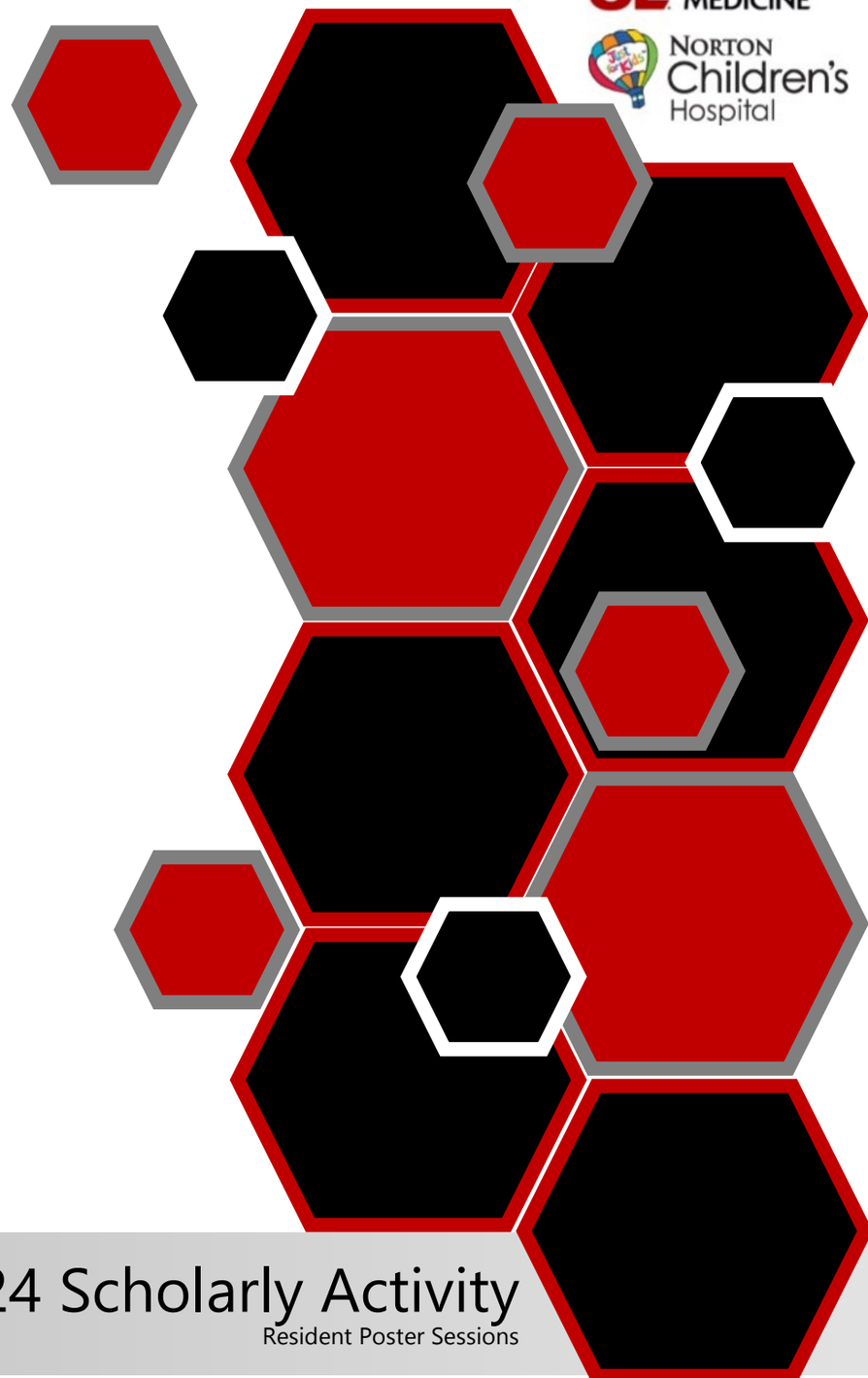

2024 Scholarly Activity

Resident Poster Sessions

2024 Scholarly Activity:
Resident Poster Sessions

Acknowledgments

The Office of Medical Education would like to extend a special thanks to the entire faculty of the Department of Pediatrics at the University of Louisville. It takes a group of innovative and active faculty to collaborate and support resident education in the realm of scholarly activity.

We would like to express our gratitude to Dr. Janice Sullivan and Dr. Jamie Furlong-Dillard for their service as judges for the resident poster sessions.

A special thank you also goes to the many mentors and leaders who have supported our residents and fellows and who will continue to work with them as professional colleagues and friends. Finally, thank you to Dr. Kimberly Boland and Dr. Mark McDonald for their support in making these endeavors possible.

Becca Hart, MD, MSc
Director, Scholarly Activity

Sara Multerer, MD
Program Director, Pediatric Residency

Dakota Williams
Program Coordinator, Pediatric Residency

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Monday June 17, 2024

Tuesday June 18, 2024

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Wednesday June 19, 2024

Incorporating Climate Change Advocacy into Pediatric Office Visits

Leticia Dirks, MD – Pediatric Resident
Co-Author(s): Miranda Bencomo, MD; Theresa Kluthe; Dan Arnold, MD; Libby Mims, MD

Background: Children are impacted by climate change through a variety of mechanisms, and the American Academy of Pediatrics (AAP) recommends pediatricians understand the health impacts of climate change and incorporate anticipatory guidance on this subject into their office visits with families. However, despite these recommendations being provided almost a decade ago, few pediatricians are consistently providing climate-based counseling to families in the office.

Methods: This project aimed to increase pediatric resident awareness of the 2015 AAP Policy Statement on Climate Change by offering an educational video on this topic to providers in our academic offices. Data was collected before and after watching the video to assess knowledge base, confidence, and practices of providers relating to climate change. A Wilcoxon-Rank-Sum test compared median results before and after the educational video. A smart phrase was also incorporated into electronic medical record (EMR) note templates, prompting providers to indicate if they discussed this topic during adolescent well visits. Charts were analyzed over a ten month period to determine how frequently providers reported discussing this topic with families.

Results: After completion of our educational video, providers reported increased awareness of the AAP policy statement on climate change ($W=30$, p-value <0.001), and an increase in knowledge regarding the impact on child health ($W=39$, p-value 0.001). Providers also reported increased confidence in providing anticipatory guidance regarding this topic ($W=28.5$, p-value <0.001), and plan to change their current practice ($W=12.5$, $p<0.001$). Answers to knowledge based questions did not show a statistically significant change after the educational content, although baseline results were fairly high. Providers identified various barriers to discussion, including knowledge base, time constraints, comfort, relevance, political concerns, and language barriers. There was a statistically significant decrease in the number of providers who identified knowledge base as a barrier after receiving the educational video ($W=157.5$, $p= 0.024$), but the other barriers did not show statistically significant change. Chart review of actual climate counseling documented during adolescent well visits shows residents went from not providing climate counseling at all to providing this counseling at 15% of adolescent well visits five months after the intervention. Climate counseling fell to 7% ten months after the intervention.

Conclusions: Residents reported improved awareness, knowledge, confidence in, and intent to provide climate counseling following our educational intervention. Chart-level data also showed that residents improved documentation of climate counseling from a baseline of zero to a high of 15% of adolescent well visits. However, this behavior change was not sustained and further work needs to be done to address the additional barriers that prevent providers from discussing climate change with families during office visits.

Incorporating Climate Change Advocacy into Pediatric Office Visits

Leticia Dirks, M.D., Miranda Bencomo, M.D., Theresa Kluthe, M.S., Dan Arnold, M.D, Libby Mims, M.D.

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

Background

- Climate change has a direct and significant impact on child health in the many ways – physical and psychological trauma associated with severe weather and extreme heat, worsening control of asthma and allergies as a result of declining air quality, geographical expansion of vector-borne illnesses, and exacerbation of food insecurity due to impacts on crop yield. Children from socially disadvantaged populations are at increased risk.
- The AAP has issued a policy statement on climate change recommending education for providers on this topic, and emphasizing the importance of providing climate-related anticipatory guidance to families during office visits.
- Information on the frequency with which pediatricians are utilizing these recommendations is scarce.

Methods

- This QI project was aimed at increasing pediatrician awareness of the AAP policy statement on climate change.
- Participants were provided with a brief educational video on this topic, and survey data was collected before and after completion of the video to assess knowledge base, confidence, and current practices in providing climate-related counseling to families. A Wilcoxon-Rank-Sum test compared median results before and after the educational video
- Intervention: EMR smart-phrase incorporated into note templates for adolescent well visits (age 11-19), prompting providers to document whether climate-related counseling was provided during these visits.
- Charts were analyzed over a 10 month period to determine frequency this was discussed with families

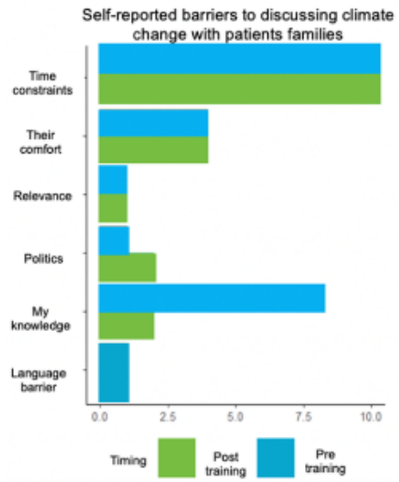
Results

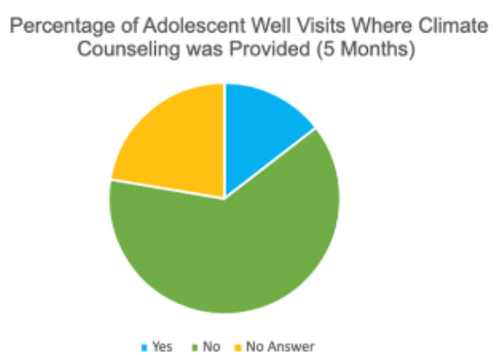
Table 1: Changes in subjects' self-reported responses about their awareness of (yes/no) and views of climate change in their practice (1 to 5), tested by Wilcoxen-Rank-Sum test.

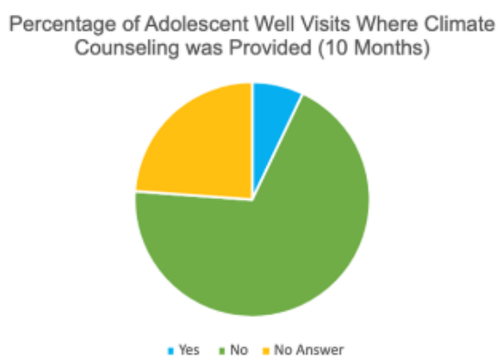
Question	Pre-test Median	Post-test Median	W	p-value
Awareness of 2015 AAP statement	0	1	30	< 0.001
Knowledge of affects to children's health	3	3	39	0.001
Confidence in providing guidance	1	3	28.5	< 0.001
Current practice	1	3	12.5	< 0.001

Table 2: Changes in subjects' tests, tested by Wilcoxen-Rank-Sum test.

Question	Pre-test % Correct	Post-test % Correct	W	p-value
Question 1	100.00%	100.00%	112.5	>0.999
Question 2	93.33%	86.67%	120	0.577
Question 3	73.33%	93.33%	90	0.158
Question 4	40.00%	66.67%	82.5	0.157
Question 5	86.67%	80.00%	120	0.653







Results

- After completing our educational videos, providers reported:
  - Increased awareness of the AAP policy statement on climate change (W=30, p-value <0.001)
  - Increased knowledge regarding the impact of climate change on child health (W=39, p –value 0.001)
  - Increased confidence in providing anticipatory guidance related to this topic (W=28.5, p-value <0.001)
  - Plan to change their current practice (W=12.4, p<0.001)
- A number of barriers were identified that providers felt would limit their ability to discuss this topic with families including knowledge base, time constraints, comfort, relevance, political concerns, and language barriers
  - There was a statistically significant decrease in the number of providers who identified knowledge base as a barrier after the educational video
- Five months after our educational intervention, chart level data showed residents were discussing climate change with families during 15% of adolescent well visits
  - This number fell to 6% ten months after the intervention

Conclusions and Next Steps

• Our project led to increased resident awareness, knowledge, confidence in and intent to provide climate-related counseling to families

•Continued efforts are needed to educate medical providers on the relationship between climate change and child health. We hope to continue to work towards incorporating this information into the vernacular of Louisville pediatricians.

Navigating Preschool Enrollment Program: CATCH Grant 2023-2024

Alexandra Howard, MD – Pediatric Resident
Co-Author(s): Amber Pendleton, MD

Background: Kindergarten readiness can be enhanced with preschool; however, many qualified children are not enrolled. Even more concerning, primarily Black/African American families living in west Louisville neighborhoods have significantly poorer rates of kindergarten readiness, about 25-30% compared to 60% in eastern neighborhoods. Evidence shows this disparity is related to poverty, racism, and discrimination. Downstream effects are detrimental to children's education and health. This program works to make connections earlier and increase the overall number of children enrolled in preschool. Preschool helps children with social skills, following rules, establishing routine, writing, language development, and more. This project increased connections to community partners who recognize that school readiness is a priority. We sought to increase the number of Louisville children enrolled in preschool, through partnership with primary care physicians, encouraging advocacy and education related to enrollment.

Project Description: This is a single site project, funded through the AAP CATCH Program, taking place at a resident-run primary care clinic. The clinic serves > 6300 children who primarily live in west Louisville. More than 85% of patients have Medicaid insurance. Community health workers, clinical social workers, pediatric residents, and attendings were trained on the optimal routes for connection to preschool, and available resources in our community. Handouts were made in collaboration with community partners and a program Parent Advocate and available in English and Spanish. We partnered with Metro United Way (MUW), a local community organization was formed, and a new referral system was put into place. At three- and four-year-old well checkups parents/guardians are asked their personal knowledge on preschool enrollment and provided with information and MUW referral placed. Data was collected on demographics (age, zipcode), documentation of preschool discussions during visits and MUW referrals placed.

Discussion: At this time, education has been completed for 2 clinical social workers, 1 community health worker, 37 residents, and 8 attendings. Information on preschool, kindergarten readiness, and community resources were made and are accessible in clinic. Since inception in December 2023, 21 referrals have been placed, and 2 children are fully enrolled in preschool, with all other connections in process. We have reached families from 11 different zipcodes, with overwhelming majority located in west Louisville.

Conclusion: This project is ongoing and continuing to make connections for families to preschool, sustainable beyond the initial CATCH Grant which will end in May 2024. This program has connected many families to preschool and has increased our conversations around preschool in the clinic setting. Next steps for the project include expanding to two additional resident clinics, and continued follow-up with families after the initial connection is established to ensure children are enrolled in and start preschool.

Navigating Preschool Enrollment Program: CATCH Grant 2023-2024

Alexandra Howard, MD, Amber Pendleton, MD

Norton Children's and University of Louisville School of Medicine, Louisville, Kentucky

BACKGROUND

- 2019-2020 school year only 51% of children in Louisville's Jefferson County Public School (JCPS) District entered school ready for Kindergarten
- Kindergarten readiness in West Louisville in 2019 was 25-30% when compared to 60% in East Louisville
- Preschool has shown to improve emotional knowledge, self regulation, writing, language, ability to follow rules and routines, improved physical and mental health outcomes, and children are more likely to graduate high school

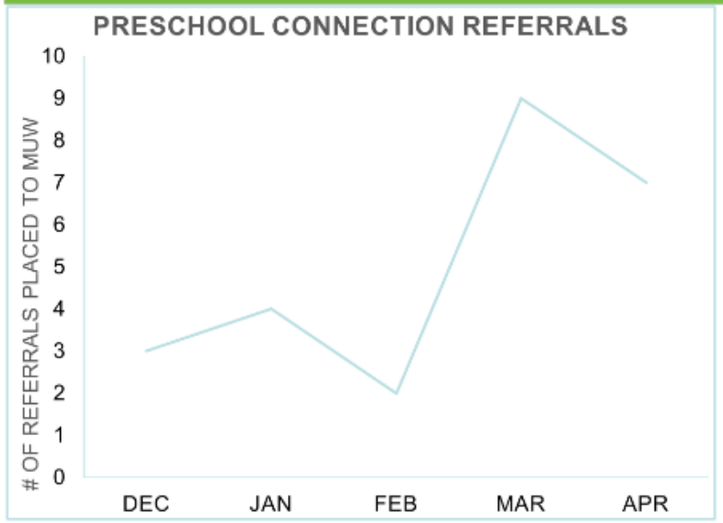
AIMS

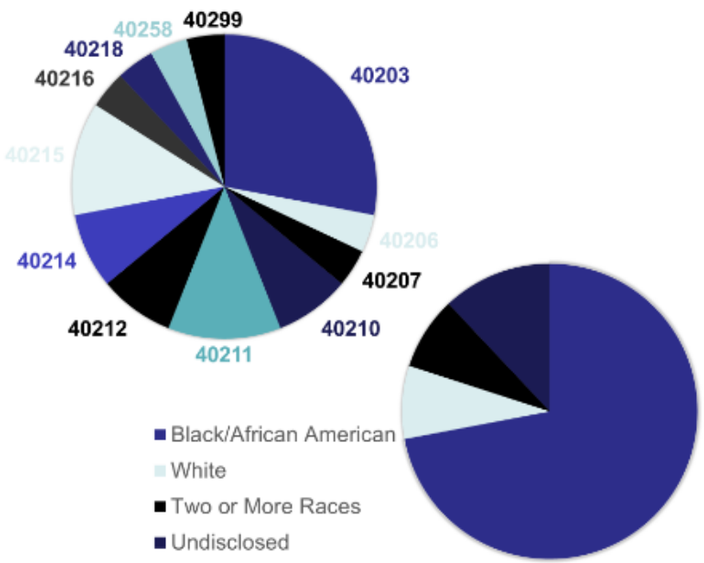
1. Create and implement the Navigating Preschool Enrollment Program at NCMG-Novak Clinic through working with broad-based community partners and parent advocate to increase the number of underserved children age 3-5 years old in Louisville enrolled in preschool by 40% at pilot site, by April 2024 and increase engagement with primary care physicians
2. Form a new task force to create program with community partners including JCPS, Head Start, Ohio Valley Education Collaborative, Metro United Way, and Play Cousins Collective
3. Train eight pediatric attendings and two clinical social workers on the Navigating Preschool Enrollment Program and integrate ten residents to clinic workflow at Novak prior to program launch

METHODS

- Single site project at resident-run primary care clinic, serving >6300 children who primarily live in west Louisville and have state funded insurance. Project funded through AAP CATCH Program
- Community meetings with partners, named parent advocate, created preschool worksheets, and referral tool
- Community health workers, clinical social workers, pediatric residents, and attendings trained on the optimal routes for connection to preschool, and available resources in our community
- New referral system put into place through partnership with Metro United Way (MUW).
  - At three- and four-year-old well checkups guardians asked personal knowledge on preschool enrollment and provided with information in form of handouts, available in English and Spanish, and discussion with clinic team.
  - Referral placed if needed to help facilitate enrollment

RESULTS



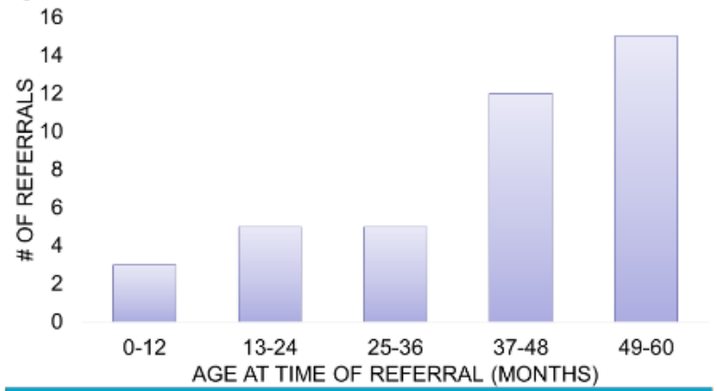


Clinic staff were educated with an oral presentation on preschool that details the basics of qualifications, options available in the community, differences between the options available, and discussed best practices for family interactions and engagement.

Number of staff trained:

- 2 Clinical Social Workers
- 1 Community Health Worker
- Attendings
  - 37 Pediatric Residents
  - 8 General Pediatrics

Through the new partnership with MUW, 15 additional referrals were made for other programs. 9 of those children are too young at this time to qualify for preschool but will be enrolled once they reach qualifying age.



CONCLUSION

This program has connected many families to preschool and has increased our conversations around preschool in the clinic setting.

Next steps:

- Expanding to three additional resident clinics
- Continued follow-up with families after the initial connection is established to ensure current and future children referred through this program are enrolled in and start preschool
- Follow children referred for Ages and Stages Program to enroll in preschool when they are appropriate age

Project ADAM Affiliation at University of Louisville and Norton Children's Hospital

Kaitlyn Middaugh, MD – Pediatric Resident
Co-Author(s): Adam Skaff, MD; Allison Black, MD

Background: Sudden cardiac arrest accounts for 10 deaths per 100,000 each year and ventricular fibrillation causes between 8-20% of pediatric cardiac arrests. Automated external defibrillator (AED) use within 3-5 minutes of arrest improves survival rate and neurologic sequelae. With the passing of HB 331 in 2023 in Kentucky, schools are required to have cardiac emergency response plans (CERPs) for sudden cardiac arrest; however, many schools need help navigating this requirement. Project ADAM is a national hospital-based community outreach program supporting implementation of practiced CERP for sudden cardiac arrest.

Methods: We obtained IRB approval to become a project A.D.A.M. affiliate and evaluated our impact on school involvement with voluntary, anonymous surveys. We utilized RedCap to record responses and compile data from our surveys. We created a Key Drivers Diagram **(Figure 1.1)** and a Simplified Failure Mode Effects Analysis **(Figure 1.2)** to help guide our project and obtain community involvement. We went through different avenues to contact schools including emailing school nurses, meeting with the Director of Kentucky School Safety, Manager District Health of JCPS, creating a QR code for a sign-up document distributed to all 173 school districts advertising our help with their CERP. We then used a process map **(Figure 1.3)** to streamline our process and involvement with schools. The process included using the Project ADAM checklist to evaluate the school's current CERP. We then met with the school virtually to discuss how we can help and the process of our involvement. We also asked the school to complete a demographic survey with this initial discussion. We then went to the school to perform a "drill" which included us going through the school's CERP with a scenario case. We also evaluated proper CPR and AED use. We provided a pre-drill survey and a post drill survey to evaluate subject and object improvement after our involvement. If the school meets all the criteria on the checklists, then the school will be designated a Heart Safe School and receive a banner to hang at their school. We will then touch base with the school annually to re-certify their designation.

Results: We had our first two Heart Safe School designations on April 23, 2024 with Spencer County Elementary and Spencer County Middle School. We obtained demographic surveys from all six schools in Spencer County. We sent anonymous, optional surveys to all the participants before our drill and after our drill. We had three responses to the pre-drill survey but did not have any responses to the post-drill survey. Results of the demographic survey are shown below **(Figure 1.4)** with total number of students in Spencer County School system highlighting the number of children benefitting from a Heart Safe School.

Project ADAM Affiliation at University of Louisville and Norton Children's Hospital

Kaitlyn Middaugh, MD; Adam Skaff, MD; Allison Black, MD
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

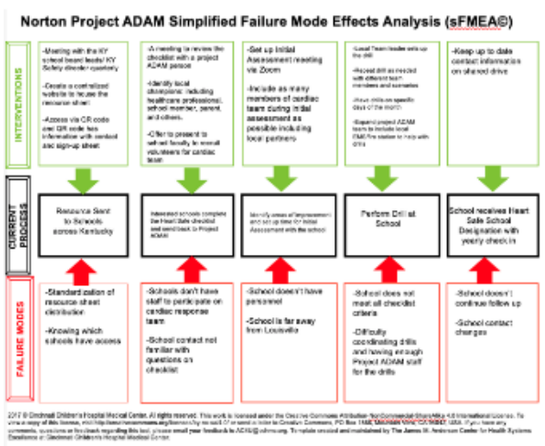
BACKGROUND

- Many schools have AEDs but there is variability or lack of an appropriate emergency response plan.
- Becoming a Project ADAM affiliate will allow us to give structured, validated guidance and resources to assist schools with their cardiac emergency response plans (CERP) to prevent deaths from sudden cardiac arrest.
- Project ADAM is a national hospital-based community outreach program supporting implementation of practiced CERP for sudden cardiac arrest.

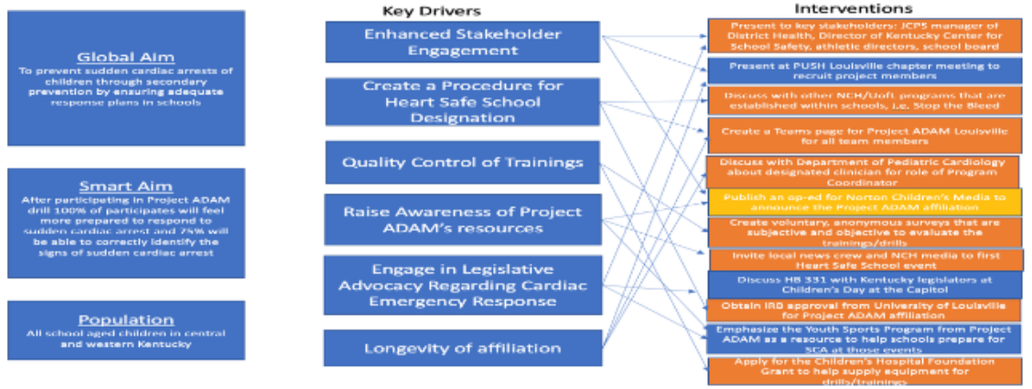
Global Aim and Measures

- Global Aim: Prevent sudden cardiac arrests in children though secondary prevention by ensuring adequate response plans in schools
- **SMART Aim:** After participating in Project ADAM drill 100% of participates will feel more prepared to respond to sudden cardiac arrest and 75% will be able to correctly identify the signs of sudden cardiac arrest
- **Process Measure:** Completion of checklist and debriefing
- **Outcome Measure:** Improve knowledge of SCA by 20% pre and post survey

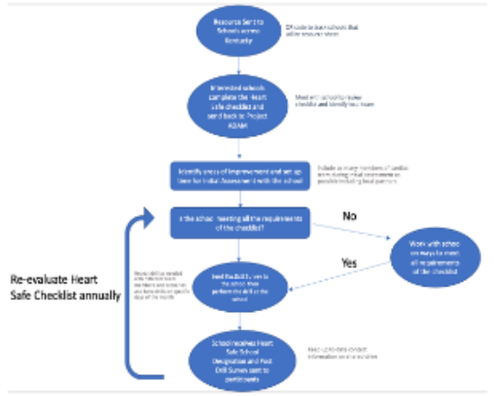
Simplified Process Failure Mode Effects Analysis



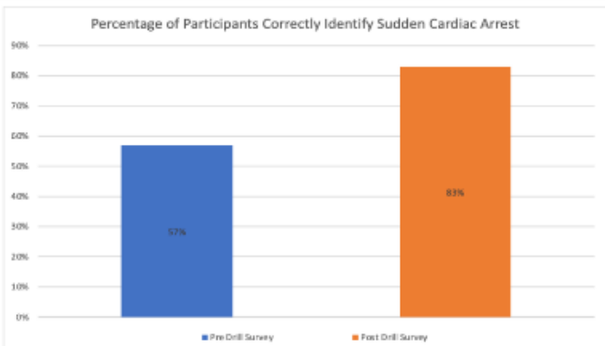
Key Driver Diagram



Process Map for Heart Safe Schools



Results



- Partnered with Spencer County School District
- First two Heart Safe Schools were Spencer County Elementary School and Spencer County Middle School
- 100% of post drill respondents felt prepared to respond to a sudden cardiac arrest after the drill
- 57% of respondents could correctly identify the signs of SCA prior to the drill and 75% of respondents could correctly identify the signs of SCA after the drill

Heart Safe Schools

Conclusions/Next Steps

- Expansion to additional schools in Kentucky
- Touch base with every Heart Safe School annually and re-designate them with another drill every 2 years.
- Expand our Project ADAM team to help staff the drills by speaking with healthcare groups to recruit volunteers, parent advocacy groups, local healthcare providers and medical trainees.
- Continue to bring awareness to Project ADAM and importance of CERP through media avenues and working with more schools.

