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Germs are Germs and Why Not Take a Risk?

Perception of Bottom-Line Gists and the Relationship to Antibiotics Prescribing Behaviors

David A. Broniatowski

Engineering Management and Systems Engineering

The George Washington University

Based on work performed with Eili Y. Klein (Johns Hopkins University and Center for Disease Dynamics and Policy) & Valerie F. Reyna (Cornell University)

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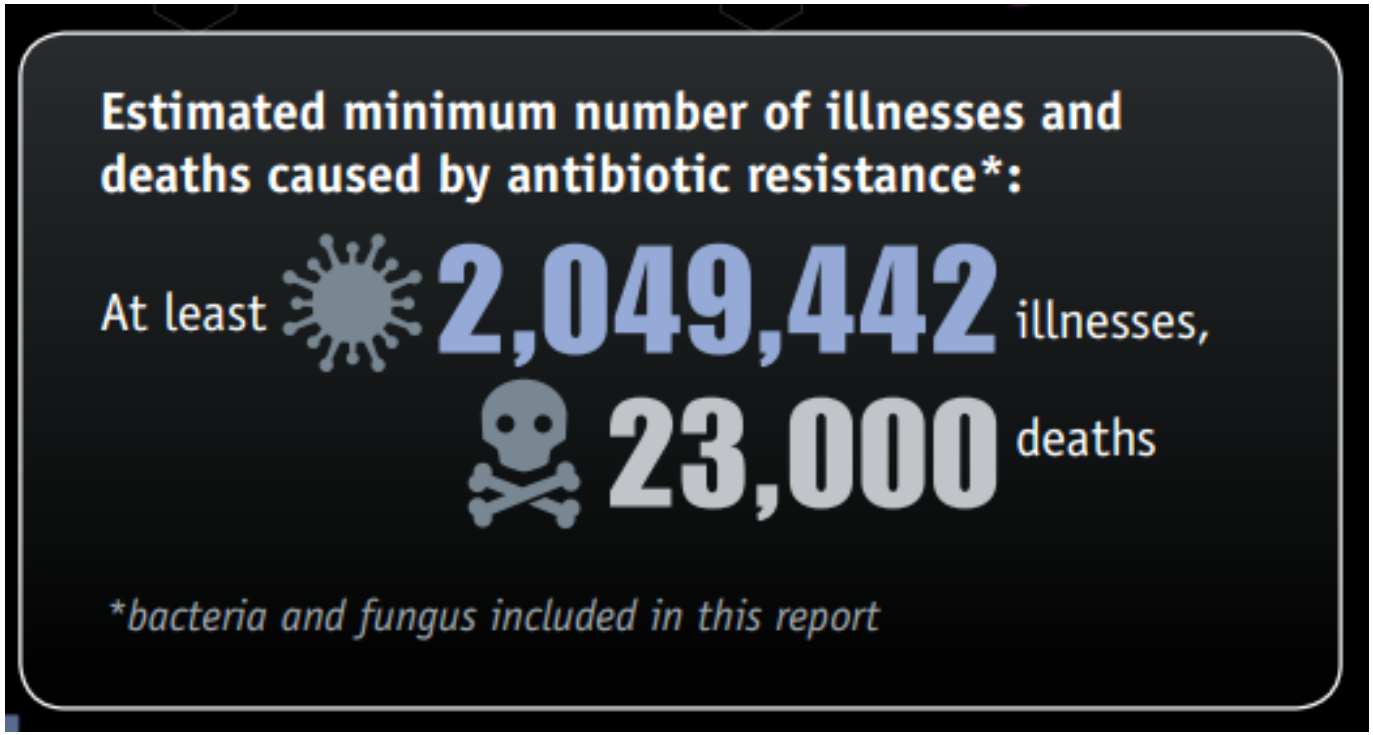
Conflicts of Interest

- I, Dr. David A. Broniatowski have a financial interest in Eli Lilly and Company, a manufacturer of antibiotics, which is a topic under discussion today.

