DEVELOPMENT OF PEDIATRIC WEIGHT-BASED PRE-PRINTED ORDERS IN THE COMMUNITY HOSPITAL SETTING. Elizabeth Boucher, Blais C, Depiero D, Marden R, Devito G, Oliviera T, Carr N, McCluskey G. Concord Hospital, Concord, NH. e-mail: lizbouch@comcast.net

Purpose: To develop pediatric weight-based pre-printed order sets in a community hospital to help medication ordering
Methods: Pre-printed orders are used in many hospitals to help the medication ordering process. In the pediatric population, having weight-based orders helps the physician and pharmacist in dosing medications for pediatric patients. The revision and development of the pre-printed orders were based on the need of having an new order set or the need for an order set to be revised and updated. All pre-printed orders were developed based on the hospital template. The contents of the order sets were determined based on its target condition, i.e., bronchiolitis, orthopedic surgery, so appropriate treatment is provided based on that condition. The content included nursing, laboratory, respiratory and medication orders for each condition. Any medication on the order set were verified with The Harriet Lane Handbook and the Pediatric Dosage Handbook. Also when appropriate the primary literature was reviewed to support new dosing or determine appropriate dosing guidelines for certain conditions. The dosing of the medications were written as either mg/kg/dose or mg/kg/day. Non-medication orders were determined by the appropriate department including nursing and respiratory. Before any pre-printed orders were allowed to be used in the hospital, they were reviewed by a multi-disciplinary team including physicians, nurses, pharmacists, and dieticians.
Results: To date we have developed many pre-printed orders sets that are pediatric specific. These order sets have been developed for a variety of areas. These areas include but not limited to; orthopedic surgery, bronchiolitis, antibiotic orders, and pre-operative anesthesia. The usage of pre-printed orders have become part of the prescibing practice in the hospital for these conditions. The pediatric medical staff have supported the use of these pre-printed order sets and have encouraged the general medical staff to use these orders when treating a pediatric patient.
Conclusions: In conclusion, we have been successful in developing pediatric weight-based pre-printed order sets in the community hospital. The orders sets have been developed for a variety of pediatric areas. We are encouraged by our progress and will continue to add new pediatric specific orders to the hospital.

HOME INOTROPIC INFUSION THERAPY. Ann Boughner. Cincinnati Children's Hospital Medical Center Home Care Pharmacy MLC 5017, Cincinnati, OH. e-mail: aboughner@aol.com

Purpose: The Department of Cardiology and Home Care Pharmacy have developed a plan for continuous milrinone infusions in the home, for symptomatic management of patients in heart failure who were unable to be weaned as an inpatient.
Methods: Orders are written with the dose in mcg/kg/min, with the calculation weight specified. Calculations confirmed by pharmacy. A plan is predetermined for loss of intravenous access, or mechanical malfunction of the infusion device. Monitoring parameters are individualized per patient. Caregivers are given instruction on the operation of the ambulatory pump, along with care of the intravenous catheter. Milrinone and all administration supplies are dispensed from the Home Care Pharmacy. A back up infusion pump is in the home in the event of equipment failure. Caregivers are contacted by a pharmacist weekly for a follow up assessment, and re-supply.
Results: To date, four patients, one female and three males, have received home treatment. Two patients used the therapy as a bridge to cardiac transplantation, and two patients for end of life care for cardiomyopathy associated with Duchenne muscular dystrophy. All infusions were via percutaneous peripherally inserted central catheters. Patient's age range is 9 to 23 years, with a home service range of 61 to 243 days. One patient was readmitted four

times due to clinical decline. On the last admission, inotropic support was discontinued, and patient subsequently expired.
Conclusions: Continuous milrinone infusions in the ambulatory setting can be a safe and cost effective alternative to prolonged inpatient stays, with improved quality of life

IMPACT OF GUIDELINES FOR INTRAVENOUS (IV) PENTAMIDINE ADMINISTRATION ON PATIENT SAFETY. Michael Chicella, Lambert C, Butler D. Children's Hospital of The King's Daughters Department of Pharmacy, Norfolk, VA. e-mail: chicelmf@chkd.org

Purpose: IV pentamidine is an alternative for PCP prophylaxis in patients who cannot take TMP/SMX. Due to concern regarding adverse reactions associated with its use, guidelines were implemented for administration. These included: 1) Infusing doses > 90 minutes; 2) Cardiac monitoring during infusion; 3) Premedicating patients who experienced adverse reactions previously. The purpose of this study was to document that guidelines for IV pentamidine administration reduced adverse reactions associated with its use.
Methods: A retrospective review of hematology/oncology patients was conducted. Patients were stratified into two groups; 44 who received pentamidine during a 6-month period prior to guideline implementation (group 1) and 79 who had received pentamidine during a 6-month period after (group 2). The occurrence of adverse reaction(s) experienced, and the number of patients monitored properly were compared between the groups.
Results: All patients received 4 mg/kg/dose. Doses were administered over 60 minutes in group 1, and > 90 min in group 2. No group 1 patients received premedication, and eighteen group 2 patients (23%) received premedication. In group 1, adverse reactions were reported 22 times (50% of doses). In group 2, thirteen adverse reactions were reported (16% of doses). Over half of the pulmonary complications in group 1 required medical intervention. One pulmonary complication occurred in group 2 and resolved without intervention. Ten patients (23%) were monitored prior to guideline implementation, whereas 100% of patients were monitored after. No patients experienced arrhythmia(s) while receiving pentamidine.
Conclusions: These guidelines reduced the number of adverse reactions experience during IV pentamidine. Additionally, patient safety was improved through increased monitoring.

SAFETY INITIATIVE: IMPLEMENTING A UNIT DOSE MEDICATION AND ENTERAL FEEDING DELIVERY SYSTEM IN A NEONATAL INTENSIVE CARE UNIT. David Copelan, Appel J. Southern Regional Medical Center, Riverdale, GA. e-mail: davidcopelan@numail.org

Case Report: There have been numerous reports in the literature of medication errors resulting from enteral formulas and oral medications being administered intravenously and intravenous medications being administered enterally, resulting in patient harm and even death. Oral syringes have been available for several years to prevent this occurrence. Unfortunately, oral syringes have not been readily accepted in the neonatal intensive care unit due to equipment incompatibility, dose variation, and other reasons. Prior to adapting to a new delivery system, enteral formulas were administered with intravenous leurlock syringes, extension tubing, and syringe pumps. By converting to oral syringes and enteral tubing to deliver feedings, and by not being able to interchange intravenous and enteral supplies, medications will not be administered via the wrong route. Medications were previously dispensed in bulk bottles, drawing up patient specific doses at the bedside. Converting from dispensing medications in bulk to a unit-dose system allows a double-check system to be established, where doses are first checked by a pharmacist and then checked by a nurse prior to administration. This double-check safeguard has been proven to reduce the likelihood of medication errors. This presentation describes the planning, implementation, and practice changes required in making this safety initiative a success.

