“Nudging” Clinicians to Improve Antibiotic Stewardship in Primary Care

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Nudging Clinicians to Improve Antibiotic Stewardship in Primary Care

Mark W. Friedberg, MD, MPP

@MWFriedberg
How can we help clinicians avoid antibiotic overuse?

- Help them use behavioral insights (behavioral economics, psychology) to create effective nudges

  A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. ... Putting fruit at eye level counts as a nudge.

  —Thaler and Sunstein, 2008

- Psychology and design can be useful
Psychology: identify the leverage points for individual clinicians

- Professionalism: wanting to do the right thing for patients
- Desire to appear consistent over time
- Pride: wanting to be the best doctor around
  - vs own ideal ("self-concept maintenance")
  - vs peers
  - avoid embarrassment
Design: Understand what environmental factors create opportunities

• A good nudge makes it ridiculously easy to do the right thing, relative to not doing the right thing

• Removing a bad nudge: probably as effective as creating a good nudge

• Where are the bad nudges? What makes it harder for clinicians to do the right thing?
Bad nudges

• EHR design
  – Everything is hard (almost)
  – Many, many haphazard/unintended nudges

• Tyranny of the clock
  – Nudges clinicians into “system 1” thinking: fast, instinctual decision making
Empirical questions

• Are clinicians nudgable? How much?
  – If so, how can nudges improve care?

• What kinds of nudges are best?
  – Does this vary by objective sought?

• How long should nudges be applied?

• How many nudges can we apply simultaneously?
  – Does it depend on the type of nudge?

• Nearly all of these are open questions
Three randomized trials of physician nudges

- **Meeker et al. JAMA Intern Med 2014**
  
  **Original Investigation**

  Nudging Guideline-Concordant Antibiotic Prescribing
  A Randomized Clinical Trial

  Daniella Meeker, PhD; Tara K. Knight, PhD; Mark W. Friedberg, MD, MPP; Jeffrey A. Linder, MD, MPH;
  Noah J. Goldstein, PhD; Craig R. Fox, PhD; Alan Rothfeld, MD; Guillermo Diaz, MD; Jason N. Doctor, PhD

- **Tannenbaum et al. JGIM 2014**
  
  **Nudging Physician Prescription Decisions by Partitioning the Order Set: Results of a Vignette-Based Study**

  David Tannenbaum, PhD, Jason N. Doctor, PhD, Stephen D. Persell, MD, MPH, Mark W. Friedberg, MD, MPP,
  Daniella Meeker, PhD, Elisha M. Friesema, BA, Noah J. Goldstein, PhD, Jeffrey A. Linder, MD, MPH,
  and Craig R. Fox, PhD

- **Meeker et al. JAMA 2016**
  
  **Original Investigation**

  Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices
  A Randomized Clinical Trial

  Daniella Meeker, PhD; Jeffrey A. Linder, MD, MPH; Craig R. Fox, PhD; Mark W. Friedberg, MD, MPP;
  Stephen D. Persell, MD, MPH; Noah J. Goldstein, PhD; Tara K. Knight, PhD; Joel W. Hay, PhD; Jason N. Doctor, PhD
Antibiotic overprescribing is bad

• No benefits

• Frequent harms
  – Diarrhea, yeast infection, rash, etc.

• Antibiotic resistance

• Acute respiratory infections: most common antibiotic prescriptions in the United States
  – 50% of antibiotic prescriptions for adults
  – 75% for children
RCT #1: Public commitment posters

- 5 clinics, 14 clinicians
- ~1000 patients with acute respiratory infections
- Intervention: poster-sized commitment letters in exam rooms for 12 weeks
- Theory:
  - People are likely to follow through on public commitments
  - Professionalism
Public commitment for weight loss

Public Commitment as a Motivator for Weight Loss

Prashanth U. Nyer
Chapman University

Stephanie Dellande
University of New Orleans

Figure 2. The effect of public commitment on weight loss.

