrexia, renal and hepatic derangement, coagulopathy, and thrombocytopenia. Within the next 24 hours an abdominal ultrasound was performed due to type 7 bloody stools and suspicion for ileus but with no evidence of necrotising enterocolitis. The patient didn't tolerate feeds when restarted therefore due to a prolonged period of nil by mouth, parenteral nutrition was started. Insertion of a pericardial drain resulted in marked improvement in cardiac output and a rapid reduction in inotrope requirement. Treatment for possible colchicine toxicity was as per Toxbase, using activated charcoal and a sodium bicarbonate infusion to correct the acidosis[1]. A platelet infusion was required and phytomenadione administered for rising INR. The patient made a good recovery and was discharged home with an echocardiogram planned in their local hospital in a weeks' time.

Colchicine is used off-label for pericarditis in both adults and children. Dosing is variable across resources and this case highlighted the lack of robust paediatric dosing information for colchicine. On investigating the high dose prescribed, the Doctor had used the BNFc maximum dosing for prophylaxis of familial Mediterranean fever rather than the starting dose of 0.5mg once daily[2]. The European Society of Cardiology recommend 0.5mg once daily in patients <5 years old[3]. A systematic review in 2015 found that evidence for use of colchicine is scarce, of poor quality and contradictory however, in practice it is still used when other treatments have failed[4]. Therefore, it is important to act on this case of toxicity to prevent future events. Locally, a template has been built on the electronic prescribing system for colchicine in order to try and avoid this happening again. On a larger scale, an audit of national paediatric cardiology centres to establish usual practice would help guide future use and establish tolerated doses in children of different ages.

References

1. National Poisons Information Service. TOXBASE colchicine- pharmaceutical 2022. Accessed July 3, 2024 via https://www.toxbase.org/poisons-index-a-z/c-products/colchicine-pharmaceutical/
2. Joint Formulary Committee. British National Formulary [Internet]. London: British Medical Association and Royal Pharmaceutical Society of Great Britain; [updated 2024 June 27; cited 2024 July 3].: Accessed July 3, 2024 via https://bnfc.nice.org.uk/
3. Adler Y, Charron P, Imazio M, et al. 2015 ESC Guidelines for the diagnosis and management of pericardial diseases. European Heart Journal 2015; 318: 8-8.
4. labed S, Pérez-Gaxiola G, Burls A. Colchicine for children with pericarditis: systematic review of clinical studies. Archives of Disease in Childhood 2016; 101: 953-956

P65 Is changing manufacturer of Tacrolimus liquid associated with blood level instability?

Sophie Alice Williams[1]

[1]*Cardiff And Vale University Health Board, Cardiff, Wales*

Introduction: Tacrolimus is a calcineurin inhibitor used to prevent rejection of transplants. In a cohort of paediatric renal transplant patients, patients were switched from the Rosemont branded special of tacrolimus to a different manufacturer due to a supply issue with the Rosemont brand. There is guidance recommending the prescribing of Tacrolimus by brand to minimise the risk of graft rejection with switching brands [1], however there is no guidance on whether this applies to switching between different liquid preparations. A literature search shows mixed evidence on whether or not this will affect levels [2], [3]. The liquids in a small cohort of patients rather than the licensed Modigraf granules due to the flexibility of modifying the liquid dose compared to the granule dosing.

Aim: To assess whether switching post renal transplant paediatric patients from a specific brand of tacrolimus liquid to the generic liquid affects their tacrolimus levels.

Method: A retrospective study examining Tacrolimus patients following a switch of patients from one specials manufacturer to another. Tacrolimus levels are checked routinely at each clinic appointment and this was compared to whether and when they received the generic liquid of Tacrolimus compared to the Rosemont brand that they had previously been established on.

Results: 8 patients between the ages of 2-14 were identified as being on Tacrolimus liquid and 6 of them had received the generic brand instead of the Rosemont. Out of these patients, 5 patients had their tacrolimus levels reduced with the most likely cause being the switch in liquid preparation. The other 3 patients: one received their supply of tacrolimus liquid whilst the Rosemont brand was still in stock therefore did not receive a different formulation, another one was trialled on tablets during this period so their tacrolimus level increased during this time, and has since been switched back to the Rosemont liquid, and the final patient was excluded as due to virus complications, is on a very small dose of tacrolimus with levels running at <0.2.