STERILITY OF REPACKAGED LIPID EMULSIONS FOLLOWING 12-HOUR INFUSION. Catherine Crill, Hak, EB, Helms, RA. The University of Tennessee Health Science Center, Memphis, TN, USA. e-mail: ccrill@utmem.edu

Purpose: Many institutions repackage IV lipid emulsion (LE) products since they are not available in unit doses suitable for infusion in preterm neonates. Our institution infused LE direct from bottle to patient (no repackaging), but infusion device errors required a change in practice. We began repackaging LE into 2 syringes daily (each infused over 12 hours) for infants < 2.5 kg. Sterility testing was performed to validate the change in practice.
Methods: Syringes were repackaged from commercial LE bottles (Intralipid 20%, Baxter) under laminar flow in the pharmacy twice (0800 and 2000) daily. Syringes were then sent to infants' bedsides to infuse with PN (via y-site). After 12-hour infusion, syringes were collected and sent to the hospital microbiology laboratory. Samples were inoculated into blood culture bottles and incubated (BacT/ALERT Incubator Module, Biomerieux) for 5 days and then subcultured to blood agar plates with olive oil and incubated for 2 days (CO_2 incubator).
Results: 30 syringes were collected over 3 days (15 collected each at 0800 and 2000). The samples collected at 2000 sat at room temperature until the following morning prior to sterility testing. Two syringes were positive for coagulase negative staphylococcus (one from each collection time). Both samples had growth within the first 24 hours (20.8 and 21.7 hours). The other syringes showed no bacterial or fungal growth.
Conclusions: Repackaging LE increases the risk for microbial contamination. LE should infuse from the manufacturers' packaging to the patient in infants. Alternate methods should be addressed to prevent infusion related errors in patients receiving LE.

THE IMPLEMENTATION OF A IMMUNIZATION PRE-PRINTED ORDER FORM. Jamie Cronin, Boudreau MH, Brown N, Aziz S. Eastern Maine Medical Center, Bangor, MA. e-mail address: jlcroninpharmd@aol.com

Purpose: The purpose of the initiative is to prevent medication errors associated with the administration of vaccines.
Methods: The methods included the conception and development of a pre-printed order sheet for immunizations by a multi-disciplinary group for use at our institution.
Results: A document to be used for the prescribing of immunizations within our institution.
Conclusions: The practice of immunizing children against diseases prevents morbidity and mortality associated with these conditions. Unfortunately, because of the confusing acronyms, increasing number of vaccines and revised formulations, there have been an increased number of medication errors associated with vaccine administration. The Institute of Safe Medical Practices (ISMP) has reported errors involving Tetanus-diphtheria (Td) being confused with Tuberculin Purified Protein Derivative (PPD) where patients were incorrectly diagnosed and treated for Tuberculosis because of the error. There are also case reports of confusion between Haemophilus b Influenza vaccine (Hib) and Influenza vaccine, Varicella vaccine and Varicella Immune Globulin (VZIG), and the new Pneumococcal Conjugate vaccine (Prevnar) and the Pneumococcal Polyvalent vaccine (Pneumovax 23). Based on these reports and the experience at our institution, the Medication Management Function Team (a multidisciplinary group including risk-management tasked to prevent medication errors) recommended the development and implementation a pre-printed order sheet for vaccines. The order sheet includes the vaccine by component name, common abbreviated name, trade name, dose, route and site of administration and date the vaccine was administered. The order sheet also includes pre-medication orders for acetaminophen and Ela-Max; reminders to obtain consent and educate the caregivers with the Vaccine Information Sheet (VIS). If contraindications or cautions apply they are also noted on the order sheet with the vaccine.

ASSESSMENT OF A PEDIATRIC INTENSIVE CARE UNIT ANTIBIOGRAM. Lea Eiland. UAB/ Division of Pediatrics, Huntsville, AL. e-mail: eilanls@auburn.edu

Purpose: The antimicrobial susceptibility data for a twelve bed pediatric intensive care unit (PICU) was collected and collated in order to compare the results to the previous year's antibiogram and evaluate changes in resistance patterns. Secondary analyses included comparing the PICU data to the hospital-wide antibiogram to assess the need for further attainment of a pediatric spe-

cific antibiogram.
Methods: Last year, a PICU specific antibiogram was initially developed based upon 2002 susceptibility reporting provided by the hospital microbiology department. The project was updated with 2003 data. Data from both years were compared for organism prevalence and resistance. Next, PICU data were compared to the hospital-wide antibiogram for 2003 in order to look for similar resistance trends.
Results: Notable increases in resistance patterns in the PICU involve Streptococcus pneumoniae, Staphylococcus aureus, Escherichia coli, and Haemophilus influenzae. Pseudomonas aeruginosa has the greatest increase in susceptibility rates overall and E. coli has the largest decrease. S. aureus and P. aeruginosa are the most common organisms isolated in the PICU for both years. S. pneumoniae and E. coli have lower susceptibility rates in the PICU compared to the hospital-wide antibiogram.
Conclusions: Although the total number of isolates is lower (n = 50) within the unit compared to hospital-wide, a PICU specific antibiogram is warranted for our institution, due to significant variance in culture and sensitivity results when compared to the hospital-wide antibiogram. This data will aid in more appropriate empiric antimicrobial therapy for the purpose of improving patient outcomes.

CEFEPIME CEREBROSPINAL FLUID (CSF) CONCENTRATIONS IN NEONATAL BACTERIAL MENINGITIS. Jennifer Ellis, Rivera L, Reyes G, Castillo F, Marte P, Tejada M, Salazar JC. University of Connecticut School of Pharmacy Connecticut Children's Medical Center, Hartford, CT, e-mail: jenni_sunshine@msn.com

Purpose: To evaluate the steady-state cerebrospinal fluid (CSF) and serum cefepime trough concentrations in neonates with evidence of bacterial meningitis.
Methods: Neonates (< 30 days old) with evidence of bacterial meningitis were treated with cefepime 50 mg/kg IV every 12 hours over 10 minutes. Steady state serum and CSF trough concentrations were obtained at 48 hours. Cefepime concentrations were calculated by high-performance liquid chromatography (HPLC).
Results: Nine neonates were enrolled into the study. The mean ± standard deviation (SD) weight was 2.84 ± 1.08 kg. 55% were male. The mean ± SD cefepime concentrations in serum and CSF at 48 hour were 32.66 ± 23.31 mcg/mL and 5.83 ± 7.93 mcg/mL, respectively. Gestational age (GA) stratification demonstrated increased CSF concentration in the two premature (< 37 weeks GA) neonates (range: 12.9–24.4 mcg/mL) versus the 7 term (≥ 37 weeks GA) neonates (range: 0.45–5.1 mcg/mL).
Conclusions: This is the first data describing cefepime penetration into the CSF of neonates. This preliminary data suggests that 48-hour cefepime CSF concentrations after 50 mg/kg IV every12 hours should be adequate for treating meningitis caused by susceptible E.coli, group B streptococci, and non-ESBL producing Klebsiella spp. Further study is required to evaluate cefepime CSF penetration in the neonatal population across various gestational and postnatal ages.

