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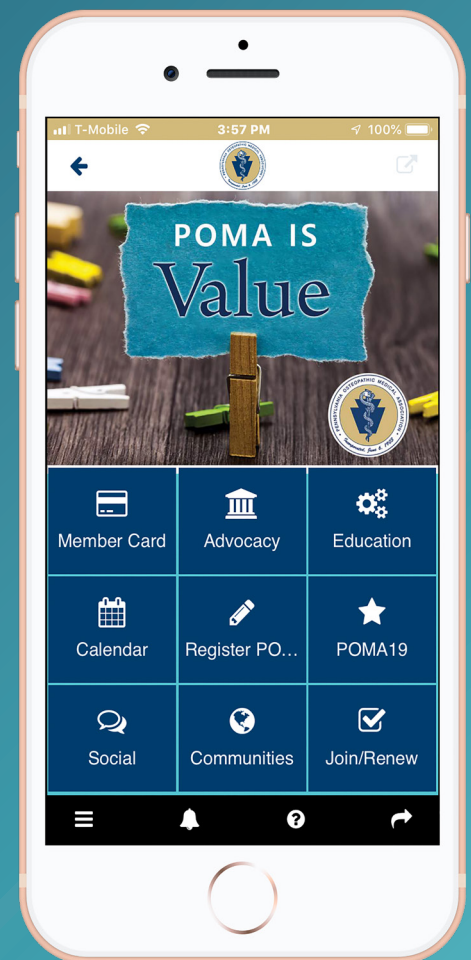
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FROM THE EDITOR'S DESK

Mark B. Abraham, DO, JD



Mark B. Abraham, DO, JD
Editor-in-Chief

At this point, is there much left to say about 2020? Not only is this issue and thus editorial quickly appearing on the heels of the prior issue, but I think that all of us have dissected the good, bad and ugly of this year.

Tele-communicating is not just "a thing" but in many ways is going strong in medicine and practiced by many who (by their own accounts) never expected to be using technology to examine and treat patients in quite this way.

Just as Google became a verb, so has Zoom. What many had to use out of necessity for school or work also became a window to the rest of the world. A window at times we may have grown tired of looking through but a window none-the-less. While we wanted to be with friends and family in person for events but could not, we have been able to share events with those who we may otherwise not be able to see.

Milestone and life achievements were celebrated in ways we never imagined. Who would have thought that a caravan driving past a home with people waving from cars and from a lawn or driveway was the new way to have a graduation, wedding or Bat/Bar Mitzvah "party"?

We also have learned to mourn in similar ways — distanced. Our kids have had to go to school "virtually" and had much less interaction with their peers. Live, in-person, interpersonal experiences are important for all of us, but for kids they are vital in their growth. What will the long-term consequences be?

The partnership of government and big pharma seemingly has developed vaccines against COVID-19 in record time. Could this be what helps start our leaders back on the

course of all working together for the citizens and not their own political careers?

POMA ends the year by celebrating the 2020 Clinical Writing Contest winners and publishing the winning entry. We will continue celebrating into '21 by publishing the two second place entries and the honorable mention in the spring. POMA also looks ahead to 2021 by implementing Phase 2 of the association's three-year strategic plan which is published in this issue. We look forward to having the 2021 Writing Contest, as well as the 2021 Clinical Assembly. Hopefully, some of our events will be held in-person in 2021 so we can see each other again. Laugh. Reminisce with former classmates and colleagues. Heal. Learn.

Thank you to our families, colleagues, friends and patients. We have looked to each other and relied upon one another to get through this year. POMA has been here as well — supporting and serving the membership, profession and the Commonwealth through all of this and will be there in 2021, as well.

On that note, once again a special thank you to Brenda Dill who continues to be my right hand and at times my left hand, my feet and head when it comes to the *Journal*. Putting any issue together is a lot of work. Having to make sure that we can publish as many issues as we want (4 a year) when a whole piece of the year seemingly was removed, was no easy challenge. She tackled it just like Mean Joe Greene getting after Roger Staubach.

My toast to you all, "May we all be happy, healthy, safe and together in person in 2021!"

Collegially,

Mark B. Abraham, JD, DO, FAAFP

Samuel J. Garloff, DO

Lions and 20/20 and Bears, Oh My!

Disclaimer: This article was prompted by watching the Chicago Bears lose to the Detroit Lions December 6, at Soldier Field. By reading this article you may become amused, bemused and/or confused. This is known as the Garloff ABC's of writing. The following cities will be mentioned in this article. Erie, home of LECOM. Consider this the first osteopathic reference. Philadelphia, home of PCOM. Consider this the second osteopathic reference. Chicago, home of the AOA. Consider this the third osteopathic reference. Pittsburgh, home of Iron City beer and kielbasa. In fairness, Pittsburgh is also home to the Andy Warhol Museum. On exhibit at the Museum, you will find large canvases of Andy and his friends urine stains. Remember we are talking about Pittsburgh. Lastly, we will mention Pottsville. Pottsville of course is famous for Yuengling beer. Pottsville was also the home of the Maroons.

