Agenda & Abstracts

Department of Pediatrics
Trainee Research Night

Thursday, November 7, 2019
OHSU Doernbecher Children's Hospital
700 SW Campus Drive, Portland, OR 97239

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Welcome to the 2019 Department of Pediatrics Trainee Research Night!

Agenda

4:00 - 5:00 pm	Poster session	Please enjoy a beverage and view the posters on display in the lobby area
		Dinner will be served at 4:45pm. Please take dinner into the Vey Auditorium for oral presentations

Oral Presentations

5:05 - 5:15 pm	Carrie Phillipi and Dmitry Dukhovny	Welcome
5:15 - 5:30 pm	Meredith Haag and Jesse Goldfarb	*Bronchiolitis and weight status in infants*
5:30 - 5:45 pm	Kellee Parker	*Understanding the family experience of surviving childhood cancer*
5:45 - 6:00 pm	Katie Sacotte	*Comparing mental health outcomes among young adults with histories of parental incarceration and juvenile justice involvement*
6:00 - 6:15 pm	Atoosa Craighead	*Are probiotics a cost-effective therapy for prevention of NEC in VLBW infants: decision analysis*
6:15 - 6:30 pm	Matt Dietz	*Tumor-macrophage hybrid cells facilitate disease detection in pediatric patients with glioma*
6:30 - 6:45 pm	Cesar Gonzalez De Alba	*Myocardial strain and fibrosis evaluation by CMR-FT and T1 mapping in adults with repaired tetralogy of Fallot*

Abstracts

John Adair, fellow, Neonatal-Perinatal Medicine
Pulmonary function tests in very low birth weight (VLBW) infants screened for pulmonary hypertension

Alia Broman, fellow, Pediatric Critical Care
Current practice and barriers to consulting palliative care after pediatric out of hospital cardiac arrest: a mixed methods study

Frances Chiang, resident
Medical student charting restrictions lifted - a year in review

Atoosa F. Craighead, fellow, Neonatal-Perinatal Medicine
Are probiotics a cost-effective therapy for prevention of NEC in VLBW infants: decision analysis

Matthew Dietz, fellow, Pediatric Hematology-Oncology
Tumor-macrophage hybrid cells facilitate disease detection in pediatric patients with glioma

Luong Doan, fellow, Pediatric Endocrinology
Evaluation of collagen type X marker levels in children and adolescents: a biomarker for growth

Adam S. DuVall, fellow, Pediatric Hematology-Oncology
The role of inflammation in the clonal evolution of familial platelet disorder (FPD) to acute myelogenous leukemia (AML)

Sophia French, resident, Child Neurology
EEG as a predictor rather than a cause of poor outcome in pediatric survivors of cardiorespiratory arrest

Cesar Gonzalez de Alba, fellow, Pediatric Cardiology
Myocardial strain and fibrosis evaluation by CMR-FT and T1 mapping in adults with repaired tetralogy of Fallot

Meredith B. Haag, medical student
Weight-based vancomycin dosing in overweight and obese children

Meredith B. Haag, medical student
Jesse Goldfarb, resident
Bronchiolitis and weight status in infants

Tiffany Lee, medical student
Single center experience with neurodevelopmental follow-up in cardiac patients

Tiffany Lee, medical student
Timing of antibiotic administration for neonatal sepsis at Doernbecher Neonatal Intensive Care Unit

Megan McKittrick, medical student
Clinical and sociodemographic factors are associated with human donor milk supplementation in term newborns

Devlynne Ondusko, resident
Do standardized scripts improve interpreter acceptance by Spanish-speaking families?

Kellee Parker, fellow, Pediatric Hematology-Oncology
Understanding the family experience of surviving childhood cancer

Christina Ramo, resident
Growing @ Home: discharge from the neonatal intensive care unit (NICU) with remote patient monitoring

Christina Rufener, resident
Initiative to reduce excess use of heated high flow nasal cannula in infants with bronchiolitis: The SCRATCH Protocol

Kaitlyn Sacotte, resident
Comparing mental health outcomes among young adults with histories of parental incarceration and juvenile justice involvement

Doris Valenzuela-Araujo, medical student
Gastric volvulus presenting with pancreatitis: a rare diagnosis worth adding to the differential

Pulmonary function tests in very low birth weight (VLBW) infants screened for pulmonary hypertension

Adair, John; Kelly, Brendan; Schilling, Diane; Parkhotyuk, Kseniya; Kim, Amanda; Scottoline, Brian; McEvoy, Cindy

Background
Bronchopulmonary dysplasia (BPD) is a significant respiratory complication of preterm neonates that is characterized by aberrant growth of alveolar and vascular tissue. Pulmonary hypertension (PH) develops in certain phenotypes of BPD and results in severe long term implications including increased mortality rates. The development of PH in preterm infants is poorly understood. The quantification of pulmonary function tests (PFTs) in infants with and without PH will increase the understanding of the relationship between lung and vascular disease in preterm infants and may be a valuable physiologic marker to help identify preventive therapies for this potentially devastating morbidity of prematurity.

Objective
Compare PFTs in VLBW infants with evidence of PH versus those without evidence of PH. We hypothesized that infants with PH would have an increased passive respiratory resistance compared to those without PH.

Design/Methods
Infants with PFTs performed at 34 to 38 weeks post menstrual age (PMA) as part of the PH screening guideline in the OHSU NICU were included. This guideline applies to any infant born at ≤ 1500 grams requiring respiratory support at > 34 weeks PMA and includes a screening echocardiogram, blood gas, chest x-ray, NT-proBNP, and PFT. A single pediatric cardiologist reviews and estimates right ventricular pressure and defines PH as an estimated mean pulmonary arterial pressure or right ventricular pressure greater than half systemic pressure. Passive respiratory resistance (Rrs) and compliance (Crs) were measured with the single breath occlusion technique and functional residual capacity (FRC) with the nitrogen washout as per standardized criteria. Based on previous data, approximately 22 infants were needed per group to show a 25% difference in Rrs with an α of 0.05 and power of 80%.

Results
22 VLBW infants with PH and 26 without PH were studied. Those with PH had a significantly lower birth weight and a trend toward a lower gestational age compared to those without PH. There were no other demographic differences between the groups. The infants with PH had a significantly increased Rrs and decreased Crs. There was no difference in FRC but this measurement was not completed in all of the infants. (Table)

Conclusion
In this pilot study of VLBW infants screened for PH at a range of 34-38 weeks PMA, those with PH had a significantly increased Rrs and decreased Crs compared to those without PH. Additional studies are needed to further phenotype infantsts with evolving BPD and PH.

Demographics and PFT Results of Infants without and with Pulmonary Hypertension (PH)

	No PH (n=26)	Any PH (n=22)
Birth weight (g)	945 ± 181	823 ± 224*
Gestational age (wks)	27.4 ± 2.1	26.3 ± 2.0
Cesarean section delivery (%)	65	68
Gender Male (%)	54	50
Race Caucasian (%)	73	77
PMA at time of PFT (weeks)	35.0 ± 1.1	34.9 ± 1.3
Weight at time of PFT (kg)	1.94 ± 0.41	1.94 ± 0.45
Days of PFT from PH ECHO	3.0 ± 2.3	2.2 ± 2.1
Rrs (cmH2O/mL/sec)	0.073 ± 0.032	0.100 ± 0.047**
Crs /kg (mL/cmH2Okg)	0.98 ± 0.25	0.77 ± 0.20**
Crs (mL/cmH2O)	1.88 ± 0.51	1.46 ± 0.51**
FRC / kg (mL/kg)[a]	23.0 ± 6.4	22.2 ± 5.6
FRC (mL)[a]	44.0 ± 14.5	44.1 ± 16.3

Values are Mean ± SD unless otherwise noted; [a] FRC obtained in 19 versus 20 patients ;* P <0.05 from independent sample t-tests for the mean **P<0.05 by linear regression adjusting for birth weight and gestational age

Current practice and barriers to consulting palliative care after pediatric out of hospital cardiac arrest: a mixed methods study

Broman, Alia; Carney, Patricia; Williams, Cydni; Macauley, Robert

Background
Over the past 2 years only 35% of pediatric patients admitted to OHSU Doernbecher pediatric intensive care unit (PICU) survived to discharge after initial presentation of out of hospital cardiac arrest (OHCA). Of those that survived, approximately one-quarter had a devastating, but survivable neurological injury, based on the change between their admission and discharge functional status score (FSS). Among the survivors, very few children received a pediatric palliative care consult. While all children in the PICU receive comprehensive care, this care does not extend beyond the hospital without specialty team involvement during admission. Given the poor survival rate and persistence of functional limitation in children with OHCA, we believe patients with an elevated baseline FSS and/or significant change in FSS upon discharge would benefit from long-term palliative care involvement, starting during initial admission.

Objectives
To address current palliative care utilization for patients with out of hospital cardiac arrest and identify barriers to placing a palliative care consult.

Design/Methods
A single-center retrospective chart review of patients admitted to the Doernbecher PICU from August 25, 2016 to March 1, 2019 with primary diagnosis of OHCA was performed. The search identified children with significant change in baseline to discharge functional status score (FSS) and if they received a palliative care consult.

Additionally, a qualitative survey was created with the help of a board certified pediatric palliative care provider, as well as a PhD with extensive experience in qualitative research and analysis. The target population surveyed were pediatric critical care providers (MD, APP, RN). Cognitive survey testing was performed using a focus group of current pediatric residents prior to survey dissemination. All answers and analyses will be performed using Qualtrics made available through OHSU. The survey consists of multiple choice, short answer questions, and patient scenarios. IRB approval was obtained and this specific project was deemed exempt.

Results/Conclusions
Anticipated results will highlight obstacles to placing palliative consults, as well as allow providers to review their current practices and encourage opportunities for change when caring for future patients.