IDENTIFICATION OF PEDIATRIC PATIENTS AT RISK FOR CANCER-INDUCED ANOREXIA AND CACHEXIA. Tracy Hagemann, Rush MV. University of Oklahoma College of Pharmacy 1110 N. Stonewall Avenue, Oklahoma City, OK. e-mail: tracy-hagemann@ouhsc.edu

Purpose: Poor nutrition and oral intake can have devastating consequences on a child's growth and development, especially when complicated by a diagnosis of cancer. Currently there are no published data on which pediatric cancer patients may be at highest risk for cancer-related anorexia and cachexia. The purpose of this study is to identify specific pediatric oncology populations at risk for the development of anorexia and malnutrition. Once the population is identified, we can more efficiently target prevention and treatment strategies.
Methods: We conducted a retrospective chart review of 167 patients in the oncology clinic diagnosed with cancer within the last 3 years. Age, height and weight at baseline and at every three months were collected and plotted over time on the CDC growth percentile charts. We also reviewed the diagnosis, chemotherapy regimen and medication profile. The use of TPN and/or enteral supplementation was also determined.
Results: Patients between the ages of 0 to 5 and 11 to 15 and those with a diagnosis of ALL, AML

or Hodgkin's lymphoma tend to exhibit greater deficits in growth and weight gain over the time course of their treatment. Final analysis of this data showed that 65 % of patients with < 10% weight increase over time had been diagnosed with ALL, AML, and NHL. These findings are confirmed by looking at diagnosis prevalence for different age groups of patients with < 10% weight gain or weight loss. In higher risk age groups of 0–5 and 11–15, percent of patients with ALL, AML and NHL were 70% and 54%, respectively. Even though the other two age groups (6–10 and 16–20 years) did not have a significant number of patients, the percents of high risk cancers are 50% and 88%. These patients were also noted to be more prone to developing infections and other complications.

Conclusions: Our next step is to target those patients identified as being at risk and investigate potential treatments for prevention of chemotherapy-induced anorexia and cachexia.

CEREBROSPINAL FLUID VANCOMYCIN CONCENTRATIONS FOLLOWING INTRAVENOUS THERAPY IN CHILDREN. Laney Jorgenson, Reiter P, Winston K, McBride L, Graupman P, Handler M, Freeman J, Fish D. The Children's Hospital, Denver, CO. e-mail: jorgenson.laney@tchden.org

Purpose: This study is an open-label prospective trial describing central nervous system (CNS) concentrations, penetration rate and pharmacokinetic profile of vancomycin in children.

Methods: The population consists of pediatric patients admitted for the insertion/revision of a cerebrospinal device or a documented shunt infection requiring intravenous vancomycin therapy. Two treatment regimens are evaluated: a single prophylactic dose of IV vancomycin prior to a shunt revision/insertion (10–15 mg/kg/dose) and conventional IV therapy (15 mg/kg/dose every 6 to 8 hours) for the treatment of a documented or suspected shunt infection. Cerebrospinal fluid samples were obtained intraoperatively in children who received a single preoperative dose of IV vancomycin. Daily cerebrospinal fluid was obtained in patients on conventional therapy once therapeutic serum levels were confirmed. Determination of CNS vancomycin levels was performed using florescence polarization immunoassay. Primary outcomes include CSF concentrations following a single or multiple dose IV regimen, and percent penetration using AUC for CSF/serum levels for multiple dose therapy.

Results: Preliminary results from the prophylactic treatment arm (n = 15) reveal that 47% (n = 7) had non-dectectable CSF vancomycin levels following a single intravenous vancomycin dose, and 33% (n = 5) had a concentration of 0.05–0.5 mcg/mL. In the multi-dose treatment arm (n=3), results reveal a CNS vancomycin penetration rate range of 0.6–18% in children with staphylococcal shunt infections.

Conclusions: The data suggests CNS vancomycin levels are consistently subtherapeutic following single dose therapy and a high interpatient variability exists in terms of CNS vancomycin percent penetration.

VARIABILITY IN ASTHMA SEVERITY AMONG STEROID-NAÏVE PEDIATRIC PATIENTS PREVIOUSLY RECEIVING SHORT-ACTING BETA2-AGONISTS. Kelly Kirby, Dorinsky P, Stauffer J, Sutton L, Emmett A. GlaxoSmithKline, Abington, MA. e-mail: kellykirby66@hotmail.com

Purpose: According to national and international asthma guidelines, pediatric patients with persistent asthma can be classified into one of three categories (mild, moderate, or severe). It is widely believed that there is a high degree of variability in pediatric patients with asthma, and that patients may not remain consistently in any given severity category over time.

Methods: To address this issue, an analysis of previously conducted asthma studies was undertaken.To evaluate pediatric patients aged 4–11 years previously receiving short-acting beta2-agoinsts alone in one of five double-blind, randomized, 12-week trials. The analysis is limited to patients randomized to placebo in these trials. At baseline, all patients met the criteria for moderate/severe asthma.

Results: During the study, pediatric patients receiving placebo exhibited marked fluctuations in asthma severity. When only individual parameters were considered in assessing asthma severity, patients spent approximately 48%, 31% and 22% of weeks in the intermittent, mild, and moderate/severe categories, respectively, based upon asthma symptom frequency and 57%, 27%, and 15% of

weeks, respectively, based upon albuterol use. However, when all components of the severity criteria were considered, patients spent the majority of weeks in these 12 week studies in the moderate/severe category. Furthermore, over 35% of all patients exhibited 15 or more changes in their asthma severity classification based upon PEF during the 12-weeks studies.
Conclusions: This analysis demonstrates that asthma is a variable condition and that pediatric patients frequently move between severity categories. These data also emphasize the fact that asthma severity cannot be determined in many pediatric patients by discrete, point-in-time assessments.

