

Behavioral insights to curtail antibiotic overuse

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IN HEALTH CARE...

1/3



of health care expenditures—an estimated \$750 billion!—don't improve health.

IN OTHER INDUSTRIES...



FACTORY ASSEMBLY LINES

are continually monitored to improve quality, identify inefficiencies, and remove waste.

What policies can improve the quality of decisions that are produced in healthcare?

Behavioral Insights



Peer Comparison

We look to others for how we should act.



Justifications

We want others to approve of our behavior.



Public Commitments

Commitments bind our future self to desires our present self wants to fulfill.



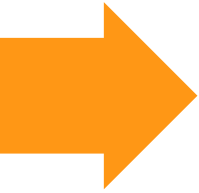
Decision Fatigue

Decision making gets worse with repeated decisions.



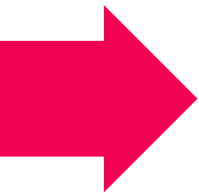
Choice Partitioning

We spread our choices over salient consumption options.



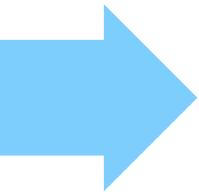
12.6%

of outpatient visits result in an antibiotic prescription



50%

of these are in appropriate



34,000,000

inappropriate outpatient prescriptions per year

JAMA The Journal of the
American Medical Association

 ORIGINAL CONTRIBUTION

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

Methods: Enrollment

- ***Invited:*** 355 clinicians
- ***Enrolled:*** 248 (70%)
 - Consent
 - Education
 - Practice-specific orientation to intervention
 - Honorarium

Methods: Primary Outcome

- ***Antibiotic prescribing for non-antibiotic-appropriate diagnoses***
 - Non-specific upper respiratory infections
 - Acute bronchitis
 - Influenza
- ***Excluded:*** chronic lung disease, concomitant infection, immunosuppression
- ***Data Sources:*** EHR and billing data

Results: Clinicians (N = 248)

	Control	Suggested Alternatives	Accountable Justification	Peer Comparison
Age, mean	47	49	48	48
	%			
Female	48	68	61	61
Clinician Type				
Physician	81	79	81	80
PA or NP	19	21	19	20

Results: Visits (N = 16,959)

	Control	Suggested Alternatives	Accountable Justification	Peer Comparison
Age, mean	49	47	48	46
	%			
Female	65	70	66	68
White	88	86	88	87
Latino	35	32	30	36
Private insurance	60	59	58	58



1.

Peer Comparison

We look to others for how we should act.

Intervention 3: Peer Comparison

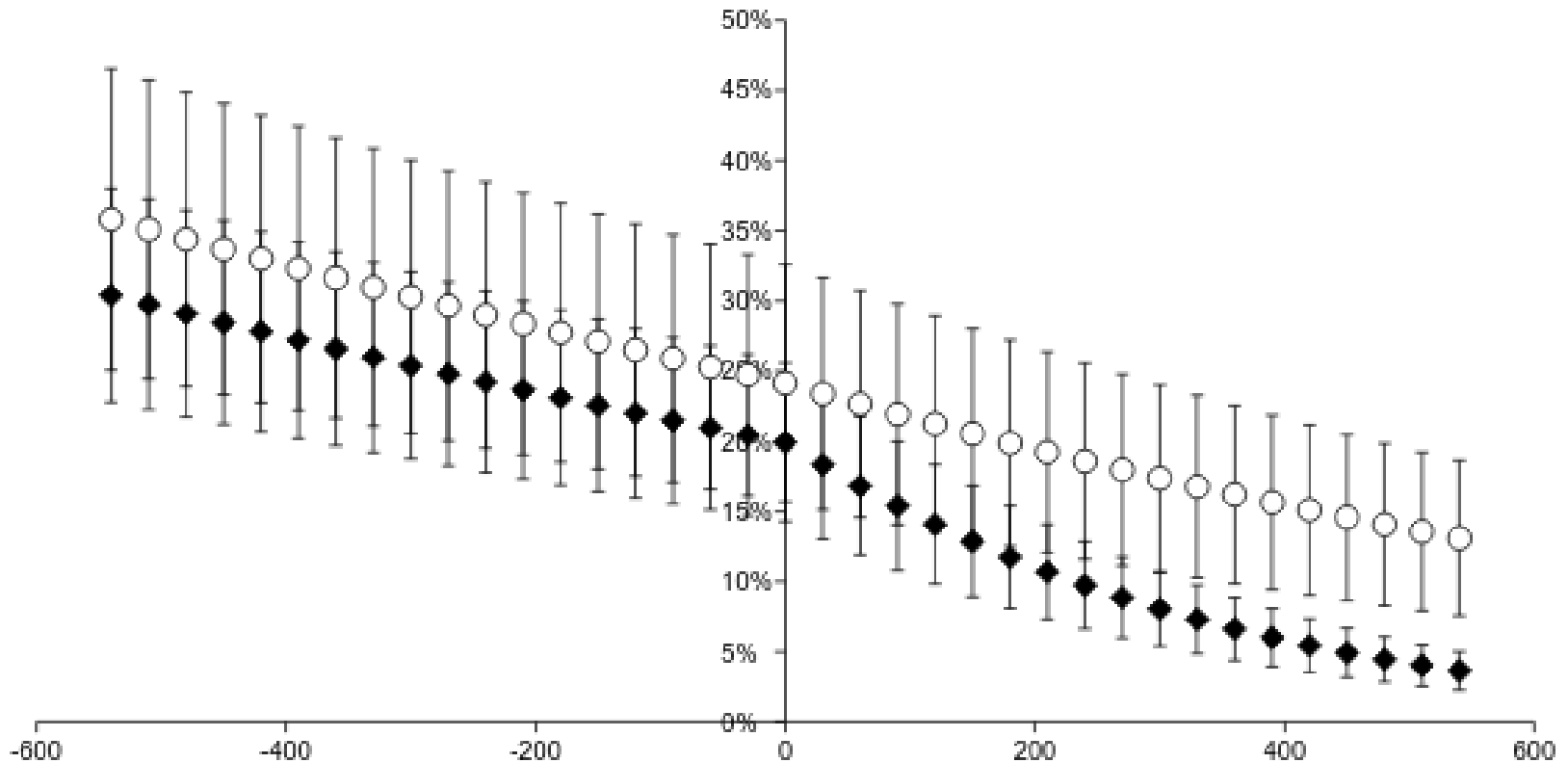
“You are a Top Performer”