Black Box Warning: See disclaimer.

Watching the Bears lose to the Lions reminded me of another team known as the Lions. The Lions represented Academy High School in Erie. In my youth, if your high school played Academy, you were assured of a victory. The Lions played their home games at the Erie Veterans Stadium. The stadium was completed in 1924.

On October 26, 1938, the Philadelphia Eagles played the Chicago Cardinals at Veterans Stadium. The Eagles won 7-0. The game in Erie was considered a home game for the Eagles.

In 1940, lights were added to the stadium. George Halas, owner of the Bears, and Art Rooney, owner of the Steelers, commemorated the event by playing an exhibition game there on August 31. This was quite a remarkable event. Rooney is revered by Steelers Nation. Halas, even more so to Bears fans. The fact that both teams agreed to play in Erie demonstrates the importance of the city at that time in history.

In 1958, on Thanksgiving Day, November 27, Erie hosted the inaugural Gem City Bowl Game. The game consisted of All-Star college players from the East and the West. The coach for the East was Francis Reagan from Villanova. The coach for the West was Ara Parseghian.

Yes, that Ara Parseghian. The game took place early in the day on Thanksgiving allowing the spectators to enjoy an outdoor activity prior to the celebration of the holiday.

The last bowl game took place in 1961. I was fortunate enough to attend them all.

Previously, I wrote that the Chicago Cardinals played the Philadelphia Eagles in Erie. I also made mention of Pottsville. The Pottsville Maroons football team was founded in 1920 (known then as the Pottsville Eleven) and later played in the National Football League from 1925 to 1928. In 1925, the Maroons and the Cardinals vied for the championship. On December 6 of that year, the Maroons defeated the Cardinals at Comiskey Park. The score was 21-7. The championship was awarded to Pottsville. Pottsville then played an exhibition game at Shibe Park against the Notre Dame All-Stars. Unfortunately, the Frankfort Yellow Jackets had a home game scheduled the same day. The Yellow Jackets filed a protest with the league claiming that the Maroons violated their territorial rights. In addition, the Cardinals scheduled two additional games against league dropouts winning easily. This now gave the Cardinals a higher winning percentage. That fact, coupled with the protest by the Yellow Jackets, ended in the league taking the championship from Pottsville and giving it to the Cardinals.

In fairness to the Cardinals, they initially refused the title. In 2003, Gov. Ed Rendell forced the NFL to vote on reinstating the championship to Pottsville. Only two teams voted in favor, the Eagles and the Steelers.

In 2007, David Fleming of ESPN, wrote a book about the Maroons. The book was entitled *Breaker Boys: The NFL's Greatest Team and Stolen 1925 Championship*. I had the pleasure of meeting Mr. Fleming and briefly discussing the history of the Maroons. He firmly believes the championship belongs to Pottsville. He is in good company. Red Grange did too.

So there you have it. All that is written above was prompted by the Bears losing to the Lions. Living in Chicago and adopting the Bears as my team, there is one other reason I

(continued on page 16)



Samuel J. Garloff, DO

POMA 2021-2023 Strategic Plan



Background

Three years ago, POMA started the process to affirm itself as an influential organization within the Pennsylvania healthcare sector following the adoption of its 2018-2020 strategic plan. With 2020 coming to a close, POMA engaged the same research group to survey Pennsylvania's osteopathic physicians, adding residents and students, to frame the strategic direction of the next three years. The survey included questions tied to the 2017 survey and some were added to gauge the impact of the COVID-19 pandemic.

POMA leadership collaboratively developed the pillar structure. Each pillar — Communication, Community, Education and Influence — denotes an area critical to POMA achieving its mission. Using this pillar structure, the POMA Strategic Plan Phase 2 was developed and adopted by the board at its November meeting. Each presidential leader accepted responsibility to discuss and develop the Phase 2 goals and objectives in collaboration with a representative workgroup of volunteers to review the comparative data from the prior and current strategic planning survey; review the goals and objectives of Phase 1; then develop the overall goals and objectives for Phase 2 based on the 2020 data. Where there continues to be alignment, current goals and objectives were updated or augmented. Where there was dissonance, recommendations were made to alter,

eliminate or discontinue programs, products or services. Where new insights were offered, the workgroups discussed creating new programs, products and service opportunities that align. The workgroups developed consensus on the desired strategic goals, as well as prioritizing the goals and establishing a timeline for completion.