Conclusion: Although the evidence in the literature is lacking, the results of this small retrospective analysis show that switching from the Rosemont to the generic was associated with tacrolimus levels decreasing, and in some cases the levels dropped to <0.2 which is the lowest measurable level that the system will detect. This highlights the need to communicate with prescribers when there are stock shortages as substituted medication may need closer monitoring or adjustment of doses. This should also be communicated within the pharmacy team to ensure dispensing staff understand the effects of switching manufacturer of specials on medicines with a narrow therapeutic index.

References

[1] Medicines and Healthcare products Regulatory Agency. Oral tacrolimus products: prescribe and dispense by brand name only, to minimise the risk of inadvertent switching between products, which has been associated with reports of toxicity and graft rejection. 2014 [accessed 26th June 2024]. Available from: Oral tacrolimus products: prescribe and dispense by brand name only, to minimise the risk of inadvertent switching between products, which has been associated with reports of toxicity and graft rejection - GOV.UK (www.gov.uk)
[2] Riva N, Guido P C, Licciardone N et al. Therapeutic monitoring of pediatric transplant patients with conversion to generic tacrolimus. Farmacia Hospitalaria. 2017;21(2):150-168.
[3] Madian A, Panigrahi A, Perera M et all. Case report: inability to achieve a therapeutic dose of tacrolimus in a pediatric allogeneic stem cell transplant patient after generic substitution. BMC Pharmacology and Toxicology. 2014;15:69.

P66 Using Zaficeta in an extreme pre-term neonate to treat burkholderia cepacia sepsis

*Lauren Williams[1], **Susan Kafka[1]***

[1]NHS Greater Glasgow and Clyde, Bishopton

Background Situation: On day 10 of life, an extreme pre-term neonate (gestational age at birth 24+5 weeks, working weight 540g) had positive blood cultures for burkholderia cepacia with clinical sepsis.

Empirical treatment for sepsis with vancomycin and meropenem was initially commenced on day 6 of life in response to altered infection markers (CRP/WCC/temp). Positive blood cultures for Burkholderia cepacia were returned on day 10 of life.

Based on susceptibility patterns (S= Co-trimoxazole; I=Ceftazidime, levofloxacin; R= meropenem), Microbiology recommended treatment with IV co-trimoxazole and deferred to the NICU and antimicrobial (AM) pharmacists for dosing advice. Literature review demonstrated a paucity of evidence for use in this population. Considerable safety concerns around toxicity due to formulation excipients (ethanol; 6 x upper recommended limit) and known potential for adverse effects in term infants less than six weeks (risk of kernicterus) were raised by the NICU and AM pharmacists and discussion opened with the Microbiology and Neonatal teams around the use of 'novel' therapies.

Ceftazidime and levofloxacin were started in combination whilst further MICs were awaited, however concern over therapeutic failure remained due to the respective MICs (C=12mg/L; L=4mg/L), local epidemiology and clinical parameters. Subsequent analysis of the MIC for the 'novel' antimicrobial ceftazidime/avibactam, as requested by Pharmacy, indicated excellent susceptibility (MIC=6mg/L). Experience with ceftazidime/avibactam at our centre was previously restricted to treatment in teenagers with Cystic Fibrosis.

Clinical Contribution: Pharmacy intervention drove the decision to treat with ceftazidime/avibactam, having considered risk: benefit of the alternative therapies/combinations. Mitigating risk of serious toxicity and/or treatment failure were at the forefront of clinical decision making. Literature searches were undertaken, along with shared learning from another tertiary UK centre. Clinical parameters were considered in the optimisation of therapeutic response: sepsis markers; increasing ventilator requirements; renal function. A crude estimation of creatinine clearance (Schwarz -Cr 71, length 30cm) indicated CrCl <20ml/min/1.73m2, accepting limitations of population parameters in calculating renal function in an extreme pre-term neonate and acknowledging a creatinine of 71 as significantly elevated from baseline.

Risk to life from overwhelming sepsis with a pathogen rarely seen in this patient population remained a significant concern. Given the MIC distribution and limited treatment options, dosing of ceftazidime 50mg/kg was recommended, with a corresponding avibactam dose of 12.5mg/kg. Risk of accumulation due to compromised renal function was identified, thus frequency reduced to once daily dosing as per product literature and the Renal Drug Database, with parameters for monitoring set.

The patient received three weeks of treatment with ceftazidime/avibactam and repeated negative cultures obtained, confirming successful therapeutic response. No adverse effects were noted during treatment and there was no deterioration in clinical status.

Conclusion:

This clinical case indicates the benefit of collaborative multi-disciplinary working to support use of novel agents in previously unconsidered patient groups.

