

antimicrobial resistance

STRATEGIES FOR EFFECTIVE MESSAGING



Dr Hidayatul Radziah Ismawi

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by

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preface

Antibiotic resistance threatens to render our most potent medical treatments ineffective, jeopardising not only individual health but also public health on a global scale. Yet, despite its severity, antibiotic resistance is often misunderstood or overlooked by the public. This e-book aims to bridge that gap by providing clear, concise, and persuasive messaging strategies to engage diverse audiences.

Whether you are a healthcare professional, educator, policymaker, or simply someone passionate about raising awareness, the insights and techniques outlined in this ebook will empower you to convey the urgency of antibiotic resistance in a compelling and impactful manner. Together, we can inspire action, promote responsible antibiotic use, and safeguard the effectiveness of these life-saving medications for generations to come.

author profile



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introduction

WHAT IS ANTIMICROBIAL RESISTANCE?

Antimicrobials are drugs or medicines that destroy or inhibit the growth of microorganisms (especially pathogenic microorganisms). Generally, they are often classified into:

- Antibiotics or antibacterials - drugs that treat or prevent infections caused by BACTERIA
- Antivirals - drugs that treat or prevent infections caused by VIRUSES
- Antifungals - drugs that treat or prevent infections caused by FUNGI
- Antiparasites - drugs that treat or prevent infections caused by PARASITES

According to the World Health Organisation (WHO) antimicrobial resistance (AMR) occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death. (WHO, 2021).

The greatest possibility of evil in self-medication [with penicillin] is the use of too-small doses, so that, instead of clearing up the infection, the microbes are educated to resist penicillin and a host of penicillin-fast organisms is bred out which can be passed on to other individuals and perhaps from there to others until they reach someone who gets a septicemia or a pneumonia which penicillin cannot save.

In such a case the thoughtless person playing with penicillin treatment is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism. I hope this evil can be averted.

-SIR ALEXANDER FLEMING

The first recorded case of antibiotic resistance dates back to 1940 when penicillin-resistant strains of *Staphylococcus aureus* were discovered, just four years after penicillin was introduced as the first widely used antibiotic. Sir Alexander Fleming warned of antibiotic resistance during his Nobel Prize acceptance speech.

Antibiotic resistance presents a significant global challenge to modern medicine and society, yet it remains largely underestimated by healthcare professionals and the general public. Numerous strains of bacteria, including methicillin and vancomycin-resistant *Staphylococcus aureus*, as well as multi-drug resistant *Mycobacterium tuberculosis*, continue to affect both developed and developing nations. Annually, more than 700,000 deaths result from infections caused by antibiotic-resistant bacteria.

Currently, among the most common causes of hospital-acquired and multi-drug resistant infections are the ESKAPE group of bacteria (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter spp.*). These bacteria have developed various mechanisms to survive antibiotic therapy.

We celebrate Antimicrobial Resistance Awareness week on 18-24th November yearly, using it as an opportunity to shine a light on this important issue and educate our fellow healthcare colleagues as well as the general public.

But how effective are we in delivering our message?

back to basics

MECHANISMS OF ANTIMICROBIAL RESISTANCE

Undoubtedly, any messaging regarding AMR should be preceded by the basics. This includes the mechanisms of AMR and drivers of AMR.

Mechanisms of antimicrobial resistance can generally be divided into two main goals:

- Stop the antibiotic from reaching its target
- Modify or bypass the target of the antibiotic