You are in the top 10% of clinicians. You wrote 0 prescriptions out of 21 acute respiratory infection cases that did not warrant antibiotics.

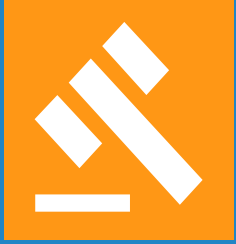
“You are not a Top Performer”

Your inappropriate antibiotic prescribing rate is 15%. Top performers' rate is 0%. You wrote 3 prescriptions out of 20 acute respiratory infection cases that did not warrant antibiotics.

Main Results: Peer Comparison



$p = <.001$



2.

Justifications

We want others to approve of our behavior.

Intervention 2: Accountable Justification

BestPractice Advisory - Zztest,Bearistudyfive


▼ Text Alerts (1 Advisory)

▼ Antibiotics are not generally indicated for acute bronchitis

▼ Justifications (1 Advisory)

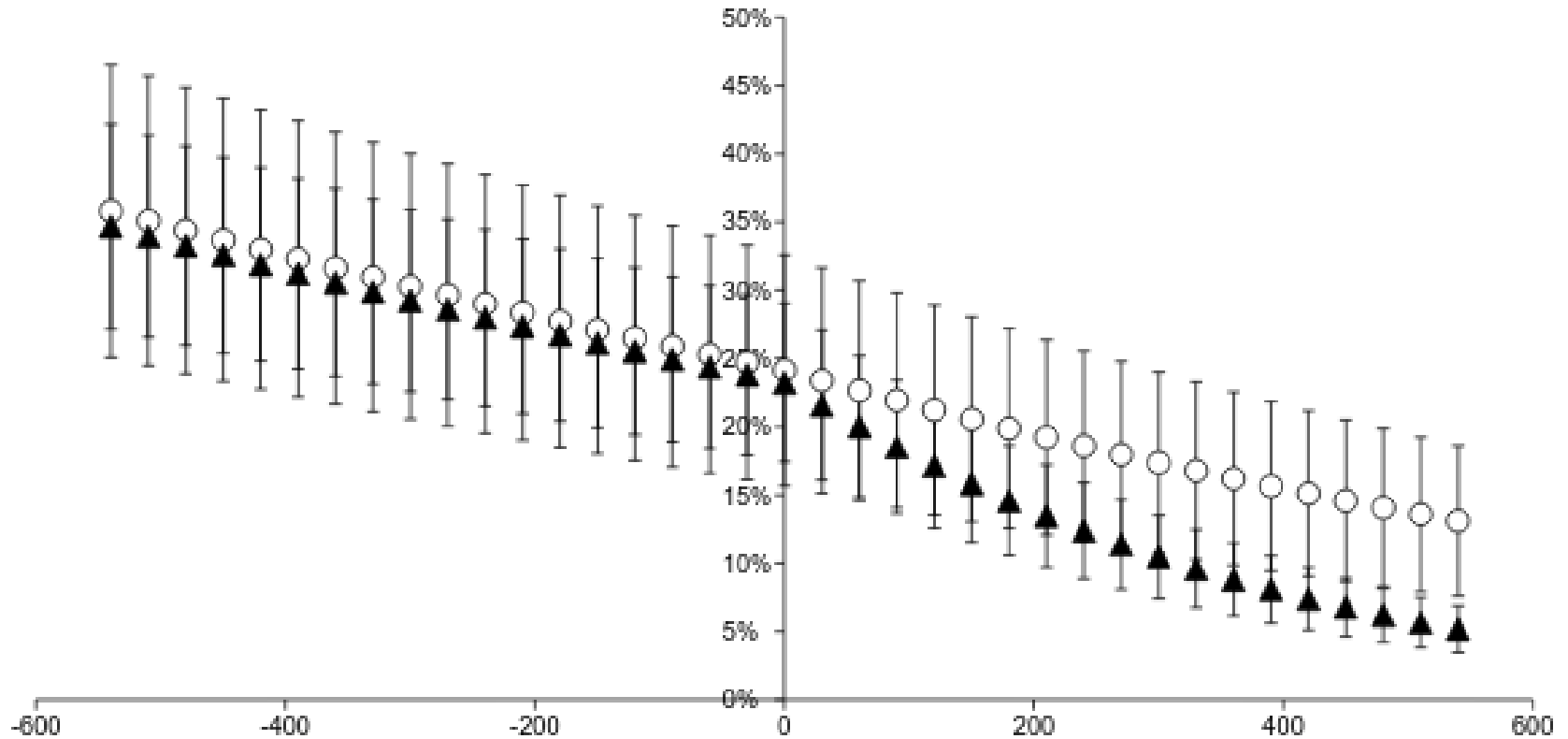