Barriers

- Navigating involvement in school system
- Expanding Project ADAM team with volunteers and creating a paid position
- The format of the questions in our survey and the data that resulted in
- Participation in surveys

Acknowledgements

Purchase of manikins and banners were funded by the Norton Children's Heart Institute

The Chicken or the River: A case of a healthy infant presenting with disseminated Histoplasmosis

Alexandra Anderson, DO – Pediatric Resident
Co-Author(s): Elizabeth Hernandez, MD; Julia H. Sparks, MD

Introduction: Histoplasmosis is the most common endemic mycosis in North America, and typically presents with fever, cough, and weight loss. Of children that test positive for Histoplasmosis, 72.5% are immunosuppressed. While not immunosuppressed, infants are at higher risk of disseminated infection due to immature immune system. This case illustrates the importance of thinking about fungal infections when infants present with prolonged fevers.

Case Presentation: A 4-month old previously healthy, fully-immunized male presented with 12 days of fever and pancytopenia. Fevers began immediately after receiving his routine immunizations and reached Tmax of 103 F. On day 6 of fever, the pt presented to his primary care physician (PCP) where rapid COVID-19 antigen testing was positive. On day 11 of fever, he was admitted to an outside facility and worked up for multisystem inflammatory syndrome in children (MIS-C). On exam, patient was pale but overall nontoxic with abdominal fullness and hepatosplenomegaly. Labs were notable for pancytopenia (WBC 6.2, ANC 1460, Hg 7.8, platelets 66k), CRP 3.6, elevated AST (109), and a UA with 50-100 WBCs. Abdominal US showed hepatosplenomegaly and trace ascites. At this point he was transferred to a tertiary care center for admission. On HD 1, temperature ranged from 94.8-105F, responsive to antipyretics. He was started on broad spectrum antibiotics. Leading differentials for etiology of his presentation included infectious (viral, bacterial), oncologic (HLH), Kawasaki disease, or less likely MIS-C. Given the broad differential, Hematology-Oncology, Infectious Disease, and Rheumatology were consulted. His diagnosis came to light after Heme-Onc performed a bone-marrow biopsy, which quickly revealed budding yeast with pathologic confirmation of disseminated Histoplasmosis. Additional labs including Histo antigen and complement fixation supported the diagnosis. The patient was started on Amphotericin B and transitioned to Itraconazole with good prognosis.

Discussion: A stable infant presenting with prolonged fever without clear oncologic findings is usually admitted to the hospitalist service. Hospitalists see many patients with prolonged fever, ranging from benign (recurrent viral infections) to more severe (acute COVID-19, MIS-C, Kawasaki disease, malignancy, autoimmune conditions). This case represents an important reminder to consider fungal etiologies in the differential for patients presenting with prolonged fever. ID helped guide treatment and found that in addition to residence in the Ohio River Valley, his exposure to free range chickens supported the diagnosis of disseminated Histo. Based on literature review of histoplasmosis, infants are at high risk of developing disseminated disease due to their immature immune systems. Furthermore, immunocompetent patients with disseminated histoplasmosis usually do not have the skin or respiratory findings typically seen in immunocompromised patients. This aligns with our patient's relatively asymptomatic presentation notable only for prolonged fever, mild fussiness, HSM, and pancytopenia.

Conclusions: Even though we live in an area endemic for fungal infections, they are often overlooked. This case serves as a reminder that, even in the absence of immunocompromised or specific skin/lung findings, disseminated fungal infections should be considered when a patient presents with prolonged fever from an endemic region.

The Chicken or the River: A case of a healthy infant presenting with disseminated Histoplasmosis

Alexandra Anderson, DO; Elizabeth Hernandez, MD; and Julia H. Sparks, MD

Norton Children's and University of Louisville School of Medicine
Louisville, Kentucky

Case Presentation

4-mo previously healthy, fully-immunized male with 12 days of fever and pancytopenia. Fevers began immediately after receiving routine immunizations, Tmax 103 F. On day 6 of fever, pt presented to PCP where rapid COVID-19 testing +. On day 11 of fever, admitted to an OSH and worked up for MIS-C. On exam, patient pale but nontoxic with abdominal fullness and hepatosplenomegaly. Abdominal US showed HSM and trace ascites. Transferred to a tertiary care center for further evaluation.

PMH
- BHx: Born at term. Pregnancy notable for maternal COVID-19 at 38 weeks; recovered without complication.

Social Hx
- Paternal GF recently moved in, possible exposure to COVID-19.
- Lives in the Ohio River Valley.
- Two cats, two dogs, and free-range chickens at home.

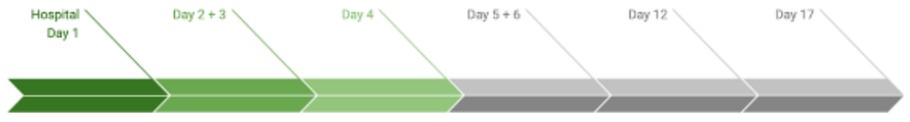
ROS
- **Gen**: +fever, +fussiness, possible night sweats
- **HEENT**: possible nasal congestion
- **GI**: +diarrhea

Physical Exam
- **Vitals**: Temp 100.3F, HR 159, BP 113/55, RR 37, SpO2 98%
- **General**: pale but well appearing infant, alert, smiling
- **Abdomen**: mildly distended, +hepatosplenomegaly

Infectious Workup

Category	Test	Result
Viral	Neonatal HSV PCR	Negative
	COVID-19 PCR	Negative
	Adenovirus Quantitative PCR	Negative
	Parvovirus B19 DNA PCR	Negative
	CMV IgM Ab	Negative
	CSF Pathogen Panel	Negative
Bacterial	Bone Marrow Bacterial PCR	Negative
	Bone Marrow Bartonella PCR	Negative
Fungal	**Bone Marrow Culture**	**Rare budding yeast**
	Histoplasma Ag (Serum)	**Detected**
	Histoplasma Ag (Urine)	**Detected**
	Histoplasma complement fixation and immunodiffusion	**Positive**
Rheum	Anti-Ro Ab, Anti-La Ab	Negative

Hospital Course



- Overnight: hypothermic (94.8 F)
- Obtained HSV swabs
- Deferred LP
- Started Ceftriaxone, Vancomycin, Acyclovir at Meningitic Dosing

- ID, Heme-Onc, + Rheumatology consulted
- Bone Marrow Biopsy
- LP
- Received PRBCs

- Bone Marrow growing budding yeast
- Abx stopped
- Started Amphotericin
- Path confirmed Histoplasmosis

- Optho: no Ocular Histo.
- Last fever
- Received platelets + 3x cryoprecipitate
- Surgery places CVL
- Started Iron Supplementation

- Received Neupogen

- Completed 14 days of Amphotericin
- Discharged home

Labs:
WBC 4.88, ANC 1320, Hgb 7.1, MCV 65, Platelets 48, CRP 3.8, Procal 2.71, ALT 23, AST 86, LDH 594

WBC 5.14, ANC 1080, Hg 6.4, plts 52, Uric Acid 1.5

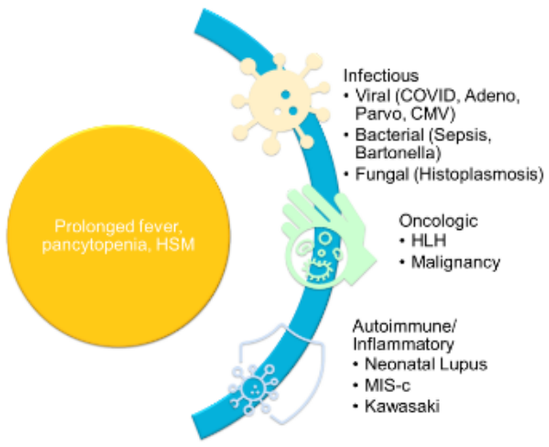
WBC 3.7, ANC 1190, Hg 7.7, plts 34, Fibrinogen 68

WBC 2.66, ANC 1040, Hg 7.2, plts 23, Fibrinogen 87

WBC 3.95 ANC 80, Hg 8.0, plts 115, Fibrinogen 121

WBC 5.17, ANC 560, Hg 9.0, plts 169, Fibrinogen 137

Reaching the Diagnosis



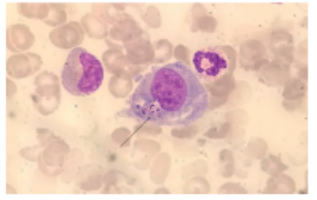


Figure 1: Histoplasma capsulatum on bone marrow smear. Intramacrophagic yeast form (photo by Emilie GUEMAS). *Source: Guemas, E., Sobanska, L., & Denier, M. (2020). Histoplasma capsulatum and Histoplasmosis: Current Concept for the Diagnosis. IntechOpen. doi: 10.5772/intechopen.92782*

Figure 2: CDC map of histoplasmosis outbreaks from 1938–2013 and number of outbreak-related cases by state or territory. *Source: https://www.cdc.gov/fungal/diseases/histoplasmosis/maps.html*

Management

Empiric Vancomycin, Ceftriaxone, Acyclovir

2 weeks of **Amphotericin B** (Liposomal); Blood products PRN

6 weeks of **Itraconazole**

Discussion

- A stable infant presenting with prolonged fever without clear oncologic findings is usually admitted to the hospitalist service.[1] Hospitalists see many patients with prolonged fever, with etiologies ranging from benign (recurrent viral infections) to more severe (acute COVID-19, MIS-C, Kawasaki disease, malignancy, autoimmune conditions).
- This case represents an important reminder to consider fungal etiologies in the differential for patients presenting with prolonged fever.[2]
- Based on literature review of histoplasmosis, infants are at high risk of developing disseminated disease due to their immature immune systems.[3,4] Furthermore, immunocompetent patients with disseminated histoplasmosis usually do not have the skin or respiratory findings typically seen in immunocompromised patients. This aligns with our patient's relatively asymptomatic presentation notable only for prolonged fever, mild fussiness, HSM, and pancytopenia.[3]

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Are we feeding our future Pediatric Residents enough information regarding eating disorder?

Molly Stinnett, MD – Pediatric Resident
Co-Author(s): Rebecca Hart, MD, MSc; Brittany Badal, MD; Adam Patterson, MD, MSc

Introduction: Eating disorders (ED) have become increasingly common in the pediatric population, yet medical trainees receive limited instruction on pediatric ED diagnosis and treatment. A robust, dedicated curriculum may improve the care of this high-risk population.

Objective: To perform a targeted needs assessment of Pediatrics, Child Neurology, and Internal Medicine-Pediatrics interns characterizing educational exposure to pediatric ED and identifying knowledge deficits in the diagnosis, evaluation, and treatment of this population.

Methods: An anonymous electronic survey was distributed to interns at the beginning of the 2022-2023 academic year. Likert-scale and open-ended questions assessed baseline educational exposure to pediatric ED, confidence in the diagnosis/management of 5 subtypes of ED, and knowledge related to ED complications/admission criteria. Data were analyzed using standard descriptive statistics.

Results: Among 32 interns, 21 (66%) completed the survey. Most respondents (48%) received < 2 hours of education on ED prior to residency. Most interns agreed or strongly agreed that they were comfortable recognizing/diagnosing anorexia nervosa (81%), bulimia nervosa (76%), and binge eating disorder (71%). However, very few agreed/strongly agreed they felt comfortable diagnosing atypical anorexia (9%) and avoidant restrictive food intake disorder (ARFID, 19%.) Most interns (67%) had been directly involved in managing a patient with anorexia nervosa; fewer had managed bulimia nervosa (48%). Less than 15% of respondent had ever managed a patient with either atypical anorexia nervosa, ARFID, or binge eating disorder. Interns felt uncomfortable managing/treating patients with *any* type of eating disorder in the inpatient setting (Fig 1.) On knowledge-based questions, only 29% of interns correctly identified more than 2 /11 admission criteria for ED. Finally, only 47% of interns were able to correctly identify *any* lab abnormalities associated with refeeding syndrome, with none able to identify >3.

Conclusions: We identify a gap in medical education among pediatric trainees related to management and diagnosis of pediatric ED. Given the morbidity and mortality associated with ED, it is crucial to introduce educational interventions targeting medical trainees. In the future, we plan to utilize this needs assessment to develop an innovative, case-based curriculum aimed at educating upcoming Pediatric Residents about the inpatient management and treatment of ED.

Are we feeding our future Pediatric Residents enough information regarding eating disorders?

Molly Stinnett, MD; Rebecca Hart, MD, MSc; Brittany Badal, MD; Adam Patterson, MD, MSc

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- ~ 9% of the United States population (28.8 million Americans) will have battled an eating disorder at some point in their lifetime.
- Shockingly, less than 6% of people with an eating disorder are medically diagnosed as "underweight," which is likely a direct consequence of lack of adequate medical training.
- With the growing prevalence of these disorders, a large gap in medical training has become increasingly apparent.

METHODS

- An anonymous electronic survey was distributed to interns prior to beginning the 2022-2023 academic year.
- Likert-scale and open-ended questions assessed baseline educational exposure to, confidence in diagnosis of, and knowledge of complications/admission criteria for 5 subtypes of pediatric eating disorders.
- Data were analyzed using standard descriptive statistics.

A Targeted Needs Assessment demonstrates that future Pediatric Residents are underprepared to care for pediatric patients with eating disorders.

Figure 1: Number of Hours Dedicated to Learning about Eating Disorders

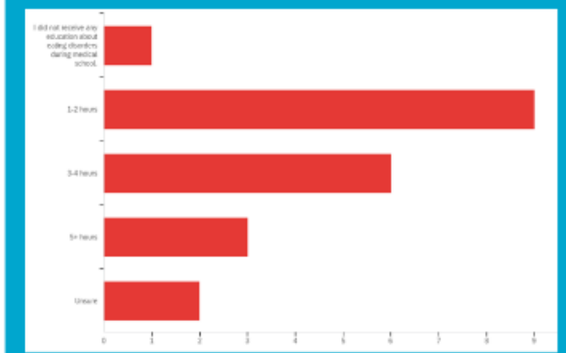


Figure 2: Pediatric Intern Comfort Level in Managing/Treating 5 Subtypes of Eating Disorders

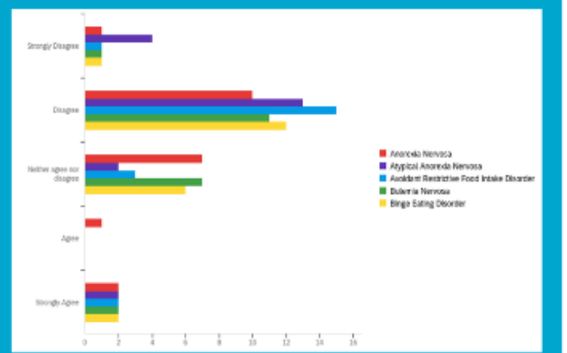


Figure 3: Identifying Admission Criteria for Patients with Eating Disorders

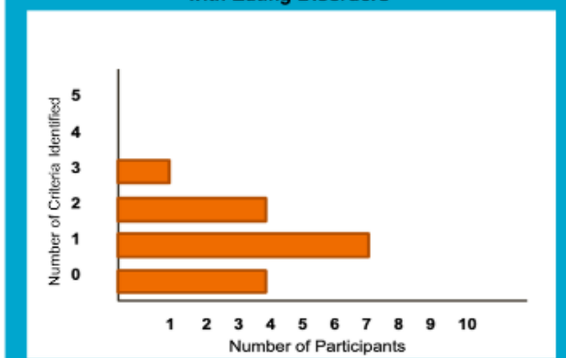
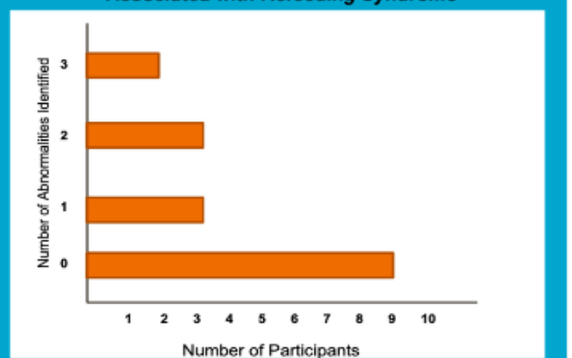


Figure 4: Identifying Electrolyte Abnormalities Associated with Refeeding Syndrome



RESULTS

- Most interns received <2 hours of ED education in medical school (Figure 1.)
- Most interns were comfortable diagnosing anorexia nervosa (81%), bulimia nervosa (76%), and binge eating disorder (71%). However, very few felt comfortable diagnosing atypical anorexia (9%) and avoidant restrictive food intake disorder (ARFID, 19%.)
- Interns felt uncomfortable managing/treating patients with *any* type of eating disorder in the inpatient setting (Figure 2.)
- Only 29% of interns correctly identified more than 2/11 admission criteria for ED (Figure 3.)
- Only 47% of interns were able to correctly identify *any* lab abnormalities associated with refeeding syndrome, with none able to identify >3 (Figure 4.)

CONCLUSIONS

- We identify a gap in medical education among pediatric trainees related to diagnosis and management of pediatric eating disorders.
- Given the morbidity and mortality associated with ED, it is crucial to introduce educational interventions targeting medical trainees.
- We plan to utilize this needs assessment to develop an innovative, case-based curriculum aimed at educating upcoming Pediatric Residents about the inpatient management and treatment of eating disorders.

Calling a Consult for More Time: Measuring Time Management Behavior in Pediatric Residents

Dylan Vish, MD – Pediatric Resident
Co-Author(s): Julia Sparks, MD; Aaron Calhoun, MD

Introduction: Time management is crucial for success in the medical profession, yet it is a skill often overlooked in training programs. Physician burnout rates are escalating due to the demands of modern healthcare environments. Our study aims to develop and validate a Medically Directed Time Management Behavior scale (MD-TMB) tailored for pediatric residents, medicine-pediatrics residents, and child-neurology residents.

Methods: We will modify the existing Time Management Behavior scale (TMB), a 46 item questionnaire, to suit the medical context and validate it using Messick's framework. The study will involve first modifying the tool with goals of maintaining construct consistency via a modified Delphi process. Next, the modified tool (MD-TMB) will be distributed to participating residents, attending and peer evaluations will be collected on participating residents, and finally the data will be subsequently analyzed. Content evidence will be established through expert reviews and a modified Delphi process. Internal structure evidence will be assessed through data collection from practicing residents and statistical analyses on their responses and on repeat testing. Relationship to other variables will be evaluated by comparing MD-TMB scores with expert and peer ratings of time management skills as well as duty hour logs. Categorical pediatrics, Medicine-pediatrics, and child neurology residents in their first two years of training will participate. Risks to participants will be minimal, with measures in place to ensure confidentiality.

Results: Results of phase 1 of the study is production of the modified tool, the MD-TMB. We are in the midst of the modified delphi process at the time of this abstract's publishing. Phase 2 involving implementing and validating the tool for use in our population will include psychometric and comparative statistics evaluating internal consistency, inter-rater reliability, test-retest, correlation with attending/peer evaluation, and correlation with duty hours.

Conclusion: Our study addresses a critical gap in medical education by providing a validated tool to assess time management skills among resident physicians, ultimately aiming to improve physician satisfaction and patient outcomes.

Calling a Consult for More Time: Measuring Time Management Behavior in Pediatric Residents

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BACKGROUND

- Good time management has many positive effects, including improved efficiency, career success, and reduced burnout
- Multiple Entrustable Professional Activities (EPAs) focus on triage, organization, and prioritization of care.
- Medical trainees entering residency have little formal training in time management strategies and responding to day to day tasks
- A 46 item questionnaire (TMB) has been validated to assess time management and behavior in undergraduate students with 4 factors:
  - Setting Goals
  - Mechanics
  - Perceived Control of Time
  - Organization

METHODS

- Modify the TMB for use in pediatric, medicine-pediatric, child neuro residents
- Modified Delphi process to obtain anonymous feedback rom attending physicians
- Repeat adjustment of tool until consensus reached

Can we measure time management behaviors in pediatric residents?

Item #	Item	Score: Seldom true (0) to very often true (4)				
1	I avoid taking on too many tasks	0	1	2	3	4
2	I find myself overwhelmed by trivial and unimportant tasks	0	1	2	3	4
3	I rarely underestimate the time needed to complete a given task	0	1	2	3	4
4	I feel in control of my time	0	1	2	3	4
5	I often delegate tasks to others when able	0	1	2	3	4
6	I am able to say "no" when I feel like the task I am being asked to do is unmanageable	0	1	2	3	4
7	I am frequently up to date on course memos and emails	0	1	2	3	4
8	I am able to identify unimportant tasks	0	1	2	3	4
9	I keep my workspace clean	0	1	2	3	4
10	I avoid frequently socializing at work	0	1	2	3	4
11	I avoid getting distracted by small details that are likely insignificant	0	1	2	3	4
12	I keep scheduled appointments and deadlines	0	1	2	3	4
13	I can find the things I need for my work more easily when my workspace is messy and disorganized than when it is neat and organized	0	1	2	3	4
14	I avoid procrastinating	0	1	2	3	4
15	I keep long term goals that I set	0	1	2	3	4
16	I review my short and long term goals	0	1	2	3	4
17	I break down tasks into smaller tasks	0	1	2	3	4
18	I set short term goals for what I want to accomplish in a few days or weeks	0	1	2	3	4
19	I set deadlines for my goals	0	1	2	3	4
20	I try to find ways to more efficiently complete my tasks	0	1	2	3	4

RESULTS and NEXT STEPS

Results will include the modified TMB

We plan to take this tool and validate it for use in pediatric, med-peds, and child neurology residents using Messick's Framework

- Content evidence (Delphi)
- Internal structure
  - Repeatability
  - inter-item correlation
- Response Process
  - Likert scale
- Relationship to other variables
  - Expert and peer ratings
  - Duty hours

STRENGHTS/LIMIITATIONS

Using a previously validated tool, albeit in a different population introduces both strength and limitations

Rigid adherence to Messick's framework allows for a stronger validity argument
Limited by single program, single group of expert reviewers,

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Rest Assured: Enhancing Safe Sleep Education for Nursing Students

Kaitlyn West, DO, CLC – Pediatric Resident
Co-Author(s): Mary Beth Wright RN, BSN; Bethany Woomer, MD

Introduction: Safe sleep related deaths are still a large subset of sudden unexplained infant death (SUID), making up an estimated 90% of SUID deaths in Kentucky as of 2020. More specifically, Norton Children's Hospital ED within 18 months (1/2021-6/2022) experienced 20 infant deaths, all found unresponsive in their sleep and 17 of them found in unsafe sleep environments. These statistics demonstrate the need for continued education, starting with demonstrating a safe sleep environment for parents in our own hospital.

Objective: To assess University of Louisville (UofL) nursing student knowledge regarding safe sleep practices and their importance/benefits; increase recognition of unsafe sleep practices in patients under the age of 1 years old; increase overall knowledge of safe sleep recommendations, and to empower nursing students to acknowledge and notify appropriate parties when unsafe sleep practices were seen in the hospital.

Methods: We conducted a pre-survey among UofL nursing students which included knowledge-based questions regarding current recommendations for safe sleep including alternatives for safe sleep areas when a crib is unavailable, anatomical positioning in safe sleep and why it's beneficial, as well as risks associated with SUIDS. We then developed and implemented an educational intervention through a 1-hour lecture to review safe sleep recommendations, SUIDS and specific risk factors, as well as interactive models demonstrating safe sleep and unsafe sleep environments. A post-intervention survey was given following the lecture and included the same questions, and results of pre- and post-surveys were compared by standard descriptive statistics.

Results: Pre-surveys were completed by 50 UofL nursing students and post-surveys were completed by 51 UofL nursing students. There was a significant increase in average scores from 77% in the pre-survey to 91.5% in the post-survey. Specific increases were noted in SUID-based knowledge (30% increase pre- to post), as well as alternative safe sleep options (32% increase). Knowledge about anatomical positioning in safe sleep and why it's beneficial was relatively consistent across both pre- (88% correct) and post- surveys (84% correct).

Conclusions: Our educational intervention resulted in a significant increase in knowledge regarding current safe sleep practices. In the future, measurement of implementation of these practices from the UofL nursing students while on their pediatric rotation at the Children's Hospital may further delineate overall effectiveness of the intervention.

Rest Assured: Enhancing Safe Sleep Education for Nursing Students

Kaitlyn West, DO, CLC; Mary Beth Wright RN, BSN; Bethany Woomer, MD
Norton Children's and the University of Louisville School of Medicine
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BACKGROUND

Safe sleep related deaths make up an estimated 90% of SUID deaths in Kentucky as of 2020.

In 18 months (1/2021-6/2022), NCH experienced sleep-associated 20 infant deaths; 17 were found in unsafe sleep environments.

There is ongoing need for education around safe sleep, starting with demonstrating a safe sleep environment for parents in our own hospital.