Table 1: *Study Demographics*

	Survived N *(%)*	Died N *(%)*	Total N *(%)*
	18 *(35)*	33 *(65)*	51
GENDER			
Male	12 *(67)*	19 *(58)*	31 *(61)*
Female	6 *(33)*	14 *(42)*	20 *(49)*
AGE RANGE			
0 - 12 months	6 *(29)*	15 *(71)*	21 *(41)*
1 – 12 years	4 *(29)*	10 *(71)*	14 *(28)*
12 - 18 years	8 *(50)*	8 *(50)*	16 *(31)*
FSS			
Admit - normal	13 *(72)*	28 *(85)*	41 *(80)*
Admit - abnormal	5 *(28)*	5 *(15)*	10 (20)
Discharge - normal	14 *(78)*	-	*NA*
Discharge- abnormal	4 *(22)*	[1 *(3)*]*	*NA*

[ ]*Patient initially with normal FSS but survived with abnormal FSS, discharged home and passed away on hospice. Discharge FSS not included in above calculations. FSS: functional status score

Figure 1: *Patients admitted with OHCA and whether or not they received a palliative care consult during their entire hospital admission*
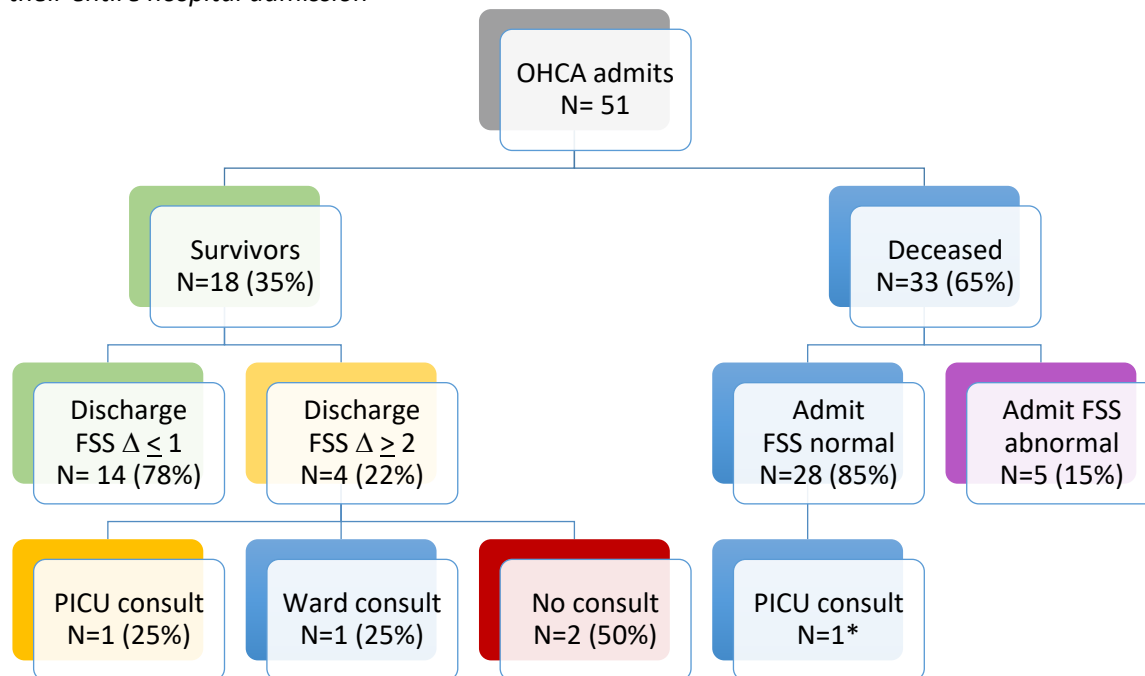
*Patient initially with normal FSS but survived with abnormal FSS, discharged home and passed away on hospice. OHCA: out of hospital cardiac arrest; FSS: functional status score; PICU: pediatric intensive care unit; Ward: general pediatric hospital ward.

Medical student charting restrictions lifted - a year in review

Chiang, Frances; Dixon, Will; Michaelis, Ruth; Simmons, Kim

With the intent to reduce the administrative burden of teaching physicians, in March 2018 the Centers for Medicaid and Medicare Services (CMS) allowed for the medical student's note to serve as primary documentation with verification by a teaching physician. An observational research study was performed to evaluate the updated CMS policy's effects on the clinical experience for medical students and preceptors at A.T. Still University School of Osteopathic Medicine in Arizona (ATSU-SOMA) during the 2018-2019 academic year.

In order to examine how CMS policy changes impacted student learning and preceptor teaching, surveys were distributed to 3rd and 4th year medical students (n=214) from 12 community health center (CHC) campuses at the institution, and the core family medicine preceptors (n=35) at 3 of the CHC sites (Seattle, Tucson, Washington, DC). The outcomes measured included time spent on teaching, satisfaction with teaching/learning and effects on clinic flow. Surveys were administered in Fall 2018 (response rates: 53% students, 74% preceptors) and repeated in Spring 2019 (response rates: 49% students, 45% preceptors) to compare trends in outcomes. Notably, over 70% of students stated they feel more part of the team when they can document in the patient chart and around 60% of preceptors stated that student charting saved them time (from <15 to 60 minutes) in clinic.

Are probiotics a cost-effective therapy for prevention of NEC in VLBW infants: decision analysis

Craighead, Atoosa F.; Caughey, Aaron B.; Chaudhuri, Anoshua; Yieh, Leah; Hersh, Alyssa R.; Dukhovny, Dmitry

Background
Necrotizing Enterocolitis (NEC) is a multifactorial disease occurring in 5-10% of Very Low Birthweight (VLBW) infants and is associated with high morbidity and mortality. Multiple strategies exist to help attenuate the incidence of NEC, including probiotics. Given the high morbidity and costs associated with NEC, prophylactic use of probiotics may be a cost-effective intervention.

Objectives
To create a decision analysis model for NEC prevention and use this model to perform an economic evaluation on the use of prophylactic probiotics.

Design/Methods
We built a decision analysis model using TreeAge. Inputs from literature were used to inform the model parameters. Current market value of $2,207 was estimated as the cost for a course of probiotics per VLBW. For the base case analysis, the rate of NEC was 5.82% with risk reduction from probiotics of 0.41. The incremental cost of NEC in a VLBW compared to VLBW without NEC was $17,864. Effectiveness was assessed using quality-adjusted life-years (QALY) with a lifetime time horizon. The primary outcome was incremental cost-effectiveness ratio (iCER) expressed as cost per QALY. Deterministic sensitivity analyses (SA) were performed on all parameters and probabilistic SA were performed as Monte Carlo simulations. All costs were expressed in 2017 US dollars with a willingness-to-pay (WTP) threshold of $100,000/QALY.A lifetime horizon and societal perspective was undertaken.

Results
In an annual cohort of 55,000 VLBW infants, prophylactic probiotics prevent 1,892 cases of NEC and save 702 lives. For the base case analysis, the iCER of probiotics vs no probiotics for the prevention of NEC in VLBWs was $2,965/QALY. With increasing rate of NEC, probiotics become the dominant strategy (less costly and more effective) at a rate of 7.4% and higher (Figure 1). SA revealed that prophylactic probiotics become dominant when the incremental cost of NEC per VLBW approaches $44,000 or higher. Monte Carlo simulations demonstrated probiotics are cost-effective 98% and dominant 39.6% of time (Figure 2).

Conclusion
Our model demonstrates that prophylactic probiotics are a cost-effective strategy in the reduction of NEC given our budget constraints. The model results are sensitive to the model inputs, allowing for adaptation of the model to specific practice settings in order to understand the economic impact of this practice change.

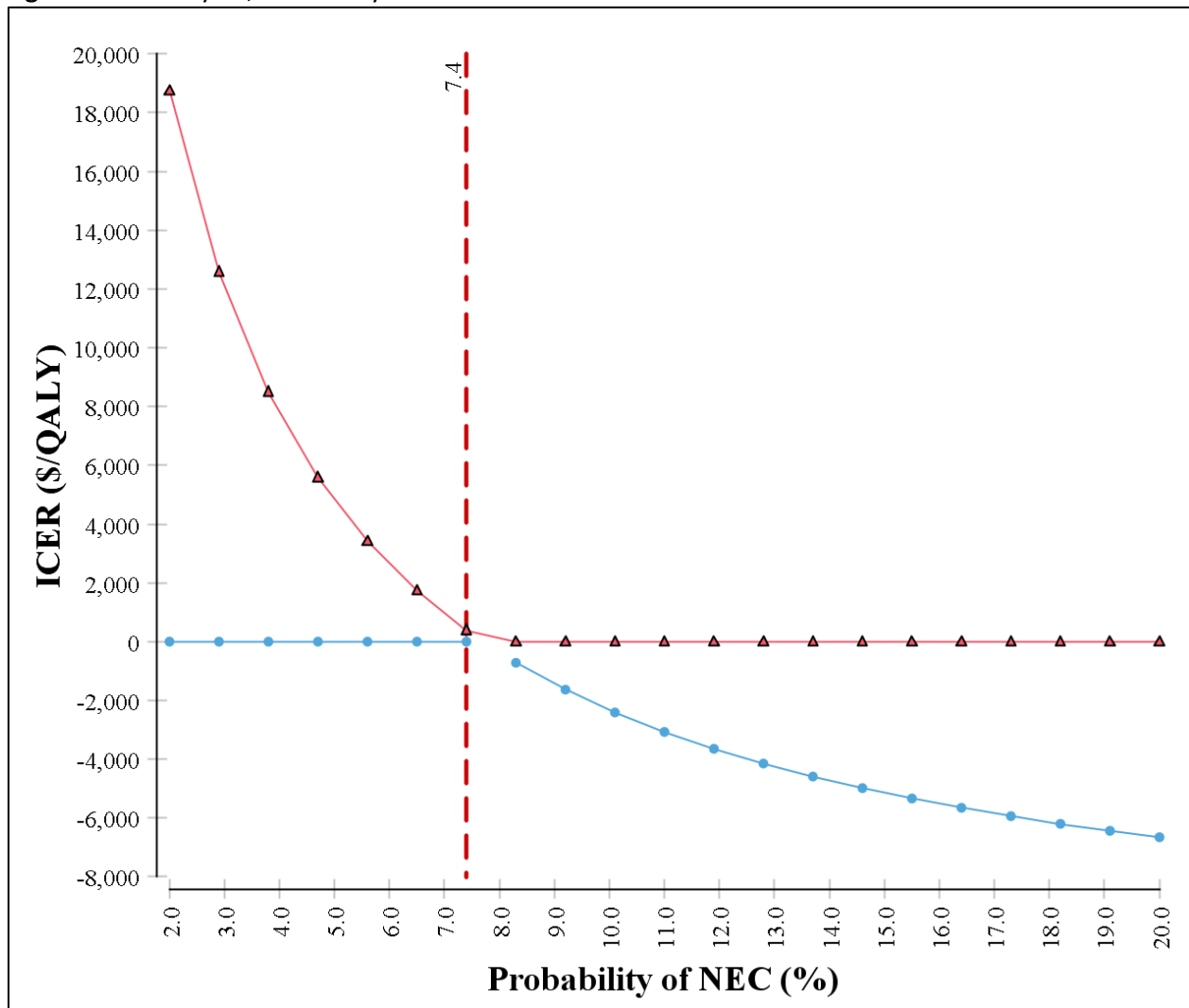**Figure 1:** One-way SA, Probability of NEC

Figure 1. One-way SA, Probability of NEC. A one-way SA is a deterministic method that evaluates a variable over a range of values to understand the impact on the ICER. The probability of NEC was evaluated from 2% to 20%.

