The Use of Complementary Therapies for the Reduction of Prescribed Opiate Morphine Milligram Equivalents in Patients Receiving Treatment for Chronic Pain with Comorbid Mood Disorders: A Retrospective Study

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Objective

- The objective of this study was to show that the use of psychotropic medications, behavioral health therapy, osteopathic manipulative therapy, or the combinations thereof, would lower the required total morphine milligram equivalents (MMEs) in patients with chronic pain and a comorbid mood disorder.

Background

- In a 2019 National Health Interview Survey, 50.2 million adults (20.5%) reported that they experienced chronic pain.
- About 20% of people who have chronic pain have a comorbid mood disorder.
- Studies have shown longer-term opioid use in adults with mood disorders.
- Generalized anxiety disorder affects 6.8 million adults or 3.1% of the U.S. population, yet only 43.2% are receiving treatment. There often exists a co-occurrence of major depressive disorder.
- Despite this strong co-occurrence, limited research exists on the best approach to managing chronic pain that is comorbid with a mood disorder.
- Many psychotropic medication classes have been shown to be effective in reduction of inflammation, treatment of nerve pain, and the treatment of osteoarthritis.
- Additional therapies such, osteopathic manipulative therapy (OMT) has been shown to be safe and effective for the management of chronic pain.
- There are inadequate studies to explore the efficacy of individual and combination non-opiate therapies for chronic pain.

Methods

- This is a retrospective study of patients within a rural outpatient primary care setting who had an active diagnosis of chronic pain between the dates of January 01, 2021 and July 31, 2021.
- Patients were further assessed for a comorbid mood disorder defined as depressive disorders (MDD) (ICD 10 codes: F33.0-F33.9) and anxiety disorders (GAD) (ICD 10 codes: F41.0-F41.9).
- 211 patients were included. 57 had a comorbid mood disorder.
- Additional treatment modalities were controlled for including psychotropic medication commonly prescribed for MDD and GAD; behavioral health therapy (BHT) as defined as an appointment with a licensed professional counselor, licensed clinical social worker, or psychiatric physician; and osteopathic manipulative therapies (OMT).
- BHT and psychotropic medications were not controlled for separately due to the BHT only group being significantly underpowered.
- The primary outcome was the average MMEs prescribed per month in those with and without a comorbid mood disorder.

Results

Table 1

Average MMEs when controlling for different treatment modalities

		n	MME, mean	*P-value* *
Comorbid Mood Disorder		57	31.26	
No Comorbid Mood Disorder		154	16.44	0.002
All Patients		211		
	Treatment**	121	24.08	
	No Treatment**	90	15.56	0.046
	OMT	31	6.72	
	NO OMT	180	22.81	0.006
	Treatment** + OMT	17	7.09	
	Treatment** + no OMT	104	26.85	0.035
Patients With a Comorbid Mood Disorder		57		
	Treatment**	49	31.76	
	No Treatment**	8	28.24	0.836
	OMT	6	4.25	
	NO OMT	51	34.44	0.111
	Treatment** + OMT	5	1.5	
	Treatment** + no OMT	44	35.2	0.123
Patients Without a Comorbid Mood Disorder		154		
	Treatment**	82	14.32	
	No Treatment**	72	18.85	0.224
	OMT	25	7.31	
	NO OMT	129	18.21	0.03
	Treatment** + OMT	12	9.42	
	Treatment** + no OMT	60	20.74	0.171

*One Factor ANOVA
**Treatment represents psychotropic medications and/or behavioral health

Table 2

Average prescribed MMEs when controlling for different psychotropic medications

		n	MME, mean	*P-value* *
Comorbid Mood Disorder		57	31.26	
No Comorbid Mood Disorder		154	16.44	0.002
Patients With a Comorbid Mood Disorder		57		
Psychotropic Medication				
	SSRI	36	37.13	0.175
	SNRI	27	30.55	0.908
	TCA	6	22.25	0.599
	Antipsychotic	13	36.06	0.658
	Benzodiazepine	27	44.19	0.033
Patients Without a Comorbid Mood Disorder		154		
Psychotropic Medication				
	SSRI	38	20.02	0.271
	SNRI	29	26.09	0.012
	TCA	7	15.36	0.899
	Antipsychotic	19	19.74	0.507
	Benzodiazepine	23	21.63	0.242

*One Factor ANOVA

Conclusions

- Patients with a comorbid mood disorder required significantly more MMEs to control their chronic pain.
- Contrary to expected outcome, augmenting with any complementary treatment modality did not result in significant reduction in total MMEs among patients with a comorbid mood disorder; although, the groups could be underpowered.
- Additionally, when assessing all patients, patients receiving BHT and/or psychotropic medications required significantly higher total MMEs.
- When controlling for different psychotropic medications among those with a comorbid mood disorder, those receiving benzodiazepine medications required significantly higher total MMEs; whereas, the addition of SNRI medications resulted in significantly lower MMEs among patients without a comorbid mood disorder.
- Importantly, the addition of OMT to both patients with and without a comorbid mood disorder is associated with a significantly or near significant reduction in required MMEs.

Discussion

- The association of higher MMEs and the addition of psychotropic medications and/or BHT likely is not a causal relationship but a display that chronic pain patients with comorbid mood disorders tend to experience pain that is more difficult to control.
- This is likely demonstrated when controlling for the use of benzodiazepines and its association with significantly higher MMEs.
- SNRIs are an important augmenting medication among patients without a comorbid disorder.
- OMT could be used as a viable treatment both for chronic pain and mood disorders. In fact, research on therapeutic touch and its association with improvement in depressive symptoms has been demonstrated.
- A multimodal and multidisciplinary approach to pain and mood disorders should be pursued and could be a viable option in helping combat the opiate epidemic.

Limitations

- Because this is a retrospective study, ongoing prospective study is warranted.
- It is unknown what targeted behavioral health therapies were implemented when being treated by LPCs, LCSWs, or psychiatrists.
- To date, there still exists limited published data on the efficacy of OMT for chronic pain and the use of therapeutic touch for mood disorders. Further research could show important and cost effective ways to manage both.

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Maternal influence of HPV vaccine uptake and hesitancy: A cross-sectional analysis of the 2020 National Immunization Survey (NIS)

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BACKGROUND

- Human Papillomavirus (HPV) is one of the most common sexually transmitted infections.[1] HPV infections are associated with 4.8% of all human cancers and pose a significant increase in morbidity and mortality.
- Mothers have been shown to be highly involved in their children's healthcare decisions, especially with regards to HPV vaccination.[2]
- Factors associated with HPV vaccine receipt or rejection have been well characterized, but specific maternal characteristics driving uptake among teens have not been fully explored.

OBJECTIVES

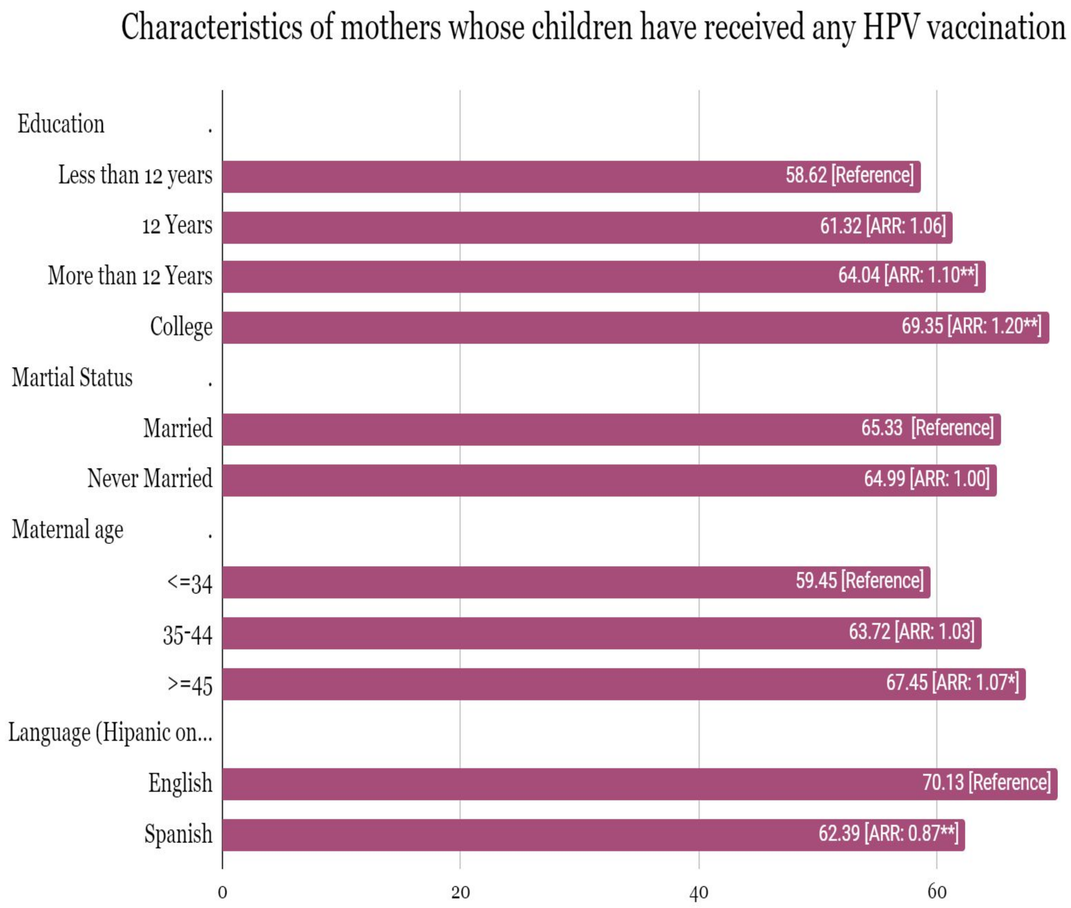
- This study aims to examine maternal characteristics influencing teen vaccine uptake and intent to vaccinate.
- Our secondary aim is to assess whether these factors could inform targeted recommendations to improve HPV vaccine uptake among teens.

METHODS

- We performed a cross sectional analysis of the 2020 National Immunization Surveys (NIS) data.[3]
- We constructed logistic regression models to determine any associations, via relative risk ratios (RRR),[4] between child vaccination status and maternal characteristics and then intent to vaccinate a child within the next 12 months.
- We then conducted a sub-group analysis among Hispanic mothers by language (English or Spanish).

RESULTS

- Our results show that among parents of adolescents and teens aged 13-17, maternal education and advanced maternal age were the strongest predictor of a child having received any HPV vaccine. (Figure 1)
- Intent to have a child vaccinated within the next year was higher among mothers with less education compared to college-educated mothers. (Figure 1)
- Our sub-analysis found a slight difference in vaccination status between english and spanish speaking parents. (Figure 1)



CONCLUSION

- Vaccination against HPV has been shown to be safe and confer excellent protection against high risk oncogenic phenotypes.
- Understanding maternal characteristics associated with HPV vaccine hesitancy is necessary for creating targeted approaches to improve vaccine uptake in their children.

SIGNIFICANCE OF FINDINGS

- Vaccination rates being lowest among children of less-educated mothers suggest potential socioeconomic barriers that are affecting uptake rather than attitudes or beliefs about the vaccine.
- Younger mothers might have lower perceived benefit from vaccination compared to older mothers because of lack of personal exposure to once devastating illnesses.
- Proper counseling to mothers through the use evidence-based information and shared-decision making could potentially increase vaccine uptake in children.
- Public health promotion efforts and increased accessibility to vaccination could serve to alleviate some of the socioeconomic barriers and increase vaccine uptake.

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Surgical Diagnosis of Bilateral Ectopic Pregnancies: A Case Report

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Abstract

Bilateral ectopic pregnancies, a rare type of heterotopic pregnancy, occur in about 1 in 200,000 pregnancies and 1 in 725 to 1,580 ectopic pregnancies (1). Given the increased number of women undergoing assisted reproductive technology (ART) to achieve fertility, there are a growing number of bilateral ectopic pregnancies being diagnosed. Surgical treatment of bilateral ectopic pregnancies may include linear salpingostomy versus salpingectomy. A less utilized treatment includes direct methotrexate injection into the bilateral fallopian tubes. This case report will detail a bilateral ectopic pregnancy that was diagnosed surgically and confirmed by pathology. The patient desired future fertility, requiring two separate laparoscopic salpingectomies for the most conservative treatment. This led to the diagnosis of the contralateral ectopic pregnancy several days following the initial ectopic pregnancy, which has occurred in multiple other case reports, even delaying diagnosis up to several weeks (5).

Introduction

- Ectopic pregnancies are a rare occurrence, with an incidence of approximately 1-2% of all pregnancies (6).
- The most common location for ectopic pregnancies to occur is in the fallopian tube, more specifically in the ampulla.
- There are approximately 250 literature cases of bilateral ectopic pregnancies (2).
- Bilateral ectopic pregnancies can further be divided into primary, meaning they are spontaneous in nature, or secondary, meaning they were achieved during the process of assisted reproductive technology (ART).
- Bilateral ectopic pregnancies are most commonly diagnosed at time of laparoscopy or laparotomy.
- Transvaginal ultrasound in conjunction with serum beta-HCG are rarely diagnostic of bilateral ectopic pregnancy, however are useful for treatment monitoring and ruling out intrauterine pregnancies or heterotopic pregnancies.
- Surgical treatment may involve bilateral salpingectomy, however treatment should be tailored for each patient's desire for future fertility.

Case Report

- Patient is a 34 year old G2P0020 Caucasian female who presented to the emergency department with intermittent abdominal pain for one week. She reported her first day of her last menstrual period was on 4/26/21 and had a positive home pregnancy test on 5/28/21. Had visited the ED one week prior and beta HCG was noted to be 5,658 mIU/mL. Transvaginal ultrasound was performed and revealed a small gestational sac within the uterine cavity, without fetal pole or yolk sac.
- Patient was sexually active with intentions to conceive. Abdominal exam was remarkable for mild guarding and right lower quadrant tenderness to palpation. Her serum beta-HCG was now 12,481 mIU/mL. Transvaginal ultrasound revealed a 1.6 x 1.5 x 1.7cm complex lesion on the right ovary and a similarly appearing 1.7 x 1.3 x 1.7cm complex lesion on the left ovary. There was no evidence of intrauterine pregnancy.

Case Report, contd.

- Proceeded with a diagnostic laparoscopy for suspected ectopic pregnancy. Intraoperative findings revealed a right fallopian tube that was hemorrhagic in nature and consistent with an ectopic pregnancy. The left fallopian tube appeared edematous, cyanotic, and tortuous in the ampulla. Initially surgeons considered right salpingectomy for removal of suspected ectopic pregnancy and biopsy of the left fallopian tube for fresh frozen pathologic evaluation. However, pathology was unavailable for an immediate review. Given the patient's desire for future fertility, proceeded with a laparoscopic right salpingectomy, preserving the abnormal appearing left fallopian tube.
- Beta HCG was repeated on postoperative day 1 and resulted in a 5% decrease. She was discharged to home on postoperative day one after pathology confirmed presence of chorionic villi in the right fallopian tube.
- Presented to ED on postoperative day four with worsening diffuse abdominal pain. Her abdominal exam was remarkable for lower abdominal tenderness and voluntary guarding. Her beta HCG on admission was 22,054 mIU/mL. Transvaginal ultrasound revealed no intrauterine pregnancy with a left adnexal complex structure measuring 1.9 x 1.5 x 1.6cm with an echogenic structure possibly representing a fetal pole.
- She was taken to the operating room for diagnostic laparoscopy for suspected left ectopic pregnancy. Intraoperative findings included a hemorrhagic appearing left fallopian tube that was more edematous and hemorrhagic in appearance compared to prior laparoscopic findings (see Figure 1). She underwent a left salpingectomy without difficulty and was discharged to home on postoperative day zero. Pathology confirmed chorionic villi in left fallopian tube.

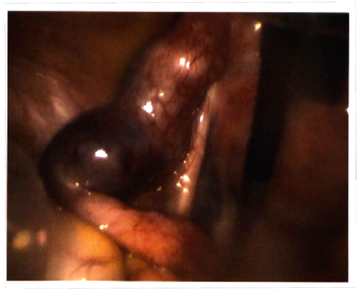

Figure 1: Left ectopic pregnancy from second laparoscopic surgery

Discussion

- Ectopic pregnancies can occur in 1-2% of all pregnancies (1). Multiple risk factors can increase patients' risk of ectopic including: sexually transmitted infections, endometriosis, adhesions, previous tubal surgery or damage to fallopian tubes, late ovulation, or infertility treatment. The highest risk factor for an ectopic pregnancy is a history of a previous ectopic pregnancy.

Discussion, contd.

- Ectopic pregnancies are almost always unilateral and occur most commonly in the fallopian tube but can occur in other locations such as the ovary, cervix, abdomen, cesarean scar, or myometrium.
- Bilateral ectopic pregnancies are a rare occurrence, occurring in 1 in 200,000 pregnancies and the incidence varies from 1 in 725 to 1 in 1580 ectopic pregnancies (1). The incidence appears to be higher in native Africans, occurring one in every 51 ectopic pregnancies (4).
- Bilateral ectopic pregnancies are more commonly associated with patients who are undergoing artificial reproductive technology (ART), most commonly in pregnancies with in vitro fertilization (IVF) with embryo transfer, occurring in 12% of IVF embryo transfers (1).
- Unlike unilateral ectopic pregnancies, case reports support the conclusion that it is difficult to diagnose a bilateral ectopic pre-operatively. Most commonly the ultrasound will show a unilateral ectopic pregnancy, the patient will undergo laparoscopy or laparotomy, where the bilateral ectopic will then be revealed by gross visual inspection of the fallopian tube.
- Beta HCG levels do not appear to be elevated with bilateral ectopic as compared to unilateral ectopic pregnancies at the same suspected gestational age. With regards to spontaneous bilateral ectopic pregnancies, the average gestational age at time of diagnosis was 7w5d and beta HCG ranged from 539 to 113,102 mIU/mL (1).
- During laparoscopy, physicians should always inspect both fallopian tubes, as the bilateral ectopic pregnancies are most commonly diagnosed at time of surgery.
- Of the limited estimated 250 reported cases, the majority of bilateral ectopic pregnancies were not ruptured upon laparoscopic surgery findings(2).
- If the patient is desiring future fertility, salpingostomy may be preferred over salpingectomy. However, the physician should carefully inspect the fallopian tube, as it may be too damaged to even benefit from salpingostomy. There are also risks with salpingostomy, including incomplete evacuation of ectopic pregnancy, increased risk of recurrent ectopic pregnancy, or the persistence of gestational tissue post procedure.
- With regards to this case report, the patient did desire fertility, thus when the ectopic was visualized on the right fallopian tube, a decision was made to perform a unilateral salpingectomy at that time. Conservatively decided to leave the left fallopian tube to potentially preserve future fertility despite its abnormal appearance.
- Persistent ectopic pregnancies can occur and range from 4 to 15% (7). In this case, patient was instructed to obtain weekly beta-Hcg levels after her first unilateral salpingectomy because her abnormal appearing fallopian tube was left *in situ*. Because this patient's beta-HCG level increased to 22,054 mIU/mL on post-operative day 4 (an increase of 46%) along with no intrauterine pregnancy seen on transvaginal ultrasound, a second ectopic pregnancy was highly suspected.
- Systemic methotrexate is used for medical management of ectopic pregnancies for the appropriate candidate and could potentially be considered for treatment of bilateral ectopic pregnancies.
- In a 2001 case report, direct local injection of methotrexate 1mg/kg into each fallopian tube successfully treated a bilateral ectopic pregnancy (1). Medical management with methotrexate or potassium chloride may be potentially used for treatment of bilateral ectopic pregnancies however selecting the appropriate candidate and extensive patient counseling is needed.
- Maternal death rates associated with ectopic pregnancy 0.8 in 1000 (4).
- Though not an absolute contraindication, a beta-HCG level greater than 5,000 mIU/mL or a presence of fetal cardiac activity increases the likelihood of treatment failure and tubal rupture, necessitating surgical management (6).

