Online supplement
Designing safer use of antipsychotics in youth: A human-centered approach to an algorithm-based solution

Appendix 1. Interview guide

Brief description

Objective

The goal of this study is to improve the care youth receive for behavioral conditions like ADHD and disruptive behavior.

We are studying providers' prescribing practices to help us design clinical decision support (CDS) that recommends a psychiatry consult for prescription of antipsychotic medications for non-psychotic disorders. The CDS is based on a best practice algorithm and would apply to new medication orders and medication changes, including new patients who may have had previously been prescribed medication.

We are engaging providers who have experience prescribing antipsychotic medications for non-psychotic disorders. Because of your experience, we are interested in your input.

As you may know, the American Psychiatric Association recommends against routinely prescribing antipsychotic medications to treat behavioral or emotional symptoms of childhood mental disorders in the absence of approved or evidence supported indications.[1]

Findings from this study will help us to better understand providers' current workflow barriers, as well as their needs and preferences for enhancing workflow with algorithm-driven CDS in the electronic health record.

Procedures

The interview will last approximately 1 hour and include the following components:

(1) Critical incident interview to characterize current prescribing workflow without SUAY

Interviews follow the critical incident technique[2] to characterize providers' current prescribing workflow and understand needs and barriers that could impact SUAY workflow. Participants recount the last incident in which they prescribed an antipsychotic medication for a non-psychiatric condition, including steps they took and challenges they experienced. Participants then describe their current prescribing context more generally (e.g., steps taken, who is involved, what is difficult). The critical incident technique is a well-established qualitative method for unpacking complex or poorly understood practices using factual reports of an individual's observation of their own behavior[2] and has been used to evaluate adverse healthcare issues that health information technology can address.[3,4]

(2) Storyboarding to elicit feedback on proposed prescribing workflow with SUAY

We use a storyboard[5] to concretely walk through the proposed SUAY workflow grounded in a clinical scenario, in which a provider receives a best practice alert upon

entering an order for an antipsychotic medication for a pediatric patient. The alert recommends peer consultation with a psychiatrist, provides a one-time emergency prescription, and refers the patient for care navigation. We use this walkthrough to further uncover needs and barriers and elicit participants' reaction and design preferences for the technology and information flow (e.g., override options, real time consultation, documentation, follow-up). We compliment the storyboard with vignettes of four fictitious patients to encourage participants to consider the workflow across different clinical scenarios (e.g., new prescription vs. medication change, on-label vs. off-label use, clear vs. ambiguous diagnosis). Storyboards are a formative design technique that visually depict the future use of an information system.[5] These comic-like workflow scenarios have been used to elicit feedback that can inform the design of health information technology, such as decision aids.[6]

(3) Exit Survey to collect participant characteristics

We collect age, sec, race, ethnicity, clinical role, practice setting and years of experience with automated alerts in electronic medical records, number of pediatric antipsychotic medication orders in past year, familiarity with guidelines for prescribing antipsychotic medications t pediatric patients, and number of times they used a consultation-based program for child mental health.

References

1. American Psychiatric Association: Five Things Physicians and Patients Should Question. Philadelphia, Choosing Wisely, 2013. http://www.choosingwisely.org/doctor-patient-lists/american-psychiatric-association
2. Flanagan JC: The critical incident technique. Psychol Bull 1954; 51:327–358.
3. Kaplan B. Addressing organizational issues into the evaluation of medical systems. Journal of the American Medical Informatics Association 1997; 4(2):94-101.
4. Arora V, Johnson J, Lovinger D, et al: Communication failures in patient sign-out and suggestions for improvement: A critical incident analysis. Quality & Safety in HealthCare 2005;14(6):401-407.
5. Truong KN, Hayes GR, Abowd GD: Storyboarding: An empirical determination of best practices and effective guidelines; in DIS '06: Proceedings of the 6th conference on Designing Interactive systems (pp. 12–21). Edited by Carroll JM, Bødker S, Coughlin J. University Park, PA, Association for Computing Machinery, 2006.
6. Henderson VA, Barr KL, An LC, et al: Community-based participatory research and user-centered design in a diabetes medication information and decision tool. Progress in Community Health Partnerships: Research, Education, and Action 2013: 7(2):171.

