Parental Perceptions, Adherence, and Disposal Practices of Antibiotics Prescribed for ARIs

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BACKGROUND

- Antibiotic stewardship programs (ASPs) encourage judicious prescription of antibiotics, but little is known about what parents do with antibiotics after the prescription is written.
- The implementation of an ASP program at Vanderbilt Children's Hospital has led to a decrease in inpatient antibiotic use[1] and is currently expanding to outpatient settings.
- An online survey conducted in the US reported that about ½ of parents save left over antibiotics and ¾ of parents divert them to known contacts.[2]
- The US Food and Drug Administration has established guidelines for safe disposal of unused drugs, including antibiotics (Figure 1).
- Improper disposal of antibiotics may alter resistance profiles of soil microbiota, an important source of human pathogens.[3]

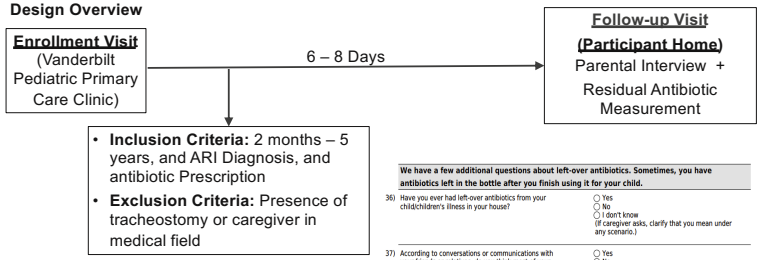
Figure 1: Courtesy of FDA

OBJECTIVES

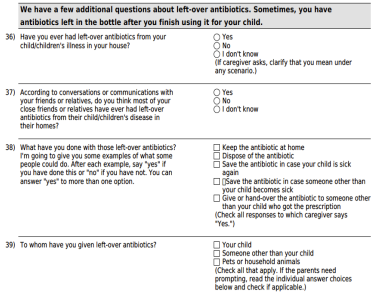
1. Understand parental perceptions about antibiotics prescribed for their children for acute respiratory infections (ARI).
2. Measure adherence to prescribed antibiotics.
3. Understand patterns of disposition of residual antibiotics.

METHODS

- **Study design:** Pilot prospective cohort
- **Design Overview**



- **Semi-structured parental interview**
  - Multidisciplinary team input
  - 25 closed-ended questions and 11 open-ended questions in REDCap (Figure 2)
  - Estimated time of administration: 20 minutes
  - Audio recorded and interviews transcribed



We have a few additional questions about left-over antibiotics. Sometimes, you have antibiotics left in the bottle after you finish using it for your child.

36) Have you ever had left-over antibiotics from your child/children's illness in your house? ○ Yes ○ No ○ I don't know (If caregiver asks, clarify that you mean under any scenario.)

37) According to conversations or communications with your friends or relatives, do you think most of your close friends or relatives have ever had left-over antibiotics from their child/children's disease in their homes? ○ Yes ○ No ○ I don't know

38) What have you done with those left-over antibiotics? I'm going to give you some examples of what some people could do. After each example, say "yes" if you have done this or "no" if you have not. You can answer "yes" to more than one option. ☐ Keep the antibiotic at home ☐ Dispose of the antibiotic ☐ Save the antibiotic in case your child is sick again ☐ [Save the antibiotic in case someone other than your child becomes sick ☐ Give or hand-over the antibiotic to someone other than your child who got the prescription (Check all responses to which caregiver says "Yes.")

39) To whom have you given left-over antibiotics? ☐ Your child ☐ Someone other than your child ☐ Pets or household animals (Check all that apply. If the parents need prompting, read the individual answer choices below and check if applicable.)

Figure 2: Portion of REDCap Survey

- **Qualitative data collection and management**
  - Hierarchical coding system for transcripts
  - Recruit until thematic saturation (target ~25 participants)
  - 2 independent coders
  - Proposed major theme categories:
    1. Personal Knowledge/Understanding
    2. Benefits of antibiotics
    3. Concerns
    4. Information provided
    5. Use and handling
- **Statistical Analyses**
  - Summary statistics
  - Examine and describe patterns of codes
  - Inter-rater agreement between coders
  - Calculation of residual antibiotics:
    - Subtract measured volume of antibiotic at follow-up visit from prescribed amount

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PRELIMINARY RESULTS

Table 1: Characteristics of cohort

	Number of Participants (N = 9)
Age	
2 – 12 months	5
12 - 24 months	3
24 – 60 months	1
Race	
African American	8
Caucasian	1
Diagnosis	
Acute otitis media	8
Preseptal cellulitis	1
Antibiotic	
Amoxicillin	8
Clindamycin	2*

