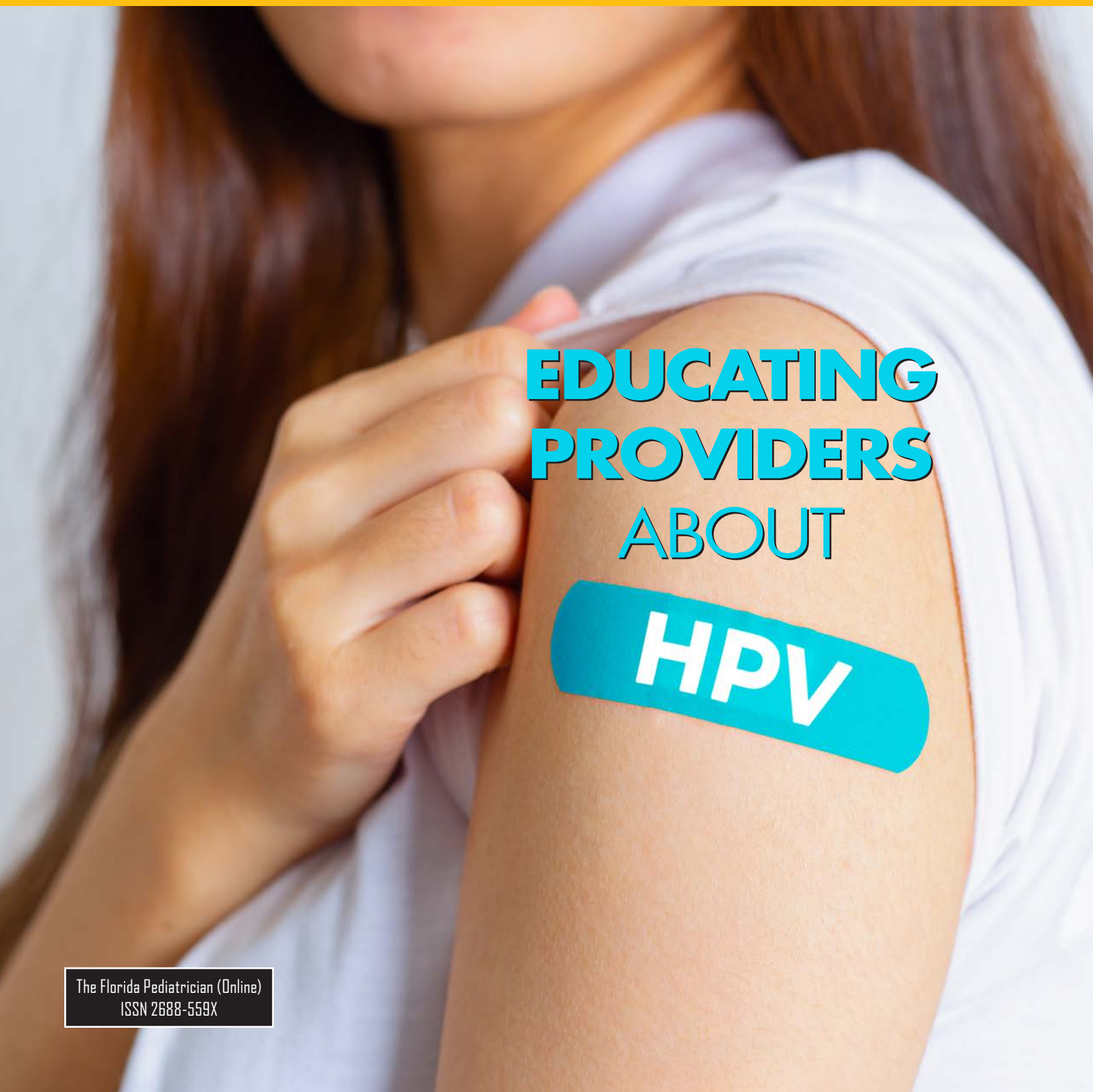
The Florida Pediatrician

FCAAP
Florida Chapter
OF THE AMERICAN ACADEMY OF PEDIATRICS
INCORPORATED IN FLORIDA

THE PEER-REVIEWED JOURNAL OF THE FLORIDA CHAPTER OF THE AAP SUMMER 2024



The Florida Pediatrician (Online)
ISSN 2688-559X

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Florida Chapter of the American Academy of Pediatrics
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The Florida Pediatrician is the peer-reviewed journal of the Florida Chapter of the American Academy of Pediatrics, published by the FCAAP Editorial Board for FCAAP members.

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Pediatric Work Force Crisis!

July has always been an exciting time in the practice of medicine. Freshly minted physicians embark on their professional journeys by starting their residency training. They are still excited, idealistic, and not jaded.

The 2024 match season was not kind to pediatrics. It will only get worse as more internal medicine and family practice residencies open and medical students burdened with debt look for better remuneration. That is the bad news. The good news is that those who join pediatrics are not just committed to their profession, but more importantly, they are committed to the well-being of children. This dedication is what will make them exceptional pediatricians.

Like all medicine, pediatrics, especially specialists, will face a physician shortage. This will be highly challenging in pediatrics because of the additional six years required for training. After their training, some specialists get paid less than general pediatricians. That is the illogical nature of medicine in the United States.

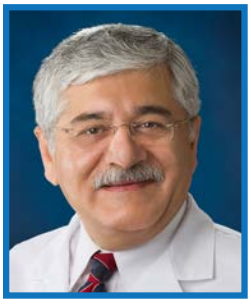
What can be done? For one thing, it may be time to re-think the length of training in pediatrics. I am convinced that pediatric fellowships should not be three years long. That is not the case for internal medicine. If it is appropriate to have two-year fellowships for pediatric hospital medicine, then why not other pediatric specialties? The research requirements need to be decreased. Those interested in research can certainly do three years. That was the case before there were pediatric board requirements. Many fellows did a two-year fellowship. Others (including me) chose to do three years to do more research, and it was worthwhile. But there should be a choice.

One could even consider four years of training for specialists: two as residents and two as fellows. There was (and I believe still is) an accelerated training option in which a fellow can complete all their training in four years. But this process is cumbersome.

Two other things are already happening and could impact specialty pediatrics. In specialties where the pediatric residents are not choosing fellowships, mid-level providers will fill the gaps. Folks, this is a reality. Patients must be seen, work must be done, and personnel are needed. Those among us who have worked with mid-levels for decades know that such a partnership can be valuable.

Another thing that may happen is that international medical graduates will be allowed to take on roles similar to mid-levels. This is already occurring. Eight states, Florida, Arizona, Virginia, Wisconsin, Missouri, Illinois, Iowa, and Idaho, already have something in place. Several other states are looking into similar programs. This program is not new for Florida as there was a similar program that sunset several years ago. Florida Senate Bill 7016 eliminates the need for international medical graduates to repeat residency training in the US if they have had training outside the US. The details of how this will be implemented are still being worked out.

The point is the current situation is not sustainable. Kids need care, and as more and more pediatricians retire, the gaps are not being filled while the needs are increasing. It's time for change, and it's time to act.



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STUDENT QI ARTICLE

Educating Future Providers About Human Papillomavirus

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ABSTRACT

Objectives/Background

This project aims to address the lack of knowledge regarding human papillomavirus (HPV) and the HPV vaccine in Florida by creating an educational webinar and educational materials to distribute to current and future healthcare providers. The goal is that these efforts will increase current and future providers' knowledge of HPV, which can one day be translated into greater public knowledge and improved Florida HPV vaccination rates.

Methods

An educational webinar and pamphlet on HPV and HPV vaccines were created and distributed to Florida's medical and dental schools and the Florida Chapter of the American Academy of Pediatrics. Twenty participants completed a webinar survey that asked them to answer content questions about HPV after watching the webinar and self-report their HPV knowledge before and after the webinar.

Results

11 of the 12 HPV knowledge questions were answered correctly by all 20 participants after viewing the webinar. There was a statistically significant increase in self-reported knowledge after viewing the webinar regarding HPV and HPV vaccine hesitancy using the Wilcoxon Signed Rank test with an alpha level of 0.05.

Conclusions

This project's goals were realized, as results indicated a statistically significant difference between self-reported knowledge before and after viewing the webinar. This suggests that short webinars improve current and future providers' knowledge base. Future goals include expanding HPV education efforts into school curriculums to increase provider HPV knowledge and vaccination counseling efficacy.

INTRODUCTION

Background

Human papillomavirus (HPV) and its manifestations impact multidisciplinary health fields, including pediatrics, family medicine, gynecology, and dentistry. Many patients with HPV have no clinical consequences. However, HPV infections with high-risk strains may develop serious clinical sequelae, including genital warts, oropharyngeal cancer, and genitourinary cancer. Over 30,000 Americans will be diagnosed with oropharyngeal cancer this year.[1]

Statement of Problem / Rationale

Florida has the 9th highest incidence of oral cancers in the United States but ranks near the bottom for HPV vaccination rates among both males and females. One study suggests a lack of public knowledge regarding HPV's manifestations, with about 70% of US adults not knowing that HPV causes oral, anal, and penile cancers.[2] Another study indicates that educating healthcare providers on the importance of HPV vaccination and effective communication with patients about HPV may increase the number of quality recommendations for HPV vaccination.[3]

Project Aims

This project aims to address the lack of knowledge regarding human papillomavirus (HPV) and the HPV vaccine in Florida by creating an educational webinar and educational materials to distribute to current and future medical and dental providers. The goal is that these efforts will increase current and future providers' knowledge base of HPV, which can one day be translated into greater public knowledge and improved Florida HPV vaccination rates.

METHODS

The HPV Team of the Medical Student Committee (MSC) of Florida's Chapter of the American Academy of Pediatrics (FCAAP) collected data for this project from spring 2021 – spring 2022.