SA= sensitivity analysis; ICER= incremental cost-effectiveness ratio; NEC= necrotizing enterocolitis; QALY= quality-adjusted life year
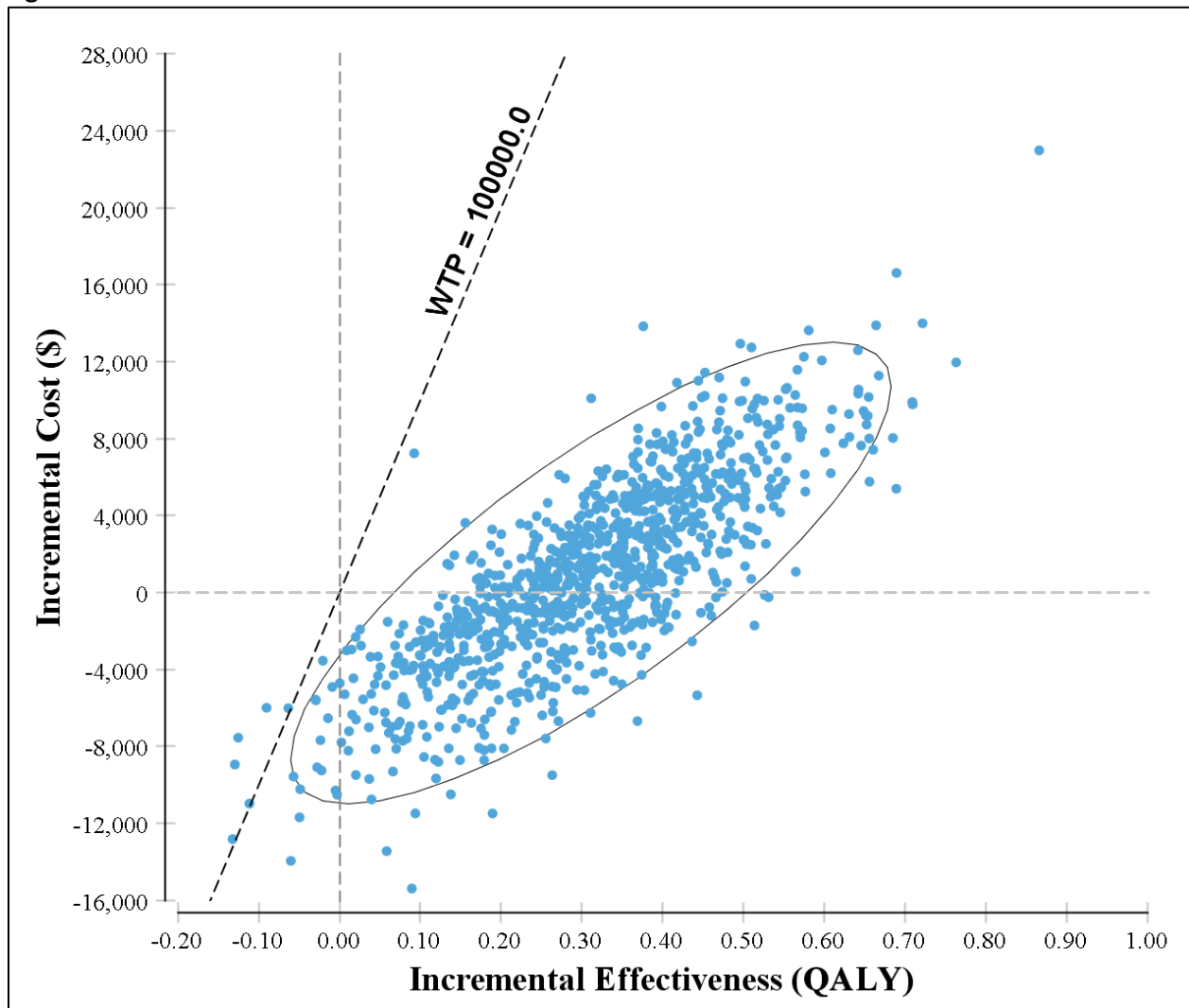
Figure 2: Monte Carlo Simulations

Figure 2. Monte Carlo Simulations ICER Plot. Monte Carlo Simulations are a probabilistic method that evaluate all variables in the model over a range of values. In these simulations, the model is run 1,000 times and each point on the plot is a unique ICER value. Ellipse represents the 95% CI.

Tumor-macrophage hybrid cells facilitate disease detection in pediatric patients with glioma

Dietz, Matthew[1*]; Parappilly, Michael[2]; Beach Catherine Z.[3]; Wong, Melissa H.[2,4]
[1]Department of Pediatrics, [2]Cell, Developmental & Cancer Biology, [3]Radiation Medicine, [4]Knight Cancer Institute, Oregon Health & Science University, Portland, OR 92739

Background
Central nervous system (CNS) tumors are the leading cause of death from childhood cancer. Pediatric gliomas are the most common CNS tumor of childhood, a subgroup of which is characterized by an aggressive, recurrent, and highly lethal clinical course. Despite a decade of revolutionary advances in understanding the molecular biology driving pediatric gliomas patient outcomes have not improved, in part due to crude measures of disease. Disease assessment is limited by tumor location and risk of serial biopsy as well as under-developed circulating analytes. Recent research identified a unique circulating tumor cell (CTC) derived from fusion of macrophages and tumors cells results in a tumor hybrid cell harboring hematopoietic and tumor properties (called circulating hybrid cell, CHC). In solid tumors CHCs correlate with disease burden and overall survival. In pediatric gliomas, detection of circulating cells with tumor characteristics, such as CTCs, are seldom reported and there are not yet reports of CHCs. The development of noninvasive circulating biomarkers in pediatric gliomas is critical to detecting disease evolution, progression and recurrence allowing investigations into the biologic processes underlying these phenomena and associated therapeutic opportunities.

Objective
The purpose of this project is to detect and delineate the role of CHCs as a liquid analyte of disease status in pediatric patients with glioma.

Method
Peripheral blood was obtained from 8 pediatric patients with: H3K27M mutant midline glioma (n=3), glioblastoma (n=2), anaplastic astrocytoma grade III (n=1) and astrocytoma grade II (n=2) at initial resection/biopsy (n=2) or disease progression/recurrence (n=6). Peripheral blood mononuclear cells (PBMCs) were isolated, adhered to poly-d-lysine–coated slides, fixed, permeabilized and stained with antibodies to CD45 and Glial Fibrillary Acid Protein (GFAP) and DAPI. Discrete cellular populations were identified by protein expression using a Zeiss AxioObserverZ.1 microscope, then digitally scanned using a Zeiss AxioScanner, and processed with ZEN software.

Results
CHCs, defined as cells expressing CD45 and GFAP, were identified in 7 of 8 samples evaluated including high and low grade glioma. This pilot study established an isolation and immunofluorescence detection platform for measuring CHCs in pediatric patients with glioma.

Conclusion
CHCs are detectable in pediatric patients with glioma. We are investigating the immune, phosphorylome and molecular profiles of CHCs using a multiplexed immunofluorescence imaging technique. Based on these findings we will perform longitudinal study of CHCs in pediatric patients with newly diagnosed high and low grade glioma to determine their role as a biomarker of disease status.

Evaluation of collagen type X marker levels in children and adolescents: a biomarker for growth

Doan, Luong; Boston, Bruce

Background
Collagen type X is normally synthesized and deposited in the hypertrophic zones of active growth plates. It is degraded and released into circulation as a byproduct of endochondral ossification. An ELISA assay has been developed that accurately measures the byproducts of collagen type X degradation in the serum as collagen type X markers (CXM). A recent study has found that CXM correlates with expected growth velocity in humans. However, there is a large amount of individual variability in the assay with unclear etiology. We hypothesize that the variability observed in CXM levels are due to the effect of external factors including exercise and diurnal variability.

Specific Aim I
Determine the impact of time of day on CXM levels in growing children and adolescents.

Specific Aim II
Determine the impact of activity and exercise on CXM levels in growing children and adolescents.

Specific Aim III
Determine the duration of exercise's impact on CXM levels. If it is determined that intense activity increases CXM levels, the duration that CXM levels remain elevated is important to define.

Study Design
Actively growing children between the ages of 2-17 years are eligible for this study. Children with a growth disorder or untreated chronic illness that impacts growth will be excluded. CXM levels can be accurately measured from plasma extracted from dried blood spotted on a filter paper. Subjects will be asked to saturate one complete circle on a protein saver card. Two sub-studies will be conducted. In the first sub-study, subject samples will be collected when they first wake up in the morning and right before going to bed to evaluate for the presence of a diurnal variation. Samples will be collected for 5 consecutive days provided they do not participate in intense activity that day. In the second sub-study, samples will be collected before, immediately after, and 3 hours following two different levels of activities. These activities will be classified as sedentary and intense. Minimal duration of activity will be 1 hour. Subjects will record the date, time, and type of activity on their dried blood spot card. Samples will be obtained during 5 sedentary and 5 intense activities. Cards will be coded to de-identify patients. Medical record review will be used to obtain additional information such as patient age, gender, weight, BMI, medical history, and growth velocity over the previous 6 months period.

Results
Data collection in process.

