

Commentary

It is time to define antimicrobial never events

Jiajun Liu PharmD^{1,2}, Keith S. Kaye MD, MPH³, Nicholas J. Mercurio PharmD^{4,5}, Susan L. Davis PharmD^{4,5},
Twisha S. Patel PharmD⁶, Lindsay A. Petty MD⁶, Gwendolyn M. Pais PhD¹ and Marc H. Scheetz PharmD, MSc^{1,2}

¹Pharmacometrics Center of Excellence, Department of Pharmacy Practice, Northwestern University Chicago College of Pharmacy, Downers Grove, Illinois,

²Northwestern Memorial Hospital, Chicago, Illinois, ³University of Michigan Medical School, Ann Arbor, Michigan, ⁴Henry Ford Hospital, Detroit, Michigan,

⁵Eugene Applebaum College of Pharmacy, Wayne State University, Detroit, Michigan and ⁶Michigan Medicine, University of Michigan, Ann Arbor, Michigan

Abstract

Inappropriate antibiotic use is associated with increased antimicrobial resistance and adverse events that can lead to further downstream patient harm. Preventative strategies must be employed to improve antibiotic use while reducing avoidable harm. We use the term “antibiotic never events” to globally recognize and define the most inappropriate antibiotic use.

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Antibiotic overuse directly fuels the development of multidrug-resistant pathogens and challenges public health efforts worldwide.¹ Although resistance was initially confined to hospital infections, community settings are no longer a safe harbor from antibiotic resistance.¹ Annually in the United States alone, more than 2 million people acquire antibiotic-resistant infections and at least 23,000 die.² Aside from driving resistance, antibiotic overuse puts patients at risk for adverse drug events. Notably, antibiotic use in the outpatient settings contributes to approximately 20% of all drug-related emergency department visits in the United States, and 1 in 5 in patients receiving antibiotics experiences an adverse effect.^{3,4} We have collectively reached a societal tipping point in which inappropriate antibiotic use must be addressed. It is critical to establish tools to effectively identify, track, and compare antibiotic use and/or misuse and risks associated with inappropriate use across multiple care environments. In this vein, we propose that a new framework for classification of antibiotic misuse should be created. In cases in which antibiotic use is expected to result in negligible benefit and risks substantially exceed potential gains, over-prescription must stop. Thus, we suggest adoption of the term “antibiotic never events” (ANEs), which we define as widely recognized clinical scenarios in which antibiotic use is convincingly inappropriate.

Never Events, a Brief History of the Term

Patient safety is a national focal point in the delivery of quality healthcare in the United States. In 2001, the term “never events” was introduced to describe particularly severe medical errors that should never occur.⁵ Subsequently, the National Quality Forum published a report on “serious reportable events” based on never

events.⁵ This seminal report defined and categorized medical errors to systematically investigate the most serious errors and to use this knowledge to improve patient safety outcomes.⁵ The measurable never events, though not comprehensive, were clearly regarded as unacceptable errors by the medical community and the public. The applications of the term “never events” is relevant to the field of infectious diseases. From the NQF report, the Centers for Medicare and Medicaid Services created a list of never events in 2008 that included catheter-associated urinary tract infections, vascular catheter-associated infections, and surgical site infections.⁶ The purpose of the list at that time was to limit payment for preventable infections.

Never Events, Contemporary Application to Antibiotics

Although the term “never events” applies to infections that should not be acquired in the hospital setting, the appropriateness of antibiotic prescribing has not been addressed. The literature documents that nearly 50% of antibiotic use is inappropriate.⁷ Any use that is not expected to result in abatement of illness contributes unnecessary and unacceptable risk and violates the well-known medical tenet of “first, do no harm,” and these instances should be termed “antibiotic never events” (ANEs). Risk is realized in direct patient harm (ie, adverse drug events), downstream antibiotic collateral damage (eg, *C. difficile* infection), and transformation of susceptible organisms into untreatable drug-resistant pathogens. The current ANE framework can be used to capture the risks of antibiotic misuse in certain situations³ in which antibiotic use is not only clinically unsupported but carries a definable or measurable risk of serious harm. We are applying ANEs to the treatment of syndromes where little to negligible benefit of treatment with antibiotics exists. These include asymptomatic bacteriuria and viral upper respiratory tract infection. Asymptomatic bacteriuria is characterized by the presence of a specified quantity of bacteria in an appropriately collected urine culture from an individual without signs or symptoms of urinary tract infection. Past research clearly

Author for correspondence: Marc H. Scheetz, PharmD, MSc, Professor of Pharmacy Practice, Northwestern University, Chicago College of Pharmacy, Pharmacometrics Center of Excellence; 555 31st St, Downers Grove, IL 60515. E-mail: mschee@midwestern.edu

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Table 1. Examples of Potential Antibiotic Never Events

Antibiotic Never Events
Antibiotic use for a nonsusceptible organism after identification and susceptibility
Antibiotic use that exceeds 2 days after causative organism identified and susceptibility results available when de-escalation is possible (can safely be treated by a narrower agent)
Postsurgical antibiotic prophylaxis exceeds national guidelines
Antibiotic use for viral upper respiratory tract infections
Antibiotic use for asymptomatic bacteriuria

demonstrates that antibiotics do not confer clinical benefit and only impart adverse events.⁸ Similarly, viral upper respiratory tract infections without bacterial coinfection comprise another syndrome in which antibiotic use provides negligible benefit because antibacterial agents are not active against viruses. In patients with viral upper respiratory tract infections, those who received antibiotics had significantly longer hospital stay, higher in hospital all-cause infections, and higher frequency of *C. difficile* infections compared to those who did not receive antibiotics.⁹ With these examples, we suggest defining the bounds of the most inappropriate and egregious use (ie, ANEs) to provide events that can be converted into a metric that can be easily followed. For certain inappropriate antibiotic use measures, the acceptable target event rate is probably a nonzero number or percentage of use, and the beauty of defining true ANEs is that the target level is actually zero. Temporal trend measurements of ANEs represent the perceptible “tip of an iceberg” of inappropriate antibiotic usage. We further suggest several other syndromes that meet the criteria for low clinical benefit and high adverse event potential (Table 1).

Defining the most egregious antibiotic use scenarios as ANEs has the advantage of utilizing a framework that is already deeply rooted in medical culture. Patient safety literature, especially in surgery discipline, has employed the term never events to convey and quantify medical errors or adverse consequences.¹⁰ Khaneman and Tversky’s Nobel Prize-winning research on “negative framing” suggests that humans are more strongly inclined to take action when the actions in question are labeled to convey the loss avoided (rather than benefit gained) and when the consequences of failing to act are mentally vivid.¹¹ Furthermore, this common language has facilitated a framework to identify and mitigate the causes of never events.¹⁰ It is time to take a similar approach in the classification of antibiotic use, implementation of a term that is clinically measurable and readily understood. Classifying

inappropriate antibiotic use with an encompassing term allows these questionable antibiotic prescribing practices, facilitates measurement to be identified and ultimately allows for prevention. By defining ANEs, tracking and prevention efforts will ultimately facilitate behavior change in prescribing practices and minimize avoidable patient harm.

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