METHODS

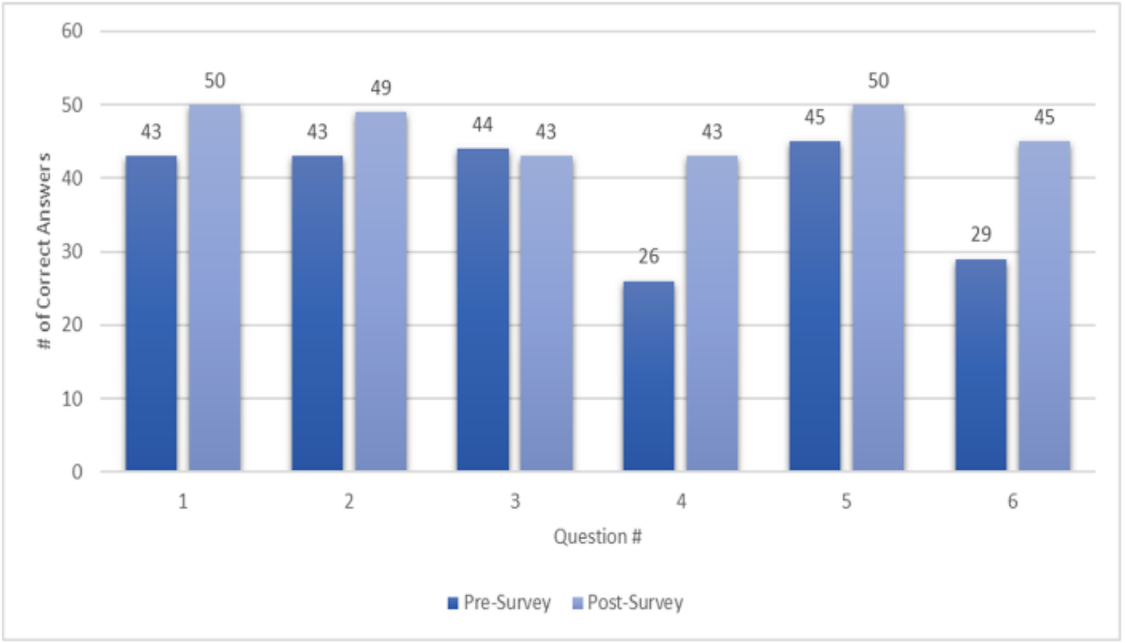
Survey of UofL nursing students: knowledge-based questions on current recommendations for safe sleep, risks associated with SUID.

Following survey, we developed and implemented an 1-hour educational intervention reviewing safe sleep recommendations, SUID and specific risk factors, as well as interactive models demonstrating safe unsafe sleep environments.

Post-intervention survey followed the lecture and included the same questions.

Pre- and post-survey results were compared by standard descriptive statistics.

RESULTS



Pre-survey completed by 50 UofL nursing students and post-surveys were completed by 51 UofL nursing students.

Proportion of average score improved from 77% in the pre-survey to 91.5% in the post-survey.

Specific increases noted in SUID-based knowledge (30% increase pre- to post), as well as alternative safe sleep options (32% increase).

Knowledge about anatomical positioning in safe sleep and why it's beneficial was relatively consistent across both pre- (88% correct) and post- surveys (84% correct).

CONCLUSIONS

Our educational intervention resulted in an increase in knowledge regarding current safe sleep practices. In the future, measurement of implementation of these practices from the UofL nursing students while on their pediatric rotation at the Children's Hospital may further delineate overall effectiveness of the intervention.

STRENGTHS/LIMITATIONS

This study was limited by time (including both length of lecture and timing of lecture) and was strengthened by a large sample size.

Improving Pediatric Resident Knowledge and Accurate Application of Infant Formula Types

Jessika Young Purcell, DO – Pediatric Resident
Co-Author(s): Alexandra Mientus, MD; Sara Multerer, MD; Diana Pantalos, PhD; John T. Stutts, MD

Background: According to the CDC's Infant Feeding Practices Study II, 62% of infants aged 0-6 months were fed formula in the prior seven days. Despite the prevalence of infant formula use and the reliance of families on their pediatricians for nutritional guidance, little is known about formal educational programs to educate pediatric residents on infant formula use. A needs assessment of our residency identified a knowledge deficit on infant nutrition topics, including formula choice.

Objective: As part of a larger nutrition curriculum, this quantitative study aimed to assess the efficacy of both passive and active learning interventions on pediatric residents' ability to accurately determine the best infant formula choice for a patient's diagnosis in a large, urban, academic residency program.

Design/Methods: Educational interventions included the distribution of a review article on infant formula types with an interactive quiz during longitudinal clinic, posters outlining formula types and commonly used names of formulas placed in clinics and hospital resident work areas, and an ongoing interactive morning report thread on infant nutrition entitled "The Sample Closet Series." Pre- and post-intervention surveys and quizzes were distributed to resident physicians, including Likert-style questions regarding the individual's comfort providing advice on infant formula choice, as well as 8 multiple-choice questions on formula choice for specific clinical vignettes. Following completion of the interventions and post-intervention survey, paired Likert data was analyzed with a Fisher's exact test, while the percentage of multiple-choice questions correctly answered was statistically analyzed with the Mann-Whitney U test.

Results: In the pre-intervention quiz, 36 responses were received with an average confidence rating of 4.42 (out of 10) in selecting formulas and 4.19 on educating families. On multiple choice questions, residents had a Average of 40.9% correct answers.

In the post-intervention quiz, 20 responses were received with an median confidence level of 6.6 (out of 10) in both selecting formulas and educating families. Confidence of formula type based on name was 6.15 out of 10. Mean knowledge based scores demonstrated an improvement to 58.1% correct answers.

Conclusions: Based on these analyses, we concluded that the passive and active educational interventions were associated with an improvement in resident comfort and application of infant formula choice, even though not statistically significant based on p-values.

Improving Pediatric Resident Knowledge and Accurate Application of Infant Formula Types

Jessika Young Purcell, DO; Alexandra Mientus, MD; Sara Multerer, MD; Diana Pantalos, PhD; John T. Stutts, MD
Norton Children's and the University of Louisville School of Medicine
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BACKGROUND

Despite the prevalence of infant formula use and the reliance of families on their pediatricians for nutritional guidance, little is known about formal educational programs to educate pediatric residents on infant formula use.

A prior needs assessment within our residency program identified a knowledge deficit on infant nutrition topics, including formula choice.

METHODS

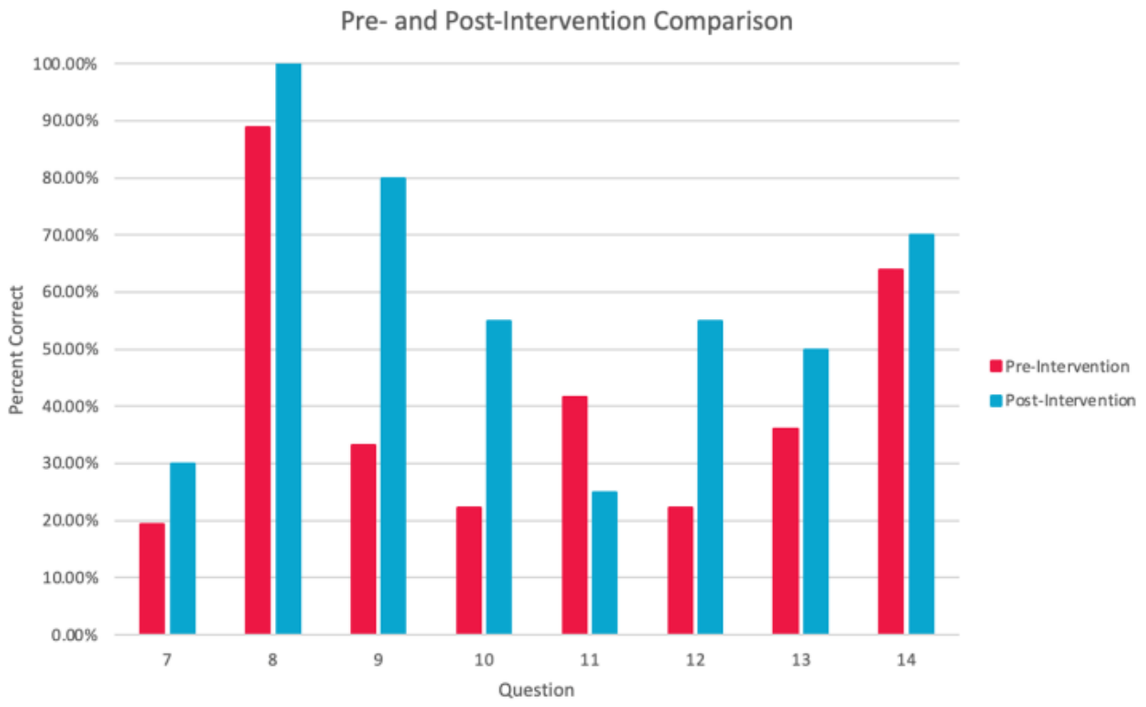
Pre-intervention survey:
- Comfort providing advice on infant formula choice (Likert scale)
- 8 knowledge questions (multiple-choice)

Educational interventions :
- Review article on infant formula types with an interactive quiz during longitudinal clinic
- Posters outlining formula types and commonly used names of formulas placed in clinics and hospital resident work areas
- Ongoing interactive morning report thread on infant nutrition entitled "The Sample Closet Series."

Post-intervention surveys and quizzes mimicking pre-intervention questions.

Paired Likert data analyzed with a Fisher's exact test, while the percentage of multiple-choice questions correctly answered was statistically analyzed with the Mann-Whitney U test.

RESULTS



Pre-intervention (n =36):
- 4.42/10 median confidence score for selecting formulas
- 4.19/10 median confidence educating families
- Mean 40.9% correct for knowledge-based questions

Post-intervention (n = 20):
- 6.6/10 median confidence score for both selecting formulas and educating families.
- Mean 58.1% correct for knowledge based scores

CONCLUSIONS

Passive and active educational interventions were associated with an improvement in resident comfort and application of infant formula choice, even though not statistically significant based on p-values.

Further study with larger sample sizes and evaluation of retention of knowledge over time is indicated.

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https://www.cdc.gov/nutrition/infantandtoddlernutrition/formula-feeding/choosing-an-infant-formula.html

Development and Implementation of a Parenting Elective for Pediatric Residents

Kristin Schutzman, MD – Pediatric Resident
Co-Author(s): Sara Multerer, MD; Marian Morris, MD

Introduction: One of the skills that pediatricians of all subspecialties and practice settings must possess is the ability to counsel on parenting topics and help parents navigate raising children in an ever-changing world. A previous needs assessment identified that many pediatric residents, both parents and non-parents, did not feel comfortable discussing many parenting topics. Drawing on this previous work, we sought to develop a curriculum for a parenting elective to help bridge this gap. Additionally, a secondary aim of this elective was to allow for more gradual return to work for residents who have a child in residency to promote parent-child bonding and/or establish breastfeeding while still earning credit towards graduation and learning invaluable skills that will help in their practice as pediatricians.

Methods: We performed a literature search to identify similar electives offered at other pediatric residency programs and chose several key Entrustable Professional Activities (EPAs) created by the American Board of Pediatrics that general pediatricians should be able to perform. Using these two main influences we created a framework for the elective and identified key learning objectives and different tasks or opportunities that residents could select to best accomplish their individualized learning goals and meet the requirements for the elective. Residents were assessed by completing pre- and post-elective surveys and reflecting on the various assignments.

Results: Currently, two residents have completed the parenting elective and three more are scheduled to take it this academic year. There was one additional resident who requested the elective but was unable to be scheduled. The surveys of the two residents who have completed the elective did show improvement in the level of comfort with counseling on parenting topics and in the topics they felt able to share advice about. Residents also provided some qualitative feedback about the rotation which was overall positive.

Conclusions: Based on feedback from residents who have taken the elective and the overall interest in the elective, this is a much needed and useful addition to the elective curricula offered to pediatric residents. It may also be helpful to take earlier in training to be able to practice the counseling skills gained throughout the time in residency.

Development and Implementation of a Parenting Elective for Pediatric Residents

Kristin Schutzman, MD; Sara Multerer, MD; Marian Morris, MD
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

INTRODUCTION

- Pediatricians of all practice settings must be equipped to counsel on parenting topics. Despite this, many pediatric residents do not feel comfortable discussing parenting with families.
- A parenting curriculum was thus developed with two main aims:
  - To bridge the gap between current and desired resident knowledge/comfort with parenting topics to help them become better pediatricians.
  - To develop an elective that residents who become parents during training can take to allow for more gradual return to work and promote parent-child bonding and/or establish breastfeeding while still earning credit towards graduation.

METHODS

Kern's Six Steps of Curriculum Design were utilized for elective design.

1. Problem Identification and General Needs Assessment
2. Targeted Needs Assessment

→ A needs assessment was conducted the prior year by surveying pediatric residents and performing a literature search for existing parenting electives.

3. Goals and Objectives

→ Goals and objectives created in line with several key Entrustable Professional Activities from the American Board of Pediatrics.

4. Educational Strategies
5. Implementation

→ Tasks and learning opportunities were created that residents could select to best meet individual learning goals.

6. Evaluation and Feedback

→ Residents were assessed by reflecting on their experiences and by pre and post-elective surveys which incorporated feedback using open-ended questions and a 5-point Likert scale.

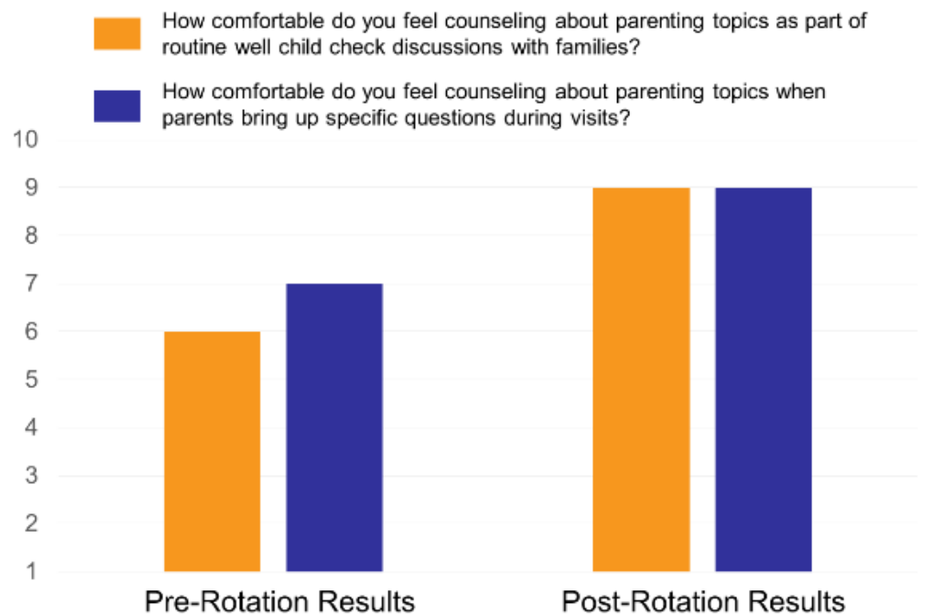
RESULTS

- Currently, two residents have completed the parenting elective and three more are scheduled to take it this academic year. One additional resident requested the elective but was unable to be scheduled.

"After taking the course I feel much more comfortable with various parenting methods and feel like I have helpful knowledge to bring out if parents ask questions at WCCs."

"Feel much more comfortable discussing toilet training, sleep training, and baby-led weaning…will change how I discuss all 3 topics with parents."

"Learned a lot of tips that I wish I had known earlier to incorporate into WCCs."



DISCUSSION + CONCLUSIONS

- Based on feedback from residents who have taken the elective and the overall interest in the elective, this is a much needed and useful addition to the elective curricula offered to pediatric residents.
- It may also be helpful to take earlier in training to be able to practice the counseling skills gained throughout the time in residency.
- Future possible changes include critiquing parent "influencers" on social media, suggested topics for learners to research, making coursework available ahead of time for learners who wish to get a head start or spread the work out (particularly those taking as a new parent).
- It will be helpful to gain additional feedback from residents who take the course to further improve and develop the curriculum, as the current data is limited by the small sample size given recent implementation.

Gender Affirming Care and Asthma Morbidity

Hannah Frudden, MD – Internal Medicine/Pediatric Resident
Co-Author(s): Adrian O'Hagan, MD; Lisal Folsom, MD

Background: There are an estimated 1 to 1.4 million gender-minority (GM; transgender, non-binary) individuals in the United States.[1] Despite this, there is a lack of research and literature on these individuals and their health care, especially with regards to subspecialty medicine. Transgender status is associated with a significantly higher risk of lifetime asthma, with research suggesting that sex hormones play a role in the risk of asthma and lung function. No specific research on the effects of gender affirming hormone therapy (GAHT) on lung function in GM individuals exists at this time.

Objectives: To describe asthma morbidity (defined by number of unscheduled clinic visits, exacerbations requiring systemic steroids, ED visits, hospitalizations), and prescribed controllers in a population of transgender patients at a single, tertiary care pediatric pulmonology/endocrinology center between March 1st, 2020 and July 14th, 2023.

Methods: We conducted a single-center retrospective observational study involving medical record review of patients aged 25 and under with a diagnosis of asthma and gender dysphoria or an Endocrine disorder in male-to-female transgender person or female-to-male transgender person between March 1st, 2020 and July 14th, 2023 at Norton Children's Hospital. We compared asthma morbidity as previously defined in individual's pre and post gender affirming hormone therapy (GAHT). The data was summarized and then tested for association with which form of GAHT the subject was on. Differences in demographics, comorbidities, asthma symptoms and treatment between different medication groups were tested by Kruskal-Wallis test for continuous variables and Fisher's Exact test for the categorical variables. Each medication group's risk of changing their medication number over the course of the study was calculated relative to the patients who received no GAHT. Wilcoxon Rank Sum tests were performed comparing the asthma exacerbations and medication levels before and after beginning GAHT, sub-analyzed by each medication group.

Results: A total of 162 patients were identified who met inclusion criteria. Fourteen were lost to follow-up, 2 patients were diagnosed with asthma after the start of the study period, and 1 patient was receiving Testosterone for hypogonadism and not for GAHT. We included a total of 129 patients in our final analysis (median age 16), of whom 13.2% received estrogen therapy, 38.0% received Testosterone therapy, 8.5% received puberty blocking therapy with gonadotropin-releasing hormone agonists (GnRHas), and 40.3% did not receive any GAHT during the study period.

There was sufficient evidence to accept that patients receiving estrogen had more asthma exacerbations over the study period than the other GAHT groups, p-value = 0.013.[1] There was sufficient evidence to accept that patients receiving estrogen also had more asthma exacerbations over the study period than the patients not receiving any GAHT, p-value 0.026.[1]

There were no significant differences between the prevalence of asthma controller medications at the start of the study period, however a higher percentage of the subjects on estrogen therapy were found to be on controller asthma medications at the end of the study period compared to patients receiving other forms of GAHT or no GAHT (52.9%, p-value = 0.034). Specifically, a higher percentage of the subjects on estrogen were found to be on a long-acting muscarinic antagonist at the end of the study period (11.8%, p-value = 0.045). Patients receiving estrogen were approximately 1.4 times more likely to have an increase in the use of controller medications over the 2 year study period compared to patients not receiving any GAHT (relative risk [RR], 1.397, 95% CI, 1.061-2.203).

There were no significant differences in exacerbations before and after beginning GAHT overall, however there was a significant bump in exacerbations for patients on estrogen therapy from 3 to 6 months after beginning GAHT compared to patient's

receiving other forms of GAHT (p = 0.042). There were no significant differences in medications before and after beginning GAHT.

Additionally, there was a significant association between a history of suicidal ideation and patients with GnRHa prescriptions (81.8%) and patients with no GAHT prescription (71.2%) compared to other groups (p-value = 0.002). There was also a significant association between a history of suicide attempts and no GAHT prescription (42.3%) compared to other groups (p-value = 0.03).

Conclusions: Over the whole study period those patients who received estrogen therapy had significantly more exacerbations and had a significant risk of increasing the number of controller medications used. There were no significant differences in exacerbations before and after beginning GAHT overall, however there was a significant bump in exacerbations for estrogen patients from 3 to 6 months after beginning GAHT compared to other forms of GAHT. There were no significant differences in medications before and after beginning GAHT.

This is the first retrospective observational study to examine the effect of GAHT on asthma morbidity. Our results provide evidence that the initiation of GAHT could increase patients' risk of an asthma exacerbation or the need for an escalation in controller medication use. This study also echoes previous research showing an association between gender affirming care and a reduction in suicidality. Further investigation is needed to examine the effects of gender affirming hormone treatment on patient's pulmonary and overall health.

Gender Affirming Care and Asthma Morbidity

Hannah Frudden, Adrian O'Hagan, Lisal Folsom

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BACKGROUND

Transgender status is associated with a significantly higher risk of lifetime asthma[4], with research suggesting that sex hormones play a role in the risk of asthma and lung function[5].

Despite the prevalence of gender-minority (GM) individuals in the US and the known psychological benefit of undergoing gender affirming care[11-13]; existing research is lacking on the effects of gender affirming hormone therapy (GAHT) in GM individuals, including related to asthma morbidity and pulmonary function.

OBJECTIVE

To describe asthma morbidity and prescribed controllers in a population of transgender patients at a single, tertiary care pediatric pulmonology/endocrinology center between March 1st, 2020 and July 14th, 2023.

METHODS

Single-center retrospective chart review:

- Patients aged ≦ 25
- Diagnosis of asthma and gender dysphoria
- March 1st, 2020 to July 14th, 2023

Primary outcome: number of asthma exacerbations during study period pre- and post- initiation of GAHT

- Exacerbation - number of unscheduled clinic visits, exacerbations requiring systemic steroids, ED visits, hospitalizations

Differences in demographics, comorbidities, asthma symptoms and treatment between different medication groups were tested by Kruskal-Wallis Fisher's Exact test .

Each medication group's risk of changing their controller medication use over the course of the study was calculated relative to the patients who received no GAHT.

Wilcoxon Rank Sum tests were performed comparing the asthma exacerbations and medication levels before and after beginning GAHT, with sub-analysis by each medication group.

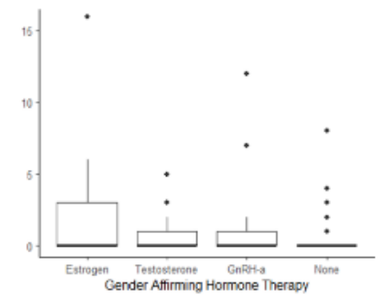
RESULTS

Patient Demographics and Comorbidities

		Overall	Estrogen	Testosterone	GnRH-a	None	p
N		129	17	49	11	52	
Age on 3/1/2020 (median [IQR])		16.0 [14.0, 20.0]	22.0 [16.0, 24.0]	15.0 [16.0, 21.0]	12.0 [11.50, 14.0]	14.0 [12.75, 16.0]	<0.001
Race (%)	White	102 (79.1)	14 (82.4)	40 (81.6)	9 (81.8)	39 (75.0)	0.377
	Black	14 (10.9)	0 (0.0)	6 (12.2)	1 (9.1)	7 (13.5)	
	Multiple	3 (2.3)	0 (0.0)	0 (0.0)	1 (9.1)	2 (3.8)	
	Unknown	10 (7.8)	3 (17.6)	3 (6.1)	0 (0.0)	4 (7.7)	
Ethnicity (%)	Not Hispanic	114 (88.4)	15 (88.2)	45 (91.8)	10 (90.9)	44 (84.6)	0.78
	Hispanic	7 (5.4)	1 (5.9)	1 (2.0)	1 (9.1)	4 (7.7)	
	Unknown	8 (6.2)	1 (5.9)	3 (6.1)	0 (0.0)	4 (7.7)	
Body Mass Index (BMI) Category (%)	< 18.5	7 (5.4)	0 (0.0)	0 (0.0)	1 (9.1)	6 (11.5)	0.029
	18.5 - 24.9	48 (37.2)	8 (47.1)	14 (28.6)	5 (45.5)	21 (40.4)	
	25 - 29.9	18 (14.0)	2 (11.8)	9 (18.4)	0 (0.0)	7 (13.5)	
	30 - 34.9	20 (15.5)	2 (11.8)	8 (12.2)	3 (27.3)	9 (17.3)	
	35 - 39.9	18 (14.0)	0 (0.0)	12 (24.5)	2 (18.2)	4 (7.7)	
	> 40	18 (14.0)	5 (29.4)	8 (16.3)	0 (0.0)	5 (9.6)	
Anxiety (%)	Yes	90 (69.8)	11 (64.7)	37 (75.5)	6 (54.5)	36 (69.2)	0.534
Depression (%)	Yes	84 (65.1)	7 (41.2)	33 (67.3)	8 (72.7)	36 (69.2)	0.167
Bipolar Disorder (%)	Yes	16 (12.4)	4 (23.5)	6 (12.2)	1 (9.1)	5 (9.6)	0.494
PTSD (%)	Yes	14 (10.9)	1 (5.9)	3 (6.1)	2 (18.2)	8 (15.4)	0.319
Panic disorder (%)	Yes	4 (3.1)	0 (0.0)	3 (6.1)	1 (9.1)	0 (0.0)	0.106
Suicidal Ideation (%)	Yes	74 (57.4)	5 (29.4)	23 (46.9)	9 (81.8)	37 (71.2)	0.002
Suicide attempt (%)	Yes	38 (29.5)	2 (11.8)	10 (20.4)	4 (36.4)	22 (42.3)	0.03
Self-Harm/Self-Injurious behavior (%)	Yes	49 (38.0)	6 (35.3)	11 (22.4)	7 (63.6)	25 (48.1)	0.016
Fibromyalgia (%)	Yes	5 (3.9)	0 (0.0)	4 (8.2)	1 (9.1)	0 (0.0)	0.069
Obstructive Sleep Apnea (%)	Yes	7 (5.4)	0 (0.0)	3 (6.1)	0 (0.0)	4 (7.7)	0.877
COPD (%)	Yes	1 (0.8)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	0.217
Cystic Fibrosis (%)	Yes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	>0.999
Vocal Cord Dysfunction (%)	Yes	1 (0.8)	0 (0.0)	1 (2.0)	0 (0.0)	0 (0.0)	0.597
pulmonary Embolism (%)	Yes	1 (0.8)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	0.217
Allergic Rhinitis or Seasonal Allergies (%)	Yes	64 (50.0)	10 (58.8)	21 (43.8)	4 (36.4)	29 (55.8)	0.435
Eczema (%)	Yes	11 (8.5)	0 (0.0)	3 (6.1)	2 (18.2)	6 (11.5)	0.231
GERD (%)	Yes	41 (32.0)	5 (29.4)	15 (30.6)	8 (72.7)	13 (25.0)	0.199

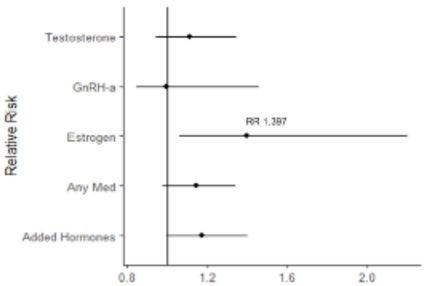
Pulmonary Disease; GERD Gastroesophageal Reflux Disease

Number of Asthma Exacerbations Over Study Period



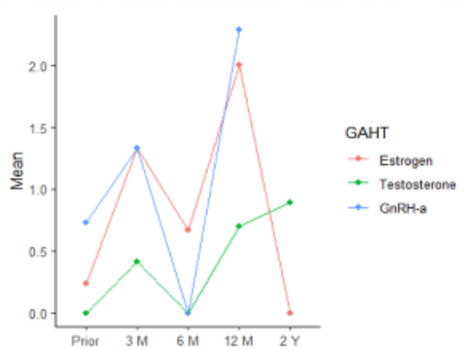
Box Plot showing mean number of asthma exacerbations over study period. Kruskal-Wallis rank test showed that patients receiving estrogen had more asthma exacerbations over the study period compared to patients receiving other medications (p-value = 0.011) and compared to patients not receiving any medication (p-value = 0.005). GnRH-a = Gonadotropin-releasing hormone agonist

Relative Risk of Increased Controller Medication Use Over Study Period



Relative Risks of increasing the number of asthma controller medications for each medication category, compared to those who had no GAHT. Patients receiving estrogen were approximately 1.4 times more likely to have an increase in the use of controller medications (RR, 1.397; 95% CI, 1.053-2.203). GnRH-a: Gonadotropin-releasing hormone agonist

Mean Number of Asthma Exacerbations Pre and Post GAHT Initiation



Results: Wilcoxon rank test showed that patients receiving estrogen had more asthma exacerbations over the 3 time points after beginning GAHT compared to other medication groups (p-value = 0.042). GAHT: Gender affirming hormone therapy; GnRH-a: Gonadotropin-releasing hormone agonist

Asthma Exacerbations Pre and Post GAHT Initiation

	V	p-value
Testosterone	0	0.057
Estrogen	2	> 0.999
GnRH-a	2	> 0.999
Added Hormones	6.5	0.2317
All Medications	15.5	0.439

Wilcoxon rank test for comparing asthma exacerbations before and after beginning gender affirming medications in each medication group. GnRH-a: Gonadotropin-Releasing Hormone Agonist

Asthma Controller Medication Use Pre and Post GAHT Initiation

	V	p-value
Testosterone	262	0.534
Estrogen	6	0.395
GnRH-a	21	0.903
Added Hormones	333.5	0.974
All Medications	509.5	0.93

Wilcoxon rank test for comparing asthma controller medications before and after beginning gender affirming medications in each medication group. GnRH-a: Gonadotropin-Releasing Hormone Agonist

CONCLUSIONS

- Patients who received estrogen therapy had significantly more exacerbations and had a significant risk of increasing the number of controller medications used, when compared to other forms of hormone therapy.
- There were no significant differences in exacerbations or controller medication use before and after beginning GAHT overall.
- Initiation of GAHT could increase patients' risk of an asthma exacerbation or the need for an escalation in controller medication use. Further investigation is needed to examine the effects of gender affirming hormone treatment on patient's pulmonary and overall health.