The role of inflammation in the clonal evolution of familial platelet disorder (FPD) to acute myelogenous leukemia (AML)

DuVall, Adam S.; Lin, Hsin-Yun; Hosseini, Mona; Ors, Aysegul; Mohammed, Hisham; Lind, Evan; Traer, Elie; Joshi, Sunil; Borate, Uma; McWeeney, Shannon; Tyner, Jeffrey; Druker, Brian; Agarwal; Anupriya

Acute myeloid leukemia (AML) is a deadly cancer with limited improvement in outcomes of young, healthy individuals over the last 20 years. Up to 20% of some populations harbor germline mutations that lead to a predisposition to leukemia. Familial platelet disorder (FPD) is defined by a germline runt-related transcription factor 1 (RUNX1) mutation where ~50% of patient will go on to develop acute leukemia with worse outcomes than non-RUNX1 mutated acute leukemia. The acquisition of secondary mutations in preleukemic cells is theorized to lead to the transformation of FPD to AML, but the cause and mechanism are unknown. We propose that microenvironment-driven inflammatory insult provides a selective advantage to preleukemic and leukemic cells and cooperates with disease progression. Our goal is to identify a comprehensive mechanism of FPD/AML transformation so that patients at risk of disease progression can be identified at an early stage and malignant clones can be selectively eradicated to improve outcomes for these patients. We aim to identify the contribution of inflammatory cytokines in promoting clonal evolution in FPD/AML. Mononuclear cells (MNCs), CD34+ stem cells, and stromal cells were purified from primary samples of patients who have germline RUNX1 mutations but have yet to develop leukemia. MNCs and CD34+ cells were maintained in liquid culture, exposed to inflammatory stimuli, and serially counted. CD34+ cells were also maintained in liquid culture with inflammatory stimuli that promoted differentiation into myeloid, erythroid, and megakaryocytic lineages separately. Inflammatory stimuli did not demonstrate significant differences in the proliferation of MNCs and CD34+ cells between FPD samples and healthy controls. However, there is a qualitative difference in the rate of stromal growth between FPD and healthy stroma on exposure to tumor necrosis factor alpha (TNFα). In the absence of stimulation, FPD CD34+ cells demonstrated a preference to self-renewal and blocked differentiation. Erythroid, myeloid, and megakaryocytic maturation defects were also discovered on exposure to different cytokines. Ongoing effort aims to delineate the contribution of the cellular hematopoietic niche to this altered hematopoiesis. Overall, this preliminary work supports our hypothesis that an inflammation-rich microenvironment promotes clonal evolution of germline RUNX1-mutated cells to drive transformation from preleukemic FPD to AML.

EEG as a predictor rather than a cause of poor outcome in pediatric survivors of cardiorespiratory arrest

French, Sophia[1]; Pettersson, David[3]; Piantino, Juan[1]; Williams, Cydni[2]

[1]Oregon Health & Science University, Pediatric Neurology, Portland (OR) USA; [2]Oregon Health & Science University, Pediatric Critical Care, Portland (OR) USA; [3]Oregon Health & Science University, Diagnostic Radiology, Portland (OR) USA

Study Objective
To evaluate the clinical significance of abnormal EEG patterns in children following cardiopulmonary arrest.

Design
This was a retrospective cohort study of 20 children seen at Oregon Health and Science University following cardiopulmonary arrest between 2016 and 2019. Baseline characteristics were obtained for all patients and EEG and neuroimaging were obtained when indicated during the initial hospitalization and outcomes of motor exam and functional status score were evaluated at discharge and at a 2 month follow up visit.

Results
All patients with electrographic seizures (30%) had pre-existing epilepsy (5%) or radiographic ischemic injury (25%) and their arrests were due to a respiratory etiology or warm-water drowning. No patient had a low risk arrest, seizures, and a bad outcome. All patients with an abnormal motor outcome had prolonged time to ROSC or muscular dystrophy, a respiratory or warm-water drowning etiology for their arrest, radiographic ischemic injury and acute symptomatic seizures. All patients with a low risk etiology of arrest due to arrhythmia or a cold-water drowning had normal neuroimaging, no seizures, and good outcomes (Tab 1).

Conclusions
In patient who suffer a cardiorespiratory arrest, the presence of acute symptomatic seizures is predictive, but not necessarily causative, of a poor functional and motor outcome. Other factors that were associated with a poor outcome include abnormal neuroimaging, prolonged time to ROSC, and a respiratory etiology for their arrest.

Table 1: Patient Summary

Baseline Characteristics			Arrest Details			Neurodiagnostics															Motor exam			Outcomes		
						EEG			Neuroimaging															Total FSS		
Age	Sex	Comorbidities	Etiology of arrest	Time to ROSC	GCS normalization	Suppressed	Discontinuous	Seizures	Type	Frontal	Occipital	Parietal	Temporal	Insula	BG	Thalamus	Hippocampus	CC	BS	Total	Tone	Walking	Reflexes	Baseline	Δ at discharge	Δ at 2 months
3months	M	none	respiratory: asphyxiation	30min	never	yes	yes	yes	MRI	3	4	3	3	2	4	1	4	2	5	31	decreased	no		6	20	
10months	M	none	warm water drowning	>60min	never	no	no	yes	MRI	2	0	0	0	0	6	2	3	0	0	11	increased	no	increased	6	17	8
12years	F	neurologic: muscular dystrophy	respiratory: viral PNA	2min	never	yes	yes	yes	MRI qb	0	0	2	0	0	3	0	1	0	0	8	decreased	no	decreased	11	17	17
3weeks	F	none	respiratory: apnea	20min	HD10	yes	yes	yes	MRI	0	4	0	0	0	0	3	3	3	0	6	increased		increased	6	4	
6months	M	none	unknown	5min	HD0	yes	no	yes	MRI	2	4	3	1	1	1	2	0	3	0	16	normal	yes	normal	6	1	1
3years	M	neurologic: Kabuki syndrome	warm water drowning	45min	never	no	no	yes	MRI	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	9	2	
2months	M	none	respiratory: asphyxiation	15min	HD4	no	no	no	MRI	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	2	
6years	M	none	cold water drowning	45min	HD6	yes	yes	no	CT	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	0	
14years	M	none	arrhythmia	10min	HD10	no	no	no	CT	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	0	
17months	F	cardiac: myocarditis	arrhythmia	30min	HD3	no	no	no	CT	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	0	0
13months	F	cardiac: double aortic arch	respiratory: choked	3min	HD4	no	no	no					no neuroimaging done								normal	yes	normal	6	1	0
12years	M	cardiac: anomalous left coronary artery	arrhythmia	10min	HD1	no	no	no					no neuroimaging done								normal	yes	normal	6	0	0
14years	M	cardiac: anomalous left coronary artery	arrhythmia	5min	HD4								no neuroimaging done								normal	yes	normal	6	0	0
2months	F	cardiac: double outlet right ventricle	unknown	5min	HD0	no EEG done							no neuroimaging done								normal	yes		8	0	
2months	M	cardiac: aortic arch hypoplasia	respiratory: URI	5min	HD2	no EEG done							no neuroimaging done								normal	yes	normal	7	1	
4years	F	none	warm water drowning	3min	HD0	no EEG done			MRI	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	0	
15months	M	neurologic: pervasive developmental disability	arrhythmia	10min	HD4	no EEG done			MRI	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	0	
3months	M	starvation due to pyloric stenosis	arrhythmia	45min	HD1	no EEG done			MRI	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	7	1	1
4years	F	none	respiratory: strangulation	0min	HD1	no EEG done			MRI qb	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	0	0
15years	M	cardiac: left coronary occlusion, RYR2 mutation	arrhythmia	5min	HD0	no EEG done			MRI	0	0	0	0	0	0	0	0	0	0	0	normal	yes	normal	6	0	0

PNA=pneumonia, URI=upper respiratory infection, EEG=electroencephalogram, MRI=magnetic resonance imaging, MRI qb=quick brain magnetic resonance imaging, CT=computed tomography, BG=basal ganglia, CC=corpus callosum, BS=brain stem, FSS=functional status score

Myocardial strain and fibrosis evaluation by CMR-FT and T1 mapping in adults with repaired tetralogy of Fallot

Gonzalez de Alba, Cesar; Broberg, Craig

Background
Tetralogy of Fallot is the most common form of severe congenital heart disease in adults. Associated LV systolic dysfunction has prognostic implications including increased mortality. Cardiac magnetic resonance feature tracking (CMR-FT) strain analysis is a non-invasive tool that can assess global and regional myocardial function. CMR can also quantify myocardial extracellular volume (ECV) as a surrogate for diffuse interstitial myocardial fibrosis by T1 mapping. Abnormal myocardial fibrosis and strain have been used to predict long-term outcomes in different cardiac diseases.

Objective
Evaluate the association between LV systolic strain by CMR-FT, LV myocardial fibrosis by T1 mapping as and follow-up outcomes in rTOF patients.

Methods
This is a case-control study of 49 adults with rTOF and 20 age-matched healthy controls who underwent standard CMR studies from 2009 – 2011 at Oregon Health & Science University. Mean follow up time was 4.5 ± 1.9 years. CMR studies were performed using a 1.5 Tesla MRI system (Ingenia, Philips). Mid-ventricular ECV was quantified using native T1, 5 mins, 7 mins and 15 mins post-gadolinium injection. Global longitudinal, circumferential and radial strain (2D and 3D) were obtained by retrospectively contouring the epicardium and endocardium of cine images from the ventricular short axis view, 2 chamber view and 4 chamber view using Circle CVi[42] Software.

Results
Study groups had similar baseline demographics. The rTOF group had a higher mean ECV and LV and RV volumes (statistically significant). Both LVEF and RVEF were notably lower in rTOF patients (p = <0.001). Global circumferential strain (GCS) 2D and 3D and global longitudinal strain (GLS) 2D and 3D were lower in rTOF subjects (statistically significant). Global radial strain was lower in rTOF subjects (statistically significant for 2D). There was no association between strain and ECV. Strain parameters were positively correlated with LVEF and RVEF and negatively correlated with LVESV, LVEDV, RVESV and RVEDV. There were a total of 4 deaths, 5 hospitalizations and 8 arrhythmia diagnoses. Odds ratios were higher for both hospitalization and death in all 2D strain parameters (statistically significant). There was no association between arrhythmia and strain.

Conclusion
Abnormal LV strain by CMR-FT in rTOF patients is not associated with LV fibrosis or arrhythmia, but it is with death and hospitalization, mainly abnormal 2D GCS and 2D GLS.

Table 1. Baseline demographics and CMR volumetric data.

	rTOF (N = 49)	Controls (N = 20)	
	Mean ± SD	Mean ± SD	P value
Age	41 ± 14	38 ± 11	0.32
Height (in)	67 ± 4	67 ± 4	0.5
Weight (lbs)	171 ± 33	161 ± 32	0.25
Body surface area	1.9 ± 0.2	1.84 ± (0.2)	0.29
QRS duration	148 ± 28	N/A	
ECV (%)	28 ± 4	26 ± 3	0.03
LVEDV (ml)	158 ± 35	145 ± 28	0.11
LVESV (ml)	63 ± 28	45 ± 10	<0.001
RVEDV (ml)	246 ± 88	159 ± 37	<0.001
RVESV (ml)	122 ± 53	61 ± 17	<0.001
LVSV (ml)	95 ± 17	100 ± 25	0.48
RVSV (ml)	124 ± 44	97 ± 24	0.002
LVEF (%)	62 ± 9	69 ± 6	<0.001
RVEF (%)	51 ± 8	62 ± 5	<0.001

CMR = cardiovascular magnetic resonance, ECV = extracellular volume, LVEDV = left ventricular end-diastolic volume, LVESV = left ventricular end-systolic volume, RVEDV = right ventricular end-diastolic volume, RVESV = right ventricular end-systolic volume, LVSV = left ventricular stroke volume, RVSV = right ventricular stroke volume, LVEF = left ventricular ejection fraction, RVEF = right ventricular ejection fraction, rTOF = repaired tetralogy of Fallot.