Our strategic priorities remain Communication, Community, Education and Influence with the distinctiveness of the osteopathic profession serving as the common thread that unites us all. Together, the strategies and initiatives support POMA's mission: To promote the distinctive philosophy and practice of osteopathic medicine in Pennsylvania, for our members and their patients.

Respectfully,
Diana M. Ewert, MPA, CAE
POMA Chief Staff Officer

Pillar: Communication

POMA will provide accessible and affordable education and maintain a base for effective advocacy. Digital competencies are an essential component of modern business strategy and POMA's to successfully achieve its goals. POMA will continue expanding capacity and capabilities surrounding digital and online content, creation, distribution and communication.



Goal: POMA will maintain a robust digital infrastructure to provide CME, advocacy and communications activities that provide member value and improve patient care.

Objective 1: Create digital and online offerings to provide educational and advocacy materials targeting physicians, non-physician clinicians, patients and their families, and policy makers.

- Strategies:** Identify online and digital infrastructure needs.
 Ensure infrastructure supports delivery of educational content in smaller increments for constituent convenience.
 Develop a POMA-branded podcast series.
- Objective 2:** Assess existing content and communication creation and production processes.
- Strategies:** Continue to survey the membership about content and preferred delivery methods.
 Assess the POMA Journal.
- Objective 3:** Develop assessment of digital infrastructure necessary for sustaining and communicating a substantial online presence.
- Strategies:** Distribution of information by text.
 Continue to update the POMA mobile app with content and features that are relevant and timely.

Pillar: Community

POMA members are increasingly challenged to find time away from their practice and families. To improve member value, POMA will need to make advocacy and education more locally accessible and, to combat the stress and resulting burn-out, develop compelling and supportive communities of peers.



- Goal 1:** *Support district, other geographic, subject matter and/or other types of peer teams to act as locally led mechanisms for education, practice management, and career and personal support.*
- Objective 1:** Evaluate the relative strength of existing formal and informal communities, such as districts, to determine methods to improve local engagement.
- Strategies:** Appoint a workgroup/task force to assess the current district structure and make recommendations to the POMA Board of Trustees for consideration.
 District leadership meetings will be held every two months for purposes of information sharing and leadership development.
 Develop events and meetings that are meaningful to encourage greater participation.
- Goal 2:** *Identify and support peer-based teams within districts to organize education, social and other activities designed to improve the value and cohesion of the local DO community.*
- Objective 1:** Hold local events to bring membership value directly to members through districts in person (when possible) and virtually.
- Strategies:** Districts Go Digital Series — Continue with digital programming through the remainder of 2020/21 fiscal year, encouraging districts/regions to collaborate on programs that offer both continuing medical education and social interactive opportunities.
 When feasible, return to in-person district programs that appeal to all membership types with minimal (if any) product theater offerings.
 When feasible, support and promote social/family activities within the districts.
- Objective 2:** Implement an onboarding campaign to welcome new members to POMA and their respective districts.
- Objective 3:** Establish mentor programs.
- Strategies:** The Mentor Task Force has been established to develop relationships with physicians, residents and students through multiple pathways.
 Test and operationalize the work of the task force as decisions are made, engaging the appropriate communities.
- Objective 4:** Improve member recognition.
- Strategies:** Appoint a task force to review all of POMA's recognition programs and provide a report with recommendations to the Board of Trustees/House of Delegates for consideration in 2021.
 Implement the approved recommendations of the task force in fiscal year 2021/22.

Goal 3: *Identify opportunities to impact the greater local community and our patients; promote osteopathic philosophy to patients and support community-based projects aligned with philosophy.*

Objective 1: Seek opportunities to impact health in local communities.

Strategies: In conjunction with the POMA Foundation, develop mechanisms to identify community needs and collaborate with established organizations/projects to impact the health of the community.

Objective 2: Seek opportunities to support members outside interests impacting local communities.

Strategies: In conjunction with the POMA Foundation, develop mechanisms to assist POMA members in requesting funding and recognition support to extra-occupational interests that align with the osteopathic philosophy.

Goal 4: *Promote the osteopathic legacy to osteopathic physicians in Pennsylvania.*

Objective 1: Advocate for the DO degree.

Strategies: Provide pro-active education regarding the uniqueness and importance of the SBOM for licensure of osteopathic physicians in Pennsylvania. In conjunction with Influence activities, promote DO involvement in public health and as thought-leaders for healthcare in Pennsylvania. Provide materials (obtain from AOA) to support conversations/remove confusion regarding the DO degree.

Objective 2: Promote Osteopathic history and heritage in Pennsylvania.

Strategies: Past: Provide a forum for seasoned osteopathic physicians to share their experiences; possible use of Mentor platform.
Present: Provide examples of current practice of osteopathic medicine in Pennsylvania and promote leaders in their fields — primary care, subspecialists; consider Podcast forum.
Future: Develop a thought-leaders forum to envision the future practice of osteopathic medicine in Pennsylvania; incorporate the continuum of practice from student to retiree.