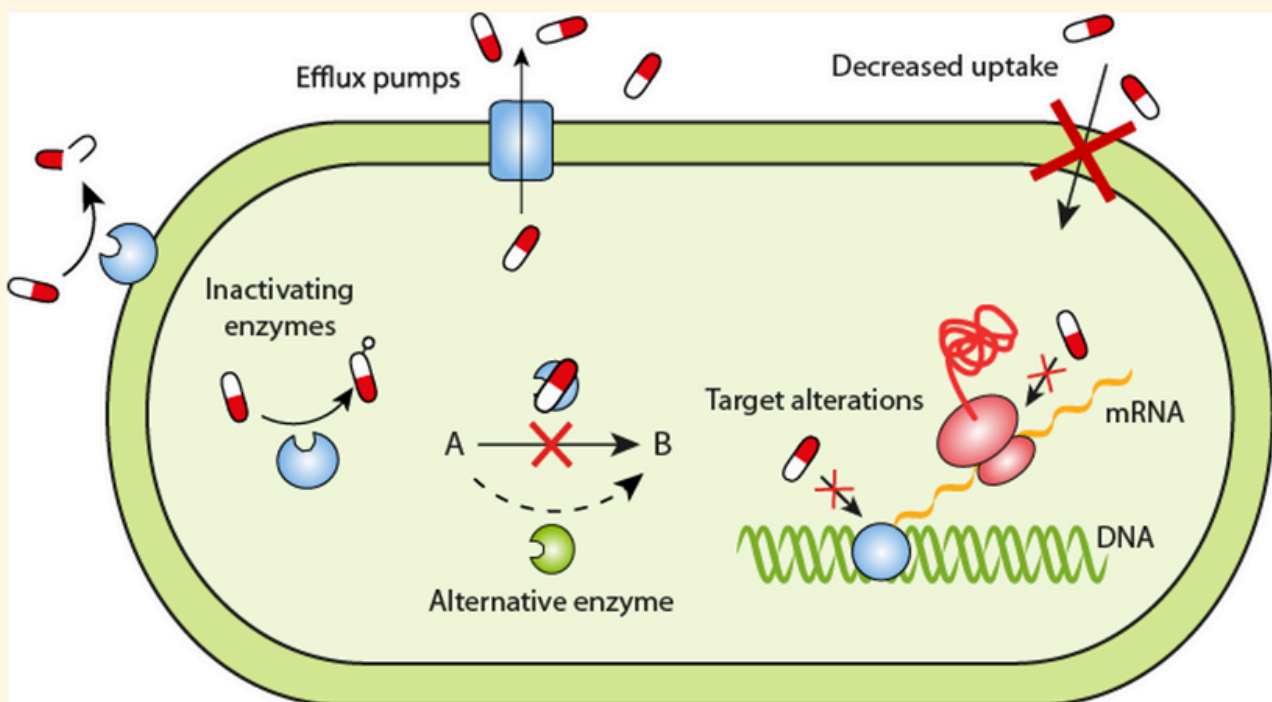


Diagram by E. Wistrand-Yuen

STOP THE ANTIBIOTIC FROM REACHING ITS TARGET

Pump the antibiotic out from the bacterial cell:

Bacteria have the ability to generate pumps positioned within their membrane or cell wall. Known as efflux pumps, these are prevalent in bacteria and facilitate the transportation of various substances, including signal molecules and nutrients. Additionally, certain pumps have the capacity to expel antibiotics from the bacterium, thereby reducing the antibiotic concentration within the bacterial cell. Under certain circumstances, mutations occurring in bacterial DNA can prompt the bacteria to produce greater quantities of specific pumps, thereby enhancing resistance.

Decrease permeability of the membrane that surrounds the bacterial cell:

Specific alterations in the bacterial membrane create barriers that impede passage. Consequently, a reduced amount of the antibiotic is able to penetrate the bacteria.

Destroy the antibiotic:

Bacterial enzymes have the capability to render antibiotics inactive. One instance is β -lactamase, which targets the active component (the β -lactam ring) of penicillins, crucial antibiotics for combating human infections. In recent times, the emergence of bacteria producing extended-spectrum β -lactamases (ESBL-producing bacteria) has posed significant challenges. These enzymes can degrade a broad range of β -lactam antibiotics, including those considered last-resort drugs for infections caused by such bacteria.

Modify the antibiotic:

Bacteria may produce enzymes that have the ability to attach various chemical groups to antibiotics. Consequently, this prevents the antibiotic from binding to its target within the bacterial cell.

MODIFY OR BYPASS THE TARGET OF THE ANTIBIOTIC

Camouflage the target:

Alterations in the composition or arrangement of the bacterial target, stemming from mutations in bacterial DNA, can hinder the antibiotic from engaging with the target. Alternatively, bacteria can modify the target structure by attaching diverse chemical groups, thereby shielding it from the antibiotic.

Express alternative proteins:

Certain bacteria possess the capability to generate alternative proteins that can substitute for those inhibited by the antibiotic. For instance, the bacterium *Staphylococcus aureus* can acquire the resistance gene *mecA*, leading to the production of a novel penicillin-binding protein. These proteins are crucial for bacterial cell wall synthesis and serve as targets for β -lactam antibiotics. The newly formed penicillin-binding protein exhibits reduced affinity to β -lactam antibiotics, rendering it resistant to the drugs and enabling the bacteria to withstand treatment. This form of resistance is the foundation of MRSA (methicillin-resistant *Staphylococcus aureus*).

