

Antibiotic overuse and increasing antibiotic resistance – time to react

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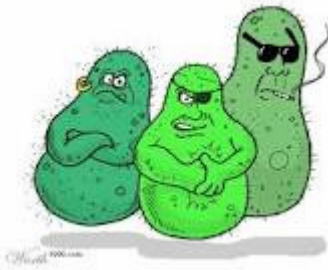
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Antimicrobials, Antimicrobial resistance, Post antibiotic era

- Discovery of antimicrobials/antibiotics revolutionized treatment of infectious diseases

- Soon develop



realized bacteria could
antimicrobial resistance

- AMR, a serious public health problem
- Infections could again become serious health problem



Downward trend in development of new antibiotics

- After 1970 very few new classes of antibiotics launched
- Topical antibiotic
 - Mupirocin 1985
 - Retapamulin 2007
- Systemic antibiotic
 - Linezolid 2000
 - Daptomycin 2003

Primary cause of AMR



- ❑ Resistance to antibiotic a natural phenomenon
- ❑ Indiscriminate and inappropriate use of antibiotics resulted in rapid increase and spread of AMR
- ❑ The reasons for drug pressure are multi-factorial and involve both human and animal use.



Rising antibiotic use

- Between 2005 and 2009, the units of antibiotic sold increased by about 40% in India (IMS data)
- Increased sales of cephalosporins were particularly striking, the sales increased by 60%
- Survey conducted in part of Delhi in 2004* and 2008# showed increase in use of cephalosporins

*Kotwani A, Holloway K, Roy Chaudhury R. Methodology for surveillance of antimicrobials use among out-patients in Delhi. *Indian Journal of Medical Research* 2009; 129: 555-560

#Kotwani A, Holloway K. Trends in antibiotic use among outpatients in New Delhi, India. *BMC Infectious Diseases* 2011;11.

Inappropriate antibiotic use



- ❑ Antibiotics cure bacterial but not viral infection
- ❑ Globally 20-50% of antibiotic use is inappropriate
- ❑ Globally, antibiotics are prescribed for many viral, self-limiting conditions
- ❑ Netherlands with minimum DDD/1000 inhabitant consumption in Europe, also has overprescribing of antibiotics (ABs) by general practitioners
- ❑ Similar data of overuse of ABs from the USA for URTI, sinus, etc.

Tracking antibiotic use and AMR

Developed country settings

- Extensive surveillance programs to track pattern of antibiotic use and AMR over time
- Swedish Program – STRAMA
- European Program – ESAC and EARSS
- Qualitative studies and intervention programs to check antimicrobial misuse
- Antimicrobial Stewardship Programs in U.S.A



Situation in developing countries



- Ability to undertake extensive surveillance is lacking
 - No quality database for antibiotic use
 - Problem of AMR has little recognition
- A reproducible and sustainable surveillance methodology needed for quantifying antibiotic use and resistance in the community
 - Investigating the reasons and factors underlying
 - Identify the barriers to behaviour change
 - Implementing and evaluating interventions

Steps in right direction...




- WHO collaborated 5 pilot projects in resource-constrained settings to develop reproducible and sustainable surveillance methodology for AB use(2002-05)
- Refined a methodology by conducting exit interviews*
- II phase of the study (2007- 2008), New Delhi, expanded the established methodology to a detailed community surveillance of antibiotic use#



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Findings from the survey.....

- The surveillance system successfully captured the pattern of antibiotic use (newer AB used), 
- Repeat survey could catch the change in trend of AB use over a period of time
- Same methodology was used to study pattern of antibiotic (mis)use in URI and acute diarrhea
- 43 to 57 per cent patients with URI and acute diarrhea* receive an antibiotic, though not needed

*Kotwani A, Roy Chaudhury R, Holloway K. Antibiotic prescribing practices of primary care prescribers for acute diarrhoea in New Delhi, India. *Value in Health*, 2012; 15: S116-S119.

Why this overuse of antibiotics?

Qualitative studies with doctors*, pharmacists#, community, high school children. Salient findings:

1. Lack of microbiology testing; Peer & commercial pressure
2. Doctors' perceived demand and expectation
3. Retail pharmacists copying the prescription of neighbourhood doctors and dispensing antibiotics for common conditions like cold, sore throat, and diarrhoea
4. Incentives for pharmacists to make a profit

#Kotwani A, et al. Irrational use of antibiotics and role of pharmacists:.....qualitative study New Delhi, India. *Journal of Clinical Pharmacy Therapeutics* 2011 Online published 23 AUG 2011

*Kotwani A, et al. Antibiotic use in the community: what factors influence primary care physicians to prescribe antibiotics in Delhi, India? *Family Practice* 2010; 27: 684-690

Antibiotic use in animals and poultry

- Antibiotics are used in livestock and poultry to control and treat diseases and,
- in low doses in animal feed, to promote growth and improve production of animal products
- Widespread use of antibiotics selects for resistance
- Antibiotics used in animal feed and used in human medicines are: penicillins, tetracyclines, macrolides
- Solution: phase out the use of antibiotics as routine animal feed additives; done in Europe, USA

