

Case Worksheet for Learners

Case Goal

Children with autism spectrum disorder (ASD) often present with challenging or maladaptive behaviors that are commonly seen in addition to the core deficits. Pediatricians are often called upon to help evaluate children for underlying medical concerns and to facilitate obtaining appropriate treatment.

Key Learning Points of This Case

1. *Evaluate the etiology of changes to behavior and functioning in children with ASD and describe strategies to analyze these changes.*

a. Identify specific causes that can increase maladaptive behavior. _____

b. Describe the components of a functional behavioral analysis. _____

c. Be familiar with rating scales that can be used to assess behavior change in children with ASD. _____

2. *Develop knowledge regarding specific options to treat maladaptive behaviors in children with ASD*

a. Identify key red flags for ASD. _____

b. Recognize the difference between a typical temper tantrum and one of a child with an ASD. _____

c. Describe the most common complementary and alternative medicine (CAM) therapies used to treat children with ASD. _____

d. Learn strategies to engage families around the use of CAM. _____

Post Learning Exercise

Talk with a family who has a child or adolescent with an ASD. Discuss the challenges in managing symptoms, such as aggression, obsessions, and other issues.

Case Study Handout Part I

Kofi is an overweight 8-year-old boy who was diagnosed with an ASD and borderline intellectual functioning (IQ of 75) at 4 years of age when he presented with delays in social communication skills (i.e., lack of conversational speech, poor eye contact), repetitive and stereotyped behaviors (e.g., hand flapping and toe walking). He is receiving state-of-the-art physical, occupational, and speech therapy; social skills group therapy; and behavioral therapy. His medical history is significant for only occasional bouts of loose, foul-smelling stools. Kofi's adaptive functioning is good: he is fully toilet trained and he feeds and dresses with minimal assistance. He communicates wants and needs with short sentences and pointing. Kofi presents to your general pediatric practice with his mother, who is concerned about new problem behaviors. When asked to elaborate, his mother says that over the past several months, Kofi has been "biting, spitting, and growling" at his classmates, teachers, and 10-year-old brother. She adds that Kofi has difficulty staying in his seat and participating in class activities. She has received numerous phone calls from his teachers, who are concerned about the safety of the other students and themselves. They have tried several behavioral interventions with limited success.

Kofi's mother reports less physical aggression at home, but notes that Kofi has become more irritable. He has tantrums nearly every hour and especially right before bedtime. Kofi also wakes up at night upset and has trouble falling asleep again. "The police have even come a few times," cries Kofi's mother, "because someone thought I was abusing my child!"

Kofi's mother buries her face into her hands and begins sobbing. "He was making such great progress with his therapies...I don't know what happened!"

After you comfort and reassure Kofi's mother, she tells you that Kofi has been in good health. His intermittent diarrhea was present well before these new behaviors and has not worsened. Kofi's mother states that the diarrhea has improved since he was put on a lactose-free diet several years ago. Kofi continues to have a hearty appetite ("He eats anything I put in front of him!"). He had no caries or gum disease on his last dental exam and cleaning.

Kofi's mother reports that she has tried giving Kofi a warm bath, applying deep pressure massage, using his weighted vest, and playing "relaxing" music to help him sleep. In spite of these strategies, Kofi regularly wakes up three to four hours after he falls asleep. "Sometimes Kofi will wake up and just wander around the apartment," explains the mother. "Other times he'll start crying, or worse, screaming." Kofi only falls asleep when one of his parents is in the bed with him. His mother reports no heavy snoring, coughing, or times when he stops breathing briefly while he is asleep.

His mother identifies Kofi's aggressive and irritable behavior as the highest priority. She worries that it will escalate to a point where he will "really hurt someone." She cannot identify any triggers for these outbursts. There have been no stressors or major changes in the family or in Kofi's social and educational settings. "Most of the time it just happens out of the blue," she explains. She and Kofi's teachers have tried time outs and behavior modification plans, including one based on applied behavioral analysis, to little avail.

Your physical and neurological exam reveals no changes since his last exam six months ago. His BMI remains high at 29.3. You observe one of Kofi's outbursts. He has a high-pitched cry and begins tossing your toys against the wall. He screams and kicks on the floor for several minutes until the screensaver of your computer captivates his attention.

Kofi's mother is aware that children with ASD can be aggressive and irritable and have difficulties with sleep regulation. She has read about other parents with similar problems. She says, "My friend's son takes Ritalin for his behavior problems. Do you think medication could help Kofi?"