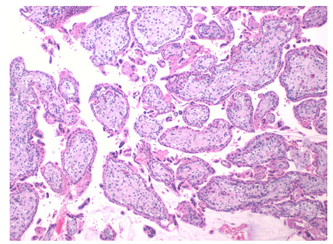

Figure 2: pathology of chorionic villi

Conclusion

- Overall, the incidence of spontaneous bilateral ectopic pregnancy is low, and the treatment approach must be individualized for each patient. If the patient desires future fertility (as seen in this case report), salpingostomy can be performed if surgically appropriate. However, salpingectomy remains the standard of care.
- Medical management with direct methotrexate injection into the bilateral ectopic pregnancies at 1mg/kg directly is also a treatment option as shown in the 2001 case report (1). Systemic methotrexate may also be considered for the appropriate candidate, however there is a risk of treatment failure.
- With the increasing use of assisted reproductive technology, bilateral ectopic pregnancies may increase in occurrence.

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Adherence Rates of Person-Centered Language in Pediatric ADHD Research: A Cross-Sectional Analysis.

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COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

Introduction

Attention-deficit/hyperactivity disorder (ADHD), one of the most common neurodevelopmental disorders in children, has historically been associated with a negative stigma that often leads to mental health problems and a lower quality of life (Lebowitz, 2016).

The implementation of person-centered language (PCL) in medical literature is one way to decrease stigmas (Crocker & Smith, 2019) and provide better physician education for effective care of children with ADHD. Thus, we conducted a cross-sectional study to determine PCL compliance in current pediatric ADHD-related medical literature.

Methods

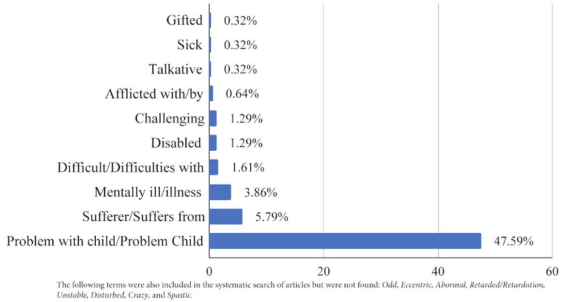
500 ADHD-related articles were screened for inclusion of pre-specified, non-PCL terminology. These articles were chosen using a systematic search of PubMed articles published from January 2014 to March 2021.

Each article was assessed for adherence to guidelines of PCL in the AMAMS (*AMA Manual of Style*, 2020). Screening was conducted in a masked, duplicate style and discrepancies were resolved by reaching 100% user agreement.

Results

After exclusion, 311 articles were retained, of which 131 (42.12%) adhered to PCL guidelines. Among articles with non-PCL, stigmatizing language was used with terminology such as "problem(s) with [the/a] child or problem child" and "suffers from," used most frequently—occurring in 47.59% (148/311) and 5.79% (18/311) of articles, respectively. We found a significant association between PCL adherence and first author employment (P = 0.04). Other stigmatizing language included "mental/mentally ill/mental patient" found in 12 (3.86%) articles and "difficult child/child is difficult" found in 5 (1.61%) of articles.

Percent of Articles (n=311) with Stigmatizing Language in Published Research Focused on Children with ADHD.



Clinical Relevance

The use of stigmatizing language from physicians has been shown to have a damaging effect on the physician-patient relationship (Como et al., 2020). Using non-PCL language may reinforce the stigmas that surrounds children with ADHD and negatively impact the patient's quality of care, mental health, and social life. Implementing PCL in clinical practice may have a positive impact on patient care and increase patient satisfaction.

Summary

Over half of the articles examined did not adhere to PCL guidelines. Due to the negative stigmas and harmful outcomes on mental and physical health that children with ADHD experience, it is our recommendation that literature and clinical practice shift away from non-PCL use. This change will reduce negative outcomes and improve patient satisfaction of those with ADHD.

Future Directions

Future research will focus on determining the importance of PCL language in journals, clinical practice, and medical education. PCL use within various medical conditions and research may also be explored.

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Association of Alcohol Use and Concussions Among High School Athletes

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BACKGROUND & OBJECTIVE

- In 2017, an estimated 2.5 million high school students reported having at least one concussion related to sports or physical activity.[1]
- Individuals between 15 and 19 years of age experience the highest rates of concussion.[2]
- Alcohol is one of the most frequently used substances by adolescents of these ages.[3]
- A previous study found that injury rates were twice as high among athletes who drank weekly versus non-drinkers.[4]
- Objective: Determine if alcohol use is a significant risk factor for concussions in high school athletes and assess potential disparities among gender and race/ethnicity

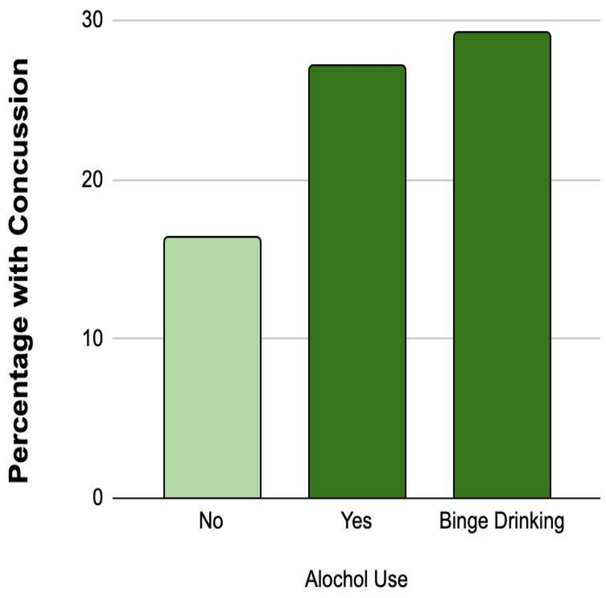
METHODS

- We performed a cross-sectional analysis of the Youth Risk Behavior Surveillance System (YRBSS).
- We included respondents who participated in one or more sports teams and responded to alcohol use and concussion prompts to analyze the prevalence of alcohol use and concussions among high school athletes.
- Respondents were also categorized by grade, race/ethnicity, sex, and BMI category to identify additional associations.

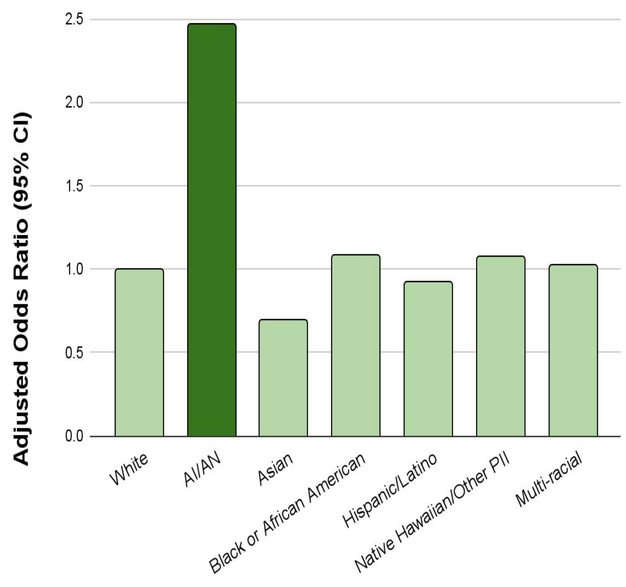
RESULTS

- 38.27% (n = 30710, N = 32759) of high school athletes reported having consumed alcohol in the past 30 days and 14.73% (n = 11,153, N = 12,899) reported having engaged in binge drinking.
- 20.65% (n = 2273, N = 2,815) of the athletes reported sustaining a concussion.
- There was a statistically significant difference in alcohol use prevalence by race/ethnicity (X^2 = 59.38, P <.001) with the highest rates among American Indian/Alaska Natives (AI/AN) athletes (46.87%), followed by white athletes (43.61), and Multi-racial athletes (43.01%) with the lowest rate reported among Asian American athletes (22.14%).
- Athletes reporting alcohol consumption in the last 30 days were significantly more likely to sustain a concussion (AOR = 2.02; 95%CI: 1.77-2.30) and those reporting binge drinking were also significantly more likely to sustain a concussion (AOR = 1.98; 95%CI: 1.64-2.40)
- AI/AN athletes were significantly more likely to have sustained a concussion (AOR = 2.47; 95%CI = 1.21-5.04), compared to white athletes.

CONCUSSION PREVALENCE BY ALCOHOL USE



ADJUSTED ODDS OF SUSTAINING A CONCUSSION BY RACE



IMPLICATIONS

- Given the high rates of alcohol use, and its association with concussions, short and long-term health may be impacted among these athletes.
- This risk factor is not currently recognized by the existing concussion evaluation guidelines or return to play guidelines, as outlined by the 2016 Berlin Consensus Statement on Concussion in Sport.[5]
- A history of concussions alone significantly worsens mental health outcomes, which may be amplified due to the risk of concussions with alcohol abuse.[6]

CONCLUSION

- Physicians can educate athletes, coaches, and parents about the risk of alcohol use, which may help protect young athletes from unnecessary concussions.
- Additionally, it is undetermined why there is an increased likelihood of AI/AN athletes to sustain a concussion, which provides a basis for future research.
- Future research is needed to further assess the effect of alcohol use and race/ethnicity on concussion prevalence to better protect young athletes.

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Laparoscopic Removal of Heterotopic Pregnancy with Subsequent Term Delivery of Intrauterine Fetus; A Case Report

OKLAHOMA STATE UNIVERSITY
CENTER FOR HEALTH SCIENCES

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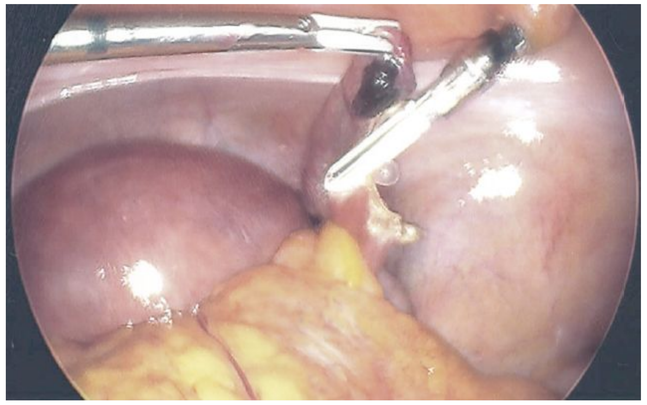
INTRODUCTION

Heterotopic pregnancy has a reported incidence of 1 in 30,000 spontaneous pregnancies and 1 in 100 pregnancies using In-Vitro Fertilization.[1] Although rare, the incidence is rising and a consensus for management has yet to be published. Expectant management, laparoscopy, laparotomy, and fetal reduction are current management methods, yet each presents unique risks to the mother and intrauterine pregnancy.[2] Due to the lack of guidance, clinicians are left to decide the best route based on the clinical scenario and their individual comfort.

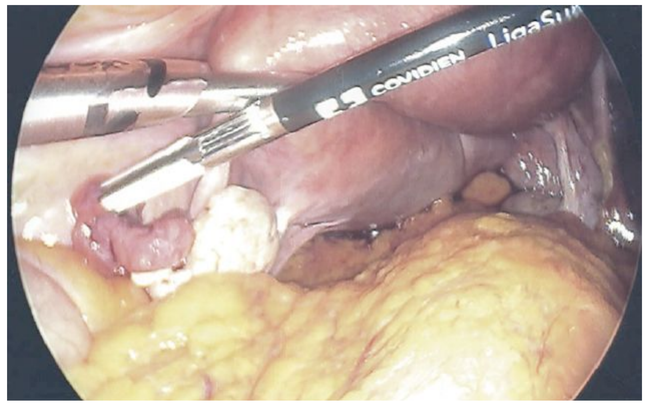
CASE PRESENTATION

A 42-year-old G5P3023 Hispanic female presented to the Emergency Department (ED) for vaginal bleeding and lower abdominal cramping. ß-hCG on presentation was 15,000 mIU/mL. A transvaginal ultrasound (TVUS) showed an irregularly shaped sac within the endometrial cavity and a cystic structure adjacent to the right ovary. She was hemodynamically stable and instructed to return in 48 hours for reevaluation. Repeat ß-hCG was 53,000 mIU/mL and the TVUS noted intrauterine and right-sided ectopic pregnancies consistent with gestational ages of 5 weeks and 6 days. She underwent a laparoscopic right salpingectomy without complications. She ultimately delivered a term neonate with no consequences from the early gestation laparoscopy.

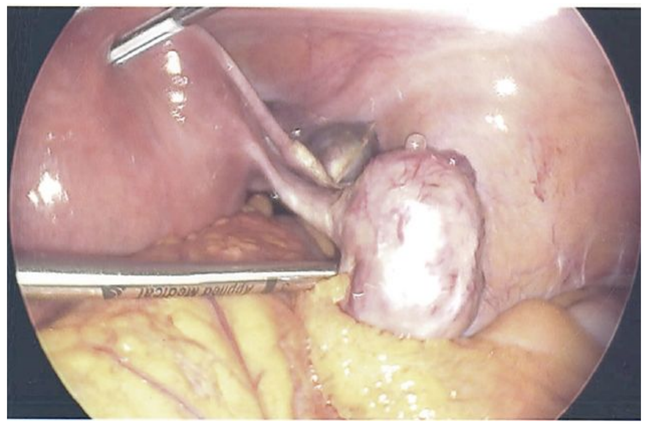
INTRAOPERATIVE IMAGES



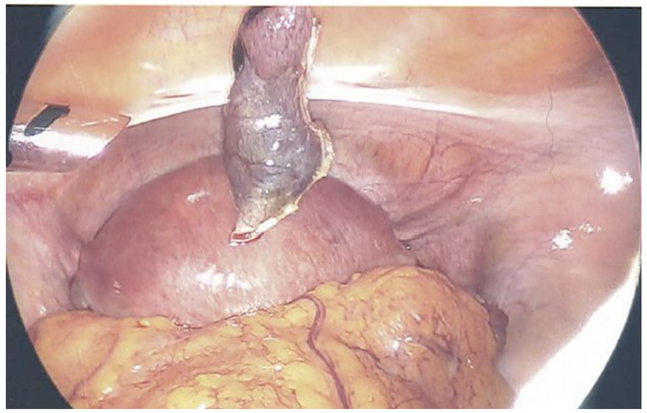
Ectopic pregnancy visualized on right fallopian tube at initiation of removal



Free blood noted in pelvis



View of normal right sided ovary, utero-ovarian ligament, and round ligament s/p removal of right fallopian tube with ectopic pregnancy.



Right fallopian tube with ectopic pregnancy completely separated from uterus

CONCLUSION

A Heterotopic pregnancy is defined as a multifetal pregnancy containing one conceptus with normal uterine implantation that coexists with one implanted ectopically.[3] Consistent with numerous prior published data, our case report confirms laparoscopy as a safe and effective method for management of the extrauterine pregnancy of a heterotopic pregnancy while maintaining the integrity of the intrauterine pregnancy.[4-9]

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Oklahoma State University College of Osteopathic Medicine

Evaluation of Medical Student Sleep Parameters using Wrist Actigraphy

CENTER FOR HEALTH SCIENCES
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INTRODUCTION

Medical students frequently report poor sleep (i.e., inadequate sleep duration, sleep disruptions), predisposing them to various mental health conditions.[1] Additionally, evidence suggests poor sleep diminishes neurocognitive functions, such as alertness and learning.[2] To date, investigations on medical student sleep have relied on subjective evaluations (i.e., surveys, sleep diaries), while wrist actigraphy devices have been used to objectively evaluate sleep metrics among physicians, nurses, and pharmacy students.

OBJECTIVE

The goal of this study was to evaluate medical students' sleep parameters using wrist actigraphy.

METHODS

Thirty medical students (first-year = 9, second-year = 9, third-year = 8, fourth-year = 4) wore a Fatigue Science ReadiBand™ for 14 days.[3] The following data from the Fatigue Science SAFTE Model™ were analyzed: *Sleep Quantity* (hours), *Awakenings per Night*, *Average ReadiScore* (0-100), *Sleep Quality* (1-10), and *ReadiScore Zones*. *Average ReadiScore* represents average cognitive alertness at a given time. *ReadiScore Zones* (percent, %) represent the amount of time an individual spent with an *Average ReadiScore* during waking hours while wearing the ReadiBand™. *ReadiScore Zones* have been previously validated and correlate with blood alcohol content (BAC) levels of cognitive impairment and delayed reaction times.[3] A higher *Average ReadiScore* and *ReadiScore Zone* indicates higher alertness and less cognitive impairment. Means and standard deviations were calculated for each variable followed by one-way ANOVAs by academic year with a Tukey post-hoc analysis.

RESULTS

Thirteen males and 17 females participated (age 26.50 ± 4.88 years and BMI 27.77 ± 7.45 kg/m^2). Means and standard deviations for *Sleep Quantity*, *Total Awakenings per Night*, *Average ReadiScore*, and *Sleep Quality* for all participants were: 6.52 ± 1.05 hours/night, 3.09 ± 1.35 awakenings per night, 87.80 ± 6.50, and 6.77 ± 1.68, respectively. Second-year students demonstrated the highest *Average ReadiScore* (88.78 ± 5.19), *Sleep Quality* (7.00 ± 1.41), and spent the most time at optimal cognitive attention levels. First-year students obtained the highest *Sleep Quantity* (6.76 ± 1.29 hours) and spent the least amount of with severely impaired alertness. Third-year students had the lowest *ARS* (86.63 ± 10.16) and *Sleep Quantity* (6.26 ± 1.24 hours). Fourth-year students had the lowest *Sleep Quality* (6.25 ± 1.71) and experienced the most sleep disruptions (3.58 ± 1.46 awakenings/night). In comparison, third and fourth-year students spent the most time with impaired alertness. One-way ANOVAs by academic year did not demonstrate any statistical significance.