Agenda

- Background
  - antibiotic resistance
  - patients' expectations
  - Fuzzy-Trace Theory
- Hypotheses
  - Germs are Germs
  - Why not Take a Risk?
- Methods: Survey of patients in ED
- Results: Emphasize categorical gist
- Implications

Antibiotic Resistance: a growing threat



United States
population 300m

>23,000 deaths

>2.0m illnesses

Overall societal costs
Up to $20 billion direct
Up to $35 billion indirect

Source: US CDC 2013

Centers for Disease Control 2013. Slide credit: EY Klein

Background: Patients' Expectations Drive Prescribing

- Patient satisfaction is a major driver of prescribing (Stearns et al., 2009)
- Physicians prescribe based on beliefs regarding patients' expectations
  - Yet physicians are often unable to accurately judge patients' expectations
- Patients are even more satisfied, and diagnoses are more accurate, when expectations are clear and physicians address them
  - Butler et al., 1998; Shapiro, 2002; Ong et al., 2007

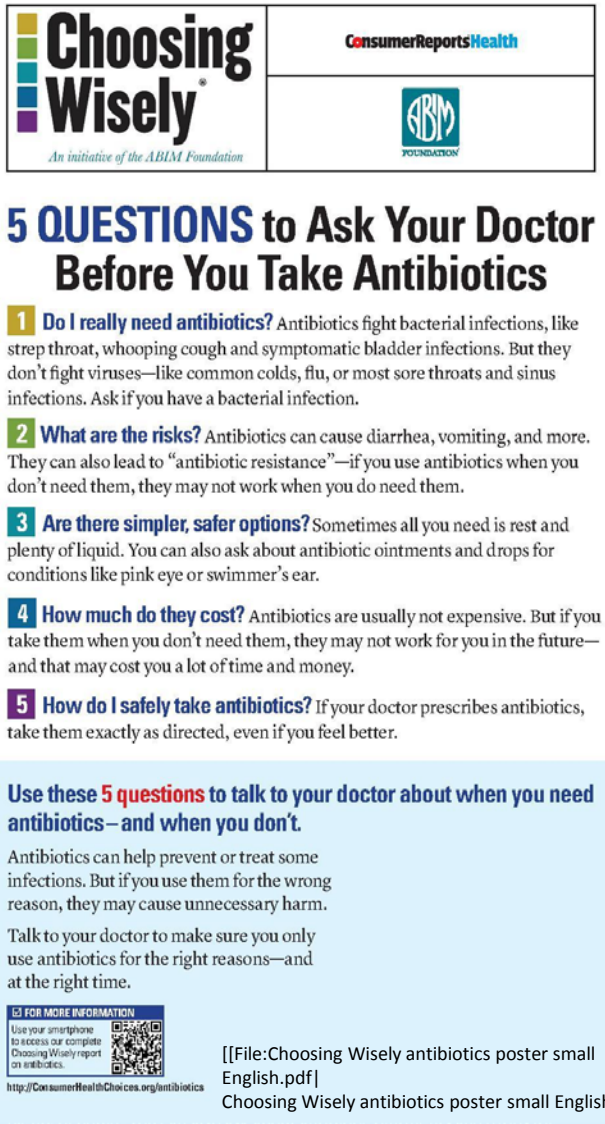
Background: How are patients' expectations formed?

- What do antibiotics mean to patients?
  - Do patients conflate antibiotics with "treatment" in general? (Butler et al., 1998)
  - Do antibiotics make the time, and effort, of a trip to the hospital "worth it" to the patient? (Stearns et al., 2009)
- Fuzzy Trace Theory (e.g., Reyna, 2008)
  - Explains medical decision-making under risk
  - Decisions are based on meanings derived from information given

By CDC / Provider: Don Stalons (phil.cdc.gov) [Public domain], via Wikimedia Commons

Background: Fuzzy Trace Theory

- Key concept: multiple types of mental representations are encoded into memory simultaneously
  - Verbatim: Precise/metric representation – "If I take antibiotics, there is a 0.1% chance of negative side effects."
  - Gist: Qualitative/categorical representation – "If I take antibiotics, mostly nothing bad will happen"
  - Gist captures bottom-line meaning to the patient
- When possible, patients prefer to rely on categorical gist instead of verbatim calculation



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5 QUESTIONS to Ask Your Doctor Before You Take Antibiotics

1 **Do I really need antibiotics?** Antibiotics fight bacterial infections, like strep throat, whooping cough and symptomatic bladder infections. But they don't fight viruses—like common colds, flu, or most sore throats and sinus infections. Ask if you have a bacterial infection.