To our knowledge this is one of only a few patient case studies. More evidence is required before significant conclusions can be drawn about the safety profile of ceftazidime/avibactam in extreme pre-term neonates.

References
1 Shirley M. 'Ceftazidime-Avibactam. A review in the treatment of serious gram-negative bacterial infections. Drugs 2018; 78, 675-692
2. Asfour et al, "Intravenous ceftazidime-avibactam in extremely premature neonates with carbapenem-resistant enterobacteriaceae: Two case reports: Journal Paed. Pharmacol. Therapy; 2022; 27(2); 192-197

P67 Comparative study: Assessing the prospect of pharmacy technician pre-screening of paediatric discharge prescriptions

Nicola Wilson[1], *Jennifer Kimmins*[1], *Lorraine Mellon*[1]

[1]*NHS Greater Glasgow and Clyde, Glasgow*

Aim: To assess the utility of pharmacy technician pre-screening of complex discharge prescriptions by reviewing the number of straightforward formulation and dosing changes made during pharmacist screening of discharge prescriptions, then comparing to previous audit results from more simple prescriptions from the same hospital[1].

Method: A retrospective audit of prescriptions dispensed in a dispensing room (covering renal, orthopaedic, gastroenterology, neurology and complex surgical patients) in a tertiary paediatric hospital. All completed electronic discharge prescriptions dispensed within a one month period were compared with original electronic prescriptions. Two factors were initially assessed: changes to formulation (e.g. changing to preferred strength of liquid) and simple changes to dosing instructions (e.g. adding maximum frequencies or changing to standardised instructions). During the audit, it became apparent that some changes did not fit into these categories so new categories were added – miscellaneous, dispensing instructions and specialist pharmacist knowledge required.

Results: 1087 items were ordered on 290 prescriptions. 315 items were modified (29%) during pharmacist screening with 20 dispensing instructions (2%) added. 173 prescriptions (59%) required modification (between 1 and 6 changes per prescription). 93 changes were to formulation (31% of changes made), 137 (43%) were to dosing instructions and 74 (23%) were miscellaneous (e.g. meeting Controlled Drug requirements, duration of therapy, variable dosing instructions). 11 changes (3.5%) required specialist pharmacist knowledge.

Conclusion: When compared to the results of a previous audit undertaken in less complicated clinical areas within the same hospital (Acute Receiving Unit & Clinical Decision Unit), fewer items were modified (29% vs 39%) but a similar number of prescriptions were modified (59% vs 58%)[1]. Only 3.5% of alterations were deemed to require specialist pharmacist knowledge. Examples include complex dose titrations and dose adjustments due to drug interactions.

Medication errors in children are associated with significant harm[2]. Lack of appropriate formulations or choice of incorrect formulation can lead to potentially fatal incidents.

The changes noted in the previous study were more straightforward – falling into two categories (formulation and simple dose adjustments). No modifications were deemed to require specialist pharmacist knowledge[1].

This demonstrates that more complex prescriptions are seen in non-general paediatric wards and that pharmacist time should be targeted on these areas in comparison to ARU and CDU, although the majority of changes could still be made by an experienced paediatric pharmacy technician.

Additional dispensing instructions were relatively straightforward, for example dispersing tablets in a specific volume, and are generally standard instructions for each drug (e.g. aspirin) and could be added to prescriptions by a technician.

Experienced paediatric pharmacy technicians have the knowledge base to make the more straightforward adjustments needed in ARU and CDU patients, and the self-awareness to refer complicated prescriptions to pharmacists as needed[3],[4]. Using pharmacy technicians to carry out pre-screening of discharge prescriptions in defined clinical areas or patient groups could save money and target development of clinical services in more complex clinical areas[4].

The General Pharmaceutical Council supports advanced roles for pharmacy technicians in the UK, as evidenced in their 2017 standards for pharmacy professionals[4].

References

1. Wilson N, Mellon L, Stockton A. P36 Should discharge prescriptions be pre-screened by pharmacy technicians in a tertiary paediatric hospital? BMJ Paediatrics Open 2024;8:doi: 10.1136/bmjpo-2024-NPPG.46
2. Wong ICK, Wong LYL, Cranswick NE. Minimising medication errors in children. Archives of Disease in Childhood 2009;94:161-164.
3. Smith L. A day in the life of a paediatric palliative care pharmacy technician. The Pharmaceutical Journal 2018;Online:DOI:10.1211/PJ.2018.20205467
4. Boughen M, Fenn T. Practice, Skill Mix, and Education: The Evolving Role of Pharmacy Technicians in Great Britain. Pharmacy (Basel). 2020 Mar 26;8(2):50. doi: 10.3390/pharmacy8020050. PMID: 32224904; PMCID: PMC7355578.