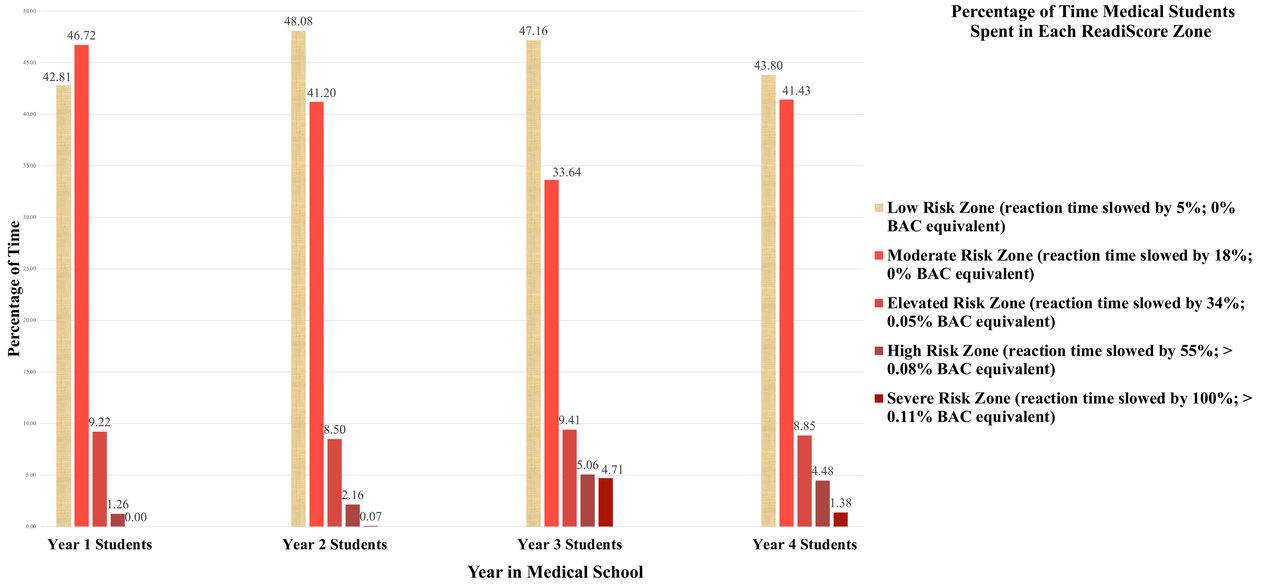
Table 1. Sleep Metrics (Means and Standard Deviations) with One-Way ANOVAs by Academic Year

Sleep Metric	Academic Year	Mean ± Standard Deviation	F	Significance
Sleep Quantity	MS-I (N = 9)	6.76 ± 1.29	0.29	0.83
	MS-II (N = 9)	6.52 ± 0.87		
	MS-III (N = 8)	6.26 ± 1.24		
	MS-IV (N = 4)	6.53 ± 0.46		
Awakenings per Night	MS-I (N = 9)	3.18 ± 1.85	0.25	0.86
	MS-II (N = 9)	2.94 ± 1.06		
	MS-III (N = 8)	2.90 ± 1.13		
	MS-IV (N = 4)	3.58 ± 1.46		
Average ReadiScore	MS-I (N = 9)	88.22 ± 4.89	0.17	0.91
	MS-II (N = 9)	88.78 ± 5.19		
	MS-III (N = 8)	86.63 ± 10.16		
	MS-IV (N = 4)	87.00 ± 6.50		
Sleep Quality	MS-I (N = 9)	6.67 ± 2.29	0.19	0.90
	MS-II (N = 9)	7.00 ± 1.41		
	MS-III (N = 8)	6.88 ± 1.36		
	MS-IV (N = 4)	6.77 ± 1.68		

Table 1. Percent of Time Spent in ReadiScore Zones by Academic Year (Means and Standard Deviations

Academic Year	90-100 ReadiScore Zone (Low Risk)*	80-90 ReadiScore Zone (Moderate Risk)*	70-80 ReadiScore Zone (Elevated Risk)*	60-70 ReadiScore Zone (High Risk)*	0-60 ReadiScore Zone (Severe Risk)*
Reaction Time Slowed by	*5%*	*18%*	*34%*	*55%*	*100%*
BAC Equivalent	*0%*	*0%*	*0.05%*	*> 0.08%*	*> 0.11%*
MS1 (N = 9)	42.81 ± 29.99	46.72 ± 21.72	9.22 ± 9.93	1.26 ± 1.65	0.00
MS2 (N = 9)	48.08 ± 33.68	41.20 ± 24.20	8.50 ± 8.58	2.16 ± 3.15	0.07 ± 0.20
MS3 (N = 8)	47.16 ± 31.31	33.64 ± 23.70	9.41 ± 9.89	5.06 ± 10.95	4.71 ± 13.33
MS4 (N = 4)	43.80 ± 33.81	41.43 ± 28.37	8.85 ± 8.10	4.48 ± 4.69	1.38 ± 2.68

BAC = Blood Alcohol Concentration; * = values represent percentage of time spent at an Average ReadiScore between the two listed numbers



CONCLUSION

Our results indicate that medical students are not sleeping the recommended hours per night, nor obtaining adequate sleep quality, potentially due to stress and sacrificing sleep for the demands of medical school. Second-year students generally demonstrated the best sleep metrics, possibly due to familiarity with curriculum. However, clinical rotations, erratic schedules, residency applications, and residency interviews, likely contributed to third and fourth-year students' poor sleep metrics. Additionally, more senior medical students frequently function with diminished daily cognitive alertness. Noting the common theme of poor sleep behaviors often discovered among medical students, it is important to objectively identify sleep behaviors and eventually develop interventions to combat excessive stress, fatigue, and adverse health risk among physicians in training.

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OBSTETRICS & GYNECOLOGY

Endometrial Receptivity Testing and Subsequent Adjustment to Window of Implantation Timing Improve Pregnancy Success Rates of Women Undergoing Assisted Reproductive Technology

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INTRODUCTION

For decades, REI research focused on solely on the creation of a viable embryo to increase pregnancy rates. Recently, research has identified the impact of endometrial adhesion molecule expression during the window of implantation (WOI) as playing a major role in embryo implantation.

METHODS

This is a retrospective case-control study of women undergoing assisted reproductive technology and the effects of the Igenomix © Endometrial Receptivity Assay (ERA) on pregnancy success rates following frozen embryo transfer.

RESULTS

ERA results showed 29 of 60 patients were normal, 20 of 60 patients were Early Receptive (WOI existing 12 hours later than expected), and 11 of 60 patients were Pre-Receptive (WOI existing 24 hours later than expected). Ninety-one percent of patients with a corrected abnormal ERA had successful pregnancies while only 72% achieved successful pregnancy without using ERA to assess for their WOI ($p = < 0.01$, OR 3.82).

Table 1: Patient Demographics

	Women with ERA testing	Women without ERA testing
Sample Size	60	47
Minimum Age (yrs)	27	25
Maximum Age (yrs)	43	36
Average Age (yrs)	34.6	34.4

Table 2: Comparison of successful pregnancies in patients with normal vs abnormal ERA test results after failed FET

	Successful Pregnancy	Unsuccessful Pregnancy	Pregnancy %
Normal ERA	16	13	55.2
Abnormal ERA	12	19	38.7
p = 0.24			
OR = 1.98			

Table 3: Comparison of Successful pregnancies in patients with corrected abnormal ERA vs. control group after failed FET

	Successful Pregnancy	Unsuccessful Pregnancy	Pregnancy %
Corrected ERA	20	2	90.9
Control Group	34	13	72.3
p = < 0.01			
OR = 3.82			

Table 4: List of major biomarkers associated with WOI and endometrial receptivity that are tested for by ERA

Avß3 Integrin
Leukemia Inhibitor Factor (LIF)
HOXA10
Glutathione Peroxidase 3
CD56+ NK Cells
NOTCH1

CONCLUSION

Endometrial Receptivity Assay testing has a significant impact on successful pregnancy rates among patients undergoing ART. Women should be encouraged to undergo ERA testing to ensure accurate timing of their WOI for embryo transfer. While numerous medication changes can be made by the physician to improve implantation success rates, if the WOI timing is not accounted for, those changes are for naught because the endometrium is not prepared to receive the embryo and subsequent embryo implantation into the endometrium will not occur. The use of ERA could save the patient tens-of-thousands of dollars and shave years off their time to achieving successful pregnancies.

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What are patients asking about shoulder arthroplasty? An investigation of Google Searches

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INTRODUCTION

The utilization of shoulder arthroplasty has been increasing steadily over the last few decades.[1] Given this continuous increase, we expect that patients will increasingly search the internet for sources of information regarding shoulder arthroplasty.The primary objective of this study is to characterize the content of the most frequently asked questions (FAQs) regarding shoulder arthroplasty. The secondary objective is to assess both the quality and transparency of the suggested information for shoulder arthroplasty.

METHODS

On October 9th, 2022 the following search terms were searched using Google "shoulder arthroplasty", "total shoulder arthroplasty", "reverse shoulder arthroplasty", and "reverse shoulder surgery." For each search, the "people also ask" function was queried until a minimum of 200 FAQs were generated for each search term. All FAQs were classified using the Rothwell Classification. All sources were assessed for transparency using JAMA Benchmark and quality with the Brief DISCERN tool.[2,3]

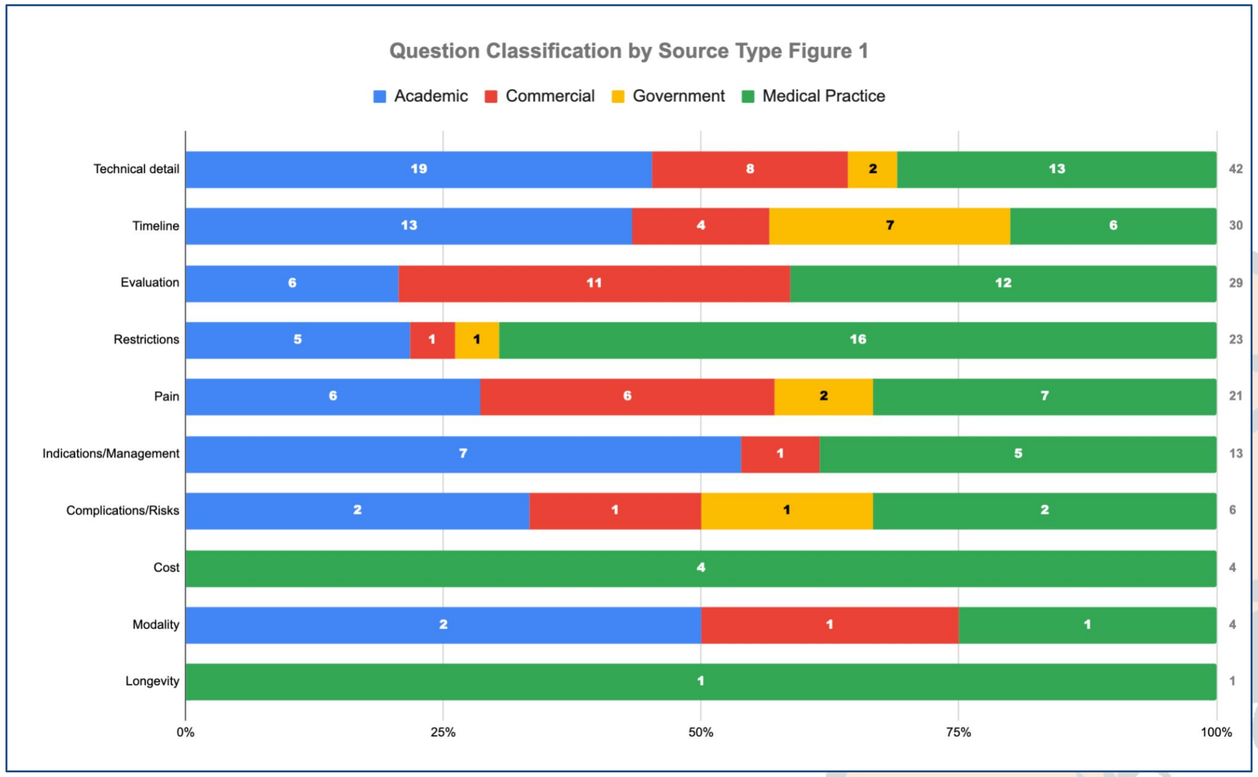

Table 1. JAMA Benchmark Criteria and Brief DISCERN by Source Type

	Source Type				Total n= 173	Chi-Square (DF = 3), P
	Academic n= 60	Commercial n= 33	Government n= 13	Medical Practice n= 67		
JAMA Benchmark						
≥3	28	29	5	10	72	**50.71, P <.001**
<3	32	4	8	57	101	
Authorship						
No	47	7	5	57	116	**49.51, P < 001**
Yes	13	26	8	10	57	
Attribution						
No	31	9	5	63	108	**52.06, P <.001**
Yes	29	24	8	4	65	
Currency						
No	27	1	0	34	62	**31.37, P <.001**
Yes	33	32	13	33	111	
Disclosure						
No	0	0	0	1	1	1.59, P =.66
Yes	60	33	13	66	172	
Brief DISCERN	**Academic**	**Commercial**	**Government**	**Medical Practice**	**Average**	**ANOVA**
Score (mean; SD)	20.53 (6.26)	24.12 (4.74)	23.38 (5.56)	16.10 (5.29)	19.72 (6.37)	**F = 18.57, P < .001**

RESULTS

Our search returned a total of 1275 FAQs. After removing duplicates and unrelated FAQs our included sample size was 173. Fact questions were the most common classification type (102/173, 59%) followed by value questions (52/173,30%) and policy questions (19/173, 11.0%). The most common fact questions were related to technical details (42/103, 40.7%). Medical Practices (67/173, 38.7%) were the most encountered source type followed by Academic sources (60/173, 34.6%). Both Academic and Medical Practices were associated with poor transparency (Table 1.). The one-way analysis of variance (ANOVA) revealed a significant difference in mean quality scores among the 5 source types (F = 18.6, P <.001) with Medical Practices averaging the lowest score (16.1/30) . (Table 1)

CONCLUSION

Patients seeking online information for shoulder arthroplasty appear to search Google for questions related to a plethora of technical details and restrictions. The most common source type encountered by patients are those of Medical Practices; these were found to have both poor quality as well as poor transparency as measured by JAMA Benchmark and Brief DISCERN. Moving forward, medical practices should use validated tools as guidance for increasing the transparency and quality of the medical information they publish online. Physicians should know that their patients may be informing themselves about shoulder arthroplasty risks and management with low quality internet sources. Our findings reinforce the importance of well informed, evidence-based patient counseling before and after shoulder arthroplasty.

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The Association between Steroid Use and Concussions among High School Athletes

COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

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BACKGROUND & OBJECTIVE

- In 2017, almost 2.5 million US high school students experienced one or more concussions due to participation in a sport or physical activity.[1]
- There is an interest in concussed high school athletes and the long-term neurologic and mental health problems they may face.[2]
- Steroid use can cause behavioral changes like increased aggression which may lead an increased risk for concussions.[3]
- Objective: To assess the prevalence of steroid use and concussions in high school athletes

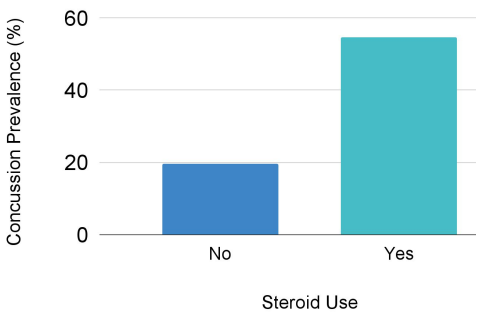
METHODS

- A cross-sectional analysis of the Youth Risk Behavior Surveillance System.
- Inclusion criteria: Respondents who had participated in a sport within the past year and responded to the steroid use and concussion prompts.
- Demographic variables: age, gender, race/ethnicity, body mass index (BMI), and education grade level.

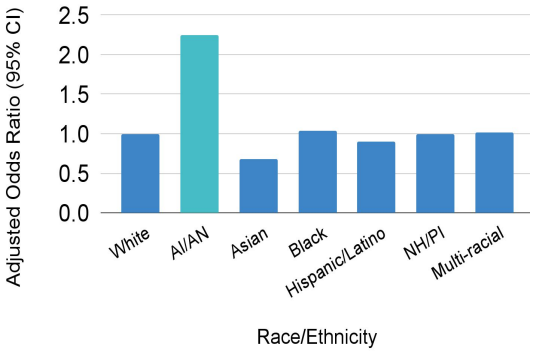
RESULTS

- Of high school athlete respondents, 3.66% (n = 2991, N = 3130) reported previous steroid use and 20.65% (n = 2273, N = 2,815) having sustained a concussion.
- The highest rates of steroid use occurred among American Indian/Alaska Native (AI/AN) (7.23%) and Native Hawaiian/Other PI (NH/PI) (7.09%) followed by Hispanic/Latino (4.3%) with the lowest rate reported in Asian (3%).
- There was a statistically significant difference in steroid use by race/ethnicity ($X^2 = 5.78$, $P < .001$).
- From 1999 to 2019, we found the weighted prevalence of steroid use dropped from 3.38% to 1.87% with the sharpest decline between 2015 and 2019.
- Athletes reporting steroid use were significantly more likely to have a concussion (AOR = 4.33; 95%CI: 3.19-5.88).
- Compared to white athletes, we found that AI/AN athletes were significantly more likely to have sustained a concussion (AOR = 2.25; 95%CI = 1.18-4.29).

CONCUSSION PREVALENCE BY STEROID USE



ADJUSTED ODDS OF HAVING A CONCUSSION BY RACE



IMPLICATIONS

- Steroid use in adolescents can result in stunted growth, liver dysfunction, male infertility, mania, and aggression.[4]
- Alone, concussions may result in cognitive impairment, depression, anxiety, substance use, or more severe long-term effects such as Alzheimer's disease or chronic traumatic encephalopathy, CTE.[2]
- Separately, steroid use and concussions have numerous health consequences; furthermore, in combination, these effects may be amplified and increase in severity.

CONCLUSION

- While it is unknown why AI/AN high school athletes are more likely to sustain a concussion and use steroids, this population may have increased health issues associated with these findings.
- Future research is needed to assess the role that steroids and race/ethnicity play in concussion prevalence to improve the safety of these athletes.

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CTE, Media Presence, & NFL Player Deaths

Trends of Public Interest of Chronic Traumatic Encephalopathy (CTE) from 2004-2022.

OKLAHOMA STATE UNIVERSITY
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INTRODUCTION

- Chronic Traumatic Encephalopathy (CTE) is a progressive neurodegenerative brain condition thought to be caused by numerous forceful blows to the head and repeated sports-related concussions.
- Previously termed Dementia Pugilistica until 2005 when Dr. Omalu Bennet published the first autopsy report.
- Public interest has increased due to publicised sports injuries and media presence.
- Using Google Trends to explore events that have increased public interest in

METHODS

- Data was obtained using an RSI in Google Trends between 1/2004 and 11/2022.
- Major events displayed in Table 1 used to assess the increase in RSI starting in 2012.

Table 1. Major events that align with spikes in search interest

Date	Event
05-2012	J. Seau commits suicide
01-2013	Autopsy confirms J. Seau's CTE Diagnosis
11-2013	T. Dorsett: Documented symptoms indicate CTE
02-2016	'Concussion' movie popularity rises
09-2017	A. Hernandez's autopsy gains media attention
09-2018	D. Te'o-Nesheim's autopsy gains media attention
09-2019	Increased exposure for CTE within the NFL
01-2020	'Killer Inside: The Mind of Aaron Hernandez'
04-2021	Autopsy: P. Adams' CTE diagnosis, Stage II
01-2022	D. Thomas dies from neurological complications
07-2022	Autopsy confirms D. Thomas' CTE diagnosis
10-2022	T. Tagovailoa's consecutive concussions

RESULTS

- The release of Aaron Hernandez's autopsy results in 2017 was the highest peak in RSI (100)--this was 87.81 (95%CI: 8.72-15.66) higher than forecasted, showing a 720.26% increase in RSI.
- There is a gradual increase in RSI of CTE from 2004 to 2022.
- Noticeable trends with significance to events occurring within a given month and year.
- Noticeable trends with significance to events occurring after increased media coverage such as movies (02-2016), autopsy reports (09-2017, 09-2018, 04-2021, and 07-2022)), and documentaries (01-2020).

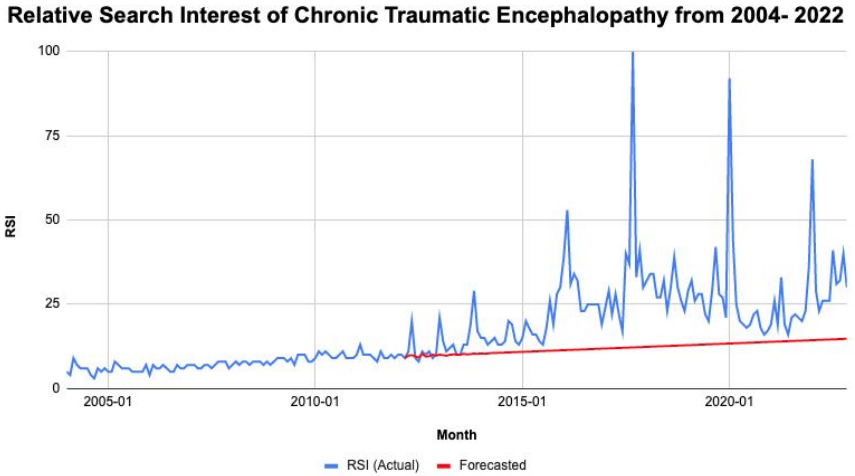

Figure 1: Google trends search interest in the topic 'Chronic Traumatic Encephalopathy' from 1/2004 - 11/2022.

DISCUSSION

- Increased media attention involving NFL players and traumatic events can lead to increased funding for agencies to continue CTE research.
- Screening abilities made available earlier in order to educate the players of the NFL, and the public.
- Given the increased media exposure, clinicians should be aware of ongoing, fast-paced research regarding concussions and CTE among football players, and other athletes exposed to sports with increased risk of head trauma.

CONCLUSION

- Following the initial publishing of CTE research in 2005, there has been an increase in public interest in CTE.
- Search interest surged following well-known media events such as: the 'Concussion' movie, and media publications after Aaron Hernandez and Demaryius Thomas' deaths.
- Already established concussion protocols should be followed prior to further testing
- We recommend increased research funding for CTE, ongoing trials regarding repetitive concussions from combat sports, enforcement and amendment of sporting rules, and more protective equipment to prevent earlier onset of CTE.