Part 1. Critical incident interview

To understand how you make prescribing decisions, I would like to ask you some questions about your current practice when considering prescribing antipsychotic medications for pediatric patients.

Recount last prescribing incident (from prescription to first refill)

Think back to the last time you considered prescribing an antipsychotic medication to a pediatric patient for a non-psychotic disorder. What were the general circumstances leading up to this consideration and how did things unfold? Please do not to use any patient names, but focus instead on describing the process.

- Why did you consider prescribing this medication (e.g., what medication, for what problem, what factors did you consider, what information or help did you seek, if any)?
- What challenges did you face in getting this patient/family the care they needed? For example, if you considered therapy as part of the treatment plan, did you have trouble accessing behavioral health? Or face challenges coordinating with specialists?
- Did you decide to prescribe or not prescribe the medication? How did you reach the decision? What steps did you take to order the medication? Was the prescription short- or long-term? Was the prescription refilled?
- If you could do this over again, what if anything would be different to make this process better?

General steps for current prescribing workflow without CDS

Thinking more generally across patients, walk me through the typical steps you take when prescribing an antipsychotic medication to a pediatric patient.

- What steps do you generally take?
- What information do you need at each step?
- Who all is involved at each step (e.g., specialists, pharmacists, patient/parent, etc.)?
- What is difficult about this process today?
- What could make this process better in the future?
- What experience, if any, do you have with consultation-based programs for child mental health, such as Partnership Access Line (PAL), Medication Second Opinion Consult Service, “MindPhone”, “Pediatric Psychiatry Network”, or similar?

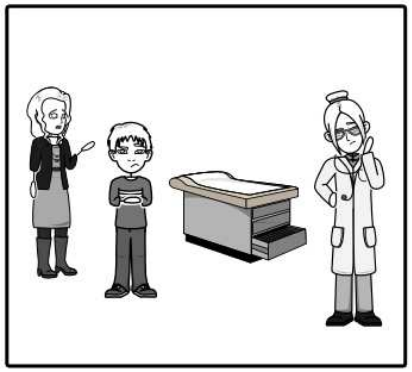
Part 2. Storyboarding

I would like your feedback on ways we could improve prescribing in the future. One scenario is for providers to receive an alert when they order an antipsychotic drug for a pediatric patient. The alert could guide providers to obtain a second opinion consultation with a peer psychiatrist and connect the patient with a care navigator.

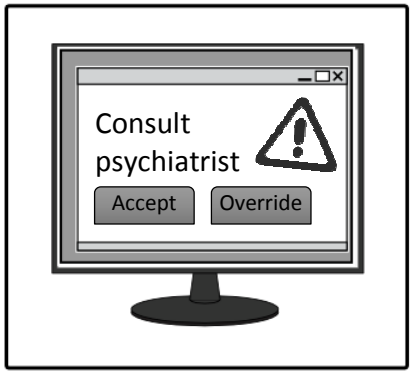
I am going to walk through a "storyboard" showing how this process might work for a provider, and then ask for your reflections if you were in the shoes of this provider. Then, we will walk through a few other fictitious patient vignettes to see if your reflections on the process change.

A "storyboard" is a visual illustration that concretely describes a proposed process. We are interested in your input on aspects of the storyboard that might work well or not well when you envision your future practice with clinical decision support.

Storyboard



1. The patient and parent visit the provider for help



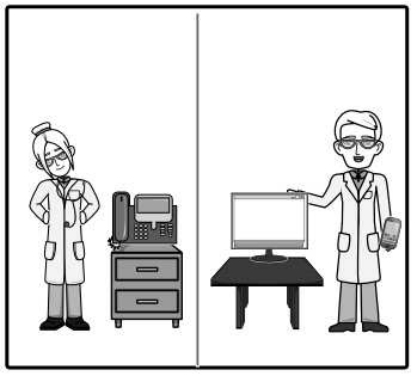
2. The provider orders the medication and receives an alert recommending peer consultation for a second opinion.