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Optimizing Nutritional Status in Infants with Cystic Fibrosis

Sarah Alexander, MD – Pediatric Resident
Co-Author(s): Adrian O'Hagan, MD; Erica Stevens, MD; Shari Willy, RD

Introduction: Research consistently demonstrates the impact of early childhood nutritional status on linear growth and lung function in people with cystic fibrosis (CF). The CF Foundation nutrition recommendations for infants less than 24-months of age include a weight-for-length at the 50th percentile on the World Health Organization growth curve. Although the national median values for weight-for-length have been above this goal from 2012-2021, the median values at our center have been below national values and were below goal four years out of the ten. Thus, we aimed to facilitate optimization of nutritional status in infants less than 24-months old with CF by providing families with a Nutrition Action Plan.

Aim: To increase the average weight-for-length percentile amongst high-risk CF infants (weight-for-length <50th percentile) aged < 24-months by 10% from May 2023 to February 2024.

Methods: A prospective quality improvement study was conducted using the Model for Improvement methodology from May 23, 2023 to February 22, 2024. A Nutrition Action Plan (NAP) handout was completed, discussed, and given to families with CF infants. This handout included current weight, goal weight, weight-for-length quartile, and action steps to meet goal percentile. The primary outcome was weight-for-length percentile. Process measures included proportion of eligible patients receiving a NAP. A two-tailed chi square test was performed to assess the average change in weight-for-length percentiles amongst patients whose families received a NAP versus those who did not receive a NAP.

Results: Families received a NAP in only 22 out of 184 encounters (12%). This value is comparable to how often it was received for families of high-risk CF infants (10%). Of the 184 encounters, 38 were follow-up appointments in which percentiles were available for comparison. Among families that received NAP (n=22) there was an overall 9.7% increase in weight-for-length percentiles at the subsequent appointment versus a 2.8% increase among patients whose families that did not receive NAP (n=162). This difference was not statistically significant (p-value 0.92).

Conclusion: The observed, non-significant change in the small number of families receiving NAP suggests further efforts should be made to increase the number of families receiving NAP. Further research is needed to determine the impact of NAP on optimizing nutritional status.

Optimizing Nutritional Status in Infants with Cystic Fibrosis

Alexander, Sarah, MD; O'Hagan, Adrian, MD; Stevens, Erica, MD; Willy, Shari, RD

Norton Children's Hospital and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- Early childhood nutritional status has significant impact on linear growth and lung function in people with cystic fibrosis (CF)

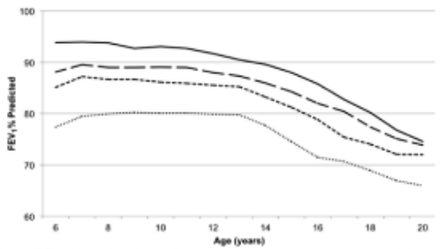

Fig. 1. FEV1 % predicted stratified by weight category at age 4 years [1]

- Median weight-for-length percentiles (WLP) at our center above CF Foundation recommended goal only six out of ten years (2012-2021)
- Aim: increase the average WLP amongst high-risk CF infants (weight-for-length < 50th percentile) aged < 24-months by 10% from May 2023 to February 2024

METHODS

- Prospective QI study from May 23, 2023 to February 22, 2024
- Inclusion criteria: infant < 24-months of age with CF seen at UL Pediatric Pulmonology CF Center
- Nutrition Action Plan (NAP) completed, discussed, and given to families of eligible patients
- Tracked WLP and NAP use at each visit for infants with CF < 24-months of age
- Two-tailed chi square test assessed difference in WLP amongst patients whose families received NAP versus those who did not

RESULTS

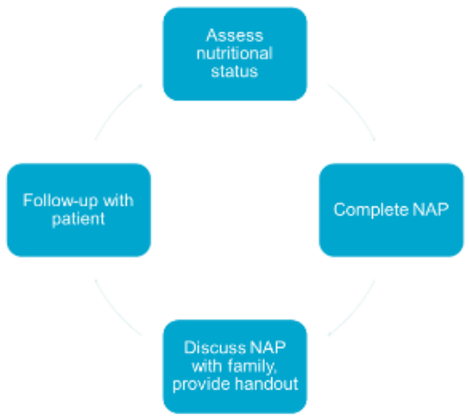

Fig 2. QI intervention cycle

Fig. 3. NAP provided to families

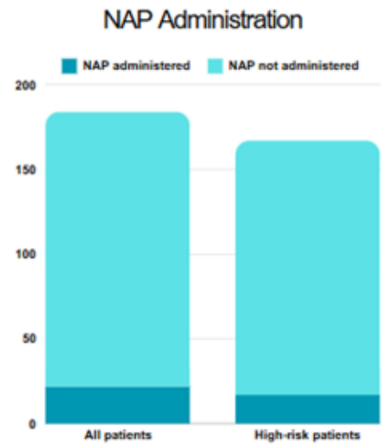

Fig. 4. Frequency of NAP administration to eligible families

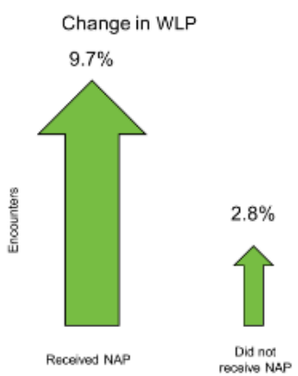

Fig. 5. Average change in WLP at subsequent appointments.

RESULTS

- Families received NAP in 22/184 encounters (12%)
- Families of high-risk CF infants (WLP < 50th) received NAP in 17/167 encounters (10%)
- Overall average of 9.7% increase in WLP at subsequent appointment after NAP administered
- Overall average of 2.8% increase in WLP at subsequent appointment after which NAP not administered
- p-value 0.92

CONCLUSIONS

- Observed, non-significant change in small number of families who received NAP
- Larger study needed to determine impact of NAP on optimizing nutritional status

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Assessing Demographics in Non-Organic Failure to Thrive Admissions

Elizabeth Nields, MD – Pediatric Resident
Co-Author(s): Anderson Huxol; Alexandra Anderson, DO; Heather Huxol, MD

Background: Non-organic failure to thrive (FTT), defined as poor growth with no known medical cause, is a common reason for pediatric hospital admission. Data related to causes of non-organic FTT is limited.

Aim: To describe demographics and length of stay for non-organic failure to thrive admissions at an urban, tertiary care pediatric hospital.

Methods: Data was collected via retrospective chart review. Children ages 0-12 months (inclusive) admitted to Norton Children's Hospital (NCH) and/or Norton Women and Children's Hospital (NWC) between January 1, 2017 and December 31, 2023 with a diagnosis of failure to thrive, weight loss, or poor weight gain without an organic etiology identified were included. Charts were manually reviewed for hospital of admission, patient's primary insurance type (public vs private), race/ethnicity, home zip code, and length of stay (LOS) in the hospital. Patients with gastrotomy tube dependence, congenital heart disease, cystic fibrosis, hyperthyroidism, tracheostomy dependence, prematurity less than 37 weeks, genetic disorder, and viral infection were excluded.

Results: A total of 2,058 charts were manually reviewed for inclusion and exclusion criteria resulting in 155 qualifying encounters. There were 134 admissions at NCH and 21 at NWC. The population included 93 (60.0%) white/Caucasian, 55 (35.5%) Black/African American, 7 (4.5%) Hispanic/Latino, and 2 (1.3%) native Hawaiian/other Pacific Islander across 45 zip codes. The most common zip codes are 40229 and 40219 (South Central/SW Louisville). There were 101 (65.2%) patients with public insurance and 54 (34.8%) patients with private insurance. The mean length of stay was 4.1 days, with a median of 3 days and mode LOS 3 days. Those with public insurance had a mean LOS of 4.3 days, vs mean 3.7 day LOS for those with private insurance. White/Caucasian patients had a mean LOS of 4.26 days compared with native Hawaiian/other Pacific Islander 4 days, Black/African Americans 3.9 days, and Hispanic/Latino 3.5 days. Differences in mean LOS were not statistically significant between groups based on race/ethnicity ($p = 0.153$) or insurance type ($p = 0.069$).

Conclusions: Non-organic FTT admissions are common in our hospital system across all demographics without significant differences in LOS by insurance type or race/ethnicity. Possible directions for further research include analyze data from pediatricians referring for admission, frequency of admission if presenting to the emergency department for poor growth, targeted community education for preventing admission, hospital-based interventions for reducing length of stay, and long-term follow-up to determine if organic causes become evident later in life.

Assessing Demographics in Non-Organic Failure to Thrive Admissions

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Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

Non-organic failure to thrive, a common reason for pediatric hospital admission, is defined as poor growth with no known medical cause.

Data is limited with most research related to infant and children diagnosed with non-organic failure to thrive being greater than 30 years old.

METHODS

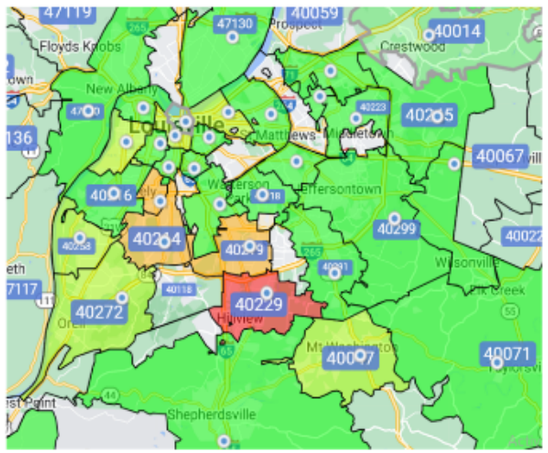
Retrospective chart review of patients admitted to Norton Children's Hospital and Norton Women's and Children's Hospital between January 1, 2017 and December 31, 2023 with diagnoses of failure to thrive, weight loss, or poor weight gain without organic etiology identified.

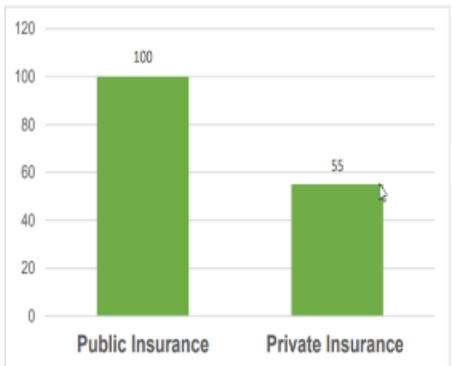
Exclusion criteria: gastrotomy tube, tracheostomy, congenital heart disease, cystic fibrosis, hyperthyroidism, prematurity <37 weeks, genetic or metabolic disorder, and viral infection.

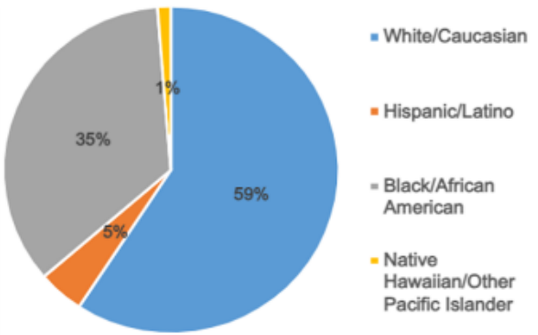
Data included:
- Hospital of admission
- Zip codes
- Insurance type
- Race

Independent samples t-test and ANOVA compared LOS between insurance types and race.

RESULTS







Number of Encounters	
	13+
	8 to 11
	5 to 7
	1 to 4

Length of Stay in Days	
Mean	4.1
Median	3
Mode	3

Demographic	Number of Encounters	Average Length of Stay
Public Insurance	100	4.3 days
Private Insurance	56	3.7 days
		p-value = 0.069
White/Caucasian	93	4.3 days
Black/African American	55	3.9 days
Hispanic/Latino	7	3.5 days
Native Hawaiian/Other Pacific Islander	2	4 days
		p-value = 0.800

CONCLUSIONS

Non-organic FTT is a common reason for admission in our hospital system. There is no statistical significance in the length of stay between different demographics.

FUTURE RESEARCH

Future goals include evaluation of frequency of admission for patients presenting to the emergency department with FTT/poor weight gain, evaluate potential community and/or hospital-based interventions to improve outpatient management and decrease admission rates/LOS, and long-term outcomes.

SEVERE GASTROINTESTINAL BLEEDING SECONDARY TO TRAMETINIB IN PEDIATRIC LOW-GRADE GLIOMA

Ashley Klein, DO – Pediatric Resident
Co-Author(s): Blakely Moorman, MS3; Michael Huang, MD

Background: Trametinib is an oral, reversible, and highly selective inhibitor of MEK1 and MEK2, the final kinase in the MAPK signaling pathway. It is approved for use in BRAF-mutant tumors in adults. The MAPK pathway plays a vital role in regulating cell proliferation and differentiation in epithelial cells, including those in the gastrointestinal tract. Nearly 20% of pediatric patients diagnosed with Neurofibromatosis type I (NF1) develop pilocytic astrocytomas due to dysregulation of the RAS-MAPK pathway. Trametinib is generally well-tolerated in children, but is associated with rare, serious side effects.

Case presentation: The patient is a 17-year old male with NF1 treated with trametinib for disease progression of a right cerebellar pilocytic astrocytoma. He had previously received therapy with vincristine and carboplatin for a tectal/optic glioma, which was switched to bevacizumab and irinotecan due to carboplatin hypersensitivity. He then underwent salvage treatment regimens with imatinib, vinblastine, and trametinib for disease recurrence. Twenty months into treatment with trametinib, the patient presented with hematemesis and melena. Complete blood count (CBC) showed moderate anemia with a hemoglobin of 9 g/dL. Esophagogastroduodenoscopy (EGD) was performed and confirmed a bleeding duodenal ulcer with several gastric antral erosions, which were treated with carafate and omeprazole. Trametinib was discontinued at that time. The patient is now 20 months progression-free and has had no repeat gastrointestinal bleeding episodes.

Discussion/Conclusion: Clinical trials are underway to investigate MEK inhibitors for the treatment of NF1-associated pediatric low grade gliomas. However, there is need for close vigilance in monitoring for rare on-target, off-tumor adverse side effects with the use of newer, targeted cancer drugs in children.

SEVERE GASTROINTESTINAL BLEEDING SECONDARY TO TRAMETINIB IN PEDIATRIC LOW-GRADE GLIOMA

Ashley Klein, DO, Blakeley Moorman, MS3 & Michael Huang, MD
Department of Pediatrics, University of Louisville, Louisville, Kentucky

Introduction

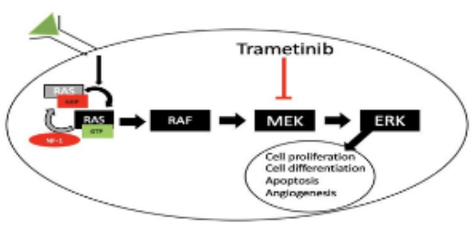
Trametinib is an oral, reversible, and highly selective inhibitor of MEK1 and MEK2 and is approved for use in BRAF-mutant tumors in adults[4]

MEK1 and MEK2 are downstream kinases in MAPK signaling pathway[2]

The MAPK pathway plays a vital role in regulating cell proliferation and differentiation in epithelial cells, including those in the gastrointestinal tract.[2]

20% of pediatric patients with Neurofibromatosis type 1 (NF-1) develop pilocytic astrocytoma due to dysregulation of RAS-MAPK pathway[1,5]

Trametinib is generally well tolerated in children, but is associated with rare, serious side effects[3,5]



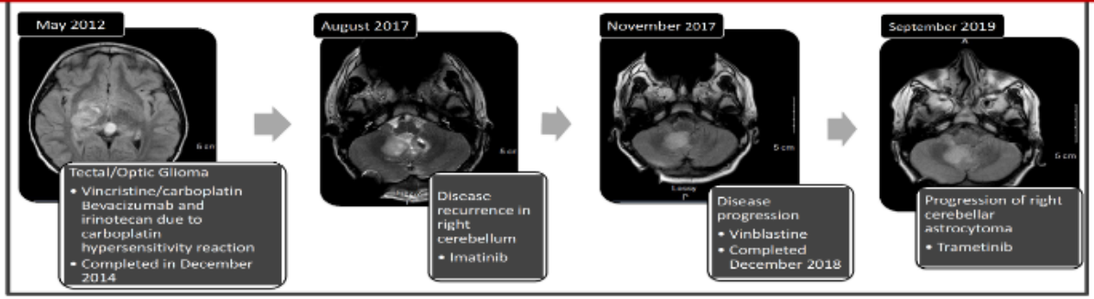
Objective

We present a case of a pediatric patient who developed severe gastrointestinal bleeding after using trametinib as a salvage regimen for an NF-1 associated pilocytic astrocytoma.

Methods

Clinical history was obtained through retrospective chart review from electronic medical record

Patient Background: 17 year old male with NF-1 associated low-grade glioma

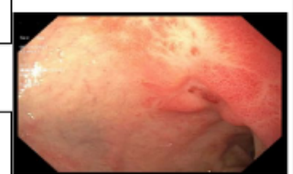


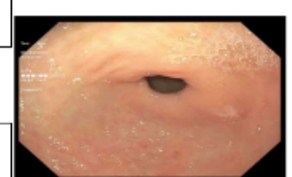
Results

17-year-old with NF-1 treated with trametinib for progression of right cerebellar pilocytic astrocytoma

Presented with hematemesis and melena and found to have moderate anemia (hemoglobin 9 d/gL) a year and a half into treatment with trametinib

Esophagogastroduodenoscopy confirmed a bleeding duodenal ulcer and several gastric antral erosions





Patient Outcomes

Treatment for acute GI bleeding:
- Carafate
- Omeprazole

Discontinued trametinib

Patient is almost 2 years progression free with no repeat GI bleeding episodes

Conclusions

Clinical trials are underway to investigate MEK inhibitors as up front treatment of NF-1 associated pediatric low-grade gliomas.

There is need for close vigilance in monitoring for **rare** on-target, off-tumor adverse side effects with the use of newer, targeted cancer drugs in children.

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SCHOOL OF MEDICINE

Evaluation of Heuristic Processes in a Case of Superior Mesenteric Artery Syndrome Secondary to Cannabis Hyperemesis Syndrome

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Summary: The application of heuristics, or cognitive shortcuts, in medicine, offers numerous advantages. Primarily, they serve to streamline complex choices within an environment that necessitates prompt intervention. However, these shortcuts also come with the risk of misdiagnosis and sometimes inappropriate, or unnecessary, treatment. The focus of this report is on a specific, yet commonly observed, recognition heuristic[2]. In simpler terms, swiftly identifying a particular element of a patient's history (in this case, vomiting concurrent with frequent marijuana use) leads to a prompt deduction (diagnosing cannabis hyperemesis syndrome), while likely ignoring other potential diagnoses, that at the time, seem unlikely. Additionally, this report serves as a compelling example of how novel information, including additional patient history, symptom evolution over time, and vital sign abnormalities, gathered during early admission, can modify the differential diagnosis, avoid the pitfalls of anchoring bias, and in this case, led to the diagnosis and treatment of the potentially life-threatening condition, superior mesenteric artery (SMA) syndrome.

Background: Cannabinoid hyperemesis syndrome (CHS) is a type of "functional gut-brain axis disorder"[5]. Initially identified as a diagnosis in 2004, CHS cases have only continued to rise, likely due to legalization and more frequent use. Cannabis is currently the most frequently abused substance in the United States[5]. Symptoms include abdominal pain (85.1%), severe nausea and vomiting often described as "cyclical" over several months (100%), and compulsive hot showers that provide symptom relief (92.3%), in the setting of THC exposure, and resolution of symptoms after cessation of cannabis use (96.8%). Of note, CHS tends to have a male predominance (76.6%). Research has suggested that there may be 5 genetic mutations that play a role in pre-disposing patients to this illness, with research ongoing[6]. Early diagnosis of CHS is crucial to prevent complications from dehydration/hypovolemia, but a strict set of criteria for this diagnosis is still lacking and currently, remains a diagnosis of exclusion[5]. The Rome IV criteria is the current diagnostic tool to assess for potential CHS. With only 3 criteria including 1) stereotypical episodic vomiting resembling cyclical vomiting syndrome for >6 months, 2) presentation after prolonged cannabis use, and 3) relief of vomiting episodes by sustained cessation of cannabis use, true diagnosis based on history alone, can be difficult. Patients with features including, hematochezia, melena, concurrent iron deficiency anemia (IDA), unintentional weight loss, palpable abdominal mass/lymphadenopathy on exam, family history of gastrointestinal cancer, dysphagia, persistent non-cyclical vomiting, or associated neurologic symptoms should always be evaluated for other diagnoses regardless of if the patient meets the Rome IV criteria for CHS[5]. In turn, SMA syndrome, while an infrequent cause of the afore mentioned symptoms (prevalence 0.1-0.3%), carries a significant morbidity and mortality risk[8]. This emphasizes its importance as a vital consideration in the differential diagnosis, particularly when accompanied by recent weight loss. SMA syndrome is caused by duodenal compression due to the loss of the mesenteric fat pad that lies between the aorta and the superior mesenteric artery (Figure 1). This diagnosis can be easily confirmed with various imaging modalities including fluoroscopy of the upper GI tract, CTA, or MRA. A normal aortomesenteric angle is anywhere from 38-65 degrees. An angle < 25 degrees or a distance between structures <10mm can cause duodenal compression. Some etiologies for weight loss leading to SMA syndrome include hypermetabolism, anorexia, malignancy, and malabsorptive disease. CHS should also be considered. In many cases conservative management may fail and laparoscopic duodenojejunostomy is the optimal definitive treatment8.

Case Presentation: An 18-year-old male presented with crampy diffuse abdominal pain persisting for 3 days. The pain was particularly pronounced in the epigastrium but radiated throughout the abdomen. He reported experiencing multiple (>5) instances of non-bloody, non-bilious emesis daily. Zofran did not yield any improvement in symptoms. Notably, his symptoms intensified following the

consumption of food or liquids. Although he denied ever observing blood in his stool, he had not experienced a bowel movement for approximately 4 days prior to arrival. He had no contact with any sick individuals. He was sexually active with females but did not express concerns about sexually transmitted infections (STIs), and thus refused any testing in that regard. He acknowledged using marijuana daily, while abstaining from alcohol and other drugs. Initial laboratory tests, including complete blood count (CBC), lipase, and C-reactive protein (CRP), were unremarkable. His comprehensive metabolic panel (CMP) indicated a mild anion gap metabolic acidosis (gap of 14). A urine toxicology screen was positive for cannabinoids. An abdominal ultrasound displayed no abnormalities in relation to gallstones, cholecystitis, liver mass, perihepatic hematoma, biliary dilation, free fluid, hydronephrosis, renal mass, or lymphadenopathy. During his emergency department visit, he received a normal saline bolus, Reglan to alleviate nausea, Toradol for pain, and capsaicin cream. Subsequently, he was admitted to the pediatric service for the management of the presumed diagnosis of cannabinoid hyperemesis syndrome. Upon admission to the floor, a clear liquid diet and maintenance IV fluids were initiated. Additionally, Pepcid was trialed to alleviate the epigastric pain attributed to gastritis. Over the subsequent 24-hour period, the frequency of the patient's emesis decreased, and while some residual epigastric discomfort persisted, it was anticipated that these symptoms would continue to improve as the patient refrained from using marijuana. With the patient's stability, the medical team planned to discharge. However, complications arose when the patient attempted to consume a regular diet, resulting in a significant exacerbation of symptoms, including worsening vomiting and abdominal pain. This escalation prompted considerations of a peptic ulcer and other gastrointestinal pathologies as potential contributors. Patient was transitioned to a proton pump inhibitor, sucralfate, as needed Bentyl for abdominal pain, and deescalated to a clear liquid diet. Gastroenterology consulted at that time and in agreement on the diagnosis of Cannabis hyperemesis syndrome, yet the initiation of Miralax was recommended due to the patient's lack of bowel movements in recent days. Stool studies were also conducted to assess for H. pylori infection, yielding negative results. It's pertinent to note that psychiatric consultation was also pursued during the patient's hospitalization. The patient's prolonged history of marijuana usage was of significance, and he had entered the contemplative stage of cessation due to adverse effects such as vomiting, abdominal pain, and weight loss. On admission, the patient's BMI was 18 (21st percentile for weight), and he expressed the desire to regain lost weight. Notably, his weight had been at the 57th percentile 15 months prior to admission. Following psychiatric recommendations, the patient was started on olanzapine and PRN benztropine to mitigate nausea, with some positive outcomes, albeit with ongoing emetic episodes and abdominal pain. On the sixth day of admission, the patient's blood pressure was elevated to 160/90, necessitating a dose of isradipine. The patient denied experiencing symptoms like headaches, vision changes, shortness of breath, or chest pain at that time. Nephrology consulted. Various diagnoses, including SMA syndrome and other vasculopathies, were considered. An echocardiogram yielded unremarkable results for any aortopathies, and thyroid-stimulating hormone (TSH) levels were within normal limits. Renal ultrasound revealed potential left renal artery compression with a tardus parvus waveform (Figure 2), prompting concern about compression of both the duodenum and the left renal artery between the aorta. Renin and aldosterone levels were within normal ranges, and labetalol was initiated twice daily. A fluoroscopic upper GI study confirmed compression of the midthird portion of the duodenum, consistent with SMA syndrome (Figure 3). In light of the patient's acute on chronic weight loss, and new diagnosis of SMA syndrome, evaluation for underlying malabsorptive disorders including a celiac panel and erythrocyte sedimentation rate (ESR) were pursued and produced reassuring results. Notably, the patient was transferred to the Pediatric Intensive Care Unit (PICU) on the 13th day of admission due to unresponsive hypertension/hypertensive urgency, with a blood pressure of 170/116. Baseline antihypertensive medications were up titrated. In the setting of SMA syndrome and hypertension an abdominal computed tomography angiogram (CTA) was performed due to concerns for mid-aortic syndrome. The results once again confirmed the diagnosis of superior mesenteric artery (SMA) syndrome, with an aortomesenteric angle and distance measuring 12 degrees and 5mm respectively.

