

COMMUNICATING WITH PATIENTS ABOUT ANTIBIOTICS

Alistair Thorpe, PhD
Research Assistant Professor
Population Health Sciences
Alistair.Thorpe@hsc.utah.edu



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DISCLOSURES

NONE TO DISCLOSE.

OBJECTIVES

1. Review the importance of communicating effectively with patients and the public about antibiotics
2. Discuss the potential for psychological insights to enhance how we communicate antibiotic information

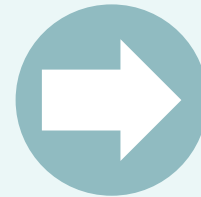
Overtreatment of ASB for adults ≥ 65 yrs

Inaccurate antibiotic allergies: delabeling efforts

WHY COMMUNICATE WITH PATIENTS ABOUT ANTIBIOTICS?

Direct pathway

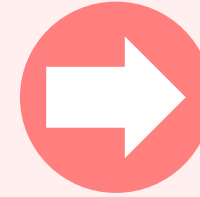
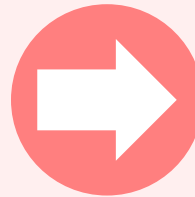
Self-medicating
Inappropriate disposal



(E.G., LAXMINARAYAN & HEYMANN, 2012; MORGAIN ET AL., 2011; TORRES ET AL., 2019)

Indirect pathway

Antibiotic
seeking behaviors



(E.G., HAMM ET AL., 1996, COCKBURN & PIT., 1997, MACFARLANE ET AL., 1997, COENEN ET AL., 2006, MCNULTY ET AL., 2013, COLE., 2014, PINDER ET AL., 2015, SIROTA ET AL., 2017)

WHY COMMUNICATE WITH PATIENTS ABOUT ANTIBIOTICS?

Knowledge deficits

Illnesses

- Bacteria vs. Virus

Antibiotics

- Efficacy & Use
- Side effects
- Resistance

(E.G., HOFFMANN ET AL., 2013; CARTER ET AL., 2016; KFF, 2019)



CLINICAL INFORMATION SUBSTANTIALLY REDUCES INAPPROPRIATE EXPECTATIONS FOR ANTIBIOTICS BUT NOT FOR EVERYONE AND NOT COMPLETELY

(E.G., THORPE ET AL., 2020 & 2021)

PSYCHOLOGICAL INSIGHTS CAN ENHANCE **HOW WE COMMUNICATE ANTIBIOTIC INFORMATION BY...**

1. Identifying barriers to clinically appropriate antibiotic attitudes and preferences
2. Informing strategies to help people understand the information they need to make better antibiotic decisions

(E.G., SIROTA ET AL., 2024)

WHY DO SOME PEOPLE WANT ANTIBIOTICS EVEN WHEN INFORMED THAT THEY WILL NOT HELP THEM AND CAN BE HARMFUL?

Cognitive biases



Bias for action

E.g., “I preferred to do something rather than just do nothing”

(Thorpe et al., 2020)

ACTION BIAS: HOW SHOULD WE PRESENT CHOICES INVOLVING ANTIBIOTICS?

Option: Take antibiotics

Option: Rest (Without antibiotics)

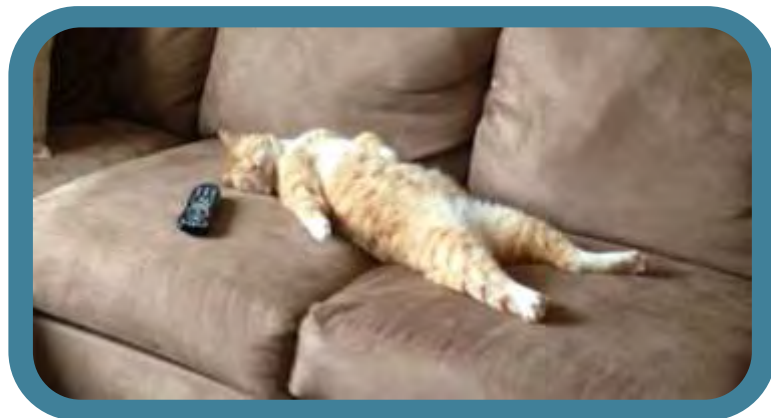
Action

Inaction

Fight the infection by taking a few days rest

Take a few days to rest and look after yourself

Go and take a few days to beat the infection



ACTION BIAS: HOW SHOULD WE PRESENT CHOICES INVOLVING ANTIBIOTICS?

Option: Take antibiotics

Action

Option: Rest (Without antibiotics)

Inaction

Option: Take aspirin and antibiotics

Action

Option: Take aspirin and rest

Action



Effective alternatives

Communicating a clear contingency plan

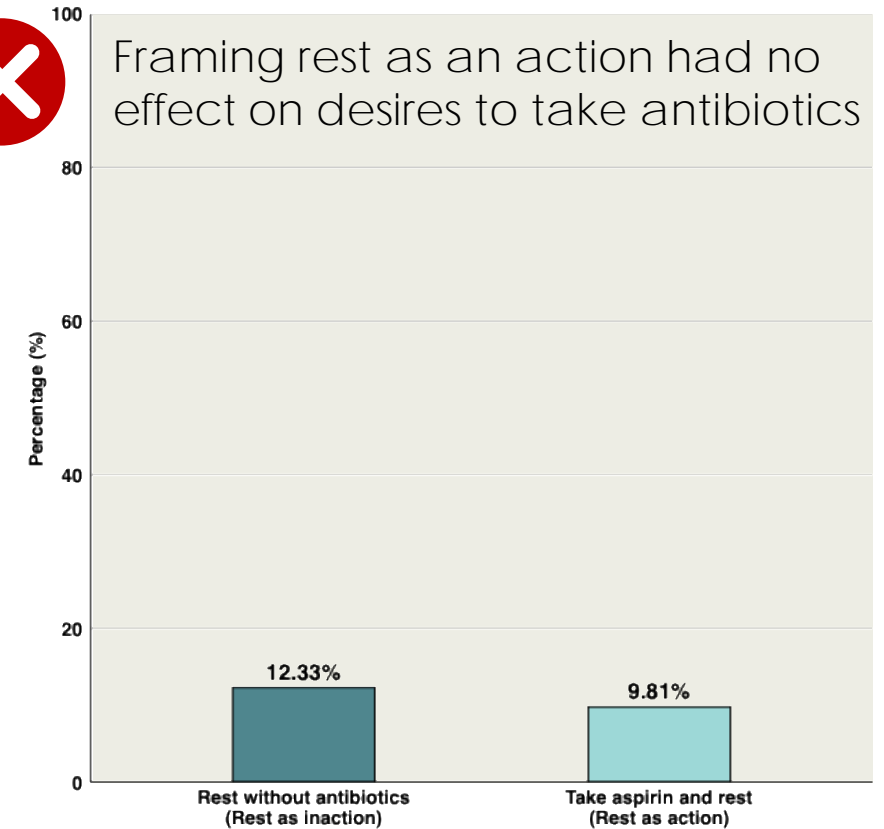
(Mangione-Smith, 2001)

"If you feel worse in the next few days
come back and we will..."

Would want to take antibiotics



Framing rest as an action had no effect on desires to take antibiotics



WHY DO SOME PEOPLE WANT ANTIBIOTICS EVEN WHEN INFORMED THAT THEY WILL NOT HELP THEM AND CAN BE HARMFUL?

Cognitive biases



Bias for action



Information neglect

E.g., “I preferred to do something rather than just do nothing”

E.g., “The information about antibiotics was not relevant to me”

(Thorpe et al., 2020)

