A Review on the Steps to Improve Antimicrobial Prescribing in Developing Countries

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Abstract

Antimicrobial resistance (AR) is an anticipated threat to the globe, measures taken by developing countries to combat this problem are insufficient. If neglected, many surgical procedures and treatments that exist today could come to a standstill, because all of those carry a sizeable risk of infection. An enormous majority of the global population could die from infectious diseases. This review emphasizes the significance of an antimicrobial stewardship team in the hospitals of developing countries as well as the steps to be taken to drive it forward. The pace at which antimicrobial resistance develops will multiply if hospitals fail to impose restrictions on antimicrobial prescribing. The nonchalant attitude of hospital administrations, infection control committees have a significant impact on this situation. To delay the accelerated progression of AR there should be further developments made in the field of diagnostic testing and alternatives to antimicrobial treatments. There should also be more trials conducted, to determine the effectiveness of antimicrobial stewardship, and the same should be implemented if possible, in every clinical setting. Clinical Pharmacists are undoubtedly the key to propel this movement towards Antimicrobial Stewardship.

KEYWORDS: *Antibiotic Resistance; Antimicrobial Stewardship; developing countries*

Antibiotic resistance

Antibiotic resistance (AR) is a high-priority cause for apprehensions about future medical treatments and patient care worldwide.

Antibiotic resistance develops when the bacteria intended to be killed upgrades itself to thrive even in the presence of the antibiotic.

According to the review of 2016 on AR,

Ten million people around the world could die from AR-related infections.

The progress of this forthcoming reality can be slowed down only if there is a halt to the pressure imposed on medical practitioners to prescribe antibiotics when it's veritably unnecessary and by hindering the food industry from fattening poultry with antibiotics.[1]

There are three categories of antibiotic-resistant organisms[2]

Multi-drug resistant (MDR) organisms

non-susceptible to at least one antibiotic in three or more classes;

Extensively drug-resistant (XDR) organisms

non-susceptible to at least one antibiotic from almost all classes of antibiotics, excluding one or two classes;