▼ You have prescribed antibiotics for a likely viral diagnosis. Please click the Enter Justification button below and write your justification for prescribing antibiotics in the comment box. This justification will be entered into the patient's record.

If you do not enter a justification into the comment box, the phrase "No justification for prescribing antibiotics was given." will appear in the patient's record. Click Accept when you are finished.

Acknowledge reason:  [Close](#)

[Click this box and enter ARI justificati...](#)

Main Results: Justification



$p < .001$

Persistence

- Evaluated prescribing for 12 months after interventions were turned off
- Difference of differences comparing 18-month treatment period to 12-month follow-up period

Persistence of Effects

Letters

RESEARCH LETTER

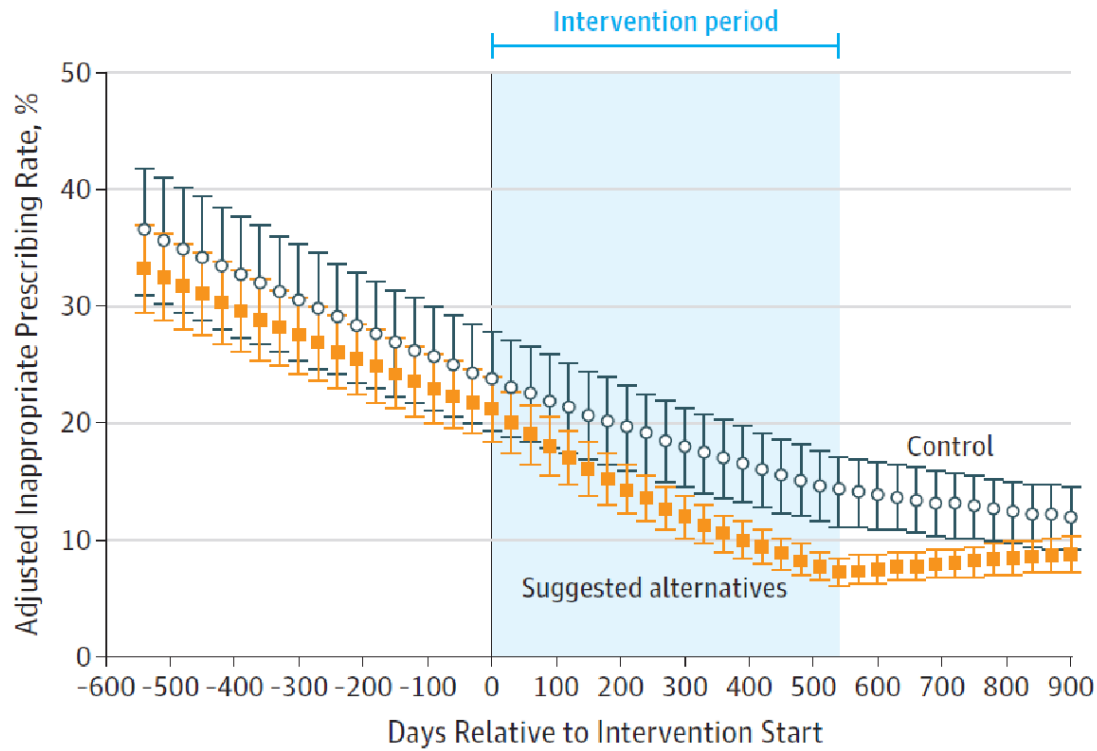
Effects of Behavioral Interventions on Inappropriate Antibiotic Prescribing in Primary Care 12 Months After Stopping Interventions