INFORMATION NEGLECT: MAKING HARMS PERSONAL AND MEANINGFUL

Control



Complete information



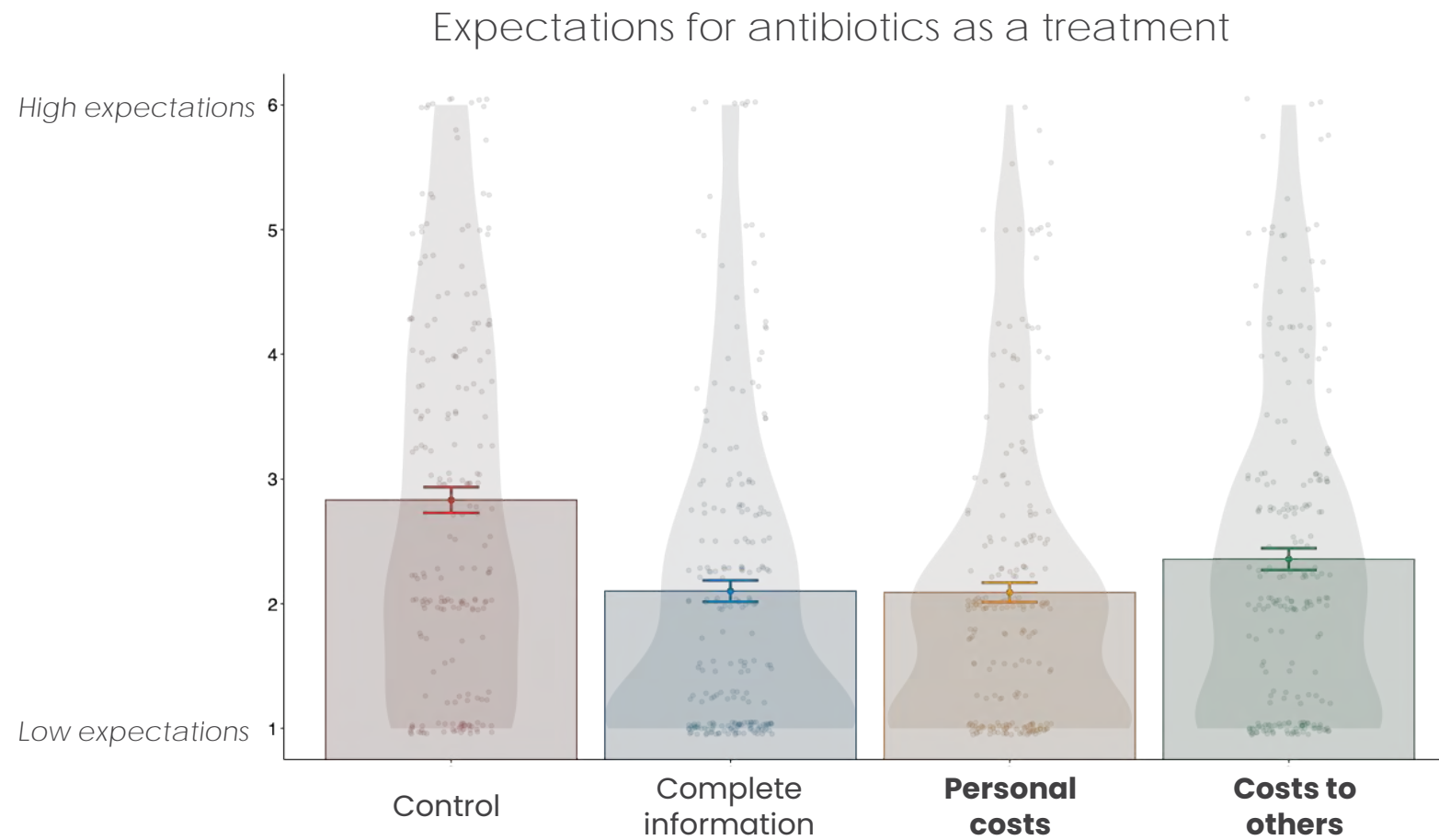
Personal costs

“...That means that antibiotics may not work for you when you need them most...”

Costs to others

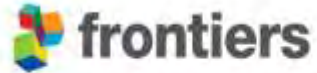


INFORMATION NEGLECT: MAKING HARMS PERSONAL AND MEANINGFUL



Communicating the personal harms and harms to others of AMR reduced inappropriate expectations for antibiotics

INFORMATION NEGLECT: MAKING HARMS PERSONAL AND MEANINGFUL (COVID-19)



In future, COVID-19 may be a useful comparison for describing the spread of AMR and highlighting how difficult it is to control, once it has emerged.

(Murray., 2020)

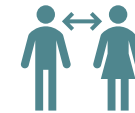
- Despite growing awareness people tend to view AMR as distant



Geographically



Temporally



Personally

(e.g., McCullough et al., 2015; Carter et al., 2016., Huttner et al., 2019)

- Drawing comparisons with familiar threats
 - Successful strategy for abstract/novel health risks (e.g., Edwards, 2003, Galesic et al., 2013)

INFORMATION NEGLECT: MAKING HARMS PERSONAL AND MEANINGFUL (COVID-19)

Antibiotic resistance
message (Control)

Control + COVID-19
comparison

Control + COVID-19
comparison (poster)

The impact of an antibiotic resistance crisis will be much more severe than anything we have seen before. It will also be much more difficult to control. We can all do our bit to prevent this crisis and the time for us to act is now. The most important thing we can all do is make sure we only use antibiotics when they are strictly necessary (when prescribed for a bacterial infection [e.g., pneumonia]). By doing so, we can prevent an antibiotic resistance crisis. With this in mind, please always remember that most cold and flu symptoms are best treated at home by taking Tylenol or ibuprofen, and getting plenty of fluids and sleep.

INFORMATION NEGLECT: MAKING HARMS PERSONAL AND MEANINGFUL (COVID-19)

The impact of an antibiotic resistance crisis will be much more severe than anything we have seen before. It will also be much more difficult to control. We can all do our bit to prevent this crisis and the time for us to act is now. The most important thing we can all do is make sure we only use antibiotics when they are strictly necessary (e.g., pneumonia, sepsis, etc.).

Antibiotic resistance
message (Control)

Control + COVID-19
comparison

Control + COVID-19
comparison (poster)

The COVID-19 pandemic has shown us how devastating a global health crisis can be. Every aspect of our daily lives had to change so that we could stay safe and protect the people we care about from COVID-19. We have all faced major challenges during this time and many of us have lost loved ones. This has given us first-hand experience of how difficult these crises are to control once they start.

The impact of an antibiotic resistance crisis will be much more severe than anything we have seen before—even COVID-19. It will also be much more difficult to control as it may not be possible to create new treatments against antibiotic resistant infections like we did with vaccines for COVID-19.

INFORMATION NEGLECT: MAKING HARMS PERSONAL AND MEANINGFUL (COVID-19)

The impact of an antibiotic resistance crisis will be much more severe than anything we have seen before. It will also be much more difficult to control. We can all do our bit to prevent this crisis and the time for us to act is now. The most important thing we can all do is make sure we only use antibiotics when they are strictly necessary. For example, pneumonia is a common infection [e.g., pneumonia] crisis. With the symptoms of getting plenty

Antibiotic resistance
message (Control)

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The impact of
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Control + COVID-19
comparison

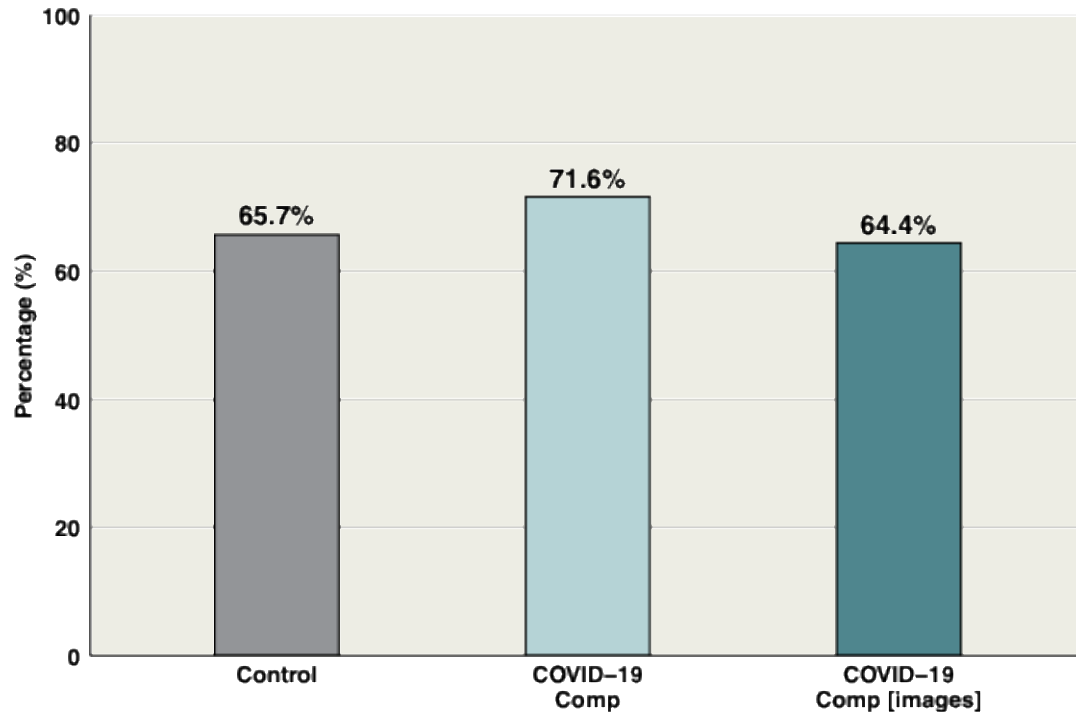
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Control + COVID-19
comparison (poster)

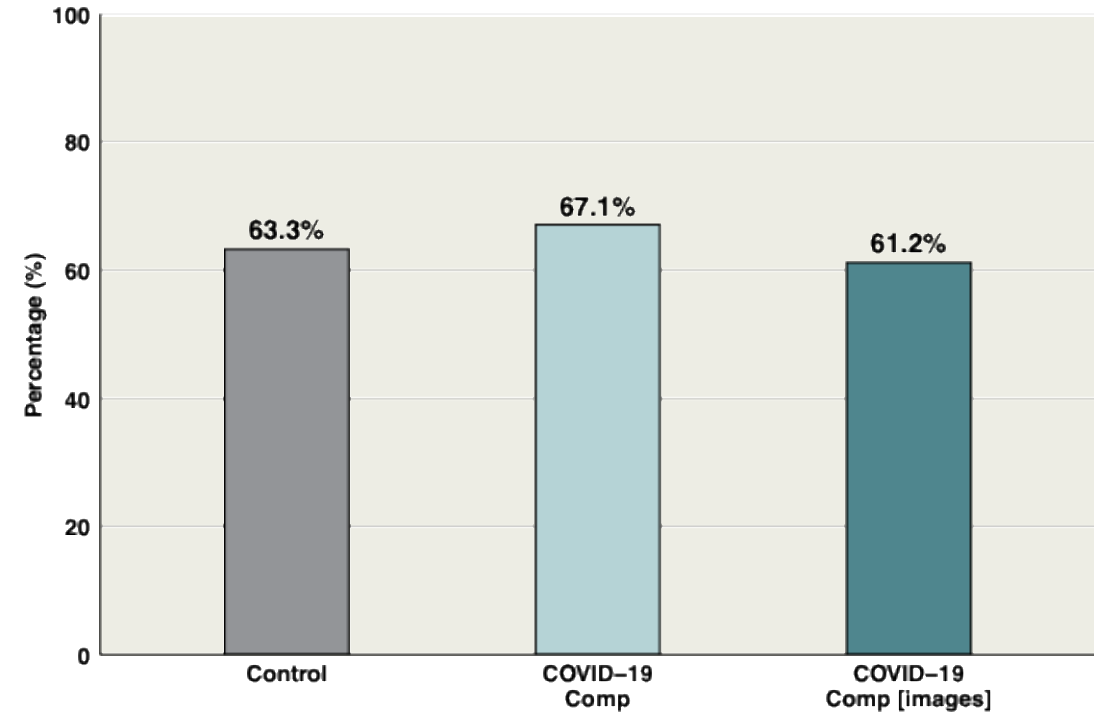


INFORMATION NEGLECT: MAKING HARMS PERSONAL AND MEANINGFUL (COVID-19)

Would want to consult a PCP



Would want to get antibiotics



Comparing a future AMR crisis to COVID-19 experiences did not affect
1) consulting intentions, or 2) antibiotic desires

WHY DO SOME PEOPLE WANT ANTIBIOTICS EVEN WHEN INFORMED THAT THEY WILL NOT HELP THEM AND CAN BE HARMFUL?