P68 Severe hypocalcaemia and hypomagnesaemia in a neonate following maternal cinacalcet therapy

Thomas Wyllie[1], *David Odd*[2]

[1]*University Hospital of Wales, Cardiff,* [2]*Cardiff University, Cardiff*

Case summary: A baby boy weighing 2kg was born at 34+3 weeks gestation by caesarean section due to worsening maternal chronic hypertension. Mother had an extensive medical history including two renal transplants and hyperparathyroidism, and was on various medications including tacrolimus, cinacalcet & labetalol. The baby was admitted to the neonatal unit where feeding was initiated with breast milk. Feeds were changed to formula the following day due to concerns around existing maternal medications.

On day 2 of life the patient was being cared for on the transitional care unit when blood tests revealed hypocalcaemia (1.53mmol/L) and hypomagnesaemia (0.5mmol/L). The patient was readmitted to NICU and received IV infusions of calcium and magnesium. Parathyroid hormone (PTH) was checked and found to be within the normal range (2.7pmol/L – reference range 1.6-7.2pmol/L). The patient was commenced on oral supplements of calcium 1mmol/kg/day & magnesium 0.6mmol/kg/day, in addition to daily supplements of vitamin D3 (colecalciferol 400 units) and alfacalcidol 100nanograms as advised by paediatric endocrinology following an initial serum vitamin D level of 17 nmol/L.

Two further calcium infusions were required on days 7 & 10, while oral calcium supplementation was increased in a stepwise manner up to a dose of 8mmol/kg/day. Serum phosphate was raised from day 5, peaking at 4.46mmol/L on day 13 before falling back into normal ranges. Parathyroid hormone had increased to 8.1pmol/L when it was rechecked at day 11 of life.

Calcium and magnesium supplements were discontinued at day 22 with serum levels for both within the normal range. Colecalciferol and alfacalcidol were continued on endocrinology advice and the infant was discharged home on day 28.

Discussion: Cinacalcet acts as a calcimimetic by allosterically activating the calcium-sensing receptor expressed in various human tissues. It mimics the action of calcium, leading to lower PTH levels. This reduction in PTH is associated with a decrease in serum calcium levels.

PTH plays a vital role in calcium homeostasis – a low calcium should trigger an increase in PTH, which then enhances bone resorption and distal tubular reabsorption of calcium. In this case the initial normal PTH level is inappropriate in the presence of low serum calcium and was preventing the patient's homeostatic response.

Cinacalcet has a half life in adults of 30-40 hours[1]. There is little published information on the effects of cinacalcet in pregnancy and breastfeeding and reference sources offer conflicting advice on its use in these situations. The experience of this patient is similar to cases in the existing literature in which a neonate required calcium supplementation for 11 days[2], 4 weeks[3] and 6 weeks[4] but hypocalcaemia resolved in all cases.

This case reinforces the need for close monitoring of calcium and magnesium levels in infants where there is a history of maternal cinacalcet use.

References

(1) Padhi D, Harris R. Clinical pharmacokinetic and pharmacodynamic profile of cinacalcet hydrochloride. Clin Pharmacokinet. 2009;48(5):303-311.

(2) Horjus, C, Groot, I, Telting, D, et al. Cinacalcet for Hyperparathyroidism in Pregnancy and Puerperium. J. Pediatr. Endocrinol. Metab. 2009;22(8): 741-750.

(3) Nadarasa K, Bailey M, Chahal H, et al. The use of cinacalcet in pregnancy to treat a complex case of parathyroid carcinoma. Endocrinol Diabetes Metab Case Rep. 2014;2014:140056

(4) Vera L, Oddo S, Di Iorgi N, et al. Primary hyperparathyroidism in pregnancy treated with cinacalcet: a case report and review of the literature. J Med Case Rep. 2016;10(1):361

P69 Counting the cost of medicines on the neonatal unit

Thomas Wyllie[1]

[1]*University Hospital of Wales, Cardiff*

Background: Spending on medication is second only to workforce costs in the overall NHS budget[1]. Neonatal care is expensive[2] and the cost of drugs contributes significantly to this cost. Initiatives championing prudent[3] or value-based[4] healthcare have emerged advocating for the judicious use of resources, which inherently necessitates a comprehensive understanding of the costs involved.