Inappropriate antibiotic prescribing contributes to antibiotic resistance and leads to adverse events.¹ A cluster-randomized trial of 3 behavioral interventions² intended to reduce inappropriate prescribing found that 2 of the 3 interventions were effective.³ This study examines the persistence of effects 12 months after stopping the interventions.

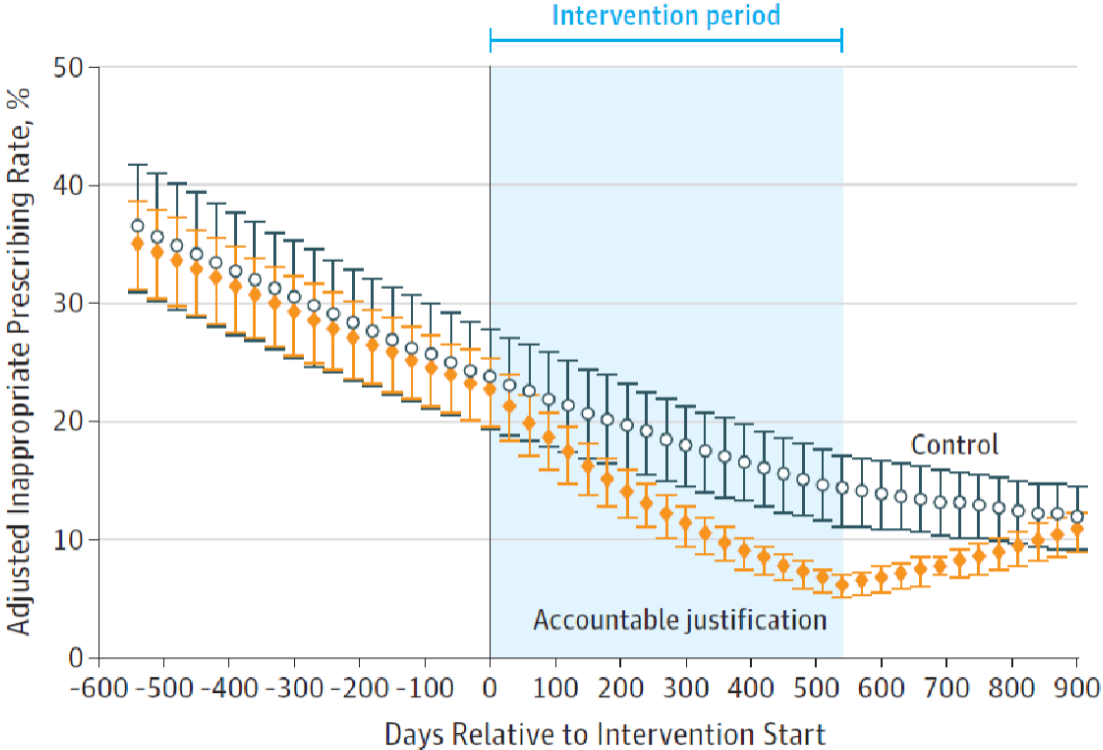
Methods | We randomized 47 primary care practices in Boston, Massachusetts, and Los Angeles, California, and

Results | There were 14 753 visits for antibiotic-inappropriate ARIs during the baseline period, 16 959 during the intervention period, and 7489 during the postintervention period. During the postintervention period, the rate of inappropriate antibiotic prescribing decreased in control clinics from 14.2% to 11.8% (absolute difference, -2.4%); increased from 7.4% to 8.8% (absolute difference, 1.4%) for suggested alternatives (difference-in-differences, 3.8% [95% CI, -10.3% to 17.9%]; $P = .55$); increased from 6.1% to 10.2% (absolute difference, 4.1%) for accountable justification (difference-in-differences, 6.5 [95% CI, 4.2% to 8.8%]; $P < .001$); and increased from 4.8% to 6.3% (absolute difference, 1.5%) for peer comparison (difference-in-differences, 3.9% [95% CI, 1.1% to 6.7%]; $P < .005$) (Figure). During the postintervention pe-