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Depression Screening in Osteopathic Medical Students vs. Previous Depression Diagnosis

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INTRODUCTION

Depression in individuals working in high stress fields is a well studied phenomenon. Depression rates in resident-physicians have been measured to be between 20.9-43.2%, which puts both physicians' health and patient outcomes at risk.[1] As depression is a chronic disease, addressing the issue early on in a physician's career presents a longitudinal opportunity to improve the mental health of future physicians. During medical school, depression may negatively impact a student's performance, as the presence of depression is associated with a drop in GPA of 89% in undergraduate students with depression.[2] Notably, this drop in GPA can be mitigated by effectively treating the depressive symptoms.[2] Furthermore, depression is directly linked with increased burnout in front line healthcare workers.[3] There is little literature investigating the prevalence of depression in American medical students. The most recent insight was provided by the University of Michigan in 2009, which utilized the PHQ-9 depression screening survey in their own medical student cohorts. Within a 13 year window significant experiences of recent geo-political turmoil, COVID-19 and inflationary impact on medical students have occurred. The current risks of depression in medical students is in dire need of re-examination. Furthermore, no such study has been completed at an Osteopathic medical university, where the emphasis on mind-body connection and whole person healthcare might influence changes in trends between an allopathic and osteopathic student body wellness. The current institution presents a dynamic campus location in which unique and cutting edge interventions on student mental wellness may be achieved. Identifying and treating depression early in medical students may help mitigate medical school dropout rates, negative trends in GPA, increase academic performance, and act as a preventative measure against longitudinal effects of depression on future physicians' clinical careers.[4]

METHODS

An anonymous survey including demographic questions and PHQ-9 was sent out to first through fourth year medical students during the fall semester at an osteopathic medical school. Survey results were placed in SPSS. Frequencies, means and standard deviations were calculated. One-way ANOVAs were performed for the PHQ-9 score by demographic variables. One specific question asked on the survey was whether or not a student had been previously diagnosed with depression. A calculation was then performed to compare the number of students who were previously diagnosed with depression to the number in the survey who were currently displaying depressive symptoms.

RESULTS

Key Findings

Among the 153 surveyed participants, 26.1% reported a previous diagnosis of a depressive disorder. 50.7% of participants scored a PHQ-9 survey indicating mild, moderately, or severely depressed, representing a 94.3% increase. When using a previous diagnosis of depression, those with a prior diagnosis had a statistically significant higher PHQ-9 score ($F(1,151)=5.84$, $p<0.05$).

Table 1: Stratification of student PHQ-9 scores

	Frequency	Percent
minimal depression	74	48.4
mild depression	49	32
moderate depression	21	13.7
moderately severe depression	9	5.9
Total	153	100

Table 2: Scoring Interpretation of PHQ-9

Interpreting PHQ-9 Scores

Diagnosis	Total Score	For Score	Action
Minimal depression	0-4	≤ 4	The score suggests the patient may not need depression treatment
Mild depression Moderate depression	5-9 10-14	5 - 14	Physician uses clinical judgment about treatment, based on patient's duration of symptoms and functional impairment
Moderately severe depression Severe depression	15-19 20-27	> 14	Warrants treatment for depression, using antidepressant, psychotherapy and/or a combination of treatment.

CONCLUSION

The Osteopathic tenet of "The body is a unit; the person is a unit of body, mind, and spirit," provides the foundation of Osteopathic medical education and further emphasis on its meaning can aid the future wellbeing of Osteopathic physicians.[5] Medical school attendance nearly doubled the risk of experiencing depressive symptoms in our study population. Significant findings in our study highlight the risk of mental health issues Osteopathic students face during their time in medical school. The continued depressive risk regardless of year classification in medical school demonstrates the strain each year of schooling places on an individual's well being. Increasing mental health support while implementing curriculum changes targeting student wellness are a potential solution.[6] Treating depression in medical students may even provide the ability to decrease future burnout in physicians. Current studies show physician burnout rates rose sharply during the Covid-19 Pandemic.[7] Burnout in physicians has led to a rapidly increasing gap in provider shortage nationwide.[8] Continued emphasis on medical student mental health throughout the education process is needed as our data suggests the majority of students are potentially facing mental health challenges.

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Trends and Disparities in Unmet Childhood Mental Health Care Needs: Analysis of National Survey of Children's Health 2016-2020

COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

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INTRODUCTION

- With 20% of children experiencing mental health disorders, it is critical to ensure mental health care (MHC) is accessible.[1]
- MH disorders can hinder children from adequately developing psychological, cognitive, physical, and emotional characteristics essential for a healthy transition into adulthood.[2]
- The COVID-19 pandemic created challenges in both MHC delivery and accessibility.[3]
- Minority children have shown an increased risk for poor mental health (MH) correlated to the effects of both structural and individual racism.[4]

OBJECTIVES

- Assessing trends in children's unmet MHC needs from 2016–2020 may aid in the development of strategies to overcome those barriers, thus our objectives were to identify:
  1. the disparities among age groups, race/ethnicity, federal poverty level, or urbanicity
  2. the changes among each state
  3. the potential effects of the COVID-19 pandemic

METHODS

- We assessed the National Survey of Children's Health to estimate trends of unmet MHC needs from 2016-2020.
- To identify state-level trends, we calculated each state's percent change between 2016-2019 and between 2019-2020 to determine the impact of COVID-19.
- Lastly, we measured associations, via logistic regression, between children's unmet MHC needs and demographic factors to assess disparities.

RESULTS

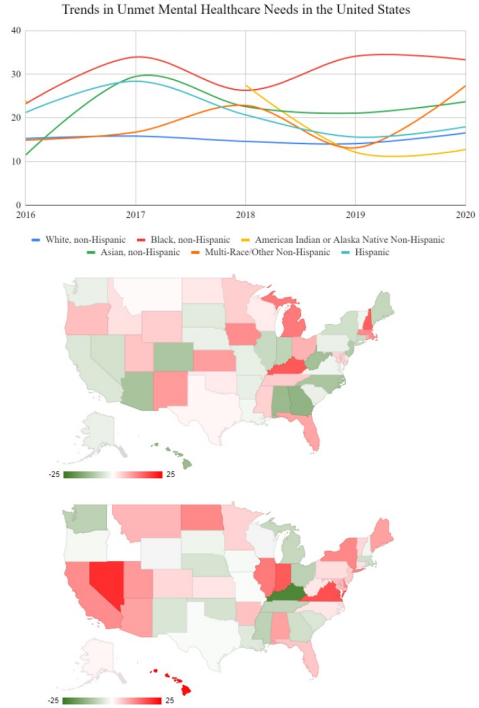

Figure 1A. Difference in percentage of children unmet MHC needs among children from 2016-2019. **Figure 1B**. Difference in percentage of children unmet MHC needs among children from 2019-2020.

Table 1. Unmet Mental Health Care needs among Children by Sociodemographics.

Characteristic	Multivariable logistic Regression
Age group	AOR
6-10	1 [Reference]
3-5	**1.62****
11-14	0.91
15-17	0.84
Race/Ethnicity	
White, non-Hispanic	1 [Reference]
Black, non-Hispanic	**1.91****
Indigenous, non-Hispanic	0.60
Asian, non-Hispanic	1.48
Native Hawaiian and Other Pac.	1.14
Multi-Race/Other Non-Hispanic	1.26
Hispanic	1.25
% Federal Poverty Level	
400+	1 [Reference]
0-99	**2.25****
100-199	**1.73****
200-399	**1.55****
Urbanicity	
Metro	1 [Reference]
Non-metro	1.10

* P < .05, ** P < .01

RESULTS

- There was no significant improvement in the number of children with unmet MHC needs from 2016-2019 nor 2019-2020.
- By 2020, 20.14% of the pediatric population did not receive MHC when it was needed.
- Nevada had the highest unmet MHC needs overall.
- Compared to White children, Black children were significantly more likely to have unmet MHC.
- Unmet MHC was significantly associated with household income, but not urbanicity.

CONCLUSIONS

- From 2016-2020, there were no significant improvements in unmet MHC needs among children
- Disparities in receiving MHC exist, primarily among Black children and among those between the ages of 3–5.
- Unmet MHC needs could affect the proper development to adulthood, future efforts to minimize barriers to MHC services could reduce unmet MH needs and potentially reduce chronic MH disorders.
- Efforts to improve accessibility of MHC through advocacy, optimized payment options and expansion of evidence-based programs targeting groups most likely to have unmet MHC needs may improve MH outcomes.

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Demographics of individuals refusing cancer treatment and reported pain compared to those in treatment: An analysis of the 2017-2020 Behavioral Risk Factor Surveillance System

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BACKGROUND & OBJECTIVE

- More than 1.6 million people are diagnosed with cancer each year.
- Despite the different treatment options available for cancer, many individuals refuse treatment for various reasons.
- However, there is little known about the cumulative group of individuals who refuse treatment.
- Objective: To assess characteristics and associations among this group of individuals compared to those who receive cancer treatment.

METHODS

- A cross-sectional analysis was performed using the BRFSS data from 2017 to 2020.
- We included respondents who answered yes to the prompt "Do you have cancer?" and subsequently answered "Are you currently receiving cancer treatment?" with choices of "currently receiving treatment", "refused treatment", or "am waiting for treatment".
- Demographic variables: sex (male or female), education (less than high school, high school graduate or GED, some college, college graduate or higher), and race/ethnicity (White or all other races)

RESULTS

- The sample included 6,238 individuals of whom 83% were White, 53% were female, and over half reported attending college or technical school.
- Individuals with cancer of internal organs had higher rates of cancer treatment refusal at 8.43%, compared to 4.41% of breast cancer, 5.94% of skin cancer, and 4.15% of other types.
- Individuals who did not graduate high school were nearly twice as likely to refuse cancer treatment than other education groups (11.57%; $p<0.01$).
- We found no significant difference in reported cancer related pain among in the cancer refusal group compared to those in treatment (AOR: 0.59; 95%CI:0.21-1.61); however, those waiting for treatment were less likely to report cancer related pain (AOR: 0.3; 95%CI 0.17-0.52)

CHARACTERISTICS OF INDIVIDUALS WITH CANCER BY STATE OF TREATMENT

Table 1. Characteristics of individuals with cancer by state of treatment (n = 6,238, N = 544,641).

Characteristic	In Tx (%)	Refused (%)	Waiting (%)	Total (%)	Chi-square F, *P*
Race					
White	68.85	5.73	25.42	83.29	6.17, .003
All other races	77.09	7.85	15.07	16.71	
Sex					
Male	69.19	5.96	24.86	46.97	0.50, .59
Female	71.13	6.2	22.68	53.03	
Education					
< High school	66.74	11.57	21.69	15.27	4.02, 0.002
Graduated High School	70.46	5.83	23.71	28.69	
Some college/Tech	67.73	6.14	26.13	30.62	
Graduated college/Tech	74.94	3.05	22.01	25.42	
Cancer Type					
Breast	86.33	4.41	9.26	19.14	10.88, <.001
Internal organs	73.02	8.43	18.55	31.06	
Skin	62.25	5.94	31.82	31.54	
Other (Blood, Bone, Head/Neck, other)	76.28	4.15	19.57	18.25	
Age^A					
M (SD)	65.24 (12.58)	60.03 (17.45)	61.72 (14.73)	64.09 (13.58)	11.83, <.001

A. Linear regression analysis was used to determine significance for age. Percentages are weighted.

DISCUSSION

- Our investigations revealed statistically significant associations among treatment groups and race/ethnicity, cancer type, and educational attainment—the latter of which showed that individuals with less than a highschool education were nearly twice as likely to refuse treatment than those with higher levels of education.
- Given low education is related to low health literacy, the Agency for Healthcare Research and Quality's (AHRQ) Health Literacy Universal Precautions Toolkit may help increase patient understanding of their health and provide them with proper support based on their health literacy.

CONCLUSION

- Our findings showed that low educational attainment and being of a minority group were associated with higher rates of cancer treatment refusal.
- Previous research has shown these groups are more likely to have low health literacy, and focused efforts to improve cancer screening and treatment awareness.

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Trends and forecasted rates of Adverse Childhood Experiences among Adults in the United States:

An Analysis of the Behavioral Risk Factor Surveillance System

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INTRODUCTION

- The adverse childhood experiences (ACEs) study was one of the first to demonstrate the robust, life-long effects of family dysfunction, child maltreatment, and neglect during childhood.[2]
- The initial study of well-educated, middle-class adults indicated that early life traumatic events are common and frequently co-occur with more than 66% reporting having at least 1 ACE and over 20% with 3 or more.[2]
- There is a dose-response relationship with the ACEs accumulated and a range of adverse health outcomes.[4]

RESEARCH QUESTION

- Our objective was to analyze the risk for ACEs in future generations due to the lasting behavioral and biological adaptations that occur as a result of the effects of ACE's in prior generations.

METHODS

- We performed cross-sectional analysis of data from the 2020 Behavioral Risk Factor Surveillance System (BRFSS).
- To assess trends in ACEs by year of birth, we summed the ACE items from the BRFSS ACEs module and calculated the mean number of ACEs by reported participant age with survey design and sampling weights provided by BRFSS.
- To determine participants' year of birth, we subtracted the reported age from the survey year (2020).
- We then used an autoregressive integrated moving average (ARIMA) to forecast the birth year when US residents surpass a mean of 3 cumulative ACEs— a benchmark in which multiple studies have shown the disparities in comorbid diseases and disrupted education increases significantly.

RESULTS

- Of the participants reporting ACEs (n=116,378; N=63,076,717), the average number of participants per yearly age from 18-79 was 1714.6 (SD=535.9) and 10,071 respondents in the 80+ grouping.
- The mean number of ACEs reported by participants 80 years or older (born in or before 1940) was 0.79 (95%CI 0.74-0.85), while the highest ACEs were reported by respondents who were 22 years of age (born in 1998; Figure 1).
- The forecasted model shows that individuals born in 2018 will, on average, surpass a cumulative of 3 ACEs.

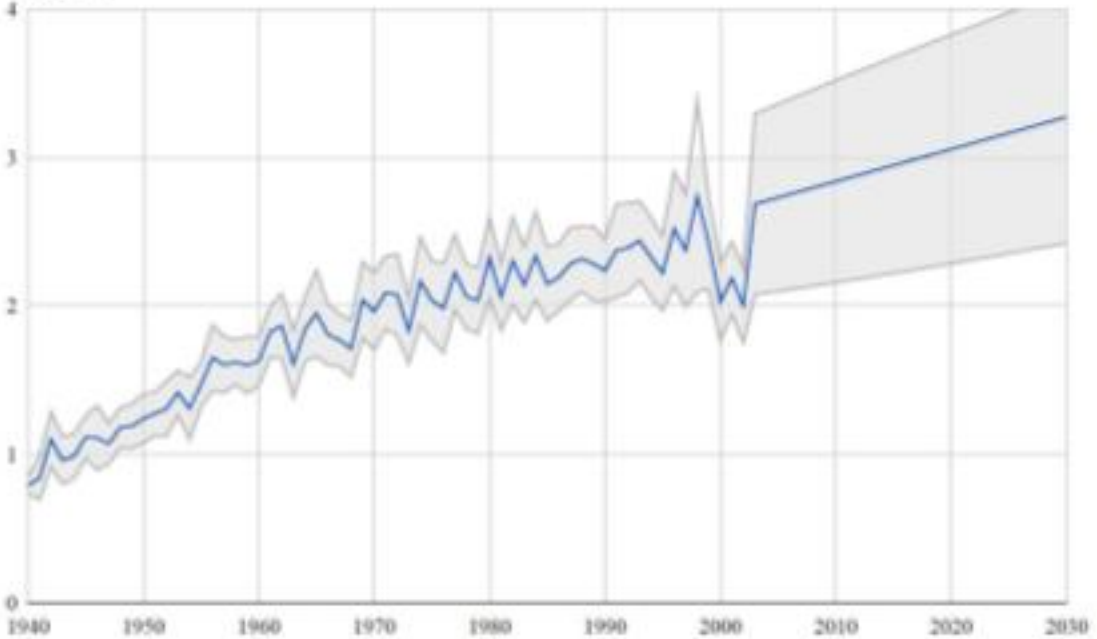

Figure 1. Mean ACEs of respondents from 2020 BRFSS aged 18-80+ plotted by year of birth in the United States with forecasting to 2030.

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CONCLUSION

- The accumulation of ACEs across the past 80 years supports behavioral and biological theories regarding the transmission of intergenerational trauma.
- Further, these analyses estimate that U.S. children born in 2018 will, on average, experience more than 3 ACEs.

CLINICAL IMPLICATIONS

- Implementation of resilience practices is necessary in order to prevent the continued intergenerational accumulation of ACEs and associated mental and physical comorbidities.
- Prevention of ACEs through strengthening economic support to families, teaching skills to families, and providing early intervention by trauma-informed primary care and victim-centered services may affect this trajectory. [1]
- The Osteopathic Principles and Practices should guide an osteopathic physician's early prevention of ACE's by understanding that the body is a unit of mind, body, and spirit; capable of self-regulation, self-healing, and self-maintenance once that unity is restored.
- Not all children exposed to ACEs experience poor health outcomes; indeed, future research target inclusion of measures and interventions on protective factors associated with resilience.[3]

ACKNOWLEDGEMENTS

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College of Osteopathic Medicine

“Do all bunions need surgery?” An Investigation of Google Searches for Hallux Valgus

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Background

Hallux valgus (HV) or a bunion is one of the most common forefoot deformities.[1] Approximately one in four adults will develop HV with a higher prevalence in adult females.[1] Up to 80% of adult internet users reference online sources for health related information.[2] Overall, the high prevalence of HV combined with the numerous treatment options, we believe patients are likely turning to internet search engines for questions germane to HV. Previous orthopaedic investigations have used Google’s “People Also Ask” box to characterize frequently asked questions (FAQs) regarding total knee and hip arthroplasty.[3] Yet, no such investigation has been conducted for HV. Using Google’s FAQs, we sought to classify these questions, categorize the sources, as well as assess their levels of quality and transparency.

Methods

On October 9, 2022, we searched Google using these four phrases: “Hallux Valgus Treatment,” “Hallux Valgus Treatment Surgery,” “Bunion Treatment Surgery,” and “Bunion Treatment Surgery.” For each search, we used a free Chrome extension, SEO Minion, until a minimum of 200 FAQs were produced; the extension extracted both the FAQs and sources. Information transparency was classified using Rothwell Classification. Next we categorized sources and assessed the level of transparency and quality using the Journal of the American Medical Association’s (JAMA) Benchmark tool and Brief DISCERN, respectively.

Results

Our Google search returned 299 unique FAQs after removing duplicates and unrelated FAQs. The majority were classified as fact based questions (149/299, 49.8%), followed by value (92/299, 30.8%) and policy questions (58/299, 19.4%). Overall the most common topic searched was related to the evaluation of treatment or surgery (79/299, 26.4%). The frequent answer sources were medical practices (158/299, 52.8%), followed by commercial (69/299, 23.1%) and academic (38/299, 12.7%). The one-way analysis of variance revealed a significant difference in mean quality scores among the 5 source types (F= 54.49, P<.001) with medical practices averaging the worst score (12.1/30) compared to academic sources which were found to have the highest score (21.8/30).