2 **What are the risks?** Antibiotics can cause diarrhea, vomiting, and more. They can also lead to "antibiotic resistance"—if you use antibiotics when you don't need them, they may not work when you do need them.

3 **Are there simpler, safer options?** Sometimes all you need is rest and plenty of liquid. You can also ask about antibiotic ointments and drops for conditions like pink eye or swimmer's ear.

4 **How much do they cost?** Antibiotics are usually not expensive. But if you take them when you don't need them, they may not work for you in the future—and that may cost you a lot of time and money.

5 **How do I safely take antibiotics?** If your doctor prescribes antibiotics, take them exactly as directed, even if you feel better.

Use these 5 questions to talk to your doctor about when you need antibiotics – and when you don't.

Antibiotics can help prevent or treat some infections. But if you use them for the wrong reason, they may cause unnecessary harm.

Talk to your doctor to make sure you only use antibiotics for the right reasons—and at the right time.

FOR MORE INFORMATION
Use your smartphone to access our complete Choosing Wisely report on antibiotics.
http://ConsumerHealthChoices.org/antibiotics

[[File:Choosing Wisely antibiotics poster small English.pdf|
Choosing Wisely antibiotics poster small English]]

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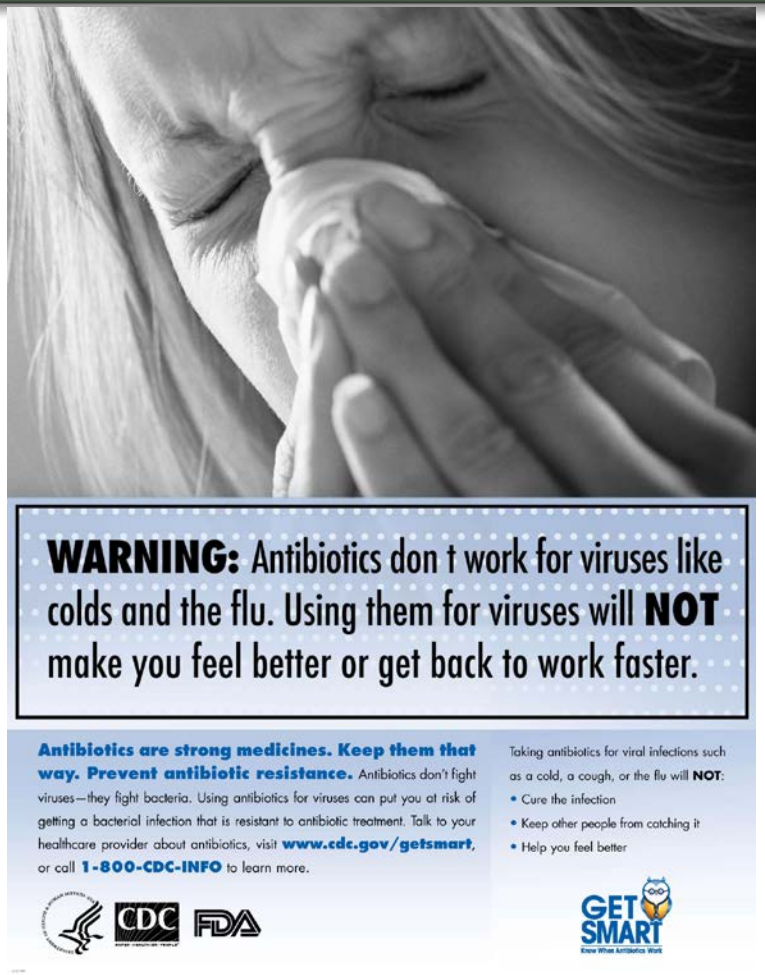
Hypotheses: Germs are Germs