THE SAFETY OF FLUTICASONE PROPIONATE/SALMETEROL DISKUS® IN PEDIATRIC PATIENTS. Kelly Kirby, Stauffer J, Schoaf L, VanderMeer A, House K, Dorinsky P. GlaxoSmithKline, Abington, MA, USA. e-mai: kellykirby66@hotmail.com

Purpose: To evaluate the safety of FSC BID compared with fluticasone propionate 100 mcg Diskus (FP) BID.
Methods: A 12 week, randomized, double-blind, parallel-group study was conducted in 203 patients 4–11 years of age with asthma, who were symptomatic on an ICS. Safety measures included assessment of adverse events, asthma exacerbations, vital signs, 12-lead electrocardiograms (ECG), oropharyngeal examinations, laboratory tests, and 24-hour urinary cortisol excretion.
Results: The overall incidence of adverse events was similar between treatment groups (FSC = 59%, FP = 57%). The most common AEs (i.e., ≥ 5%) for FSC vs FP were as follows: headache (20% in each group), URTI (10% vs 17%), throat irritation (8% vs 7%), GI discomfort/pain (7% vs 5%), nausea and vomiting (5% vs 3%) and fever (5% vs 13%). The overall incidence of drug-related AEs was low and similar with FSC (13%) and FP (9%). The incidence of oral candidiasis was low in both groups (4% for FSC and < 1% for FP). Of note, the incidence of asthma exacerbations was lower in the FSC group (3%) compared with FP (8%). Changes in heart rate, blood pressure and laboratory parameters were infrequent and similar between treatment groups. No patient had a clinically significant abnormal ECG during treatment. The values for 24-hour urinary cortisol excretion at baseline and after 12 weeks of treatment were similar.
Conclusions: This study demonstrated that FSC 100/50 mcg via Diskus twice daily has a favorable risk/benefit profile in pediatric patients with asthma, as it provides added clinical benefit with a similar safety profile to FP 100 mcg Diskus.

THE VALUE OF PHARMACISTS IN PREPARATION OF NEONATAL CARE PROTOCOLS. Kay Kyllonen, Temple, M, Cummings, L. Cleveland Clinic Foundation–The Children's Hospital Department of Pharmacy, Cleveland, OH. e-mail: kyllonk@ccf.org

Purpose: Introduction: The Cleveland Area Neonatal Roundtable is now a consortium of neonatalogists, pharmacists, nurses, and neonatal nurse practitioners from area hospitals that meets to discuss neonatal conditions/diseases and treatment. Three years ago, a neonatal pharmacist first joined the group of physicians and nurses to advise it regarding dosing and monitoring of medications. The group now includes three pharmacists and a neonatal dietician.
Methods: The consortium meets monthly for 90 min. Typically a member is selected to lead the group in discussions on a drug or disease management topic. The leader performs a literature search on the topic, prepares a preliminary algorithm of assessment, treatment and monitoring and presents it to the group for discussion. Then, based on the most salient of the articles and clinical practice experiences, the algorithms are revised. Thus, protocols promoting excellent, yet practical neonatal care are developed through group discussions. Several monthly discussions are required to finish a protocol.
Results: The Roundtable has developed several pharmacotherapy-based protocols since pharmacists have joined the Roundtable. Recently developed protocols involving pharmacists' input include pain and sedation assessment and management, neonatal GERD, parenteral nutrition guidelines, enteral feeding guidelines for those weaning off parenteral nutrition, and neonatal sepsis assessment/treatment. Pharmacists have served as leaders or co-led discussions on neonatal GERD, parenteral nutrition, and pain and sedation medications. Protocols are re-evaluated periodically or as significant new information is released.

Conclusions: Adding neonatal pharmacists to a Neonatal Roundtable provides valuable insight to those preparing protocols for care of NICU patients.

PEDIATRIC DOSE STANDARDIZATION TO IMPROVE PATIENT SAFETY. Marjorie Lazarre, Vitale R, Sander P. Yale-New Haven Hospital, New Haven, CT. e-mail : m_lazarre@hotmail.com

Purpose: To provide dose standardization of common pediatric medications thereby eliminating immeasurable and/or impractical medication doses. Focusing primarily on ensuring accurate prescribing, preparation, and administration. The guideline aims to improve appropriate prescribing by decreasing clinically insignificant dosing increments and minimizing the ability to type-in doses via our computerized physician order entry (CPOE) system.
Methods: Utilizing CPOE data, we determined that numerous pediatric medication orders had type-in doses, which were immeasurable. A multidisciplinary team reviewed commonly prescribed medications and determined that a number of the evaluated doses were clinically correct, however the probability of accurate administration was diminished in most cases. Additionally, attempts to obtain exact volumes or measure factions of commercially available dosage forms would likely increase the potential for medication administration error.
Results/Conclusions: It is predicted that the standardization of dosing increments will reduce the potential for prescribing, preparation and administration medication errors. Additionally, the standardization process will improve the communication of data between the CPOE system and automated dispensing machines, enabling ease of dispensing and medication use documentation.

REVIEW OF KETOROLAC USE IN A PEDIATRIC TEACHING HOSPITAL. Kelley Lee, Schneider C. Le Bonheur Children's Medical Center and University of Tennessee Health Science Center, Memphis, TN. e-mail: leek@lebonheur.org

Purpose: Ketorolac has become a commonly used medication at our pediatric hospital although there is limited data on its use in children. Because of concerns regarding adverse events we conducted a review of the use of this drug. The purpose of our study was to determine the appropriateness of ketorolac prescribing and to determine adverse events and problems associated with use of the drug.
Methods: We collected data using retrospective chart review that included the dosage regimen, renal function, concomitant NSAID use, and adverse events. Information on prescribing outside established safety parameters was also collected.
Results: 78 patients were reviewed. The prescribers were surgical specialties (n = 24), Anesthesiology (n = 22), Pediatrics (n = 21) and Emergency Medicine (n = 11). Ketorolac was prescribed for post-operative pain in 43 cases and sickle cell pain crisis in 21 cases. The mean dose was 0.65 mg/kg (range 0.15–2 mg/kg) with a mean duration of 1.5 days (range 1 dose–11 days). 36% of patients had either an adverse event (n = 12) or prescribing error (n = 16). 9 patients had a 0.2 mg/dL or greater increase in SCr and/or decreased urine output while receiving ketorolac. 1 patient each developed bleeding post-operatively, emesis, and acute tubular necrosis. Prescribing errors included concomitant NSAID use (n = 3), unusual dosage regimens (n = 5), ketorolac use for greater than 5 days (n = 3), significant dehydration prior to use (n = 2), no SCr monitoring during therapy (n = 2), and previous allergy to NSAIDs (n = 1).
Conclusions: Ketorolac appears to be a problem prone medication in our pediatric population.