Objective 3: Use of affinity (community) groups.

Strategies: Provide a forum for members to connect with others with similar interests; use of Mentor platform.

Pillar: Education

A key aspect of POMA's role is to be a leader in providing educational opportunities that incorporate clinical and non-clinical resources for students, residents and practicing physicians. This includes strong CME offerings, both online and in person, supportive resources for career tracks (solo, small/group practice, employed) and locations (urban, suburban, rural) and personal career support for physician stress, residency programs and student debt. An osteopathic workforce that has solutions and resources to be better prepared to address these challenges will enhance POMA's strategic value proposition.



Goal 1: *Patient Care — Continuing Medical Education.*

Objective 1: Provide accessible, affordable, quality continuing medical education to improve patient care and provide member value.

Strategies: Create online CME offerings designed to provide more accessible, osteopathic specific education.

Provide state-mandated courses

Develop a POMA-branded podcast series that offers CME.

Expand district or institutional level CME programming to provide more accessible education and improve the local physician community.

Provide education on procedural topics for online, district/regional and state programs.

Develop specialty track CME for online, district/regional and state programs.

Develop a robust video library.

Implement online question series with CME credit.

Goal 2: *Practice Viability*

Objective 1: Provide resources and education to improve the viability of osteopathic led practices and health institutions.

Strategies: Create online practice management education and service offerings that provides practice leaders with critical business and leadership resources.

Review resources readily available and partner.

Objective 2: Retain partnerships designed to provide POMA members with vetted, trusted and useful practice management and leadership assistance.

Goal 3: *Post-graduate Education*

Objective 1: Collaborate with program directors to educate residents on distinct value of osteopathic principles and careers in osteopathic medicine.

Strategies: Create orientation program designed to educate residents on the value and desirability of a career in osteopathic medicine.

Develop programming to increase resident value for future employment.

Maintain a list of activities that qualify for CME credit and scholarly activity.

Objective 2: Work with residency programs to pursue and maintain osteopathic recognition.

Strategies: Share scholarly activity opportunities offered through POMA with residency programs.

Create resources for program directors to easily incorporate osteopathic components into residency training programs.

Objective 3: Bring residency program directors together to share information, resources and network.

Strategies: Invite all residency program directors to regular meetings.

Pillar: Influence

POMA's role is to be a leader in supporting osteopathic principles and practices at the state and federal level for physicians, patients, health care systems and policy makers. Increasing resources in this area is critical to POMA's success as an organization and supports the vision that patients are healthy and highly satisfied with their osteopathic medical care.



Goal: *Critical stakeholders (insurers, health systems, policy makers and the public) understand, support and advocate for osteopathic principles and practices.*

Objective 1: Inform policy makers about osteopathic principles and practices and encourage support of policies/legislation which improves care and patient access.

Strategies: Advocacy activities designed to educate and encourage support of POMA public policy and legislative priorities.

Look to the Committee on Legislation and Public Policy (or successor committee name) to determine advocacy direction and priorities.

Develop a public-facing POMA government affairs agenda/platform that coincides with the 2021-22 legislative session.

Establish a Public Policy Committee to develop overarching public policy positions for the organization to guide its legislative and regulatory positions.

Develop and enhance training for POMA leaders and members to engage public officials regarding POMA's policy and legislative priorities, including the district-level.

Conduct a DO Day on the Hill in Harrisburg at least one every two years. Accelerate POMA's Key Physician Influencer grassroots advocacy program by establishing key legislative district DO contacts and enrolling POMPAC donors.

Continue and enhance efforts to improve donations to the political action committee targeting Pennsylvania state policy makers.

Engage with contracted lobbying services and use objective metrics to measure value.

Expand local coordination and outreach of members to improve relationships with public officials and public and private organizations.

Coordinate meet and greet functions within POMA districts.

Build relationships with colleges, health systems, residency training programs and other organizations by finding areas of agreement to raise the visibility of POMA.

Coordinate community events for increased visibility and awareness.

Materials should reflect the value of POMA and POMPAC memberships.

Objective 2: In conjunction with Communications activities, create educational resources on the unique aspects of osteopathic principles and their value to patients and families.

Strategies: Develop educational materials for the public and public officials. Support physician-led dialogue with health institutions on application of osteopathic principles and practices.

Objective 3: In conjunction with Community activities, develop mentor programs to engage future leaders.

Strategies: Implement a formal mentor program for new board members and future leaders at all levels of training and practice, especially regarding advocacy training and POMPAC development.