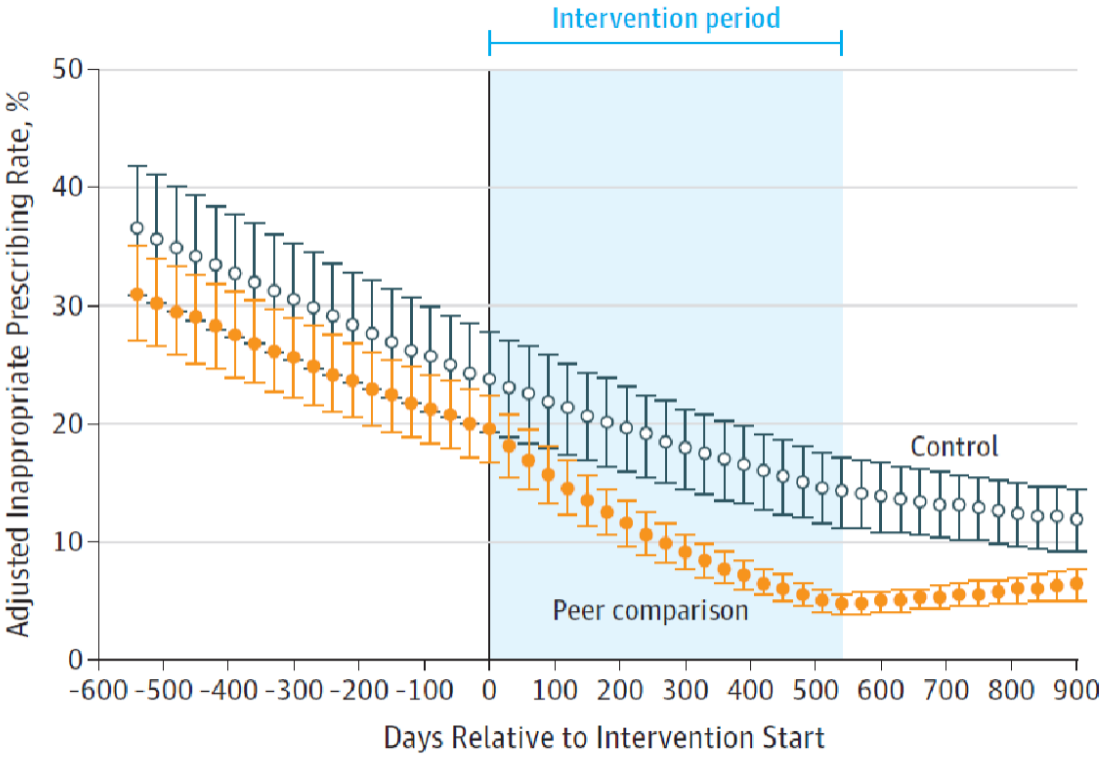
Persistence: Suggested Alternatives



Persistence: Accountable Justification



Persistence: Peer Comparison



Linder. JAMA
2017

Summary

- Peer comparison showed greater persistence than other interventions
- Possible hypotheses
 - Justification effects may depend on being prompted
 - Clinicians may have internalized being a “top performer” into their self-image and continued to act accordingly
- If interventions are time-limited peer comparison may be the best option

Conclusions and Implications

- ***Social motivation appears effective***
- ***Interventions show durable effects post-intervention***



3.

Public Commitment

Commitments bind the future self to desires the present self wants to fulfill.

Public Commitment

JAMA Internal Medicine

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

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 on when you should or should not take antibiotics.

When you have a cough, sore throat, or other illness, ask your doctor for the best possible treatments. If an antibiotic is necessary, your doctor will explain this to you, and you should take it exactly as directed.

Your health is very important to us. As your doctors, we promise to treat you in the best way possible. We are also dedicated to avoid 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,



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 deseables.

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 eso es importante que los use solo cuando su doctor le indique que debe.

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 avoid prescribing antibiotics when they are likely to do more harm than good.

mejor para usted.