Cognitive biases



Bias for action



Information neglect

Social influences



What others do and what others want us to do

E.g., “Most people I know would take antibiotics”

E.g., “My family members would *want* me to take antibiotics”

(Thorpe et al., 2020; Szymczak et al., 2020)

SOCIAL INFLUENCES: TALKING ABOUT THE BEHAVIORS OF OTHERS

Social norms

[mis]perceptions of what
others do

(e.g., Prentice & Miller, 1993)

Framing effects

How options are presented

80% survive vs. 20% will not survive
(e.g., Tversky & Kahneman, 1981)

SOCIAL INFLUENCES: TALKING ABOUT THE BEHAVIORS OF OTHERS

Framing

Information provision

Research shows
**38% of people
want antibiotics
for cough or flu
symptoms.**

Research shows
**62% of people
do not want antibiotics
for cough or flu
symptoms.**

Research shows
**38% of people
want antibiotics for
cough or flu symptoms.**

Antibiotics are effective against serious bacterial infections but do not work against viral infections such as the cold and flu. Taking antibiotics when you do not need them can lead to the bacteria that cause infections changing so that antibiotics do not work anymore. This could mean that if you or your loved ones would be infected in the future, there might not be any effective treatments.

To avoid this, the most important thing we can all do is make sure we only use antibiotics when they are strictly necessary (for a bacterial infection [e.g., pneumonia]) and only when prescribed. By not wanting or asking your doctor to give you antibiotics for cold and flu symptoms you can help prevent an antibiotic resistance crisis.

Research shows
**62% of people
do not want antibiotics
for cough or flu symptoms.**

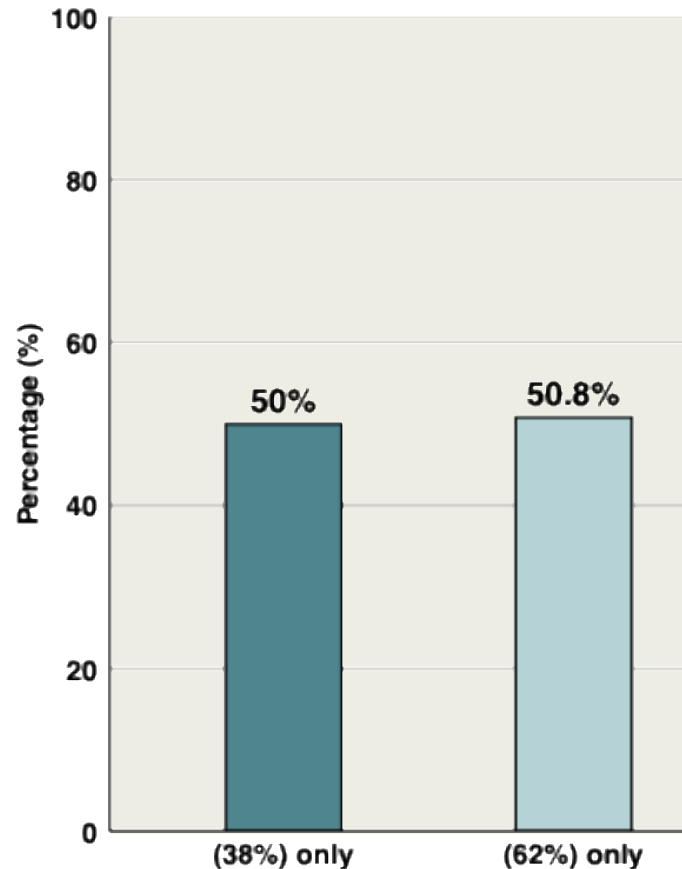
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To avoid this, the most important thing we can all do is make sure we only use antibiotics when they are strictly necessary (for a bacterial infection [e.g., pneumonia]) and only when prescribed. By not wanting or asking your doctor to give you antibiotics for cold and flu symptoms you can help prevent an antibiotic resistance crisis.

SOCIAL INFLUENCES: TALKING ABOUT THE BEHAVIORS OF OTHERS



Who would want to take antibiotics for cold/flu symptoms



Pairing clinical information with data that most people follow the correct behavior effectively reduced antibiotic desires for cold/flu symptoms



WHY DO SOME PEOPLE WANT ANTIBIOTICS EVEN WHEN INFORMED THAT THEY WILL NOT HELP THEM AND CAN BE HARMFUL?

Cognitive biases



Bias for action



Information neglect

Social influences



What others do and what others want us to do

Healthcare experiences



Trust
(provider & general)



ABX history

E.g., “I did not fully trust what Dr. __ said about antibiotics”

E.g., “Dr. __ always gives me an antibiotic when I have symptoms like this”

(Thorpe et al., 2020, 2025; Szymczak et al., 2020; Linder., 2021; Thorpe et al., 2025)

TRUST: LEVERAGING TRUST IN PROVIDERS



Low trust
(i.e., low warmth and low competence)

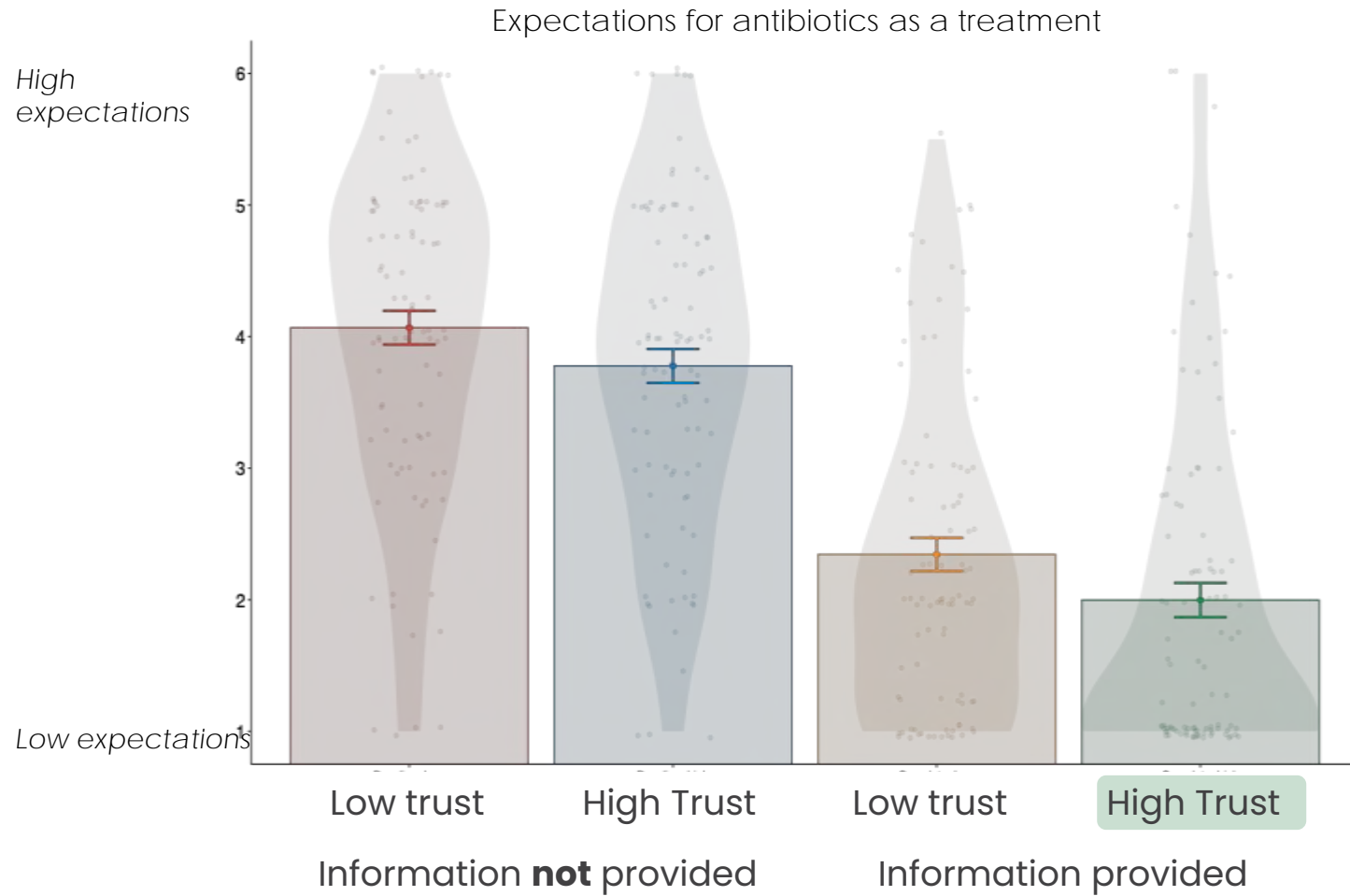
- No greeting
- No eye contact
- Unprepared
- Made an error in physical

vs.