The first step was creating an educational webinar about various topics related to HPV using a collaborative approach with medical and dental students on the HPV Team. The webinar featured medical student speakers from medical schools across Florida. The webinar length was 37 minutes. Final approval of the webinar, including the script and slide set, was provided by the FCAAP Immunizations Committee. The objectives of the webinar are enumerated in Table 1. The HPV Team also created an educational pamphlet to be used in the clinical setting to teach patients about HPV, HPV-related cancers, HPV prevention, and HPV vaccine access, as seen in Figure 1.

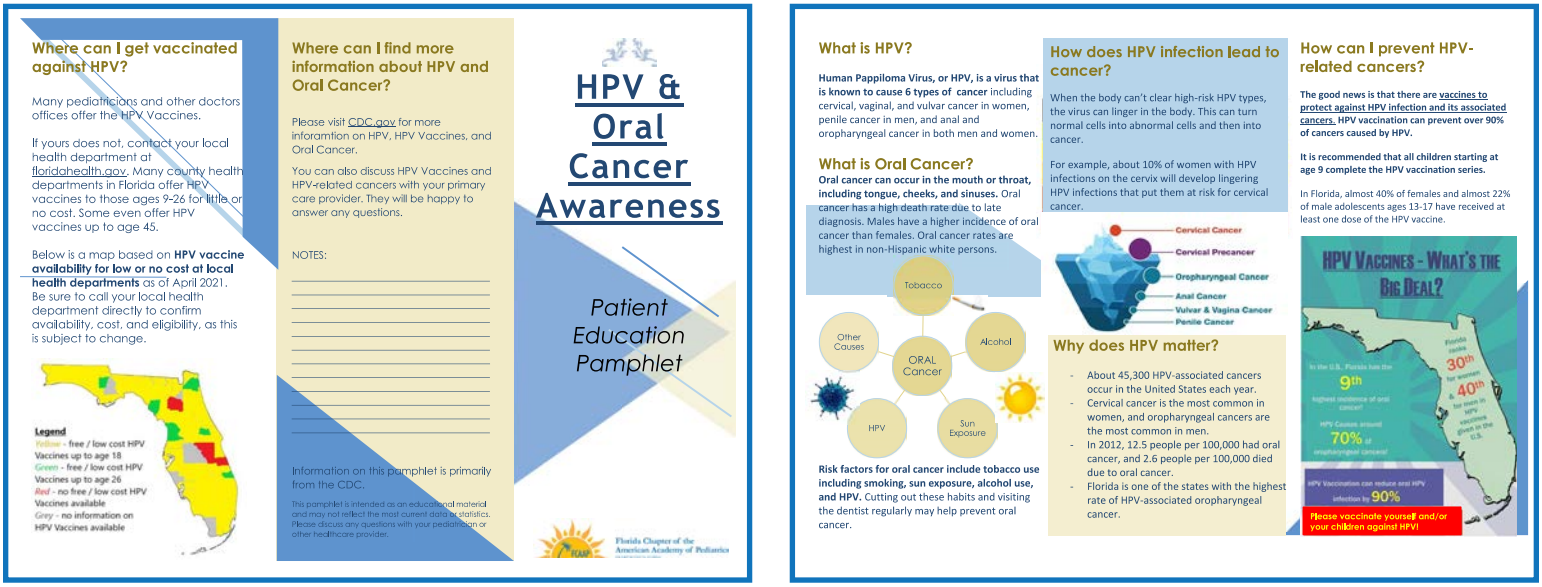

Figure 1: *Educational Pamphlet about Human Papillomavirus*

A crucial component of this project, displayed within the webinar and on the educational pamphlet, was a map of Florida with HPV vaccine access locations. To obtain this data, each county health department in Florida was contacted by phone and/or email up to three times in spring 2021 to acquire information regarding department availability, eligibility, and cost of HPV vaccines. This task aimed to show areas of free or low-cost HPV access across Florida that future and current healthcare providers could recommend to patients as necessary. At the time of data collection, 77.6% of Florida county health departments offered HPV vaccines at no/low cost for patients up to age 18. 10.4% offered no/low-cost HPV vaccines for patients up to age 26. 4.5% did not currently offer HPV

Human Papillomavirus Webinar Goals
1. Understand the general disease course of human papillomavirus, including risk factors, manifestations, and prevention.
2. Learn how to address general vaccine hesitancy in the pediatric population.
3. Learn how to address Human papillomavirus vaccine-specific hesitancy in the pediatric population.
4. Learn about financial resources available to provide human papillomavirus vaccines for those who are un- or under-insured.
5. Understand recommendations for future screenings for human papillomavirus-related cancers.
6. Understand the multidisciplinary role that family medicine physicians, obstetrics-gynecologist physicians, dentists, and other health care providers play in human papillomavirus-related screening and prevention.
7. Understand the role of dental professionals in the detection of human papillomavirus-associated oropharyngeal cancers.
8. Practice scenarios advising patients based on content discussed in the webinar.

Table 1: *HPV Webinar Goals*

vaccines for various reasons, including the impact of COVID-19 and Hepatitis A outbreaks, funding, and vaccine availability. 7.5% of health departments were unable to be successfully contacted.

The educational webinar and pamphlet were distributed to Pediatric Interest Groups in Florida medical schools, student organizations at Florida dental schools, and the FCAAP Medical Student Committee members. Participants volunteered to view the webinar and complete the survey within those distribution groups. The 20 participants included 17 medical students from four medical schools, two dental students, and one physician (Figure 2).

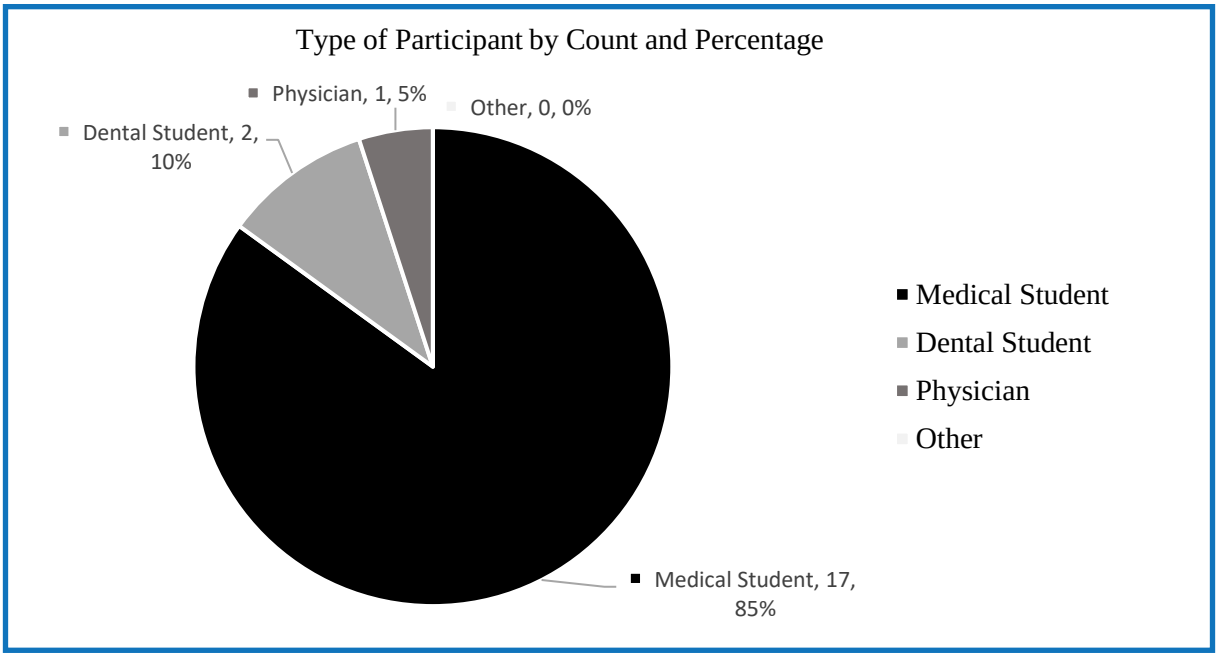

Figure 2: *Type of Participant by Count and Percentage*

The medical student participant type accounted for 85% of the 20 participants, or a count of 17.
The dental student participant type accounted for 10% of the 20 participants, or a count of 2.
The physician participant type accounted for 5% of the 20 participants, or a count of 1.
There were no other participant types.

After watching the webinar and reviewing the educational pamphlet, each participant was asked to complete a survey created by the HPV Team. The survey included background questions about the participant, a content quiz utilizing multiple-choice questions, and questions regarding self-reported knowledge about HPV before and after viewing the webinar using a sliding scale from 0 (least knowledgeable) to 5 (most knowledgeable). The survey utilized in this project can be seen in Table 2.

Several months after the webinar was distributed, the FCAAP offered a Live question-and-answer session online conference for those who viewed the webinar and wanted to participate in a discussion or ask questions about the topics presented.

Analysis/Measurement Used

Survey data was collected from each participant who completed the post-webinar survey. Analysis of these data was specifically focused on participants' self-reported knowledge about HPV, HPV vaccine hesitancy, and confidence to address patient's concerns regarding the HPV vaccine in the future (Question #13 vs. Question #14 and Question #15 vs. Question #16 on the survey. Table 2). The content quiz was also graded for each participant. Note that the entirety of the survey was completed after viewing the webinar and that before vs. after webinar knowledge questions were self-reported by each participant.

RESULTS

All 20 participants completed the post-webinar multiple-choice content questions. All participants answered 11 of the 12 questions correctly. Question #11 (Table 2) was correctly answered by 18 of the 20 participants (90%).

Because the data about self-reported knowledge before and after viewing the webinar was ordinal matched data that was not normally distributed, the Wilcoxon Signed Rank Test was used instead of Paired T-Tests. The Wilcoxon Signed Rank Test is a statistical test comparing two sets of scores from the same participants. The conditions for the use of the Wilcoxon Signed Rank Test include dependent observation (before and after measurements accounting for individual differences from baseline), assumed independence (even distribution of webinar to schools and Florida Chapter of AAP), continuous variable (survey questions sliding scale with maximum score of 5), and ordinal measurement (values compared on same scale or ranking system) were met.