Aim: This project explores the views and knowledge of healthcare professionals (HCPs) working on a neonatal unit about the price of the medicines they prescribe and/or administer.

Methods: Nurses, doctors & ANNPs on a tertiary neonatal unit were invited to participate in a survey designed to gauge their perspectives on medication costs. The survey was structured in two segments: the initial part sought to capture the participants' views, while the subsequent section challenged them to estimate the costs of 17 routinely utilised medications within the unit.

Results: 45 HCPs responded (25 nurses, 19 doctors, 2 ANNPs) with a broad range of experience within neonatology. The majority of respondents said that the cost of medicines should be a factor in prescribing decisions and 40% thought that it was 'important' or 'very important' to know the cost of medicines prescribed. However, when asked if they knew the cost of the medicines they used, HCPs self-reported low knowledge (mean 1.8 out of 5; range 1-3). This was borne out by the results of the test. Estimations of cost varied between 1.5% and >70,000% of the true monetary value. 70% of all answers overestimated the price of the medicines.

Conclusions: The findings of this study underscore a paradox within the healthcare system: while there is a consensus on the relevance of cost-awareness in prescribing, there exists a palpable deficit in the actual understanding of medication prices among healthcare professionals. This disconnect poses a formidable challenge in aligning clinical decisions with economic considerations, particularly when differentiating between equivalent treatment options or considering the deprescribing of medications.

Most HCPs in this study believed the cost of medicines should be a factor in prescribing decisions, however these results show a lack of awareness of medication prices. This presents a significant challenge to educate HCPs about the cost of medicines in common use.

References

1. https://www.england.nhs.uk/medicines-2/medicines-value-and-access/
2. Yang M, Campbell H, Pillay T, et al Neonatal health care costs of very preterm babies in England: a retrospective analysis of a national birth cohort BMJ Paediatr Open 2023;7:e001818
3. Scowen, L., Howson, H., & Martin, C. (2015). Delivering Prudent Health: Creating a Social Movement for Innovation. https://bevancommission.org/wp-content/uploads/2023/09/Delivering-Prudent-Health-Creating-a-Social-Movement-for-Innovation.pdf
4. Hurst L, Mahtani K, Pluddemann A, et al. Defining Value-based Healthcare in the NHS: CEBM report. https://www.cebm.net/2019/04/defining-value-based-healthcare-in-the-nhs/

P70 Comparative analysis ready-to-use versus individualized parenteral nutrition for neonatal patients: Rapid review update

*Ana Cristina Bento Silvestre, Angela Ferreira Lopes[1], **Nathalie De Lourdes Souza Dewulf***

[1]School of Pharmacy, Federal University of Goias, Goiania, Brazil

Aim: To update the scientific literature regarding ready-to-use (RTU) parenteral nutrition (PN) compared to individualized PN (iPN) in premature neonatal patients.

Method: An overview of systematic reviews (SR) using a rapid evidence approach with a structured search conducted on BVS Health, PubMed, Cochrane Library, Embase, Web of Science, and Scopus. Clinical trials database was accessed to identify ongoing studies. Study question: What is the effectiveness and safety of RTU compared to iPN in premature neonatal patients?

Results: Two systematic reviews met the eligibility criteria: Mena, K.D.R. et al. (2018)[1] from Colombia, and Mihatsch, W. et al. (2023)[2] from Germany. Among these, three studies addressed the study question: Immeli, L. et al. (2020)[3], a retrospective cohort study, focused on RTU PN outcomes such as energy and protein intakes, length of stay, and mortality compared to historical controls, showing a significant difference in first-week protein intake; and two single-arm clinical trials, published by Rigo, J. et al. (2012)[4] and Colomb, V. et al. (2012). Rigo et al. found the RTU PN system easy to use and preferred by clinical staff, while Colomb et al. reported that RTU PN meets the varied nutritional needs of preterm infants. Both studies focused on handling and usage without a control group. An ongoing multicenter randomized phase IV clinical trial, registered in 2018 and currently recruiting, was also identified; however, no partial results have been presented.

Conclusion: The limited literature evidence available does not allow us to infer whether ready-to-use parenteral nutrition presents benefits over iPN in neonatal care. The level of evidence remains low, revealing the necessity for high-quality trials to explore this scientific theme.