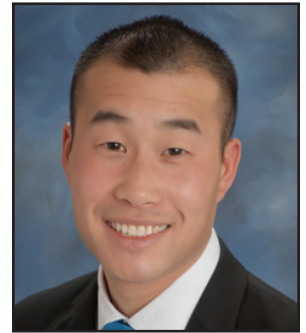
Objective 4: Educate patients and their families on the distinct value of osteopathic principles.

Strategies: Create educational resources designed to educate patients and their families on the unique value of osteopathic medical care.

ABOUT THE AUTHORS

Brenton Song, DO, received the 2020 POMA Golden Quill Award for his manuscript, "*Current Diagnostic and Treatment Models in Patients with Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infection.*" Dr. Song is a third-year psychiatry resident at Millcreek Community Hospital in Erie, Pennsylvania. He is a graduate of California State University in Fullerton, California and

a 2018 graduate of the Lake Erie College of Osteopathic Medicine at Seton Hill in Greensburg, Pennsylvania. Dr. Song is an avid soccer enthusiast having been personally recruited by former U.S. National Soccer Team member Clint Mathis to work as a soccer coach for clinics in Southern California. He is certified to train any soccer team aged 21 and below.



Brenton Song, DO

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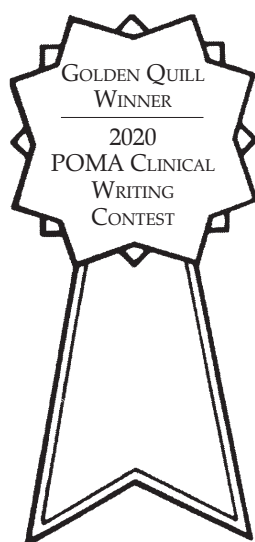
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Medical Update

Current Diagnostic and Treatment Models in Patients with Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infection

by Brenton
Song, DO



Abstract

This literary review will attempt to understand current diagnostic and treatment models of Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections (PANDAS). The ultimate goal of the project would be to investigate long term sequelae that can be prevented by earlier diagnosis and intervention of patients with this disease. I believe that the reported instances of PANDAS is underreported due to lack of standardized diagnostic models. Although treatment appears to be effective, I am hypothesizing that delay in treatment of this condition can lead to long-term sequelae.

Introduction

Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections, or PANDAS for short, is an acute onset of a prodrome of symptoms that includes intense anxiety, mood lability, motor tics, as well as obsessive compulsive behaviors in children who did not show these symptoms at their respective baselines. These behaviors appear to be associated with infection with Group-A streptococcal bacteria within the last six months prior to symptom onset.

Results

In their 2017 article entitled *Longitudinal Outcomes of Children with Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcal Infections (PANDAS)*, Leon, et. al investigated a double-blind initial infusion of intravenous immunoglobulin (IVIG).¹ Afterwards, those assigned to placebo received a

dose of IVIG six weeks after original infusion. All participants were prescribed a 6-month duration of prophylactic antibiotics. Penicillins were the most commonly prescribed with macrolides, cephalosporins, other and sulfonamides. Telephone follow-ups for up to five years but with a mean of 3.3 years. Participants met criteria for both PANDAS and Pediatric Acute-onset Neuropsychiatric Syndrome (PANS) with moderate to severe obsessive compulsive disorder (OCD) symptoms. Exclusion criteria were a history of Sydenham chorea or acute rheumatic fever, symptoms consistent with autism spectrum disorder or schizophrenia and severe physical, behavioral, or psychiatric symptoms that would prevent study participation, and prior corticosteroid or immunomodulatory therapy for PANDAS. At final follow up, 88% had complete or near complete remission of symptoms, 72% had at least one exacerbation during follow-up period, 30% of exacerbation associated with second group A streptococcus (GAS) infection. Three children continued to have chronic symptoms. Researchers were unable to identify any differences between these three and the other children.

Likewise, Nave, Harmel, Buchert and Harms described a case of altered cerebral glucose metabolism that was normalized in a patient with PANDAS-like symptoms after treatment with plasmapheresis in their 2018 article *Altered Cerebral Glucose Metabolism Normalized in a Patient with a PANDAS-like Condition Following Treatment with Plasmapheresis: A Case Report*.² In this report, they described an 18-year-old male with a PANDAS-like condi-