When the provider clicks "accept" to proceed:

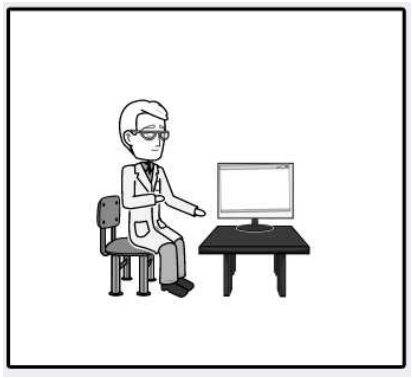
- A one-time 72-hour emergency prescription is ordered
- A referral for second opinion consult is ordered
- A referral for care navigation is ordered

3. The care navigator begins monitoring 2nd opinion scheduling and patient follow up.

4. Meanwhile, the patient and parent pick up the emergency prescription.

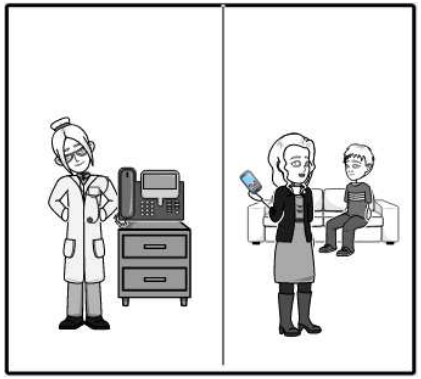


5. The provider consults the psychiatrist for a second opinion. They review the patient's case together.



6. The consulting psychiatrist documents the conversation and sends the recommendation to the provider, which can cover:

- The antipsychotic medication
- A different medication
- Parent/child therapy
- Further specialty follow up

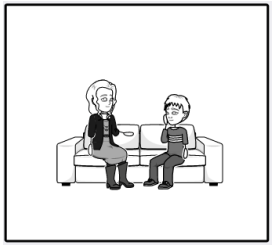


7. The provider discusses the recommendation with the parent and child to decide on next steps.

Ongoing care coordinated by care navigator:

8a. Provider orders the antipsychotic medication, receives alert, and clicks "override" to acknowledge completion of consultation (suppresses alert in future)

8b. Provider orders a different medication



8c. Provider orders parent-child interaction therapy

8d. Provider orders other specialty follow up

Reactions to storyboard of future prescribing workflow

If you were to use a process like this in the future, benefits or barriers would you expect? What concerns if any would you have about the following:

- Overall, is the recommendation clear and feasible? Why/why not?
- What options would you expect when interacting with the alert (e.g., ability to "override" with a short-term prescription, consultation completed, etc.)?
- How important would consultations in real time be during patient visits or outside of patients visits, and why?
- What kinds of documentation would you expect to receive following the consultation? How would you document the consultation?
- Would you anticipate the need for follow up consultation? How would you want to monitor follow up care, such as counseling?
- How valuable would it be to involve a care navigator in this process? (e.g., to schedule 2nd opinion, track patient follow-up care, as needed?)
- Consider an alternative design to help ensure safe antipsychotic prescribing which would require 2 signatures, both your signature and a signature from the consulting psychiatrist. What advantages and/or disadvantages would you expect?

Patient vignettes that accompany the storyboard

1. Terry: New prescription for off-label use of medication for ADHD

Terry, who is 14, was diagnosed with ADHD two years ago and is taking Concerta 36mg daily. Over time his family reports he has had increasing frustration, defiance, and anger with episodes of impulsive aggression.

Terry was suspended from school for threatening to hurt another student. This involved his saying "I'll kill you" during a fight with a peer. The principal does not want Terry to return to school until he has been "cleared by a doctor."

Terry says he doesn't really want to kill the other student, it was just something he said when he was mad. Terry and his parent are at your office today. Both are frustrated and want to do something so that he can return to school, though Terry blames his predicament on the actions of the other student.

Terry's mom asks you to prescribe Seroquel (quetiapine) because she says it helped her nephew's behavior problems, and hopes it will help Terry return to school.

2. Cole: Prescription for medication change for on-label use for possible bipolar with an ambiguous diagnosis

Cole is 12 and had a history of "mood problems" last year for which he was prescribed risperidone 1mg QHS with reported good effect.

Because he experienced significant weight gain as a side effect, this medication was decreased last month to 0.5mg QHS. The plan was to further reduce or stop the medication at the next visit if his excessive appetite did not decrease.

Cole's parents just returned saying that Cole has developed some new problems. Over the past week he's slept very little at night and has excessive energy. He talks more quickly than usual, trips over his words, and has developed really big ideas that he believes fervently like feeling he knows how to cure cancer.