High Trust
(i.e., high warmth and high competence)

- Greets you with a smile
- Turns to face you
- Well prepared
- Efficient physical

TRUST: LEVERAGING TRUST IN PROVIDERS



Pairing clinical information with warm and competent clinician behaviors had the greatest reduction in antibiotic desires

HISTORY: TAILORING TO FREQUENCY OF USE

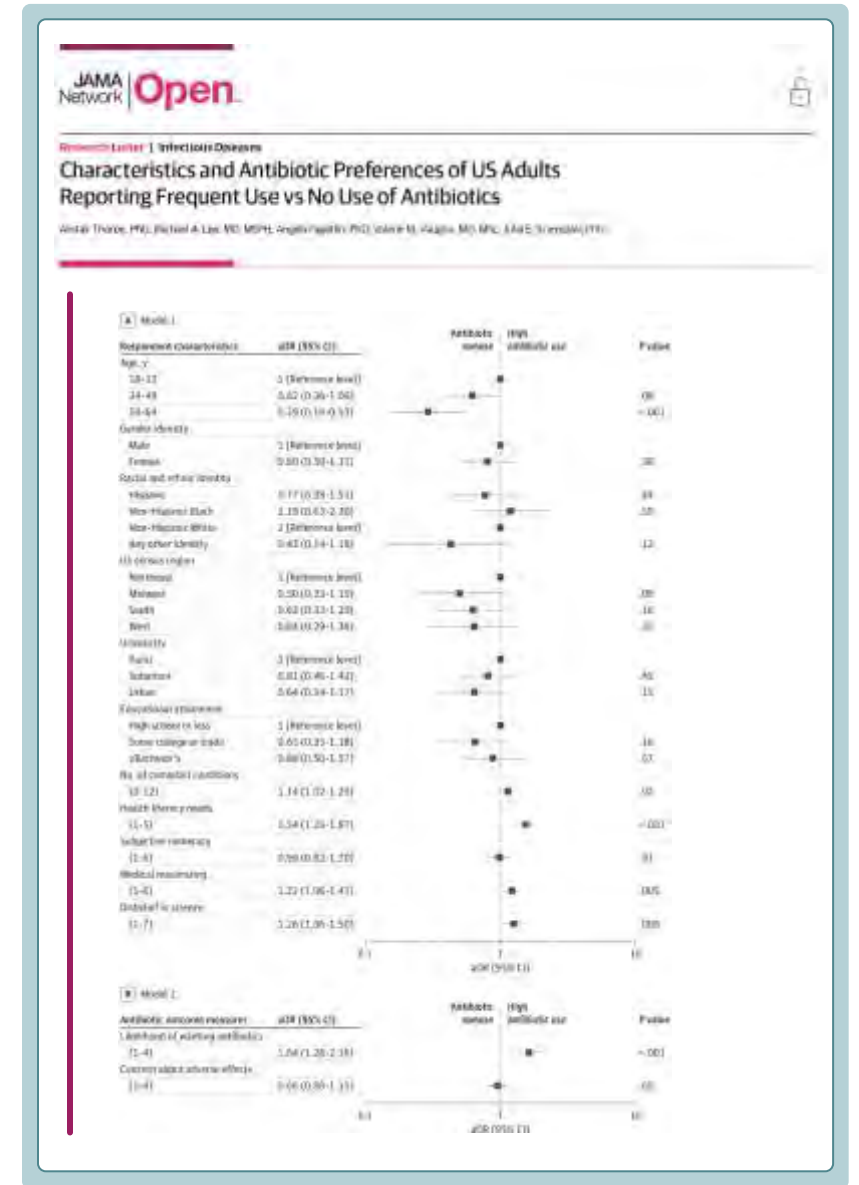
Frequent antibiotic users were more likely to report:

Wanting antibiotics for a viral upper respiratory infection

Medical Maximizing: Prefer to act vs. watch and wait

Health literacy needs: Need help reading health-related materials

Disbelief in science: "We put too much faith in science"



Frequent: ≥3 times in 12 months

WHY DO SOME PEOPLE WANT ANTIBIOTICS EVEN WHEN INFORMED THAT THEY WILL NOT HELP THEM AND CAN BE HARMFUL?

Cognitive biases



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Information neglect

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What others do and what others want us to do

Healthcare experiences



Trust
(provider & general)



ABX history

HOW CAN WE HELP PEOPLE UNDERSTAND THE INFORMATION THEY NEED TO MAKE BETTER ANTIBIOTIC DECISIONS?

What has worked well...



Making antibiotic harms personal and meaningful

(Sirota et al., 2022)



Reports of positive antibiotic behaviors by most others

(Thorpe et al., in prep)



Enhancing trust in providers advice about antibiotics

(Thorpe et al., 2020)

What has NOT worked well...



Reframing choices involving antibiotics

(Thorpe et al., 2020)



Making antibiotic harms more relatable (COVID-19)

(Thorpe et al., in prep)

CASE 1: COMMUNICATING WITH PATIENTS ≥ 65 ABOUT ASYMPTOMATIC BACTERIURIA

CASE 1: ASB AND UTI W/ ADULTS ≥ 65

- Misdiagnosis of asymptomatic bacteriuria (ASB; *bacteria in the urine without signs of infection*) as urinary tract infection (UTI) is a common trigger of antibiotic overuse. (Petty, et al 2019)
 - Positive urine culture and nonspecific symptoms (e.g., delirium)
 - Older adults (≥ 65 yrs) are at high-risk of overtreatment for ASB
- For almost all patients, antibiotic treatment for ASB does not improve outcomes and increases risk of patient harms. (Nicolle, et al 2019)
- IDSA guidelines recommend not to screen or treat ASB;
~80% of hospitalized patients receiving antibiotics for ASB. (Petty, et al 2019)

CASE 1: ASB AND UTI W/ ADULTS ≥ 65

Aim: To better understand the perspectives of patients and caregivers at high-risk of antibiotic overuse for UTIs.



Semi-structured interviews with patients ≥ 65 yrs & caregivers

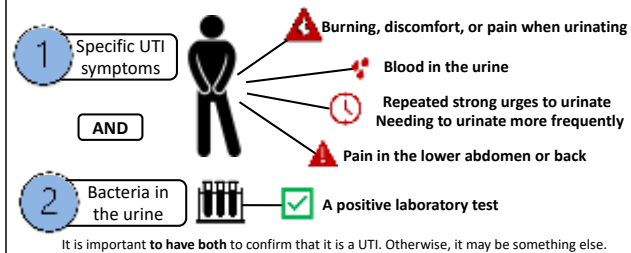
- More involvement in treatment decisions
- To learn more about antibiotics, UTI, ASB
- Support to improve their knowledge and prepare for conversations with staff

CASE 1: ASB AND UTI W/ ADULTS ≥65

URINARY TRACT INFECTIONS

We know that having symptoms and caring for other people with symptoms can be extremely difficult. To help you get the best care possible, we have worked with patients, caregivers, and healthcare professionals to make this resource with information felt would important for people to know about UTIs and their treatment. We hope this information will help you feel more confident and prepared to talk about your thoughts and concerns with our healthcare staff.

Urinary tract infections (UTIs) are common and usually caused by bacteria. To confirm a UTI **requires two things:**



Having bacteria in the urine is common

Many people have bacteria in the urine without having a UTI.* This is called *asymptomatic bacteriuria* [ASB for short] and **does not** need to be treated with antibiotics.

*Around 15% of adults aged 65-80 and 50% of adults older than 80

Non-specific symptoms could be something else

Symptoms like fever, confusion, sudden behavior change, feeling tired or dizzy, a change in color or smell of urine, or a fall could have many other causes and might not be a UTI. For instance, other causes could be:

Other types of infections Lack of (or poor) sleep Medication side effects
Nutrition/diet Dehydration Constipation Depression

TALKING ABOUT ANTIBIOTICS

To help make treatment decisions **that are right for you**, it is important to know and discuss with your doctor or other healthcare professional about:

- What is causing your symptoms
- The possible risks and benefits of potential treatment options
- Your preferences, values, and concerns

Below are some suggestions to help you think about what to ask your doctor or other healthcare professional:



My symptoms and my treatment options: Do I know...

- o What caused my symptoms?
- o How to prevent this happening again?
- o Who to talk to for more information and support?
- o What are my treatment options (and their risks and benefits)?

Antibiotics: Do I know...

- o Why I need to take antibiotics for my symptoms?
- o The possible risks & side effects (short & long-term)?
- o What antibiotic resistance is (if it can affect me & what I can do)?
- o How to tell if they are working and how long it should take?
- o If antibiotics are a long-term solution to my symptoms?



Do I know my preferences, values, and concerns...

- o Do I prefer to act now or wait and see if things get better?
- o What would I like to know more about?
- o What am I still concerned or confused about?



TALKING ABOUT ANTIBIOTICS

Antibiotics are important medicines for **bacterial infections**. However, **antibiotics can also be harmful**:

Possible short-term harms: Antibiotics may cause

- o Rashes or allergic reactions
- o Nausea, vomiting, diarrhea, or headaches
- o Harm to kidneys or other organs

Antibiotic use also leads to antibiotic resistance

This is when bacterial infections can't be treated by antibiotics.

These are sometimes called **superbugs** and can cause severe illness and death

So, even when they are needed, antibiotics can have side effects and cause resistance.