There was a statistically significant difference in the mean self-reported score before and after viewing the HPV educational webinar using the Wilcoxon Signed Rank Test with an alpha level of 0.05 for both knowledge of HPV and HPV vaccination and confidence in addressing concerns about HPV vaccination. These data can be seen in Figure 3. The statistical analysis explanation for these data can be found in Table 3.

DISCUSSION

Summary

The goal of this project, which was to increase current and future providers' knowledge base of HPV, was to use an educational webinar, which was successful. Survey data indicated a statistically significant difference between self-reported knowledge before and after viewing the webinar.

Interpretation

The results of this project show that increasing provider education with methods such as short webinars is effective. The purpose of increased provider knowledge regarding HPV and the HPV vaccine was to encourage and enable more effective communication with patients, which may ultimately increase Florida's vaccination rates and public knowledge of HPV.

Project Strengths

A strength of this project was the multidisciplinary and state-wide collaboration within the HPV Team, which created the project. This allowed greater collaboration and experience as many hands were involved in making the material easy to understand and the webinar successful. When asked about the strengths of the webinar, participants commented on concise information addressing many HPV-related topics, the speakers, the helpful visuals, and the scienced-backed data to address common reasons for vaccine hesitancy.

Project Limitations

A limitation was the low number of webinar viewers. With the target audience of busy healthcare students and healthcare providers, few possible participants viewed the webinar and completed the survey. This could be changed if the webinar is incorporated into the curricula of medical and dental schools in Florida or if it became part of a continuing medical education or other similar conference. Another limitation is that the survey quality improvement questions relied on self-reported before and after approximations of how comfortable the participants were with HPV and related topics. It would be more accurate to use multiple surveys of HPV content-based questions completed over various time points, a lengthier quiz, and a scored patient interaction scenario in which the participant would discuss HPV vaccine hesitancy with a patient and their family. These methods were not possible in this project due to various constraints. Finally, when asked about the weaknesses of the webinar, four participants commented that it was too long, with an ideal length of the webinar being less than 30 minutes. The remaining participants commented that the length of the webinar was appropriate.

Conclusions/ Implications

Webinars are an effective way of providing education regarding HPV to future and current healthcare providers.

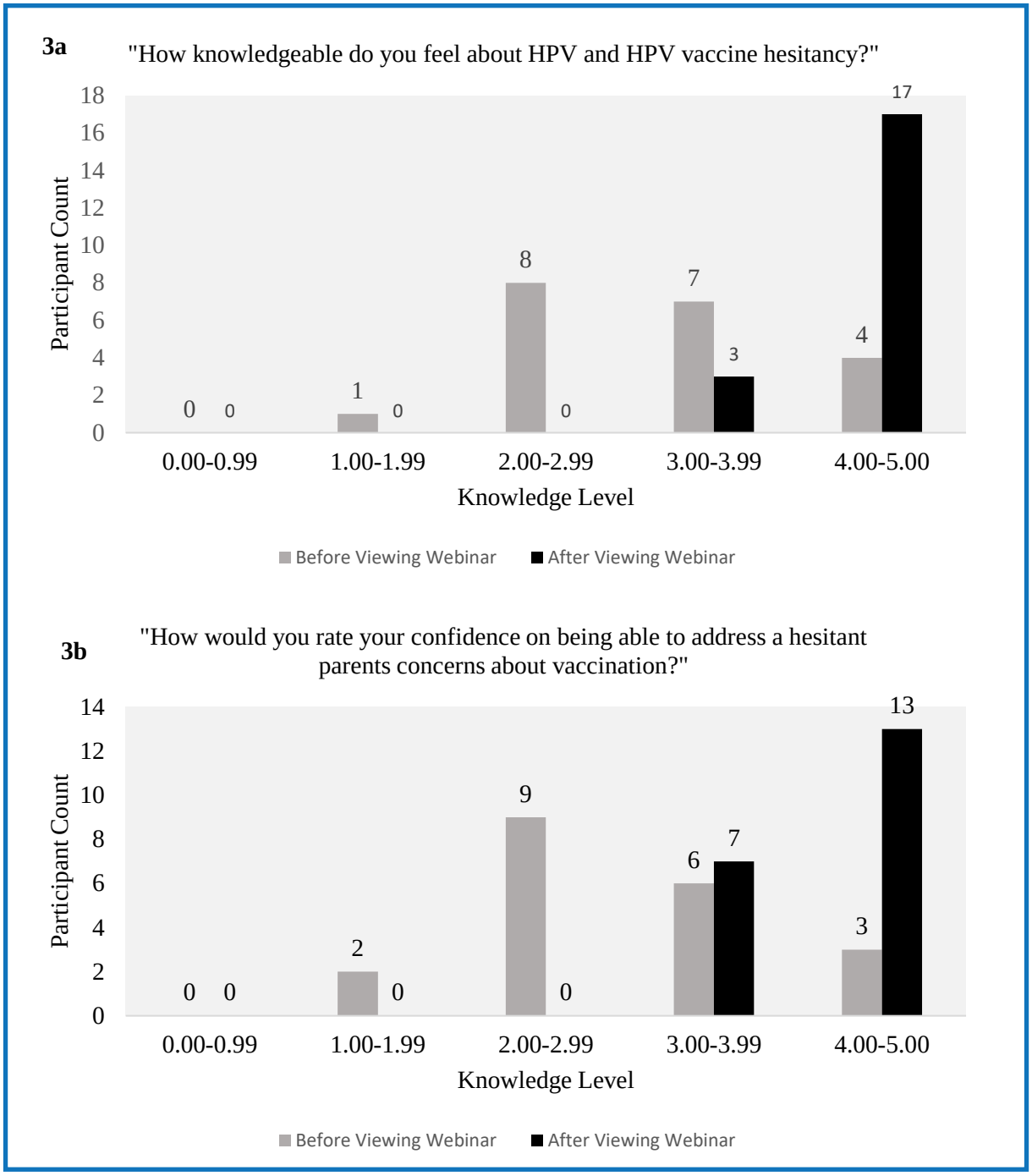

Figure 3: *Participant Perceptions of Webinar Usefulness*

3a "How knowledgeable do you feel about HPV and HPV vaccine hesitancy?" displays data collected in the survey as the participant was asked to answer this question based on their knowledge before viewing and after viewing the HPV educational webinar. There a statistically significant difference in the mean score before and after viewing the HPV educational webinar using the Wilcoxon Signed Rank Test with an alpha level of 0.05. 3b "How would you rate your confidence on being able to address a hesitant parent's concerns about vaccination?" displays data collected in the survey as the participant was asked to answer this question based on their knowledge before viewing and after viewing the HPV educational webinar. There is a statistically significant difference in the mean score before and after viewing the HPV educational webinar using the Wilcoxon Signed Rank Test with an alpha level of 0.05.

Recommendations / Future Directions

Future projects focusing on HPV provider education may consider in-person sessions as part of a school or residency curriculum or sessions at conferences to increase webinar viewership. This project model could be applied to other topics in pediatrics and other specialties. Tracking changes in Florida's HPV vaccination rates after large-scale HPV educational projects among healthcare students and providers would be an interesting addition to future projects.

ACKNOWLEDGMENTS

The authors acknowledge and offer special thanks to past and present members of the FCAAP Medical Student Committee HPV Team who worked on this project, including dental students who joined in the research. Special recognition for their contributions to this project, specifically to creating the educational webinar, goes to Hannah Zwiebel, Jennifer Ferrante, Amber Bulna, Nichole Anderez, and Emilee Flament. Special recognition for those who helped with the distribution of the webinar goes to Ally Fraser, Arielle Sanghvi, Ashley McGrath, Samantha Hicks, Amelia Hartje, Rebecca Ratusnik, Arielle Ashkenazi, and Alyssa Haag.

Thank you to the FCAAP for supporting this project, helping distribute and advertise the webinar, and assisting with technical concerns along the way. Special recognition for their contributions in making this project possible goes to Alicia Adams, Melanie Range, Dana Mykytyn, Dr. Audrey Ofir, and the FCAAP Immunizations Committee. Further thanks to the Department of Health in Florida and to each county health department representative who assisted in providing information and resources regarding HPV vaccination.