Table 2. Follow up findings in rTOF subjects and abnormal CMR strain (N=45)

		OR (p-value, [95% CI])		
	Total (%)	2D global radial strain	2D global circumferential Strain	2D global long. Strain
Arrhythmia	8 (17)	0.95 (0.4, [0.84 - 1.07])	1.15 (0.3, [0.86 - 1.5])	1.22 (0.16, [0.92 – 1.62])
Hospitalization	5 (11)	0.76 (0.037, [0.6 – 0.98])	1.77 (0.026, [1.07 – 2.9])	1.59 (0.03, [1.04 – 2.4])
Death	4 (8)	0.72 (0.036, [0.53 – 0.98])	2.03 (0.026, [1.08 – 3.79])	1.8 (0.026, [1.07 – 3])

CI = confidence interval, OR = Odds ratio

Weight-based vancomycin dosing in overweight and obese children

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Background
Vancomycin is typically dosed by total body weight, and children with overweight or obesity may be at risk for under-dosing, resulting in treatment failure, or overdosing, compromising renal function, as a result of the pharmacokinetic parameters associated with their body composition. This study aimed to identify how total body weight impacted vancomycin levels in children and to examine whether alternative weight-based dosing may be more accurate.

Methods
We conducted a retrospective review of pediatric patients treated with IV vancomycin from January 2012 to October 2016 at a large, academic hospital. Analysis was limited to patients age 2-18 with no renal or hepatic disease, who received three or more doses of IV vancomycin, and had an appropriate vancomycin trough obtained. We utilized descriptive statistics to describe how dosing strategies and trough levels varied by weight status. Multiple regression analyses were utilized to determine which body-weight indicator, total body weight (TBW), ideal body weight (IBW), or adjusted body weight (ABW), best predicted ideal vancomycin trough concentrations.

Results
Of the 358 patients included in the final analytic sample, 122 (34%) had overweight or obesity. Children with overweight or obesity received lower dosing by total body weight compared with their normal weight peers (p<0.001) and higher per-kilogram dosing based on ideal or adjusted body weight (Table 1). Notably, the majority (55%) of initial trough levels overall were below 10μg/mL. There were no differences in the proportion of children whose vancomycin trough levels fell within the target range (10-20 μg/mL) by weight status (p=0.43). Using data restricted to children with overweight or obesity, multivariable logistic regression demonstrated no difference in the predicted probability of target-range vancomycin level by body-weight indicator, after accounting for age and sex.

Conclusion
Children with overweight or obesity may have higher vancomycin levels when using total body weight dosing. The finding that neither TBW, ABW or IBW significantly impacted whether the regression model predicted a target-range vancomycin level among children with overweight or obesity suggests that the differences attributable to these parameters is minor. However, the finding that the majority of patients, regardless of weight category, had a sub-therapeutic initial vancomycin trough calls into question current IDSA dosing recommendations for obese and non-obese patients alike.

Table 1. Vancomycin trough level by weight status

	Underweight n = 52	Normal weight n =184	Overweight n=61	Obese n=61	All n =358	p-value
Vancomycin levels, categorical, n (%)						0.43
<10μg/mL	33 (64)	61 (51)	37 (61)	33 (54)	197 (55)	
10-20 μg/mL	19 (37)	78 (42)	21 (34)	24 (39)	142 (40)	
>20 μg/mL	0 (0)	12 (7)	3 (5)	4 (7)	4 (7)	
Model 1, unadjusted, EMM (SE)	9.1 (0.9)	10.9 (0.5)	10.0 (0.8)	11.3 (0.8)	10.3 (0.4)	0.18
Model 2, adjusted for dose per kg total body weight, EMM (SE)	8.5 (0.8)*	10.8 (0.4)	10.3 (0.8)	11.8 (0.8)*	10.4 (0.4)	0.03

EMM = estimated marginal mean, SE = standard error, * pair-wise comparison significant

Bronchiolitis and weight status in infants

Haag, Meredith B.; Goldfarb, Jesse; Foster, Byron A.

Background

The relationship between abnormal weight status and the incidence of respiratory disease in children has been established. Childhood obesity has been associated with an increased risk of later asthma and a higher incidence of respiratory infection. In the acute care setting, outcomes related to weight status are mixed, with some studies demonstrating longer length of stay and increased risk of PICU transfer for children with obesity. The impact of weight status for children hospitalized with bronchiolitis, either on the length of hospitalization or on the efficacy of treatment, has not been examined.

Objective

To examine the association between weight status, length of stay, and ICU transfer in children with bronchiolitis.

Design/Methods

We conducted a retrospective cohort study examining infants hospitalized at Doernbecher Children's Hospital with bronchiolitis, grouped by weight status, examining the outcomes of length of stay and ICU transfer. Data was abstracted from Epic using the Research Data Warehouse. Analyses were limited to children with a diagnosis of bronchiolitis, who were age 24 months and younger at the time of admission. Data were extracted with relevant identifiers: age (weeks), gender, race, Hispanic ethnicity, last weight (kg), last height (in), primary ICD-10 code, length of stay (days), admission department, discharge date, and time. ICD-10 codes from the patients' chart were abstracted for classification as either having or not having significant co-morbidities.

Results

There were 765 children in the final analytic sample, 599 without co-morbidities and 166 with a significant co-morbidity (e.g. prematurity, congenital heart disease). The median length of stay for the whole sample was 2.8 days (IQR 1.7-4.9 days). Table 1 shows the sample by comorbidity diagnosis:

	ALL (N=765)	NO SIGNIFICANT COMORBIDITIES (N=599)	1+ SIGNIFICANT COMORBIDITIES (N=166)	P-VALUE*
AGE, MEAN IN WEEKS	29.16	27.66	34.58	0.003
SEX (% FEMALE)	58.95	59.10	58.43	0.878
RACE/ETHNICITY, N (%)	-	-	-	<0.001
NON-HISPANIC WHITE	471 (61.57)	365 (60.93)	106 (63.86)	-
HISPANIC	160 (20.92)	111 (18.53)	49 (29.52)	-
NON-HISPANIC BLACK	17 (2.22)	11 (1.84)	6 (3.61)	-
MULTIRACIAL	43 (5.62)	41 (6.84)	2 (1.20)	-
OTHER	74 (9.67)	71 (11.85)	3 (1.81)	-

PONDERAL INDEX, MEDIAN (IQR)	24.79 (22.20-27.53)	24.74 (22.26-27.49)	24.87 (21.98-27.75)	0.341
BMI Z SCORE, MEDIAN (IQR)	-0.33 (-1.23-0.68)	-0.26 (-1.16 – 0.68)	-0.76 (-1.73-0.72)	0.035
LOS, MEDIAN (IQR)	2.83 (1.65-4.88)	2.67 (1.56-4.48)	3.64 (2.21-6.89)	<0.001
PICU TRANSFER, N (%)	248 (32.42)	192 (37.14)	56 (38.36)	0.788

We saw a significant association between our primary measure of adiposity, Ponderal index, and length of stay, r = 0.14, p<0.001. We did not find an association between the weight measure and ICU transfer. Further multivariable analysis examining the weight measures and the outcomes of length of stay and ICU transfer are ongoing.

Conclusion
Our initial data analysis indicates a possible association between weight status among infants with bronchiolitis and length of stay. Further analyses including adjustments for age and gender will help answer this question. Excess adiposity may have an impact on respiratory health at an early age.

Single center experience with neurodevelopmental follow-up in cardiac patients

Lee, Tiffany; Ronai, Christina; Saxton, Sage; Madriago, Erin

Background

The current literature on neurodevelopment (ND) in pediatric cardiology patients has largely revolved around specific ND outcomes. Children with congenital heart defects (CHD) have a higher risk for acquiring developmental disorders, disabilities, and cognitive delay due to a combination of factors including prenatal cerebral perfusion, ongoing cyanosis, and exposure to cardiopulmonary bypass. Routine developmental evaluations throughout childhood can increase the chances of identifying these deficits, allowing early intervention.

Objective

We sought to evaluate referral to early intervention after congenital heart surgery and associated variables.

Design/Methods

We performed a retrospective chart review of pediatric patients with CHD requiring cardiac surgery within the first year of life at Doernbecher Children's Hospital from 1/1/13-12/31/18. Evaluated variables included whether the diagnosis was made prenatally, birth weight, gestational age at birth, presence of other genetic abnormalities, length of stay, number of catheterizations, mortality, ND referral, evaluation and follow-up, and distance for ND evaluation from patient's home.

Results

Of 151 patients with CHD, 57 (37.7%) were female and 111 (73%) were prenatally diagnosed. Sixteen (10.6%) had additional genetic abnormalities. Twenty (13.2%) died prior to six months of age. Table 1 shows basic demographics of the entire cohort. Of the total group, 64 (42.4%) were referred to ND services, and 60 (39.7%) patients accessed ND services, at a median age of 8.4 months and median distance of 39.7 miles from their home. Table 2 differentiates between patients with single and two ventricle physiology. Patients with single ventricle anatomy had a significantly increased rate of ND referral (50% vs 31%, $p<.05$) for early intervention in comparison to those with two ventricles.

Conclusion

Despite the risk for ND challenges, only 42.4% of eligible children with CHD were referred to Early Intervention. Patients with single ventricle anatomy who maintain the highest risk for poor ND outcomes had a 50% referral rate. Furthermore, patients with two ventricle physiology who also carry risk for ND delays were even less likely to be referred for evaluation. When referred, 93.8% of patients accessed ND services. Further investigation of barriers to referral as well as results of CHD specific ND assessments are ongoing.