Reprogram target:

Occasionally, bacteria have the ability to generate an altered version of a necessary structure. For instance, vancomycin-resistant bacteria develop a distinct cell wall compared to susceptible bacteria. As a result, the antibiotic cannot interact as effectively with this type of cell wall.

DRIVERS OF AMR

The transmission of antimicrobial resistance (AMR) is driven by various factors. Socio-economic factors and related socio-ecological behaviours, such as scarce resources, poor sanitation, food safety issues, lax rules and regulations, overcrowding, and poverty, create environments conducive to the spread of resistant bacteria. Additionally, antibiotic misuse in human medicine, including the use of counterfeit and non-prescription antibiotics, exacerbates AMR. Antibiotic usage in animal health and the agricultural sector further contributes to the proliferation of resistant strains. These drivers underscore the complex interplay between socio-economic dynamics, healthcare practices, and environmental factors in fuelling the spread of AMR.

world view

THE GLOBAL PERSPECTIVE

World Antimicrobial Awareness Week (WAAW) is a global event that takes place annually from November 18 to 24. It is important to use this period to raise awareness about antibiotic resistance, emphasising its global impact.

By 2050, the Wellcome Trust predicts that resistant infections will be the NUMBER ONE cause of death globally, with an estimated 10 MILLION attributable deaths per year. The Wellcome Trust is a charitable foundation focused on health research based in London, in the United Kingdom.

Antimicrobial resistance (AMR) poses a challenge for nations worldwide, irrespective of their economic status. It disregards national boundaries, spreading across borders without discrimination. Factors fuelling its spread include inadequate access to clean water, sanitation, and hygiene (WASH) for humans and animals alike, deficient infection and disease prevention and control measures in households, healthcare settings, and agricultural environments, limited availability of high-quality and affordable vaccines, diagnostics, and medications, insufficient awareness and understanding, and lax enforcement of pertinent legislation. Individuals residing in resource-constrained environments and vulnerable communities bear a disproportionate burden, being particularly susceptible to both the drivers and repercussions of AMR.

AMR continues to pose a significant threat to global health, with alarming statistics highlighting its impact. In 2019 alone, AMR was directly responsible for 1.27 million global deaths and approximately 4.95 million deaths were attributed to antimicrobial resistance-related causes.

Furthermore, the emergence of multidrug-resistant tuberculosis (MDR-TB) presents another formidable challenge. In 2021, there were approximately 450,000 new cases of MDR-TB reported worldwide, further exacerbating the burden on healthcare systems and communities.

Despite these alarming statistics, the development of new antibiotics remains insufficient. Currently, there are only 32 antibiotics in clinical development that specifically target the World Health Organization's (WHO) list of priority pathogens.

Looking ahead, the global community has outlined ambitious goals to tackle antimicrobial resistance. By 2030, there are plans to address 40 research priorities related to AMR. These initiatives aim to advance our understanding of antimicrobial resistance mechanisms, develop innovative treatment options, and strengthen surveillance and control measures.

local action

BEGIN AT YOUR OWN DOORSTEP

It is crucial that any messaging about antimicrobial resistance focuses on the specific target population in the local area. It is best to avoid using generic messages that target healthcare professionals and the general public. Instead, we should aim to tailor the messages to suit each specific audience. We need to address unique local issues and identify any knowledge gaps that may exist in the community.

The number of AMR deaths in Malaysia is higher than deaths from digestive diseases, diabetes and kidney diseases, transport injuries, chronic respiratory diseases, and neurological disorders.

AMR poses a significant burden in Malaysia, as evidenced by the alarming statistics. In 2019 alone, the nation recorded 3,500 deaths directly attributable to AMR, with an additional 14,000 deaths associated with this growing threat.

According to global rankings, Malaysia holds the 98th lowest age-standardized mortality rate per 100,000 population associated with AMR out of 204 countries. This places Malaysia among the nations struggling with the adverse effects of antimicrobial resistance on mortality rates.

Trends in antimicrobial resistance in Malaysia

The National Medical Care Survey (NMCS) gathered data of 27,587 patients that received antibiotic prescriptions, 3.4% received more than one antibiotics.