References
1. Mena, KDR, Espitia,OLP, Vergara, JAD. Management of ready-to-use parenteral nutrition in newborns: systematic review. *Journal of Parenteral and Enteral Nutrition* 2018; 42: 1123-1132.
2. Mihatsch, W, Jiménez Varas, MÁ, Diehl, LL, et al. Systematic review on individualized versus standardized parenteral nutrition in preterm infants. *Nutrients* 2023; 15: 1-14.
3. Immeli, L, et al. A triple-chamber parenteral nutrition solution was associated with improved protein intake in very low birthweight infants. *Acta Paediatrica* 2020; 109: 1588-1594.
4. Rigo, J, et al. Benefits of a new pediatric triple-chamber bag for parenteral nutrition in preterm infants. *Journal of pediatric gastroenterology and nutrition* 2012; 54: 210-217.

P71 KidzMedz Cymru - reflections on setting up a pill school

Bethan Davis[1]

[1]*Cardiff & Vale University Health Board, Cardiff*

Aim: The aim of KidzMedz Cymru was to teach Welsh paediatric patients, aged 4 years and above, how to safely swallow tablets and capsules in a structured environment. The project also sought to transition children from liquid medications to tablets or capsules; thus, improving convenience for families and reducing liquid medication prescribing. KidzMedz Cymru was inspired by successful pill schools in England (1,2).

Method: In October 2022, the project was awarded funding from the health board charity and approved by the Youth Council.

We created self-contained kits including sports cap drinks bottles (for ease of swallowing water), pill packs, information leaflet and a certificate. The dummy pill packs included sprinkles, Millions©, sunflower seeds, mint Tic-Tacs©, Skittles©and dummy capsules. To improve accessibility of the project the contents of the packs are vegan and halal, and the literature is available in both Welsh and English. Each kit also included a data collection form to be filled out by staff, and a parent/carer questionnaire accessible via a QR code. Staff could pre-order kits before a clinic or pick up a few on-demand kits if they needed it immediately.

KidzMedz Cymru was rolled out in June 2023 to the respiratory, endocrine, and renal teams due to their close relationship with specialist pharmacists. Posters comparing the sizes of commonly prescribed medicines to the sweets in the kit were also created. Drop-in staff training was available before the launch, with the option for further training on request.

Results: Over the first year, 131 kits were distributed,54 data collection forms were completed and returned (41% response rate). Of these 54 patients who received the training only 15 patients had medication changed to tablets or capsules (28% success rate). Although the number of patients successfully switched was small there were practical successes achieved including the paediatric gastroenterology department using it to train two patients for video capsule endoscopy, thus eliminating the need for more invasive procedures like endoscopy or colonoscopy. One patient on dialysis had 3 medicines switched from liquid to tablets which meant the patient was more adherent to their fluid balance as well as providing a cost saving of £592 per month. For the patient's family it was beneficial as they had a smaller amount of medicines to store safely at home and could collect the medication from their local community pharmacy.

Only 8 parents or carers completed the online questionnaire so we were unable to see how their beliefs on tablet taking and liquid medicines changed with the education provided. The low response rate may have been influenced by reliance on staff to return forms and the QR code for the questionnaire possibly being missed.

Conclusion: KidzMedz Cymru faced challenges with data collection. However, the project demonstrated its potential by successfully transitioning children to tablets and supporting non-invasive diagnostic procedures in paediatric gastroenterology. The next steps include expanding the project to ward settings by December 2024 and integrating into local university pharmacy programs.

References

1. Rashed AN, Terry D, Fox A*, et al.* Feasibility of developing children's Pill School within a UK hospital. *Archives of Disease in Childhood* 2021;**106:**705-708.
2. Tse Y, Vasey N, Dua D*, et al.* The KidzMed project: teaching children to swallow tablet medication. *Archives of Disease in Childhood* 2020;**105:**1105-1107.

P72 Discharge Medicines Service (DMS). A tertiary specialist paediatric hospital's experience

*Michael Hall[1], **Nikesh Gudka[1]**, Bhumik Patel[1], Meera Thacker[1]*

[1]Great Ormond Street Hospital, London

Introduction: Discharge Medicines Service (DMS) is an essential pharmacy service established in February 2021 to ensure better communication, between the discharging hospital and community pharmacy (CP) around any changes to their medication during their hospital stay[1]. The NICE guidance NG5 published March 2015 recommends that medication-related communication systems should be in place when patients move from one care setting to another. Between 30 – 70% of patients have an error or unintentional change to their medication when moving between care settings[2,3]. Discharge from hospital is associated with an increased risk of avoidable medication related harm[3,4]. This can be of particular importance in the paediatric setting due to non-standard dosing, the availability of multiple formulations and strengths of the same medication in the community setting.