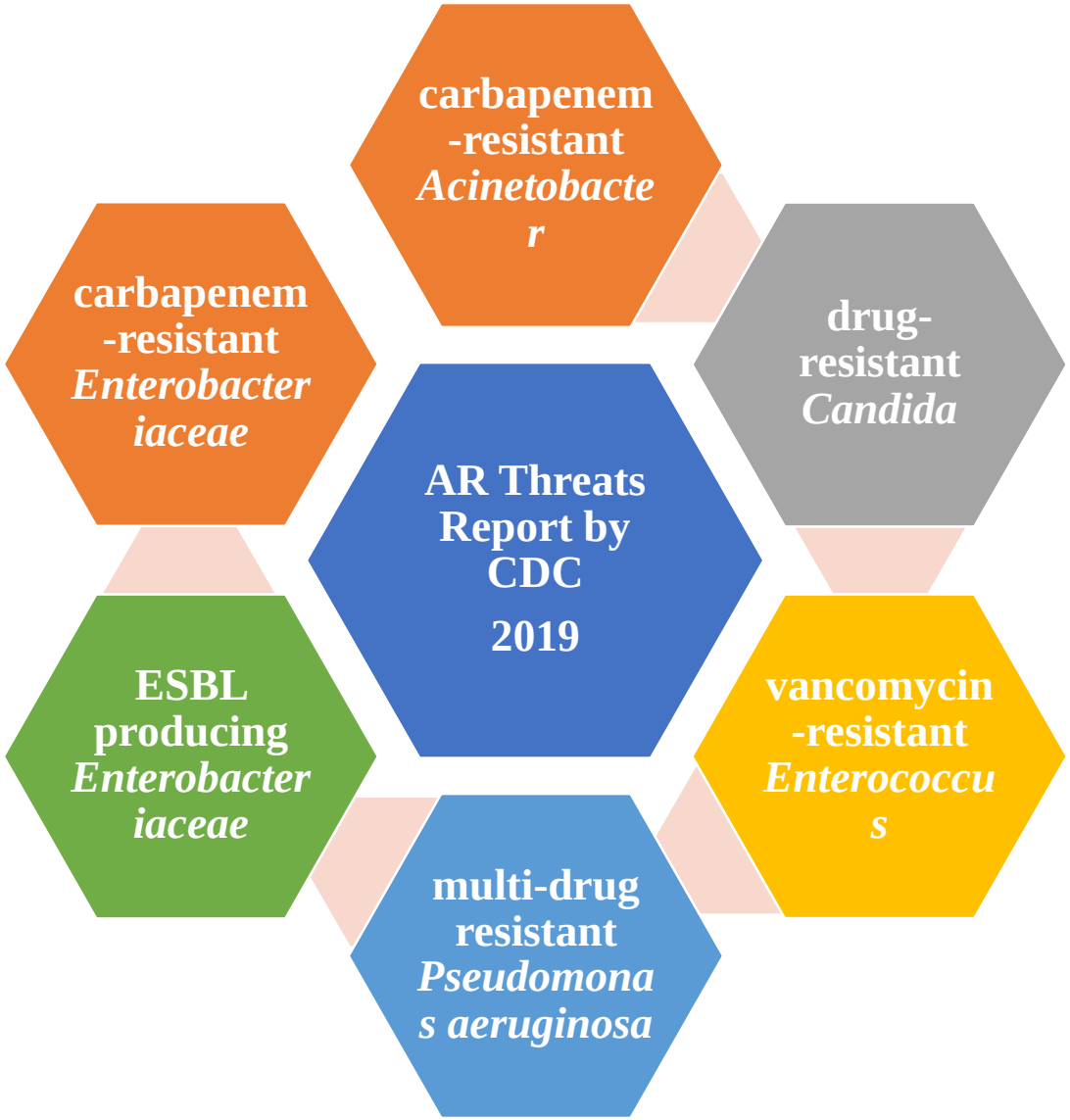
Pan drug-resistant (PDR) organisms

non-susceptible to at least one antibiotic from all antibiotic classes.

Modes by which antibiotic-resistant bacteria can spread [3]

- Contaminated surfaces
- Water
- Air
- Sexual contact
- Animals
- Close contact with infected persons

Organism requiring urgent and serious action [3]