CHEMICAL STABILITY OF ALPROSTADIL IN THREE CONCENTRATIONS OF DEXTROSE SOLUTIONS. Ralph Lugo, MacKay M, Mann D, Sweeley J. University of Utah, Salt Lake City, UT. e-mail: ralphalugo2003@yahoo.com

Purpose: Alprostadil is used to maintain patency of the ductus arteriosus in neonates with CHD. The stability of alprostadil in concentrated dextrose solutions is unknown. The objective of this study was to determine the chemical stability of alprostadil prepared in varying concentrations of dextrose solutions and stored for 48 hours at room temperature in polypropylene syringes.
Methods: Alprostadil Injection, USP (500 mcg/mL) was diluted with 10%, 15%, and 20% dextrose solutions to a final concentrations of 2, 5, 10, and 20 mcg/mL. Solutions were prepared in triplicate

in 30cc polypropylene syringes. Each syringe was sampled in duplicate at 0, 3, 6, 12, 24, and 48 hrs. Concentrations were determined by a stability-indicating HPLC assay using a 150 x 4.6 mm C18 reverse phase column with UV absorbance monitored at 200 nm. Standards were prepared prior to each sample set from a prostaglandin E1 stock solution (1 mg/mL). Peak areas were plotted against known concentrations and the correlation coefficients for the standard curves were > 0.9995. The intraday and interday coefficients of variation were < 5% at 5 mcg/mL.

Results: The mean concentration of alprostadil at 48 hours ranged from 93.7% to 96.1% of the baseline concentration in 10% dextrose, 91.8% to 95.8% of baseline in 15% dextrose, and 90% to 95.4% of baseline in 20% dextrose.

Conclusions: Alprostadil diluted in 10%, 15%, and 20% dextrose solutions to a final concentration of 2, 5, 10 and 20 mcg/mL retained at least 90% of its initial concentration for 48 hours and is therefore chemically stable under the conditions tested.

COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) USE IN PEDIATRICS. Jillian Morris. A.I. duPont Hospital for Children, Wilmington, DE. e-mail: jillianmmorris@yahoo.com

Purpose: To evaluate the extent of complementary and alternative medicine (CAM) amongst pediatric outpatients. Ancillary objectives include determining the types of therapies used, reasons for choosing these therapies, conditions being treated by CAM, level of satisfaction with CAM therapies, physician awareness of use of therapy, and insurance coverage of CAM.

Methods: Cross-sectional, descriptive survey utilizing an anonymous questionnaire distributed to patients/caregivers in selected clinics affiliated with A.I. duPont Hospital for Children. These areas included the hematology/oncology clinic, rheumatology clinic, emergency department, and a general pediatric office (Jessup St. Clinic). Questionnaires were distributed for approximately 3 months (beginning March 2004). Data was analyzed using Epi Info and descriptive statistics.

Results: Based on 45 completed questionnaires, 7 children (~15%) were treated with some type of CAM therapy. Therapies chosen included herbal remedies, therapeutic touch, massage therapy, homeopathy, naturopathy, chiropractic care, and other therapies. Parents/caregivers chose to use CAM therapies for various reasons including gastrointestinal complaints, the common cold or flu, and other indications. Most caregivers were satisfied with the CAM therapy. However, only 16% of patients surveyed had a discussion about CAM therapy with their child's physician. Most insurance companies did not pay for CAM therapies.

Conclusions: Complementary and alternative medicine (CAM) is used by pediatric patients, and this use is not limited to children seeking specialized physician care. Therefore, it is important for physicians to inquire about the use of CAM therapies in their patients and educate them about the risks and benefits associated with these therapies.

PROPOFOL INFUSION IN THE HOME FOR TERMINALLY ILL PEDIATRIC PATIENT. Colleen Nelson, Raymundo J, Boedigheimer A, Allen C, Hakel L. Children's Hospitals and Clinics, Minneapolis, MN. e-mail: rcnelson@ usfamily.net

Purpose: To describe the effectiveness of propofol added to a conventional narcotic/sedative regimen in a terminally ill pediatric patient wishing to die at home.

Methods: A 5 year old child with rhabdomyosarcoma had tumor progression in the maxillary sinus cavity invading the ethmoids and orbit causing severe pain. This required escalating doses of fentanyl and propofol to control symptoms.

Results: Pain was stabilized in the hospital and then the patient was discharged to home on fentanyl 1 mcg/kg/hr with propofol 13 mcg/kg/min both as continuous infusions. The patient remained at home with escalating doses over 2 months to fentanyl 157 mcg/kg/hr and propofol 238 mcg/kg/min just before death.

Conclusions: Propofol for end of life pain control and sedation was effective and allowed the patient to have good quality of life at home for a significant period of time. Doses were easily titratable to desired pain control with minimal side effects. Although limited data exists, propofol may be an option for palliative pain control and sedation in pharmacologically challenging end of life patients.

ANALYSIS OF VANCOMYCIN PRESCRIBING HABITS FOR COAGULASE-NEGATIVE STAPHYLOCOCCI (CONS) INFECTIONS IN A NEONATAL INTENSIVE CARE UNIT (NICU). Kimberly Novak, Kuhn RJ, Desai NS. University of Kentucky Chandler Medical Center/ University of Kentucky Children's Hospital Department of Pharmacy, Lexington, KY. e-mail: knovak1@juno.com

Purpose: Analyze patient outcomes and antimicrobial resistance patterns based on antibiotic selection (non-vancomycin vs. vancomycin) for CONS infections in the NICU.
Methods: Retrospective review of neonates born January 1 through December 31, 2003 who had confirmed positive blood cultures for CONS during their NICU stay. Data collected included patient demographics, cultures and sensitivities, antibiotic selection, clinical status indicators, and clinical outcome indicators.
Results: Thirty-one neonates met inclusion criteria; one neonate was excluded due to incomplete data. Among included neonates, 66.7% (n = 20) received non-vancomycin initial antibiotic regimens, while 33.3% (n = 10) received vancomycin-containing regimens. Baseline demographics were similar between both groups. Within the non-vancomycin group, 55% (n = 11) achieved successful eradication, while 45% (n = 9) were changed to vancomycin regimens. Five neonates (20%) were changed due to persistent infection (treatment failures), while four were clinically improving and were changed due to physician preference alone. Within the vancomycin group, 70% (n = 7) received empiric vancomycin before culture results were known; 30% (n = 3) received vancomycin at initial culture growth (no empiric antibiotics). Two neonates (20%) had persistent infection on initial vancomycin (treatment failures). All-cause mortality was higher in neonates receiving vancomycin (4-vs.-1), and three deaths were attributed in part to CONS sepsis (all vancomycin-treated). Fungal species were isolated only in vancomycin-treated neonates (n = 3). No vancomycin-resistant enterococci (VRE) or vancomycin-intermediate staphylococci (VISA/VISE) were isolated.
Conclusions: Neonates initially treated with non-vancomycin antibiotic regimens who are clinically improving can be successfully treated for CONS regardless of sensitivity.