The rate of antibiotic prescriptions in private clinics (30.8%) is higher than in public or government clinics (6.8%). Almost half of the prescribed antibiotics are for acute upper respiratory tract infections (URTI) followed by other diagnoses such as fever and gastroenteritis.

A total of 97 antibiotics have been approved in Malaysia and registered with the Ministry of Health for food and animal practice, most of these antibiotics are not advisable for veterinary purposes by WHO

The action plan on antimicrobial resistance (MyAP-AMR) is structured based on four key areas:

- (1) public awareness and education
- (2) surveillance and research
- (3) infection prevention and control
- (4) appropriate use of antimicrobials.

Ab Rahman N et al. (2016), Naeemmudeen NM et al. (2021)

Factors influencing inappropriate use of antibiotics: Findings from a nationwide survey of the general public in Malaysia

Erroneous beliefs regarding the effectiveness of antibiotics against viral infections and their ability to hasten recovery from common ailments like coughs and colds persist despite efforts to educate the public.

Furthermore, awareness of key terms such as 'drug resistance', 'antimicrobial resistance', and 'superbugs' remains low among the population, indicating a need for increased public education on these topics.

Non-adherence to recommended antibiotic doses is prevalent, posing a significant challenge in combating antimicrobial resistance.

Education level emerges as a crucial factor influencing antibiotic knowledge, with individuals with higher education attainment demonstrating greater awareness of antibiotic-related issues.

Ethnic disparities in knowledge are apparent, suggesting the need for targeted interventions to ensure equitable access to antibiotic education and information across diverse communities.

Moreover, participants from urban and suburban areas exhibit higher levels of antibiotic knowledge compared to those in rural regions, highlighting the importance of tailored educational campaigns to reach populations in remote areas.

The study also reveals concerning practices such as discarding leftover antibiotics and administering them to pets, further emphasising the urgency of promoting responsible antibiotic use and disposal practices to mitigate the risk of antimicrobial resistance.

Wong LP et al. (2021)



personalise

EMPHASISE TO MAXIMISE

Humans are naturally more invested when issues directly relate to them. That is why, messaging regarding antimicrobial resistance should highlight how AMR can impact individuals and the personal risk AMR poses on future treatments.

Serious illness

AMR strains of bacteria and other pathogens can cause severe and often life-threatening diseases, complicating treatment and recovery processes.

Prolonged hospitalisation

Patients infected with AMR pathogens may require extended stays in healthcare facilities for comprehensive management and monitoring, leading to increased strain on healthcare resources and infrastructure. Earlier observational studies have indicated that the presence of third-studies of cephalosporin resistance and fluoroquinolone resistance in Gram-negative bacterial bacteraemia is linked to extended lengths of stay compared to cases involving susceptible strains.

Escalation of healthcare costs

Treating infections caused by AMR strains often necessitates the use of more expensive medications, extensive diagnostic procedures, and prolonged hospital stays, contributing to elevated healthcare expenditure at both individual and societal levels. When coupled with antimicrobial resistance (AMR), healthcare-associated infections incurred substantial additional healthcare costs and impacted the turnover rate of hospital beds. The majority of the escalated medical expenses were borne by patients and their families.

Increased likelihood of treatment failures

Persistent infections, also referred to as chronic infections, frequently occur due to antibiotic treatment failures, as these infections are inadequately cleared by the host's immune system. AMR undermines the efficacy of conventional antimicrobial treatments, resulting in a higher incidence of treatment failures, recurrent infections, and prolonged illness duration, posing significant challenges to clinical management and patient outcomes.

unveil the unseen

MAKE THE INVISIBLE VISIBLE

While the majority of messaging about AMR focuses on the numbers and generic examples, a more effective strategy would be to tell the personal stories of the devastation caused by drug-resistant infections on individual lives. We should also highlight the findings of local research.

A case report

A 19-year-old army officer who presented with fever and respiratory symptoms for 5 days. He had no known medical illness before and no history of hospitalization. Upon arrival, he was in septicaemic shock requiring invasive ventilator support and renal replacement therapy in ICU. Chest X-Ray showed bilateral lung consolidations and bronchoscopy revealed haemoserous and greenish bronchiole secretion. He was treated with broad spectrum antibiotics and oseltamivir. Unfortunately, he died on day 3 of hospital admission. His bronchial lavage culture came back positive for MDR *Acinetobacter baumannii*.