tion, who developed tic-like symptoms and involuntary movements three weeks after cardiac surgery. Symptoms included emotional imbalance, loss of concentration with involuntary movements of his left upper extremity (LUE), especially the hand. Later the involuntary movements affected his left lower extremity causing gait instability. The patient was having trouble sleeping, and was increasingly aggressive at home. Severe decline in school performance occurred. The patient had suffered from pharyngotonsillitis the day before onset of symptoms. Anti-streptolysin O titer was elevated. Anti-basal antibodies were found. Cerebrospinal fluid and brain CT were normal. The patient was given high-dose penicillin (3x 1 Mio. I.E./ d) for 3 days with no improvement. IVIG (2g/kg for 105g total) was given with minor short lasting improvement of movement disorder. Patient was sent home on tiapride 100 mg TID which mildly improved sleep quality. Patient returned several weeks later with his psychological symptoms worsening, and losing 9 percent of his body weight. ASO was still elevated. No central nervous system (CNS) autoantibodies could be found. MRI showed small bicerebellar microbleeds. EEG showed diffuse brain dysfunction. PET/CT scan demonstrated moderate to severe hypermetabolism of basal ganglia, hypometabolic signals in the cortex. Anti-dopaminergic was discontinued, additional IVIG administered and high-dose cortisone therapy (1g i.v. for 5 days) was administered. Improved restlessness, LUE strength, and quality of sleep, but symptoms did not resolve. Five cycles of plasmapheresis were initiated. Four months later at follow-up, the patient's motor symptoms had almost returned to normal with only a minor fine motor deficit in the left hand. Neuropsychological disorders had resolved. Follow-up PET/CT scan revealed normalization of glucose metabolism. They eventually noted that the patient's personality returned to their premorbid state. Gadian, et.al, agreed with the conclusion that IVIG improves recovery in selected patients with PANDAS (level 2).³ They go on to recommend IVIG be considered in patient with a diagnosis of PANDAS (Grade B).

Course of Neuropsychiatric Symptoms After Introduction and Removal of NSAIDs: A Pediatric Study (Spartz, et.al, 2017) hypothesized the benefits of NSAID therapy on PANDAS patients, and reviewed EMR data for patients who met PANS/PANDAS criteria and had been to their PANS clinic.⁴ Patients had to at least have one addition or removal trial of

NSAIDs as the sole intervention. Evaluated response to NSAIDs by clinical assessments in the EMR. Seventy-seven patients had 52 NSAID addition and 57 removal trials as the sole change in treatment. Sixteen of 52, 31%, NSAID addition trials documented improvement in psych symptoms. Twenty of 57, 35%, NSAID removal trials documented escalations in neuropsychiatric symptoms. Thirty patients had side effects, 14 had GI symptoms, 12 had various other side effects (pseudophyria, hematuria, blood in stool, red eyes, abnormal liver enzymes coinciding with viral gastroenteritis, dizziness, and rectal bleeding. The paper presented two individual cases where there was a clear improvement when treated with NSAIDs and clear deterioration when discontinued. It also presented one case of dramatic improvement when treated with ibuprofen for control of joint pain. Patient was then switched to naproxen. Attempting to decrease naproxen dose, worsened OC symptoms, in the setting of a GABHS infection. A follow-up second trial only a mild increase in OC symptoms.

The authors therefore concluded that they recommended trials of different NSAIDs, though a particular point of note is that they admitted the study is limited due to other treatments being administered at the same time as NSAID trials, and that it relies on documentation by physicians and reports from parents.

However, there are differential treatment regimens that have been documented, all with varied levels of success. The article *Treatment of PANDAS and PANS: A Systemic Review* (Siga, Hellemark, Bejerot, 2018) speaks about various treatments that have been employed, including antibiotic therapy, therapeutic plasma exchange, IVIG, tonsillectomy with adenoidectomy, cognitive behavioral therapy, NSAIDs, corticosteroids, and selective-serotonin reuptake inhibitors.⁵ Their study determined penicillin prophylaxis was not superior to placebo to prevent strep infection. Surprisingly, they demonstrated that penicillin, compared to azithromycin to prevent recurrent strep infection, was found to be equal. It should be noted, however, that no placebo arm was included in this study. Children with PANS treated with azithromycin versus placebo found no significant effect by CY-BOCS, but did find a modest effect by CGI-S. A subsequent large survey study performed showed 8-52% effectiveness of antibiotics. The researchers also compared TPE, IVIG, and placebo-IVIG in an open label placebo study in 10 children with PANDAS. The study found striking improve-

ment in the therapeutic plasma exchange (TPE) group compared to placebo and more improvement compared to IVIG at six month follow-up. The results demonstrated that only 25 out of 698 patients received TPE with only six experiencing an enduring positive effect. A retrospective study on 35 patients treated with TPE, 78 percent reported reduction in symptom severity from six months to up to 5.4 years post treatment. Five were documented to be non-responders to corticosteroids and 17 to IVIG, and overall improvement was not associated with duration of illness. In conclusion of this treatment, the authors ascertained that TPE has not been tested in a controlled study with blinding therefore evidence for TPE is inconclusive. Nine children with IVIG improved considerably compared to placebo at one month. Interestingly, after one month treated with open-label IVIG, researchers did not find a difference between IVIG and placebo. Patients improved after open-label phase with elevated baselines levels of calmodulin-dependent protein kinase II, and antinuclear antibodies (ANA) after post hoc analysis, with overall conclusion at that time indicating that the evidence for IVIG is inconclusive. Two observational studies indicate no support for tonsillectomy and adenoidectomy. Additionally, cognitive behavioral therapy, NSAIDs, corticosteroids, or SSRI use was inconclusive, though it was noted that SSRI use could aid in the OCD symptoms that patients diagnosed with PANDAS frequently exhibit.