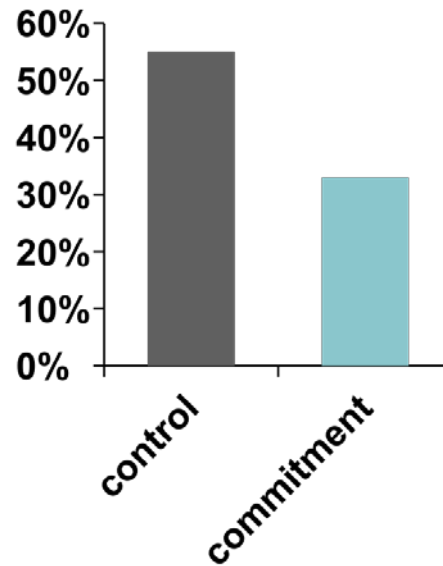
Su salud es importante para nosotros. Como sus doctores, nosotros prometemos tratar su enfermedad en la mejor manera posible. También nos comprometemos a evitar recetar antibióticos cuando sean probables de hacer más daño que bien.

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

Atentamente,



Results: Public commitment



Characteristic	Poster Condition		Control Condition	
	Baseline	Final Measurement	Baseline	Final Measurement
Inappropriate prescribing rate, % (95% CI)	43.5 (38.5 to 49.0)	33.7 (25.1 to 43.1)	42.8 (38.1 to 48.1)	52.7 (44.2 to 61.9)
Absolute percentage change, baseline to final measurement (95% CI)	-9.8 (0.0 to -19.3)		9.9 (0.0 to 20.2)	
Difference in differences between poster condition and control (95% CI)	-19.7 (-5.8 to -33.04) ^b			

Abbreviation: ARI, acute respiratory infection.

^b $P=.02$ for the difference.

^a Adjusted for demographic characteristics and insurance status.

JAMA – Internal Medicine, 174, 425-431, 2014.

CDC funded Replications: IDPH & NYSDH



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PDSB Campaign Goals

- Increase **provider and patient knowledge** & provide **resources** about antibiotic resistance and use

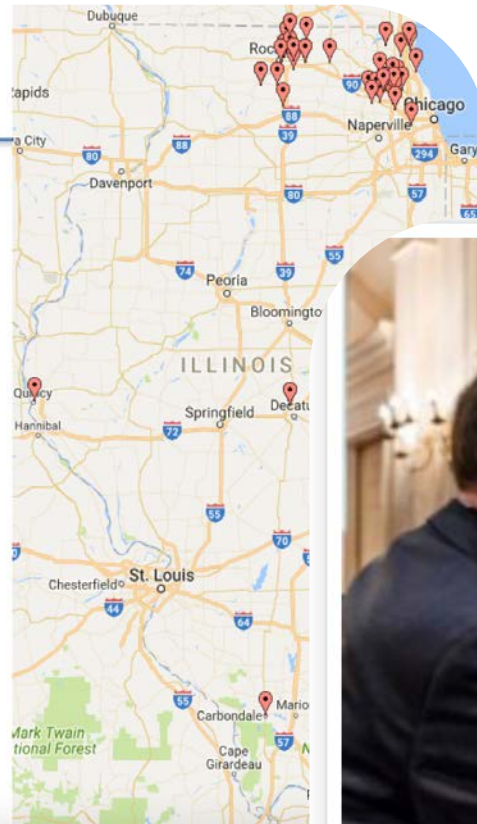
Phase I Participation

March 2015



Present

- 55 practices representing > 385 providers



CDC Core Elements Outpatient Antibiotic Stewardship (2017)

EU Draft Guidelines for Antibiotic Stewardship

The NYS Department of Health recently rolled out a “Get Smart Guarantee” poster for healthcare providers to pledge to only prescribe antibiotics when they are needed.



4.

Decision Fatigue

Decision making gets worse with repeated decisions



If you have to force yourself to do something you are less willing or able to exert self-control when the next challenge comes around.—Daniel Kahneman