Outcomes & Follow Up: Over the next several days, nutrition continued to take precedence. The nasojejunal (NJ) tube inserted prior to CTA for post-pyloric feedings led to significant improvement of symptoms. However, on the 15th day of admission, the NJ tube dislodged and attempts to replace it were unsuccessful, resulting in the placement of a central venous catheter to administer total parenteral nutrition. Subsequently, the patient was able to return to the floor where he continued to improve. Hypertension notably improved to the point where scheduled antihypertensive medications could be reduced and eventually discontinued. The patient's weight gain progress continues, as he remains hospitalized at the time of documenting this case report.

Discussion: To the best of our understanding, prior to this case report, there have been only two other instances documented in medical literature where SMA syndrome has emerged secondary to CHS. This is not meant to disregard the possibility that other cases of SMA syndrome could have been linked to CHS, as social history might not have been collected comprehensively or patients may have omitted essential information. One of the cases, documented in 2022, examined a 17-year-old female who shared a resemblance in presentation with the current case. Although her history aligned with Rome IV criteria for CHS, her admission symptomatology seemed more concerning culminating in the diagnosis of SMA syndrome[1]. Another case, documented in 2018, involved a 15-year-old female with an exceedingly comparable clinical trajectory[3]. Our case report stands out by shedding light on the following clinical associations. This case presentation highlights one of the more serious consequences of significant weight loss, SMA syndrome. During the hospital stay, collaboration with gastroenterologists enabled the medical team to systematically eliminate alternative explanations for the patient's pronounced acute on chronic weight loss including malabsorptive processes, concern for malignancy, psychiatric disorders including anorexia, or most common causes of hypermetabolism. Consequently, the inciting diagnosis of cannabis hyperemesis syndrome emerged as an exclusion-based conclusion, primarily influenced by the patient's social history. Another significant lesson to draw from this report lies in recognizing how additional patient history, the progression of symptoms over time, and vital sign abnormalities collected during admission can effectively counteract the influence of anchoring bias. For instance, the new elevation in the patient's blood pressure could have been attributed to various factors such as abdominal pain, frequent vomiting episodes, or the general stress of hospitalization. However, the significance of this vital sign was duly acknowledged. As a result, the possibility of SMA syndrome or other forms of vasculopathy was deliberated upon and investigated, ultimately leading to a timely and accurate diagnosis as a complication of CHS. Another valuable insight derived from this case revolves around the strategic utilization of time as a diagnostic tool. Initially, the patient exhibited partial improvement following symptomatic and supportive care. In the absence of cannabinoids, if uncomplicated CHS had been the primary diagnosis, the medical team's assumption of ongoing symptom amelioration would not have been unfounded. However, the progression of symptoms over time prompted a deliberate pause in the diagnostic process and reconsideration of the heuristic “shortcut” that occurred early in the hospitalization. This pause prompted the concern of other potential diagnoses or complications stemming from presumed CHS. Frequently, heuristics operate as subconscious connections rooted in individual experiences, which can occasionally lead to inaccurate or notable variations in patient care. Looking ahead, how can current and future medical professionals, along with other healthcare providers, effectively leverage heuristics to maximize benefits while minimizing associated risks? One approach involves cultivating a heightened awareness of the heuristic processes consistently employed in daily practice. Another strategy entails providing education to practitioners about prevalent heuristic techniques, commencing from the medical school curriculum and maintaining emphasis throughout clinical training. In an article published in the New England Journal of Medicine by John Brush, MD, the concept of encouraging all healthcare practitioners to diligently collect thorough patient histories is discussed. The objective of this approach is to amass more accurate "cues" that contribute to constructing a more comprehensive and precise clinical framework, analogous to the arrangement of "stars in a constellation" [2]. Again, this case report underscores the necessity for analytical thinking to prevent heuristic errors and highlights the

importance of being mindful of the potential pitfalls, such as anchoring bias, when evaluating complex patients.

Learning Points:

- Recognize emerging variances in vital signs as indicative of a broader clinical phenomenon or a more severe underlying process.
- Incorporate the passage of time and the progression of symptomology as diagnostic tools within clinical decision-making.
- Be mindful of heuristic errors in the field of medicine.

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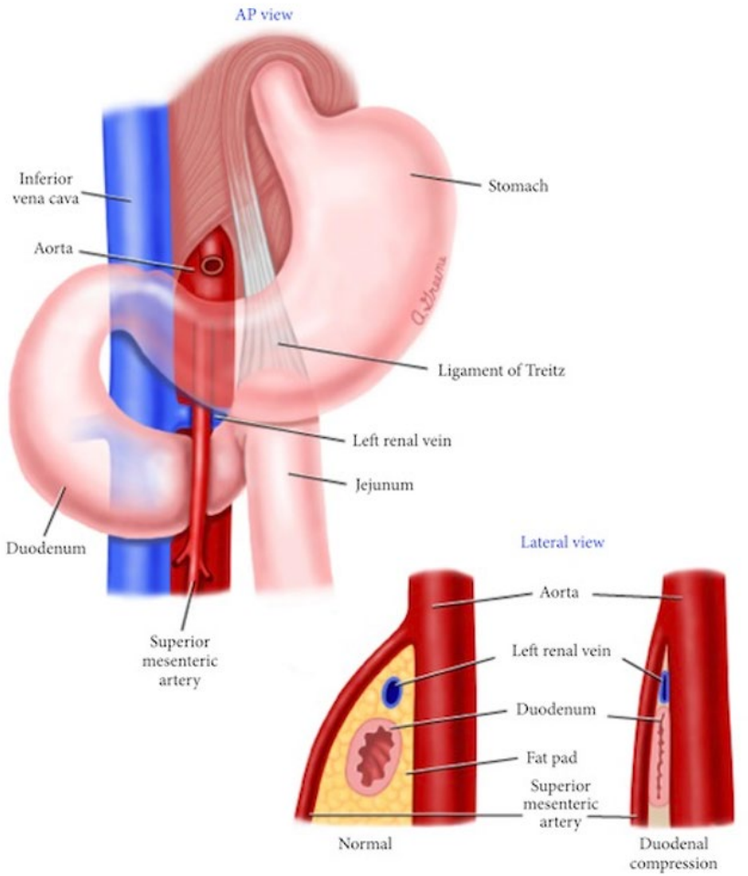

Figure 1. Diagram of pathology underlying Superior Mesenteric Artery Syndrome. This syndrome has other names including Wilkie Syndrome, Arteriomesenteric duodenal obstruction[7].

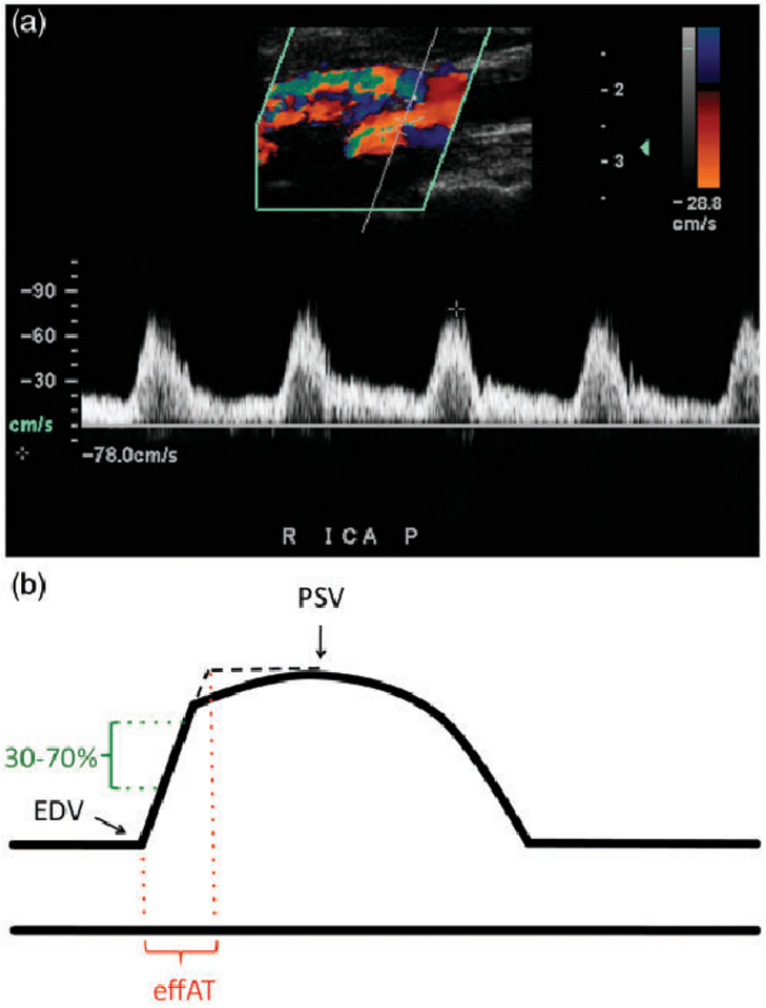

Figure 2. Tardus parvus refers to a pattern of Doppler ultrasound spectral waveform resulting from arterial stenosis. The phenomenon is observed downstream to the site of stenosis and is due to reduced magnitude of blood flow through the narrowed vessel during ventricular systole [4].

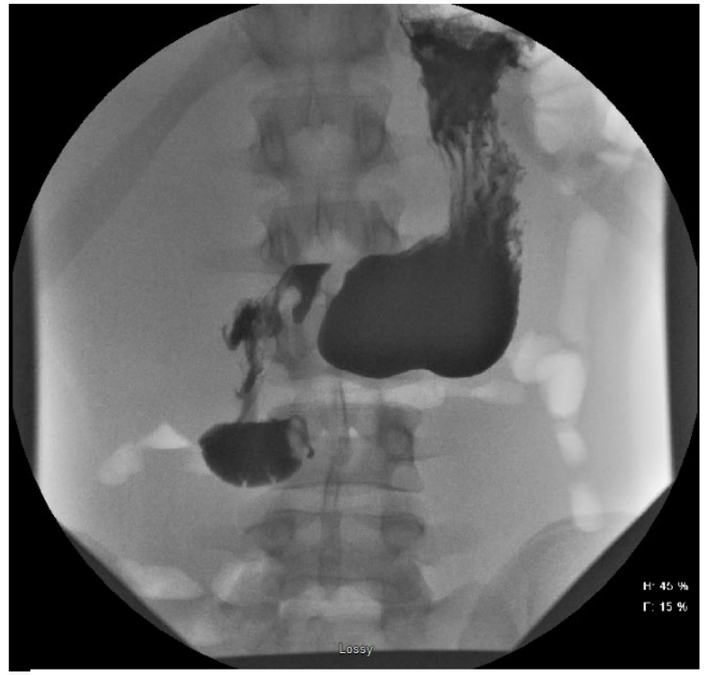

Figure 3. Fluoroscopic upper GI study showing compression of the mid-third portion of the duodenum compatible with SMA syndrome.

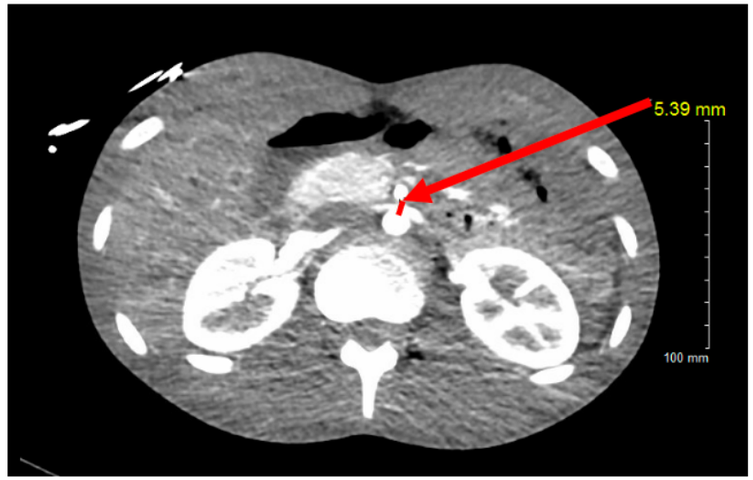

Figure 4. Computed tomographic angiogram (CTA) of the abdomen showing decreased aorto-mesenteric angle and distance suggestive of SMA syndrome. The aorto-mesenteric angle of 12 degrees and the aorto-mesenteric distance of ~5mm (demonstrated by arrow).

Delayed Diagnosis in Ulcerative Colitis Leading to Toxic Megacolon

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Case Presentation: A 16-year-old male presented with 3 days of vomiting after 18 months of intermittent abdominal pain and melena. Patient was originally worked up 16 months prior at an outside hospital, where he received a colonoscopy which showed he likely had inflammatory bowel disease (IBD). However, pathology was inconclusive, and he was subsequently lost to follow-up due to the COVID pandemic and never started medications. Patient was admitted and Gastroenterology consulted with a plan for colonoscopy for diagnosis prior to treatment. Computed tomography (CT) scan showed inflammation from the ileocecal valve to the sigmoid colon, and abdominal x-ray (XR) was concerning for possible ileus. Colonoscopy was delayed due to concern for possible obstruction. Patient eventually started to tolerate minimal amounts of MiraLAX, however due to worsening serial abdominal XR, colonoscopy was delayed further and narcotic pain medications were stopped. On day 6 of admission patient developed hematochezia, tachycardia, and worsening abdominal pain. Surgery was consulted, and repeat CT showed toxic megacolon. Patient then underwent subtotal colectomy and ileostomy. Repeat pathology confirmed diagnosis of ulcerative colitis (UC).

Discussion: UC is a disease characterized by inflammation of the colon, which often occurs in a relapsing remitting pattern. It is often controlled on medications in the setting of a timely diagnosis by biopsy, although some severe cases will be treatment resistant and require colectomy. Treatment is not advised without a definitive diagnosis, as it can lead to inadequate/incorrect treatment in the future or clinical worsening in setting of infectious processes. In the setting of a delayed diagnosis, the decision-making tree that we apply to more typical presentations can become muddled. Per Trulove and Witts criteria, this case would be classified as severe. For a patient with an established diagnosis, treatment would have been intravenous (IV) steroids and monitoring. Failure of treatment for 3-5 days would lead to either IV cyclosporine or colectomy per American College of Gastroenterology (ACG) guidelines. In patients with this presentation, it is notable that many are prone to medical treatment failure (rates of 20-40% in severe colitis) [Kornbluth et al., 1995]. In those treated with cyclosporine, one study showed 83% avoided colectomy at that time; however, over half of those patients required colectomy within the next 5 years [Moskovitz et al., 2006].

Conclusions: In patients with a clinical picture indicative of severe IBD that lack diagnosis required for treatment, it could be argued that earlier colectomy could improve surgical and patient outcomes. For this patient, he received his colectomy after signs of systemic toxicity secondary to his toxic megacolon. Indications include perforation, hemorrhage or failure of maximal medical therapy, but little to no data exist comparing medical and surgical treatment.

Delayed Diagnosis in Ulcerative Colitis Leading to Toxic Megacolon

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MED-PEDS RESIDENCY PROGRAM

Learning Objectives

- Outline the diagnostic criteria and management for ulcerative colitis/IBD
- Outline the diagnostic criteria for toxic megacolon
- Examine the wide-ranging effects of COVID-19 pandemic on healthcare and delays in patient presentations

Case Presentation

17 yo man with 18 months of abdominal pain and bloody stools presented with three days of worsening abdominal pain, vomiting, and diarrhea. Described bowel movements as loose, dark, bloody stools occurring too many times to count, and vomitus as non-bloody, non-bilious. Abdominal pain was diffuse and constant. Reported associated 20-lb. weight loss, malaise, weakness, dizziness and subjective fevers. Denied sick contacts, recent travel or any family history of chronic diarrhea or diagnosed inflammatory bowel disease (IBD). Not on any medications.

Upon further history it was noted that he was seen at an OSH at initial onset of symptoms and evaluated for IBD. Colonoscopy showed patchy erosions and irritability of the sigmoid colon. Pathology showed non-specific mild-moderate colitis and IBD serology was equivocal. He presented to an ED 6 weeks prior to admission with dehydration and anemia, and was sent home with specialized diet and recommendation for gastroenterology follow-up.

Physical Exam:
Vital signs: **HR 110**, RR 17, SpO2 95% on RA, BP 90/75; T 100.0°
Gen: ill, nontoxic appearing
HEENT: EOMI, anicteric sclera, dry oral mucosa
CV: RRR, no M/R/G
Lungs: CTAB, no wheeze or crackles
Abdomen: soft, non-distended, mildly tender in all 4 quadrants, non-peritonitic, no masses or HSM
Extremities: warm, dry, cap refill 2 seconds
Neuro: alert, oriented, CN grossly intact

Initial Laboratory Studies/Imaging:

7.2
14 | 708
24

MCV 72
Iron sat 6
Retic index 0.46
TIBC 165
Iron Sat 6
Ferritin 96
CRP 12.6
ESR 99

137	102	10	75
3.8	27	0.78 (BL ~0.4)	

Ca 9.5	AST 10
Protein 6.3	ALT 7
Albumin 3	ALP 73

Tbili 0.3

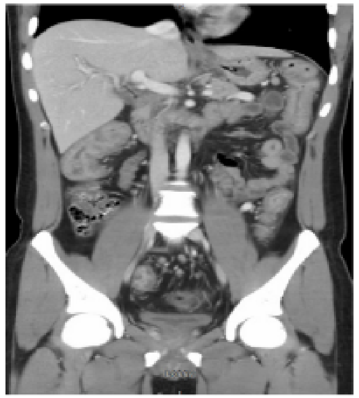

Figure 1: Diffuse colitis from the level of the ileocecal valve through the rectum

Diagnostic Studies, Imaging & Case Outcome

- Patient was stabilized in the ED, admitted with GI and surgical consults for bowel rest, rule-out of infectious colitis, and diagnostic colonoscopy.
- Bowel cleanout delayed by concern for ileus on imaging, started serial abdominal exams and abdominal X-rays, initial infectious rule-out returns negative.
- Clinical worsening on day 5 of admission with labs as follows:

6.5
21 | 647
21.4

PT 76, INR 6.3
PTT 37.2
Fibrinogen 486
D-dimer 3431
Lactic acid 1.4
Procalcitonin 120
VBG 7.42/pCO2 40/HCO3 26

Ca 6.9 (corrected 8.7)	AST 15
Protein 4.6	ALT 11
Albumin 1.8	ALP 106

Tbili 0.2

137	107	13	119
3.9	28	0.52	

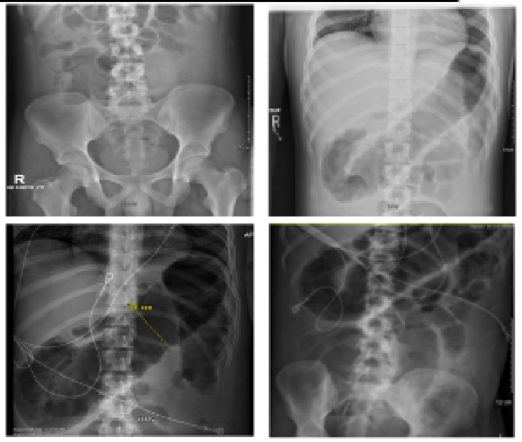

Figure 2: Serial abdominal films from initial course

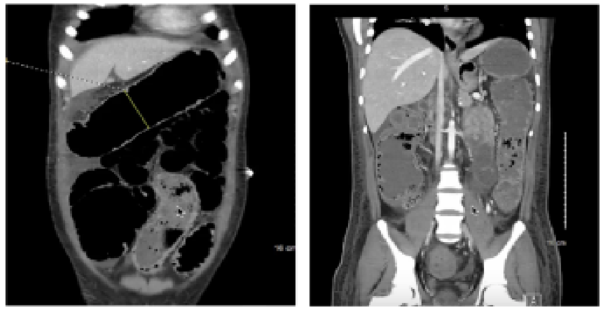

Figure 3: Axial computed tomography (CT) scans
Findings are worrisome for fulminant colitis resulting in toxic megacolon

- Patient was upgraded to the PICU, stabilized, and taken to the OR for subtotal colectomy with ileostomy.
- Surgical specimen was sent for pathology which showed likely ulcerative colitis with secondary toxic megacolon.
- Course was further complicated by E. coli sepsis secondary to toxic megacolon treated with antibiotics and abdominal hematoma requiring subsequent laparotomy.
- Patient was downgraded to the floor for continued management, monitored for improvement, and eventually transferred to an acute rehab facility.
- Plan for outpatient follow-up with surgery and GI

Diagnosis / Treatment of IBD

IBD Diagnosis

- Suggestive clinical picture: bloody diarrhea, urgency, tenesmus, weight loss, microcytic anemia, relapsing-remitting course
- Followed by rule-out of infectious causes and/or superinfection, as untreated superinfections can worsen prognosis and increase risk of toxic megacolon.
- Evaluation by colonoscopy with characteristic findings of friability, erosions, ulcerations along with confirmatory biopsy

IBD Treatment

- Guided by clinical severity of disease as well as extent of colon involvement (proctitis vs. distal vs. extensive)
- Acute management with IV steroids. If refractory to treatment after, consider cyclosporine or anti-TNF□(infliximab/adalimumab) and/or surgical consult. Indications for surgery include toxic megacolon, refractory hemorrhage, perforation, treatment failure.
- Chronic management with steroid-sparing therapies. In distal, mild/moderate disease, topical 5-ASA based medications are an option. If still requiring corticosteroids, recommend thiopurines after testing TPMT activity. If requiring anti-TNF for induction or severe disease, would continue use for maintenance. For refractory disease, vedolizumab and surgical options can be explored. Other biologics that are helpful in adults are being investigated for children (golimumab, tofacitinib, ustekinumab).

Discussion, continued

Table 2. Previously established adult and the currently suggested pediatric criteria for diagnosis of toxic megacolon

Adult criteria (from Jalan *et al.* (102))	Suggested pediatric criteria (based on ref. 92)
(A) Radiographic evidence of colonic distention	(A) Radiographic evidence of transverse colon diameter ≥56mm (or >40mm in those <10 years)
(B) At least three of the following: 1. Fever >38°C 2. Heart rate >120/min 3. Neutrophilic leukocytosis >10.5×108/l 4. Anemia	PLUS (B) Evidence of systemic toxicity, such as: 1. Fever >38°C 2. Tachycardia (heart rate >2 s.d. above mean for age) 3. Dehydration 4. Electrolyte disturbance (sodium, potassium, or chloride) 5. Altered level of consciousness or coma 6. Hypotension or shock
(C) In addition to the above, at least one of the following: 1. Dehydration 2. Altered level of consciousness 3. Electrolyte disturbances 4. Hypotension	

- CDC data has shown a COVID pandemic relation to decline in visits to ambulatory practices, leading to a worsening of chronic health conditions.
- By June 2020, 41% of adults had delayed or avoided care. 12% reported avoidance of emergent care. This avoidance of emergent care was more prevalent among unpaid caregivers, those with medical conditions, those with disabilities, and black and Hispanic adults.
- One survey showed that over 50% of people reporting delayed or inaccessible healthcare reported adverse health consequences.
- Many healthcare facilities suspended elective procedures during pandemic surges.

Conclusion

- Efficient diagnosis and treatment is essential in preventing adverse patient outcomes. This includes arranging and ensuring adequate follow up.
- The diagnosis of IBD requires clinical symptoms, rule-out of infectious etiologies, and confirmation of disease on pathology. Serology is not required/recommended.
- Toxic megacolon is an emergent complication of UC that may require surgical intervention. Diagnosis is based on clinical signs and symptoms in conjunction with imaging. This hinges on a high degree of clinical suspicion with worsening of symptoms.
- The COVID pandemic has been a complicating factor for all patients with chronic diseases leading to delays in necessary routine or emergent/urgent care

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Acknowledgements: Shout out to Adam Hall, PGY 4 Med-Peds chief for his unyielding optimism and help in preparing this project.

TUMmy Troubles: A Case of Over Treated Hypercalcemia

Malik McMullin, MD – Internal Medicine/Pediatrics Resident
Co-Author(s): Andrew Hubbs; Laura Bishop, MD

Introduction: Severe hypercalcemia can be defined as > 14.0 mg/dL and is considered a medical emergency. Hypercalcemia treatment involves repletion of the intravascular space with isotonic fluid, administration of calcitonin, dialysis, and/or the use of bisphosphonates.

Case Presentation: 62-year old male, history of hypothyroidism presented with a two-week history of emesis, dizziness and abdominal pain. Took 10 tabs Ca Carbonate/day for pain. Review of systems were positive for muscle aches, twitching and confusion. Vitals (T: 36.5, HR: 118, RR: 21, BP: 126/77). General disposition is pleasant, well nourished, and tremulous. Cardiac was Fast rate, regular rhythm. Pulmonary airway clear of auscultation bilaterally. Abdomen displayed tenderness to palpitation in the epigastric region. Extremities had warm skin, 2+ pulses in all four. Patient was diagnosed with hypercalcemia secondary to milk-alkali syndrome. Started on IV fluids and calcitonin; dose of Pamidronate was given in the ED. Five days after admission, he experienced hypocalcemia (CA 5.3, Ionized CA .87) and required daily oral calcium carbonate as well as IV calcium gluconate to normalize his calcium, which was 8.2 upon discharge. He was discharged on oral calcium carbonate with close follow up for repeat calcium labs.