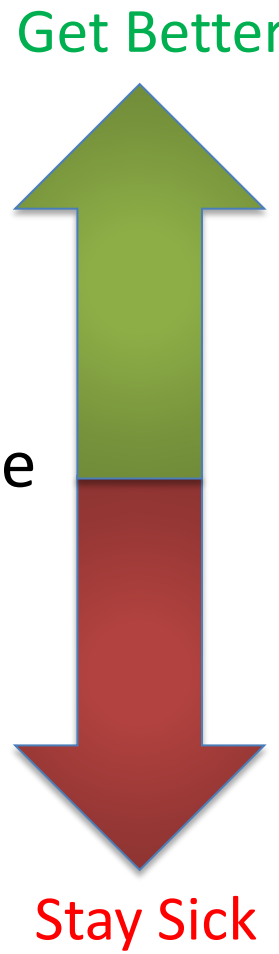
- Patients don't know the difference between bacteria and viruses (e.g., Reyna & Adam, 2003; Adam & Reyna, 2005)
  - Therefore, they assume that antibiotics work against viruses
  - E.g., CDC's "Get Smart" program
- If true, educating patients about the difference between viruses and bacteria should reduce their expectations for antibiotics



By United States Centers for Desease Control and Prevention (Get Smart: Posters) [Public domain], via Wikimedia Commons

Hypotheses: Why Not Take a Risk?

- Motivated by Fuzzy Trace Theory
- Status quo: patient is already sick
- Two options
  1. Stay sick for sure (by avoiding antibiotics)
  2. Maybe stay sick; maybe get better (by taking antibiotics)
- Getting better is preferred over staying sick, so choose antibiotics
- Underlying assumptions:
  - There is some chance that antibiotics could make them feel better (see also the anti-inflammatory property of some ABX)
  - Antibiotics are essentially harmless to the individual



Methods: Survey

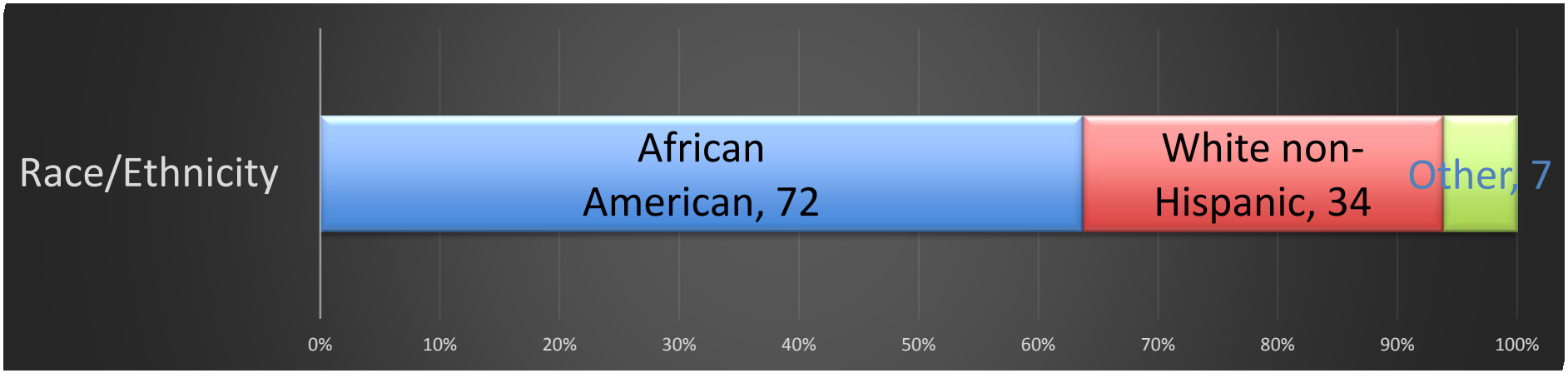
- We administered a paper survey between January and April 2013
  - Emergency Department of large urban hospital
  - Level 1 trauma center
  - Predominantly African American community
- Survey administered anonymously to patients presenting to ED after they were seen by physician but prior to discharge
- Eligibility criteria:
  - 18+ years old
  - Patients capable of responding (lucid, could understand English)
  - No incentives offered
- Protocol approved under Johns Hopkins University School of Medicine IRB (IRB-X #NA_00081478)