Figure 1. Rothwell Classification

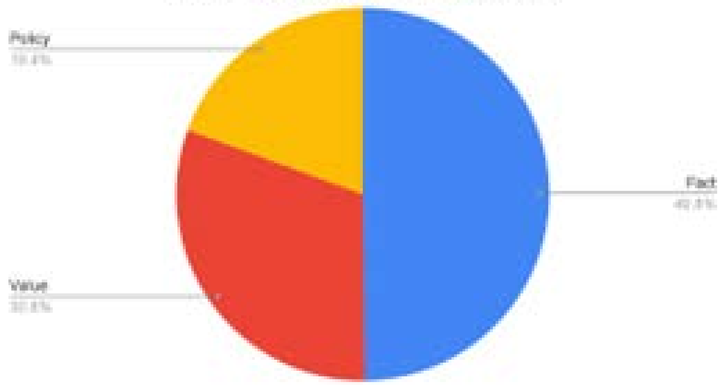

Table 1. JAMA Benchmark Criteria and Brief DISCERN by Source Type

	Source Type						
	Academic n= 38	**Commercial n= 69**	**Government n= 14**	**Medical Practice n= 158**	**Media Outlet n= 20**	**Total n= 299**	**Chi-Square (DF = 4), P**
JAMA Benchmark							
≥3	26 (8.7)	45 (15.1)	12 (4.0)	11 (3.7)	20 (6.7)	115 (38.5)	144.09, P <.001
<3	12 (4.0)	24 (8.0)	2 (0.7)	126 (42.1)	0	184 (61.5)	
Authorship							
No	26 (8.6)	22 (7.4)	9 (3.0)	99 (33.1)	4 (1.3)	175 (58.5)	48.74, P <.001
Yes	12 (4.0)	47 (15.7)	5 (1.7)	38 (12.7)	16 (5.4)	124 (41.5)	
Attribution							
No	16 (5.4)	61 (20.4)	2 (0.7)	135 (45.2)	7 (2.3)	242 (80.9)	139.73, P <.001
Yes	22 (7.4)	8 (2.7)	12 (4.0)	2 (0.7)	13 (4.3)	57 (19)	
Currency							
No	11 (3.7)	17 (5.7)	0	87 (29.0)	0	87 (29.1)	69.55, P <.001
Yes	27 (9.0)	52 (17.4)	14 (4.7)	50 (16.7)	20 (6.7)	212 (71.0)	
Disclosure							
No	0	0	0	23 (7.7)	0	27 (9.0)	26.48, P <.001
Yes	38 (12.7)	69 (23.0)	14 (4.7)	114 (38.1)	20 (6.7)	272 (91.0)	
Brief DISCERN	**Academic**	**Commercial**	**Government**	**Medical Practice**	**Media Outlet**	**Average**	**ANOVA**
Score (mean; SD)	21.76 (5.07)	15.30 (3.26)	19.14 (4.49)	12.07(3.98)	18.20 (4.20)	14.79 (5.27)	F = 54.49, P <.001

Summary

Patients seeking online information concerning treatment options for HV appear to search for questions related to treatment efficacy and the restrictions associated with the treatment. The most common source type encountered by patients are medical practices; these were found to have both poor transparency and poor quality. In order to increase the transparency and quality of online information regarding HV treatment, online sources should refer to established rubrics such as JAMA benchmark and Brief DISCERN when publishing online information. Physicians should be aware that patients are commonly encountering information of low quality. Our findings reinforce the importance of well informed, evidence-based patient counseling before and after HV treatment.

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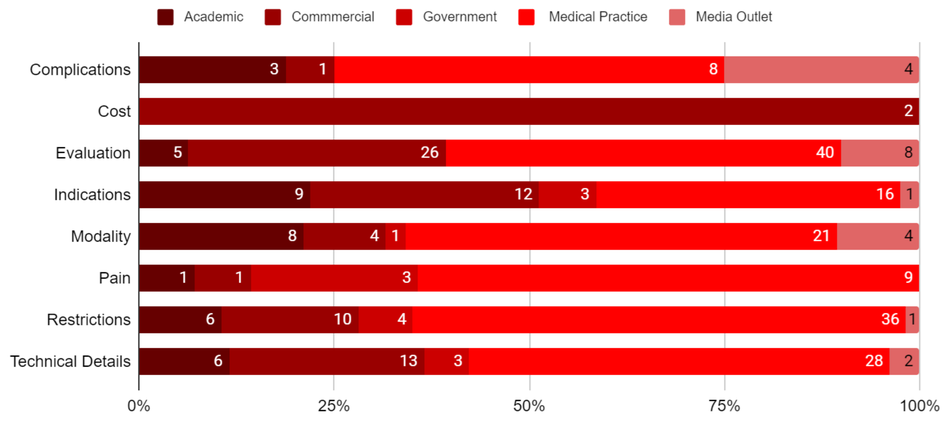
3 Shen TS, Driscoll DA, Islam W, et al. Modern Internet Search Analytics and Total Joint Arthroplasty: What Are Patients Asking and Reading Online? J Arthroplasty. Epub ahead of print 20 October 2020. DOI: 10.1016/j.arth.2020.10.024.

Figure 2. Topic By Source



Associations of Social Determinants of Health and Childhood Obesity. A cross-sectional analysis of the 2021 National Survey of Children's Health

COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

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BACKGROUND

- Childhood obesity is a growing public health problem with affected children being more likely to maintain obesity into adulthood and develop chronic diseases at a younger age.[1]
- Social determinants of health (SDOH) are known to influence overall health.[2]
- One component of SDOH is socioeconomic status (SES) in which children in a low SES household have shown to be more likely to experience being overweight and have poor health outcomes.[3]
- Childhood obesity can have profound effects on overall health into adulthood, so research into potential associations with SDOH is warranted.

OBJECTIVE

- Our study objective was to use the National Survey of Children's Health (NSCH) 2021 data to determine current associations between childhood obesity and SDOH.

METHODS

- We conducted a cross-sectional analysis of the 2021 NSCH to extract data from questions related to SDOH domains.
- We extracted sociodemographic variables to use as controls and constructed bivariate and multivariable logistic regression models to determine associations, via odds ratios, between SDOH and childhood obesity.

RESULTS

- Children identified as having obesity were significantly more likely to experience food insecurity when compared to non-obese children (AOR = 1.39; 95% CI: 1.13-1.17; Table 1).
- Children identified as having obesity were more likely than non-obese children to experience SDOH in all domains (Table 1).

Table 1. Prevalence and associations between a child having obesity and experiencing SDOH from 2021 National Survey of Children's Health.

BMI Classification	Yes n, (%)	Binary Model OR (95% CI)	Adjusted Model^ AOR (95% CI)
During the past 12 months, did this child receive any kind of medical care?			
BMI < 95th percentile	12551 (69.62)	1 (Ref)	1 (Ref)
BMI >= 95th percentile	2122 (65.79)	0.84 (0.69-1.03)	1.09 (0.88-1.35)
During the past 12 months, was there a time when this child needed healthcare but it was not received?			
BMI < 95th percentile	739 (4.07)	1 (Ref)	1 (Ref)
BMI >= 95th percentile	195 (6.32)	1.59 (1.07-2.38)	1.41 (0.9-2.20)
Since this child was born, how often has it been hard to cover the basics on your family's income?			
BMI < 95th percentile	1659 (11.26)	1 (Ref)	1 (Ref)
BMI >= 95th percentile	564 (17.46)	1.67 (1.32-2.10)	1.22 (0.94-1.57)
Which of these statements best describes your household's ability to afford food in the last 12 months?			
BMI < 95th percentile	3744 (26.27)	1 (Ref)	1 (Ref)
BMI >= 95th percentile	1172 (40.18)	1.88 (1.57-2.27)	1.39 (1.13-1.70)
To what extent do you agree with this statement? This child is safe in our neighborhood?			
BMI < 95th percentile	461 (3.9)	1 (Ref)	1 (Ref)
BMI >= 95th percentile	144 (6.14)	1.61 (1.01-2.58)	1.16 (0.73-1.85)
To what extent do you agree with this statement? This child is safe at school?			
BMI < 95th percentile	411 (2.37)	1 (Ref)	1 (Ref)
BMI >= 95th percentile	100 (2.58)	1.09 (0.72-1.66)	0.9 (0.57-1.41)

a. model controlled for race/ethnicity, household income (%FPL), parental education, and child sex. b. Ability to afford household basics answers were collapsed into binary variables of *Not difficult and Difficult. c.* Ability to afford food answered were collapsed into binary variables of *Food secure* and *Food insecure.* d. Neighborhood and school safety answers were both collapsed into binary variables as *Safe* and *Unsafe*.

CONCLUSION

- Improving policies for programs such as SNAP as well as addressing lack of access to nutritious foods, especially within food deserts, may help alleviate some food insecurity.
- Improving access to adequate amounts of nutritious foods for children and their families is critical in addressing childhood obesity and thus, decreasing risk of chronic disease and poor long-term health outcomes.

SIGNIFICANCE OF FINDINGS

- Early experiences with food insecurity may be a driver of childhood obesity and associated poor health outcomes.
- Addressing barriers to food and increasing access to supplemental food programs is a critical step in addressing childhood obesity.
- Among low-income families who may not qualify for governmental nutrition assistance programs, food pantries and food banks play a critical role in providing supplemental nutrition and helping to prevent childhood obesity.

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Measuring Outcomes of Diabetes Management:

A1c Trends in Comparison to Diabetes Education Utilization

A Retrospective Cohort Study

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Oklahoma State University Lawton Family Medicine Residency Program

INTRODUCTION

An increasing population of Americans are struggling with diabetes and the long-term sequelae of DM and/or prediabetes, namely the cardiovascular risks that contribute to many of the top causes of morbidity and mortality here in rural SW Oklahoma. Unfortunately, many Americans (especially the SW Oklahomans in our demographic) do not have adequate education on lifestyle modification, particularly diet improvement, when it comes to adequately managing glucose control.

OBJECTIVES

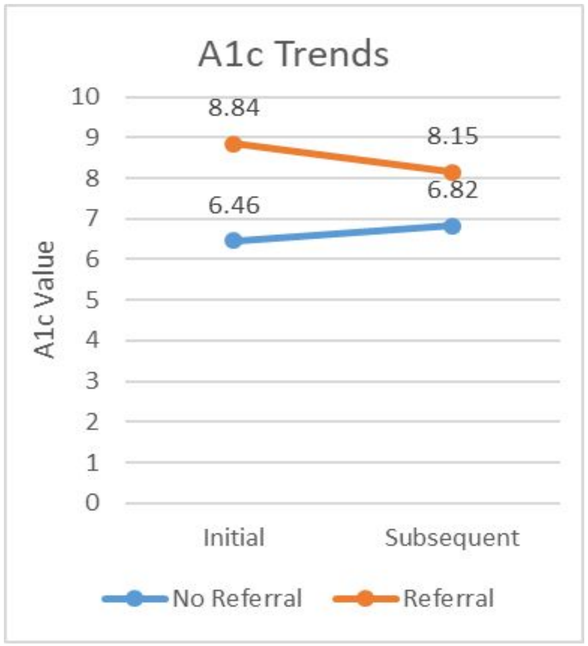
In this study, we aim to measure the trends of A1c numbers over at least 6 months in adult diabetic patients of LCHC who attend diabetes education. This study will attempt to show the effectivity of nutritional counseling/diabetes education referral in diabetic adults as a means of improving patient education in regards to their eating habits. By demonstrating this effectiveness with (hopefully) positive results, we hope to promote increased nutritional/diabetic counseling referral in the future of our clinic.

METHODS

This retrospective cohort study is designed to demonstrate the effectiveness of diabetes education objectively through trends of A1c numbers. We will statistically analyze the A1c's of diabetics who attend diabetes education sessions over a period of at least six months. As a control group, we can compare A1c number trends over a similar period of time in diabetics that did not attend diabetic education. This data will be gathered from Lawton Community Health Centers electronic health records over a study period from January 1 2021-June 30 2022.

RESULTS

A1c Trends With and Without Diabetic Education



Over 12,000 Patients were enrolled in this analysis across multiple outpatient locations in the Lawton Community Health Centers network of clinics. Of diabetics who got referral for diabetic education, the average initial A1c was noted to be 8.84. In this cohort, their most recent A1c's were noted to be an average of 8.15. Although not yet at goal of 7, there was a measured improvement of lowered A1c values of 0.69 points on average. In a control cohort group, we measured average A1c numbers over a similar period for patients who did not receive referral to diabetic education. Initial average A1c was noted to be 6.46 and the subsequent most recent A1c was noted to be 6.82. This actually showed a measured increase of A1c values of 0.36 on average. According to our analysis, those who got diabetic education referral had a demonstrable improvement in A1c, whereas, those who did not had a demonstrable worsening in A1c values.

In this study, we aimed to use this study as a motivation across our clinics to promote referral to diabetic education. Of note, and the cohorts that we analyzed, patients who received referral to diabetic education had demonstrably improved A1c's as compared to those who did not receive referral to diabetic education. Our data also showed that those who did not receive referral to diabetic education actually had statistical worsening of their A1c lab values.

Secondarily, another trend was noticed in our statistical analysis. Those he received referral to diabetic education did so add an average A1c of 8.84. However, those who did not receive referral to diabetic education had an initial A1c value in our study of 6.46. This finding seems to suggest that practitioners have a higher threshold of referring to diabetic education than should be desired. According to these numbers, practitioners did not refer to diabetic education until the A1c reaches a value of nearly 9. To correlate with this evidence, we suggest that practitioners should try to lower their threshold for referral to diabetic education as it can demonstrably decrease A1c.

CONCLUSION

Our analysis shows that referral to diabetic education does demonstrably improve A1c's, with an improved value on average of 0.69 points per patient. Practitioners know all too well the risks to cardiovascular morbidity and mortality that diabetes incurs. We also know that both oral and IM pharmacologic treatment as well as diet modification/improved exercise regimen can demonstrably improve A1c's with statistical significance. However, this data suggests that we are not often enough seeking referral for diabetic education for our patients that have elevated A1c's. Diabetic education can assist with patient management of diabetes in the realms of both pharmacologic management and lifestyle modification. We hope in the future to use these findings to encourage better referral practices to diabetic education.

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Association and Disparities of Food Security and Child Abuse: Analysis of the National Survey of Children's Health

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COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

INTRODUCTION

- At least 1 in 7 children have experienced child abuse or neglect.[1,2]
- Children from families of lower socioeconomic status exhibit a five times greater rate of child abuse as well as higher rates of food insecurity.[2]
- Given that 20% of children in food-insecure homes experience parental aggression compared to 7% in food-secure households, assessing the relationship between child abuse and food insecurity is critical.[3]
- Rates of child abuse and food insecurity also disproportionately affect children of different demographic groups, especially racial/ethnic minority groups.

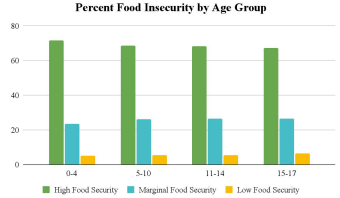
OBJECTIVES

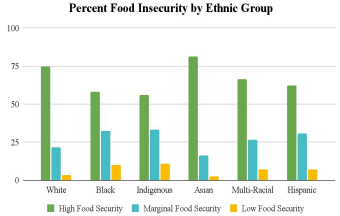
- Given the adverse effects of child abuse and food insecurity, investigating the relationship between the two may aid in developing mitigation strategies.
- Our primary objective is to assess the relationship between child abuse and food insecurity among children.
- Given that these disproportionately affect children of different demographic groups, our study aims to also identify the association amongst varying demographic factors.

METHODS

- We assessed the National Survey of Children's Health (2016-2021) to investigate the relationship between child abuse and food security, using survey weights provided by NSCH.[4]
- We determined population estimates and rates of children experiencing food insecurity and child abuse.
- We then constructed logistic regression models to assess associations, via odds ratios (OR), between food security groups and whether the child experienced child abuse.
- Finally, we constructed logistic regression models via odds ratio to assess food security and child abuse by demographic factors.

RESULTS





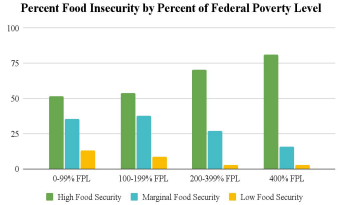


Table 1. Interaction terms for race and food security on child abuse

	Race/Ethnicity	Interaction Term AOR (95% CI)
Food grouping		
High Food Security	White	1 [Reference]
	Black	**1.61 (1.37-1.88) ***
	Indigenous	**2.1 (1.45-3.03) ***
	Asian	0.78 (0.59-1.03)
	Multi-racial	1.71 (1.44-2.04)
	Hispanic	1.11 (0.94-1.31)
Marginal Food Security	White	**2.58 (2.34-2.84) ***
	Black	**3.59 (3.03-4.26) ***
	Indigenous	**4.82 (3.49-6.67) ***
	Asian	0.98 (0.68-1.42)
	Multi-racial	4.09 (3.43-4.86)
	Hispanic	2.44 (2.07-2.87)
Low Food Security	White	**7.02 (5.95-8.27) ***
	Black	**6.78 (5.31-8.65) ***
	Indigenous	**9.26 (4.87-17.63) ***
	Asian	0.91 (0.41-2.02)
	Multi-racial	8.26 (5.67-12.04)
	Hispanic	5.27 (3.94-7.07)

Controlling for food security, age, and % FPG; * P < 0.05

RESULTS

- While rates of food security were similar across age groups, households with lower income had higher rates of marginal or low food security, as well as homes with Black, Indigenous, multi-racial, and Hispanic children.
- Compared to those with high food security, the odds of children marginal or low food security were significantly more likely to experience child abuse (AORs: 5.24, 95%CI: 4.59-6.00 and 2.36, 95%CI: 2.17-2.57, respectively).
- Compared to white children with high food security, Indigenous, Black, and White children were increasly more likely to experience child abuse as household food security decreased (Table 1).

CONCLUSION

- Child abuse and food security have a significant association, including overlapping contributory factors and disparities.
- Efforts to improve food security through policy, community food banks, and school-based programs may secondarily reduce child abuse.
- To address the disparities among racial/ethnic groups, the expansion of culturally competent, evidence-based programs to reduce food insecurity should be established, which may also reduce risk factors for child abuse.

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Associations of Cesarean Sections with Comorbidities within the Pregnancy Risk Assessment Monitoring System

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COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

BACKGROUND

- Cesarean section (CS) is a common obstetric surgical procedure aimed at reducing maternal and infant morbidity and mortality in the context of complicated pregnancies and medical emergencies.[1]
- Despite these aims, CS carries potential complications including higher rates of intraoperative or postpartum hemorrhage, hysterectomy, hematoma, major puerperal infection, venous thromboembolism, and neonatal respiratory morbidity when compared to vaginal delivery.[2,3]
- CS rates in the United States have increased over the years, as have the number of women living with comorbidities.[4,5]

OBJECTIVES

Our objective was to use the Pregnancy Risk Assesment Monitoring System date to identify the likelihood of a woman having a CS when comorbidities— diabetes, hypertension, or depression— are present.

METHODS

- We conducted a cross-sectional analysis of the 2019 Pregnancy Risk Assessment Monitoring System.
- Binary and multivariable logistic regression were used to calculate adjusted odds ratios (AORs) to determine associations between pre-existing comorbidities and CS among pregnant women.

RESULTS

- Compared to those without a diagnosis, women with pre-existing diabetes (AOR: 1.69; CI: 1.54-1.86), HBP (AOR: 1.58; CI: 1.47-1.71), and depression (AOR: 1.16; CI 1.10-1.22; Table 1) were more likely to have a CS.
- Additionally, participants with gestational diabetes (AOR 1.43; CI 1.34-1.52), HBP (AOR 1.86; CI 1.76-1.95) and depression (AOR 1.16; CI 1.09-1.22) were also more likely to have a CS than those without comorbidities.

Table 1: Prevalence and adjusted odds ratios (AORs) of comorbidities in participants having a C-Section. (n= 46,451, N=2,139,436)

	No C-Section n= 94,266, N=4,858,325	C-Section n= 46,451, N=2,139,436	Missing Values n=140,817, N=7,003,967	Logistic Regression
	% with condition (95% CI)	% with condition (95% CI)	% with condition (95% CI)	AOR (95% CI)
Pre-existing Comorbidity				
Diabetes	2.65 (2.50-2.81)	4.66 (4.36-4.99)	3.38 (0.83-12.75)	1.69 (1.54-1.86)
HBP	4.29 (4.09-4.48)	7.29 (6.91-7.69)	4.74 (1.51-13.91)	1.58 (1.46-1.69)
Depression	13.12 (12.78-13.46)	14.24 (13.72-14.77)	7.51 (3.39-15.81)	1.14 (1.08-1.20)
Any of the 3 comorbidities	15.86 (15.49-16.22)	20.47 (19.87-21.08)	9.12 (4.46-17.75)	1.37 (1.30-1.43)
Gestational Comorbidity				
Diabetes	7.96 (7.69-8.24)	12.03 (11.56-12.51)	10.42 (5.37-19.25)	1.43 (1.34-1.52)
HBP	10.19 (9.90-10.50)	17.47 (16.93-18.01)	6.98 (3.10-14.95)	1.86 (1.76-1.95)
Depression	12.38 (12.05-12.72)	13.49 (12.99-14.01)	12.13 (6.00-22.98)	1.13 (1.07-1.19)
Any of the 3 comorbidities	25.96 (25.52-26.39)	34.65 (33.96-35.36)	26.81 (17.55-38.68)	1.48 (1.42-1.54)

Model controlled for age, race, cigarette use, and income group.