AMR in Segamat

A team from Monash University Malaysia has identified a prevalent presence of antibiotic resistance in the faecal matter of individuals residing in Segamat. This suggests the existence of antibiotic-resistant bacteria within the community's gastrointestinal tract, a common scenario in the area. Notably, there was no discernible association with dietary habits or ethnic backgrounds, implying that all individuals are equally susceptible. While faeces naturally harbour bacteria, the presence of antibiotic resistance among these bacteria could present a significant risk if they were to migrate beyond the digestive system into other bodily regions. Such a scenario could render resulting infections challenging to treat.



working together

IT TAKES A VILLAGE

Another common mistake when delivering talks or information on AMR is to focus only on doctors within the hospital walls as the target audience. In order to ensure more effective messaging it is important to note that the actual intended demographic exceeds beyond that to include primary care providers, medical students and even members of the public.

A study by Lim et al. (2022) on the findings of **A Clinical Audit and Impact of Interventions on Antibiotic Prescribing Practices at a Public Dental Primary Care Clinic** found that the antibiotic prescribing practices in the clinic of study did not closely adhere to current guidelines. However, clinical audit in conjunction with targeted interventions resulted in improvement in the antibiotic prescribing patterns. Thus highlighting the fact that not all clinics follow antibiotic prescribing guidelines but are more motivated to do so if regularly audited.

In a study by M. Haque et al. (2019) titled **Self-medication of antibiotics: investigating practice among university students at the Malaysian National Defence University**, 39.3% reported self-medicating with antibiotics. Cost savings and convenience were the principal reasons for self-medicating with antibiotics (SMA), which were mainly obtained from local retail pharmacies. Despite medical students (particularly the more senior) having better knowledge of antibiotic use than non-medical students, 89% of all research participants responded that practicing SMA was a good/acceptable practice.

Aslam et al. (2021) noted similar findings, which they reported in **Self-Medication Practices with Antibiotics and Associated Factors among the Public of Malaysia: A Cross-Sectional Study**. Among the participants, 15.1% admitted to self-medicating with antibiotics. Additionally, 23.1% reported using antibiotics at least once within the last six months. A significant majority, comprising 64.8% of participants, disclosed that they obtained their antibiotics from pharmacies. The primary reasons cited for antibiotic use were to save money, with 19.2% stating this as a motive, and to save time, which was mentioned by 23.1% of respondents.

These examples indicate a need to address the various groups when addressing AMR issues.

social media

THE HOTTEST PLACE IN TOWN

In this digital era, social media platforms have become integral aspects of individuals' daily routines, facilitating continuous connectivity with their networks and the broader global community. The prevalence of social media usage has witnessed a significant surge in recent times, with platforms such as Facebook, Instagram, and TikTok emerging as the main choices among Malaysians.

Presently, social media serves as a primary source for a myriad of activities, ranging from exploring the latest fashion trends to staying updated with current events and news among Malaysian users.

Fully utilising social media is crucial for effectively disseminating messages about antimicrobial resistance (AMR). With the widespread use of platforms like Facebook, X (formerly Twitter), and Instagram, social media offers a vast reach and the ability to engage diverse audiences.

In 2023, the three most popular social media platforms in Malaysia were WhatsApp, Facebook, and Instagram. WhatsApp was the most widely used social media platform in the country, with 89.3% of the population using it due to its convenience and familiarity, which appeals to users of all ages. Facebook (84.8%) and Instagram (74.3%) have a wide range of features that attract diverse audiences and keep them connected to everything around them. Although TikTok is becoming more popular among young people seeking entertainment, WhatsApp, Facebook, and Instagram's wide reach and integration into daily life cement their dominance in Malaysia's social media landscape.

By leveraging these platforms, public health authorities can deliver targeted and accessible information about AMR, including its causes, consequences, and preventive measures. Engaging content such as infographics, videos, and interactive quizzes can help capture users' attention and increase awareness about the seriousness of AMR. Furthermore, social media facilitates real-time communication and enables dialogue between healthcare professionals, policymakers, and the public, fostering collaboration in combating AMR.