*1 participant on both amoxicillin and clindamycin

Table 2: Parental perceptions of antibiotics (based on close-ended questions)

	Yes
Do you think the antibiotic helped your child get over his/her illness?	9/9
Are you concerned about potential harmful side effects of antibiotics for your child?	4/9
Do you think most of your close friends are concerned about potential harmful side effects of antibiotics for their children?	1/9
Have you ever had left-over antibiotics?	6/9
Do you dispose of leftover antibiotics?	5/9
Do you save leftover antibiotics in case your child is sick again?	5/9
Do you give leftover antibiotics to someone other than your child who got the prescription?	3/9
Did you receive information about how to dispose of any left-over antibiotic?	6/9

Summary

- Most parents believe that antibiotics are necessary to cure respiratory infections.
- Some parents save/share leftover antibiotics with individuals for whom they are not prescribed.
- Although some patients dispose of left-over antibiotics, not everyone reported receiving instructions about safe-disposal.

Table 3: Preliminary sub-codes for major category 1 from qualitative data

Code	Category	Description
1	**Personal Knowledge / Understanding**	**Participant describes her/his knowledge about antibiotics**
1.1	Meaning	Participant describes what antibiotics mean to her/him
1.1.1	Outcome	Participant describes antibiotic based on what s/he thinks it should accomplish
1.1.2	Common	Participant mentions that s/he believes that antibiotics are common
1.2	How antibiotics work	Participant describes how s/he thinks antibiotics work
1.2.1	Bacteria	Participant describes a relationship between bacteria and antibiotics
1.2.2	Infection	Participant describes a relationship between infection and antibiotics
1.2.3	Does not know	Participant does not know how antibiotics work
1.3	Expectations	Participant discusses the expectation of being prescribed an antibiotic
1.4	Reason for prescription	Participant describes their understanding of the reason the antibiotic was prescribed
1.5	Questions asked	Participant asks a question about antibiotics

Summary

- Themes were abstracted from transcribed quotes and assigned codes.
- Parents do not have full understanding of how antibiotics work.

Example quotes from Category 1 representing personal knowledge/understanding:

- *"I don't really know much about how they are supposed to-- what they actually do. But I feel like it did what it was supposed to do, because it's not even been 10 days yet and he doesn't even look like he's on antibiotics right now. So I think they are very essential to curing infections or keeping them tamed or whatever"* (Participant 5, Eye infection, Clindamycin).
- *"But for the most part, I am pro-antibiotic because I know it's going to help with the immune system as best as possible"* (Participant 6, Ear infection, Unclear).
- *"A cure to just all type of just bacterias and infections"* (Participant 6, Ear infection, Unclear).

Table 4: Measured volume of residual antibiotics at day 6 - 8

ID*	Dispensed Volume[a]	Prescribed Amount to be Taken by Follow-up [b]	Projected Volume Remaining with Perfect Adherence [c]	Measured Volume Remaining [d]	Reported Number of Missed Doses [e]	Reported % of Antibiotic Not Taken [f]	Measured % of Antibiotic Not Taken [g]
1	100 mL	43.4 mL	56.8 mL	68 mL	1 – 2	7.1 – 14.2 %	25.8%
2	100 mL	46.8 mL	53.2 mL	23 mL	3 – 4	25.0 – 33.3%	49.1%
3	100 mL	64 mL	36 mL	14 mL	1 – 2	6.3 – 12.5%	21.9%
4	100 mL	60.8 mL	39.2 mL	10.8 mL	1 – 2	6.3 – 12.5%	17.8%
5	300 mL	168 mL	132 mL	38 mL	1 – 2	4.2 – 8.3%	22.6%
6	75 mL	57.6 mL	17.4 mL	7.6 mL	1 – 2	8.3 – 16.7%	13.2%
7	230 mL	119 mL	111 mL	14 mL	3 – 4	21.4 – 28.6%	11.8%
8	150 mL	75.6 mL	74.4 mL	0.6 mL	0	0.0%	0.8%

*follow-up measurement not performed for participant 9; c = a – b; f = (e * prescribed dose) / b; g = (d – c) / b

Summary

- Most parents missed multiple doses of antibiotics.
- Parents underestimated number of doses they missed.

CONCLUSIONS

- Parents' understanding of antibiotics, disposal instructions, and adherence to prescriptions is suboptimal.
- **Future Directions/Next Steps**
  - We have enrolled 12 participants (3 follow-up interviews pending) and will continue enrolling until we reach thematic saturation (target end date April 2020).
  - Outpatient stewardship initiatives should consider educating patients' families about proper handling of antibiotics.

REFERENCES

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