NEBULIZED GENTAMICIN FOR THE TREATMENT OF RESPIRATORY NOSOCOMIAL INFECTIONS IN NEONATES. Jennifer Pham, Rao R, Bhat R. University of Illinois at Chicago, Chicago, IL. e-mail: tran@uic.edu

Purpose: To determine whether nebulized gentamicin therapy can eradicate the bacteria and improve respiratory status without having any systemic adverse effects.
Methods: Retrospective chart reviews of neonates receiving nebulized gentamicin over the last 4 years were performed. Patients who have failed prior systemic antibiotics but are still having positive ET cultures with respiratory deterioration were treated with nebulized gentamicin at a mean daily dose of 12.6 mg/kg/day in 3 divided doses for 7 days. Gentamicin peak and trough serum concentrations were also monitored.
Results: A total of 16 patients received 20 courses of nebulized gentamicin treatments. Their GA and BW were 26.5 wks and 0.89 kg, respectively. At the time of treatment, the PCA and body weights were 36 wks and 1.65 kg, respectively. Male:female ratio was 9:7. Gentamicin peak and trough levels were done in 6/16 (38%) of patients (< 0.9 mg/L and < 0.3 mg/L, respectively). Serum creatinine concentrations and urine output did not change during the course of treatment. A total of 34 organisms were obtained from 20 cultures, with K. pneumoniae being the most common followed by P. aeruginosa and S. marcescens. 12/16 (75%) of the patients had repeat cultures after the course of treatment; 6/12 (50%) were culture negative. 7/16 (44%) were extubated within 7 days of the treatment. In 4 infants, ventilatory support was reduced by > 25%.
Conclusions: Nebulized gentamicin at a dose of 4 mg/kg/dose every 8 hours may be effective in treating respiratory infections in neonates who have failed systemic antibiotics. Treatment was associated with extubation and significant weaning in > 68% of infants. Prospective studies with a large number of neonates are needed to confirm our findings.

IS GENTAMICIN MONITORING NECESSARY IN INFANTS 3 MONTHS OF AGE OR YOUNGER? Carrie Smith, Lee KR, Phelps SJ. The University of Tennessee, Memphis, TN. e-mail: sphelps@utmem.edu

Purpose: To ensure efficacy and avoid toxicity monitoring gentamicin serum trough (Cp-trough) concentrations are routinely done within 72 hours of beginning therapy in some pediatric populations. Our objective was to determine if monitoring in infants ≤ 3-months-old is necessary and if a subset that requires monitoring exists.
Methods: We used data collected during hospitalization in infants whose postnatal age (PNA) was ≤ 3 months, whose serum creatinine (SCr) was normal and who had a Cp-trough drawn. Gestational (GA), postconceptional age (PCA), weight, gentamicin dose/interval, Cp-trough, and SCr were recorded. Age-appropriate dose/interval were defined using Neofax and/or Nelson's; our hospital's reference range was used to delineate a normal SCr. T-test, Chi-Square and Pearson correlation were used for data analysis with significance defined as $P < 0.05$. All data are presented as mean ± SD.
Results: Sixty-nine patients (PNA = 9.7 ± 20.8 days; PCA = 37.3 ± 3.4 weeks) met criteria. Eighty-six percent were ≤ 7 days PNA and 42% were premature (GA = 32.52 ± 4.11 wks). Dose (2.59 ± 0.07 mg/kg) and interval (13.9 ± 0.57 hours) were age-appropriate in 86% and 58%, respectively. Gentamicin duration was 7.9 ± 3.9 days and 61% of Cp-troughs were < 2 mg/L. No difference in mean Cp-trough ($P > 0.678$) or in Cp-trough < or >2 mg/L ($P = 0.17$) were noted between pre- and full-term infants. A poor, non-significant correlation existed between PCA and Cp-trough ($r^2 = 0$; $P = 0.9$) and a poor, significant correlation existed between PNA and Cp-trough ($r^2 = 0.05$; $P = 0.02$).
Conclusions: Because 39% of infants had a Cp-trough > 2 mg/L and because neither PNA nor PCA could predict who would have an elevated Cp-trough, infants ≤ 3 months of age should have a Cp-trough routinely monitored.

IMPLEMENTATION OF STANDARD CONCENTRATIONS FOR CONTINUOUS INFUSIONS IN A COMMUNITY HOSPITAL PEDIATRIC INTENSIVE CARE UNIT. Linette Phillips, Roman N, Farina P, Yu HC, Monge R, Barroso L. Lee Memorial Health System, Ft. Myers, FL, USA. e-mail address: linettep66@comcast.net

Purpose: The purpose was to abandon the use of the controversial "rule of six" and implement standard concentrations for continuous infusions in the Pediatric Intensive Care Unit (PICU). Standardization allows for removal of concentrated vasopressors from PICU floor stock which may help reduce medication errors. Standardization meets Joint Commission on Accreditation of Healthcare Organization mediation management standards.
Methods: In February 2002, a near miss signal event occurred involving concentrated dopamine 40 mg/mL in a six-bed community hospital PICU. Dopamine was inadvertently drawn into a syringe to be used as a saline flush, but was fortunately never administered to the patient. After performing a Failure Mode Effects Analysis, it was determined that pharmacy preparation of standard concentrations for continuous infusions would allow removal of concentrated vasopressors from PICU floor stock. Collaboration between pharmacy, nursing, physicians, biomedical engineering, and information systems was required to complete this task.
Results: In September 2002 the PICU began using standard concentrations for 25 medications routinely administered by continuous infusion. Several months later high hazard vasopressors were removed from floor stock.
Conclusions: It is possible to successfully implement standardized concentrations for continuous infusions for pediatric patients in the intensive care setting. Standardization helps meet requirements from the Joint Commission for Accreditation of Healthcare Organizations to avoid utilization of the "rule of six" to prepare continuous infusions. We have decreased the likelihood of future near miss medication errors in our PICU by removing concentrated vasopressors from floor stock.