The article *PANDAS: A Systematic Review of Treatment Options* (Farhood, Ong, Discolo, 2016) also examined differential treatment options, including adenotonsillectomy, antibiotic therapy, IVIG, and cognitive behavioral therapy.⁶ One study involving adenotonsillectomy evaluated two siblings with resolution of symptoms in one child and improvement in the other 11 months later. Both were initially treated with antibiotic therapy and responded symptomatically before the surgery was performed.

Another study followed two siblings, one with Tourette's syndrome and the other with OCD. The child with OCD was able to discontinue sertraline one year post-op and did not require anymore psych follow-up. The child diagnosed with Tourette's syndrome was found to be symptom-free two months post-op and was able to reduce their overall clonidine dosage. PANDAS patients were more likely to have remission of symptoms when receiving antibiotic therapy and surgery compared to surgery alone. Another study found no differ-

ence in symptoms intensity between surgical and nonsurgical groups. Also a majority of the patient's had symptom onset more than two years after surgery so surgery does not prevent disease onset per the authors of this research study. Another study viewed 120 PANDAS patients, 56 of which had adenotonsillectomy with no difference in symptoms severity of titer elevation after surgery compared to nonsurgical group. Authors of this study concluded PANDAS is not an indication for adenotonsillectomy. Double-blind randomized clinical trial patients were given oral penicillin V versus placebo followed by crossover after four months. Authors found no difference in infection rate or symptom severity by treatment phase. A prospective study with 12 patients over a three year period treated patients with penicillins or cephalosporins for GABHS found that treatment with antibiotics alleviated neuropsychiatric symptoms. Half had a recurrence and were treated with antibiotic therapy with improvement of symptoms. Additionally, 23 patients in a double-blind randomized clinical trial that decreased rates of infections were noted in patients treated with azithromycin or penicillin prophylaxis compared to pretreatment. One nine-year-old who received monthly benzathine penicillin injection with dosing tapered over time became symptom free at 16 years of age. Another showed improvement but the final results were inconclusive. Partially double-blind randomized clinical trials also demonstrated that IVIG and TPE had significant improvement compared to placebo, citing that 12 patients that received IVIG with follow-up from four months to seven years all reported significant improvement or complete recovery. Lastly, a prospective study seven patients with six of them taking SSRIs three weeks of CBT found significant and sustained reduction in symptoms with two patients having a complete relapse and one partial relapse.

Not all researchers agree, as Gilbert et. al argued in their 2018 paper *A Pediatric Neurology Perspective on PANDAS and PANS*. This research article examined and reviewed treatment studies, 11 of 12 which were established as biased. The sole study that was determined to be unbiased, found that treatment with placebo compared to IVIG showed no significant difference between IVIG and placebo groups in OCD.

They also reviewed 65 case reports or case series, with a final conclusion there was insufficient data to propose any antibiotic or immune modulating treatment for PANDAS.

The paper argues that current treatment guidelines are not based off evidence-based research, instead they are based off of clinical experiences. They argue that the mechanism of PANDAS is not established, and it is only assumed to be autoimmune or autoinflammatory. Researchers stated that the current treatment guidelines have potential for toxicity to patients, and recommends a more cautious treatment. These include cognitive behavioral therapy as first-line therapy for acute symptoms; however if neuro symptoms are also present, to treat neuro symptoms before attempts to treat psychiatric symptoms. If severe, disabling psychiatric symptoms with clear evidence of inflammatory or autoimmune etiology treatment should be based on the etiology, and specialists consulted. Also, if determined to be severe, disabling psychiatric symptoms with no clear etiology should not be attempted, and subsequent immune modulation not recommended.

An examination of previous randomized clinical trials, observational studies, and case reports further argued against the use of prophylactic antibiotics, as they argued that based on two randomized controlled trials, there was no evidence to provide support for the use of 4-month prophylaxis. Significant reduction of group-A streptococcal infections may have been flawed due to lack of placebo, regression toward the mean, and thus the retrospective collection of baseline data. Three randomized clinical trials reviewed for reduction of OCD severity GRADE rank was MODERATE quality evidence for antibiotic use.