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Case Study Handout Part II

Kofi's mother returns for a follow-up visit. She is awaiting consultation with the developmental-behavioral pediatrician. You ask her how things are going. She gets teary eyed. "I'm so frustrated with Kofi's behaviors," she cries. "He used to be such a nice child!" Kofi's mother then tells you that she has been reading up on complementary and alternative medicine (CAM) therapies on the Internet. She has also spoken with several parents whose children with ASD are on CAM therapies. "I couldn't just sit at home and do nothing while I wait for this appointment," she explains. "Besides, many parents in the parent support group I go to have told me how well these therapies work." Kofi's mother is now planning to start Kofi on CAM therapy, but was hesitant to tell you before because she didn't think you would approve.

You ask Kofi's mother what she has looked at, and she mentions chelation therapy, antifungal medication to treat yeast overgrowth in his GI tract, and vitamin supplements. She says, "I was hoping you wouldn't laugh at me, but I really would like your opinion – there is so much information on the Internet and it's hard to know whom to trust." She then looks away sheepishly. "Actually, I've been giving Kofi vitamin supplements I learned about on a website for the past month. I didn't tell you before because I thought you would tell me to stop giving them to him." Kofi's mother then pulls out a folder full of advertisements and articles printed from prominent parent advocacy websites and blogs. She would like your opinion on which treatments are safe for Kofi.

After discussing these issues with Kofi's mother and ensuring her you understand, you say, "Let's talk about vitamin supplements first. Kofi has no chronic illness that might affect his ability to process vitamins, so I don't think we would do any harm by giving him supplements in moderation. Let's just make sure his kidneys and liver are healthy with a few lab tests. I will add these to my records of medications that Kofi is taking. Be careful about adding other sources of the same vitamins that you may not be aware of, such as drinks and other foods that are vitamin fortified."

You continue, "Although I feel that supplements will not harm Kofi, I don't feel the same way about chelation therapy. As we already discussed, chelation therapy hasn't been shown to be effective at helping with the symptoms of ASD in a way that I find convincing. Given the risks, high costs, and potential disruption for Kofi and your family's quality of life, I strongly recommend against starting chelation therapy. On the other hand, one over-the-counter therapy that many people use to help children with trouble sleeping is melatonin. Melatonin is one of the best proven of all the CAM therapies used for children with ASD, with improvements in sleep duration and decrease in the amount of time it takes to fall asleep, with no proven risks. It might really improve everyone's quality of life. Have you looked at it?"

His mother nods her head and tells you that she was meaning to ask you about melatonin.

Kofi's mother agrees to see the specialist before making any decisions on treatment. She agrees to keep you informed of any additional practitioners or treatments she decides to enlist. You thank her for that and ask her to call you once she has seen the developmental-behavioral pediatrician.

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Case Study Part III – Epilogue

Kofi's mother calls you with an update after seeing the developmental-behavioral pediatrician. She was advised to try a medication called risperidone. The doctor raised concerns about Kofi already being overweight. The decision, however, was made to start Kofi on risperidone because these extreme behaviors had such a profound impact on his functioning. The doctor prescribed a gradually increasing dose schedule. Blood work was obtained at baseline and after one month of treatment to monitor effects on Kofi's lipids and fasting blood sugar. BMI and vital signs will also be monitored regularly. While Kofi's mother was initially hesitant because of the side effect profile, she agreed that the benefits outweighed the risks.

Kofi was started on a dose of 0.5 mg. He showed no improvement in aggressive and irritable behavior and had gained a few pounds.

The developmental-behavioral pediatrician had given her the name of a nutritionist who helps manage the increased appetite of children with ASD who are placed on risperidone, but she had not yet contacted him. You encourage her to follow through with that plan, and she agrees to do that.

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Handout I: Vitamins/Dietary Supplements and Exercise-Based Therapies

Vitamin Therapies and Dietary Supplements

Carnosine	Thought to have antioxidant activity, as well as a role in production of the inhibitory neurotransmitter GABA.; may lead to hyperactivity.
Dimethylglycine (DMG)	Given on the basis of a theory of decreased inflammation and increased immune function. An earlier study reported improvements in language when children with disabilities were given DMG; more recent studies have been unable to replicate these findings.
Melatonin	Pineal gland hormone given to help with sleep. Synthetic melatonin has been shown to be effective in children with neurodevelopmental disabilities in helping with sleep onset and duration but not necessarily maintenance. Generally thought to be safe.
Omega-3 fatty acids	Thought to have a variety of health and neuroprotective benefits. Preliminary studies have shown mixed, but promising results for improving behavior in children with ASD. Generally thought to be safe.
Probiotics	Given to counteract GI bacterial and fungal overgrowth. Beneficial effects of probiotics have been shown in irritable bowel syndrome (IBS), acute gastroenteritis, urinary tract infections, and other conditions, but meaningful research has not been done on the use of probiotics in children with ASD. Generally thought to be safe in the absence of immunodeficiency and assuming intact gut.
Vitamin A (cod liver oil)	Thought to improve immune function and vision (some groups theorize that ASD have to do with immune or auto-immune dysfunction). Can cause hepatotoxicity, increased intracranial pressure.
Vitamin B6 (pyridoxine)-magnesium	Given on the basis of B6's role in neurotransmitter production plus magnesium's supportive effect. Research has been suboptimal, but pediatricians should advise parents of the risk of B6 toxicity (peripheral neuropathy) and magnesium toxicity (changes in mental status, GI upset, muscle weakness, respiratory depression, hypotension, and arrhythmias).
Vitamin B12 (cobalamin)	Given intramuscularly, in conjunction with oral folinic acid, to counteract decreased plasma antioxidant concentrations identified in a study of 20 children with ASD. Initial research showed positive results, but attempts to replicate the findings were unsuccessful. Low risk of B12 toxicity but requires injection.
Vitamin C (ascorbic acid)	Shown to decrease stereotypic behaviors in double blind, placebo-controlled study that was never replicated. Toxicity causes nephrolithiasis and GI upset.