Decision Fatigue: Judicial Decisions Revert to Path of Least Resistance

PNAS

Extraneous factors in judicial decisions

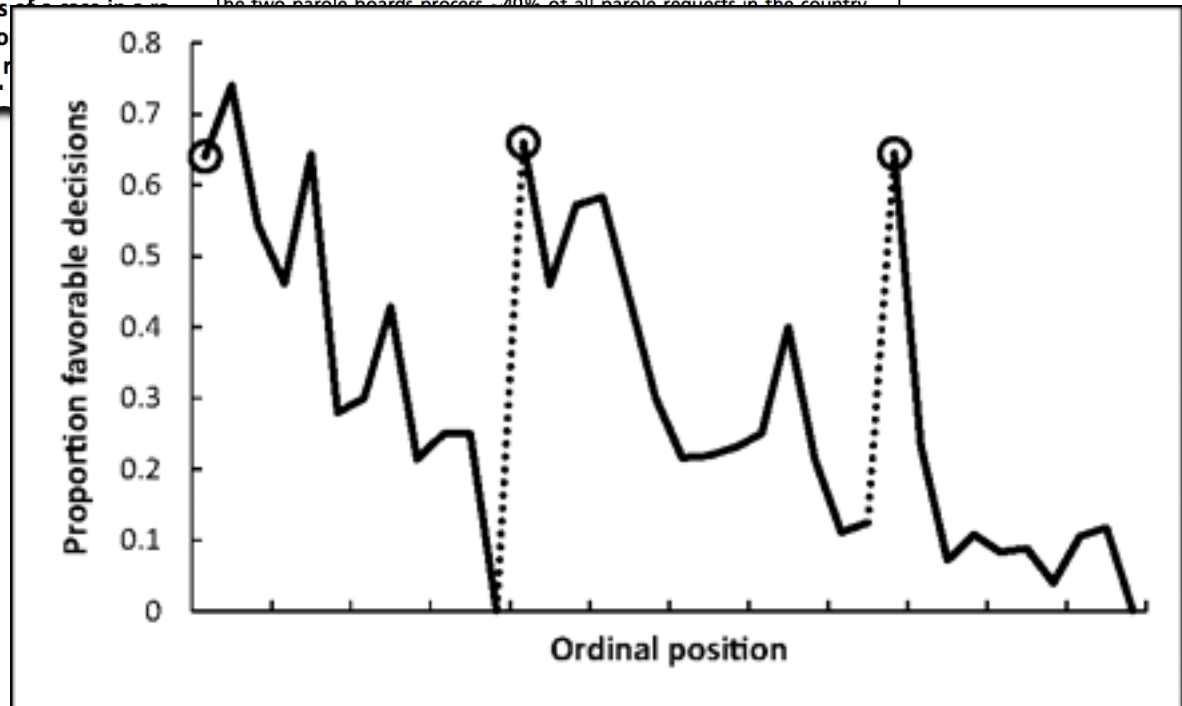
Shai Danziger^{a,1}, Jonathan Levav^{b,1,2}, and Liora Avnaim-Pesso^a

^aDepartment of Management, Ben Gurion University of the Negev, Beer Sheva 84105, Israel; and ^bColumbia Business School, Columbia University, New York, NY 10027

Edited* by Daniel Kahneman, Princeton University, Princeton, NJ, and approved February 25, 2011 (received for review December 8, 2010)

Are judicial rulings based solely on laws and facts? Legal formalism (29.3%), 50 Jewish-Israeli females (4.5%), and 9 Arab-Israeli females (0.9%). The two parole boards process ~40% of all parole requests in the country.

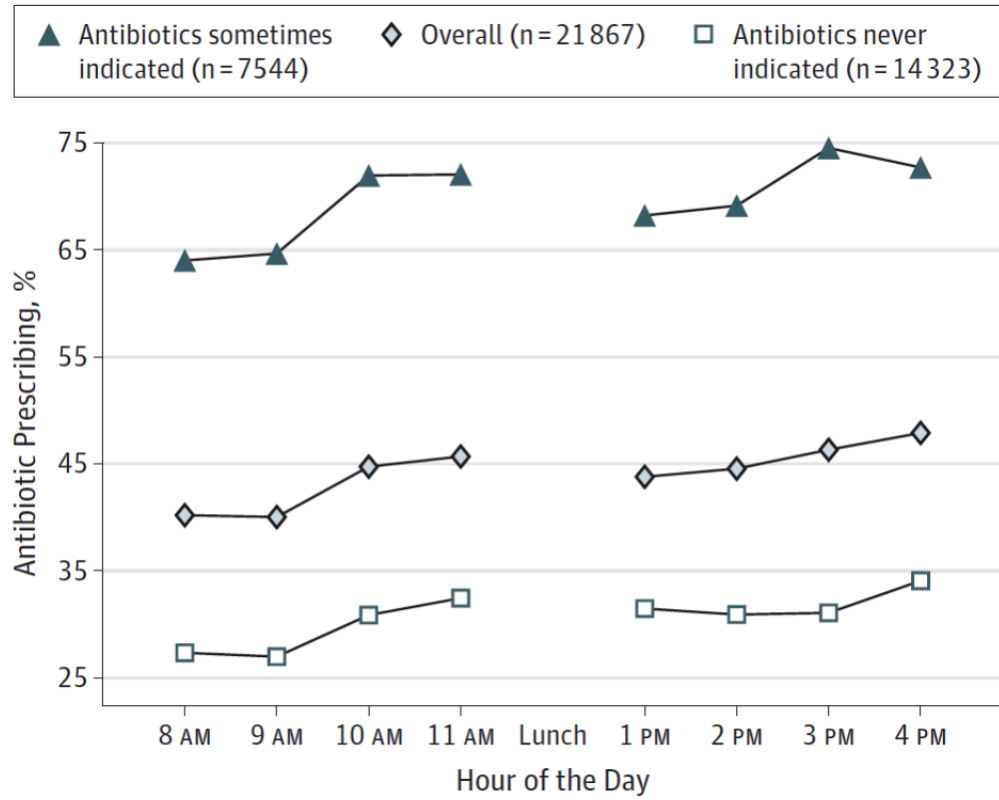
holds that judges apply legal reasons to the facts of a case in a rational, mechanical, and deliberative manner. In contrast, legal realism argues that the rational application of legal principles is often replaced by extraneous factors such as emotions, biases, and fatigue.