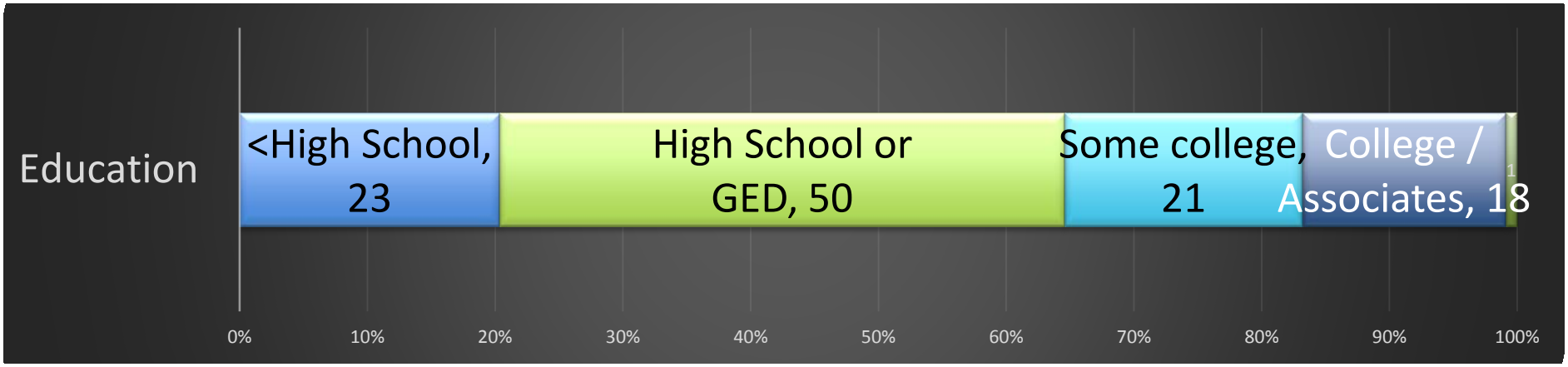
Johns Hopkins Hospital
IMAGE: KEITH WELLER / JHMI

Methods: Survey Items

- 17 5-point Likert-scale items designed to test:
  - **Correct knowledge**: e.g., “Antibiotics work against bacteria”
  - **Germs are Germs**: e.g. “Antibiotics work against viruses”
  - **Why Not Take a Risk**?: e.g., “I don’t know if antibiotics will make me better, but it’s better to be safe than sorry so I should take them”
  - **Antibiotics Might Have Side Effects**: e.g., “Antibiotics might have side effects so I should only take them when I know they will work.”
  - Other hypotheses, e.g., ”Antibiotics Will Make me Better,” “Doctors Are Supposed to Give Antibiotics,” “Getting Antibiotics Makes Going to the Doctor Worth It,” etc. (Butler et al., 1998)
- Statistics: Exploratory factor analysis with 3 factors retained
- 2 free-response questions + demographics

Sample: 113 patients (age roughly uniform)





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Results: Knowledge regarding antibiotics

- Patients know that antibiotics work against bacteria
  - 84 (75%) patients displayed some correct knowledge
- But misconceptions are widespread
  - 48 (42%) patients agreed that antibiotics work against viruses
  - Free response question: “What is the difference between bacteria and viruses?”
    - 45 (40%) patients said they did not know the difference between bacteria and viruses and 33 (29%) patients reported misconceptions of factual inaccuracies
- No differernce in any results if patients had flu-like symptoms (19%) vs. trauma (62%)

By United States Centers for Desease Control and Prevention (Get Smart: Posters) [Public domain], via Wikimedia Commons

"Why Not Take a Risk?" is more widespread than, and distinct from, "Germs are Germs"

- 86 (76%) patients endorsed at least one item supporting "Why Not Take a Risk?"
  - Items captured unique variance in factor analysis
  - We found no correlation between this gist and education
- Less than half -- 54 (48%) -- of patients endorsed at least one item supporting "Germs are Germs"
  - More educated patients were less likely to agree that antibiotics work against viruses
- Of the 81 (72%) patients that disagreed with "germs are germs," 61 (75%) agreed with at least one item endorsing "why not take a risk?"
  - These two gists are only weakly correlated (r=0.16)
- **Implications: Current public health campaigns may not address the most widespread rationale for antibiotic use.**