Additionally, social media analytics provide valuable insights into audience demographics, preferences, and engagement levels, allowing for more tailored and effective messaging strategies. Overall, fully harnessing the power of social media can play a pivotal role in raising awareness, promoting behaviour change, and ultimately mitigating the impact of AMR on a global scale.



conclusion

CHANGE IS GOOD

A transformative shift in the delivery of messaging regarding antimicrobial resistance (AMR) is essential. The time is now. Globally, the escalating threat of AMR demands urgent action to raise awareness and foster behavioural change. Locally, communities must grasp the gravity of AMR's impact on public health and healthcare systems, necessitating targeted interventions tailored to regional contexts. Personal narratives humanise the issue, illustrating the profound consequences of AMR on individuals, families, and communities. Moreover, harnessing the full potential of social media platforms is crucial for disseminating accurate information, engaging diverse audiences, and mobilising collective action. By embracing innovative approaches and leveraging the power of storytelling and digital connectivity, we can catalyse a paradigm shift in public perception and behaviour towards combatting AMR, safeguarding both current and future generations.

It's not about using less antibiotics. It's about using the right antibiotic for the right diagnosis and for the right duration of time." -Susan Bleasdale

references

- *Antimicrobial Resistance Collaborators. (2022). Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. The Lancet; 399(10325): P629-655.*
- *Church NA, McKillip JL. Antibiotic resistance crisis: Challenges and imperatives. Biologia. 2021 May;76(5):1535-50.*
- *Drug-Resistant Infections: A Threat to Our Economic future (March 2027)
<https://www.worldbank.org/en/topic/health/publication/drug-resistant-infections-a-threat-to-our-economic-future>*
- *Dwiyanto J. The gut microbiota of a Malaysian community: Characterisation of extended-spectrum β -lactamase-producing Escherichia coli and amplicon sequence analysis (Doctoral dissertation, Monash University).*
- *Haque M, Rahman NAA, McKimm J, Kibria GM, Azim Majumder MA, Haque SZ, Islam MZ, Binti Abdullah SL, Daher AM, Zulkifli Z, Rahman S, Kabir R, Lutfi SNNB, Aishah Binti Othman NS. Self-medication of antibiotics: investigating practice among university students at the Malaysian National Defence University. Infect Drug Resist. 2019;12:1333-1351*

- *Iskandar K, Molinier L, Hallit S, Sartelli M, Catena F, Coccolini F, Craig Hardcastle T, Roques C, Salameh P. Drivers of antibiotic resistance transmission in low-and middle-income countries from a “one health” perspective –a review. Antibiotics. 2020 Jul 1;9(7):372.*
- *Langford, B., Matson, K., Eljaaly, K., Apisarnthanarak, A., Bailey, P., MacMurray, L., Bearman, G. (2022). Ten ways to make the most of World Antimicrobial Awareness Week. Antimicrobial Stewardship & Healthcare Epidemiology, 2(1), E187. doi:10.1017/ash.2022.320*
- *Lim SW, Awan DB, Maling TH. A Clinical Audit and Impact of Interventions on Antibiotic Prescribing Practices at a Public Dental Primary Care Clinic. Archives of Orofacial Science. 2022 Jun 1;17(1).*
- *Liu X, Cui D, Li H, Wang Q, Mao Z, Fang L, Ren N, Sun J. Direct medical burden of antimicrobial-resistant healthcare-associated infections: empirical evidence from China. Journal of Hospital Infection. 2020 Jun 1;105(2):295-305.*
- *Suzuki H, Perencevich EN, Nair R, Livorsi DJ, Goto M. Excess length of acute inpatient stay attributable to acquisition of hospital-onset gram-negative bloodstream infection with and without antibiotic resistance: a multistate model analysis. Antibiotics. 2020 Feb 23;9(2):96.*

Antibiotic resistance threatens to render our most potent medical treatments ineffective, jeopardising not only individual health but also public health on a global scale. Yet, despite its severity, antibiotic resistance is often misunderstood or overlooked by the public. This e-book aims to bridge that gap by providing clear, concise, and persuasive messaging strategies to engage diverse audiences.

Whether you are a healthcare professional, educator, policymaker, or simply someone passionate about raising awareness, the insights and techniques outlined in this ebook will empower you to convey the urgency of antibiotic resistance in a compelling and impactful manner. Together, we can inspire action, promote responsible antibiotic use, and safeguard the effectiveness of these life-saving medications for generations to come.

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