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Question	Response Options
Background Information	
1. Which of these best classify you?	Medical Student, Dental Student, Physician, Dentist, or Other
2. If you are a student, please indicate your year.	1st year, 2nd year, 3rd year, or 4th year
3. If you are a student, which school do you attend?	(free text)
Webinar Quiz	
4. Which of the following is a manifestation of an HPV infection?	A Genital Warts B Oropharyngeal Cancer C Genitourinary Cancer D All of the Above
5. Which of the following is a risk factor for HPV infection?	A Smoking B Alcohol C High Number of Sexual Partners D Lack of Birth Control Use
6. What is one way we can lower the risk of HPV infection?	A Exercise B Condom Use C Stop Smoking D Stop Drinking Alcohol
7. Which one of the following is ~90% effective in preventing an HPV infection?	A HPV Vaccine B Abstinence C Antibiotics D There is No Way to Prevent an HPV Infection
8. Which of the following is true about vaccine hesitancy in the pediatric population?	A Most hesitant parents are not completely opposed to vaccines but may have concerns that result in under- or delayed- immunization of their children B More than 20% of parents are completely opposed to vaccination C There has been a rise in vaccine delays and refusals in recent years D Both A and C
9. Which of the following concerns some parents may have about vaccination?	A They cause the disease they are meant to prevent B Development of Autism C Long-term effects of the vaccine D All of the above
10. Which of the following are concerns held by those who are hesitant to receive/let their children get the HPV vaccine?	A The vaccine will lead to an earlier onset of sexual activity B Only girls need the vaccine because HPV causes cervical cancer C The vaccine is new and, therefore not effective D All of the above
11. What program in the state of Florida helps cover vaccines, including the HPV vaccine?	A Boys and Girls Club B Vaccines for Children C Program 17 D Both B and C
12. Which providers are essential in detecting and treating HPV infections?	A Dentists B Obstetrician-Gynecologists C Family Medicine Practitioners D All of the Above

Table 2: *Survey Completed by Participants After Viewing HPV Webinar*

Webinar Quality Improvement Survey	
13. Before watching the webinar, how knowledgeable were you about HPV and HPV vaccine hesitancy?	Rank on a sliding scale, 0 (least knowledgeable) to 5 (most knowledgeable)
14. After watching the webinar, how knowledgeable do you feel about HPV and HPV vaccine hesitancy?	Rank on a sliding scale, 0 (least knowledgeable) to 5 (most knowledgeable)
15. Before watching the webinar, how would you rate your confidence in your ability to address a hesitant parent's concerns about vaccination?	Rank on sliding scale, 0 (least knowledgeable) to 5 (most knowledgeable)
16. After watching the webinar, how would you rate your confidence in your ability to address a hesitant parent's concerns about vaccination?	Rank on a sliding scale, 0 (least knowledgeable) to 5 (most knowledgeable)
17. Overall, how would you rate this webinar?	Excellent, Very Good, Good, Fair, Poor
18. What did you like about this webinar?	(free text)
19. Is there anything that you disliked about the webinar/think needed improvement?	(free text)
20. Was the link of the webinar too long, too short, or just right?	Too long, Too Short, or Just Right
21. In your opinion, what would be the ideal length of a webinar?	(free text)
22. Are there any other topics within HPV and HPV vaccine hesitancy that you wish to see addressed?	(free text)

Table 2: *Survey Completed by Participants After Viewing HPV Webinar*

Question #13 vs Question #14 Statistical Analysis Before vs After Viewing the Webinar – "How knowledgeable did you feel about HPV and HPV vaccine hesitancy?"		
Statistics Values Used	**Statistics Explanation**	**Simple Explanation**
W-test statistic = 5.5 Critical value = 29 Alpha value = .05	Because W-test statistic is less than the critical value, there is a statistically significant difference in the reported knowledge level before versus after watching the webinar. The null hypothesis of no difference is rejected.	There was a statistically significant increase in knowledge after viewing the webinar with regards to HPV and HPV vaccine hesitancy.
Question #15 vs Question #16 Statistical Analysis Before vs After Viewing the Webinar– "How would you rate your confidence on being able to address a hesitant parent's concerns about vaccination?"		
Statistics Values Used	**Statistics Explanation**	**Simple Explanation**
W-test statistic = 0 Critical value = 25 Alpha value = .05	Because W-test statistic is less than the critical value, there is a statistically significant difference in the reported knowledge level before versus after watching the webinar. The null hypothesis of no difference is rejected.	There was a statistically significant increase in knowledge after viewing the webinar with regards to addressing hesitant parent's concerns about vaccination.

Table 3: *Statistical Analysis of Self-Reported HPV Knowledge*

The statistical values, statistical explanation, and simple explanation of the analysis of the data using Wilcoxon Signed Rank Test is found in this table for the two questions listed. There was a statistically significant increase in knowledge after viewing the educational webinar for each of the questions with alpha value 0.05.

REVIEW ARTICLE

Universal Administration of Hepatitis B Vaccine and its Impact on Public Health

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ABSTRACT

As Florida faces declining pediatric vaccination rates, this paper delves into the public health success of universal hepatitis B vaccine implementation for newborns. With children at the highest risk of transmission of hepatitis B and chronic complications, health officials targeted this vulnerable population, thereby significantly decreasing infection rates. This paper explores the history behind including the vaccine in the routine childhood schedule. It presents current data from Florida to provide valuable guidance to clinicians in supporting public health.

INTRODUCTION

The three-series hepatitis B vaccine recommendation is standard practice for U.S. pediatricians and serves as the initial vaccine administered after birth, often initiating conversations regarding vaccinations with parents. Not long ago, before universal childhood hepatitis B vaccination was implemented in 1992, thousands of children were infected with the hepatitis B virus (HBV) each year.

Infants and children are particularly vulnerable to Hepatitis b due to perinatal transmission and early childhood exposure between infected children. Furthermore, once infected, children face a higher risk of developing chronic HBV infection, with over 80%-90% of infants infected during their first year of life developing chronic infections.[1] HBV is a class I carcinogen, contributing to premature deaths from liver cancer in approximately 25% of those who become chronically infected during childhood.[2]

Background: History of Hepatitis B vaccine

Before the vaccine's introduction, hepatitis B was a significant global health problem, with an estimated 240 million people living with chronic HBV infection worldwide. The plasma-derived vaccine was developed in 1982 and initially targeted high-risk groups like men who have sex with men, injection-drug users, and individuals with multiple sex partners.[1] However, low compliance and access barriers limited the administration of the three-dose series to high-risk groups. Moreover, as many as 30% of people with acute HBV infection did not have identifiable risk factors, rendering the high-risk group approach ineffective. Vaccine hesitancy was also addressed in 1986 by the implementation of a safer, recombinant HBsAg vaccine.[1,3]

In the United States, universal hepatitis B vaccination for infants was recommended by the Advisory Committee on Immunization Practices in 1991, and the vaccination program commenced in 1992.[4] Subsequently, from 1993 to 2000, the administration of the hepatitis B vaccine among children aged 19 to 35 months in the United States remarkably increased from 16% to 90%. A similar growth trend (67%) was observed among U.S. adolescents aged 13 to 15 years.[5]

Current Data

Currently, the Centers for Disease Control (CDC) schedule in the U.S. (followed in Florida) recommends the first dose at birth, the second dose between one and two months old, and the final dose administered between six and eighteen months.[6] The State of Florida requires a complete series for children attending daycare, elementary, and middle/high schools. Since the introduction of universal hepatitis B vaccination programs for children, the incidence of HBV infection, especially perinatally acquired, has dramatically declined. The prevalence of chronic HBV infection in children younger than 5 years decreased from 4.7% in the pre-vaccine era to less than 1% in 2019.[1]

The World Health Organization (WHO) has set a 90% vaccination target to eliminate hepatitis B by 2030. However, there is wide variability in reported birth dose coverage, with global coverage currently at only 42%.[7] Current models have shown that achieving infant vaccination global coverage to 90% would avoid 4.3 million chronic hepatitis B infections during the same time frame and would prevent 1.1 million hepatitis-B-related deaths by 2030.7 Globally, birth-dose coverage varies by region, with low rates of vaccination reflected in high HBV rates, especially in the Southeast Asian and Sub-Saharan African countries.[8]

Florida is falling short of hepatitis B vaccination goals, with rates of pediatric acute HBV infection in Florida doubling since 2002 (Figure 1). All-age total chronic infections are also increasing, from 3.3 cases per 100,000 to 20 per 100,000 (Figure 2), which is reflected in Florida's total immunization rates at age two, which were 87.2% in 2000 and 84% in 2020 (Figure 3).

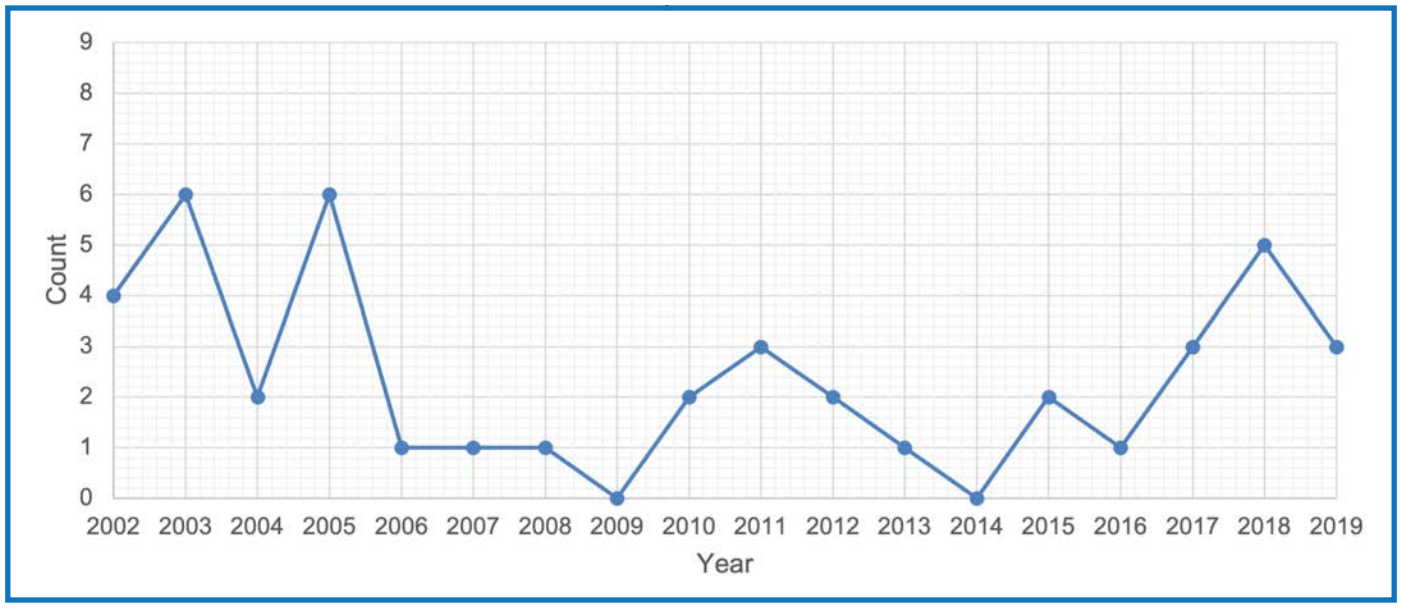

Figure 1: *Acute Hepatitis B Cases for Pediatric Age Groups (Aged 0-19 Years) in Florida*