I'm running 8 miles on Saturday and riding my bike 50 miles on Monday. Hoping if I put these things out there, that they will actually happen. :)

State your own workout goals below. Let's help hold each other accountable through the holiday weekend.
Safe Antibiotic Use:
A Letter From Your Medical Group

Dear Patient,

We want to give you some important information about antibiotics.

Antibiotics, like penicillin, fight infections due to bacteria that can cause some serious illnesses. But these medicines can cause side effects like skin rashes, diarrhea, or yeast infections. If your symptoms are from a virus and not from bacteria, you won't get better with an antibiotic, and you could still get these bad side effects.

Antibiotics also make bacteria more resistant to them. This can make future infections harder to treat. This means that antibiotics might not work when you really need them. Because of this, it is important that you only use an antibiotic when it is necessary to treat your illness.

How can you help? Carefully follow your doctor's instructions. He or she will tell you if you should or should not take antibiotics.

When you have a cough, sore throat, or other illness, your doctor will help you select the best possible treatments. If an antibiotic would do more harm than good, your doctor will explain this to you, and may offer other treatments that are better for you.

Your health is very important to us. As your doctors, we promise to treat your illness in the best way possible. We are also dedicated to avoiding prescribing antibiotics when they are likely to do more harm than good.

If you have any questions, please feel free to ask your doctor, nurse, or pharmacist.

Sincerely,

[Signatures]

El Uso Seguro de Antibióticos:
Una Carta de su Grupo Médico

Estimado Paciente:

Queremos compartir información importante con usted sobre los antibióticos.

Los antibióticos como la penicilina ayudan a combatir infecciones debido a bacterias que pueden causar serias enfermedades. Pero estas medicinas también tienen efectos secundarios como erupciones de la piel, diarrea, o infecciones por hongos de levadura. Si sus síntomas son debidos a un virus y no por una bacteria, no se mejorará con un antibiótico, y usted aún puede obtener estos efectos secundarios no deseados.

Los antibióticos también pueden hacer la bacteria más resistente a ellas. Esto hará que infecciones en el futuro sean más difíciles de tratar. Eso significa que los antibióticos no trabajarán cuando ustedes en realidad necesitan que funcionen. Por esto, es importante que usted sólo use un antibiótico cuando sea necesario para su enfermedad.

¿Cómo puede usted ayudar? Siga las indicaciones de su doctor. Él o ella le dirá si debe o no tomar antibióticos.

Cuando usted tenga una tos, garganta irritada, u otra enfermedad, su doctor le ayudará a escoger el mejor tratamiento posible. Si un antibiótico haría más daño que bien, su doctor le explicará esto y tal vez le ofrecerá otros tratamientos que sean mejor para usted.

Su salud es importante para nosotros. Como sus doctores, nosotros prometemos tratar su enfermedad en la mejor manera posible. También nos comprometemos a evitar recetar antibióticos cuando sean probables de hacer más daño que bien.

Si tiene cualquier pregunta, pregúntele a su doctor, enfermera, o farmacéutico.

Atentamente,
Posters were associated with lower inappropriate antibiotic prescribing

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Poster Condition</th>
<th>Control Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline (95% CI)</td>
<td>Baseline (95% CI)</td>
</tr>
<tr>
<td>Inappropriate prescribing rate, % (95% CI)</td>
<td>43.5 (38.5 to 49.0)</td>
<td>42.8 (38.1 to 48.1)</td>
</tr>
<tr>
<td>Absolute percentage change, baseline to final measurement (95% CI)</td>
<td>−9.8 (0.0 to −19.3)</td>
<td>9.9 (0.0 to 20.2)</td>
</tr>
<tr>
<td>Difference in differences between poster condition and control (95% CI)</td>
<td>−19.7 (−5.8 to −33.04)^b</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: ARI, acute respiratory infection.

^b P=0.02 for the difference.

