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

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

Estimated minimum number of illnesses and deaths caused by antibiotic resistance*:

At least 🎈 2,049,442 illnesses,

💀 23,000 deaths

*bacteria and fungus included in this report

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
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
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
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)
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)

Race/Ethnicity:
- African American, 72
- White non-Hispanic, 34
- Other, 7

Education:
- <High School, 23
- High School or GED, 50
- Some college, 21
- College / Associates, 18
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 difference in any results if patients had flu-like symptoms (19%) vs. trauma (62%)
“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 and 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