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CONCLUSION

- Higher rates of CS were found among individuals with a pre-existing or gestational diagnosis of diabetes, HBP, or depression than those without these diagnoses.
- With increasing rates of these conditions, it is likely that CS rates will continue their trajectory in the US. Thus, organizations must provide evidence-based guidance for physicians caring for these individuals.

SIGNIFICANCE OF FINDINGS

- There is a clinical need for medical providers to be equipped to address comorbidities both before and during pregnancy, as these increase the risk for obstetrical complications and frequency of CS.
- As comorbidities negatively impact pregnancy outcomes, public policy changes can improve insurance coverace and proactive tretament of these diagnoses.
- Relationships have been shown to exist between postpartum depression and CS, but research is limited regarding CS and pre and peripartum depression.

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HPV and Meningococcal Vaccine Uptake among Teens: A cross-sectional examination from the National Immunization Survey - Teen 2020

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BACKGROUND

- Vaccination against both Human papillomavirus (HPV) and meningococcal disease is recommended for all adolescents aged 11-12 years in the United States.[1]
- Meningococcal conjugate vaccines became recommended for preteens in 2005.[2]
- Quadrivalent HPV vaccines were first recommended for adolescent females in 2007 and males in 2011.[3,4]
- The National Immunization Survey expanded in 2006 to include the NIS-Teen which was designed to gather more information about adolescent immunizations, including the HPV and meningococcal vaccinations.[5]

OBJECTIVES

- Our primary aim was to analyze trends in vaccination for both HPV and meningococcal disease and determine factors associated with increased likelihood of dual vaccine uptake.
- Our secondary aim was to assess if state of residence influenced likelihood of dual vaccination.
- We anticipate differences in individual and dual vaccination status based on teen demographics and that teens living in states with vaccine mandates will exhibit higher rates of dual vaccination against both HPV and meningococcus compared to states without any mandates.

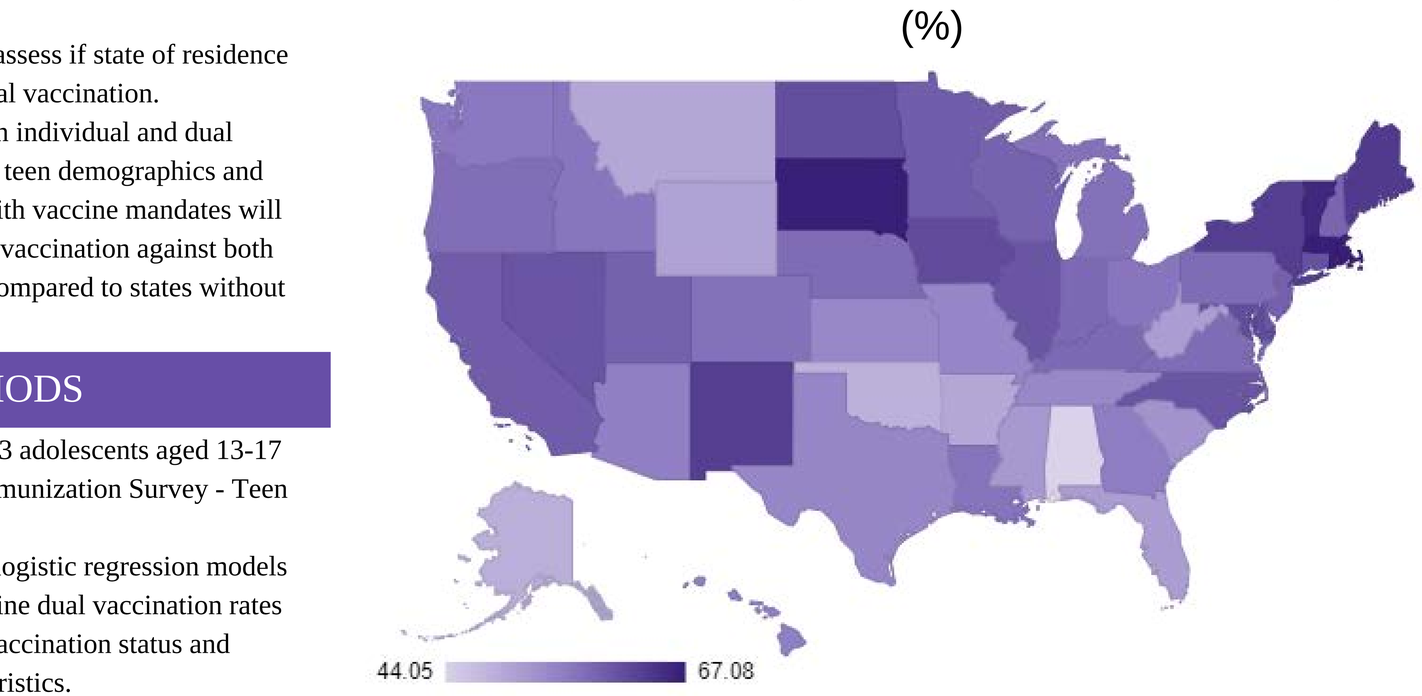
METHODS

- We analyzed data on 31,083 adolescents aged 13-17 years from the National Immunization Survey - Teen 2020.
- Bivariate and multivariate logistic regression models were constructed to determine dual vaccination rates and associations between vaccination status and sociodemographic characteristics.

RESULTS

- Teens were 2.03 (95%CI: 1.98-2.09) times more likely to be vaccinated against meningococcal disease compared to HPV.
- Teens vaccinated against HPV were 1.21 (1.15-1.27) times more likely to be dually vaccinated than teens who were vaccinated against meningococcal disease.
- Among teens living in the South relative to the Northeast, the likelihood for being vaccinated against only HPV increased by a factor of 1.30 (1.07-1.58) and against only meningococcal disease increased by a factor of 1.17 (1.03-1.33).
- Relative to those living in the Northeast, the risk for being unvaccinated rather than dually vaccinated increased by a factor of 1.51 (1.25-1.83) for those living in the Midwest, 1.62 (1.30-2.03) for those living in the West, and 1.80 (1.50-2.15) for those living in the South.
- States with the highest rate of dual vaccination against both HPV and meningococcal disease were Rhode Island (67.08%), Massachusetts (66.89%), South Dakota (66.76%), Vermont (65.61%) and Maine (63.48%).
- The states with the lowest rate of dual vaccination were Alabama (44.05%), Oklahoma (48.53%), Alaska (48.8%), Arkansas (49.78%) and Montana (49.81%).
- We also found associations in vaccination status between sex, race/ethnicity and income-to-poverty ratio.

Dual HPV and Meningococcal Vaccination Status by State (%)



CONCLUSION

- Dual vaccination against HPV and meningococcal disease among adolescents in the United States is associated with many factors including state legislation, physician recommendation, sex and census region.
- Although administration of both vaccines is recommended by the Advisory Committee on Immunization Practices (ACIP) to all adolescents aged 11-12 years, meningococcal vaccination is two-times more likely than HPV vaccination.

SIGNIFICANCE OF FINDINGS

- Given the retained efficacy and the guidance that both MenACWY and HPV vaccination series begin at ages 11-12 years, we recommend that primary care physicians encourage their patients to receive both of these vaccinations simultaneously.
- Given the similarities in disease prevalence, spread, and ACIP recommendations, HPV vaccine mandates may help reduce disease burden in the United States.
- Increased vaccination at a societal level will increase protection against preventable diseases that cause significant burden to adolescents and young adults.

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Frequency and Severity of Depression amongst Pregnant Healthcare Workers:
An Analysis Before and After the SARS-CoV-2 Pandemic

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INTRODUCTION

- COVID-19 pandemic has intensified stressors and worsened mental health outcomes for healthcare workers (HCWs), which is often exacerbated in those in who are pregnant.
- Depression in HCWs is influenced by fears for personal safety, higher workload, and social isolation.[1]
- Pregnant HCWs report a higher prevalence of psychological symptoms exacerbated by the pandemic.
- High emotional stress can lead to lower productivity, increased medical errors, and decreased empathy affecting patient care.[2]
- Aim of the study is to identify trends of depression frequency, severity, and medication use in pregnant HCWs throughout the stages of the pandemic (2019-2021).

METHODS

- Data was obtained from National Health Interview Survey combining the 2019-2021 cycles (N=613).
- Associations were categorized in COVID-19 stages of pre-pandemic (2019), during (2020), and endemic (2021) via multivariable regression controlling for age, income-to-poverty ratio, and additional children in the home.

Table 1. NHIS Depression Questionnaires

1. Have you ever been told by doctor or other health professional that you have ever had any type of depression?
2. How often do you feel depressed? Would you say daily, weekly, monthly, a few times a year, or never?
3. Do you take a prescription medication for depression?
4. Thinking about the last time you felt depressed, how depressed did you feel? Would you say a little, a lot, or somewhere in between?

RESULTS

- We found no observable differences in the rates of pregnancy, reported depression or symptomatology between HCW and non-HCW.
- During the pandemic, pregnant HCWs in 2021 were **more likely to report ever having depression** compared to pregnant HCWs in 2019 (AOR: 3.33; 95% CI:1.92-5.79).
- During 2021, HCWs were also **more likely to report a moderate to severe level of depression** compared to 2019 (AOR: 2.55; 95% CI: 1.54-4.24).

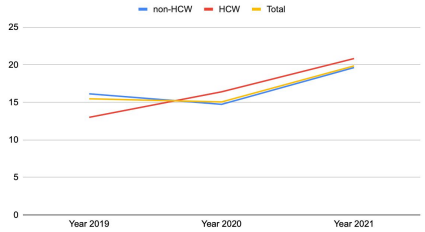

Figure 1: Prevalence of Individuals Reporting ever having Depression

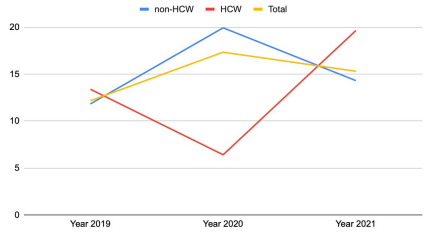

Figure 2: Prevalence of Individuals Experiencing Frequent Depression

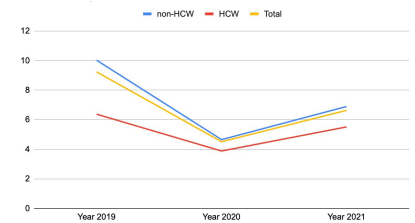

Figure 3: Prevalence of Individuals taking Medications for Depression

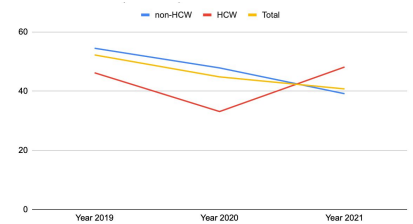

Figure 4: Prevalence of Individuals Reporting Moderate/Severe Level of Depression

CLINICAL IMPLICATIONS

- Infants born to women with untreated depression are at risk of prematurity, low birth weight, and intrauterine growth restriction.[3]
- Postpartum deaths due to depression/suicide accounts for nearly 20%.[4]
- Pregnant HCWs can request to be deployed to other work areas such as phone triages or telescreening to limit burden.
- Rapid interventions needed to reduce exacerbated depression in HCWs includes talk therapy, support groups, and spiritual practices.

CONCLUSION

- Rates of pregnancy amongst HCWs and non-HCWs were similar, as well as rates of depression and symptomatology in those who were pregnant.
- Rates of reporting ever having depression and severity was greater during the endemic stage of the COVID-19 pandemic compared to pre-pandemic.
- Exacerbated rates and severity amongst pregnant healthcare workers during the endemic stage should be prioritized to ensure positive maternal and child outcomes plus that they are able to return to the workforce when ready.

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Oklahoma State University College of Osteopathic Medicine

Evaluation of Medical Student Sleep Parameters using Wrist Actigraphy

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INTRODUCTION

Medical students frequently report poor sleep (i.e., inadequate sleep duration, sleep disruptions), predisposing them to various mental health conditions.[1] Additionally, evidence suggests poor sleep diminishes neurocognitive functions, such as alertness and learning.[2] To date, investigations on medical student sleep have relied on subjective evaluations (i.e., surveys, sleep diaries), while wrist actigraphy devices have been used to objectively evaluate sleep metrics among physicians, nurses, and pharmacy students.

OBJECTIVE

The goal of this study was to evaluate medical students' sleep parameters using wrist actigraphy.

METHODS

Thirty medical students (first-year = 9, second-year = 9, third-year = 8, fourth-year = 4) wore a Fatigue Science ReadiBand™ for 14 days.[3] The following data from the Fatigue Science SAFTE Model™ were analyzed: *Sleep Quantity* (hours), *Awakenings per Night*, *Average ReadiScore* (0-100), *Sleep Quality* (1-10), and *ReadiScore Zones*. *Average ReadiScore* represents average cognitive alertness at a given time. *ReadiScore Zones* (percent, %) represent the amount of time an individual spent with an *Average ReadiScore* during waking hours while wearing the ReadiBand™. *ReadiScore Zones* have been previously validated and correlate with blood alcohol content (BAC) levels of cognitive impairment and delayed reaction times.[3] A higher *Average ReadiScore* and *ReadiScore Zone* indicates higher alertness and less cognitive impairment. Means and standard deviations were calculated for each variable followed by one-way ANOVAs by academic year with a Tukey post-hoc analysis.

RESULTS

Thirteen males and 17 females participated (age 26.50 ± 4.88 years and BMI 27.77 ± 7.45 kg/m^2). Means and standard deviations for *Sleep Quantity*, *Total Awakenings per Night*, *Average ReadiScore*, and *Sleep Quality* for all participants were: 6.52 ± 1.05 hours/night, 3.09 ± 1.35 awakenings per night, 87.80 ± 6.50, and 6.77 ± 1.68, respectively. Second-year students demonstrated the highest *Average ReadiScore* (88.78 ± 5.19), *Sleep Quality* (7.00 ± 1.41), and spent the most time at optimal cognitive attention levels. First-year students obtained the highest *Sleep Quantity* (6.76 ± 1.29 hours) and spent the least amount of with severely impaired alertness. Third-year students had the lowest *ARS* (86.63 ± 10.16) and *Sleep Quantity* (6.26 ± 1.24 hours). Fourth-year students had the lowest *Sleep Quality* (6.25 ± 1.71) and experienced the most sleep disruptions (3.58 ± 1.46 awakenings/night). In comparison, third and fourth-year students spent the most time with impaired alertness. One-way ANOVAs by academic year did not demonstrate any statistical significance.

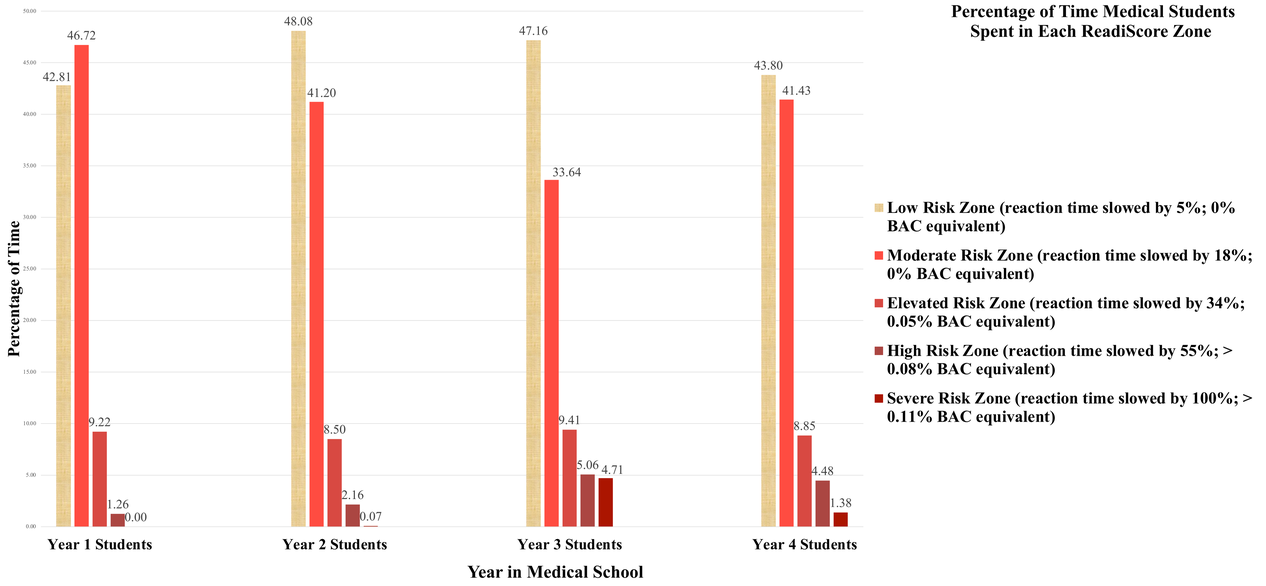
Table 1. Sleep Metrics (Means and Standard Deviations) with One-Way ANOVAs by Academic Year

Sleep Metric	Academic Year	Mean ± Standard Deviation	F	Significance
Sleep Quantity	MS-I (N = 9)	6.76 ± 1.29	0.29	0.83
	MS-II (N = 9)	6.52 ± 0.87		
	MS-III (N = 8)	6.26 ± 1.24		
	MS-IV (N = 4)	6.53 ± 0.46		
Awakenings per Night	MS-I (N = 9)	3.18 ± 1.85	0.25	0.86
	MS-II (N = 9)	2.94 ± 1.06		
	MS-III (N = 8)	2.90 ± 1.13		
	MS-IV (N = 4)	3.58 ± 1.46		
Average ReadiScore	MS-I (N = 9)	88.22 ± 4.89	0.17	0.91
	MS-II (N = 9)	88.78 ± 5.19		
	MS-III (N = 8)	86.63 ± 10.16		
	MS-IV (N = 4)	87.00 ± 6.50		
Sleep Quality	MS-I (N = 9)	6.67 ± 2.29	0.19	0.90
	MS-II (N = 9)	7.00 ± 1.41		
	MS-III (N = 8)	6.88 ± 1.36		
	MS-IV (N = 4)	6.77 ± 1.68		

Table 1. Percent of Time Spent in ReadiScore Zones by Academic Year (Means and Standard Deviations

Academic Year	90-100 ReadiScore Zone (Low Risk)*	80-90 ReadiScore Zone (Moderate Risk)*	70-80 ReadiScore Zone (Elevated Risk)*	60-70 ReadiScore Zone (High Risk)*	0-60 ReadiScore Zone (Severe Risk)*
Reaction Time Slowed by	*5%*	*18%*	*34%*	*55%*	*100%*
BAC Equivalent	*0%*	*0%*	*0.05%*	*> 0.08%*	*> 0.11%*
MS1 (N = 9)	42.81 ± 29.99	46.72 ± 21.72	9.22 ± 9.93	1.26 ± 1.65	0.00
MS2 (N = 9)	48.08 ± 33.68	41.20 ± 24.20	8.50 ± 8.58	2.16 ± 3.15	0.07 ± 0.20
MS3 (N = 8)	47.16 ± 31.31	33.64 ± 23.70	9.41 ± 9.89	5.06 ± 10.95	4.71 ± 13.33
MS4 (N = 4)	43.80 ± 33.81	41.43 ± 28.37	8.85 ± 8.10	4.48 ± 4.69	1.38 ± 2.68

BAC = Blood Alcohol Concentration; * = values represent percentage of time spent at an Average ReadiScore between the two listed numbers



CONCLUSION

Our results indicate that medical students are not sleeping the recommended hours per night, nor obtaining adequate sleep quality, potentially due to stress and sacrificing sleep for the demands of medical school. Second-year students generally demonstrated the best sleep metrics, possibly due to familiarity with curriculum. However, clinical rotations, erratic schedules, residency applications, and residency interviews, likely contributed to third and fourth-year students' poor sleep metrics. Additionally, more senior medical students frequently function with diminished daily cognitive alertness. Noting the common theme of poor sleep behaviors often discovered among medical students, it is important to objectively identify sleep behaviors and eventually develop interventions to combat excessive stress, fatigue, and adverse health risk among physicians in training.

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Examination of Pediatric Oncology Trials within the United States' National Library of Medicine's Clinical Trials Database.

COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

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BACKGROUND

- Pediatric oncology treatment is an expensive and understudied research area. Thus, it is vital that the studies that are performed are reporting novel results.