Table 1: Patient Characteristics

Table 1

Demographics	All Patients
Total # Patients	151
# Female	57 (37.7%)
# Single Ventricle	58 (38.4%)

Birth Weight (kg)	3.19
Gestational Age	39 (31.4-41.6)
Deceased Before 6 months	20 (13.2%)
Age at Initial ND Visit (months)	8.412
Referred to Early Intervention	64 (42.4%)
Accessed ND Services	60 (39.7%)
ND Follow-up Established	37 (61.7%)
Genetic Abnormalities	16 (10.6%)
Prenatal Diagnosis	111 (73%)
Average Distance Traveled for ND Eval (Miles)	62.07 (39.75-431.8)

Table 2: Patient Variable Differences Between Single And Two Ventricle Anatomy

Table 2

Demographics	Single Ventricle (n=58)	Two Ventricle (n=93)	p Value
Birth Weight	3.13 (1.6-4.6)	3.23 (2.2-4.1)	NS
Gestational Age At Birth	38.6 (31.4-41.6)	39 (34-41)	NS
Mortality	16 (27.6%)	6 (6.5%)	p=.0003
Number of Caths	1.34 (0-5)	1.0 (0-5)	NS
Number of Surgeries	2 (1-3)	1 (1-3)	NS
Prenatal Diagnosis	58 (100%)	53 (57%)	p=.00001
Length of Stay	20 (9-196)	21 (1-147)	NS
Number of Hospital admissions in 1st year of life	3 (1-7)	2 (1-16)	NS
Age at first cardiac surgery	6 (1-114)	7 (1-283)	NS
Referral to Early Intervention	37 (50%)	27 (31%)	p=.037

Values are Number (%) or Median (range)

Timing of antibiotic administration for neonatal sepsis at Doernbecher Neonatal Intensive Care Unit

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Background
Delayed administration of antibiotics has been tied to poor survival in patients with sepsis. Guidelines from the Surviving Sepsis Campaign recommend a 1-hour window between diagnosis and antibiotic administration. Patients in the neonatal intensive care unit (NICU) are especially susceptible to infections due to their immature immune systems, and thus timely administration of antibiotics for septic neonates is critical.

Objective
As part of a quality improvement effort, this project identified and explored possible sources of antibiotic administration delays in neonates admitted to the NICU who are at risk for sepsis.

Design/Methods
We performed a chart review of the time to first dose antibiotic administration in the NICU at Doernbecher Children's Hospital over ten months (N=572). The NICU is a 46-bed, level IV NICU within Oregon Health & Science University (OHSU), an academic medical center and regional referral center. The NICU is adjacent to labor and delivery, where there is a fully equipped resuscitation (resus) suite where inborn infants are stabilized prior to admission to the NICU. The data set from the electronic medical records included the patient age, antibiotic(s) ordered, time and date of the order, and time to antibiotic administration. Review was done to determine location of the sepsis evaluation and antibiotic administration. Early onset (EOS) evaluations are considered to be those done in the first 72 hours of life and typically require a blood culture, while late onset (LOS) evaluations are performed in neonates greater than 72 hours old and often require blood, urine, and CSF cultures. Median time to antibiotic administration was calculated each month and plotted on a run chart. A one-way ANOVA was run between the three groups, and t-tests were run between each of the groups.

Results
The median administration of first doses of antibiotics for the overall population was 78 minutes. The location of the sepsis rule out affects the timing of antibiotic administration (Figure 1). There was a statistically significant difference between all three groups (p=0.011) and a significant difference between EOS in the resus suite versus in the NICU (p=0.047) and versus LOS in the NICU (p=0.007).

Conclusion
There is a statistically significant difference in median time to antibiotic administration between sepsis rule out evaluations in the resus suite versus the NICU, highlighting the large role of personnel and environment in the process of sepsis rule out than the actual task involved.
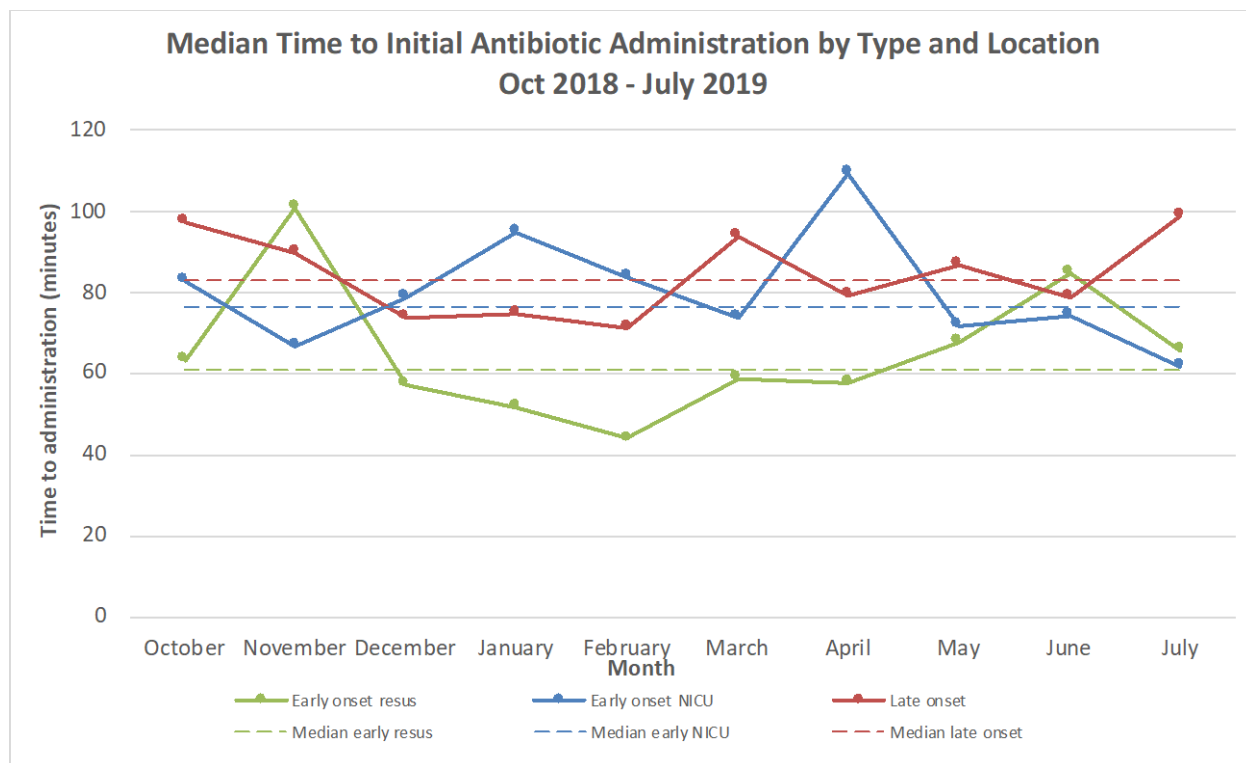
Figure 1: Median time to antibiotic administration in minutes, for each month from October 2018 to July 2019.

Clinical and sociodemographic factors are associated with human donor milk supplementation in term newborns

McKittrick, Megan; Khaki, Sheevaun; Gievers, Ladawna; Larson, Ilse

Objective
To identify clinical and sociodemographic differences between healthy, term newborns supplemented with infant formula and those supplemented with human donor milk (HDM). We hypothesized that there would be sociodemographic and clinical distinctions between newborns receiving different milk types.

Patients and Methods
This retrospective study included term newborns admitted to the postpartum unit between March 2017 and April 2019, with at least one supplemental feeding with infant formula or HDM for indications other than hypoglycemia. Demographic and clinical data were abstracted from the electronic medical record, and included maternal and newborn characteristics as well as feeding and clinical data.

Results
584 dyads met inclusion criteria. More newborns received supplementation with formula (n = 337, 57.7%) than HDM (n = 247, 42.3%). After adjustment, infants born to white, non-Hispanic mothers were more likely to receive HDM than those born to black mothers (aOR 5.6, p < 0.01), Hispanic mothers (aOR 3.0, p <0.001), or Asian mothers (aOR 2.6, p < 0.01). Infants born to primiparous women (aOR 1.7, p = 0.01), those with private insurance (aOR 3.9, p < 0.001), and those born via caesarean section (aOR 2.0, p < 0.001) were also more likely to receive HDM instead of formula. Newborns receiving their first supplemental feeding during the day (aOR 2.0, p = 0.001) and those undergoing phototherapy during the birth admission (aOR 10.0, p <0.001) were also increasingly supplemented with HDM.

Conclusions
There are clinical and sociodemographic differences between healthy, term newborns supplemented with infant formula and HDM.

Table 1. Significance and Adjusted Odds Ratio describing Relationships between Maternal and Neonatal Characteristics with Supplementation Type after Multivariate Logistic Regression

	p-value	adjusted OR
Maternal Characteristics		
Age	0.21	
Ethnicity (non-Hispanic)	< 0.01	2.97
Race (white)	0.01	5.62
Insurance type (private)	< 0.01	4.23
Parity (primiparous)	0.01	1.71
Delivery Method (caesarean)	< 0.01	2.36
Newborn Characteristics		
Completed Gestational Age	0.10	
First Supplement (day shift)	< 0.01	1.96
Phototherapy (yes)	< 0.01	10.25
NICU Transfer	0.29	