Discussion: Milk-alkali syndrome is treated by removal of the offending agent (in this case, calcium carbonate) as well as supportive therapy with IV fluids and calcitonin. Although the patient's calcium was in the severe range (>14 mg/dL), the transient and reversible etiology of his hypercalcemia warranted holding pamidronate and evaluating his response to normal saline and calcitonin. Obtaining crucial medication history early and recognizing the reversible nature of our patient's hypercalcemia may have led to a shorter hospital stay and less risk of hypocalcemia.

Conclusion: Rapid reversal of an underlying cause specific to the patient may be reason for modifying guideline-based treatment. This case displays the importance of taking a detailed history, which includes over the counter medications that may not show up in the patient medical record or be mentioned by the patient.

TUMmy Troubles: A Case of Over Treated Hypercalcemia

Malik McMullin M.D.[1], Andrew Hubbs[2], Laura Bishop, M.D.[1]

[1] University of Louisville, Departments of Internal Medicine & Pediatrics
[2] University of Louisville, School of Medicine

University of Louisville
MED-PEDS RESIDENCY PROGRAM

Introduction

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- Hypercalcemia treatment involves repletion of the intravascular space with isotonic fluid, administration of calcitonin, dialysis, and/or the use of bisphosphonates.

Case Presentation

- 62-year-old M, history of hypothyroidism presented with a two-week history of emesis, dizziness and abdominal pain. Took 10 tabs Ca Carbonate/day for pain.
- Review of systems positive for muscle aches, twitching and confusion.

Vitals	T: 36.5, HR: 118, RR: 21, BP: 126/77
General	Pleasant, well nourished, tremulous
Cardiac	Fast rate, regular rhythm
Pulm	Clear to auscultation bilaterally
Abdomen	Tenderness to palpation in the epigastric region
Extremities	Warm skin, 2+ pulses in all four extremities

Admission labs:

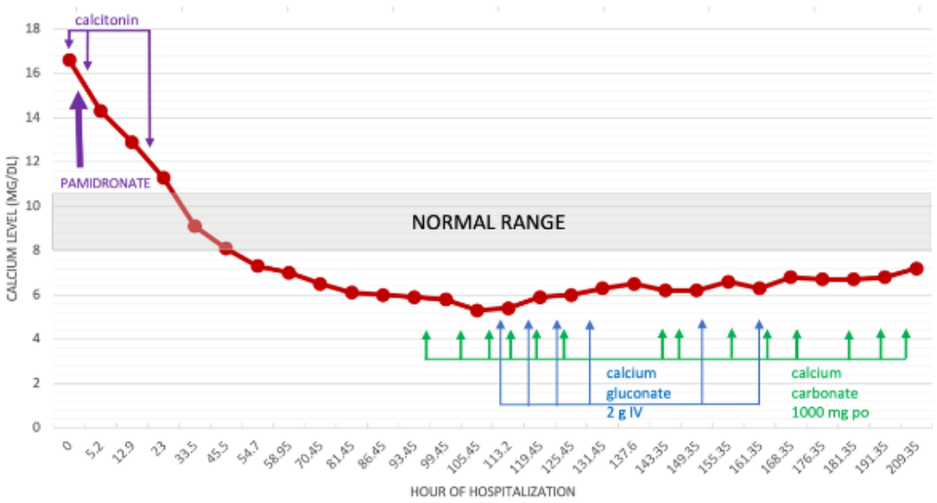
130	82	46	119
3.5	27	3.74	

Ca^{2+}: 16.6
Lipase: 1329

Hospital Course

- Pt diagnosed with hypercalcemia secondary to milk-alkali syndrome.
- Started on IV fluids and calcitonin; dose of Pamidronate was given in the ED.
- Five days after admission, he experienced hypocalcemia (Ca 5.3, Ionized Ca .87) and required daily oral calcium carbonate as well as IV calcium gluconate normalize his calcium, which was 8.2 on discharge.
- He was discharged on oral calcium carbonate with close follow up for repeat calcium labs

Calcium Timeline



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- Milk-alkali syndrome is treated by removal of the offending agent (in this case, calcium carbonate), as well as supportive therapy with IV fluids and calcitonin.
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- Rapid reversal of an underlying cause specific to the patient may be reason for modifying guideline-based treatment.
- This case displays the importance of taking a detailed history, which includes over the counter medications that may not show up patient. in the medical record or be mentioned by the

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Acknowledgements: Thank you to our clinical librarian, Ansley Stuart, for assistance with this case.

Not Your Average Spider Bite: A Case of Complicated Loxoscelism

Anna Nelson, DO – Internal Medicine/Pediatrics Resident
Co-Author(s): Sarah McQuaide, MS4; Amelia Power, MD, MS; Derek Arrington, MS4; Klint Schwenk, MD

Introduction: In Kentucky, the Loxosceles reclusa (brown recluse spider) is one of three endemic arachnids that are venomous to humans. Its venom contains phospholipase D which can lead to tissue necrosis, platelet dysfunction, hemolysis, and renal failure. Because of the similar appearance to cellulitis, brown recluse bites are often misdiagnosed initially, allowing rare but serious complications to develop undetected until patients become critically ill. We present this case of loxoscelism in an African American male to raise awareness of not only the condition itself, but also the need for representation of brown recluse bites in patients of color (POC) to allow for timely recognition and care.

Presentation: A 17-year old African American male with a past medical history of pulmonary embolism (PE), autism spectrum disorder, and morbid obesity presented to the hospital for right shoulder pain and dyspnea for one day. On review of systems, the patient reported feeling fatigued without fever or chills. He also reported vague feelings of chest discomfort. T: 100.1° F, HR: 100, BP: 117/70, RR: 20, O2: 98% on room air. Constitutional: Morbid obesity, Pulm: Normal effort without extra sounds; diminished sounds bilateral bases. Skin: Erythema over R trapezius with small area of induration with central hyperpigmentation. EKG: sinus tachycardia with left axis deviation. CXR: no acute findings. CTA: no acute cardiopulmonary findings. US soft tissue head and neck: significant for R neck soft tissue swelling without fluid collection or solid mass. Upper and lower extremity Doppler US: negative. Labs (D-dimer 1128 ng/ML; ESR 50 mm/Hr; Total bilirubin 0.8 mg/dL; Blood cultures negative; CRP 12.7 mg/dL; Hbg 12.4 g/dL; WBC 16.7K; 87% neutrophils. Hospital Course – Day 1: admitted for cellulitis; started on empiric IV clindamycin. Day 2-3: Tmax of 103° F, increasing pain, infectious work-up negative. Abx transitioned to trimethoprim-sulfamethoxazole and cephalexin. Day 4: Persistently febrile, new diffuse nonspecific rash, new O2 requirements to 3L Abx broadened to vancomycin with PO clindamycin for anti-inflammatory. Day 5: Hematuria, elevated bilirubin, and elevated CK. Slight decrease in Hbg to 9. Day 6: Hbg down to 6.7, CRP 28.8. Rapid response called for increasing pain, signs of hemolysis, and overall clinical decompensation. Upgrade to PICU. Day 7: I&D of the wound, minimally purulent. Escalated ceftriaxone to cefepime due to persistently elevated CRP. New nosebleeds. Day 8-10: Continued to hemolyze with Hgb nadir of 5.0, required six total PRBC transfusions. Nosebleeds resolved, nasal cannula discontinued, and pain improved. Day 11: Transferred out of PICU. Day 13: IV vancomycin and cefepime course completed. Patient discharged home with mother.

Discussion: This case demonstrates how easily brown recluse bites can be misdiagnosed, commonly as cellulitis, and the rare but serious complications that can occur. As such, close monitoring for the development of hemolytic anemia when brown recluse bites are suspected is of utmost importance. Given that there is no antivenom for Loxosceles reclusa bites, supportive care is the only option available to patients. This patient received supportive clinical treatment with aggressive IV resuscitation, transfusion of red blood cells, and systemic antibiotic therapy in hopes of preventing further decline or complications from infection of the bite itself. This patient's case was complicated by a multitude of factors including a history of pulmonary emboli which may have served as a red herring when his d-dimer was elevated at presentation, morbid obesity which limited out ability to obtain additional imaging (i.e. CT scan) of the lesion to assess for progression, and autism spectrum disorder so he was unable to communicate effectively what he was experiencing. Another unforeseen factor in this case was the difficulty encountered when assessing degree of erythema and induration at the site of the spider bite due to patient's skin color and lack of images of brown recluse bites in patients of color (POC) for comparison. It is becoming increasingly apparent that medical literature and study aids do not use pictures of POC when giving examples of common dermatologic findings. In turn, this leads to delays in diagnosis and thus delays in care. By documenting this case of a brown recluse bite complicated by loxoscelism in

a POC, we aim to bring attention to the lack of representation of patients of color in medical literature.

Not Your Average Spider Bite:
A Case of Complicated Loxoscelism

UofL SCHOOL OF MEDICINE

Sarah McQuaide, MS4, Amelia Power, MD, MS, Anna Nelson, DO, Derek Arrington, MS4, Klint Schwenk, MD

NORTON Children's

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

INTRODUCTION

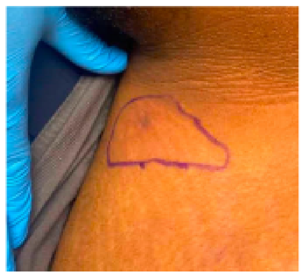
In Kentucky, the Loxosceles reclusa (brown recluse spider) is one of three endemic arachnids that are venomous to humans. Its venom contains phospholipase D which can lead to tissue necrosis, platelet dysfunction, hemolysis, and renal failure. Because of the similar appearance to cellulitis, brown recluse bites are often misdiagnosed initially, allowing rare but serious complications to develop undetected until patients become critically ill. We present this case of loxoscelism in an African American male to raise awareness of not only the condition itself, but also the need for representation of brown recluse bites in patients of color (POC) to allow for timely recognition and care.

PRESENTATION

A 17-year-old African American male with a past medical history of pulmonary embolism (PE), autism spectrum disorder, and morbid obesity presented to the hospital for right shoulder pain and dyspnea for one day. On review of systems, the patient reported feeling fatigued without fever or chills. He also reported vague feelings of chest discomfort.

T 100.1°F, HR 100, BP 117/70, RR 20 O2: 98% on room air

Constitutional: Morbid obesity
Pulm: Normal effort without extra sounds; diminished sounds bilateral bases
Skin: Erythema over R trapezius with small area of induration with central hyperpigmentation (Fig 1)



DIAGNOSTICS

IMAGING

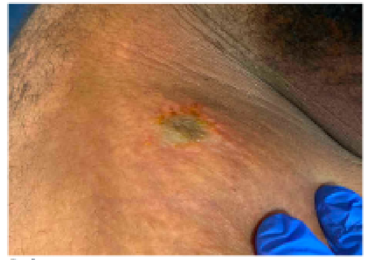
- **EKG**: sinus tachycardia with left axis deviation
- **CXR**: no acute findings
- **CTA**: no acute cardiopulmonary findings
- **US soft tissue head and neck**: significant for R neck soft tissue swelling without fluid collection or solid mass
- **Upper and lower extremity doppler US**: negative

LABS

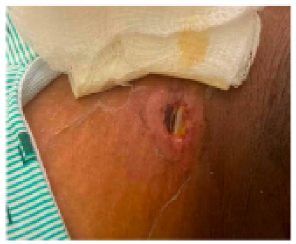
D-dimer	1128 ng/mL
ESR	50 mm/Hr
Total bilirubin	0.8 mg/dL
Blood cultures	negative
CRP	12.7 mg/dL
Hbg	12.4 g/dL
WBC	16.7K; 87% neutrophils

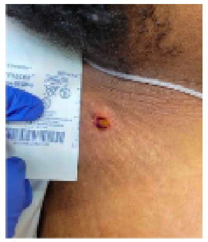
HOSPITAL COURSE

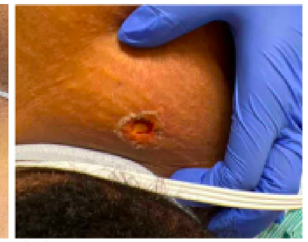
- **Day 1:** Admitted for cellulitis; started on empiric IV clindamycin
- **Day 2-3:** Tmax of 103°F, increasing pain. Infectious work-up negative. Abx transitioned to trimethoprim-sulfamethoxazole and cephalexin. Skin findings are shown in figure 2.
- **Day 4:** Persistently febrile, new diffuse nonspecific rash, new O2 requirements to 3L. Abx broadened to vancomycin with PO clindamycin for anti-inflammatory.
- **Day 5:** Hematuria, elevated bilirubin, and elevated CK. Slight decrease in Hbg to 9.



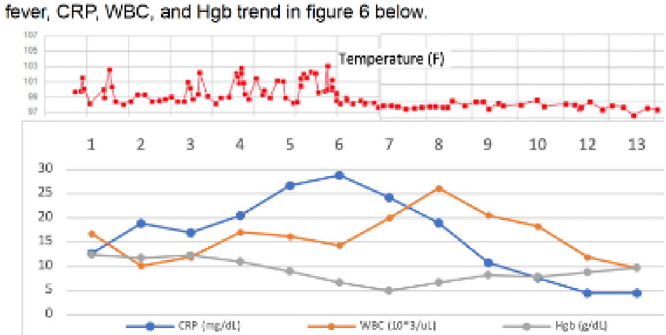
- **Day 6:** Hbg down to 6.7, CRP 28.8. Rapid response called for increasing pain, signs of hemolysis, and overall clinical decompensation. Upgrade to PICU.
Skin exam pictures below in figure 3, 4, and 5.







- **Day 7:** I&D of the wound, minimally purulent. Escalated ceftriaxone to cefepime due to persistently elevated CRP. New nosebleeds.
- **Day 8-10:** Continued to hemolyze with Hgb nadir of 5.0, required six total PRBC transfusions. Nosebleeds resolved, nasal cannula discontinued, and pain improved.
- **Day 11:** Transferred out of PICU.
- **Day 13:** IV vancomycin and cefepime course completed. Pt discharged home with mother.
Full fever, CRP, WBC, and Hgb trend in figure 6 below.



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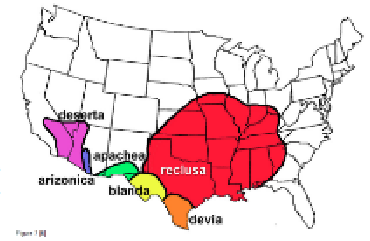

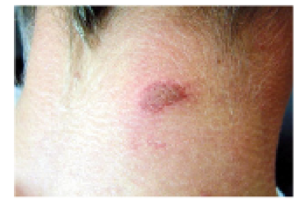

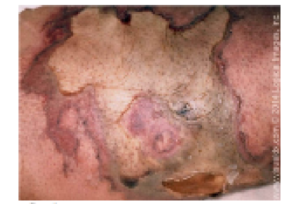

Facts about brown recluse spider (Figure 8):

- They're synanthropic, meaning they increase as the surrounding human population increases
- Generally, only bite when cornered: not intrinsically aggressive
- Bites (Figure 9 and 10) thought to be more likely to cause hemolysis in children than in adults
- Not well documented treatments, so care is supportive

This patient's case was complicated by a multitude of factors including a history of pulmonary emboli which may have served as a red herring when his d-dimer was elevated at presentation, morbid obesity which limited our ability to obtain additional imaging (i.e. CT scan) of the lesion to assess for progression, and autism spectrum disorder so he was unable to communicate effectively what he was experiencing.
Another unforeseen factor in this case was the difficulty encountered when assessing degree of erythema and induration at the site of the spider bite due to the patient's skin color and lack of images of brown recluse bites in patients of color (POC) for comparison. It is becoming increasingly apparent that medical literature and study aids do not use pictures of POC when giving examples of common dermatologic findings (note above images are of patients with white skin). In turn, this leads to delays in diagnosis and thus delays in care. By documenting this case of a brown recluse bite complicated by loxoscelism in a POC, we aim to bring attention to the lack of representation of patients of color in medical literature.

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Outcomes of Hypothermic Young Infants Presenting in the Outpatient General Pediatric Setting

Rebecca Von Handorf, MD – Pediatric Resident
Co-Author(s): Sheridan Langford, MD; Sara Multerer, MD

Introduction: Infants under 28 days are a vulnerable pediatric population. They have an immature immune system and have typically only received one immunization, placing them at risk for negative outcomes following infection. Febrile infants have been extensively studied with protocols created to guide health care providers on the work up for infection and antibiotic treatment in this population. Hypothermia, defined as an axillary temperature of less than 36.5°C, can also be a presenting symptom of serious infection in young infants. There have been studies evaluating the management and outcomes of hypothermic infants in the emergency department setting and inpatient setting, however, few studies have evaluated hypothermic infants in the outpatient setting. The objectives of this study are to identify outcomes of patients who presented to a pediatrician in the outpatient setting and to identify if offices are utilizing common laboratory testing to work-up patients for infections. This will provide further guidance to pediatricians as well as prognostic information for young infants with hypothermia.

Methods: This study is a single-center, retrospective chart review including pediatric patients aged 0-28 days seen in a Norton Children's Medical Group Office between July of 2020 to June of 2023. Data abstracted included name, date of birth, weight at visit, age at visit, race, gender, medical record number, insurance status, primary and secondary diagnoses, birth history, and prematurity. Relevant laboratory data, if obtained, were also reviewed including CBC, urinalysis, RFP or CMP, total bilirubin, CRP, procalcitonin, blood cultures, and urine cultures. Outcomes were manually reviewed to determine if patient had any office interventions, were discharged home, referred to the emergency department, or referred for admission to the hospital. Descriptive data analysis was performed.

Results: The initial query resulted in 1,113 unique patients. The cohort was narrowed to include only patients with a temperature less than 36 C, resulting in a sample of 99 patients. The mean temperature was found to 35.37 C. The mean GA was 37.53 weeks. The mean encounter weight was 2.63 kg. Of these patients that were seen for hypothermia, 81 (81.8%) were referred to an emergency department or direct hospital admission. 18 (18.2%) were not referred to the emergency department. There was no significant difference in mean temperature, encounter weight, or gestational age at birth between patients who were referred to the ED versus those who were not. Of the 99 patients that were studied, only 4 (4.04%) were found to have a pathologic diagnosis that was not hyperbilirubinemia. Additionally, only 16 (16.2%) patients had lab work-up obtained at the outpatient office. 7 of these patients had abnormal laboratory results in the office. All of these abnormal laboratory results were elevated bilirubin.

Conclusions: While the final statistical analysis is not complete, there do not appear to be clinically or statistically significant differences in characteristics of patients who were referred to the ED/admission from the outpatient setting than those who were not. As noted in previous studies of inpatient and ED settings, the incidence of serious bacterial infection or other pathologic diagnoses in well-appearing, hypothermic infants appears to be low. There does not appear to be a significant relationship between degree of hypothermia and whether a patient was referred to the ED or not.

Outcomes of Hypothermic Young Infants Presenting in the Outpatient General Pediatric Setting

Von Handorf, Rebecca, MD; Langford, Sheridan MD; Multerer, Sara, MD
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

Management of febrile infants (< 30 days) has been extensively studied, but hypothermia is also a common presenting symptom.

Management/outcomes of hypothermic infants in the ED and inpatient settings has been documented, but few studies have explored management of hypothermic infants in the outpatient setting.

OBJECTIVES

- Describe outcomes of patients < 29 days who presented in the outpatient setting with temperatures <36.5°C
- Identify frequency of use of common laboratory testing to work-up patients for infection

METHODS

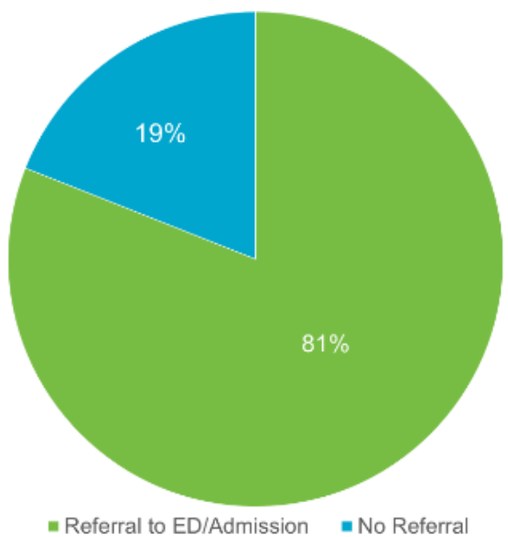
- Retrospective chart review of pts aged 0-28 days seen in a Norton Children's Medical Group office between June of 2020-July of 2023

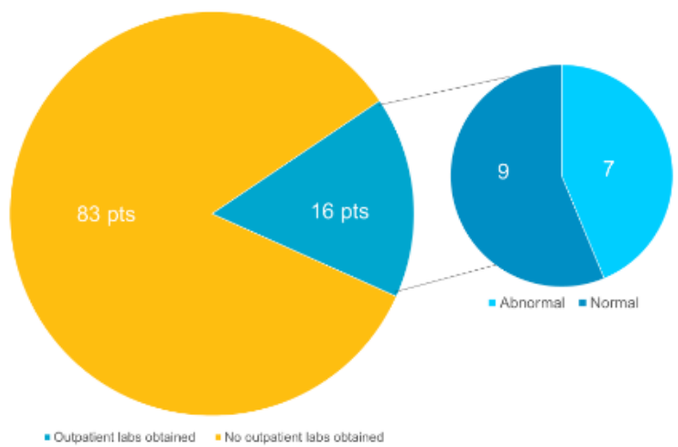
- **Data abstracted**
  - Name, MRN, race, gender
  - DOB, age at visit
  - Insurance status
  - Primary and secondary diagnoses
  - Birth history, prematurity
- **Lab values abstracted**
  - CBC
  - RFP/CMP
  - Total bilirubin
  - CRP
  - Procalcitonin
  - Blood culture
  - Urine culture, urinalysis

RESULTS

Initial Query: 1,113 Patients → Patient temp <36°C → Final cohort of 99 patients

- Mean temperature of 35.37 °C
- Mean gestational age of 37.53 weeks
- Mean encounter weight of 2.63 kg
- 81.8% referred to ED/direct admission, 19.2% sent home
- Only 4 patients (4.04%) were found to have a pathological diagnosis excluding hyperbilirubinemia. One of those being pyelonephritis.
- 16 patients (16.2%) had lab work-up obtained in the outpatient setting with 7 of those patients having abnormal lab results





CONCLUSIONS

Final statistical analysis is still pending.

- There do not appear to be any clinically or statistically significant differences in characteristics in patients referred to ED/admission.
- Incidence of serious bacterial infection or other pathologic diagnoses in well-appearing, hypothermic infants appears to be low.
- Minimal outpatient lab work-up is obtained prior to referral to ED/Admission aside from total bilirubin
- There does not appear to be a significant relationship between degree of hypothermia and whether a patient was referred to the ED or not

Immune Dysregulation as a Manifestation of Primary Immunodeficiency

Jessica Nelms, MD – Pediatric Resident

Introduction: Immunodeficiency is a relatively rare condition. Primary immunodeficiencies (PIDs) predispose those they affect to infection and to allergy, autoimmunity and inflammation. This combination of features, known collectively as immune dysregulation, may assist clinicians in identifying PIDs earlier.

Case: 1yo male with history of T-cell mediated immunodeficiency sent to ED for evaluation of pancytopenia found by his PCP. Initial CBC notable for WBC 2.6, hemoglobin 6.2 and platelets 81. On physical exam patient was noted to be macrocephalic and with hepatomegaly. Patient admitted to hematology-oncology service.

Due to pancytopenia, patient was evaluated for oncologic process. CBC confirmed pancytopenia and ANC of 0. Imaging revealed hepatosplenomgaly and diffuse lymphadenopathy. Bone marrow biopsy was not consistent with malignancy, but further work-up showed CMV IgG and IgM + which was thought to be etiology of symptoms. 12 days later, patient re-presented w/ worsening abdominal distension. Abdominal XR revealed persistent hepatosplenomegaly, hilar adenopathy and moderate stool burden. Patient again found to be pancytopenic and admitted to heme-onc service. Lymph node biopsy and repeat bone marrow biopsy revealed atypical lymphocytic process consistent with Rosai-Dorfman (RD) Disease. He was initially treated with steroids, but with worsening symptoms switched to Clofarabine and later Vinblastine and Trametinib. He initially seemed to have a good response to combination therapy but had significant disease progression about 6 months later. Patient found to have ITPR3 variant which was thought to be cause of immunodeficiency. Patient transferred to Nationwide for alpha/beta T cell depleted haplo bone marrow transplant.

Discussion: ITPR3 variants are extremely rare with only a handful of case reports currently published. ITPR3 is a gene encoding IP_3R subtype 3. The inositol 1,4,5-trisphosphate receptor (IP_3R) has been found to amplify lymphocyte signaling by releasing Ca^{2+} from endoplasmic reticulum stores following antigen stimulation. One study, involved 2 patients with immunodeficiency provided evidence showing that inherited variants in *ITPR3* alter physiologically relevant Ca^{2+} signaling responses, driving defects in immune responses (1). After many studies and various specialists' involvement from around the country, it is now believed that the patient's atypical lymphohistiocytic process is due to the underlying immunodeficiency and immune dysregulation rather than primary Rosai-Dorfman disease or other histiocytosis. Interestingly, presence of lymphohistiocytic infiltration is a consistent finding in HLH but this patient did not fit clinically (3).

Immune dysregulation is still an ever-evolving subject with many facets still unknown. There is evidence that it has been reported in all major categories of inborn errors of immunity (2). Understanding immune dysregulation may help in recognition and diagnosis of primary immunodeficiencies more swiftly and with greater confidence. Rather than presenting with recurrent or more severe infections, patients more often present with immune dysregulation. An acronym GARFIELD has been introduced as a way to categorize the main manifestations of immune dysregulation in PIDs. It stands for "granuloma, autoimmunity, recurring fever, lymphoproliferation and intestinal disease." However, the acronym by no means encompasses all dysregulatory phenotypes. This case is just one example of PID being implicated in systemic lymphoproliferation. It is unsurprising that the patient did not respond as expected to the therapies for primary histiocytosis. It can be postulated that if the patient's symptoms and phenotypic presentation were considered as manifestations of patient's underlying T cell immunodeficiency, the patient may have been brought to the appropriate treatment, bone marrow transplant, more speedily.

Conclusion: This case demonstrates the importance of diagnostic skepticism as well as the utility in recognizing a constellation of features as suggestive of primary

immune disease. While this case was rare, with the advancements in medical treatment and care, more of these patients will survive into adulthood. It is therefore, of the utmost importance that recognition and diagnosis are made to ensure the best possible outcomes.

Immune Dysregulation as a Manifestation of Primary Immunodeficiency

Jessica Nelms

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BACKGROUND

Primary immunodeficiencies (PIDs) predispose patients to infection, allergy, autoimmunity and inflammation. Together, this constellation is known as "immune dysregulation."

The swift and accurate recognition and diagnosis of various PIDs has been shown to meaningfully reduce the risk of organ damage.