^a Adjusted for demographic characteristics and insurance status.

• Promising. Replication would be good…

• CDC, New York State Department of Public Health have rolled this out
Doctors: Who else has asked you to sign a pledge in the last couple of years?

Dear Colleague,

I am asking for your help to solve an urgent health crisis facing America, the opioid epidemic. Everywhere I travel, I see communities devastated by opioid overdoses. I meet families not allowed to seek treatment for addiction. And I will never forget my own patient whose opioid use disorder began with a course of morphine after a routine procedure.

It is important to recognize that we arrived at this place on a path paved with good intentions. Nearly two decades ago, we were encouraged to be more aggressive about treating pain, often without enough training and support to do so safely. This coincided with heavy marketing of opioids to doctors. Many of us were even taught — incorrectly — that opioids are not addictive when prescribed for legitimate pain.

The results have been devastating. Since 1999, opioid overdose deaths have quadrupled and opioid prescriptions have increased markedly — double even for every adult in America to have a bottle of pills. Yet the amount of pain reported by Americans has not changed. Now, nearly two million people in America have a prescription opioid use disorder, contributing to increased hospital use and the spread of HIV and Hepatitis C.

I know asking this problem will not be easy. We offer struggle to balance reducing our patients’ pain with increasing their risk of opioid addiction. But, as clinicians, we have the unique power to help end this epidemic. As cynical as it may sound, the public still looks to our profession for hope during difficult moments. This is one of those times.

That is why I am asking you to pledge your commitment to turn the tide on the opioid crisis. Please take the pledge at www.TurnTheTideOn.org. Together, we will build a national movement of clinicians to do three things.

First, we will educate ourselves to treat pain safely and effectively. A good place to start is the CDC Opioid Prescribing Guidelines. Second, we will screen our patients for opioid use disorder and provide or connect them with evidence-based treatment. Third, we can shape how the rest of the country sees addiction by talking about and treating it as a chronic illness, not a moral failing.

Yours from now, I want us to look back and know that, in the face of a crisis that threatened our nation, it was our profession that stepped up and led the way. I know we can succeed because health care is more than an occupation to us. It is a calling in empathy, science, and service to humanity. These values unite us. They remain our greatest strength.

Thank you for your leadership.

Vivek H. Murthy

August 2016

[Image of United States Surgeon General]

Our Pledge

As health care professionals, we believe we have the unique power to end the opioid crisis. We pledge to:

1. Educate ourselves to treat pain safely and effectively.

2. Screen our patients for opioid use disorder and provide or connect them with evidence-based treatment.

3. Talk about and treat addiction as a chronic illness, not a moral failing.

By signing the pledge, you'll also be joining our contact list to stay connected as we #TurnTheTide.
**RCT #2: Order set partitioning**

- 166 primary care providers
- Vignette-based study (no actual patients!)
- Randomized to 1 or 2 menu partitions for
  - Broad vs narrow-spectrum antibiotics
  - Over-the-counter vs prescription meds
- Theory:
  - Grouping influences choice under conditions of uncertainty

Nudging Physician Prescription Decisions by Partitioning the Order Set: Results of a Vignette-Based Study

David Tannenbaum, PhD¹, Jason N. Doctor, PhD², Stephen D. Persell, MD, MPH³
Mark W. Friedberg, MD, MPP⁴,⁵,⁶, Daniella Meeker, PhD⁷, Elisha M. Friesema, BA³,⁸
Noah J. Goldstein, PhD⁹, Jeffrey A. Linder, MD, MPH⁴,⁹, and Craig R. Fox, PhD⁷
Partitioning effects on wine menus

How Subjective Grouping of Options Influences Choice and Allocation: Diversification Bias and the Phenomenon of Partition Dependence

Craig R. Fox
University of California at Los Angeles

Rebecca K. Ratner
University of North Carolina at Chapel Hill

Daniel S. Lieb
Duke University

![Graph showing the comparison between grape partition and region partition in wine selections.](image)
Partitioning effects on wine menus

Having knowledge and being certain are associated with resistance to partitioning
A 40-year-old otherwise healthy man presents with recent onset of pain and redness involving the skin of his lower right leg and foot. Physical exam reveals a low-grade fever and fissures between the toes. There is tender edema and erythema extending from the dorsal surface of the right foot to the right pretibial area.