Figure 1. Diagram of Study Participants
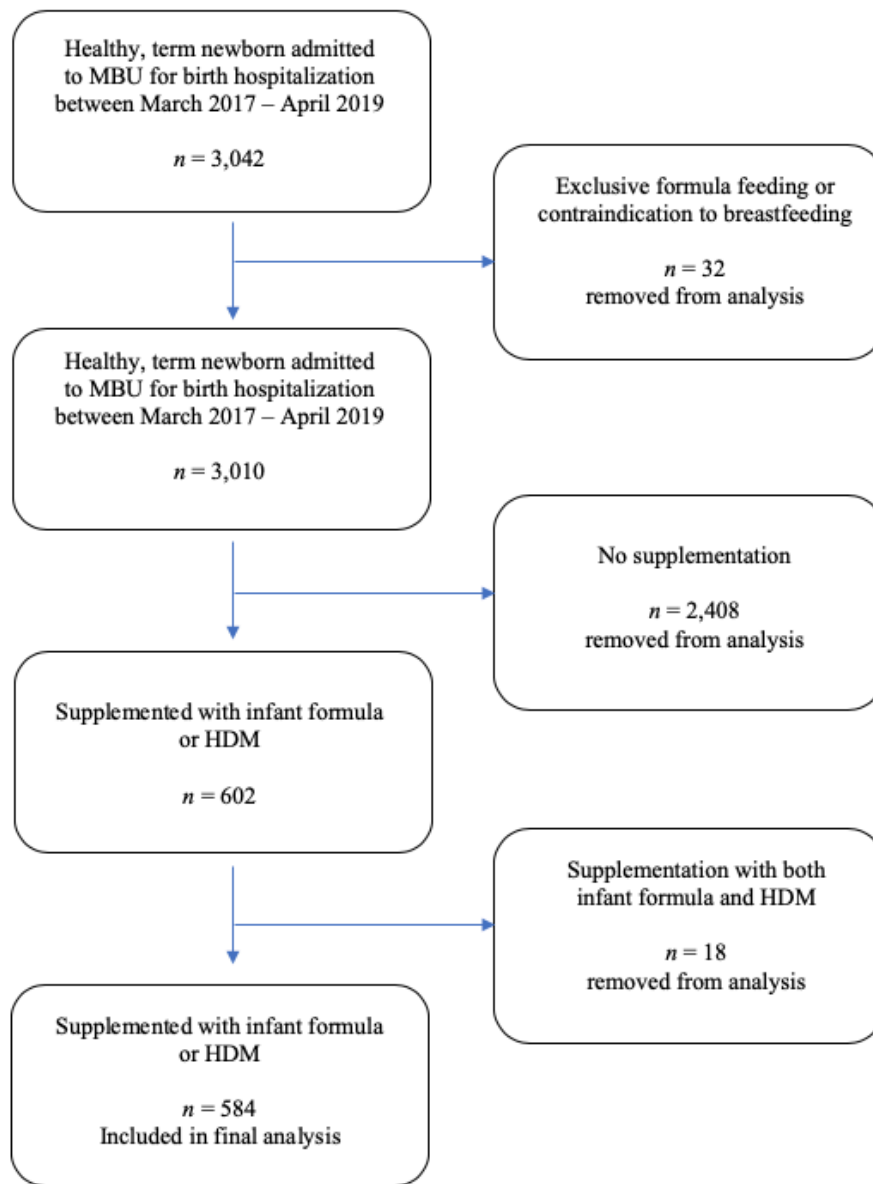
Do standardized scripts improve interpreter acceptance by Spanish-speaking families?

Ondusko, Devlynne; Khaki, Ida S; Huun, Cassidy; Krantz, Julia; Garcia Godoy, Laura; Johnson, Alicia; McEvoy, Cindy; Gievers, Ladawna

Background
Language barriers contribute to health care disparities and increase miscommunication. Patients who need but do not receive an interpreter have lower satisfaction, demonstrate poor understanding of their diagnosis and treatment, and receive more medical tests.

Objective
Many facets of interpreter use have been studied, however, a knowledge gap remains regarding the optimal way to offer an interpreter. The objective of this study was to determine which, of three standardized questions, resulted in the highest certified interpreter utilization to help bridge the language gap when provider-patient language discordance exists.

Methods
This was a randomized study of LEP Spanish-speaking mothers with newborns admitted to the Mother Baby Unit at Oregon Health and Science University between May 2018 and August 2019. Subjects were block randomized by week into three different arms, each defined by a unique scripted question offering an interpreter: Arm #1 In what language do you prefer to receive your medical care? Arm #2 Would you like an interpreter? Arm #3 A free hospital interpreter is available for you; would you like an interpreter? A sample size of convenience was utilized. Data were analyzed using ANOVA, chi-square test, and Fisher's exact test.

Results
Fifty-five LEP mothers were recruited, 17 were randomized to arm #1, 22 to arm #2, and 16 to arm #3. The three groups had similar sociodemographic characteristics. [Table 1] Overall interpreter use was 80% (44/55). There was a statistically significant difference in interpreter utilization among the study arms: 82% vs 64% vs 100% in each arm, respectively (p=0.015).

Conclusion
In this cohort there was a statistically significant difference in interpreter utilization (p=0.015). For health care providers this highlights an important aspect to providing care to LEP patients, simply offering an interpreter may not be sufficient. With this data, there is now an opportunity for providers to refine the way they offer certified interpreter services. This further underscores the need for continued development of evidence-based approaches for LEP families.

	All patients (n=55)	Scripted Question #1 (n=17)	Scripted Question #2 (n = 22)	Scripted Question #3 (n = 16)	p-value
Interpreter Utilization, n (%)	44 (80.0)	14 (82.4)	14 (63.6)	16 (100)	0.015
Maternal age (years), mean ± SD	33.2 (5.9)	31.5 (6.4)	33.7 (5.8)	34.4 (5.3)	0.335

Gravida, mean ± SD	4.2 (1.8)	4.3 (1.8)	4.1 (1.6)	4.1 (2.1)	0.942
Parity, mean ± SD	3.1 (1.5)	3.2 (1.4)	2.9 (1.5)	3.2 (1.6)	0.700
Mode of delivery, vaginal, n (%)	37 (68.5)	11 (64.7)	14 (66.7)	12 (0.75)	0.795
Insurance type, public, n(%)	53 (98.1)	17 (100)	20 (95.2)	16 (100)	>0.999
Gestational age (weeks), mean ± SD	38.5 (1.5)	38.2 (1.4)	38.5 (1.5)	38.7 (1.6)	0.609

Understanding the family experience of surviving childhood cancer

Parker, Kellee; Lindemulder, Susan; Christensen, Vivian; Chan, Lai Hin Kimi; Tarlow, Lauren; Cottrell, Erika

Background
Approximately 84% of children diagnosed with cancer are alive at least 5 years after diagnosis. More information regarding patient/family experiences with childhood cancer and outcomes most important to them is needed. Objectives of this study include gaining an in-depth understanding of the patient/family experience of childhood cancer and survivorship; determining best dissemination practices; and determining the utility of this resource to inform clinical pediatric oncology research.

Methods
This is a qualitative research study using the 'Database of Individual Patient Experiences' (DIPEx) approach, a methodology for collecting and disseminating high quality, evidence-based information on the health experiences of patients/families from a wide range of backgrounds. Parents of childhood cancer survivors are participating in semi-structured interviews and are encouraged to tell the story of their child's cancer diagnosis, treatment, and survivorship. Interviews have been conducted with parents (N=28) of children diagnosed with cancer between ages 0-14 years old, that were 1-5 years post therapy and from a variety of socioeconomic and geographic backgrounds. Interviews are ongoing. Interview transcripts are being analyzed using the constant comparison method to identify both common and divergent themes. Transcripts are coded in NVivo and discrepancies are resolved through consensus.

Results
Multiple themes have emerged thus far that highlight aspects of the experience that are most important for families. These themes include, but are not limited to, the following: need for mental health support for families during and after treatment; the significant emotional burden of transition from treatment to survivorship for both family and patient; difficult decisions and ongoing emotional distress surrounding clinical trial participation; strategies for clinicians sharing information with families; and the impact on family life.

Conclusions
As we work to design and implement clinical research studies that are more patient -centered, it is imperative that we understand what is most important to patients and families. Effective methodology is essential for understanding and accessing these patient/family experiences and DIPEx and the childhood cancer module may provide insight into these topics in a unique format. A core component of the methodology is a commitment to widespread dissemination. In addition to publications in peer-reviewed journals, findings will be disseminated via a web-based module that includes summaries of the key aspects of patient/family experiences. Transcripts will be stored in a data repository and available for future secondary analysis. We ultimately hope to encourage the use of this information among clinical researchers to incorporate patient and family experiences into the conception, design and implementation of future clinical research studies.

Growing @ Home: discharge from the neonatal intensive care unit (NICU) with remote patient monitoring

Ramo, Christina; Douglas, Angela; Wiggins, Nikki; Kayhani, Arnette; Warren, Jamie B.

Background
NICU care is expensive, and we have a subset of patients whose sole reason for hospitalization is learning how to effectively eat. The Doernbecher NICU has started a remote patient monitoring (RPM) program in May 2019 for babies whose remaining hospital-based medical need is nasogastric (NG) tube feeding support. In this program, those who qualify are discharged home with feeding supplies, a scale, and an Apple iPad that is equipped with a remote monitoring and communications platform that keeps parents and NICU providers connected after discharge.

Objective
The objective of this study is to track the babies enrolled in our RPM program in order to report our experiences to the medical community regarding safety and efficacy of the RPM. In addition, we will evaluate hospital days saved per RPM episode and determine breastfeeding rates.

Methods/Design
Patients who qualify (at least 35w CGA, weight >2kg, taking 30-50% PO consistently, and have completed all other standard criteria for NICU discharge) will be approached and given the appropriate education and materials including feeding supplies, digital scale, and iPad. They then will be expected to enter the data into the application as part of our clinical program and a team member will telephone parent daily to discuss data entered and direct care remotely.

Results
As of 9/2019, we have enrolled 15 patients in program, with 14 having completed the program. There have been no adverse events with overall high parent satisfaction. One patient was readmitted.

Conclusions/Next Steps
RPM in our NICU has proven to be safe. We plan to incorporate automatic speech language pathology and dietician. We also hope to translate application into Spanish to include that patient population moving forward. Finally, we plan to complete case-control trial to evaluate differences in time to full oral feeds, length of stay, and breastfeeding rates.

Figure

Initiative to reduce excess use of heated high flow nasal cannula in infants with bronchiolitis: The SCRATCH Protocol

Rufener, Christina; Noelck, Michelle; Foster, Alex; Kelly, Serena; Arehart, Ashley; Gilmore, Beau; Burns, Erin

Background
Heated High flow nasal cannula (HHFNC) is increasingly common in clinical practice for pediatric bronchiolitis patients despite lack of standardization and limited data regarding efficacy. Protracted HHFNC use is often associated with prolonged hospitalizations and capacity strain.

Objective
We aim to acculturate an accelerated weaning practice to reduce sub-therapeutic use of HHFNC (≤ 8 LPM) in healthy infants with bronchiolitis.

