Pharmacology Perspective on AMS

Ministry of Health & Family Welfare Government of India

Misuse of **ANTIBIOTICS** puts us all at risk.

Taking antibiotics when you don't need them speeds up antibiotic resistance. Antibiotic resistant infections are more complex and harder to treat. They can affect anyone, of any age, in any country.

Always seek the advice of a healthcare professional before taking antibiotics.

HANDLE **ANTIBIOTICS** WITH CARE

World Health Organization
India

Definition of AMS

Antimicrobial stewardship has been defined as

"the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance."

Stewardship Goals

- Reducing length of stay.

- Reducing duration of surgical prophylaxis.

- Restricting or limiting specific antimicrobials to reduce inappropriate use.

Process for the Development of Hospital Antibiotic Policy
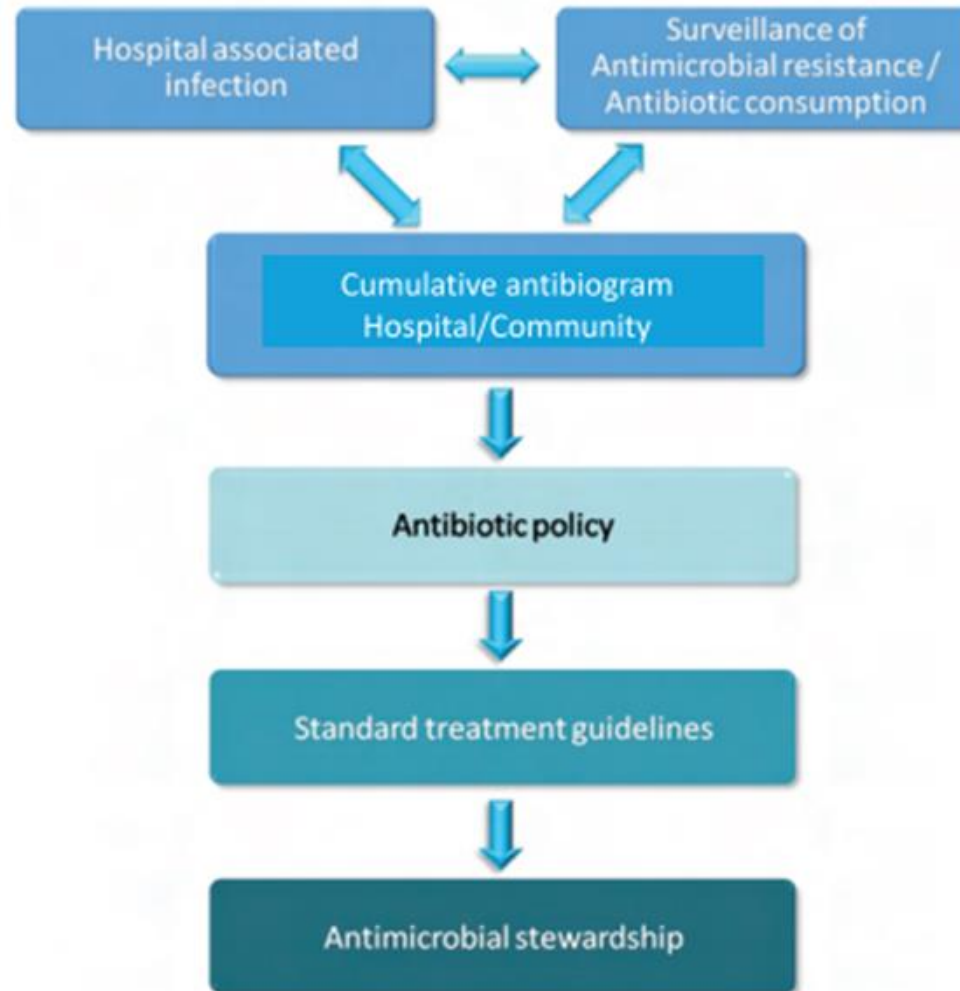
Aims of the Antibiotic Policy