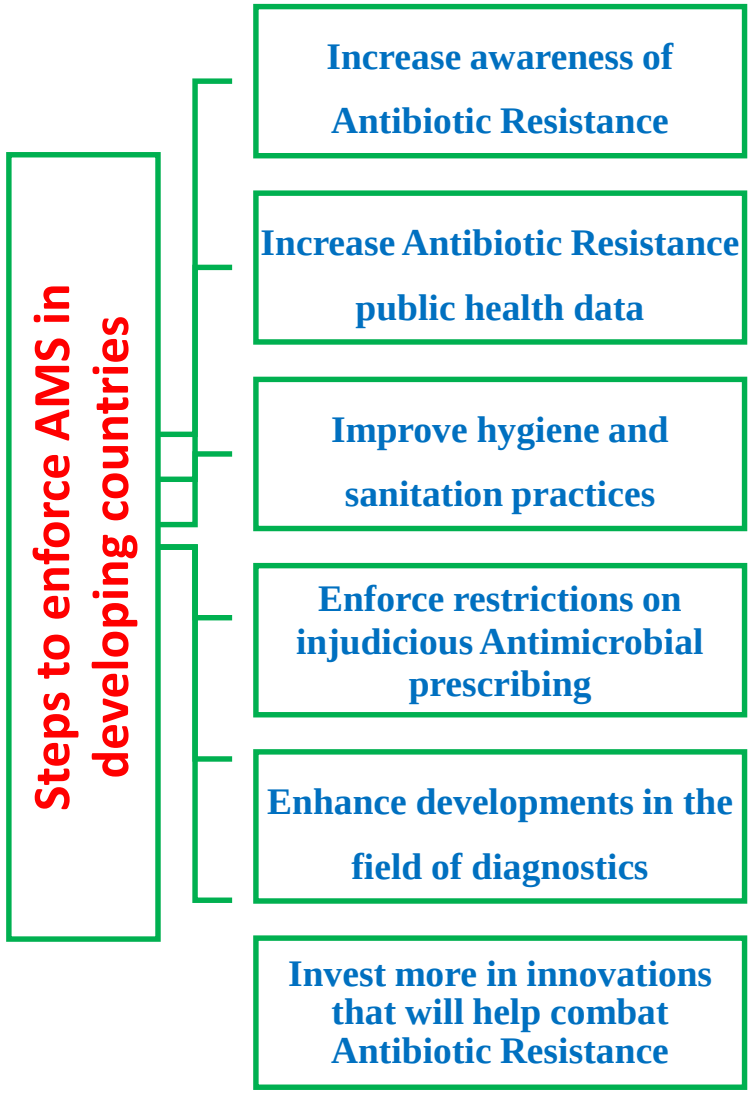
THE SOLUTION: ANTIMICROBIAL STEWARDSHIP

To move through the right trajectory, the Global Action Plan on Antimicrobial Resistance (2017) listed '**antimicrobial stewardship**' as one among its objectives. The importance of commencing this at a global, national, hospital and community level has been emphasized. With proper AMS practices implemented, antimicrobial products will be under strict vigilance; right from the inception of the drug molecule to its ultimate consumer.[3]

The Infectious Diseases Society of America (IDSA) has defined antimicrobial stewardship is a 'coordinated program that promotes the appropriate use of antimicrobials (including antibiotics), improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by multidrug-resistant organisms'. Evidence-based guidelines form the backbone of these programs.[4]

DISCUSSION

Steps to enforce Antimicrobial Stewardship in the Developing Countries



Increase the awareness of AR

The first and foremost measure to be exercised is to increase the awareness of AR rigorously from square one: starting from drug developers to the health care providers and patient population. It is only through enough knowledge and perception of this predicament in general, that the right decision can be made. To achieve this, there should be more emphasis on national awareness via social media and public platforms. McNulty *et al.* conducted a study to determine whether interactive antibiotic workshops would improve antibiotic prescription among general practitioners. Results revealed a considerable improvement in antimicrobial prescription.[5]

Increase AR public health data in developing countries

To gather sufficient public health data on food-borne antimicrobial-resistant organisms, an integrated antimicrobial surveillance programme is necessary. To stop the spread of resistant bacteria, developing countries should implement wide vaccine coverage. With the help of the AMS team who holds expertise in the latest standard guidelines; regional and global drifts in the occurrence of AR among the human population will be updated to prescribing physicians.[6]

Improve hygiene and sanitation practices

A huge amount of exhausting-to-treat antimicrobial-resistant infections occur inside hospitals. The lack of proper hygiene and sanitation measures is the constituents to blame. There has to be easy availability of alcohol-based rubs to physicians, healthcare workers and patients within hospitals. Awareness of why it is essential to wash and sanitize hands thoroughly should be taught. A study on adherence to hand hygiene by nurses after proper training was conducted by Graveto *et al.* in Portugal.[7] Additional studies such as these will benefit the population of developing countries. Moreover, people should be conversant of infectious diseases transmitted through sex, abuse of needles, food and water.

Enforce restrictions on injudicious antimicrobial prescribing

Stringent control measures have to be laid to control inappropriate antimicrobial prescribing as well as dispensing. One of the most effective methods, to put reins on the prescribing of antimicrobials, is antimicrobial restriction via formulary limitations or by demanding justification for the particular choice of antimicrobial, and prospective audit with feedback. LOS or length of stay in the hospital is a significant parameter to measure AMS outcome. With decreased LOS, there is a substantial decrease in healthcare costs involved and the risk of adverse event occurrence.[8]