Design/Methods
Previous winter seasons were reviewed and revealed large variation in HHFNC dosing, weaning, and duration for otherwise-healthy infants ages 1-24 months with bronchiolitis. A Simple Cannula/Room Air Trial for Children (SCRATCH) protocol was developed to trial patients off HHFNC onto 2LPM simple cannula or room air for 1 hour. A daily management system was developed to monitor adherence and patient safety during a 4-month pilot in the pediatric ICU, demonstrating reduced rates of HHFNC at the time of PICU to ward transfer (10% vs. 77%, p<0.0001) and a good safety profile (2 of 22 patients returned to HHFNC and none required NIPPV, intubation, or PICU readmission). This data is despite relatively low compliance (45%) with the pilot. A hospital-wide protocol was released in December 2018. After a 2-week education period, data collection began. Process measures include rate of protocol ordering and compliance. Outcome measures include median number of hours of HHFNC and percent of successful SCRATCH trials. Balancing measures include adverse events such as need for NIPPV and PICU readmission.
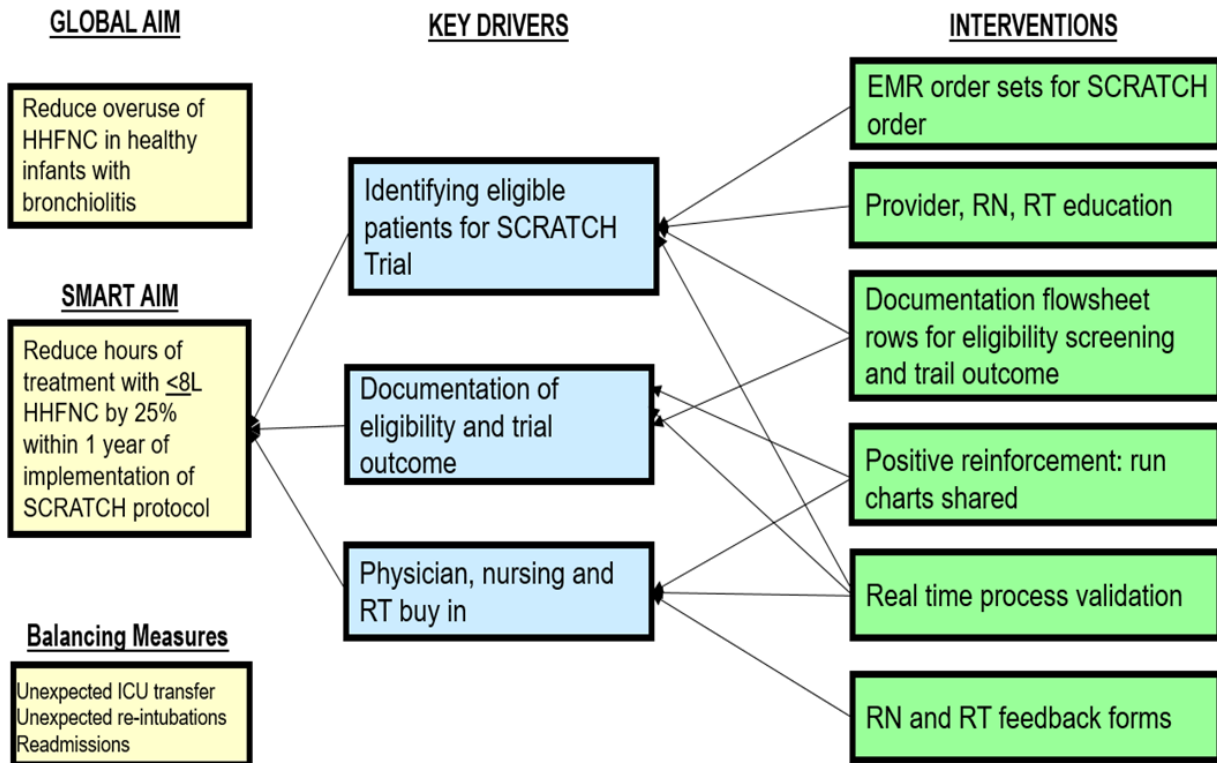
Results
During initial data (December 2018-April 2019), 82 subjects met criteria for inclusion (based on age, primary diagnosis of bronchiolitis, and no prior chronic lung or heart disease). SCRATCH orders were placed appropriately in 90.2% of subjects, and the protocol was appropriately executed in 83.8% of opportunities. Of SCRATCH trials attempted, 82.1% remained on lower respiratory support.

Conclusion
The SCRATCH trial was successfully implemented in the medical ward and PICU. A significant number of eligible patients who underwent the SCRATCH trial remained on lower respiratory support. Work is ongoing to examine further outcome measures such as total hours of HHFNC, nutritional data, number of hours spent on subtherapeutic ($\leq 8L$) HHFNC, hospital length of stay, and level of support at time of PICU to wards transfer.

Figure:

GLOBAL AIM

Reduce overuse of HHFNC in healthy infants with bronchiolitis

SMART AIM

Reduce hours of treatment with <8L HHFNC by 25% within 1 year of implementation of SCRATCH protocol

Balancing Measures

Unexpected ICU transfer
Unexpected re-intubations
Readmissions

KEY DRIVERS

Identifying eligible patients for SCRATCH Trial

Documentation of eligibility and trial outcome

Physician, nursing and RT buy in

INTERVENTIONS

EMR order sets for SCRATCH order

Provider, RN, RT education

Documentation flowsheet rows for eligibility screening and trail outcome

Positive reinforcement: run charts shared

Real time process validation

RN and RT feedback forms

Comparing mental health outcomes among young adults with histories of parental incarceration and juvenile justice involvement

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Background
Young adults who have had a parent incarcerated during their childhood or who have personal histories of incarceration are significantly more likely to have anxiety and depression as compared to their peers. However, it is unclear if a history of both parental incarceration (PI) and direct justice system involvement (JJI) before 18 has a cumulative impact on mental health.

Objective
To understand the influence of both PI and JJI on mental health outcomes in young adulthood

Methods
Using the National Longitudinal Survey of Adolescent to Adult Health data, we analyzed the relationship between three exposures (i.e., parental incarceration, juvenile justice involvement, and histories of both) and three mental health conditions (i.e., depression, anxiety, and PTSD), suicidal ideation, and receipt of mental health care. Multivariable logistic regression models were used to estimate adjusted odds ratios (AORs), controlling for individual (e.g., sex, race/ethnicity, age), family (e.g., family structure, parental education, and receipt of public assistance), and geographic-level factors (i.e., urban, suburban, rural, or other).

Findings
The cohort included 13,083 young adults aged 24-34 years old: 14% had a history of parental incarceration, 3.6% had a history of juvenile justice involvement, and 2.1% had a history of PI and JJI. Any incarceration history was associated with mental health conditions (i.e., depression, anxiety, and PTSD) and the receipt of mental health counseling. However, individuals with histories of both PI and JJI had higher odds of depression (AOR=3.33 [95% CI, 1.88-6.00]), anxiety (AOR=2.00 [95% CI, 1.28-3.14]), PTSD (AOR=4.55 [95% CI, 2.52-8.22]), and suicide attempts (AOR=3.36 [95% CI, 1.38-8.16]), as compared to peers. Interestingly, young adults with both incarceration histories were also more likely to receive psychological or emotional counseling (AOR=2.70 [95% CI, 1.43-5.11]) (Table 1).

Interpretation
In this nationally representative sample, both parental incarceration and personal involvement with the justice system places young adults at risk for poor mental health outcomes. This relationship may be compounded by the cyclical nature of justice system involvement, in that many children of incarcerated individuals go on to be directly involved in the justice system as minors, likely putting them at higher risk for certain mental health conditions. Screening families for incarceration may allow pediatricians to identify mental health conditions sooner.

Table 1. Adjusted Odds Ratios of Mental Health Outcomes Health Care Utilization by Incarceration History

Mental Health Outcomes	Parental Incarceration Only Adjusted OR [95% CI] N= 1,951, Weighted	Juvenile Justice Involvement Only Adjusted OR [95% CI] N= 408, Weighted	Both Parental Incarceration & Juvenile Justice Involvement Adjusted OR [95% CI] N= 225, Weighted
Depression	1.74 *** [1.42- 2.15]	2.14 *** [1.48- 3.10]	3.33*** [1.88-6.00]
Anxiety	1.47 *** [1.20-1.82]	1.61 * [1.10-2.35]	2.00 ** [1.28-3.14]
PTSD	1.80 ** [1.21-2.66]	2.43** [1.24-4.76]	4.55*** [2.52-8.22]
Suicide Ideation	1.56*** [1.25-1.94]	1.33 [0.79-2.26]	1.29 [0.69-2.44]
Suicide Attempt(s)	1.51 [0.91-2.51]	2.62 [0.89-7.69]	3.36** [1.38-8.16]
Mental Health counseling	1.61*** [1.29-2.00]	2.05*** [1.37-3.06]	2.70** [1.43-5.11]

Abbreviations: OR, Odds Ratio; CI, confidence interval;
*p<05. ** p<.01. *** p<.001.

Gastric volvulus presenting with pancreatitis: a rare diagnosis worth adding to the differential

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Background

Gastric volvulus is a pathologic obstruction of the foregut caused by a rotation of the stomach by more than 180° around the axis. It presents with nonspecific symptoms, most often with acute or recurrent abdominal pain, distention and vomiting. While the double bubble sign on abdominal x-ray is the classic radiographic sign, it is not always present, thus being a diagnostic challenge. Given its rarity in the pediatric population, gastric volvulus is often not considered on initial evaluation of abdominal pain and nausea. We present a case of gastric volvulus in a boy who presented with acute pancreatitis.

Case

A 4-year-old male with heterotaxy and a complex cardiac history including a complete unbalanced atrioventricular canal presented with one day of tachycardia, vomiting, and epigastric pain. He had not had these symptoms previously. On exam, he was tender to palpation in the right upper quadrant. Labs were notable for a lipase of 1,378. X-ray showed slightly distended loops of small and large bowel but no double bubble sign (figure 1). Abdominal ultrasound was consistent with acute pancreatitis. He was initially managed medically for acute pancreatitis and placed on bowel rest. His pain was managed with opioids, but his abdominal pain and vomiting worsened over the next three days. He ultimately had an abdominal CT that showed a mesenteroaxial gastric volvulus (figure 2). He underwent an emergent exploratory laparotomy which revealed gastric necrosis of one third of the stomach as well as perforation. He had a partial gastric resection. Postoperatively, after multiple days of bowel rest and total parenteral nutrition, he began oral nutrition with appropriate caloric intake and bowel function.

Figure 1: Initial abdominal and chest x-ray on presentation

Figure 2: Axial CT showing gastric volvulus

Conclusion

Although an extremely rare condition in pediatrics, gastric volvulus can be life-threatening. Early diagnosis is crucial to preventing complications such as intestinal ischemia, infarction, strangulation and necrosis that require emergent surgical interventions. Given its severity, gastric volvulus should be considered in the differential diagnosis for ongoing nausea and abdominal pain in children without a clear etiology. Clinicians should have a lower threshold for obtaining an upper gastrointestinal contrast study which would establish a definitive diagnosis of gastric volvulus.