To avoid unnecessary harms from antibiotics **it is important to only use them when necessary** and to consider alternatives whenever possible:

Watchful waiting

Keeping an eye on symptoms to see if antibiotics are needed or if you can get better without them

Prevention

Any behaviors that can help stop you getting these symptoms again

Medication review

Checking if the symptoms may be caused by another medication

Looking for other causes

Such as other infections, dehydration, lack of (or poor) sleep, nutrition/diet, or constipation

Symptom management

Seeing if there are any non-antibiotic medications that might help with the pain

CASE 1: ASB AND UTI W/ ADULTS ≥ 65

Sample: 504 US adults ≥ 65 years old

Scenario: asymptomatic with a positive urine test during prescreening for non-urologic surgery.

Control

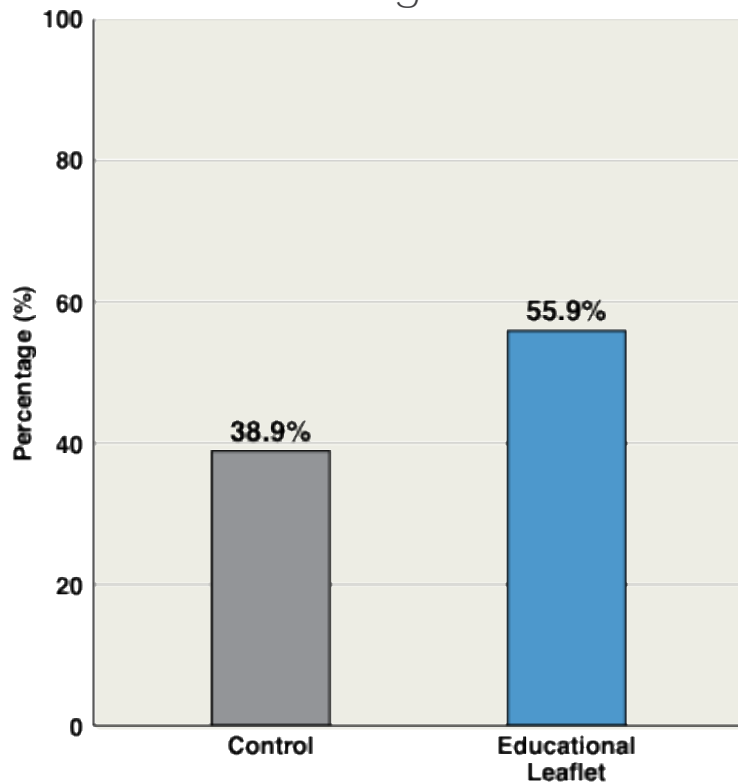


Educational
leaflet provided

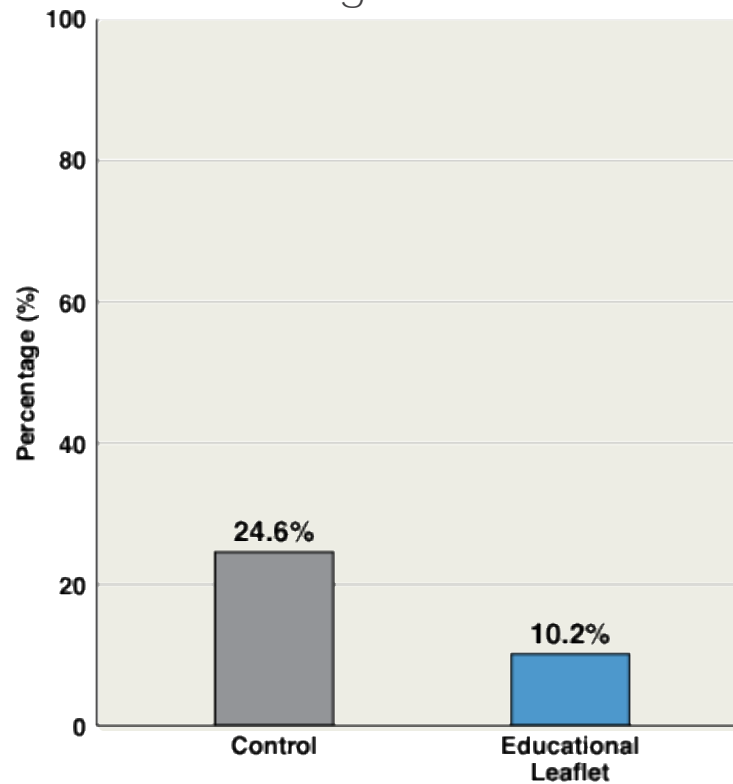


CASE 1: ASB AND UTI W/ ADULTS ≥ 65

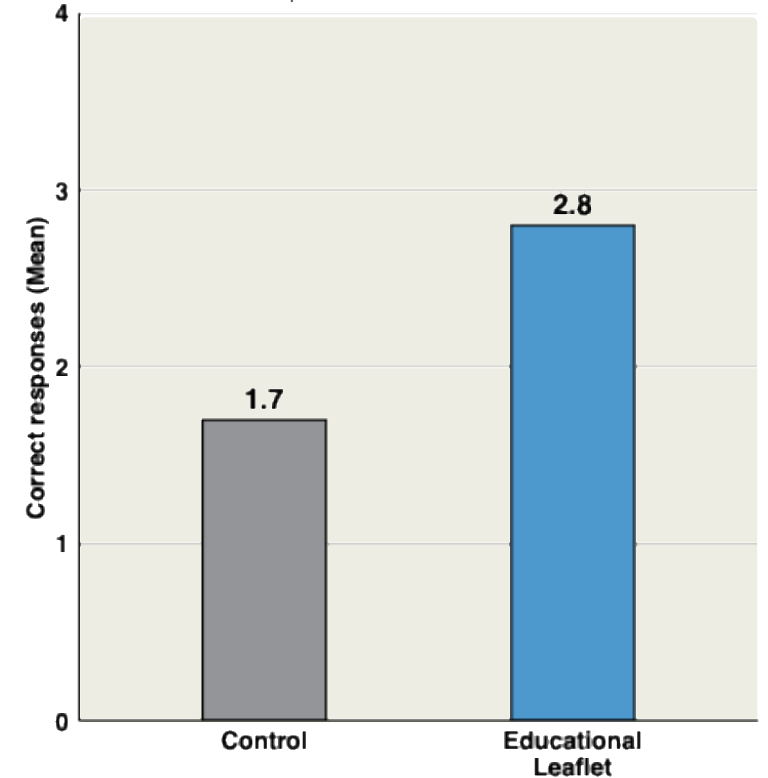
Respondents comfortable
NOT taking antibiotics



Respondents who
thought ASB = UTI



Knowledge about ASB,
UTI, and antibiotics



CASE 1: ASB AND UTI W/ ADULTS ≥65

| | No Leaflet 258 (51.2) | Leaflet 246 (48.8) | |
|--|--------------------------|-----------------------|--------|
| Total N (%) | | | |
| If someone has bacteria in their urine that means that they have a urinary tract infection. - (<i>disagree</i>) | 13.6% | 45.3% | P<.001 |
| Bacteria in urine does not always need ABXs. - (<i>agree</i>) | 35.3% | 68.3% | P<.001 |
| To confirm a bacterial urinary tract infection, you need to have both specific symptoms and a positive test for bacteria in the urine. - (<i>agree</i>) | 48.1% | 80.4% | P<.001 |
| Symptoms like fever, confusion, feeling tired or dizzy, a change in color or smell of urine, or a fall could have many other causes and might not be a UTI. - (<i>agree</i>) | 58.9% | 79.7% | P<.001 |

CASE 1: ASB AND UTI W/ ADULTS ≥ 65

Action bias

- “Need to cure the problem and not wait”
- “If you have one [UTI] it needs to be taken care of”
- “Do not want to avoid treatment that could be beneficial”

Personal safety concerns/experiences

- “UTI is very painful”
- “Past experience from leaving UTI untreated by antibiotics”

Persistent beliefs

- “Need antibiotics to kill bacteria”
- “Can’t get rid of infection without antibiotics”

Trust

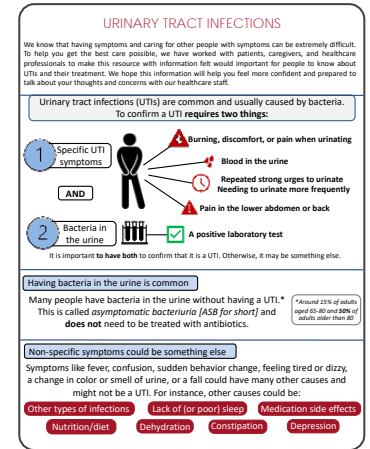
- “The labs say so, I would err on the side of caution”
- “I trust the test”



CASE 1: ASB AND UTI W/ ADULTS ≥65

This educational leaflet:

- Reduced incorrect beliefs about UTI & Enhanced knowledge
- Increased comfort avoiding antibiotics for ASB
- 10% still believed they had UTI
- 45% still felt uncomfortable not getting antibiotics



Psychological barriers and persistent beliefs...

Action bias: Contingency plans | making harms personal and meaningful

Social norms: Sharing positive behaviors of others like/or important to them

Trust in tests: Normalizing uncertainty (e.g., Han et al., 2021), Leveraging trust in HCWs

CASE 2: COMMUNICATING WITH PATIENTS ABOUT ANTIBIOTIC ALLERGY DELABELING

BACKGROUND

WHAT IS THE PROBLEM WITH INACCURATE ANTIBIOTIC ALLERGY LABELS?

Inaccurate allergy labels put patients at increased risk of harms

'Allergy labels' trigger clinicians to prescribe suboptimal antibiotics...



Mortality and treatment failures



Surgical infections and multidrug resistant infections



Length of stay, healthcare costs, bacterial resistance

(E.G. [STONE ET AL.](#), ALLERGY, 2019; [BLUMENTHAL ET AL.](#), LANCET, 2019; [SHENOY ET AL.](#), JAMA, 2019; [OLANS ET AL.](#), JT COMM J QUAL PATIENT SAF, 2022)

BACKGROUND

ANTIBIOTIC ALLERGY DELABELING

Removing allergy labels after evaluation/testing disproves allergy

Increasingly recognized as an essential pillar of stewardship, patient safety, and healthcare efficiency

However...