Exercise-Based Therapies

Many activity-based therapies are also believed to help with symptoms of ASD. The following are popular, safe, but unproven and often expensive therapies:

- Sensory integration therapy
- Aromatherapy
- Massage
- Hippotherapy (horseback riding)
- Yoga
- Water therapy (swimming)
- Craniosacral massage
- Music therapy

References

Akins, RS, Angkustsiri, K, and Hansen, R, "Complementary and Alternative Medicine in Autism: An Evidence-Based Approach to Negotiating Safe and Efficacious Interventions with Families." *Neurotherapeutics*. Vol. 7, 307-319, July 2010.

Autism Res Treat. 2012;2012:870391. Epub 2012 Nov 28. A review of complementary and alternative treatments for autism spectrum disorders. Lofthouse N, Hendren R, Hurt E, Arnold LE, Butter E.

Ching H, Pringsheim T. Aripiprazole for autism spectrum disorders (ASD). *Cochrane Database of Systematic Reviews* 2012, Issue 5. Art. No.: CD009043. DOI: 10.1002/14651858.CD009043.pub2.

Doyle CA, McDougale CJ. Pharmacologic treatments for the behavioral symptoms associated with autism spectrum disorders across the lifespan. *Dialogues in clinical neuroscience*. Sep 2012;14(3):263-279.

Huffman, L, et al "Management of Symptoms in Children with Autism Spectrum Disorders: A Comprehensive Review of Pharmacologic and Complementary-Alternative Medicine Treatments." *J Dev Behav Pediatr* 32:56-68, 2011)

Levy SE, Hyman SL. Novel treatments for autistic spectrum disorders. *Ment Retard Dev Disabil Res Rev*. 2005;11(2):131-42.

Maglione MA, Gans D, Das L, Timbie J, Kasari C; Technical Expert Panel; HRSA Autism Intervention Research – Behavioral (AIR-B) Network.

Myers SM, Johnson CP, Council on Children with Disabilities. Clinical report: management of children with autism spectrum disorders. *Pediatrics*. 2007;120(5):1173-81.

Pediatrics. 2012 Nov;130 Suppl 2:S169-78. Nonmedical interventions for children with ASD: recommended guidelines and further research needs.

Tchaconas A, Adesman A., *Curr Opin Pediatr*. 2013 Feb;25(1):130-44. "Autism spectrum disorders: a pediatric overview and update."

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Handout II: Treatment Tracking Tool

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Clinical Approach to Psychopharmacologic Management

Clinical Approach to Psychopharmacologic Management

Identify and assess target behaviors

Parent/caregiver interview

Intensity

Duration

Exacerbating factors/triggers (time, setting/location, demand situations, denials, transitions, etc.)

Ameliorating factors and response to behavioral interventions

Time trends (increasing, decreasing, stable)

Degree of interference with functioning

Consider baseline behavior-rating scales and/or baseline performance measures/direct observational data

Include input from school staff and other caregivers

Assess existing and available supports

Behavioral services and supports

Educational program, habilitative therapies

Respite care, family psychosocial supports

Search for medical factors that may be causing or exacerbating target behavior(s)

Consider sources of pain or discomfort (infectious, gastrointestinal, dental, allergic, etc.)

Consider other medical causes or contributors (sleep disorders, seizures, menstrual cycle, etc.)