Narrow-spectrum medications grouped:

Which one of the following antibiotics would you choose to treat this patient?

- □ amoxicillin-clavulanate
- □ azithromycin
- □ cefadroxil
- □ cefuroxime
- □ clindamycin
- □ moxifloxacin

Narrower-spectrum antibiotics:
- □ cephalexin □ dicloxacillin □ erythromycin □ penicillin V

Narrow-spectrum medications listed individually:

Which one of the following antibiotics would you choose to treat this patient?

- □ cephalexin
- □ dicloxacillin
- □ erythromycin
- □ penicillin V

Broader-spectrum antibiotics:
- □ amoxicillin-clavulanate □ azithromycin □ cefadroxil □ cefuroxime □ cefadroxil □ cefuroxime □ clindamycin □ moxifloxacin
Partitioning had significant effects

- In general, individually-listed treatments were chosen more frequently
- Opportunities for EHR design
- Doesn’t require clinician awareness that nudge exists
The big RCT: 3 interventions, large sample

- 47 clinics, 248 primary care providers, >30K patient visits, 3 EHRs

- 2x2x2 factorial design, 18 months pre- and post-intervention:
  - Suggested alternatives
    - Injunctive norm, distract from undesired option
  - Accountable justifications
    - Reputation effects, system 1 → system 2
  - Peer comparisons to top performers in same clinic
    - Social norm
Suggested alternatives

Over-the-counter medications

Decongestants

- Pseudoephedrine HCL (SUDAFED) 30 MG TABS
  Two tablets every 6 hours as needed for nasal congestion. Dispense 50, Refills 0.
- Oxymetazoline HCI (AFRIN SINUS) 0.05% SOLN
  One or two sprays in each nostril twice a day or as needed, but no more frequently than every 6 hours. Do not use for more than 3 days. Dispense 1 bottle, Refills 0.

Antihistamines

- Loratadine 10 MG TABS
  One tablet by mouth once a day as needed. Dispense 30, Refills 0.
- DiphenhydramINE 25 MG TABS
  Take one or two tablets by mouth every 4 to 6 hours as needed, not to exceed 6 doses in 24 hours. Dispense 24, Refills 0.

Analgesics and antipyretics

- Ibuprofen 200 MG TABS
  One or two tablets by mouth every 6 hours as needed for aches and pains due to colds or sore throat or to reduce fever. Dispense 50, Refills 0.
- Acetaminophen 500 MG TAB
  One or two tablets by mouth every 6 hours as needed for aches and pains due to colds or sore throat or to reduce fever. Do not take more than 8 pills (4000 MG) in one day. Dispense 50, Refills 0.
- Menthol (CEPACOL SORE THROAT) 3MG LOZG
  Allow 1 lozenge to dissolve slowly in the mouth; may be repeated every 2 hours as needed for up to 2 days. Dispense 18, Refills 0.

Cough suppressants and expectorants

- Guaiifenesin-DM 100-10 MG/5ML SYRUP
  One or two teaspoons every 4 hours as needed for cough. Dispense 1 bottle, Refills 0.
- Guaiifenesin 200 MG TABS
  One or two tablets every 4 hours as needed for cough. Dispense 100, Refills 0.