Possible Reasons for Declining Vaccination Rates in Florida

All exemptions in Florida, including religious exemptions, have steadily increased since 2016. However, there was a sharper increase from 6.50% to 8.10% between the 2020-21 and 2021-22 school years (Figure 4). These are the highest exemption rates seen in over a decade. We must note that this data from the Florida Department of Health may be a proxy for vaccine hesitancy, but it does not mean that that number of children who have these exemptions have not already had the hepatitis B vaccine. Moreover, the sharp uprise in vaccine exemptions coincides with the COVID-19 pandemic. The trend of decreased vaccinations during the COVID-19 pandemic has been noted globally, with data pointing to a rise in vaccine hesitancy and a decrease in healthcare access.[9] In the United States especially, over 30 states reported to the CDC that COVID-19 resulted in a decrease in vaccination coverage during the 2021-22 school year, primarily due to reduced access but also due to "local or school level extensions of grace period or provisional enrollment policies."[10]

Vaccination against HBV has also affected the status of vaccinations in the early toddler years. Not receiving the birth dose of the hepatitis B vaccine correlates with under-immunization by age 24 months.[11,12] One such study looked at birth dose before and after the COVID pandemic and found that although the pandemic did not significantly affect the uptake of the birth dose, study results

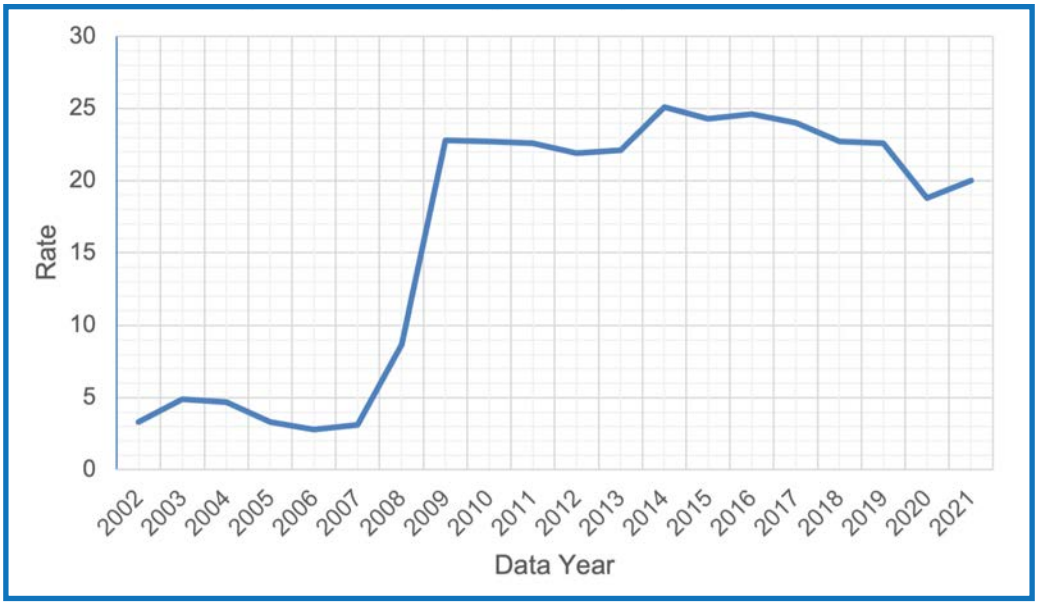

Figure 2: *Rate of All-Age Total Chronic Hepatitis B (Per 100,000 Population) in Florida*

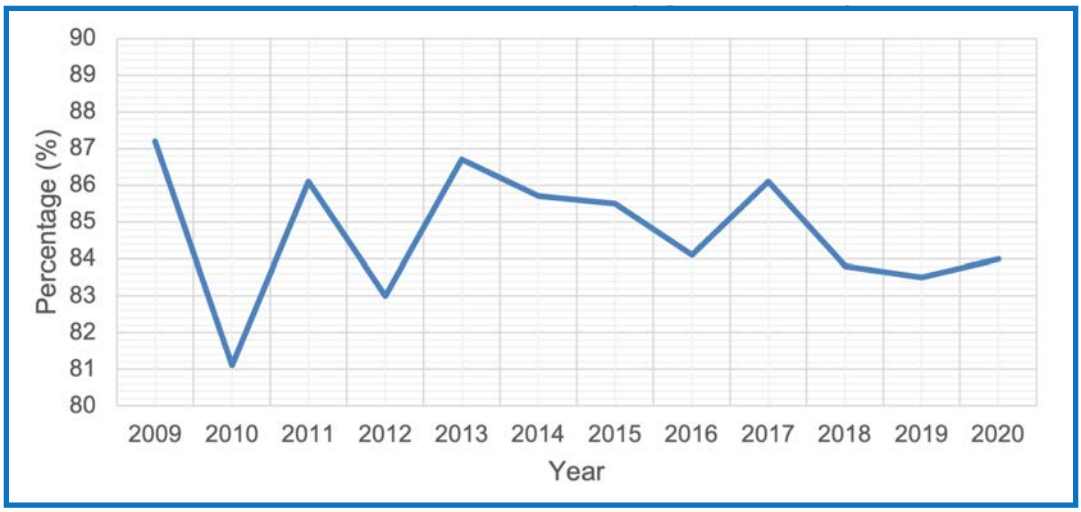

Figure 3: *Florida rates of Pediatric Full Immunization: Basic Immunization Series (Aged 2 Years)*

pointed to caregiver factors that resulted in suboptimal vaccination uptake.[13] The generalizability of the studies \mentioned above may be limited by geography, but all took place at large academic institutions similar to those in Florida. The door remains open for advocacy to complete hepatitis B vaccination and timely administration of the birth dose.

Communication Techniques for Talking with Parents Regarding Hepatitis B Vaccination Series

The CDC provides resources for discussing vaccines with parents of infants, outlining three main steps: 1) Assume parents will vaccinate, 2) Give a strong recommendation, and 3) Listen and respond to parents' questions.[14]

Regarding the hepatitis B vaccination series, healthcare providers are recommended to emphasize four main points:

1. People have a very high risk of developing chronic HBV infection if they become infected at birth or during childhood, with an increased risk of dying prematurely from liver cancer or cirrhosis.
2. Hepatitis B infection in infants and young children usually produces no symptoms, so these individuals can spread it to others without knowing it.
3. Most early childhood spread of hepatitis B occurs in households where a person has chronic HBV infection, but the spread of the virus has also been recognized in daycare centers and schools.
4. Long-term protection following infant vaccination is expected to last for decades and will ultimately protect against acquiring infection at any age.[15]

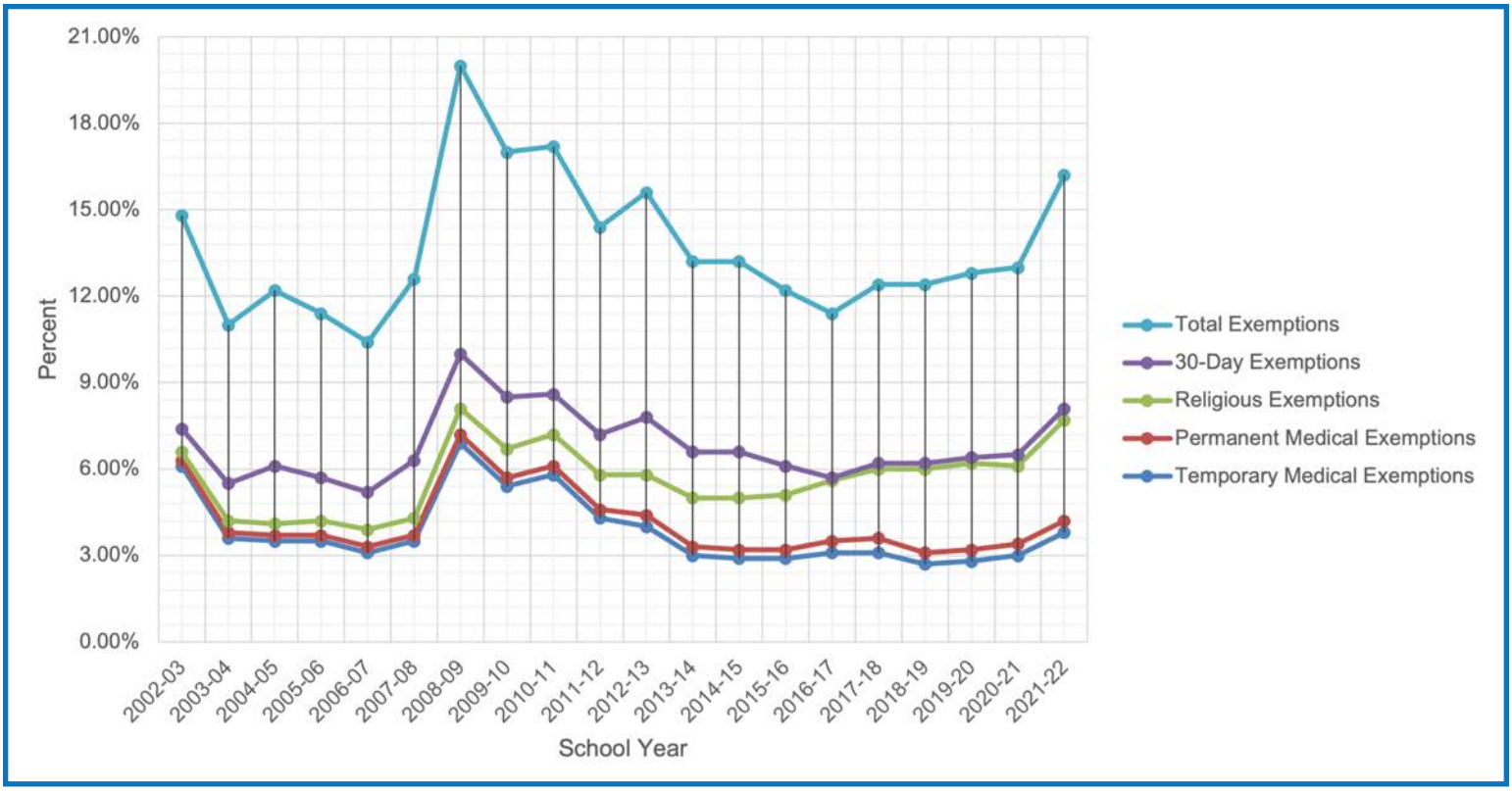

Figure 4: *Vaccination exemption status among children enrolled in public and private kindergarten, by school years, Florida, 2002-03 through 2021-22 – Kindergarten and Seventh Grade*

Providers can reassure parents that most vaccinated children experience no side effects, and serious reactions are rare.5 Offering reading materials, such as those provided by the Immunization Action Coalition, is also recommended to support informed decision-making. It is highly recommended that parents unsure about vaccination be provided with literature for their consideration. One such resource can be accessed at https://www.immunize.org/catg.d/p4205.pdf.