TREATMENT

Steroids → Clofarabine → Vinblastine + Trametinib → Stem Cell Transplant

THE CASE

1yo male with T-cell medicated immunodeficiency presented for evaluation of pancytopenia identified by primary physician

- Initial CBC: WBC 2.6, Hb 6.2, platelets 81

Physical Exam:

- Macrocephaly, hepatomegaly

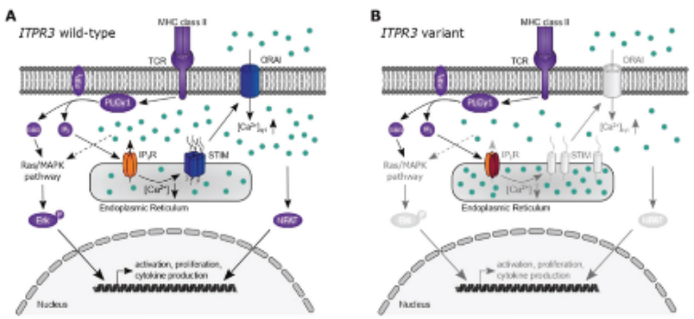
Multiple admissions with work-up including:

- CT chest/abd/pelvis with extensive lymphadenopathy
- Bone marrow biopsies not consistent w/ malignancy
- Initially + for CMV

Ultimately lymph node biopsy, repeat BM biopsy:

- Atypical lymphocytic process consistent with Rosai-Dorfman (RD) Disease.
- PET scan: extensive lymphadenopathy of head, neck, chest, abdomen and pelvis with mildly elevated metabolic activity consistent with RD.

DISCUSSION



Dysfunctional T-cell activation- this is now believed to be cause of patient's atypical lymphohistiocytic process

Clinicians can remember the acronym GARFIELD as a way to categorize the main manifestations of immune dysregulation in PIDs:

COURSE OF ILLNESS

After initial treatment on steroids, improved but had quick recurrence with weaning of steroids.

Improved further on Vinblastine + Trametinib but 6 months later, worsening progression

Found to have ITPR3 variant, likely cause of immunodeficiency

Ultimate tx: alpha/beta cell T-cell depleted haplo BMT

CONCLUSIONS

This case demonstrates the importance of diagnostic skepticism as well as the utility in recognizing a constellation of features as suggestive of primary immune disease.

Early recognition and diagnosis of rare disorders may lead to improved outcomes.

Myocardial Bridge in a Child with Cardiac Arrest and Ventricular Fibrillation: A Bridge Over Troubled Water?

Bill Ngha, MD – Pediatric Resident
Co-Author(s): Trey McHale, MD; Joshua Kurtz, MD; Deborah Kozik, MD; Christopher Johnsrude, MD; Soham Dasgupta, MD

Background: A myocardial bridge is a congenital cardiac anomaly involving a band of overlying myocardial tissue that compresses a coronary artery during ventricular systole, potentially impairing coronary blood flow and precipitating sudden cardiac death. Myocardial bridges have been found to be incidental in patients with other medical conditions; their exact prevalence is unknown in the pediatric population.

Clinical Case: A 12-year-old male with no past medical history was found unresponsive at home. The patient was found to be in ventricular fibrillation and was defibrillated by EMS. Upon arrival, in the ED, had elevated troponin levels and decreased systolic function (EF 45%). Cardiac Cath showed a dynamic obstruction concerning for suggestive of a myocardial bridge. Repeat cardiac Cath with intravascular ultrasound and fractional reserve showed minimal coronary compression and no changes in coronary flow. Transvenous dual-chamber implantable cardioverter-defibrillator was placed and the patient was discharged home on nadolol.

Discussion: Despite initial concern for a myocardial bridge of the left anterior descending artery, further testing determined it to be insignificant in causing coronary insufficiency. Myocardial bridges are quite prevalent and have been found in autopsies but there is limited information about the pediatric. Advanced genetic testing in our patient showed a missense mutation associated with hypertrophic cardiomyopathy. The idiopathic ventricular fibrillation is likely due to cardiac channelopathy or the pre-structural phase of cardiomyopathy.

Myocardial Bridge in a Child with Cardiac Arrest and Ventricular Fibrillation: A Bridge Over Troubled Water?

Bill Ngha, Trey McHale, Joshua Kurtz, Deborah Kozik, Christopher Johnsrude, Soham Dasgupta

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Background

A myocardial bridge is a congenital cardiac anomaly involving a band of overlying myocardial tissue that compresses a coronary artery during ventricular systole, potentially impairing coronary blood flow and precipitating sudden cardiac death. Myocardial bridges have been found to be incidental in patients with other medical conditions; their exact prevalence is unknown in the pediatric population.

Clinical Course

- 12 yo male no PMHx found unresponsive at home
- CPR performed within two minutes. EMS recorded ventricular fibrillation and defibrillated within ten minutes of the event (figure 1)
- Intubated/sedated in ED. Initial EKG with sinus tachycardia and non-specific ST-T wave abnormalities (figure 1a)
- Echo: dyskinetic LV wall motion, decreased systolic function (EF 45%)
- Labs: *** 0.387 ng/mL (normal < 0.03 ng/mL), which normalized after 2 days; BNP was normal on presentation
- Cardiac MRI shod no evidence of a scar; cardiac catheterization was repeated using intravascular ultrasound and fractional flow reserve. Minimal coronary compression was seen at rest with no changes during IV dobutamine administration and no changes in coronary flow
- Cardiac cath recorded normal hemodynamics; angiography showed dynamic obstruction in the mid-portion of the left anterior descending artery suggestive of myocardial bridge. (figure 2)
- A transvenous dual-chamber implantable cardioverter-defibrillator was implanted, discharged home on nadolol
- Two weeks later, pt experienced sustained ventricular tachycardia at rest and was started on Mexiletine 150mg three times a day.

Clinical Course

Figure 1

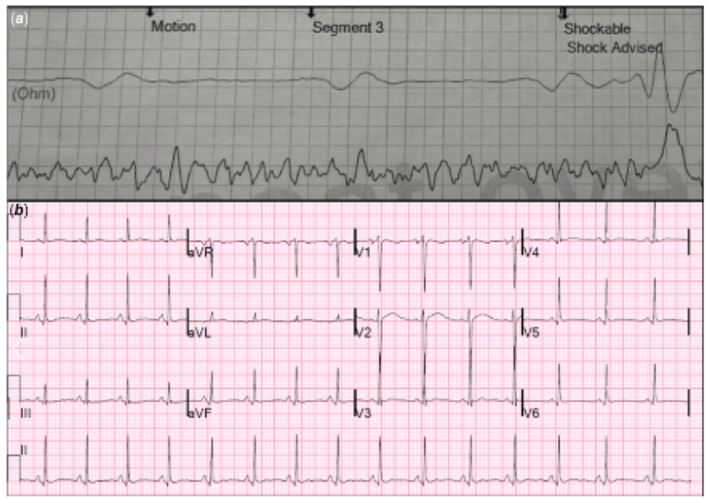


Figure 1 (a) Automated External Defibrillator (AED) strip demonstrated ventricular fibrillation at the time of sudden cardiac arrest in our patient. (b) initial post-resuscitation 12 lead electrocardiogram demonstrating sinus tachycardia and non-specific ST-T wave abnormalities

Figure 2

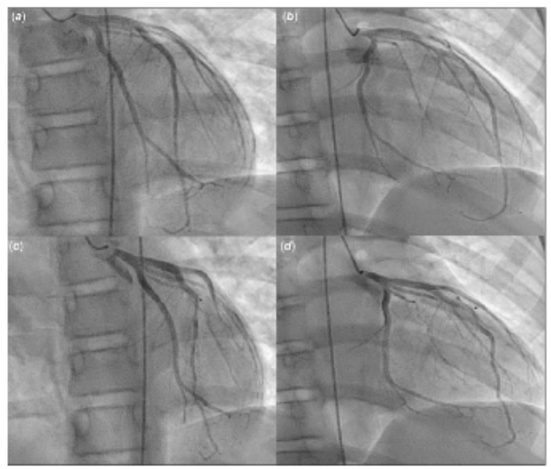


Figure 2 (a) Selective left coronary artery angiogram in straight anterior posterior (a, c) and 30 degrees right anterior oblique (b,d). (a, b) A widely patent left coronary artery system with no obvious stenosis, aneurysm, ectasia. The same left coronary artery system in systole revealing discrete compression in the mid left coronary anterior descending artery due to the myocardial bridge

Discussion

Despite initial concern for myocardial bridge of the left anterior descending artery during cardiac cath, further testing determined to be insignificant in causing coronary insufficiency.

Myocardial bridges are quite prevalent
- --15-85% reported at autopsy
- --0.5- 16% by coronary angiography
- --3.5-38.5% by coronary CT angiography

There is limited information on myocardial bridges in children. Common symptoms include chest pain.

Limited cases reported of syncope/ cardiac arrest:
- --Intravascular ultrasound in case series show coronary compression/abnormal coronary flow, improved following surgical unroofing.
- --US in this pt without these abnormalities confirmed the bridge was unlikely to cause coronary insufficiency and surgery was not indicated.

Advanced genetic testing in our patient found a missense variant of the MYH7 gene which has been seen in hypertrophic cardiomyopathy.

Conclusion

This case presents a case of sudden cardiac arrest in a young male whose initial testing revealed a myocardial bridge which was determined to be an incidental finding. Genetic testing has remained nonconclusive and the idiopathic ventricular fibrillation is likely due to cardiac channelopathy or the pre-structural phase of cardiomyopathy.

Assessing pediatric residents' attitudes towards and comfort with social media in healthcare

Paris Yamek, MD, MPH – Pediatric Resident
Co-Author(s): Brit Anderson, MD

Background: The role of social media in healthcare has exponentially increased over the last several years. There is variable evidence to support the use of social media to affect health outcomes. There is even less data regarding resident physician use of social media related to healthcare. Eight in Ten internet users seek health information online, more than 70% of which search on social media for such information.

Methods: An original, online questionnaire created by the study team was distributed electronically between June 5, 2024 and June 12, 2024. Survey consisted of 20 items in three blocks. Basic demographic information including training program, training year, and current career plans; Pediatric residents' utilization of social media in various contexts as well as perceived benefits and barriers to use in a professional capacity; Residents' perception of the need for special media-specific education during residency. Objective data analyzed using descriptive statistics.

Conclusion: Many pediatric residents engage with social media, but few utilize it professionally. Perceived barriers include harm to professional image, time commitment, potential legal consequences, and lack of knowledge on how to create content. Nearly 75% of pediatric residents agree that education regarding social media use for health purposes would be beneficial. Significant opportunity for intervention to help residents become the best advocates for their patients and for their communities.

Assessing pediatric residents' attitudes towards and comfort with social media in healthcare

Paris Yamek, MD, MPH; Brit Anderson, MD

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

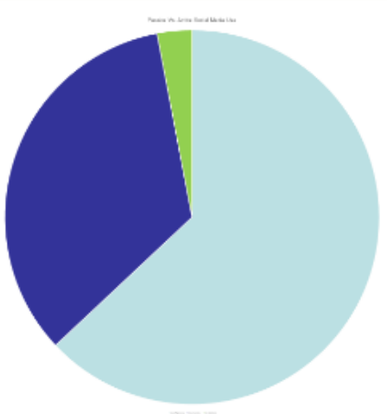
BACKGROUND

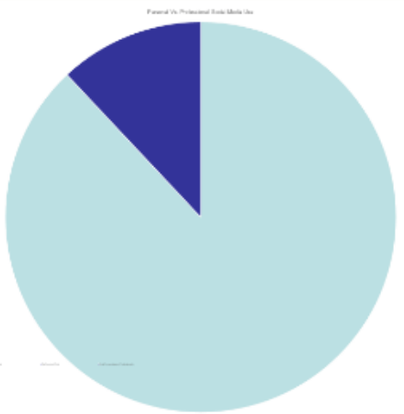
- The role of social media in healthcare has exponentially increased over the last several years
- There is variable evidence to support the use of social media to affect health outcomes
- There is even less data regarding resident physician use of social media related to healthcare
- 8 in 10 internet users seek health information online, more than 70% of which search social media for such information

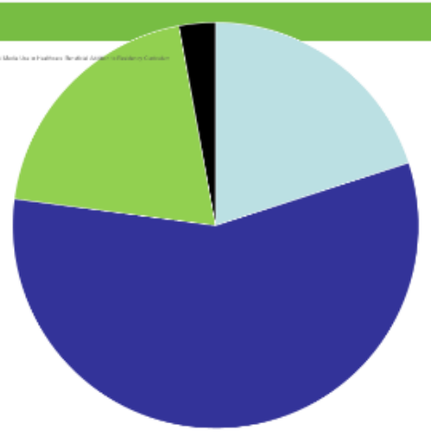
METHODS

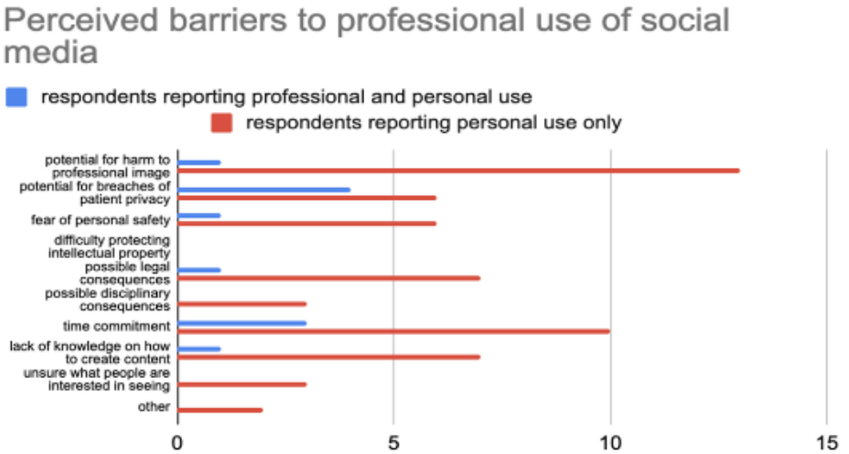
- An original, online questionnaire created by the study team was distributed electronically between 6/5/24 and 6/12/24. Survey consisted of 20 items in three blocks
  - Basic demographic information including training program, training year, and current career plans
  - Pediatric residents' utilization of social media in various contexts as well as perceived benefits and barriers to use in a professional capacity
  - Residents' perception of the need for special media-specific education during residency
- Objective data analyzed using descriptive statistics

RESULTS









CONCLUSIONS

- Many pediatric residents engage with social media, but few utilize it professionally. Perceived barriers include harm to professional image, time commitment, potential legal consequences, and lack of knowledge on how to create content.
- Nearly 75% of pediatric residents agree that education regarding social media use for health purposes would be beneficial.
- Significant opportunity for intervention to help residents become the best advocates for their patients and for their communities.

The Utility of Laboratory Workup for Pediatric Patients who present to the Emergency Department with Chief Complaint of Seizure

Emily Allen, DO, MBA – Pediatric Resident
Co-Author(s): Stacy Henley; Sean Woods; Kerry Caperall, MD, MS, MBA

Background: Seizures are a common presenting complaint to the emergency department (ED). While work up for children who present with seizures is clinician dependent, indiscriminate lab ordering carries risks, including false positive/negative results, patient pain and distress, and derangement in laboratory workflow.

Objective: To determine frequency and type of labs ordered for children presenting to the ED with seizures, to determine how frequently labs directed emergent interventions, and to characterize the effect of labs on the time to patient disposition.

Design/Methods: This was a retrospective chart review of patients aged 2 months-18 years presenting to a large, academic children's hospital ED with seizure. Patients who were transferred from an outside facility were excluded. We identified demographic data, whether/what labs were ordered, reasons for ordering labs, diagnosis and treatments provided, and length of stay (LOS). This data was used to determine whether lab tests directly resulted in an active intervention in patient care. We compared LOS for patients with/without labs via standard descriptive statistics.

Results: On Preliminary data review, we identified 652 patients presenting with seizure from July 1, 2021-November 30, 2021; 94 were excluded. Of the 558 patients included, 263 patients had basic labs collected, either a complete metabolic panel (CMP), complete blood count (CBC), or both. Documented reasons for lab collection included none (49.43%), neurology requested (23.57%), severe seizure/critical patient presentation (12.17%), sepsis concern (9.13%), and known metabolic disorder (2.66%). The most common derangements were hyperglycemia (39%), neutrophilia (35%), and lymphopenia (31%). Notably, there were a few cases of hypoglycemia (1.9%), hyponatremia (0.76%), and hypomagnesemia (0.38%); none required emergent intervention. Lab derangements impacted medical decision making in only eight patients (6 for neutrophil %, 2 for hypocalcemia), two of which had known metabolic disorders. The mean ED LOS for patients with labs collected was 396 minutes vs. 254 minutes in patients without labs ($p<0.001$). Data review is ongoing for patients who presented between December 1, 2021-June 30, 2022.

Conclusion: In pediatric patients presenting with seizures, routine lab testing rarely demonstrated significant abnormalities. Work up for pediatric patients who present with seizure should be guided by the history and physical exam findings, and patients with known metabolic disorders warrant laboratory evaluation and electrolyte replacement as needed.

The Utility of Laboratory Workup for Pediatric Patients who present to the Emergency Department with Chief Complaint of Seizure

Emily Allen, DO, MBA, Stacy Henley, Sean Woods, Kerry Caperell MD, MS, MBA

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

Seizures are a common chief complaint in the pediatric emergency department (PED), comprising 1% of visits.

Work up is largely clinician dependent and varies significantly by provider and location. However, indiscriminate lab ordering may lead to erroneous results, patient pain and distress, and derangement in laboratory workflow.

The aim of this study was to evaluate frequency of lab ordering in pediatric patients who present to the ED with a chief complaint of seizure and to determine if those labs contributed to patient management.

METHODS

Retrospective chart review of patients aged 2 months to 18 years of age who presented to the PED at a large academic children's hospital with seizure from July 1, 2021, to June 30, 2022.

Transfers from outside facilities were excluded.

We identified demographic data, labs ordered, reasons for ordering labs, diagnosis and treatments provided, length of ED stay (LOS), and disposition.

We compared LOS and disposition for patients with/without labs via standard descriptive statistics.

RESULTS

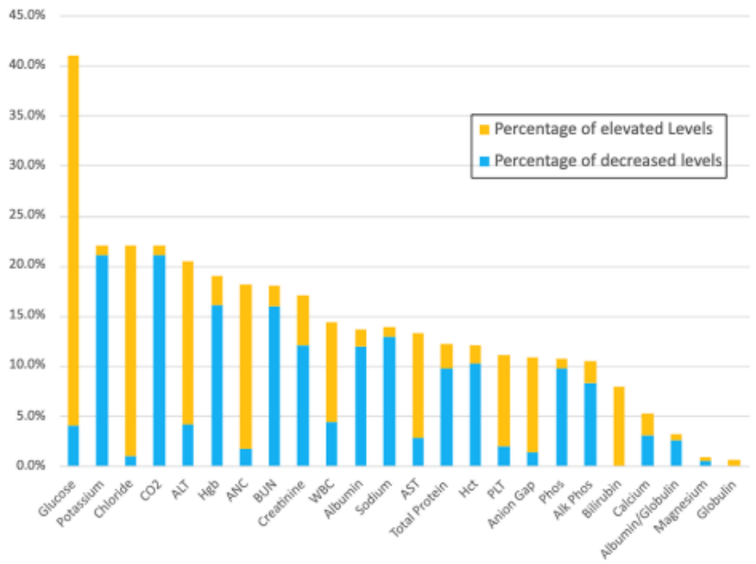


Figure 1: Bar graph depicting the total percentages of individual lab derangements

Table 1: Length of Stay analysis between subjects with labs and without labs. Subjects who had labs drawn had statistically significant longer length of stay (P<0.001)

LOS	No labs	labs
mean	239 min	356 min
SD	174	240

Independent samples 2-tailed t test; p<.001, indicating significance

Table 2: Logistic regression with disposition as dependent variable and age, sex, and labs as independent variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Sex(1)	-.045	.127	.123	1	.725	.956	.746	1.227
	Age	-.039	.011	11.722	1	<.001	.962	.940	.983
	Were labs done?(1)	2.219	.131	288.097	1	<.001	9.195	7.117	11.880
	Constant	-.752	.127	35.236	1	<.001	.471		
Step 2[a]	Age	-.039	.011	11.614	1	<.001	.962	.940	.984
	Were labs done?(1)	2.218	.131	288.069	1	<.001	9.191	7.114	11.875
	Constant	-.779	.102	58.627	1	<.001	.459		

a. Variable(s) entered on step 1: Sex, Age , Were labs done?.

1,564 total subjects reviewed -> 233 excluded (transfers from outside facilities). 597/1331 (44.9%) of included patients had labs collected: CMP, CBC, or both.
Most frequently documented reasons for labs included:

- None (43.05%)
- Neurology Requested (23.28%)
- Severe seizure/critical patient presentation (12.56%)
- Sepsis concern (9.21%)
- Metabolic concern (7.04%)

Lab derangements were noted in 564 subjects. Of those, the most common were

- Hyperglycemia (37%)
- Hypokalemia (21%)
- Hyperchloremia (21%)
- Low CO2 (21%)
- Neutrophilia (16.4%)

Lab derangements impacted medical decision making in 26 subjects:

- 16 subjects received antibiotics
- 5 subjects received IV dextrose
- 3 subjects received IV calcium replacement
- 1 subject required further imaging

Of those requiring intervention, males were 2.6 times more likely to require intervention than females (p=0.04)

Mean ED LOS for subjects with labs collected was significantly longer (356 minutes) than those without labs collected (239 minutes) (p<0.001).

CONCLUSIONS

In pediatric patients presenting with seizures, routine lab testing rarely demonstrated significant abnormalities and led to a significantly longer ED LOS. Additionally, subjects who had labs drawn were more likely to be admitted to the hospital than those without labs.

Work up for pediatric patients who present with seizure should be guided by the history and physical exam findings. Patients with known metabolic disorders warrant laboratory evaluation and electrolyte replacement as needed

Do Caregivers Consider ED Providers a Trustworthy Source of Information Related to COVID-19 Vaccine Decision-Making Compared to Primary Care Providers?

Chandni Patel, MD and Allison Marks, MD – Pediatric Residents
Co-Author(s): Erin Lawrence; Rebecca Hart, MD, MSc

Background: While COVID-19 vaccines are safe and effective, vaccine hesitancy is common. Studies suggest vaccine uptake is greater when recommended by a trusted primary care provider. Little is known about the level of trust families have in pediatric emergency medicine (EM) providers related to vaccine recommendations.

Methods: Cross-sectional survey of caregivers presenting with their child to an urban, academic pediatric emergency department. Exclusion criteria for non-English speaking, <6 months, critical medical condition/high fever, concern for abuse or neglect. Survey questions: Demographics, presence of a primary physician (PCP), and COVID vaccination history; Level of trust in PCP/PEM providers in general, and as sources of information for COVID-19 vaccines. Proportion of caregivers with high levels of trust compared with those with lower levels of trust. Associations between trust and demographic/other factors evaluated using chi-squared analysis.

Strengths/Limitations: Sample size, inability to include non-English speaking families. Higher acuity patients were excluded, and these patients may be more likely to have complex medical conditions who have caregivers that trust the ED providers more and are more likely to obtain the COVID-19 vaccines.

Conclusion(s): Caregivers had a high level of trust in both ED providers and PCP's in general and for information about COVID-19 vaccines. Caregivers demonstrated high levels of trust in PCP's regarding COVID-19 vaccines compared to an ED provider. No specific factors were associated with an increased level of trust in ED providers regarding COVID-19 vaccines.

Do Caregivers Consider ED Providers a Trustworthy Source of Information Related to COVID-19 Vaccine Decision-Making Compared to Primary Care Providers?

Chandni Patel MD; Allison Marks MD; Erin Lawrence; Rebecca Hart MD, MSc

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

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METHODS

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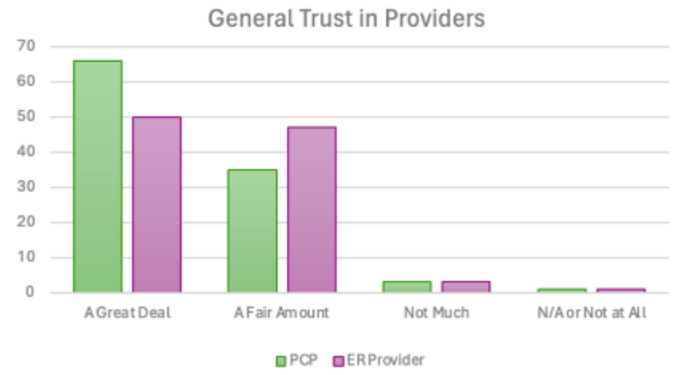
Exclusion criteria: non-English speaking, < 6 months, critical medical condition/high fever, concern for abuse or neglect.

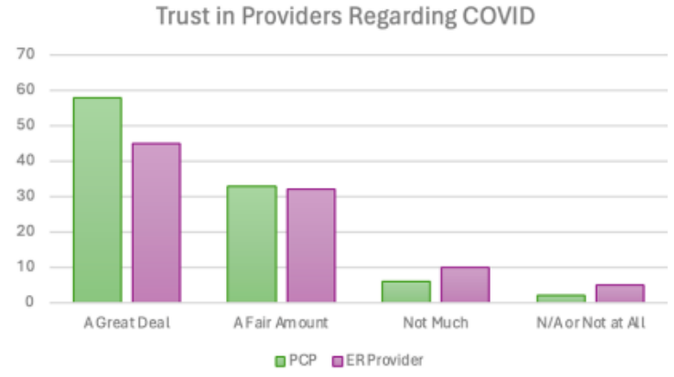
Survey questions:

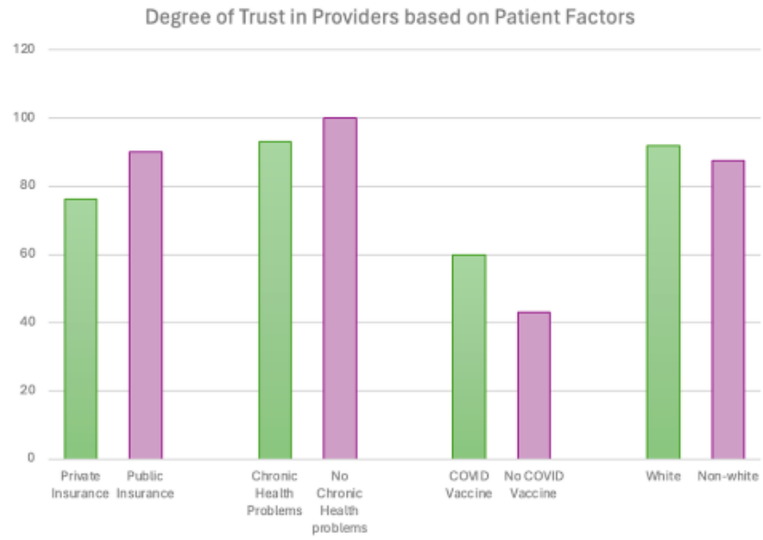
- Demographics, presence of a primary physician (PCP), and COVID vaccination history
- Level of trust in PCP/PEM providers in general, and as sources of information for COVID-19 vaccines.