His parents are very distressed by this change, and are with Cole in your office today to discuss what can be done.

3. Nathaniel: Prescription for medication change for on-label use for possible bipolar with unambiguous diagnosis

Nathaniel is 12 and was prescribed 1mg of risperidone QHS for "mood problems" last year with reported good effects.

Like Cole, Nathaniel had his risperidone dose recently decreased to 0.5mg QHS as a first step in trying to address a weight gain side effect.

After the medication was decreased, his parents returned to report that he has started having symptoms, which remind them of what he was like before starting risperidone. They say "*We don't want him to go back to being that boy again*." They describe him as being more irritable particularly when they remind him of a house rule.

He is moodier, might yell at his parents when frustrated, and so far his appetite is unchanged. His parents would like a medication adjustment to address the return of his mood problems.

4. Jane: New patient to the healthcare system with prescription for stable, on-label use of medication for autism with aggressive behavior

Jane is 10 and has Autism with aggressive behaviors. She has taken aripiprazole 2mg daily for the past two years.

Jane and her foster parents recently moved to the area and are seeing you for the first time today. They would like her prescription to be taken over by a provider here in their new town.

They say that the medication was given due to having previous problems with irritability and aggression, and that they think it was helpful for her.

They have nothing they want to review for her care today, as they perceive things are going about as well as they could reasonably go right now after the move.

Part 3. Exit survey

Participant Characteristics

1. What is your age _____ years

2. What is your sex
   - __ Male
   - __ Female

3. What best describes your ethnicity?
   - __ Hispanic or Latino
   - __ Not Hispanic or Latino

4. What best describes your race?
   - __ American Indian or Alaska Native
   - __ Asian
   - __ Native Hawaiian/Other Pacific Islander
   - __ Black or African American
   - __ White

5. What is your clinical role?
   - __ MD/DO
   - __ PA
   - __ ARNP
   - __ Other: _____

6. What is your practice setting?
   - __ Primary care
   - __ Specialty care: _____
   - __ Other

7. How many years have you practiced (in the setting selected above)? _____ years

8. How many years have you worked with automated alerts in electronic medical records? _____ years

9. About how many times have you ordered an antipsychotic medication for a pediatric patient in the past year? _____ times

10. How would you rate your familiarity with guidelines for prescribing antipsychotic medications to pediatric patients?

_ Not familiar
_ Somewhat familiar
_ Very familiar

11. Approximately how many times have you used a consultation-based program for child mental health, such as a "Pediatric Psychiatry Line" or similar?

_ Never
_ 1-2 times
_ 5-10 times
_ 10-20 times
_ 20 times or more

Appendix 2. Participant characteristics

	All providers (n=15)		**Kaiser Permanente Washington (n=6)**		**Nationwide Children's Hospital (n=9)**	
	N	**%**	**N**	**%**	**N**	**%**
Age (M±SD)	45±10		49±8		43±11	
Female sex	10	67	3	50	7	78
White race	11	73	5	83	6	67
Clinical role						
Physicians (MD)	11	73	5	83	6	67
Advanced registered nurse practitioners (ARNP)	4	27	1	17	3	33
Practice setting						
Primary care	6	40	3	50	3	33
Behavioral health	9	60	3	50	6	67
Years in practice (M±SD)	10±7		16±7		7±5	

Appendix 3. Design opportunities

Design choice	Description
A LA CARTE ORDERS	Lead the workflow with desired resources, including telephone consultation with child/adolescent psychiatrist, short-term supply of medication, and short-term talk therapy coordinated by a care navigator. Enable providers to order these optional services with “a la carte” order sets directly from the best practice alert.
PASSIVE REVIEW OF ORDERS	Enable peer review to occur passively from clinical documentation by default without requiring real-time telephone consultation on all orders. If problems or questions surface for a specific order, the consultant can follow up with the ordering provider for clarification and recommendation through a telephone consultation.
SELF-ACKNOWLEDGEMENT OF COMPLETED CONSULTATION	Encourage autonomy and a spirit of peer collaboration by enabling prescribing providers to extinguish the best practice alert through a self-acknowledgement that confirms they received documentation that the consultation was completed.