CONCLUSION

Achieving the WHO's goal of eradicating hepatitis B worldwide by 2030 and the Healthy People 2030 goal of acute infection reduction necessitates maintaining high vaccination coverage rates for infants, children, and adolescents. Acknowledging the significant public health impact of the universal hepatitis B vaccination program, healthcare providers should continue conversing with patients and parents to ensure impactful vaccine implementation.

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CASE REPORT

A Five-Year-Old with a Unique Bald Spot

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ABSTRACT

A kerion is a common but treatable cause of alopecia for children in the United States. With proper clinical diagnosis and follow-up, the lesion can be cleared, and the risk of permanent alopecia can be minimized. This case involves a five-year-old African American male who presented to the clinic with a pruritic bald spot on his scalp for two months. The lesion was determined to be a kerion caused by tinea capitis. The kerion improved after an eight-week course of griseofulvin. However, the patient still had some scaling and crusting of the scalp and no hair regrowth. During his follow-up appointment, the patient endorsed headaches, a known side effect of the medication. His treatment course was extended, and he was placed on four additional weeks of terbinafine with ultimate clearing of the infection. Prompt recognition by the team allowed for preliminary hair regrowth at the completion of the treatment courses. This report discusses the primary pathology, current treatment guidelines, and emerging kerion and tinea capitis trends.

Background

Tinea capitis and kerion are common causes of scalp lesions in pediatric patients; however, they are not commonly recognized by parents. Many parents will try to treat the lesion with topical products, such as shampoo and various creams, before seeking assistance from a physician. Delays in seeking care and in pediatricians recognizing the lesion can increase the risk of permanent alopecia.

Primary objective

Ability to identify a kerion, distinguish it from tinea capitis, and understand current treatment regimens.

PRESENTATION

A five-year-old African American male presented to the clinic with a pruritic bald spot on the scalp for two months. The patient had his first haircut at a barber shop three months prior to the presentation, where his hair was styled into an "afro." After the haircut, the patient began touching the head and scratching at the apex of his scalp. The mother noticed a bald spot forming and began treating the area with tea tree oil without improvement. Approximately one month after the haircut, the patient's mother shaved his head. She noticed the pruritic area had become absent of hair follicles, leaving a cleared area of erythema and yellow pustules. She began

Figure 1: *Photographs of Scalp Lesion on Presentation to Clinic*

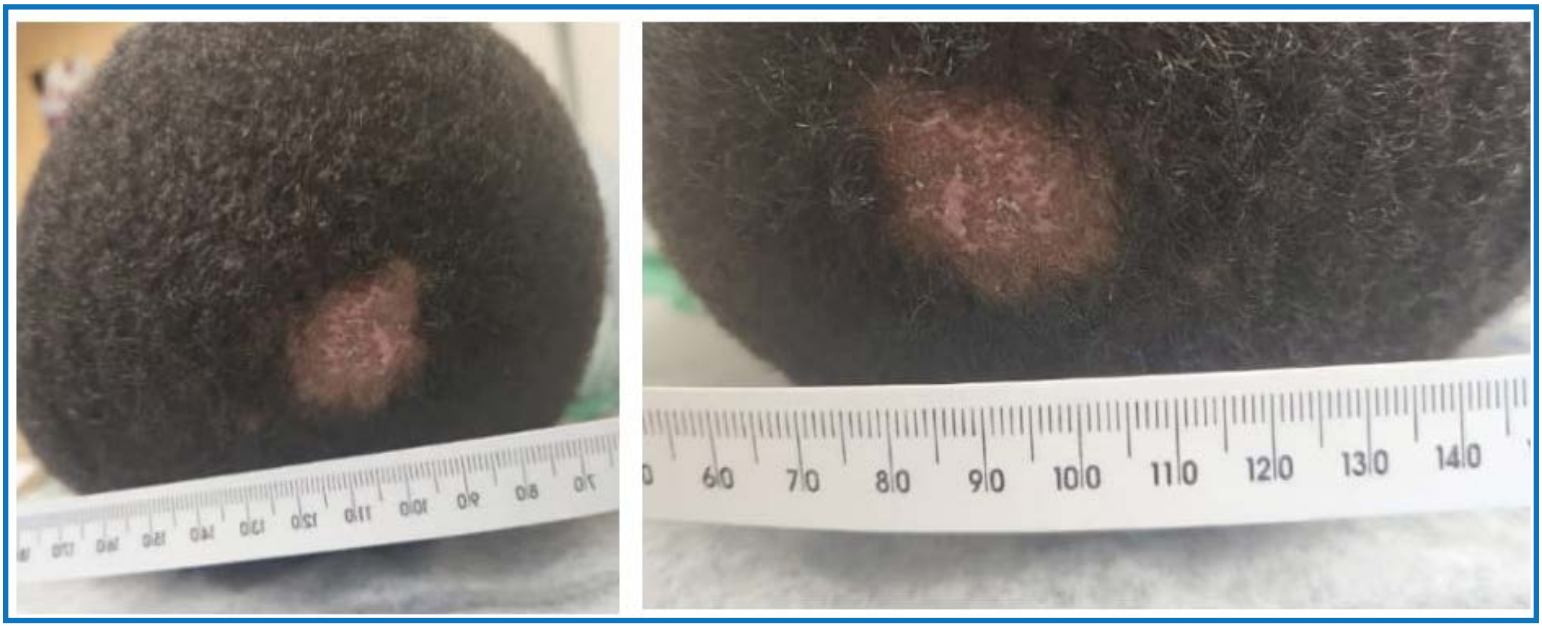

Figure 2: *Photographs of Scalp Lesion After Eight Weeks of Griseofulvin*

Figure 3: *Photographs of Scalp Lesion After Four Additional Weeks of Terbinafine*

washing his hair with Selsun Blue® shampoo but noticed no improvement. One week before presentation, the scalp pustules burst, leaking pus, and the skin started to weep. After two months of topical over-the-counter treatments, the patient's mother was most concerned about the lack of hair growth.

On presentation, the area was non-erythematous, and the weeping portion of the scalp was very tender to touch. No yellow pustules were present. The plaque was 2 x 2 cm (Figure 1). The area was boggy and had black dots throughout. According to his mom, the lesion was previously "shedding skin" and peeling when the child touched it. The patient had flaking skin surrounding the perimeter of the lesion and slight scarring at the center of the lesion where the pustules were previously located. The patient had no lymphadenopathy of the head or neck, scalp lesions, or rashes on the body.

The patient had no significant past medical history, no past surgical history, or allergies. His mother had a history of seasonal allergies, and his father had eczema. There was no family history of skin disorders, systemic lupus erythematous, or diabetes. No one else at home or school had similar-looking lesions.

The patient was started on an eight-week course of griseofulvin and advised to return to the clinic for follow-up. At the eight-week follow-up, the lesion had decreased in size (Figure 2). The patient was still without erythema or pustules. The patient continued to complain of pruritus in the area, and more black dots appeared in the center of the lesion. Due to incomplete improvement of the scaling, the length of treatment was extended. The patient complained of twice-weekly bilateral frontal headache, a known side effect of griseofulvin, which self-resolved. As a result, the patient was switched to oral terbinafine, which he took for four additional weeks. Liver function tests were ordered, but the family did not follow up with the lab.

The child returned to the clinic four weeks later for follow-up, and the kerion had resolved (Figure 3). Significant hair regrowth was noted on the periphery of the previous lesion, and the beginnings of hair growth were seen in the central area of the lesion. The area was no longer boggy, tender, or pruritic.

FINAL DIAGNOSIS

Kerion

DISCUSSION:

Tinea capitis is a fungal scalp infection that presents with pruritis and scaling areas of hair loss. It is most often caused by *Trichophyton* and *Microsporum* species of dermatophyte fungi.[1] In the United States, peak incidence occurs in African American children between three and seven years of age.[2,3] Children most commonly acquire the infection via contact with a dermatophyte-infected individual or with a contaminated object (comb, hairbrush, hat, or pillows)[4]. In the case discussed above, the patient likely acquired the infection from clippers or a comb that was not cleaned properly between customers at the barbershop.