SYNAGIS(PALIVIZUMAB)MEDICATION USE EVALUATION AT CHILDREN'S HOME CARE: RSV SEASON 2002-2003. Joselyn Raymundo, Nelson C, Finkelstein M, Meeka P. Children's Hospitals and Clinics, Minneapolis, MN, USA. e-mail address: jarciaga@yahoo.com

Purpose: Synagis (Palivizumab) is a humanized monoclonal antibody approved for the prevention of lower respiratory tract infection caused by Respiratory Syncytial Virus (RSV) in high risk infants. The American Academy of Pediatrics published guidelines to assist providers in determin-

ing infants who would benefit from Synagis. In addition, Children's Hospitals and Clinic's Pharmacy and Therapeutics Committee (CHC) created a modified recommendation that would further restrict the use of Synagis for 2003-2004.
Methods: A randomized retrospective analysis (n = 649) was performed to determine adherence to the AAP Guidelines and the CHC guideline. A distribution of neonatologists and pulmonologists versus primary care physicians and payors in relation to adherence to AAP guidelines were analyzed; average number of months when Synagis was given and financial impact of excluding patients not meeting AAP guidelines were determined.
Results: Based on the analysis of patients receiving Synagis from Children's Home Care, 48% of those patients did not meet AAP guidelines. Most of these patients were in the gestational age group of 32+ to 35 weeks gestation lacking at least two risk factors. CHC guideline would have affected only 10.5% of patients in contrast with 44.4% if the AAP guidelines were followed. Physicians associated with Children's were significantly less likely to deviate the guidelines (13.2% vs. 86.8% $P < 0.05$).
Conclusions: Children's Home Care, has therefore launched an educational program aimed at broadening prescribers' understanding of the AAP guidelines and has adopted a self-teaching Synagis referral form. CHC guidelines will be abandoned and a follow up study for 2003-2004 & 2004-2005 RSV season is in progress.

SEVELAMER USE IN PEDIATRIC END STAGE RENAL DISEASE; A CASE REPORT. Lara E. Storms, Chicella MF, Toolan ER, Restaino I, Dice J. 601 Children's Lane, Norfolk, VA, USA. e-mail address: stormsle@chkd.com

Case Report: Sevelamer, a non-calcium, non-aluminum containing phosphate binder is frequently prescribed for the treatment of adults with hyperphosphatemia secondary to end stage renal disease (ESRD). However, published information regarding sevelamer's use in children < 11 years of age is lacking. We report the use of sevelamer as a phosphate binder in a 4-year-old with ESRD. The patient was receiving calcium carbonate 1250 mg every 6 hours for hyperphosphatemia. During this time the patient's mean phosphorus level was 7.3 mg/dL (range 4.4–10), and the mean calcium/phosphorus product was 75 mg/dL (range 44–104). This was well above the level that places the patient at risk for complications such as joint, vessel and soft tissue calcification. An aluminum containing phosphate binder was not an option given the patient's renal disease and concern for neurotoxicity. Sevelamer was considered, but a MEDLINE search revealed no pediatric dosing information. An initial dose of 65 mg/kg/day divided Q8H was extrapolated from adult data, and then titrated to 115 mg/kg/day divided Q6H, based on the patient's response. The patient's dietary phosphorus intake remained constant throughout their hospital course. On sevelamer, the patient's mean phosphorus was 6.9mg/dL (range 5.9–8.2) and the mean calcium/phosphorus product dropped to 56 mg/dL (range 53-78). We concluded that sevelamer, in the doses discussed, appears to be an effective phosphate binder in children with ESRD. Sevelamer's use resulted in an acceptable calcium/phosphorus product, and returned the patient's serum phosphorus to near normal values.

CLINICAL PHARMACIST INTERVENTIONS IN A PEDIATRIC INTENSIVE CARE UNIT. Shamim Tejani, Giamalis JN, Lawless ST. duPont Hospital for Children, Wilmington, DE, USA. e-mail address: stejani@nemours.org

Purpose: The activities of clinical pharmacists in the adult ICU setting have been well documented, however little exists describing clinical pharmacy interventions in a pediatric intensive care unit (PICU).
Methods: Clinical interventions were collected prospectively over 1 year by 2 clinical pharmacists rounding in a 22-bed PICU in a pediatric teaching hospital with a computerized physician order entry system. Data collected included the date, patient name, problem identified, action taken, classification of intervention, and the outcome of the intervention. Intervention classifications and outcomes were assigned using an intervention tracking tool consisting of 17 intervention types and 4 outcome categories. Outcomes included prevention of an adverse drug event (ADE), enhanced therapeutic effect/improved quality of care (QOC), order clarification, or cost reduction. Data was entered daily on an Excel spreadsheet. PICU census data for the year was also used.

Results: A total of 1385 interventions that resulted in a change in a patient's therapy were made by a clinical pharmacist rounding 4.2 days/week (average 6.3 interventions/day). Using PICU census data, 0.3 interventions were made per patient. The five most common intervention types were computer entry errors (33%), dosing errors (23%), discontinuation of therapy (16%), initiation of therapy (10%), and IV to PO conversions (7%). Outcomes of interventions were order clarification (35%), enhanced therapeutic effect/improved QOC (29%), cost reduction (25%), and prevention of an ADE (11%).
Conclusions: A clinical pharmacist plays a vital role in medication error prevention, drug therapy optimization, and cost reduction while rounding in a PICU. Data collected in this study is being used to help justify a PICU pharmacist rounding 7 days/week.

THE ROLE OF A CLINICAL PHARMACIST IN A PEDIATRIC EMERGENCY DEPARTMENT. Shamim Tejani, Morris JM, Lawless ST. duPont Hospital for Children, Wilmington, DE, USA. e-mail address: stejani@nemours.org

Purpose: The role of clinical pharmacists in the adult emergency department (ED) has been well documented but few reports exist documenting their role in a pediatric ED. Concerns for improving medication safety in the emergency setting prompted a pilot study to describe the utility of having a pharmacist present in the ED of a children's hospital with an average of 90 ED visits/day.
Methods: For 8 hours/day a pharmacist prospectively documented activities while present in the ED 5 days/week for 5 weeks. Clinical interventions, adverse drug reactions (ADRs) and miscellaneous drug related tasks were documented. The number of patients seen in the ED during the times the pharmacist was present was also captured.
Results: A total of 200 pharmacist hours was spent in the ED. The pharmacist captured a total of 40 interventions (0.2 interventions/hour). The average number of patients seen in the ED during the study was 1197 (48 patients/8 hour shift). Interventions were classified as incorrect dose (12), drug information requests (10), patient counseling (9), allergy clarification (4), alternative drug therapy recommendations (3), incorrect route (1), and pharmacokinetic consult (1). A total of 17 ADRs were reported. Miscellaneous drug related tasks included transport bag medication maintenance, large volume parenteral maintenance, and medication preparation for a rapid sequence intubation.
Conclusions: A clinical pharmacist can play an active role in medication use and ADR documentation in a pediatric ED. Extrapolation of the intervention rate in this study could result in the capture of 1752 interventions per year if a pharmacist was present in this ED 24 hours/day.