Rules for antibiotic use in poultry, livestock, agriculture, food industry

- No regulation in India of the use of antibiotics in food animals such as poultry, dairy cows, and buffaloes raised for domestic consumption
- Prevention of Food Adulteration Rules (1995), Part XVIII: Antibiotic applies only to the use of antibiotics in certain types of seafood, and prohibits the use of certain antibiotics in the feed and medication of poultry intended for export only
- Effect of agricultural antibiotic use on resistance levels in the general population is not known

National policy for containment of antimicrobial resistance

- Front-page news of NDM-1 in 2010
- Task force of MoH, GOI prepared the national policy for containment of antimicrobial resistance, 2011 with objective to monitor AMR, steps to decrease the AMR & misuse of ABs in the country
- National policy available on National Centre for Disease Control website which is an institute under MoH

➤ Cont...

Highlights of policy

- For monitoring use and misuse of antibiotics: A separate Schedule H1 to be introduced, exclusively for sale of antibiotics. Color coding system and restricting access for third generation antibiotics and all newer antibiotics to tertiary care hospitals
 - Hospital based sentinel surveillance system for monitoring antibiotic resistance: Identifying one or more Central Institute at the national level as coordinating centers
 - Documenting prescription patterns and establishing a monitoring system for antibiotic use: Study the consumption patterns and trends of antibiotic use and data generated to be used for intervention studies for rational use of antibiotics
- Cont..

Highlights of policy...

- Enforcement and enhancement of regulatory provisions for use of antibiotics in human, veterinary and industrial use: Develop regulations on usage of antimicrobials in poultry and other animals as well as the requisite labeling requirements in food
- Promoting rational use of drugs: Various strategies are suggested to promote rational use of antibiotics
- Strengthening diagnostic for antimicrobial resistance monitoring: Appropriate diagnostic tools already known to be selected and new ones to be developed for rapid identification

Appropriate use of medicine

- Patients receive the appropriate medicines, in doses that meet their own individual requirements, for an adequate period of time and at the lowest cost, both to them and the community (WHO)
- Definition true for antibiotic
- Inappropriate use of antibiotic when one or more of or more of these conditions are not met



Appropriate antibiotic prescribing & inappropriateness in antibiotic use

1. Prescriber

- Appropriate indication
- Appropriate antibiotic
- Appropriate patient
- Appropriate information



2. Pharmacists

- Prescribe and dispense antibiotics in developing countries

3. Patients

- Incomplete doses
- Self-medication



How to move ahead.....

- Inappropriate antibiotic use in the community? YES

We need to do

- Measure, monitor antibiotic use and AMR
- Factors responsible at all stakeholders
- Committed program for intervention & monitor
- Required **political commitment and multidisciplinary team**



Recommended national policies

- National policies, as well as interventions, can influence the appropriate use of antibiotics
- WHO recommended policies for RUM, including AB
 - Established a mandated multidisciplinary national body to coordinate policies on surveillance of antibiotic use and resistance in hospitals and community
 - Establishing hospital antibiotic committees or infection control committees
 - Develop and using evidence-based clinical guidelines for antibiotic use

➤ Cont..

Recommended national policies

- Developing list of essential medicines (EML), consistent with clinical guidelines, which are used in medicine procurement and insurance or any reimbursement programs
- Establishing drug (medicine) and therapeutics committees
- Increasing & establishing microbiological testing, (public sector)
- Restricting use of ABs in agriculture, poultry, and livestock; education of farmers and other stakeholders
- Implementation of no AB sale without a valid prescription
- Awareness programs for doctors, nurses, dentists, pharmacists, veterinarians, and community for misuse of antibiotics, antimicrobial resistance, and impact of antimicrobial resistance

Prescribing cost-effective antibiotics

Price variation between highest-price and lowest-priced antibiotic available at private retail pharmacies in NCT, Delhi *
(median price for one tablet or one ml in INR)

	Amox+Clav Syrup	Amox+Clav Tab	Cefixi- -me	Cefurox -ime	Ciproflo- -xacin	Doxycy- -cline	Ofloxa -cin
Highest-priced	3.64	40.17	19.81	43.1	9.27	4.86	8.81
Lowest-priced	1.58	11.99	9.9	24.3	4.85	0.95	4.62

*Survey conducted in NCT, Delhi using a standardized methodology of WHO/HAI for medicines prices and availability (Kotwani A, December 2011)

Role of media



- Very important and pivotal role for creating awareness for rational use of antibiotics and AMR
- Coverage to research papers on inappropriate use of antibiotics; publish the interviews of researchers working on AB use and AMR; Publish the rules and laws of other countries who are taking measures to improve use of antibiotics; Data on cost-effective antibiotics to be published; Panel discussions and talks with all stakeholders.....

Conclusions



- ❑ Antibiotics are indeed wonder drugs
- ❑ Use antibiotics judiciously
- ❑ Save the newer generations of antibiotics for next generations and severely ill patients