It is not well understood why children are more commonly infected than adults. The leading theory is that post-pubertal sebum contains short and medium-chain fatty acids with innate fungal-static properties. With lower amounts of fatty acid in the sebum of children, the pH of the scalp increases, leading to a more hospitable environment for dermatophytes.[4,5] Commensal yeast colonizes the adult skin/hair, further inhibiting the infection and overgrowth of dermatophytes.[4]

Tinea capitis typically presents as a flat, scaly, circular patch of scalp with a raised border and central clearing. Each lesion is typically a few centimeters in diameter and enlarges circumferentially over time.[5] Infection can also present as a patch of alopecia with black dots. Patients can also have widespread scaling with surrounding erythema and areas of minimal hair loss, mimicking the appearance of seborrheic dermatitis.[5,6,7]

Dermatophytes use various virulence factors to inhabit the skin and hair. Specific glycoproteins in the cell wall attach to keratin-containing cells in the host tissue. Dermatophytes produce a proteolytic enzyme known as keratinase, allowing it to penetrate the epidermis's stratum corneum, penetrate the skin's deeper layers, and extend downward into the hair follicle.[6]

A kerion is a severe manifestation of tinea capitis that results from an intense immune response to the infection. Histologically, they are characterized by neutrophilic or granulomatous infiltrates, which result in a fibrotic scar.[5,8] As in the case above, they typically present as a solitary lesion in the occipital area of the scalp, although they can present as multiple lesions.[9] Clinically, a kerion can be classified into two categories: inflammatory and non-inflammatory. The non-inflammatory presentation predominantly involves scaling of the skin and hair loss. Lesions are well-circumscribed patches of alopecia caused by destroyed cuticles. Non-inflammatory kerion is characterized as an ectothrix infection pattern as the fungal spores remain outside the hair shaft. In the endothrix infectious pattern, the kerion presents as black dots, which are exposed hair follicles caused by breakage of the hair shaft at the scalp. The diffuse scale presentation is characterized by dandruff-like scaling of the scalp.[5,10] The inflammatory category consists of tender plaques covered with broken hairs and pustules. [5,11] The child above presented with an inflammatory kerion where the erythema, skin weeping, and pustules had resolved, but thick crusting, scaling, and a boggy tender plaque were still present.

There are currently no well-established clinical guidelines for the treatment of a kerion. Dermatologists have recently developed a major and minor criterion and a grading system for kerions; however, the criteria do not change the standard treatment regimen and are more for educational/research purposes.[7]

Treatment should begin once a clinical diagnosis is made. Delaying treatment while awaiting fungal culture can lead to disease progression, disease transmission, and permanent hair loss. Fungal culture is not necessary for diagnosis. Topical anti-fungal treatment is ineffective as it cannot penetrate deep enough into the hair follicle and can lead to subclinical infection. First-line treatment is with a long course of oral anti-fungal agents, which in the United States is typically 6 to 12 weeks of griseofulvin.[7,9,11]

Current treatment guidelines specify first-line treatment with griseofulvin micronized formulation of 20 to 25 mg/kg per day for 6 to 12 weeks or ultra-micronized formulation of 10 to 15 mg/kg per day for 6 to 12 weeks.[12] Treatment failure is usually attributed to poor absorption, so it is recommended that patients take the medication with fatty foods. Initially, the patient in the case above was improving after eight weeks of treatment; however, due to side effects, he was switched to oral terbinafine for four weeks. Liver function tests may be obtained prior to the start of terbinafine therapy, as it can be liver toxic, but this is not a requirement for treatment due to the short course of medication.[7,12]

Despite the difference in appearance, treating a kerion is the same as treating tinea capitis. Kerion requires an early diagnosis to prevent bacterial superinfection, folliculitis, and permanent alopecia. Although the case above was not concerning for bacterial infection, if superinfection is present, an oral antibiotic should be added to the treatment regimen. Antibiotic options include oral cephalexin, dicloxacillin, or clindamycin.[13] Due to its boggy appearance and drainage, kerion can often be misdiagnosed as cellulitis, folliculitis, or an abscess in the scalp; however, none of these would be accompanied by alopecia. It is not well documented in the literature if treating severe infection with systemic glucocorticoids accelerates the improvement of lesions or improves outcomes in terms of alopecia.[1,7,12] Surgical drainage of a kerion is not helpful and should be avoided.

With better recognition and proper treatment of the lesion by both parents and clinicians, the risk of permanent alopecia can be minimized.

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CASE REPORT

Panner's Disease: A Case Report of An Uncommon Cause of Elbow Pain in a Pediatric Patient

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ABSTRACT

Osteochondrosis of the elbow in pediatric patients, known as Panner's disease, typically results in young, athletic males from repeated valgus stress on the elbow. Clinical symptoms include atraumatic loss of range of motion (ROM) without pain. We present an 8-year-old male with a history of a nondisplaced intercondylar fracture of the right elbow approximately two years prior, presenting to the pediatric primary care clinic with decreased ROM of the same elbow secondary to impingement without associated pain. Our patient was diagnosed with Panner's disease. To avoid further degeneration of the elbow, one must work with a pediatric orthopaedic physician, complete the physical examination, obtain relevant imaging, and instruct the patient to limit elbow activity and treat symptoms through supportive measures of rest, immobilization, ice, and oral nonsteroidal anti-inflammatory drugs.

BACKGROUND

Panner's disease, first described by Dr. Dane Panner in 1927, is a type of osteochondrosis thought to be caused by repeated valgus stresses on the elbow that ultimately result in avascular necrosis of the humeral capitellum.[1–4] The prevalence of Panner's disease is not well-documented, as no available studies provide this estimate in the general population. Osteochondritis dissecans (OCD) is a joint disorder often confused with Panner's disease.[5] While Panner's disease involves the entire capitellum and is treated with rest, OCD lesions typically involve the lateral or central portions of the capitellum and require more aggressive management, usually involving surgery to resolve symptoms.[3,6–9] The prognosis of Panner's disease is excellent, with full functional recovery without any residual deformity expected when using conservative management.[10]

PRIMARY OBJECTIVE

Given that Panner's may be on a continuum of disordered endochondral ossification and the disease's impact on range of motion, pediatricians should be able to recognize this disease and work in conjunction with pediatric orthopaedic physicians to manage patients.

SUBJECT PRESENTATION

An 8-year-old male with a history of a nondisplaced supracondylar fracture of the right elbow approximately two years ago presented to the pediatric primary care clinic with decreased ROM of the same elbow without associated pain. Two years prior, the patient fell while horseplaying, landing on his right arm fully extended. X-ray imaging showed a nondisplaced supracondylar fracture without a concerning malalignment with small joint effusion and mild periarticular soft tissue swelling. The patient was immobilized for six weeks, followed by physical therapy with the return to full activity with full ROM in 8 weeks.

Figure 1
Image at initial visit to pediatrician office two years after elbow injury showing decreased extension of the right elbow.

Now, the patient presented to their pediatrician with concern of limited ROM of the right elbow (Figure 1). Physical examination at this visit showed decreased passive and active flexion and extension range of motion with full pronation and supination range of motion, 2+ radial pulse, and intact median, ulnar, and radial nerves of the right arm. X-ray imaging of the right arm showed fragmentation and flattening of the capitellum consistent with avascular necrosis of the capitellum. This patient was not previously or currently involved in high-intensity sports, including overhead throwing or gymnastics.

Figure 2
Time of presentation to pediatrician's office two years after initial injury, plain film radiograph of injured (right) elbow, anterior-posterior and lateral view.

The differential diagnosis for this patient included Panner's disease, OCD, tendonitis, lateral epicondylitis, ligamentous sprain, fracture, and Little League Elbow. All but Panner's disease and OCD were excluded as the patient did not repetitively use their elbow, such as in overhead sports, and they had no traumatic or instigating events after his primary injury. OCD was excluded, given that it is more prevalent in adolescents and is often identifiable via the presentation of a loose foreign body. Therefore, because of the

patient's male gender, young age, decreased ROM in extension, history of trauma, and unilaterality of these findings, our leading diagnosis was Panner's disease.

After referral to a pediatric orthopaedic physician, it was concluded the patient's symptoms, history, and imaging were consistent with Panner's disease (Figure 2). The patient and his family were instructed to limit elbow activity and treat symptoms through supportive measures of rest, ice, and oral nonsteroidal anti-inflammatory drugs. They were informed that ROM should improve as the capitellum remodels.

Clinical follow-up thus far has been uneventful. At 16 weeks follow-up, the patient's symptoms have not resolved, and he continues to have stable decreased flexion and extension range of motion in the right elbow compared to the left without pain. He was referred to physical therapy to increase elbow ROM.

At the 6-month follow-up, the patient reported no pain and recently improved ROM, though it was still limited compared to the contralateral side. Physical examination shows elbow flexion/extension range of motion of 20-125 degrees with full pronation and supination. Radiographs showed increased ossification compared to 16 weeks of follow-up (Figures 3 & 4).

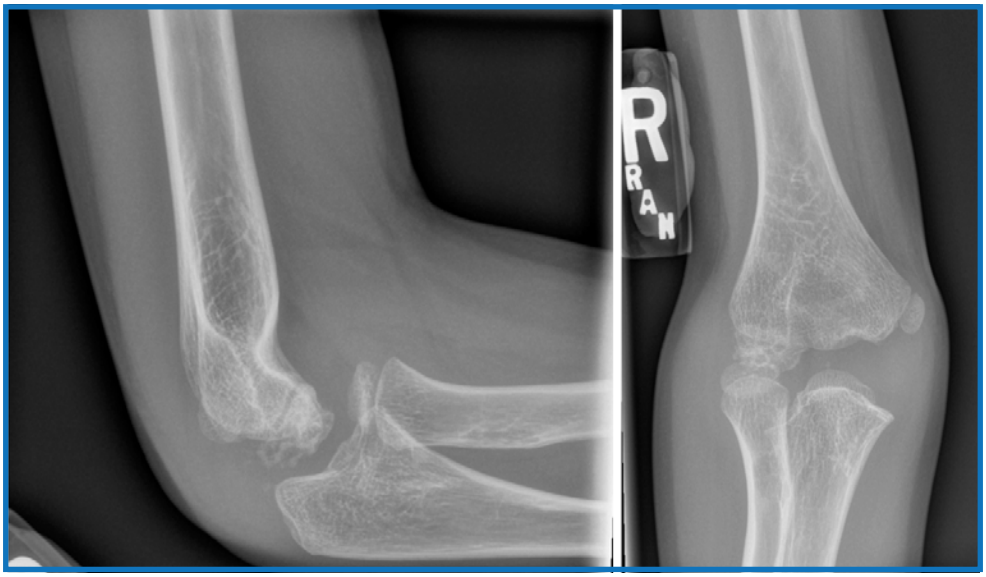

Figure 3
Sixteen weeks after time of presentation to the pediatrician's clinic, plain film radiograph of injured (right) elbow with anterior-posterior and lateral view.