EVALUATION OF "THE LION WHO COULDN'T ROAR:" ATTITUDINAL AND KNOWLEDGE OUTCOMES OF AN ASTHMA EDUCATION PROGRAM. Timothy Todd, Garzanelli T, Jackson T, Lullo A, Masood A, Mazan J, Stensland S. Midwestern University, Downers Grove, IL, USA. e-mail address: ttoddx@midwestern.edu

Purpose: To assess the knowledge and attitudinal outcomes of an educational asthma program for third grade children with and without asthma.
Methods: "The Lion Who Couldn't Roar", was developed via the collaborative efforts of seven clinical and pharmacy administration faculty to teach third-grade children basic information about asthma using a character-based interactive design. The program was presented to third-grade classes at elementary schools in the DuPage, Cook and Will Counties in Illinois. Asthma knowledge and attitudes of student participants was assessed via a print-based pretest-posttest design. Knowledge and attitudinal measurement instruments were designed for this use and modified pursuant to pilot results. The knowledge instrument includes 8 criterion-referenced items. The attitudinal instrument contains 9 questions and utilized a three-point Likert-type scale with response options from 'No' to 'Yes!' Data were analyzed using the Rasch model. Teachers of participating third-grade classes were surveyed regarding satisfaction with the program.
Results: A total of 944 students completed the knowledge pretest and posttest. All eight knowledge items functioned unidimensionally. A statistically significant increase in knowledge test scores was identified from pre to post assessment (P = 0.000). Seven of the nine attitudinal items met

model criteria for unidimensionality and indicated a statistically significant improvement (n = 944, P = 0.000).
Conclusions: These results provide evidence of the impact and worth of this program and support wider dissemination.

USE AND MONITORING OF MAINTENANCE IV FLUIDS IN DERBYSHIRE CHILDREN'S HOSPITAL. Julie Vanes. Derbyshire Children's Hospital, Derby, Derbyshire, UK. e-mail address: julie.vanes@sdah-tr.tent.nhs.uk

Purpose: To identify and review children requiring IV fluids in association with clinical condition and urea and electrolytes results.
Methods: Saline 0.18%, glucose 4% has traditionally been the IV maintenance fluid of choice for children. Children at risk of increased anti-diuretic hormone release may be at increased risk of hyponatraemia with hypotonic fluids. At Derbyshire Children's Hospital, fluid guidelines are in place for selected conditions only e.g. DKA Children receiving IV fluids were identified. Data on fluids, indication and urea and electrolytes were collected and analysed. Consultation with a Specialist Paediatric Registrar provided the following standards - use saline 0.45% if Na < 138 mmol/L, give potassium if K < 3.6 mmol/L.
Results: Of 51 children: 67% received saline 0.18%, glucose 4% (± potassium) as initial fluid. 63% had initial fluid changed. Half appeared linked to urea and electrolytes results. 35 children (69%) were considered at risk of hyponatraemia, 15 (43%) of whom had low sodium on first urea and electrolytes. 8 of the 15 (53%) initially received saline 0.18%, glucose 4%.
Conclusions: Saline 0.18%, glucose 4% is prescribed as initial IV fluid for the majority of children, including those at increased risk of hyponatraemia. No clinical problems were observed, but inconsistent prescribing and monitoring was apparent. Fluid and electrolyte prescribing and monitoring guidelines, with the consideration of increased use of saline 0.45%, glucose 5% may help to optimise fluid and elcetrolyte management. Such guidelines have now been implemented. Re-audit is intended June 2004.

IMPROVING PAIN MANAGEMENT THROUGH PERFORMANCE IMPROVEMENT INITIATIVES. Cynthia Wedekind, Butler D Hutson T Lesko A. Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA. e-mail address: cyn_wedekind@msn.com

Purpose: Appropriate pain management and reassessment is a priority for health care institutions. JCAHO includes pain management as a core standard in institution reviews. Appropriate pain management may lead to improved patient care Pain assessment and outcome were evaluated in the pediatric intensive care unit (PICU), cardiac intensive care unit (CICU) and neonatal intensive care unit (NICU) quarterly from January, 2002 through January, 2004. Data collected included: pain scale used, pain score, treatment administered, time to reassessment, and pain score at reassessment. Data was evaluated to determine appropriateness of treatment administered, patients' response to intervention, and time to reassessment. Quarterly analysis was presented to the hospital performance improvement committee. Action plans were developed and implemented.
Methods: The appropriateness of practitioners' response to pain score, patients' response to the pain intervention, and time to reassessment improved in all three units. Percent improvement: (1) Appropriate response to pain score: PICU = from 58% to 97%, CICU = from 50% to 93%, NICU = from 73% to 100%; (2) Patients' response to intervention: PICU=from 76% to 95%, CICU=from 65% to 100%, NICU=maintained at 100%; (3) Appropriate reassessment time: PICU = 20% to 81%, CICU = from 35% to 82%, NICU = from 27% to 100%. Action plans included review of data with the medical teams and staff education. Results were presented to each unit performance improvement committee.
Results: Performance improvement initiatives are useful as a means to improving staff approach to pain management. Quarterly assessment of pain management in the critical care units and resulting education action plans resulted in improvement in pain management.
Conclusions: Performance improvement initiatives are useful as a means to improving staff approach to pain management. Quarterly assessment of pain management in the critical care units and resulting education action plans resulted in improvement in pain management.

DOUBLING CALCIUM AND PHOSPHATE CONCENTRATIONS IN NEONATAL PARENTERAL NUTRITION SOLUTIONS USING MONOBASIC POTASSIUM PHOSPHATE.

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Purpose: Neonates require high intakes of calcium and phosphate to mimic fetal accretion rates and for proper skeletal mineralization. Currently, neonates receive approximately half of their requirements due to the precipitation of calcium and phosphate in TPN solutions. The objectives of this study were to compare monobasic potassium phosphate (monobasic regimen) and monobasic plus dibasic potassium phosphate (dibasic regimen) on calcium phosphate solubility in five amino acid products, and to determine whether solubility differences in these products can be explained by titratable acidity.

Methods: 85 TPN solutions were prepared. Five amino acid products were used at 3% concentrations: Primene, Vamin N, TrophAmine, Aminosyn-PF, and Travasol. Dextrose (10%) and all standard electrolytes, heparin, vitamins and trace elements were added. Calcium (as gluconate) and phosphate (as monobasic or dibasic regimen) were added in one-to-one molar ratios from 0–45 mmol/L. Solutions were inspected macroscopically and microscopically for precipitation: immediately, 24 hours after preparation at room temperature, and 3 hours later after incubation in a 37°C water bath. Titratable acidity was measured for each amino acid product by titrating with standardized 0.1 M NaOH.

Results: Monobasic regimen was soluble up to 45 mmol/L. The maximum solubility of dibasic regimen was 20 mmol/L. Titratable acidity did not determine the solubility differences observed in the amino acid products.

Conclusions: These data will allow clinicians to double the current concentrations of calcium and phosphate in neonatal TPN solutions from 12 to 24 mmol/L using monobasic regimen.