Prescription medications

- Ipratropium Bromide (ATROVENT) 0.06% SOLN
  Two sprays each nostril 4 times a day as needed for runny nose and sneezing for up to 4 days.
- Ibuprofen 600 MG TABS
  One tablets by mouth every 6 hours as needed for aches and pains due to colds or sore throat or to reduce fever. Dispense 28, Refills 0.
- GUAIFENESIN-CODEINE (CHERATUSSIN AC) 100-10 MG/5ML SYRUP
  One or two teaspoons every 4 hours as needed for cough. Dispense 180 ML, Refills 0.
- Benzonatate (TESSALON PERLES) 100 MG CAPS.
  One capsule every 4 hours as needed for cough. Do not take more than 6 capsules in 1 day. Dispense 30, Refills 0.
- ALBUTEROL HFA 108 (90 BASE) MCC/ACT AERS
  One or two inhalations every 6 hours as needed for cough. Dispense 1 inhaler, Refills 0.

Patient information (will appear in patient instructions)

- About Non-Specific Upper Respiratory Infection or “Common Cold”

Fired in gray areas: Tailored prompts for acute pharyngitis and acute sinusitis
Accountable justifications

Fired in gray areas: Prompts for acute pharyngitis and acute sinusitis gave the guidelines for prescribing antibiotics
Peer comparisons

Did NOT fire in gray areas: applied to nonspecific URI and acute bronchitis only
2 of 3 interventions significantly reduced inappropriate antibiotic prescribing

- No significant interactions between interventions
Then we turned off the nudges
One interpretation: Bad habits die hard
Nudging physicians

- New field: replicate studies, evaluate implementations
- Offers ability to engage in gray areas, away from lamppost
- EHRs are attractive platforms
- Design details are critical
  - My advice: always involve front-line clinicians when designing nudges
- Ethical concerns
  - Like any tool, can be used for good or bad purposes
  - Guidance needed
Thank you

Contact:
Mark Friedberg, MD, MPP
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@MWFriedberg
QIN-QIO’s Commitment Poster

Safe Antibiotic Use

Your health is important. We promise to treat your illness in the best way possible.

We will not give you antibiotics when they might do more harm than good. Antibiotics:

- only fight infections caused by bacteria
- should only be used when needed
- can give you a skin rash, diarrhea, a yeast infection, or worse

If your symptoms are from a virus, antibiotics will not help you feel better and may cause side effects. If an antibiotic is not needed, we will explain this to you and offer treatments that are better for you.

If you have any questions, please feel free to ask us.

Sincerely,
Your Medical Team

Bacteria or Viruses: What’s got you sick?

Bacteria
- Strep throat
- Whooping cough
- Urinary tract infection

Antibiotics? Yes

Bacteria or Virus
- Sinus infection
- Middle ear infection
- Bronchitis/chest cold (in otherwise healthy children and adults)

Antibiotics? Ask your doctor

Viruses
- Common cold/ runny nose
- Sore throat (except strep)
- Flu

Antibiotics? No

You can find this resource at the link below:

http://www.healthcarefornewengland.org/initiatives/med-safety/as/as-resources/
A Commitment to Our Patients About Antibiotics

Antibiotics only fight infections caused by bacteria. Like all drugs, they can be harmful and should only be used when necessary. Taking antibiotics when you have a virus can do more harm than good; you will still feel sick and the antibiotic could give you a skin rash, diarrhea, a yeast infection, or worse.

Antibiotics also give bacteria a chance to become more resistant to them. This can make future infections harder to treat. It means that antibiotics might not work when you really do need them. Because of this, it is important that you only use an antibiotic when it is necessary to treat your illness.

How can you help? When you have a cough, sore throat, or other illness, tell your doctor you only want an antibiotic if it is really necessary. If you are not prescribed an antibiotic, ask what you can do to feel better and get relief from your symptoms.

Your health is important to us. As your healthcare providers, we promise to provide the best possible treatment for your condition. If an antibiotic is not needed, we will explain this to you and will offer a treatment plan that will help. We are dedicated to prescribing antibiotics only when they are needed, and we will avoid giving you antibiotics when they might do more harm than good.

If you have any questions, please feel free to ask us.

Sincerely,

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