Complete any medical tests that may have a bearing on treatment choice

Consider psychotropic medication on the basis of the presence of

Evidence that the target symptoms are interfering substantially with learning or academic progress, socialization, health and safety (of the patient and/or others around him/her), or quality of life

Suboptimal response to available behavioral interventions and environmental modifications

Research evidence that the target behavioral symptoms or coexisting psychiatric diagnoses are amenable to pharmacologic intervention

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Treatments for Autism Spectrum Disorder

Choose a medication on the basis of

- Likely efficacy for the specific target symptoms
- Potential adverse effects

- Practical considerations such as formulations available, dosing schedule, cost and requirement for laboratory or electrocardiographic monitoring

- Informed consent (verbal or written) from parent/guardian and, when possible, assent from the patient

Establish plan for monitoring of effects

- Identify outcome measures

- Discuss time course of expected effects

- Arrange follow-up telephone contact, completion of rating scales, reassessment of behavioral data, and visits accordingly

- Outline a plan regarding what might be tried next if there is a negative or suboptimal response or to address additional target symptoms

- Change to a different medication

- Add another medication to augment a partial or suboptimal therapeutic response to the initial medication (same target symptoms)

- Add a different medication to address additional target symptoms that remain problematic

- Obtain baseline laboratory data if necessary for the drug being prescribed and plan appropriate follow-up monitoring

Explore the reasonable dose range for a single medication for an adequate length of time before changing to or adding a different medication

Monitor for adverse effects systematically

Consider careful withdrawal of the medication after 6-12 months of therapy to determine whether it is still needed

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References

- Amminger GP, Berger GE, Schafer MR, Klier C, Friedrich MH, Feucht M. Omega-3 fatty acids supplementation in children with autism: a double-blind randomized, placebo-controlled pilot study. *Biol Psychiatry*. 2007;61(4):551-3. Epub 2006.
- Dodge NN, Wilson GA. Melatonin for treatment of sleep disorders in children with developmental disabilities. *J Child Neurol*. 2001; 16:581-4.
- Erickson CA, Stigler KA, Corkins MR, Posey DJ, Fitzgerald JF, McDougale CJ, et al. Gastrointestinal factors in autistic disorder: a critical review. *J Autism Dev Dis*. 2005;35(6):713-27.
- Ibrahim SH, Voight RG, Katusic SK, Weaver AL, Barbaresi WJ. Incidence of gastrointestinal symptoms in children with autism: a population-based study. *Pediatrics*. 2009;124(2):680-6.
- Iwata B, Worsdell A. Implications of functional analysis methodology for the design of intervention programs. *Exceptionality*. 2005;13(1):25-34.
- Johnson CP, Myers S. The 2007 AAP autism spectrum disorders guidelines & toolkit: what's the bottom line? *Contemp Pediatr*. 2008;25(10):67.
- Kavale KA, Forness SR. Social Skill Deficits and Learning Disabilities: A Meta-Analysis. *J Learn Disabil*. 1983;16:324-30.
- Kemper K., Vohra S, Walls R. The use of complementary and alternative medicine in pediatrics. 2008;122(6): 1374-86.
- Kemper K, Cohen M. Ethics meet complementary medicine: new light on old principles. *Contemp Pediatr*. 2004;21-65.
- Millward C. Gluten-and casein-free diets for autistic spectrum disorder. *Cochrane Database Syst Rev*. 2008 Apr 16;(2):CD003498. (Update of *Cochrane Database Syst Rev*. 2004;(2):CD003498).
- Myers SM, Johnson CP, Council on Children with Disabilities. Clinical report: management of children with autism spectrum disorders. *Pediatrics*. 2007;120(5):1162-82.
- National Autism Center. National Standards Report: The National Standards Project-Addressing the need for evidence-based practice guidelines for autism spectrum disorders. Randolph, MA: National Autism Center; 2009. (Note: Within this report, sections on "Antecedent Package" and "Behavioral Package" are particularly relevant.)
- NIH National Center for Complementary and Alternative Medicine. Get the Facts: An Introduction to Probiotics. 2008. Publication No. D345. <http://nccam.nih.gov/>. Accessed April 30, 2010.
- NIH Office of Dietary Supplements. Magnesium. <http://ods.od.nih.gov/factsheets/magnesium.asp>. Accessed April 20, 2009
- Parikh MS, Kolevzon A, Hollander E. Psychopharmacology of aggression in children and adolescents with autism: a critical review of efficacy and tolerability. *J Child Adolesc Psychopharmacol*. 2008;18(2):157-78.

Treatments for Autism Spectrum Disorder

Research Units on Pediatric Psychopharmacology Autism Network. Risperidone in children with autism for serious behavioral problems. *New Eng J Med.* 2002;347(5):314-21.

Schectman M. Scientifically unsupported therapies in the treatment of young children with autism spectrum disorders. *Pediatr Ann.* 2007;36(8):497-505.

Stigler KA, McDougle CJ. Pharmacotherapy of irritability in pervasive developmental disorders. *Child Adolesc Psychiatr Clin N Am.* 2008;17(4):739-52, vii-viii.

Wasdell MB, Jan JE, Bomben MM, Freeman RD, Rietveld WJ, Tai J, et al. A randomized placebo-controlled trial of controlled release melatonin treatment of delayed sleep phase syndrome and impaired sleep maintenance in children with NDD. *J Pineal Res* 2008;44-57-64.