- ≤1% of patients with an allergy label are evaluated
(SAMARAKOON ET AL., ANN ALLERGY ASTHMA IMMUNOL, 2023)
- Up to 30% of allergy labels reappear/persist after removal
(E.G. HICKS ET AL., J ANN CLIN IMMUNOL, 2023; MONDAY ET AL., ANTIMICROB STEWARD HEALTHC EPIDEMIOL 2022)

patient was able to describe the reaction. It was felt that delabeling was more difficult when patients did not want to have the label removed.

... we are ships that pass in the night so their trust is generally with their GP. They say 'the GP said this' and you are never going to change their minds. (ST1)

Gaining the confidence of patients and enabling them to consent to delabelling was also about confidence in understanding the distinction between intolerance and an allergic reaction that carries the risk of life-threatening reaction. In addition, participants felt that patients may not understand the importance of delabelling.

(POWELL ET AL., EUR J HOSP PHARM, 2021)

RESULTS: SAMPLE

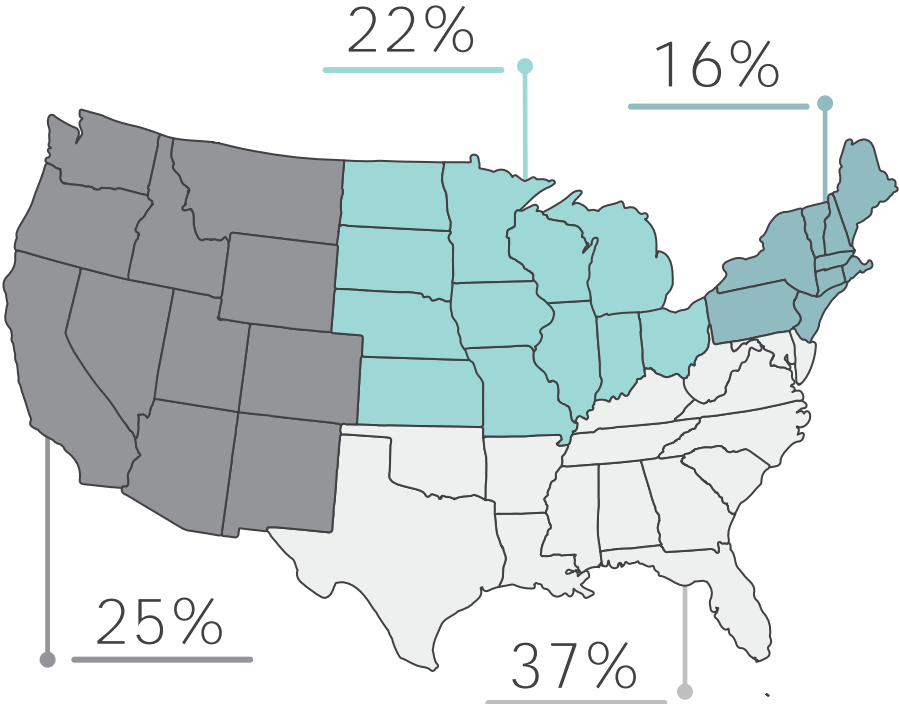


N=193 OF 1,476

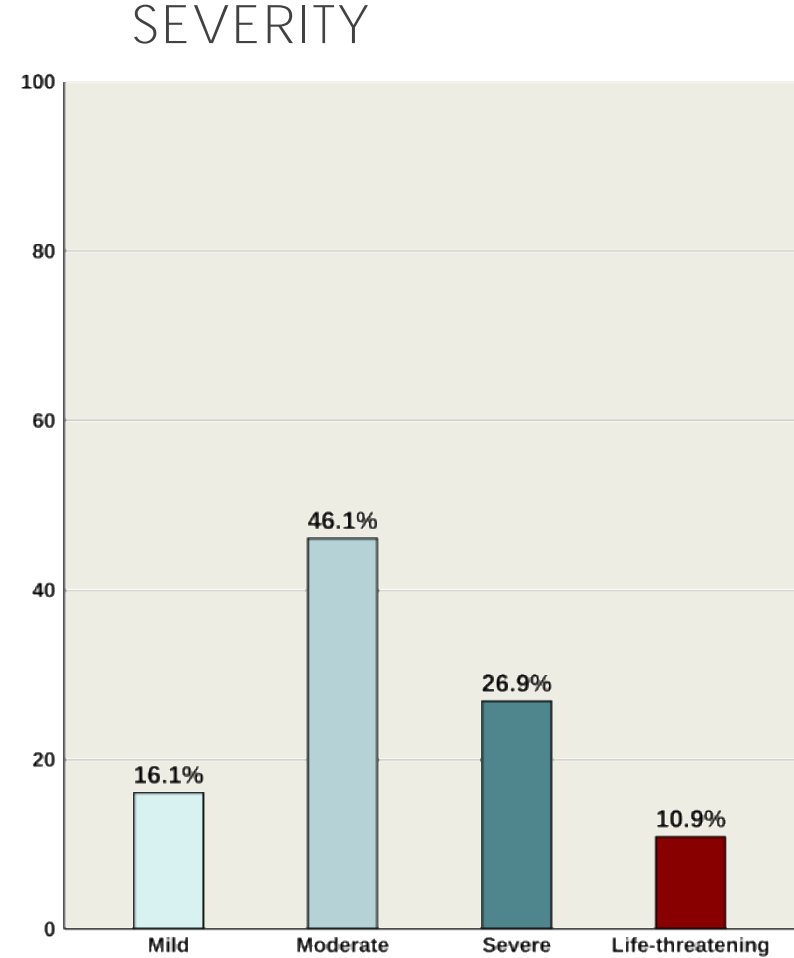
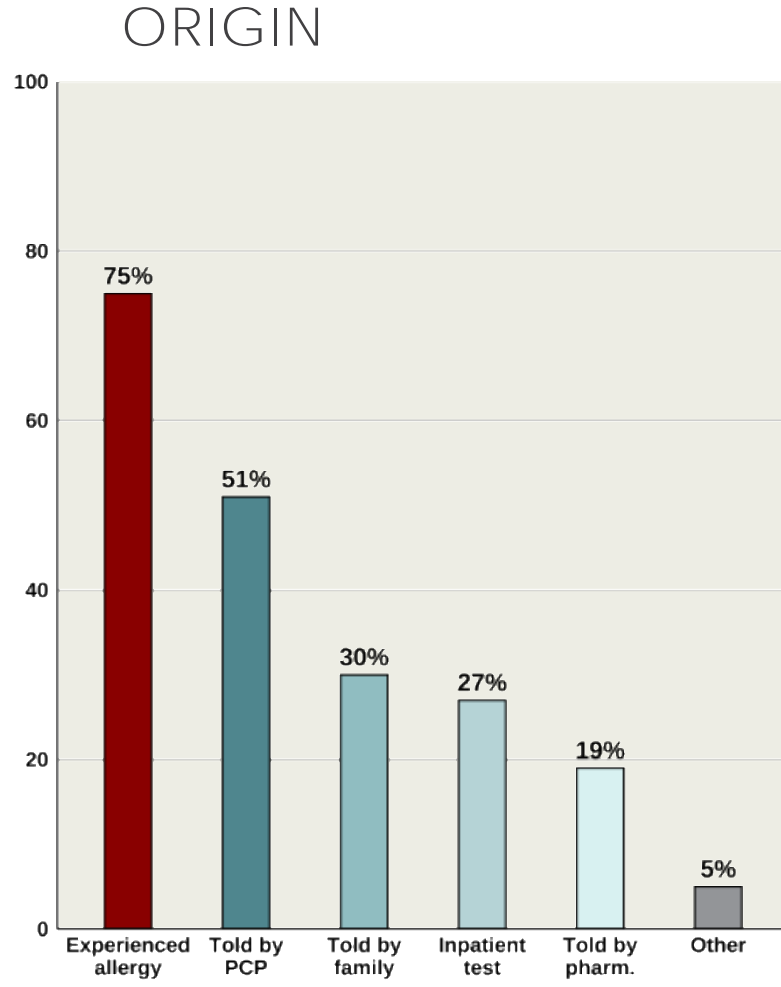
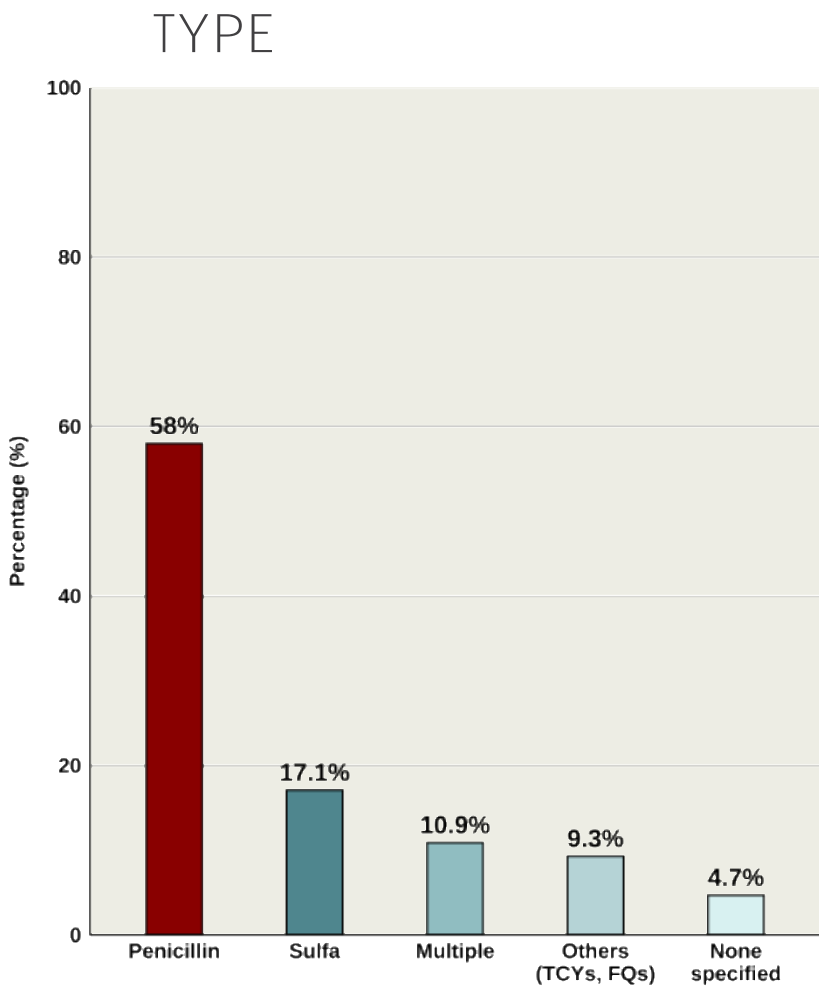