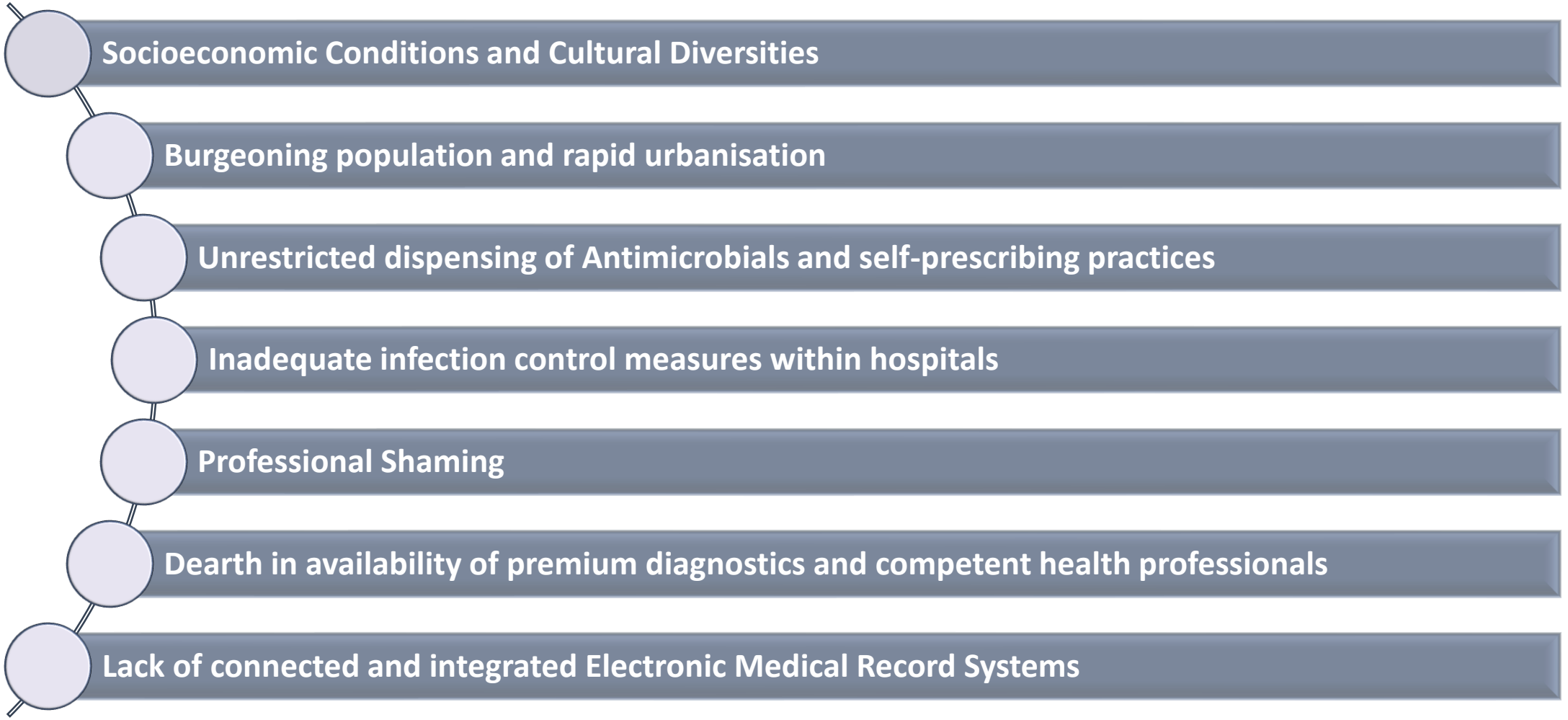
Enhance developments in the field of diagnostics

Suitable antimicrobial selection cannot take place without a timely diagnosis of the causative pathogen and a laboratory that stays in a constant vigil of hospital AR. Despite advancements in the field of diagnostics, it fails to reach the clinical care ground. Rapid diagnosis helps tailor therapy to appropriate antimicrobial agents and result in improved patient outcomes.[9]

Invest more in innovations that will help combat AR

Extended time, research and financial investments in the innovation of new antimicrobials, diagnostic tools and interventions are inevitable. Research and development of antimicrobials are blackballed due to the swift development of resistance and hence limited return of invested effort and money. There is insufficient research, in the field of AR within developing countries. With a further focus on studies comparing clinical trial outcomes: LOS, decreased duration of antibiotic therapy (ABT), and incorporation of primary care prescribing feedback; AMS programs can be strengthened.[10]

The Limitations conferred in developing settings



CONCLUSION

Every country has its limitations and yet, to put them all aside and bring about transformation lies in the hands of healthcare professionals.