At Great Ormond Street Hospital (GOSH) the PharmOutcomes portal is used to communicate between the hospital and a patients nominated CP. Working alongside our electronic patient record (EPR) team, the DMS referral letter was integrated within our electronic prescribing and health records system. A 2nd pathway was also established in case the integrated referral system failed which involved manually uploading the electronically generated referral to the portal. A data protection impact assessment was carried out for the new service and cyber checks were performed on PharmOutcomes. Both pathways of sending a referral were tested vigorously to ensure that there was end to end connectivity and robust safety measures in place before going live. A selected group of the clinical workforce was trained during the initial service implementation and as the service matured more staff where trained and embedded into the staff onboarding process.

Aim: The aim of this audit was to look at referral trends focusing on rejected referral rates. We also analysed demographic spread and the common reasons for referrals being rejected.

Method: Between Feb 2024 to May 2024 a total of 158 referrals were submitted. Referral data was extracted from EPIC and PharmOutcomes. This was then analysed to try and understand trends, rejection referral rates and common reasons for rejections.

Results: Out of these submissions 49.37% had been actioned and completed by the CP. At the time the data was extracted (June 24) 7.59% of the submissions had been rejected. The most common rejection reason was "Unable to contact patient". Throughout this date period 100% of submissions were submitted via an integrated interface. 45.57% of the patients were aged between 3-12 months representing the highest patient age cohort submitted. A tool, based within the PharmOutcomes portal, developed by Pinnacle Health based on the Newcastle study, BMJ Open Oct 2016, 6 (10) calculated an estimated savings of ~£50,104 to the local health economy.

Conclusion: In the future we hope to look at the patient experience following discharge and how we can improve engage with our community pharmacy partners to alleviate the barriers that they might face when dealing with paediatric referrals. We hope to further analyse themes such as types of meds most referred and breaking down referral rejection rates per specialities.

References

1. NHS Discharge Medicines Service [internet] NHS England » NHS Discharge Medicines Service (Accessed June 2024).
2. NICE guideline [NG5] Published: 04 March 2015 Overview | Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes | Guidance | NICE (Accessed June 2024)
3. Keeping patients safe - getting the medicines right: Royal Pharmaceutical Society, FINAL REPORT, June 2012 Keeping patients safe transfer of care report.pdf (rpharms.com) (Accessed July 2024)
4. Discharge Medicines Service. Published on: 24th February 2020 | Updated on: 1st July 2024 [Internet] Discharge Medicines Service - Community Pharmacy England (cpe.org.uk) (Accessed July 2024)

P73 Exploring the barriers and facilitators of embedding a Discharge Medication Service

*Michael Hall[1], **Nikesh Gudka[1]**, Bhumik Patel[1], Meera Thacker[1]*

[1]Great Ormond Street Hospital, London

Introduction: Transition between primary to secondary care and vice versa is identified as portraying a singularly unique risk to safe and effective care patient may receive, with a known 30 to 70% chance of medication related error(s) occurring[1, 2]. Effective communication between care providers as patients migrate between care setting to allow an accurate, safe, and timely medications reconciliation and clear understanding by care providers for the intended indications, is a hallmark of gold standard patient care.

It has long been an NHS mandate that patients being admitted to hospital have an accurate medicines reconciliation conducted in timely manner. Similarly on discharge from secondary care, all patients should be discharged with an accurate discharge summary which should include medications that the patient is to continue. This should be received by primary care clinicians within 24 hours of discharge. Despite this community pharmacy contractors often struggle to be included in these communication cascade and so remain a single point at which safe care may fail. Discharge Medication Service (DMS) is a pharmacy led initiative established in 2021[1] to improve communication between secondary care and community pharmacy contractors.

To support high risk transitions of care from a specialist tertiary paediatric hospital to community, a project commenced in 2023 to establish a discharge medicines service.

Aim: Following completion of the initial project we proceeded to conduct a qualitative review of pharmacists completing referrals to understand barriers and facilitators to support DMS.

Methods: From April 2024 to July 2024, we interviewed 10 pharmacists across all bands and paediatric specialities. Thematic analysis of interviews was undertaken to identify commonly cited barriers and facilitators to making referrals.

Results: Common thematic facilitators allowing the introduction of a DMS were, 1) acknowledgement of meeting a trust target for a Commissioning for Quality and Innovation project associated with significant financial benefit; 2) the ability to communicate on-going patient care to partner community pharmacy improving patient safety and care efficiency; 3) enhancing the patient and family experience; 4) improving and building patient and community relationships to support patient care; 6) project leads supporting and driving projects and availabilities of key standard operating procedure.