OBJECTIVES

- Discontinuation and non reporting of clinical trials has not been quantified in relation to pediatric oncology.
- The aim of this study was to assess various pediatric oncology trial characteristics and their associations with the likelihood of being discontinued.

METHODS

- ClinicalTrials.gov was searched to identify pediatric oncology trials, and their current project status.
- Trial characteristics such as trial phase, location, intervention type, funding source and enrollment numbers were determined.
- Statistical analysis was completed to determine the relationship between trial characteristics and their rates of discontinuation.

RESULTS

- The majority of studies were funded by sources other than industry or NIH (192/349; 55%) and most were phase 2 trials (140/349; 40%).
- 14.90% of pediatric oncology trials between 2008-2021 were discontinued (52/349).
- The majority of trials investigating Acute Lymphocytic Leukemia (15/20; 75%), retinoblastoma (5/6; 83.3%), and Neuroblastoma (10/14; 71.4%) did not report their results.

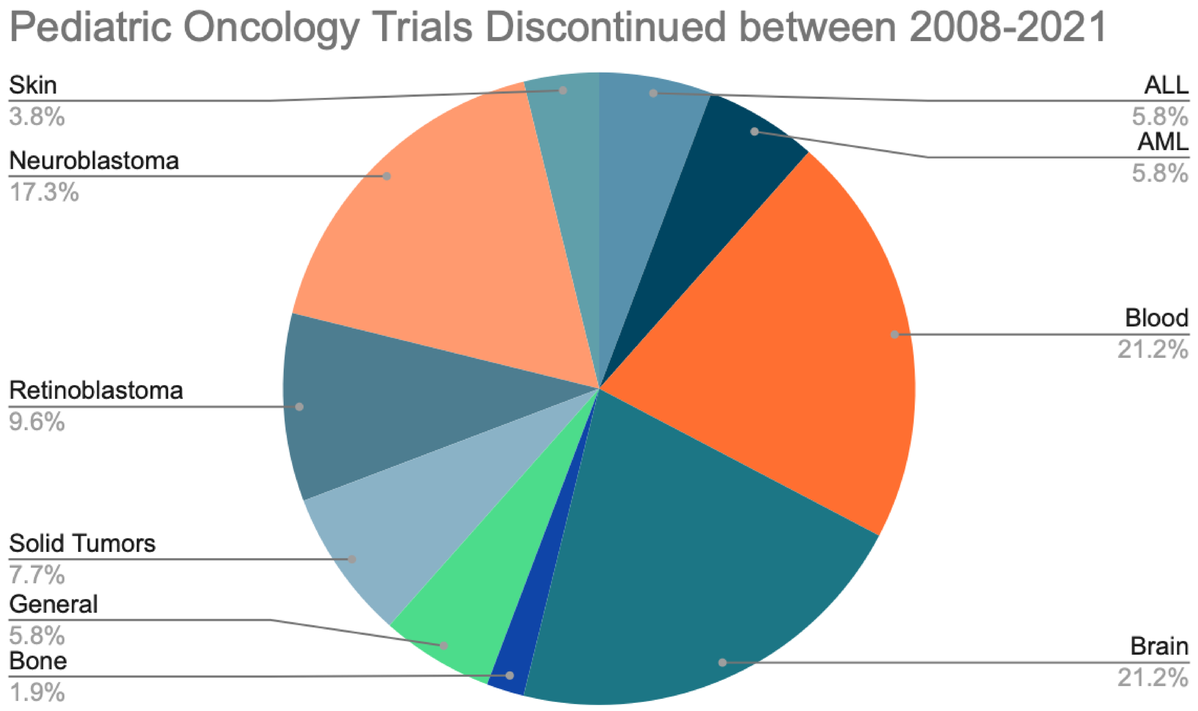

Figure 1. Types of pediatric oncology trials discontinued between 2008-2021

CONCLUSION

- A majority of trials focused on pharmaceutical interventions for cancers of the brain and blood and were in early phases. With few trials making it to stage 3 or 4, new medications for cancer treatment in children may be lacking.
- Because pediatric oncology trials subject children to sometimes painful and risky procedures, it is concerning that 15% were discontinued and nearly 65% were lacking results.
- Limiting the amount of research waste in this field will lead to a better understanding of pediatric oncology and further advancement of treatment options for this patient population.

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OKLAHOMA STATE UNIVERSITY COLLEGE OF OSTEOPATHIC MEDICINE

INEQUITIES IN EPILEPSY: A SCOPING REVIEW

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INTRODUCTION

Epilepsy is a neurological disorder with a strong presentation worldwide. It is imperative that the health inequities tied to epilepsy are assessed and accounted for. Further, it is vital that healthcare providers are familiar with such inequities to supplement appropriate care for patients.

OBJECTIVES

To complete a scoping review of literature surrounding health inequities in epilepsy while providing recommendations for future research.

METHODS

During July of 2022, we searched MEDLINE and Ovid Embase to find published articles pertaining to epilepsy and health inequities. Initially, authors received training. Authors then screened and data extracted in a masked, duplicate manner. Studies published within the timeframe of 2011-2021 in all countries were deemed appropriate. We screened 5,325 studies for titles and abstracts, then 56 studies for full text. We evaluated the inequities of race/ethnicity, sex or gender, income, occupation status, education level, under-resourced/rural, and LGBTQ+. To summarize the data and descriptive statistics of our study, we used Stata 17.0 (StataCorp, LLC, College Station, TX).

RESULTS

We obtained a sample size of 45 studies for study inclusion. The most reported health inequities were income (18/45, 40.0%), under-resourced/rural (15/45, 33.3%), race/ethnicity (15/45, 33.3%). The least reported health inequity was LGBTQ+ (0/45, 0.0%).

Figure 1. PRISMA Flow Diagram

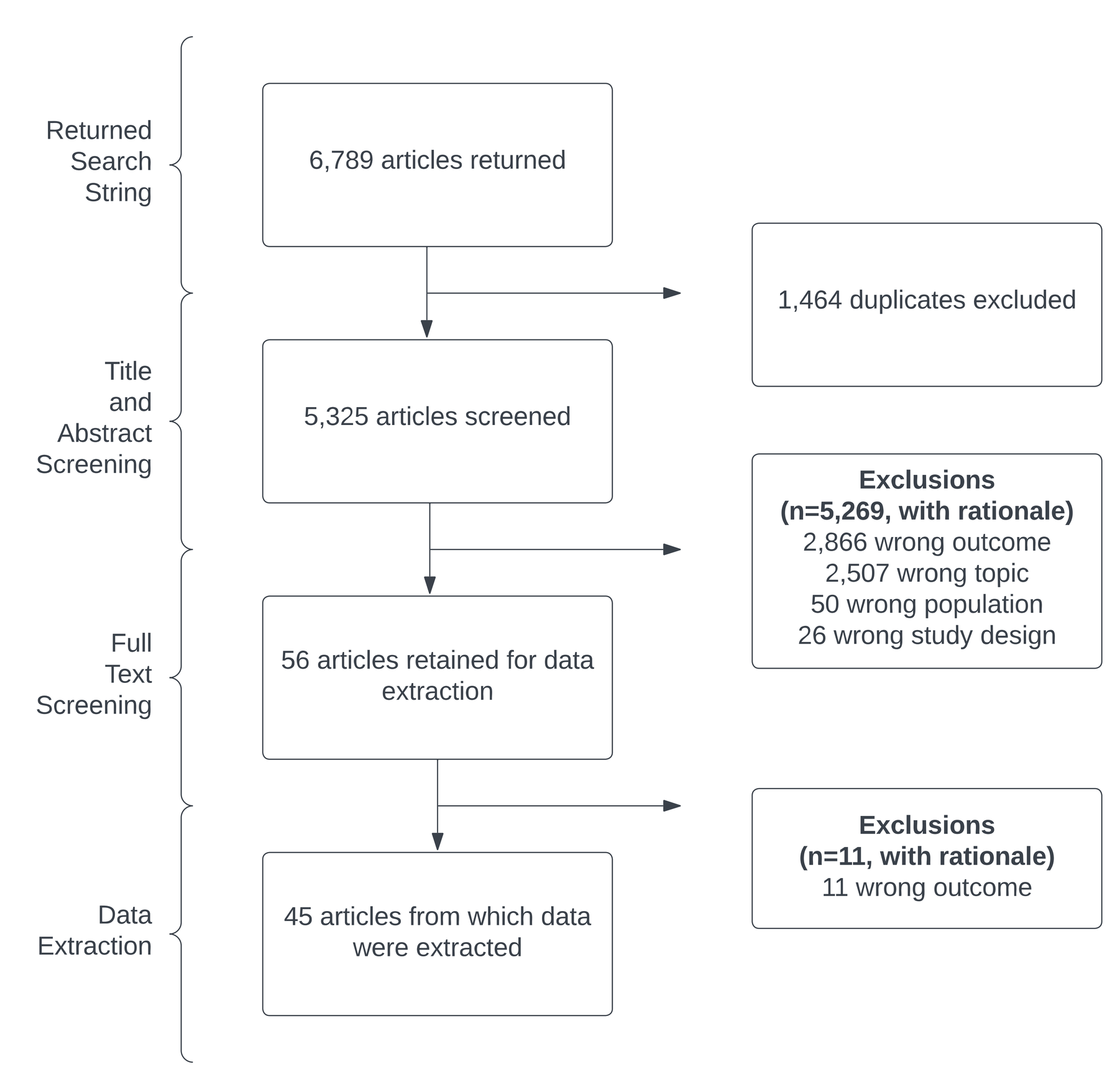

Figure 2. Frequency of Inequities Examined

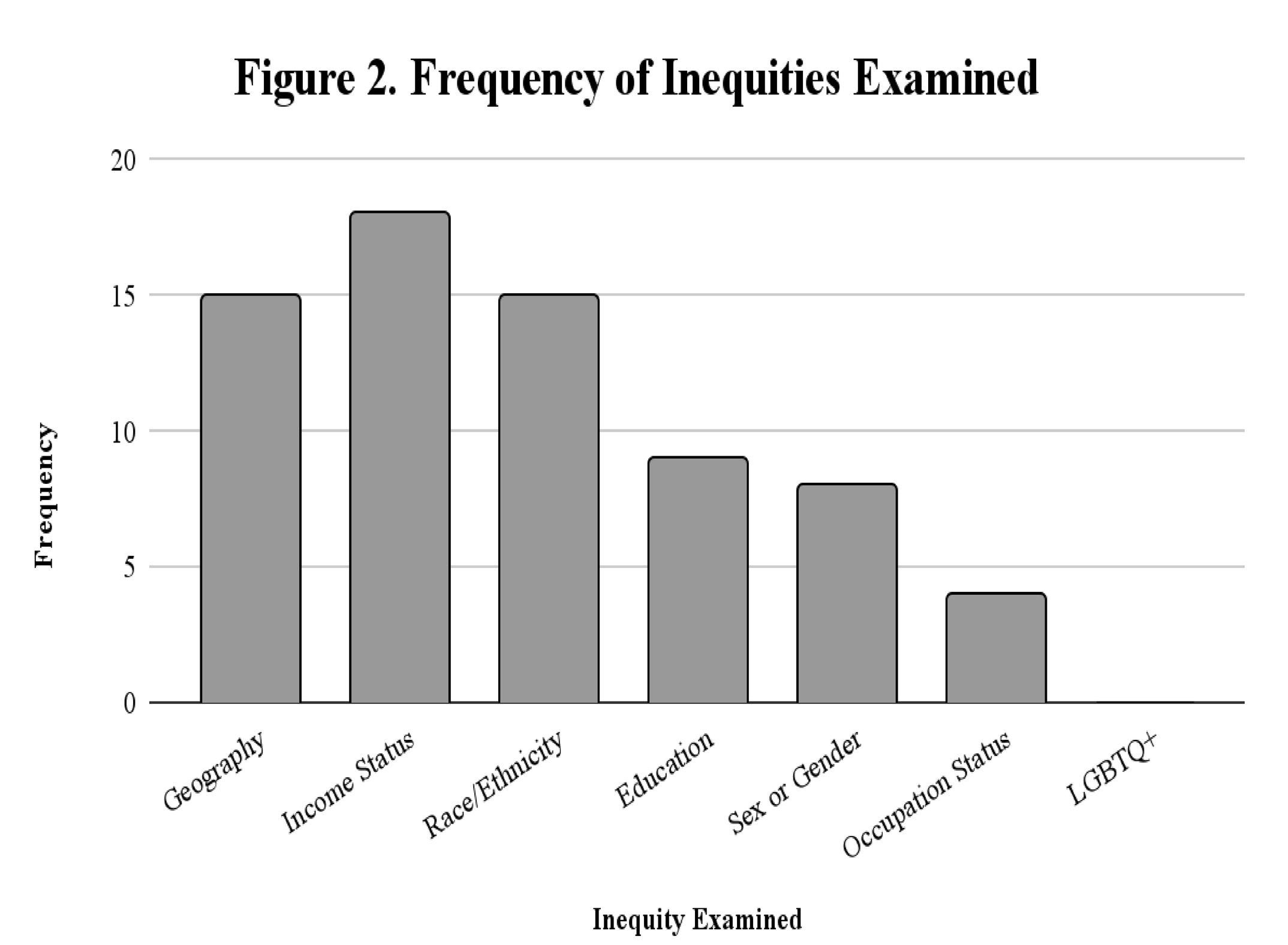

Figure 3. Frequency of Factors Examined by Year

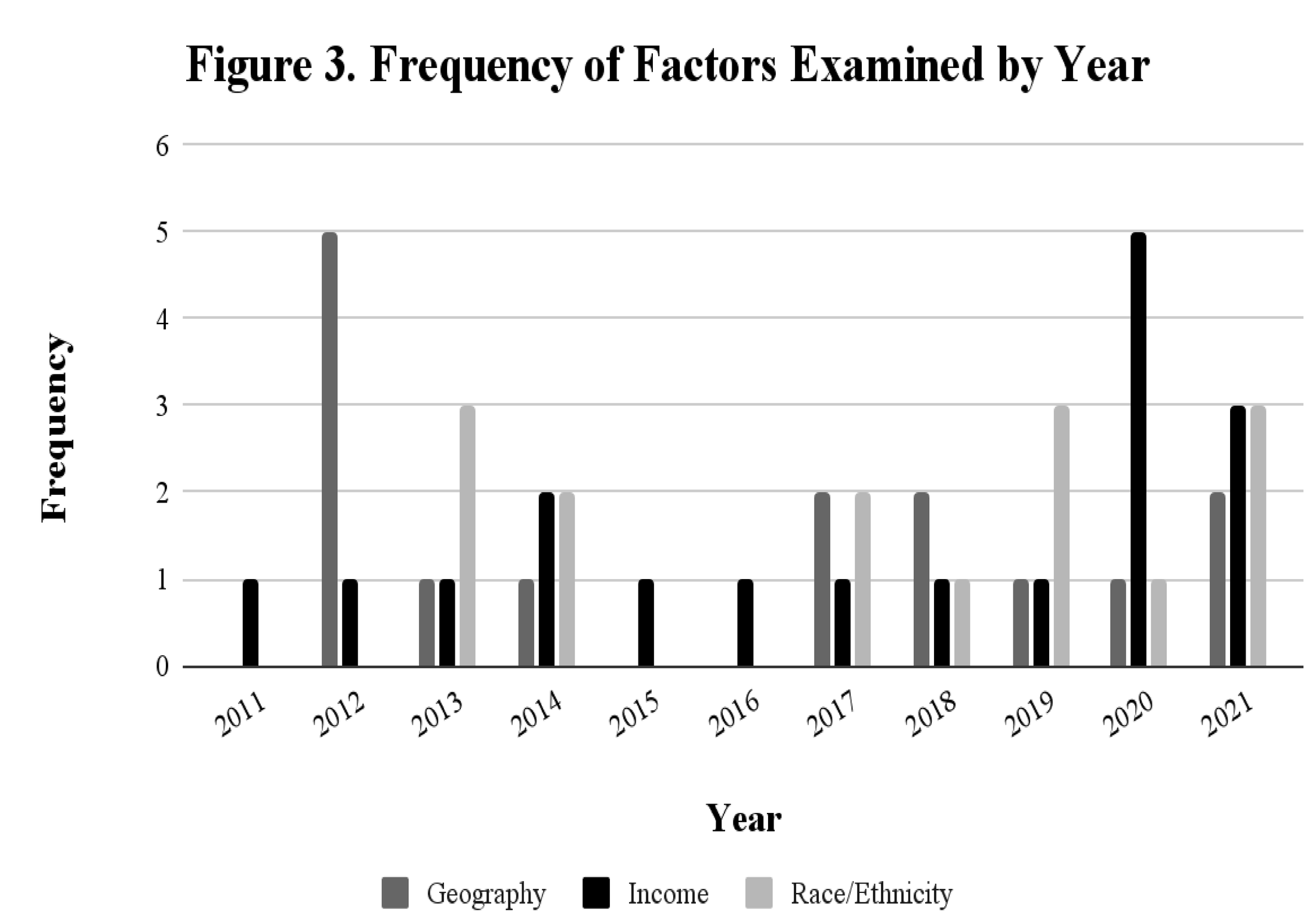

Table 1. Descriptive Statistics

Table 1. Frequencies and Percentages of Disparities Among Included Trials

Disparity Examined	Frequency (n = 45)	Percentage (%)
Geography	15	33.33
Income Status	18	40.00
Race/Ethnicity	15	33.33
Education	9	20.00
Sex or Gender	8	17.78
Occupation Status	4	8.89
LGBTQ+	0	0.00
Study Design		
Clinical Trial	1	2.17
Cohort Study	4	8.70
Cross-Sectional Analysis	18	39.13
Literature Review	6	13.04
Database Review	14	30.43
Systematic Review/Meta-Analysis	3	6.52
Study Setting		
Single Institution	21	45.65
Multiple Institution	9	19.57
National Database	11	23.91
Regional Database	1	2.17
Other	4	8.70

CONCLUSION

The findings of our study suggest that gaps exist in literature concerning epilepsy and inequities. The inequities of income status, under-resourced/rural, and race/ethnicity were examined the most while LGBTQ+, occupation status, and sex or gender were examined the least. With the ultimate goal of more equitable and patient-centered care in mind, it is vital that future studies endeavor to fill in these determined gaps.

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Characterization of Biofilm Formation by Environmental *Clostridioides difficile* Isolates

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Abstract

Clostridioides difficile is a gram-positive, spore-forming bacteria capable of causing disease, referred to as *Clostridioides difficile* Infections (CDI), which may include symptoms such as severe diarrhea and colitis. Every year in the United States, about half a million of these CDI cases result in approximately $6 billion in medical costs. *C. difficile* is difficult to eradicate due to its antibiotic resistance, virulent properties, and the fact that there is no available vaccine. CDIs are thought to be iatrogenic, but accumulating evidence suggests that environmental transmission may play an important role as well.

Previously, we were able to isolate multiple *C. difficile* samples from fish markets, hospital wastewater, and wastewater treatment plants in southern Taiwan. Genotypic analysis revealed the presence of toxigenic *C. difficile* isolates closely related to ones prevalent among humans and animals infected by *C. difficile*. To gain a better understanding of the virulence capabilities of these environmental isolates, a series of studies including growth rates, spore production, and cytotoxicity were performed; however, the biofilm forming abilities were not well characterized.

In this study, biofilm formation ability of these isolates was observed over a 72-hour period, then biofilm mass was measured using a crystal violet staining assay. By using a One-Way ANOVA, results were compared to the control lab strains 630 and R20291 to identify any significant differences. Further comparisons were made between isolates based on biofilm morphology. We observed a diverse range in biofilm formation abilities as well as biofilm morphology, but we did not detect any significant correlation between the robustness of the biofilms and the presence of toxin genes. Ongoing experiments focus on assessing the ability of these biofilms to resist antibiotics. In summary, our preliminary results contribute to the characterization of multiple environmental *C. difficile* isolates obtained from water and seafood samples in southern Taiwan.

Methods

Isolate Selection

Our samples included *C. difficile* isolated in Tainan City, Taiwan from wastewater near hospitals and water treatment plants, as well as oysters and clams from a local seafood market.[2] Lab strains, R20291 and 630, were utilized as controls to compare environmental isolates.