Three randomized clinical trials reviewed for reduction in Tic Severity Scale grade rank was low quality evidence for antibiotic use. Two randomized clinical trials review for reduction in number of neuropsychiatric exacerbations grade rank was very low for antibiotic use. Paper reviews mechanism of action of beta lactams and macrolides and states beneficial effects could be conveyed through antibiotic immunomodulatory and neuroprotective effects which prevent the formation of autoantibodies, expansion of Th17 response, disruption of blood-brain barrier (BBB), or the activation of microglia. Reports one study failed to find superiority of IVIG versus placebo. No studies done concerning antibiotic versus other therapies. Cognitive-based therapy does not prevent GAS-triggered exacerbations according to one study. Another study found antibiotic and cognitive behavioral therapy showed significant reduction in CY-BOCS (obsessive compulsive) score

post-treatment and at follow-up. However, this study did not use a control to see what extent antibiotics were responsible for OCD symptom reduction.

Interestingly, Stagi, et. al described associated levels of decreased Vitamin D levels in PANDAS patients in their 2018 article *Cross-sectional Evaluation of Plasma Vitamin D levels in a Large Cohort of Italian Patients with PANDAS*.⁸ In their research, 179 total patients (49 females, 130 males) who met diagnostic criteria for PANDAS had vitamin D levels compared in both winter (November-May) and summer (June-October). All participants had a history of two “spikes” in OCDs and/or tics with an associated previous pharyngitis and lab confirmation of a previous strep infection. The control group of 224 age and gender matched healthy Italian children with no lifetime history or first degree relative’s history of OCDs, PANDAS, SC, Tourette’s disorder, ADHD, and no infectious disorders at time of evaluation. In PANDAS patients, serum samples were taken during exacerbations of disease, typically in association with confirmed strep pharyngeal infection. The researchers found a significant difference in 25(OH)D levels in patients during a period of exacerbation in comparison with periods of remission. In conclusion, the study found that PANDAS patient’s frequently present with reduced vitamin D levels in both winter and summer, and that vitamin D levels correlated with strep infections and probability of recurrence.

Conclusion

Though there are different treatment options, with varied levels of documented success, there is no standardized treatment modality for patients with PANDAS. However, many researchers appear to agree that antibiotic treatment, whether by prophylaxis or symptomatic treatment, in addition to IVIG treatment shows the greatest efficacy and best long-term prognosis.

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OUT OF MY MIND *(continued from page 5)*

salute the Maroons. On November 26, 1925, Pottsville beat Green Bay 31-0.

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So 2021, be prepared. I asked Santa for only one gift this year. I asked that the Bears be a winning football team.

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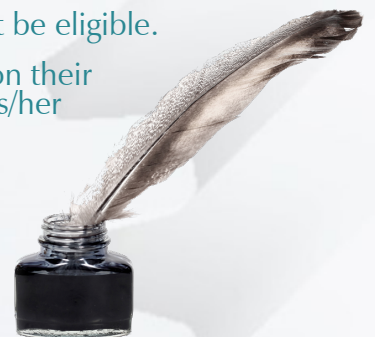
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CME Quiz

Name _____

AOA # _____

1. Intense anxiety, mood lability, motor tics and obsessive compulsive behaviors in children who did not show these symptoms at their respective baseline are symptoms of PANDAS.

- a. True
- b. False

2. What age group(s) are primary affected by PANDAS?

- a. Up to age 18
- b. 18-30
- c. 31-50
- d. Over age 50

3. What group of streptococcal bacteria is associated with PANDAS?

- a. A
- b. B
- c. C
- d. G

4. What is/are the common classes of antibiotics used to treat PANDAS?

- a. Macrolides
- b. Penicillins
- c. Cephalosporins
- d. All of the above

5. There is no standardized treatment modality for patients with PANDAS.

- a. True
- b. False

To apply for CME credit, answer the following questions and return the completed page to the POMA Central Office, 1330 Eisenhower Boulevard, Harrisburg, PA 17111; fax (717) 939-7255; e-mail cme@poma.org. Upon receipt and a passing score of the quiz, we will forward 0.5 Category 2-B AOA CME credits to the AOA CME Department and record them in the POMA CME module.

Answers to Last Issue's CME Quiz

- 1. True
- 2. False
- 3. True
- 4. False
- 5. True

(Questions appeared in the November 2020 Journal.)

Think Spring! Here's Our Next Theme...

WE WANT TO HEAR FROM YOU!

The Spring 2021 issue will focus on **technological advances in healthcare**. Virtual learning, virtual conferences, telemed, etc. What have you liked? What will you continue to use once we are able to do more in person? What would you modify? What do you never want to do again? What's missing? What's next? **Put your thoughts on paper and send them to us!**

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Submit entries or questions to Mark Abraham, DO, JD, JPOMA Editor via email to bdill@poma.org or mail to POMA, 1330 Eisenhower Blvd., Harrisburg, PA 17111. Submission deadline is **February 1, 2021**.



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