16 MINUTES (MEDIAN)

| Respondent characteristics. | | | |
|-----------------------------|-------|------------------------|-----|
| Age in years | 53±18 | | |
| Gender identity | | Urbanicity | |
| Male | 55% | Rural | 28% |
| Female | 44% | Suburban | 44% |
| Racial/Ethnic identity | | Urban | 29% |
| Hispanic | 27% | Educational attainment | |
| Non-Hispanic Black | 29% | ≤High School | 18% |
| Non-Hispanic White | 34% | College or Trade | 34% |
| Any other | 10% | ≥Bachelors | 48% |



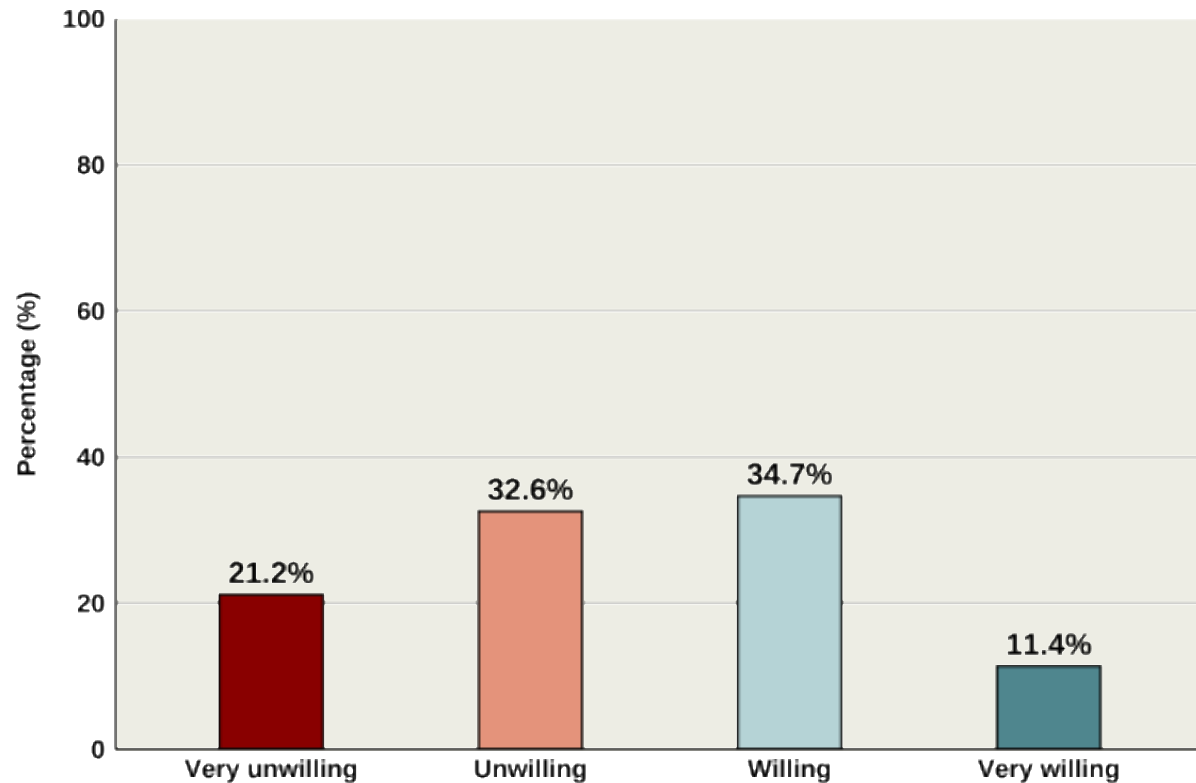
RESULTS: ALLERGY CHARACTERISTICS



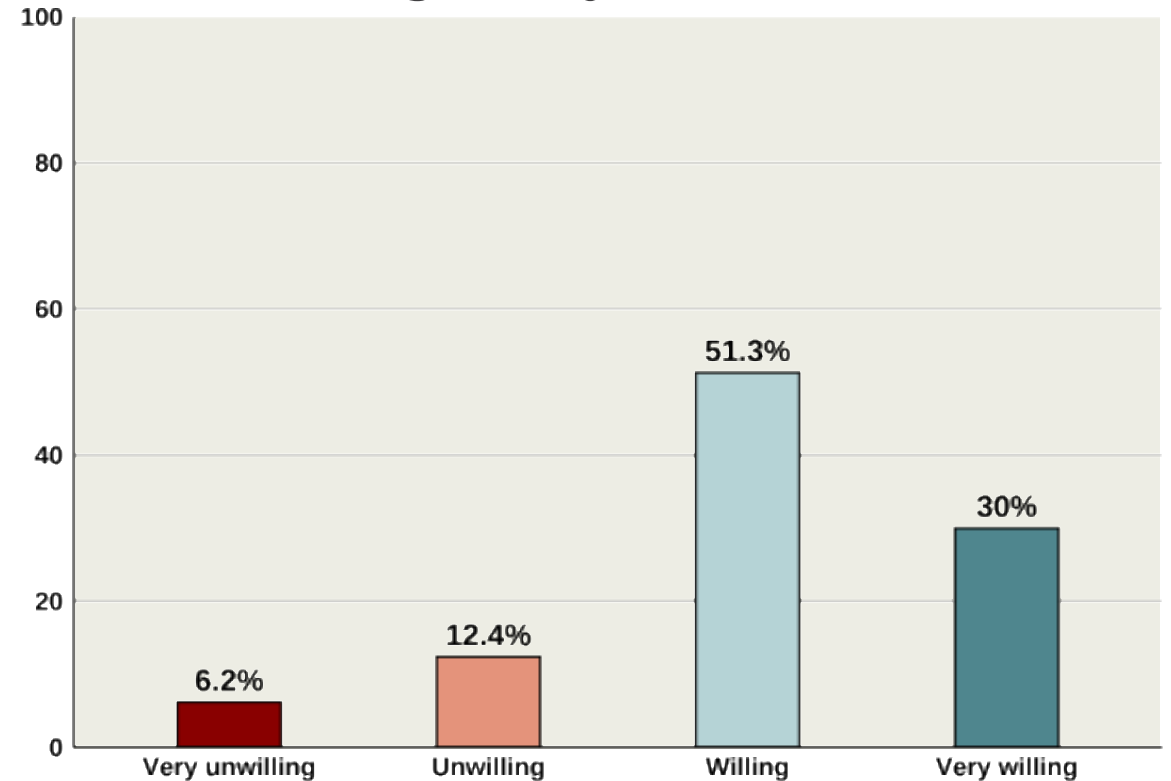
RESULTS: CHALLENGE PREFERENCES

SMALL DOSE VS. SKIN-SCRATCH TEST: To check whether you still have an allergy

46% willing to try a small dose

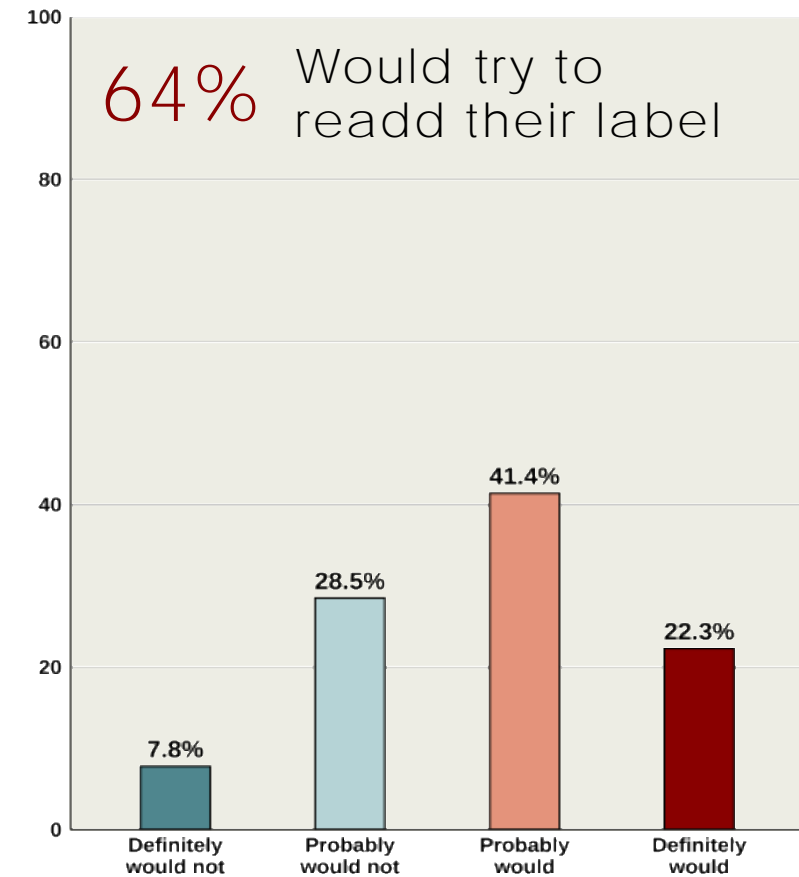
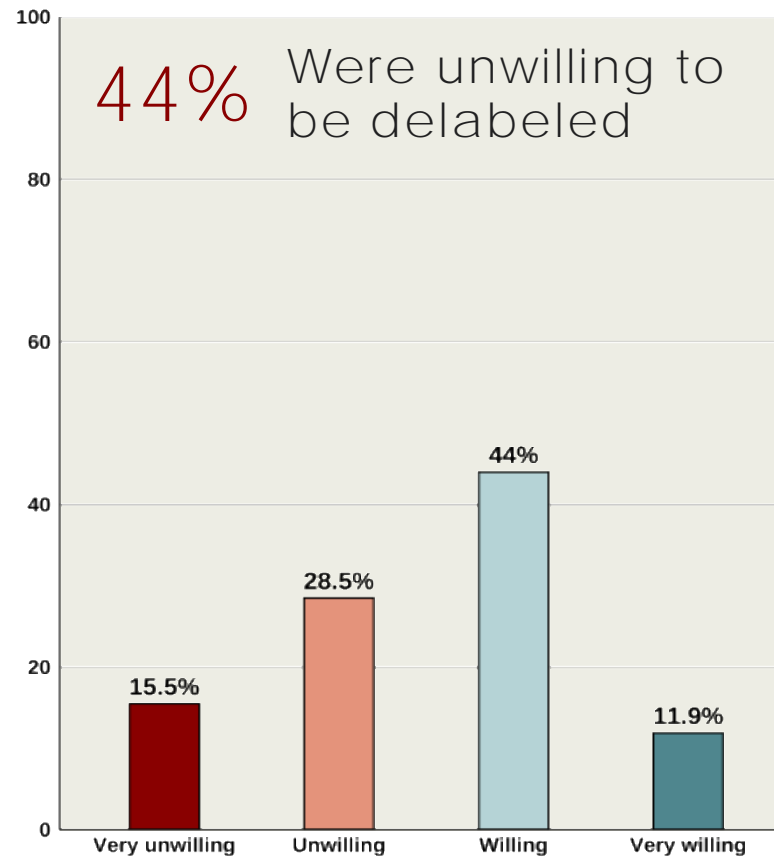
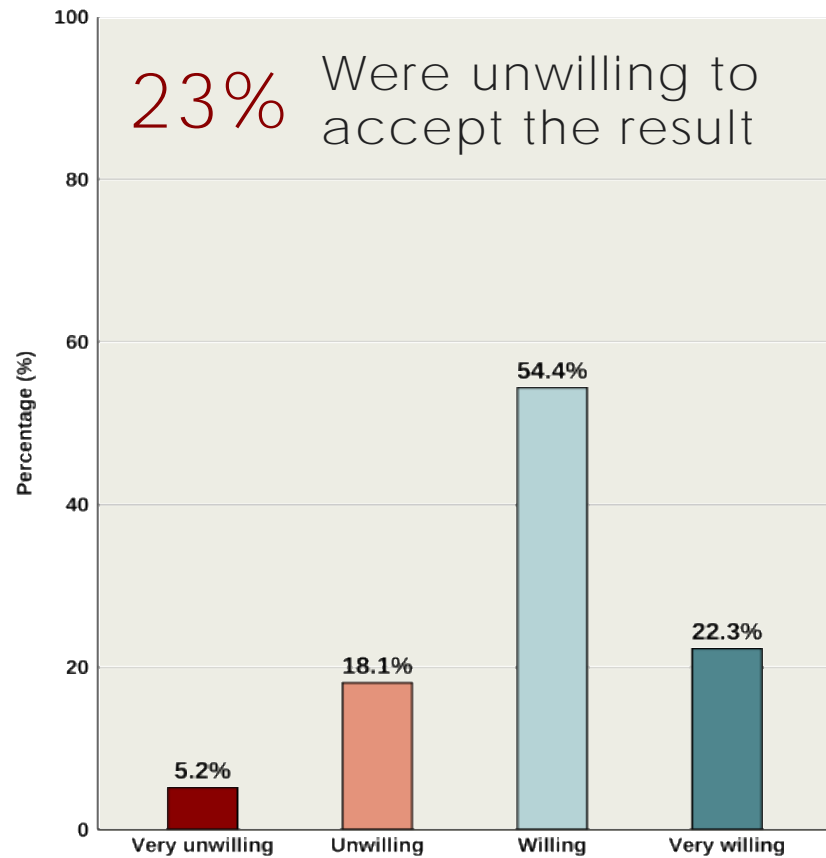


81% willing to try a skin test



RESULTS: DELABELING PREFERENCES

TEST RESULTS: If a doctor told you that you had a negative skin-test...



RESULTS:

“Test could have been altered”

“Could be a mistake in the test”

“I’m not willing to get hives again because a test says I am not allergic”

“I will still be afraid that regular doses might affect me”

“I **don’t feel** confident in **[couldn’t accept]** the test result”

“I’ve had an allergy for 65 years. **I’ll stick** with that result”

“Just to play it safe. I’d rather err on the side of caution”

“Because I do have allergies”

“It could always come back”



RESULTS: REGRESSION

Severity
"Severe" or
"Life-threatening"

Less willing to
have label
removed



More likely to try
to get their label
readded



Origin
"I was told by a
family member"

Less willing to try
a small dose



MM1
"I prefer to
take action"

More willing to
try a small dose



Knowledge
Higher scores
[out of 5 questions]

Small dose



Skin test



Label removed



RESULTS: KNOWLEDGE

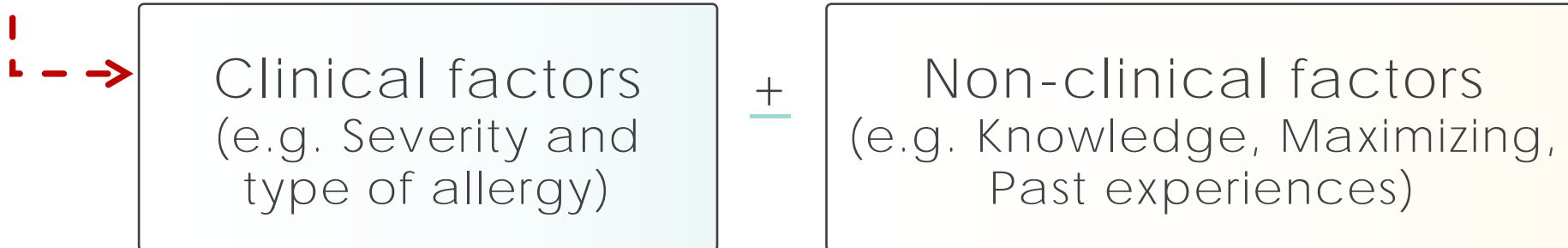
| | % answering correctly (n=193) |
|--|----------------------------------|
| For most people, an antibiotic allergy will go away over time. | 14.5 |
| Antibiotic allergies and antibiotic side effects are not the same thing. | 44.6 |
| Using alternative antibiotics for people with allergies puts them at increased risk of harms. | 38.0 |