Proportion of caregivers with high levels of trust compared with those with lower levels of trust. Associations between trust and demographic/other factors evaluated using chi-squared analysis.

RESULTS







STRENGTHS/LIMITATIONS

Sample size, inability to include non-English speaking families. Higher acuity patients were excluded, and these patients may be more likely to have complex medical conditions who have caregivers that trust the ED providers more and are more likely to obtain the COVID-19 vaccines.

CONCLUSIONS

Caregivers had a high level of trust in both ED providers and PCPs in general and for information about COVID-19 vaccines.

Caregivers demonstrated higher levels of trust in PCPs regarding COVID-19 vaccines compared to an ED provider.

No specific factors were associated with an increased level of trust in ED providers re: COVID-19 vaccines.

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Caregiver Perceptions, Experiences, and Satisfaction with Applied Behavioral Analysis in Kentucky

Madison Farley, MD – Pediatric Resident
Co-Author(s): Kimberly Schauder, PhD; Katelyn Rossow, MD; Stephanie Battistini, MD; Theresa Kluthe, MS; Maria Mendoza, MD

Background: Although applied behavior analysis (ABA) therapy is one of the few evidence-based interventions for children with autism spectrum disorder (ASD), varying perceptions of and experiences with this intervention exist. Few studies have evaluated the availability of these services in the state of Kentucky, which is a largely rural population. We sought to identify barriers that families face in accessing ABA, determine the level of satisfaction with ABA therapy if utilized, and identify caregiver considerations regarding the pursuit of ABA for children in Kentucky and Southern Indiana.

Methods: An electronic survey was distributed to 2,552 families with a child designated as having an ASD diagnosis in the electronic health record at the largest free standing children's hospital in Kentucky The survey included demographics (including location of residence and education level); questions related to caregiver knowledge and interest in pursuing ABA as a treatment option; factors that may have influenced their decision about whether to pursue ABA as a treatment option; and their experience with ABA if they ultimately decided to pursue it. Data was visualized and analyzed within Excel. Main analyses of interest were conducted in the full sample and in a subsample of respondents who participated in ABA therapy.

Results: A total of 213 caregiver surveys were included for analysis (8.3% response rate). 53% of respondents obtained at least a bachelor's degree and 13% had less than a high school diploma or GED. Respondents were distributed across the state of Kentucky and southern Indiana; 57% resided in the main metropolitan county (Jefferson). Within the full sample of 213 participants, 129 (60%) chose to pursue ABA therapy and 84 (40%) did not. No single demographic factor, initial knowledge of ABA, nor doctor's recommendation was associated with overall decision making on choice of therapy. Forty percent of all participants (79/129 who pursued ABA, 21/89 who did not pursue ABA) endorsed that their own research was the factor that most strongly influenced their decision. Other factors that strongly influenced at least 25% of respondents included a child's prior participation in other therapies, cost, time, and their doctor's recommendation. Participants who pursued ABA therapy were more strongly influenced by all possible factors than those who did not (Figure 1a).

Conclusion: A family's initial interest in ABA was the only factor we studied that contributed significantly to ultimate decision making around whether to pursue ABA. It appears critical that providers understand the information that families may have accessed prior to receiving an ASD diagnosis and utilize a shared decision-making process when providing recommendations. When families did pursue ABA services, families in this study indicated a high level of satisfaction.

Caregiver Perceptions, Experiences, and Satisfaction with Applied Behavioral Analysis in Kentucky

Madison Farley, Kimberly Schauder, Katelyn Rossow, Stephanie Battistini, Theresa Kluthe, Maria Mendoza

Norton Children's and the University of Louisville School of Medicine

Louisville, Kentucky

BACKGROUND

Applied behavior analysis (ABA) therapy is one of the few evidence-based interventions for children with autism spectrum disorder (ASD), but varying perceptions of and experiences with this intervention exist.

Few studies have evaluated the availability of or satisfaction with these services in the state of Kentucky.

METHODS

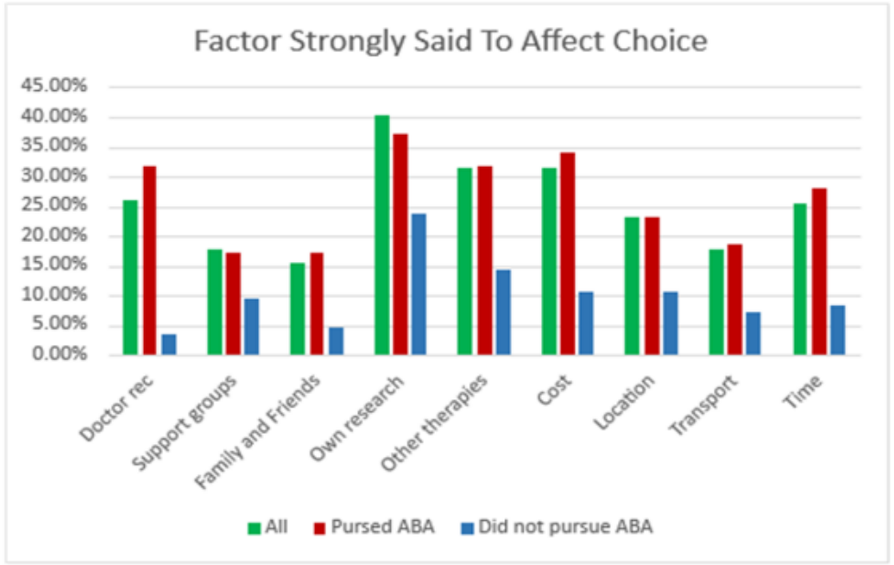
An electronic survey was distributed to families with child(ren) with ASD, identified through EHR (n = 2,552)

Survey questions included:

- Demographics (location of residence, education level)
- Caregiver knowledge about ABA
- Interest in pursuing ABA as a treatment option
- Factors influencing decision to pursue ABA (or not)
- Experience with ABA(if applicable).

Standard descriptive statistics used for demographics and to report proportion of families pursuing ABA therapy as well as common reasons for therapy choices. Factors associated with choice of therapy were evaluated.

RESULTS



213 caregiver surveys obtained (8.3% response rate).

- 129 (60%) ABA therapy, 84 (40%) no ABA

Demographics:

- 53% bachelor's degree or higher
- 13% < high school diploma or GED
- Respondents distributed across KY and southern IN
  - 57% reside in the main metropolitan county

No single demographic factor, initial knowledge of ABA, nor doctor's recommendation was associated with overall decision making on choice of therapy.

40% of all participants said personal research was most influential factor in their decision making

- 79/129 who pursued ABA, 21/89 who did not

Other factors influencing 25%+ of respondents included:

- Child's prior participation in other therapies
- Cost
- Time
- Doctor's recommendation.

CONCLUSIONS

A family's initial interest in ABA was the only factor we studied that contributed significantly to ultimate decision making around whether to pursue ABA.

Providers should understand what information families may have accessed prior to receiving an ASD diagnosis and utilize a shared decision-making process when providing recommendations.

When families did pursue ABA services, families in this study indicated a high level of satisfaction.

SAT – 712: Association of Quality of Life and Age at Diagnosis in Women with Turner Syndrome

Gerald Julian, DO – Pediatric Resident
Co-Author(s): Yana Feygin, MS; Theresa Kluthe, MS; Lisal Folsom, MD, MS

Background: There is a well-documented association between chronic disease and decreased quality of life (QoL), including in women with Turner syndrome (TS). While existing research in women with Turner syndrome establishes the finding of decreased QoL; fewer studies explore potential etiologies for this finding. Health-related QoL (HRQOL) has been evaluated using the HRQOL 14, a validated measure of QoL, in individuals >12 years of age as part of National Health and Nutrition Examination Survey (NHANES). The primary objective of our study was to investigate the relationship between health related QoL (HR-QoL) in women with TS and age of TS diagnosis (AoD). A secondary aim included identification of correlations between medical treatment history and HRQOL.

Methods: This was a cross-sectional, prospective survey study. Inclusion criteria encompassed a documented diagnosis of TS, a documented office visit within the past 2 years, and participant age of at least 18 years at time of study initiation. Exclusion criteria included lack of a confirmed diagnosis of TS, presence of other diseases known to influence stature or pubertal development, inability to understand the survey, lack of ability to read or speak English, and diagnosis of TS within the past year. QoL was assessed and reported using the HRQOL 14 survey. Demographics (including mean of diagnosis) were reported using standard descriptive statistics. We compared HRQOL results between patients with early AoD (< 13 years) vs. late AoD (> 12 years).

Results: Thirty participants completed the study out of 84 qualifying individuals. Twenty-four participants met criteria for early AoD; six met criteria for late AoD. The mean age for early diagnosis was 6 years and the mean age for late diagnosis was 23 years. The early AoD group reported fewer medical problems (3.6 vs. 6.2 other medical problems, p=0.009), was less likely to state lack of sufficient sleep (4.5 vs. 30 days, p=0.001), and was less likely to note days of limited physical activity due to pain (1 vs. 15 days, p=0.007).

Conclusions: The association of earlier AoD and fewer medical problems helps to open exploration that other diseases may be preventable or manageable when TS is diagnosed earlier. There is possibility for improved interventions and better care with earlier diagnosis.

SAT – 712: Association of Quality of Life and Age at Diagnosis in Women with Turner Syndrome

Gerald Julian, DO; Yana Feygin, MS; Theresa Kluthe, MS; Lisal Folsom, MD, MS

Norton Children's, Norton Healthcare, University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- Chronic disease is known to be associated with decreased quality of life (QoL)
- Previous studies have documented factors including depression, self-esteem, and income to be strong predictors of QoL
- Existing research demonstrates decreased health-related QoL in women with Turner syndrome (TS), however contributing influences require additional exploration
- Our objective was to investigate the relationship between QoL in women with TS and age of TS diagnosis

METHODS

- Women with TS followed by providers within our healthcare system identified using EMR-based search and limiting criteria
- Cross sectional, survey-based study
- QoL assessed using HRQOL 14
- Median and IQR used to describe non-normally distributed data
- Data analysis included Kruskal-Wallis test, ANOVA, and Fisher's exact test
- **Inclusion criteria**
  - Diagnosis of TS
  - ≥18 years of age
  - Office visit within past 2 years
- **Exclusion criteria**
  - Inability to confirm diagnosis of TS
  - Other diagnoses known to influence stature or pubertal development
  - Inability to read or understand survey in English
  - TS diagnosed within the past year

RESULTS

Table 1:
Survey responses stratified by age of diagnosis:
Early (≤ 12 years)
Late (≥ 13 years)

[1]Kruskal-Wallis test, [2]ANOVA, [3]Fisher's exact test

	Overall	Early diagnosis	Late diagnosis	p
Number of participants	30	24	6	
Mean age at diagnosis (SD)	9.45 (9.6)	6 (5.3)	22.8 (11.2)	
For how many days during the past 30 days did you have these symptoms:				
Poor physical health (median [IQR])	26.0 [0.0, 7.0]	2.0 [0.0, 3.3]	10.0 [1.0, 15.0]	0.192[1]
Poor mental health (median [IQR])	3.0 [2.0, 10.0]	3.0 [2.0, 10.0]	2.5 [0.0, 11.8]	0.636[1]
Unable to do usual activities (median [IQR])	0.0 [0.0, 3.5]	0.0 [0.0, 2.5]	0.0 [0.0, 5.3]	0.757[1]
Pain prevents usual activities (median [IQR])	2.0 [0.0, 6.5]	1.0 [0.0, 5.0]	15.0 [9.0, 18.8]	0.007[1]
Sad, blue, or depressed (median [IQR])	1.0 [0.0, 3.8]	1.0 [0.0, 3.0]	2.0 [0.0, 8.5]	0.701[1]
Worried, tense, or anxious (median [IQR])	4.5 [0.5, 13.0]	4.5 [1.5, 11.0]	6.0 [0.5, 13.8]	0.875[1]
Not enough rest or sleep (median [IQR])	9.0 [1.3, 23.0]	4.5 [0.0, 15.0]	30.0 [30.0, 30.0]	0.001[1]
Very healthy and energetic (median [IQR])	15.0 [2.0, 25.0]	20.0 [6.5, 25.8]	1.5 [0.3, 4.3]	0.019[1]
Number of medical problems (mean (SD))	4.1 (2.3)	3.6 (1.7)	6.2 (3.1)	0.009[2]
Are you limited due to health problem = Yes (%)	12 (40.0)	8 (33.3)	4 (66.7)	0.184[3]
For how long have your activities been limited (median [IQR])	8.00 [2.0, 20.0]	8.0 [2.0, 15.0]	12.0 [3.3, 20.0]	0.695[1]
Require help with personal care = Yes (%)	3 (10.0)	1 (4.2)	2 (33.3)	0.094[3]
Require help with routine activities = Yes (%)	5 (16.7)	3 (12.5)	2 (33.3)	0.254[3]
PT/OT/Speech = Yes (%)	16 (53.3)	12 (50.0)	4 (66.7)	0.657[3]
IEP or 504 plans = Yes (%)	11 (36.7)	9 (37.5)	2 (33.3)	>0.9993
Counseling or therapy = Yes (%)	13 (43.3)	11 (45.8)	2 (33.3)	0.672[3]
General health (%)				0.333[3]
Best	3 (10.0)	3 (12.5)	0 (0.0)	
Good	8 (26.7)	8 (33.3)	0 (0.0)	
Okay	10 (33.3)	7 (29.2)	3 (50.0)	
Poor	8 (26.7)	5 (20.8)	3 (50.0)	
Bad	1 (3.3)	1 (4.2)	0 (0.0)	

STRENGTHS/LIMITATIONS

- **Strengths**
  - Good participant recall of information
  - High participation rate for those able to be contacted
  - Novel findings related to HRQoL
- **Limitations**
  - Smaller sample size
  - Chart review not performed to confirm additional medical diagnoses
  - Survey-based study with potential for recall bias

CONCLUSIONS

- Earlier age of diagnosis of TS is associated with fewer medical diagnoses in adulthood
- Adult women with TS diagnosed earlier in life reported better sleep and less pain
- Establishing the diagnosis earlier in life may allow for more effective management of additional health concerns, improving quality of life in individuals with Turner syndrome

Changes in Pulmonary Artery Size over Time and Outcomes after the Fontan Operation

Joshua Lee, MD – Pediatric Resident
Co-Author(s): Iona Palmer, MD; A Nicole Lambert, MD; Arturo Hussein, MD; Jawad Kahir, MD; Joshua D Kurtz, MD

Introduction: Identification of diastolic dysfunction (DD) in patients with single ventricle physiology after Fontan palliation is often challenging and requires right heart catheterization with or without rapid volume expansion (RVE). Unlike in patients with a biventricular circulation, non-invasive measures of diastolic function are not well validated. We hypothesized that echocardiographic measures of diastolic function would be associated with invasive measures of DD after RVE in patients with a Fontan circulation.

Methods: In this single center, retrospective study we examined Fontan patients with Doppler echocardiogram within 6 months of completing routine right heart catheterization with RVE from 8/17/20 to 11/22/21. Echocardiographic measures of ventricular function were measured from the dominant ventricle and demographic data were collected. Diastolic dysfunction (DD) was defined as a post-bolus ventricular end-diastolic pressure (VEDP) of at least 15mmHg or >20% increase from baseline and greater than 12 mmHg. Differences between groups was determined using Mann-Whitney U test or Fisher's exact where appropriate, correlation between variables was measured using Spearman's rho.

Results: Patients < 5 years post Fontan procedure at the time of catheterization were excluded. A total of 20 patients were examined. Baseline demographic data, hemodynamic data, and echocardiographic data are reported in table 1. Out of 20 patients, 10 (50%) were identified to have DD. Patients with DD demonstrated significantly higher lateral E:e' and longer deceleration times compared to patients without DD (p=0.034, p=0.016). Patients with DD had significantly higher Fontan pressures, pulmonary capillary wedge pressures (PCWP), and VEDP before and after RVE compared to patients without DD. Cardiac index (CI) was significantly lower before and after RVE in patients with DD compared to without DD (p=0.02, p=0.004). However, there was no difference in transpulmonary gradient and pulmonary vascular resistance between the groups. Furthermore, post RVE Fontan pressure and VEDP were significantly higher than pre-bolus pressures in patients with DD (p=0.006, p=0.005). Baseline Fontan pressure, PCWP, VEDP, and CI were negatively correlated with pVO2 via MST (p = 0.019, p=0.022, p=0.048) and duration of Fontan to catheterization was positively correlated with VEDP (p = 0.015). There was a negative correlation between DD and CI before and after RVE (p=0.014, p= 0.002). In multivariable logistics regression DD dysfunction was independently associated with a decrease in CI before and after RVE.

Conclusion: Diastolic dysfunction in patients with a Fontan circulation was associated with changes in lateral E:E' and deceleration time. Abnormal diastolic function was independently associated with a lower CI regardless of pulmonary vascular resistance or transpulmonary gradient. Large multi-center studies are needed to better define invasive and non-invasive measures of DD.

Changes in Pulmonary Artery Size over Time and Outcomes after the Fontan Operation

Iona Palmer[1], A Nicole Lambert[1,2], Joshua Lee[1], Arturo Hussein[1], Jawad Kahir[1], and Joshua D Kurtz[1,2]
[1]University of Louisville, Louisville Kentucky, [2]Norton Children's Hospital, Louisville, Kentucky

BACKGROUND

The Fontan circuit requires patent, large pulmonary arteries (PA) to facilitate passive flow.

We aimed to assess at all palliative stages, the relationship between 1) pre-Glenn pulsatile flow and PA size and 2) PA size and post Fontan outcomes.

METHODS

Examination of patients undergoing Fontan palliation from 01/2011-10/2021 at our center.

Nakata index and McGoon ratio were calculated to represent PA size at all stages. The combined primary endpoint included protein losing enteropathy, plastic bronchitis, NYHA class 3+, transplant, or death.

Mann-Whitney U, χ^2, or Fishers exact test were used to compare differences between groups. Logistic or linear regression was used to identify associations.

RESULTS

74 patients at a median of 5.8 years from Fontan were analyzed.

Differences in PA size by the combined outcome are shown in the figure.

Regression showed a larger McGoon index prior to the Fontan was associated with lower risk of the combined outcome (OR = 0.2, p = 0.04) and pulsatile PA flow prior to the Glenn was associated with larger Nakata index at all stages (β = 92.6, p < 0.01; β = 49.97, p < 0.01; β = 43.62, p = 0.02).

RESULTS

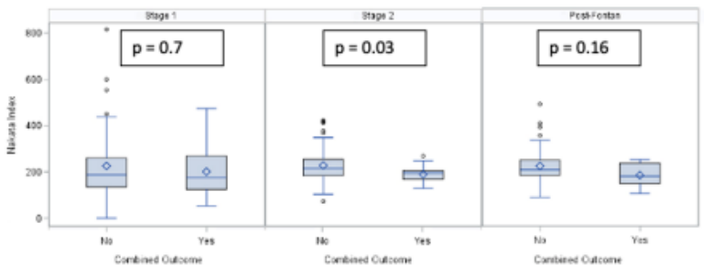


Figure 1: Box plots comparing presence or absence of combined outcome by the pulmonary artery size based on Nakata index stage 1 (pre-Glenn), stage 2 (Pre-Fontan), and post-Fontan.

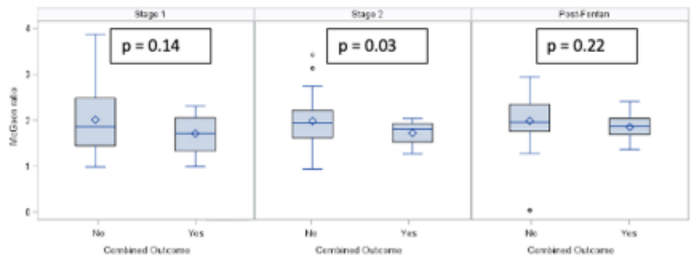


Figure 2:Comparing the pulmonary artery size based on McGoon ratio at stage 1 (Pre-Glenn), stage 2 (Pre-Fontan), and post-Fontan for combined and non-combined outcome groups.

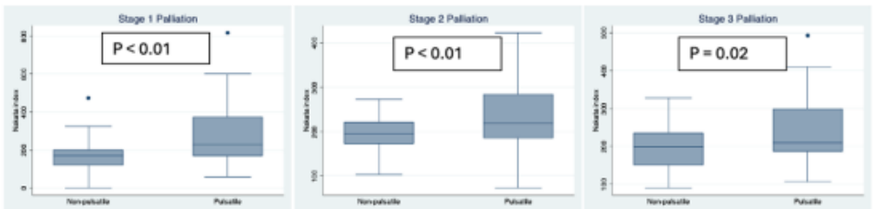


Figure 3: Box plots comparing pulmonary artery size size at each stage of palliation based on presence or absence of pulsatile pulmonary blood flow prior to stage 2. Note scales are different at each stage.

CONCLUSIONS

Pulsatility prior to the Glenn was associated with larger PAs.

Fontan patients who developed heart failure, transplant, or death had smaller PAs prior to the Fontan.

Larger McGoon index prior to the Fontan was associated with improved outcome. Larger sample and longer follow up is needed to determine the true impact of PA size on outcomes.

DISCLOSURES

None of the authors have any financial conflicts of interests or disclosures.

Are We Missing Disordered Eating Behaviors in the Pediatric Type 1 Diabetes Population?

Victoria Thompson, DO – Pediatric Resident
Co-Author(s): Lisal Folsom, MD, MS

Introduction: Eating disorders contribute to significant morbidity and mortality in the pediatric population. Disordered eating behaviors (DEB) are more prevalent in children with type 1 diabetes mellitus (T1D) compared to the general population. The risk of complications from DEB in those with T1D is higher and includes diabetic ketoacidosis (DKA), increased risk of long-term complications associated with poor glycemic control, and death. DEB have been associated with co-morbid depression; the PHQ-9 is a common clinical screening tool for this diagnosis. The m-SCOFF is a validated 5-question assessment tool developed to identify pediatric patients with T1D who may be at risk for DEB.

Objectives: The objectives are to establish the prevalence of positive screening for depression and DEB (based on m-SCOFF and PHQ-9 questionnaires) in patients with T1D at a pediatric endocrinology clinic over a 3-month time period, and to explore similarities and differences in the populations that screen positive on the m-SCOFF, PHQ-9, or both. The goal is to improve recognition of individuals at increased risk for adverse outcomes secondary to DEB.

Methods: 770 pediatric patients aged 10 years and above with T1D who presented to an urban outpatient pediatric endocrinology clinic were screened over a 3-month time frame. Screening tools included the m-SCOFF and the PHQ-9. Proportion of patients who screened positive on one or both assessments were reported using standard descriptive statistics. Gap analysis of patients who screened positive for DEB on m-SCOFF but did not screen positive on PHQ-9 was performed.

Results: 16.8% of participants screened positive for DEB on the m-SCOFF. 15.1% screened positive for depression on the PHQ-9. Of those with positive screening for DEB, 42% were also found to have positive depression screening. Not all patients with positive DEB screening had positive depression screening, and not all with positive depression screening had positive DEB screening. In this population, screening solely for depression would have missed 58% of the patients with DEB.

Conclusions: Limiting co-morbidity screening in patients with T1D to depression failed to identify 58% of patients with DEB. Additional screening tools should be implemented to identify patients at risk for DEB and adverse outcomes associated with DEB in pediatric patients with T1D.

Are We Missing Disordered Eating Behaviors in the Pediatric Type 1 Diabetes Population?

Victoria Thompson, DO, Lisal Folsom, MD, MS
Norton Children's, University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- **Disordered eating behaviors (DEB)** include a variety of irregular eating behaviors that may or may not warrant a diagnosis of a specific eating disorder
- **Prevalence of DEB:**
  - Adolescent females with diabetes are 2.4 times more likely to meet DSM-IV criteria for an eating disorder[2]
  - Up to 60% of pediatric patients with type 1 diabetes (T1DM) report insulin restriction[3]
- DKA rate is over 3 times higher in patients with T1DM AND an eating disorder: 112.5 per 1000, compared to rate of DKA in T1DM alone: 30.8 per 1000
- Withholding insulin in T1DM triples **mortality rate**

METHODS

- Site: Urban outpatient pediatric endocrinology clinic
- Study Design: 5-question screening tool for disordered eating (m-SCOFF) and PHQ-9
- Population: Adolescents and young adults ages 10-29 years, screened over 3-month time period
- Data collection included: demographics, most recent HgbA1c, BMI, screening tools
- Statistical analysis included gap analysis of patients who screened positive for DEB and screened negative for depression

DEMOGRAPHICS AND DATA

Patient Demographics	
Average Age	15.7 years
% Female	50.6%
Average A1c	8.6%
Average A1c for those who screened positive for DEB	9.3%
Average BMI	24.6 kg/m^2
Average BMI for those who screened positive for DEB	26.5 kg/m^2

	M-SCOFF Screening Tool Questionnaire	Number of Positive Responses	% of Positive responses with question (+) alone	% of Positive responses with this and another (+)
1.	Do you make yourself sick because you feel uncomfortably full?	21	39%	39%
2.	Do you worry you have lost control of how much you eat?	74	50%	39%
3.	Have you lost more than 14 pounds in a 3-month period?	39	52%	29%
4.	Do you believe yourself to be fat when others say you are too thin?	57	43%	40%
5.	Do you take less insulin than you should?	43	61%	27%

RESULTS

Positive depression screen

15.1% of patients screened positive on PHQ-9

Positive DEB screen

16.8% of patients screened positive on m-SCOFF

Positive depression + DEB screens

Of the patients screening positive on m-SCOFF, **42%** also screened positive on PHQ-9

- 770 patients screened for disordered eating behaviors (DEB) over the course of 3 months
- Patients concurrently screened for depression
- 6.4% screened positive for DEB **and** depression
- Of those who screened positive for DEB, 42% of those screened positive for depression
- **Solely screening for depression would have missed 58% of those with DEB**

CONCLUSIONS

- BMI was higher in those screening positive for DEB (**26.5 kg/m^2 vs. 24.6 kg/m^2**), p <0.05
- The average HgbA1c was higher in those screening positive for DEB (**9.3% vs. 8.6%**), p >0.05
- Although similar percentages of patients screened positive for depression (15.1%) and DEB (16.8%), only 6.4% had positive screening for both
- Screening for solely for depression would have missed **58%** of those who screened positive for DEB
- **Next Steps:** plan for more in-depth assessment of patients who screen positive for DEB with Diabetes Eating Problems Survey-Revised (DEPS-R) for further evaluation of DEB to allow for accurate diagnosis and appropriate treatment

REFERENCES

Acknowledgement to Ryan Dyess, MD

For list of references, please see separate Works Cited.