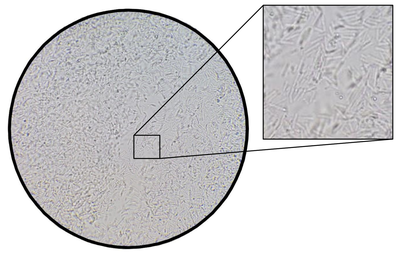
Biofilm Assay

Environmental isolate broth cultures grown in BHI-s were normalized to OD600nm of 1.0, then a 1:100 dilution was performed and aliquoted into a 24-well plate prior to incubating anaerobically at 37°C for 72 hours. Biofilms were washed twice with PBS, incubated with 200µL/well of a 0.25 aqueous crystal violet solution for 15 minutes, then washed five times with PBS. The biofilm was suspended in 1mL of methanol then centrifuged at 13,000 RPM/30 seconds. The supernatant was removed and absorbance was measured at 570nm using an ELISA Microplate Reader.

BHI-S = brain heart infusion supplemented with L-cysteine (0.1% wt/vol) and yeast extract (5g/L)

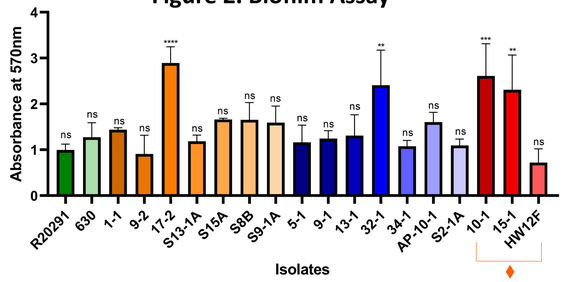
Results

Figure 1. Microscopic Image of *C. difficile*



Microscopic morphology of *C. difficile* with 1000x magnification shows a rod shape.

Figure 2. Biofilm Assay

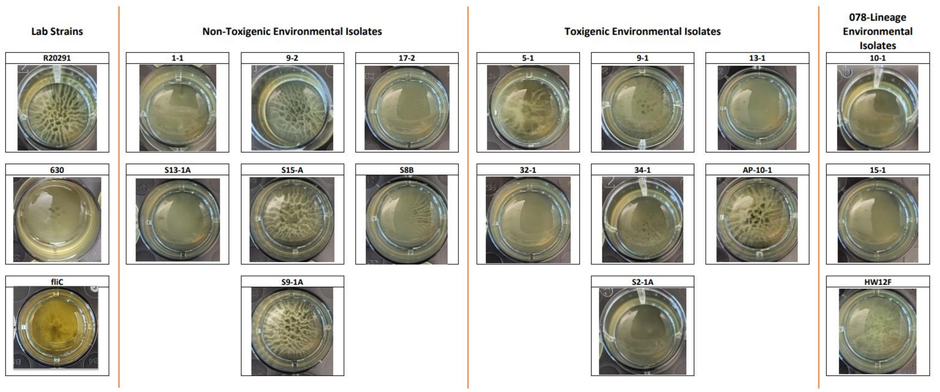


The mass of biofilm produced during a 72-hour incubation period was compared using a One-Way ANOVA♦. As expected, hypervirulent strains belonging to the 078 lineages produced some of the greatest amounts of biofilm. Isolate 17-2, belonging to the non-toxigenic group, also produced a comparable large amount of biofilm.

♦ Indicates 078 Lineage (hypervirulent strain).

♦ Indicates NS = non-significant (p>0.05), (*) Indicates p≤0.05 , (**) Indicates p≤0.01, (***) Indicates p≤0.001, (****) Indicates p≤0.0001

Figure 3. Environmental *C. difficile* Isolate Biofilm Morphology



Previous studies involving these environmental isolates compared the surface morphology of individual *C. difficile* colonies.[4] In this study we documented biofilm morphology to identify any differences within the toxigenic and non-toxigenic isolates. We observed great variations between biofilms that were consistent throughout our trials. A non-motile, R20291 mutant (fliC) was grown for 72 hours to compare its biofilm morphology to our environmental isolates. FliC formed an obvious biofilm that was very fragile when manipulating the 24-well plate it was grown in.

Significant Findings

Biofilm Formation

- The isolates that grew the greatest mass of biofilm belonged to the 078-lineage, toxigenic, and non-toxigenic groups.
  - 10-1 and 15-1 belong to the 078-lineage group.
  - 32-1 belongs to the toxigenic group.
  - 17-2 belongs to the non-toxigenic group.
- 078-lineage isolates are considered hypervirulent, so we expected to see the greatest mass of biofilm within this group.
  - 10-1 and 15-1 had significant biofilm growth.
  - HW12F, another member of the 078-lineage, grew very little biofilm compared to all other environmental isolates.

Biofilm Morphology

- Differences in morphology were seen, but there lacked a correlation between morphology and toxigenicity.
- *C. difficile* utilizes flagella to move within its environment. FliC, an R20291 mutant, is considered non-motile due to the fact that it lacks an important structural component of flagella. We were interested to observe any differences in biofilm morphology that may suggest the impact of flagella on biofilm formation.
  - FliC was able to form a visible biofilm; however, it was easily disrupted when transporting the 24-well plate.
  - This suggests that flagella may have a role in strong biofilm adhesion.

Future Directions

- We will test the hypothesis that prolific biofilm producing *C. difficile* isolates confer greater vancomycin resistance. *C. difficile* isolates to be tested:
  - Lab Stains: R20291 and 630
  - Non-Toxigenic Isolates: 9-2 and 17-2
  - 078-Lineage Isolates: 10-1 and HW12F

Further Information

- Environmental isolates can be categorized based on PCR ribotypes to compare toxigenicity.

Table 1. Environmental Isolate Toxin Genotypes

Isolate	PCR Ribotype	Toxin Genotype				Source
		tcdA	tcdB	cdtA	cdtB	
R20291	RT027	(+)	(+)	(+)	(+)	Lab Strain
630	RT012	(+)	(+)	(-)	(-)	Lab Strain
1-1	RT713	(-)	(-)	(-)	(-)	NCKUH
9-2	RT647	(-)	(-)	(-)	(-)	NCKUH
17-2	RT462	(-)	(-)	(-)	(-)	NCKUH
S13-1A	RT AI-60	(-)	(-)	(-)	(-)	Oyster
S15-A	RT060	(-)	(-)	(-)	(-)	Oyster
S8B	RT607	(-)	(-)	(-)	(-)	Oyster
S9-1A	RT592	(-)	(-)	(-)	(-)	Oyster
5-1	RT002/2	(+)	(+)	(-)	(-)	NCKUH
9-1	RT043	(+)	(+)	(-)	(-)	NCKUH
13-1	RT633	(+)	(+)	(-)	(-)	NCKUH
32-1	RT235	(+)	(+)	(-)	(-)	NCKUH
34-1	RT AI-83	(-)	(+)	(+)	(+)	NCKUH
AP-10-1	RT106	(+)	(+)	(-)	(-)	WWTP
S2-1A	RT AI-74	(-)	(+)	(-)	(-)	Oyster
10-1*	RT126	(+)	(+)	(+)	(+)	NCKUH
15-1*	RT127	(+)	(+)	(+)	(+)	NCKUH
HW12F*	RT598	(+)	(+)	(+)	(+)	WWTP

NCKUH: collection from National Cheng Kung University Hospital, Taiwan.
WWTP: collection from wastewater treatment plant in Tainan City, Taiwan.
Oyster: collection from oysters at seafood market in Tainan City, Taiwan.
*Indicates 078 Lineage (hypervirulent strain).

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Health Inequities in Melanoma: A Scoping Review

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Introduction

Skin cancer is one of the most common cancers worldwide, with melanoma resulting in 90% of deaths from all skin cancers.[1] Evaluating the extent of health inequities regarding the diagnosis, staging, and treatment of melanoma has become essential for under-resourced groups. With goals to guide future research, the objective of this scoping review is to map existing research surrounding health inequities and melanoma patients.

Methods

This review follows the Joanna Briggs Institute (JBI) Manual[2] and the PRISMA extension for scoping reviews.[3] We searched Ovid Embase and MEDLINE for studies from 2017-2021, published in English, investigating at least one health inequity as defined by the NIH.[4] Text screening and data charting were conducted in a masked, duplicate manner. We analyzed frequencies for each health inequity investigated, and summarized all findings from each study.

Results

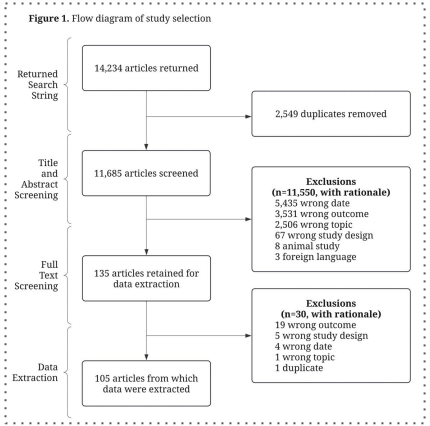

Figure 1: PRISMA flow diagram illustrating our process of study selection.

Scan the QR Code (left) to visit Open Science Framework page. This page contains additional data and methodology.

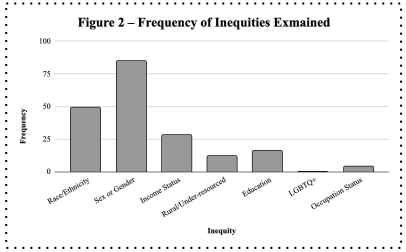

Figure 2: Frequencies of each inequity examined.

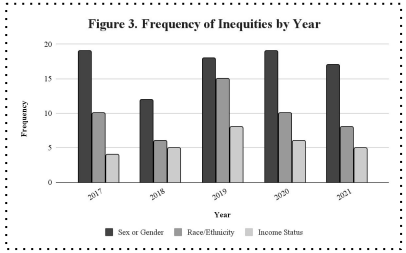

Figure 3: Frequencies of the three most common inequities by year for 2017-2021.

Conclusions

Sex or gender and race/ethnicity were the most commonly researched inequities within melanoma literature, while LGBTQ+ identity, occupation status, and rural/under-resourced were the least researched. To expand the scope of melanoma research and provide an opportunity to address the gaps, we recommend the following: (1) including LGBTQ+ identity as a baseline data element, (2) producing more occupation-specific melanoma awareness campaigns, (3) improving accessibility of teledermatology services, (4) introducing more images of skin of color in medical education and research, and (5) evaluating diagnostic efficacy of AI on skin of color.

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College of Osteopathic Medicine

An Investigation of Google Searches for Lumbar Spine Interventions

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Background

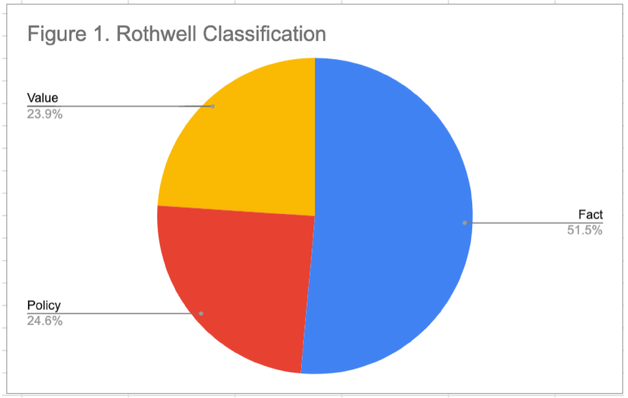
Spinal fusions are the most common surgical intervention for lower back pain with an alternative being total disc replacement[1-4]. Given the FDA's expansion of lumbar disc replacement indications, we suspect patients will increasingly search the internet for sources of information when deciding between these two interventions[5]. We explored frequently asked questions (FAQs) generated by Google to assess commonly searched questions about lumbar surgery treatments. We also sought to classify the FAQs and categorize the sources of information and determine the levels of transparency and quality of the source's information.

Methods

On October 21, 2022, we searched Google using four terms: "lumbar spine fusion surgery," "lumbar spine disc replacement surgery," "lumbar fusion," and "artificial lumbar disc replacement." Using the People Also Ask function powered by Google we searched for at least 100 FAQs and their answer links were extracted from each search. We used Rothwell's Classification of Questions to categorize the FAQs and the Journal of the American Medical Association's (JAMA) Benchmark Criteria was used to assess information transparency. Information quality was assessed using the Brief DISCERN tool.

Results

Our Google search returned 1,133 unique FAQs. After removing duplicates and unrelated FAQs our final count was 309 FAQs. The majority were classified as Fact based questions (159/309; 51.5%; Figure 1) and most of those were related to restrictions or timeline of recovery (80/159, 50.3%). Policy questions and Value questions were evenly distributed with (76/309; 24.6%) and (74/309; 23.9%) respectively. The most common answer sources were medical practices (141/309, 45.6%; Figure 2), followed by commercial (96/309; 31.1%) and then academic (38/309; 12.3%). Nearly two-thirds of the answer sources (192/309, 62.1%) were found to be lacking in transparency. One-way analysis of variance revealed a significant difference in mean quality scores among the 4 source types (F = 21.3, P <.001) with medical practices averaging the worst score (16.9/30) compared to government sources which were found to have the highest quality of all included sources (24.9/30). (Table 1)



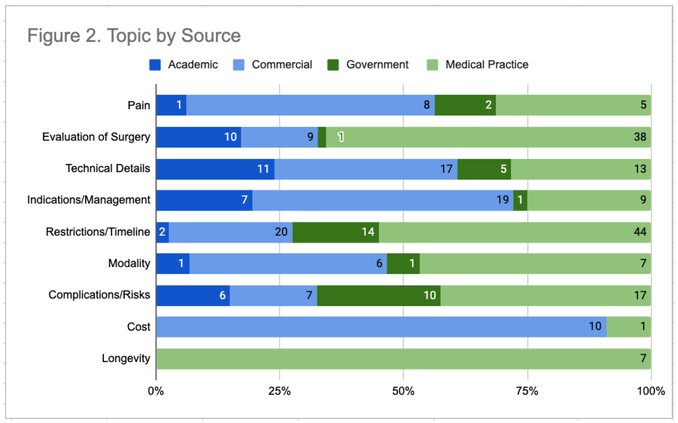


Table 1. JAMA Benchmark Criteria and Brief DISCERN criteria by Source Type

	Source Type				Total n=309	Chi-Square (DF = 4), P
	Academic n=38	Commercial n=96	Government n=34	Medical Practice n=141		
JAMA Benchmark						
≥3	17	69	13	18	117	86.38, P < 0.001
<3	21	27	21	123	192	
Authorship						
No	27	28	24	120	199	79.71, P < 0.001
Yes	11	68	10	21	110	
Attribution						
No	23	54	21	129	227	44.10, P < 0.001
Yes	15	42	13	12	82	
Currency						
No	19	13	0	88	120	82.51, P < 0.001
Yes	19	83	34	53	189	
Disclosure						
No	1	0	0	1	2	3.26, P = 0.5157
Yes	37	96	34	140	307	
Brief DISCERN	**Academic**	**Commercial**	**Government**	**Medical Practice**	**Average**	**ANOVA**
Score (mean; SD)	20.74 (4.84)A	20.24 (5.83)B,D	24.88 (3.91)C	16.92(4.53)	19.30 (5.55)	F = 21.3, P <.001

A. Post hoc, multiple comparison procedures from the ANOVA for the Brief DISCERN scores show a significant difference between Academic and Small Medical Practice were significantly different (P<.001).

B. Post hoc, multiple comparison procedures from the ANOVA for the Brief DISCERN scores show a significant difference between Commercial and Small Medical Practice were significantly different (P<.001).

C. Post hoc, multiple comparison procedures from the ANOVA for the Brief DISCERN scores show a significant difference between Government and Small Medical Practice sources were significantly different (P<.001).

D. Post hoc, multiple comparison procedures from the ANOVA for the Brief DISCERN scores show a significant difference between Government and Commercial were significantly different (P<.001).

Summary

Patients searching for online information regarding lumbar fusions or lumbar disc replacement most commonly are interested in information about restrictions or the timeline of recovery. These questions were most answered by medical practice sources which were associated with poor transparency and below average quality. To increase the transparency and quality of online information regarding lumbar fusions and lumbar disc replacement, medical practices should use established rubrics when publishing online information. Physicians should be aware that patients are commonly searching for information regarding restrictions and timeline of recovery from lumbar fusions or lumbar disc replacements.

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Increasing Advance Care Planning: A Follow-Up on Previous Quality Improvement Measures

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INTRODUCTION

We previously reported on mechanisms to address barriers to advance care planning (ACP) and access to advance directives (AD) within our health system. Over the past three years, two quality improvement projects were completed with aims of increasing discussions on ACP between resident physicians and their patients and to improve access to ADs in our electronic health record system. Prior to these projects, we found it cumbersome to determine if a patient had a scanned directive document on file and to extract the AD for use in end-of-life scenarios that required rapid retrieval. The data presented here reflects three years of follow-up since the quality improvement initiatives began.

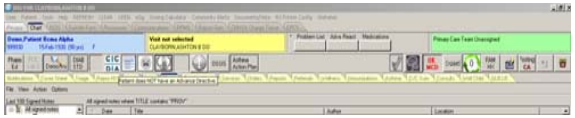
OBJECTIVES

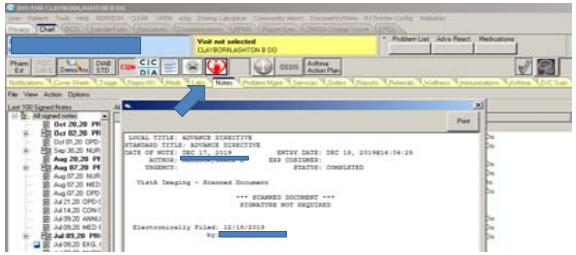
The previous quality improvement projects were undertaken with the goal of increasing ACP discussions and improving ease-of-use of our electronic health record to quickly determine if a patient has an advance directive on file and hasten retrieval if the document existed. In addition, we hoped that the access icon created for this purpose will serve as a reminder for physicians to increase documentation of patients' wishes by encouraging advance care planning. Initial data indicated success; and this data reflects 3 years of follow up.

METHODS

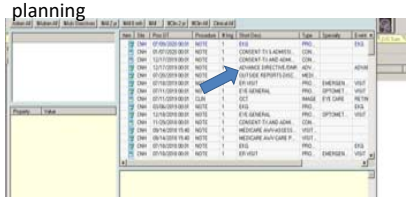
- Initial quality improvement efforts included use of an educational video as a prompt for ACP discussions between physicians and their patients.
- The multi-dimensional project included a policy change to ensure that ADs were honored in all clinical settings within our health system.
- Next followed conceptualizing and programming an access icon in our electronic health record that secondarily served as a reminder to physicians to assist in ACP and composition of ADs when such documentation was not scanned into the patient's chart.
- Follow up data was collected on the number ACP discussions held by running a query for the code 99497 for each fiscal year in the electronic health record system.

Previous Access Icon Initiative

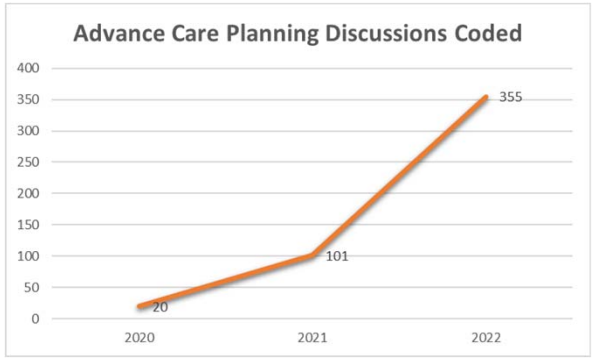




- Prior to implementation of the access icon, users had to search through a list of scanned documents to determine if an AD was present
- Since the project, the icon illuminates red if an AD is scanned
- When clicked, the icon displays the date (within 1-2 days) the document was scanned, allowing the user to quickly search the scanned document list
- Lack of illumination (grey color) of the icon may also serve as a reminder to complete advance care planning



Follow Up Data



CONCLUSIONS

- Efforts to increase the number of ACP discussions held were successful.
- There was a nearly 18-fold increase in the number of ACP discussions documented and coded over the three-year period.
- Limitations of the project include difficulty in extracting data from the electronic health record necessitating the query for the code 99497 (indicating documented ACP occurred); however, this also reflects dependence upon physician coding and documentation

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