With an increasing bulk of health-science professionals and paramedics emerging, there is no reason to refrain from eliminating the faults of the present healthcare system. Many hands make light work.

Conducting more randomised clinical trials to determine the impact of antimicrobial stewardship services is crucial.

There should be more innovations in the field of diagnostic testing: to confirm the effectiveness of drug therapy; to sound the alarm on time in case of emerging resistant pathogens; to reduce the time taken to identify the causative pathogen.

Despite the hurdles and limitations faced by resource-limited settings, standing up to fight on this barbaric microbial battleground is imperative.

REFERENCE

1. O' Neil J. Tackling drug-resistant infections globally: An overview of our work. Review onAntimicrobial Resistance. 2016 Jan; p. 2-6. Available from: Tackling drug-resistant infections - An overview of our work_LR_NOCROPS.pdf (amr-review.org). Last accessed: 09 Mar, 2021.
2. Van Boeckel TP, Gandra S, Ashok A, Caudron Q, Grenfell BT, Levin SA, Laxminarayan R. Global antibiotic consumption 2000 to 2010: an analysis of national pharmaceutical sales data. Lancet Infect Dis. 2014 Aug;14(8):742-50.
3. Gill J, Arora S, Khanna S, Kumar KVS. Prevalence of multidrug-resistant, extensively drug-resistant, and pandrug-resistant Pseudomonas aeruginosa from a tertiary level Intensive Care Unit. J Glob Infect Dis. 2016 Oct 1;8(4):155–9.
4. Ma X, Xie J, Yang Y, Guo F, Gao Z, Shao H, et al. Antimicrobial stewardship of Chinese ministry of health reduces multidrug-resistant organism isolates in critically ill patients: a pre-post study from a single center. [cited 2020 May 25]; Available from: https://clinicaltrials.gov/ct2/show/NCT02128399?term=NCT02128399&rank=1

5. Nampoothiri V, Sudhir AS, Joseph MV, Mohamed Z, Menon V, Charani E, Singh S. Mapping the Implementation of a Clinical Pharmacist-Driven Antimicrobial Stewardship Programme at a Tertiary Care Centre in South India. Antibiotics (Basel). 2021 Feb 23;10(2):220.

6. Gross R, Morgan AS, Kinky DE, Weiner M, Gibson GA, Fishman NO. Impact of a Hospital-Based Antimicrobial Management Program on Clinical and Economic Outcomes. Clin Infect Dis. 2001 Aug 1; 33(3):289–95. Available from: https://academic.oup.com/cid/article-lookup/doi/10.1086/321880

7. Ghafur A, Mathai D, Muruganathan A, Jayalal J A, Kant R, Chaudhary D, et al. The Chennai declaration: A roadmap to tackle the challenge of antimicrobial resistance. Indian J Cancer. 2013; 50:71-323. https://ncdc.gov.in/WriteReadData/l892s/File622.pdf

8. National Centre for Disease Control. National Treatment Guidelines for Antimicrobial use in Infectious Diseases. Version 1.0 (2016). Available from: https://ncdc.gov.in/WriteReadData/l892s/File622.pdf Check ref style

9. de Jong E, van Oers JA, Beishuizen A, Vos P, Vermeijden WJ, Haas LE, et al. Efficacy and safety of procalcitonin guidance in reducing the duration of antibiotic treatment in critically ill patients: A randomised, controlled, open-label trial. Lancet Infect Dis. 2016; 16(7):819–27.

10. Cairns KA, Doyle JS, Trevillyan JM, Horne K, Stuart RL, Bushett N, et al. The impact of a multidisciplinary antimicrobial stewardship team on the timeliness of antimicrobial therapy in patients with positive blood cultures: a randomized controlled trial. Available from: https://academic.oup.com/jac/article-abstract/71/11/3276/2462049