| It is possible to test if a person is allergic to antibiotics | 63.2 |
| It is safe to remove a person's antibiotic allergy from their medical record if their test is negative | 33.3 |

CONCLUSIONS:

Many US adults with self-reported antibiotic allergies were hesitant about delabeling efforts

- 23% would not accept a negative result
- 44% would not want their label removed
- 64% would try to get it readded, if removed

Associations with...



CONCLUSIONS:

WHAT NEXT?

1) Improving public knowledge

- Allergy characteristics and epidemiology
- Risks assoc. with allergy labels & safety of delabeling

2) Need for tailored evidence-based strategies

- Patient needs
- Contexts (e.g. inpatient / public health messaging)

CONCLUSIONS:

WHAT NEXT?

1) **Meeting patients' evaluation preferences**

- Skin scratch > oral challenge

2) Possible strategies

- Maximize: Framing eval/test as an action
- Norms: Experiences of others like/important to them
- Trust/identity: Delabelling is positive/empowering

Psychological insights can enhance how we communicate antibiotic information by...

- 1) Identifying barriers to clinically appropriate antibiotic attitudes and preferences
 - Cognitive biases (e.g., action bias, information neglect)
 - Social influences
 - Healthcare experiences (e.g., trust, prior antibiotic use)
- 2) Informing strategies to help people understand the information they need to make better antibiotic decisions
 - Making the harms of overuse personal, meaningful, and intuitive
 - Normalizing uncertainty
 - Leveraging trust in HCWs
 - Highlighting positive social norms

THANK YOU: RESEARCH/MENTOR TEAM



Julia E
Szymczak, PhD

University of Utah
Department of
Internal Medicine



Rachael A
Lee, MD

University of Alabama
at Birmingham
Division of Infectious
Disease



Valerie M
Vaughn, MD

University of Utah
Department of
Internal Medicine



Angela
Fagerlin, PhD

University of Utah
Department of
Population Health
Sciences

COMMUNICATING WITH PATIENTS ABOUT ANTIBIOTICS

THANK YOU



Alistair Thorpe, PhD

Research Assistant Professor
Population Health Sciences

Alistair.Thorpe@hsc.utah.edu

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