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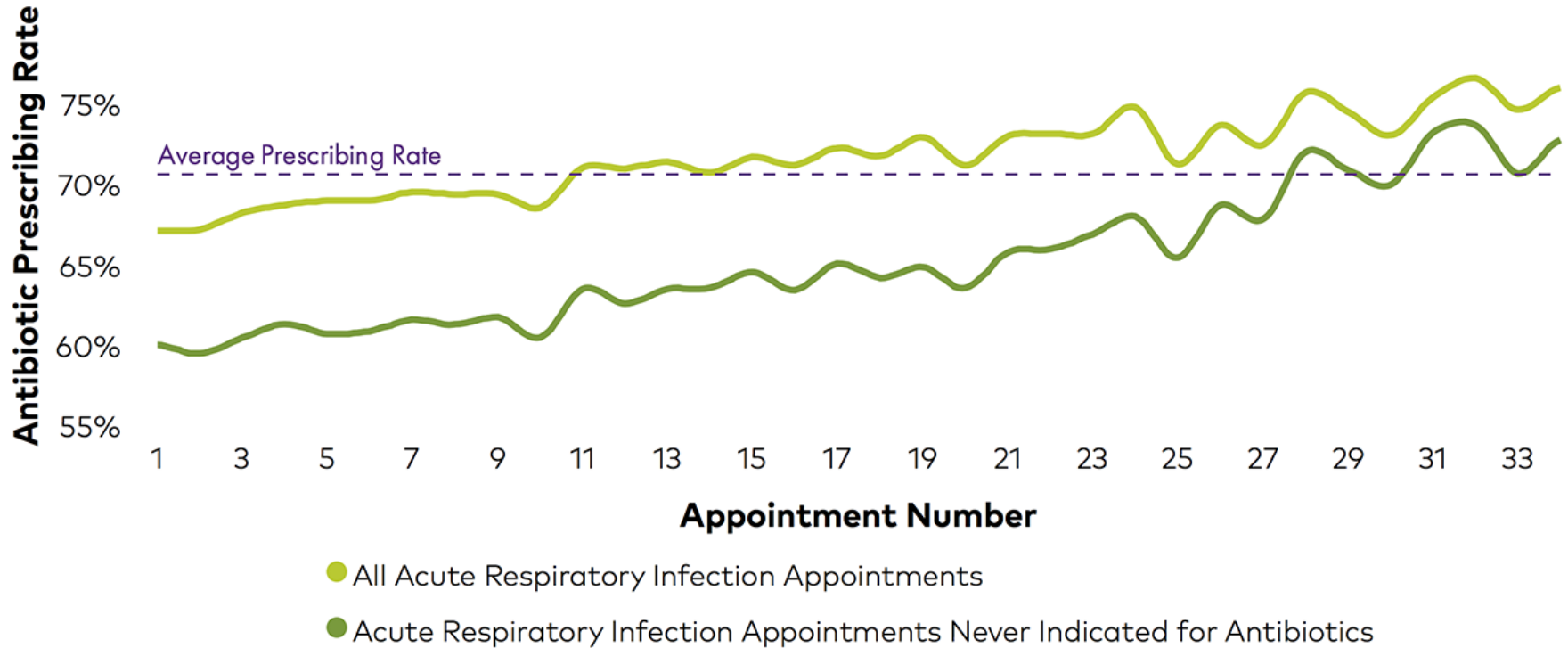
RESEARCH LETTER

Time of Day and the Decision to Prescribe Antibiotics



Replication: Athena Research

Antibiotic prescriptions over the course of a day



SOURCE: athenaResearch

<https://insight.athenahealth.com/expert-forum-decision-fatigue-antibiotics/>

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Thank you!

Questions?