Barriers emerging were 1) completion of referral but without dedicated time required to allow referring pharmacists opportunity to achieve full benefits of information transfer; 2) uncertainty around outcomes of referral; 3) lack of feedback for rejections to tertiary centre referral, making it difficult to develop optimisation strategies for patients to refer.

Conclusions: Our evaluation highlights that DMS can be introduced, following development and implementation of an integrated database, supporting care for children and young people transitioning from a tertiary specialist care environment to primary care that can be further developed. The evaluation recognises the value to safe and effective patient care and allows a platform from which the pathways can be improved and refined to further develop safe and effective care transitions as well as improve communications provided to improve the seamless and effective care provision in primary care to children and young people.

References

1. NICE guideline [NG5] Published: 04 March 2015 Overview | Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes | Guidance | NICE (Accessed June 2024)
2. Keeping patients safe - getting the medicines right: Royal Pharmaceutical Society, FINAL REPORT, June 2012 Keeping patients safe transfer of care report.pdf (rpharms.com) (Accessed July 2024)
3. NHS Discharge Medicines Service [internet] NHS England » NHS Discharge Medicines Service (Accessed June 2024)

P74 Multi Chamber Bags Parenteral Nutrition audit - response to a critical incident

Amy Phipps[1], *Alison Dinning*[1]

[1]*University Hospitals Bristol and Weston NHS Foundation Trust, Bristol*

Aim: Without additions of micronutrients, Multi Chamber Bags (MCBs) of Parenteral Nutrition (PN) are referred to as 'unsupplemented'. When containing a full range of micronutrients MCBs are referred to as 'supplemented'.

The nutrition team introduced a protocol for two unsupplemented MCBs and one supplemented MCB in 2021. In February 2022, an adolescent developed Wernicke's Encephalopathy (WE) attributable to use of an unsupplemented MCB, due to unrecognised baseline thiamine deficiency and omission of a multivitamin/mineral product intended to be taken alongside the MCB.

The nutrition team altered PN protocols in Jun 22, to mandate use of certain micronutrient-containing products alongside unsupplemented PN. This audit is to evaluate whether protocol change led to safer practice.

Method: Retrospective audit of MCBs issued 6 months after the first and second protocol versions using electronic notes and pharmacy dispensing records. Determine compliance with PN protocol (product chosen, volume, administration of micronutrients). Record PN indications, MCB indications, days of MCB administered, indications for switching from MCB to bespoke PN or vice versa, adverse effects and incidents from use of MCBs.

Results: 80 PN courses were recorded: 60% supplemented MCB and 40% unsupplemented MCB. In 46% cases MCBs were chosen because of protocol, 16% of cases nutrition team recommended use, 18% related to inability to make bespoke in local unit and 19% was unknown. Over 12 months, 83% of product choices were compliant, 34% were administered at protocol volumes on all days and 28% of unsupplemented PN was administered with micronutrients on all days. Compliance pre- and post- protocol changes respectively was: 74% versus 88% (product choice); 42% versus 21% (volume); 14% versus 75% (concomitant micronutrients). Noncompliant product choice was via dietitian advice except for one case. Noncompliant volume was almost exclusively on recommendation by dietitian or nutrition team. One patient was administered PN at a volume exceeding protocol maximum at a weekend. 70% of PN courses involved an adverse effect or incident. Incidents included split or popped bag, spike falling out, pump air alarms, incorrect product administered (similar names), incorrect fluid co-infused. Adverse effects were mild and included low serum potassium, high serum phosphate, or high triglycerides. No adverse effects led to cessation of MCB after the index case of WE. Switching to bespoke PN occurred to obtain micronutrients within PN or increase macronutrient intake (or both), primarily when supplemented MCB volume was too small to provide calorie requirements. Bespoke PN switch was also made occasionally when the ward was not trained in use of MCBs and used them temporarily to cover in-house aseptic unit unavailability. Courses of unsupplemented PN were less frequent after the second protocol was released.

Conclusions: Compliance with product choice was good and rationale was given for alternate choices. Compliance to protocol volumes every day of PN was low, as dietitians specified patient-specific plans. Once concomitant micronutrients were recommended in the second protocol, compliance was good. There was no patient harm from use of MCBs, though minor adverse effects or incidents were very common.

Profile Productions

Conference organisers
Profile Productions Ltd
Suite 213, Boundary House
Boston Road, London W7 2QE
Tel: +44(0) 20 3725 5840
info@profileproductions.co.uk
www.profileproductions.co.uk