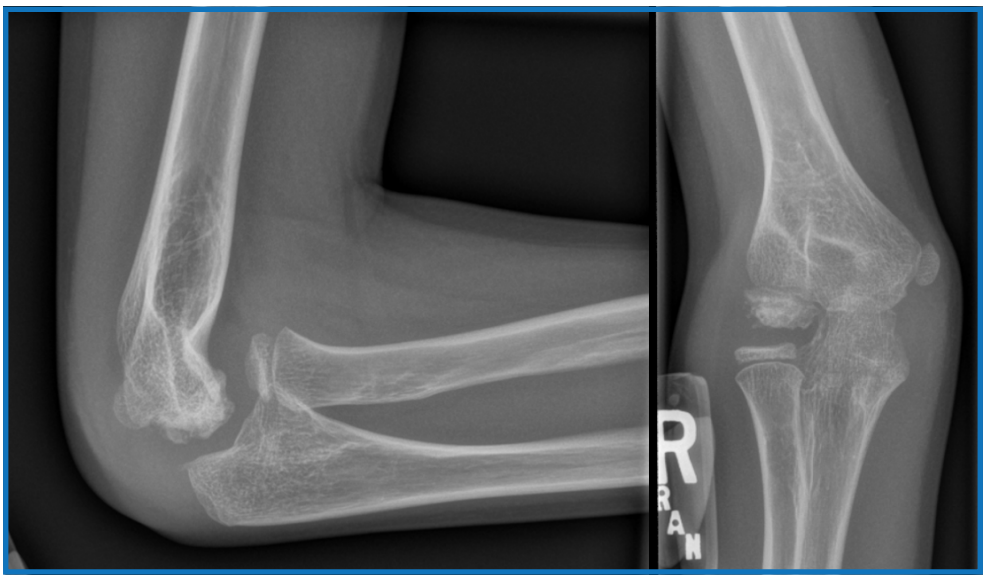

Figure 4
6 months after time of presentation to the pediatrician's clinic, plain film radiograph of the injured (right) elbow with anterior-posterior and lateral view.

DISCUSSION

Panner's disease primarily occurs in pediatric throwing or gymnastic athletes between the ages of 5 and 12 years due to repetitive valgus stress on the joint.[5,6,11,12] Panner's disease has a stronger predilection in males – 90% of reported cases have occurred in young males.[2] Etiology for this gender discrepancy is highly debated. However, it is believed Panner's disease predominates in young males due to their delay in maturation and participation in throwing sports, such as baseball, causing repetitive stress on the immature skeleton and increased tendency for trauma.[2,5,11,13]

Clinical presentation includes pain, swelling, and limitation in range of motion, defined as 20° loss in extension and loss of flexion in the elbow. Pain is often dull and induced by throwing or upper-body weight-bearing activity (i.e., baseball, gymnastics, tennis, etc.), quickly decreasing with immobilization.[2,5,14] Radiographic imaging may yield non-specific findings such as epiphyseal and contour irregularity, fragmentation of the capitellum, radio-translucent areas, and sclerosis, making it difficult to correlate specific radiographic findings with symptoms.[2,4] Magnetic resonance imaging (MRI), which is more sensitive than radiographs, may also be helpful in early diagnosis of Panner's disease as it may show abnormal areas of marrow signal on T1 and T2-weighted images with intact cartilage.[4,15,16]

Given the similarities between Panner's disease and OCD, there is ongoing debate regarding whether they are a continuum of disordered endochondral ossification.[3,6–8] Prognosis in cases of OCD is less favorable than Panner's disease. Bauer et al.[17] reported that 50% of patients with OCD had persistent elbow symptoms and radiographic osteoarthritis at follow-up (mean 23 years). It is imperative to understand the differences in typical treatment to avoid further degeneration of the elbow, given the differences in typical clinical presentations. OCD is more prevalent in adolescents, is identifiable via the presentation of a loose foreign body, and does not resolve with rest or nonsteroidal anti-inflammatory drugs.[2]

Optimal treatment for Panner's disease is the subject of ongoing debate, with conservative management as the preferred mode of treatment, which includes immobilization for 3-6 weeks, reducing activity, and pain management with nonsteroidal anti-inflammatory drugs.[2,14,15] In a recent literature review, 26% of patients were advised to rest, and 30% of case reports detailed that patients were advised to refrain from strenuous arm activities (baseball, carrying heavy items, etc.).[2] However, there was no specification for the duration of rest.[2] Immobilization of the elbow was preferred in 53% of patients; 30% were placed in a cast, and 17% were given a splint.[2] The duration of cast, sling, and splint use was inconsistent, ranging from 4 weeks to 1 year.[2] Only one case reported arthroscopic debridement and a post-operative cast for four months as a treatment method.[2] Full recovery was described in 37% of case reports. Almost complete recovery was seen in 56% of patients. Irregularity and flattening of the capitellum was still visible on some radiographs at the end of treatment2 Pain was reported by 63% of patients at the end of treatment. Of the case reports that included range of motion, 78% of patients had full range of motion, while a 20° flexion contracture was reported in one patient, and loss of 5° of terminal flexion and extension was reported in another.[2]

A case series by Sakata et al.[14] reported about three patients (males, 6-9 years old) who complained of limited range of motion and pain at the elbow joint of the dominant arm. All were diagnosed with Panner's disease using radiographs or MRI and were treated conservatively by restricting sports activities until the symptoms disappeared. The Mean duration of the rest period was 4.3 months (ranging from 2-8 months). Similarly, Chavda et al.[10] reported a 6-year-old male who presented with persistent pain and swelling of the elbow who demonstrated complete recovery from Panner's disease when treated with rest, a splint, and pain medication.

If symptoms do not self-resolve with rest, it is recommended to obtain further workup for OCD, including an MRI, to determine if surgical intervention is needed and avoid further degeneration of the elbow.[4,6,7] surgery may be necessary if fragments become loose or displaced in the elbow.[11,20]

In conclusion, a previously healthy child with a new onset of painless, limited ROM of the elbow should be suspected of Panner's disease. Conservative management should resolve symptoms with appropriate imaging and in conjunction with a pediatric orthopaedic physician. If symptoms persist, a pediatrician and pediatric orthopaedic physician should consider a further diagnosis of OCD and obtain further imaging studies, such as MRI, for more invasive treatment options.

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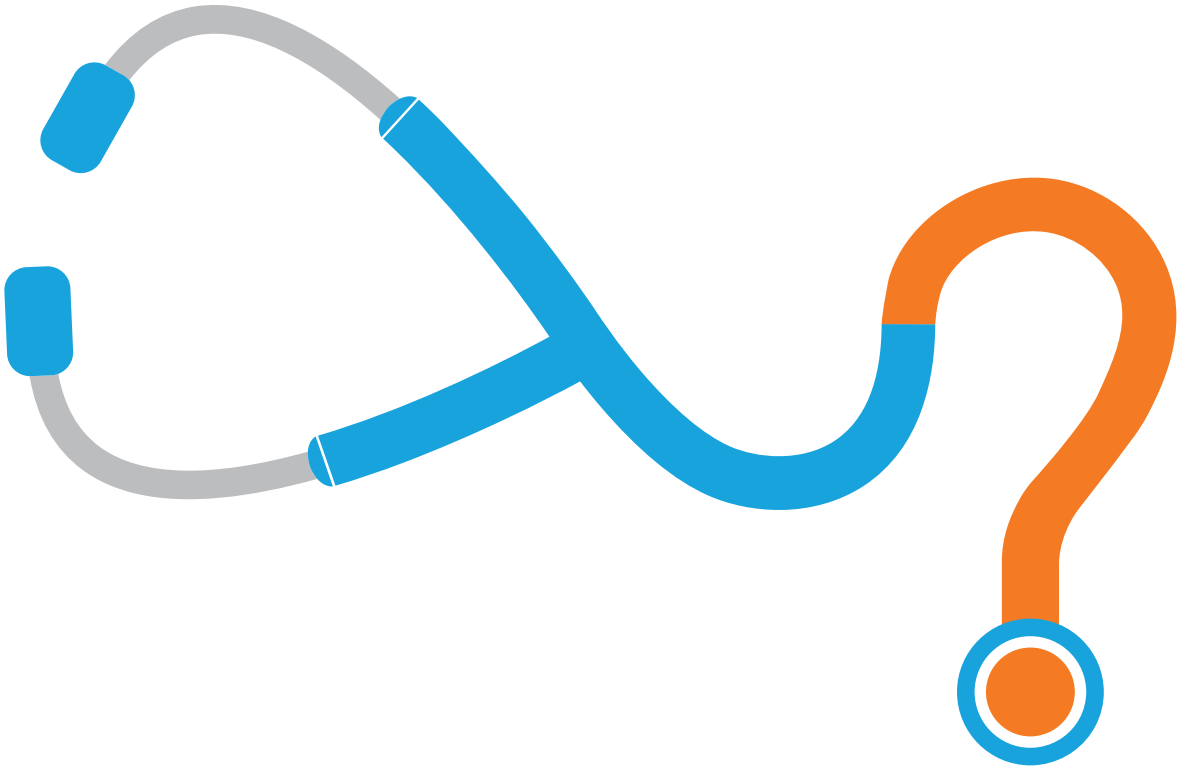

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