"Why Not Take a Risk?" is distinct from concern about Side Effects

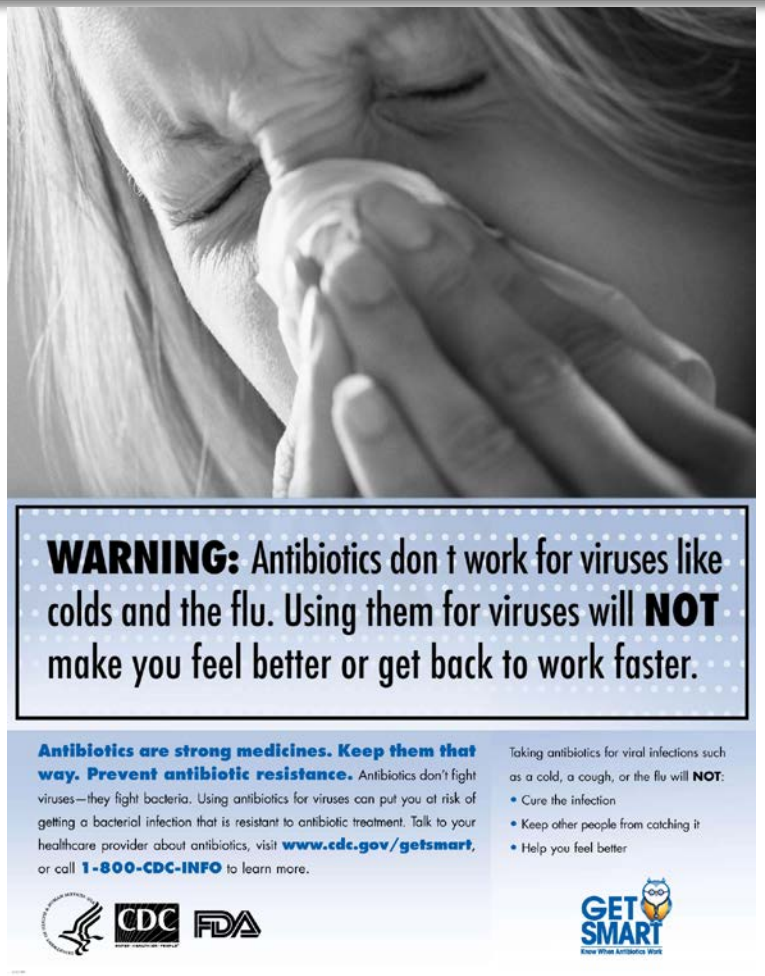
- 75 (66%) patients agreed that antibiotics might have harmful side effects
  - Of these, 52 (69%) agreed with at least one item endorsing "why not take a risk?"
  - These two gists are also only weakly correlated (r=0.12) and load on separate dimensions in factor analysis
- Two separate dimensions of risk
  - **Side effects: Addresses perception of downside risk**
  - **Why Not Take a Risk: Addresses perception of upside gain**

Implications for Educational Interventions

- Many patients endorse a strategy that treats risk categorically, thus promoting antibiotic use
- Antibiotic use boils down to a choice between:
  1. Don't take antibiotics and **stay sick for sure**
  2. Take antibiotics and **maybe stay sick**, **but** **maybe get better**
- Given this representation, option 2 will be chosen

Implications for Educational Interventions

- "Germs are Germs" is an important and widespread misconception
  - However, fewer than half the patients in our sample agreed that antibiotics work against viruses
- A large majority of patients who reject "germs are germs" still endorse "why not take a risk?"
- Conveying the differences between bacteria and viruses may not be perceived as relevant to patients' decisions about antibiotic use.



Implications for Educational Interventions

- Educating patients about side effects and adverse events associated with antibiotic use may contribute to behavior change
- However, a two-pronged approach may be more effective: Patient education strategies must communicate that:

1. Risks associated with antibiotic use are qualitatively worse than being sick
2. There are virtually no benefits associated with antibiotic use

- These communications are most likely to be effective if they are categorical; not statistical in nature.

Limitations and Future Work

- Our study is representative of an urban, low SES ED patient population, but it is not nationally representative.
- The sickest patients and those experiencing the most pain were less likely to be responsive an more likely to be excluded.
- Our analysis was not limited to those most likely to expect antibiotics (those with cold- and flu-like symptoms)
  - Most patients expressed some level of support for antibiotic use regardless of current complaint
- We measured beliefs and attitudes; not changes in behavior.
  - However, beliefs and attitudes are known to predict behavior.
  - Future work will explicitly measure patient behavior changes.

Conclusions

- Patient educational interventions may be more effective if they explicitly address patients' strategic gist: **why not take a risk**.
- When healthcare providers have made the determination that antibiotics are not indicated they should:
  - Communicate that **antibiotics can hurt**
  - Communicate that **they will not help**