- **To select patients - need to be treated.**

- **To have all antibiotics available.**

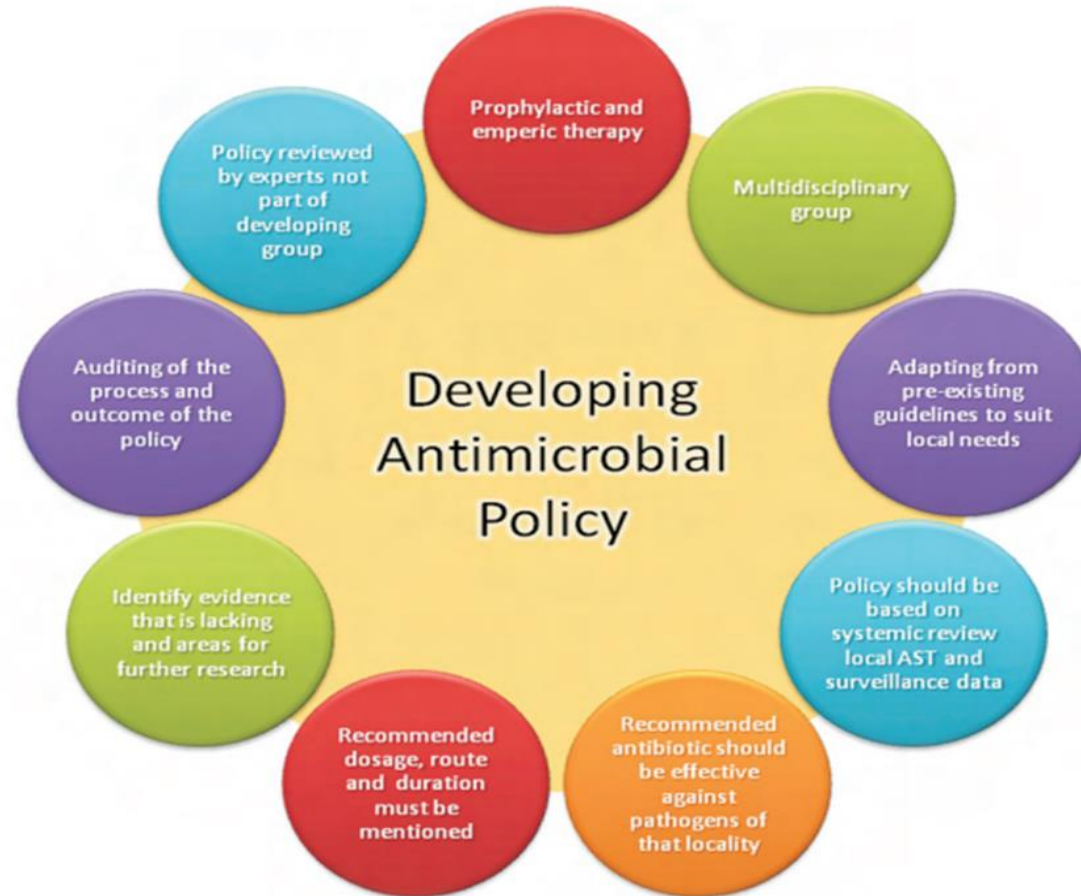- **Avoid unnecessary antibiotic use.**

Bases of Antibiotic Policy

- **Spectrum of antibiotic activity.**
- **Pharmacokinetics /Pharmacodynamics.**
- **Adverse effects.**
- **Potential to select resistance.**
- **Cost.**
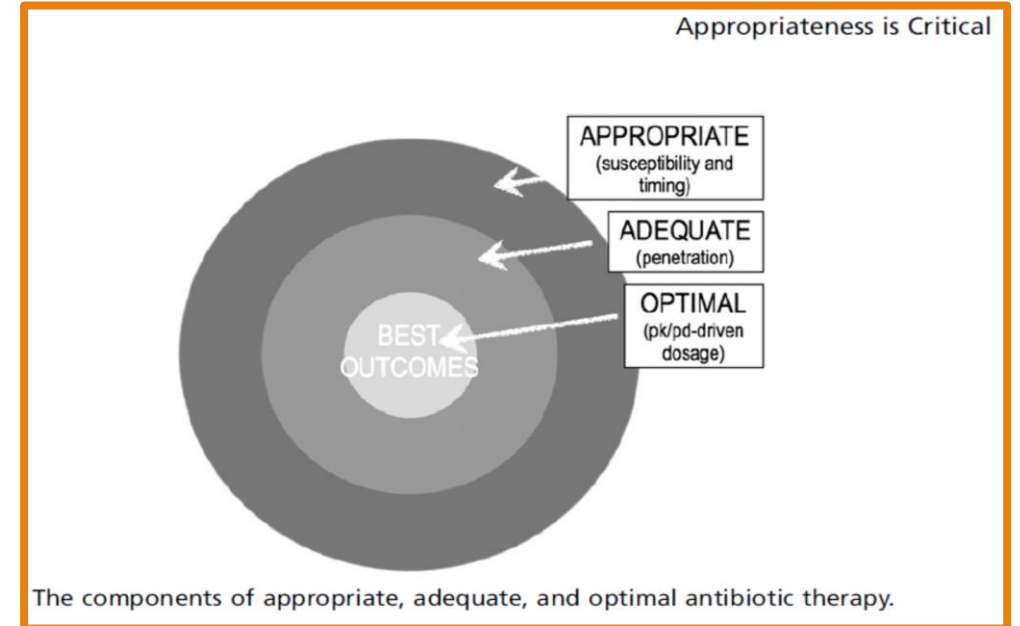- **Special needs of individual patient groups.**

Key elements of Hospital Antibiotic Policy

Principles of Empiric Antibiotic Therapy

- **Is the patient infectious?**
- **Which organ is sick?**
- **Which antibiotic should we use?**
- **What dose should we use?**

Appropriateness is Critical

APPROPRIATE
(susceptibility and timing)

ADEQUATE
(penetration)

OPTIMAL
(pk/pd-driven dosage)

BEST OUTCOMES

The components of appropriate, adequate, and optimal antibiotic therapy.

4 "Ds"

Joseph and Rodvold wrote about the "4 D's of optimal antimicrobial therapy":

right Drug,

right Dose,

De-escalation to pathogen-directed therapy, and

right Duration of therapy.

ANTIMICROBIAL STEWARDSHIP
Surgical prophylaxis algorithm

Clean surgery
Involving placement of a prosthesis or implant

Clean contaminated surgery

Contaminated surgery

Surgical Prophylaxis
ONE DOSE*[1]
Within 60 minutes before knife to skin[2]

Redose for long surgical procedures
Intraoperative redosing is needed to ensure adequate serum and tissue concentrations of the antimicrobial if the duration of the procedure exceeds two half-lives of the antimicrobial or there is excessive blood loss (i.e., >1500 mL in adults[3] or >25ml/kg in children). A treatment course of antibiotics may also need to be given (in addition to appropriate prophylaxis) in cases of dirty surgery or infected wounds[3]. The appropriate use and choice of antibiotics should be discussed with infection specialists for each case.

DOCUMENT ALL DECISIONS

Why is patient risk stratification needed ?

Not all patients admitted in tertiary care hospitals need broadest spectrum antibiotics.

Risk stratification helps us to decide who needs narrow spectrum , broad spectrum and broadest spectrum

Risk Stratification

A. Contact with the health care system
1. no contact
2. contact with health care (e.g., recent admission, nursing home, dialysis) without invasive procedures
3. long hospitalization and/or invasive procedures

B. Antibiotic treatment
1. no treatment
2. recent treatment

C. Patient characteristics
1. young, few comorbid conditions
2. old or multiple comorbidities
3. cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency

Figure 5. Risk stratification based on an assessment of the degree of contact between patients and the health care system, prior antibiotic treatment, and patient characteristics.

Adapted from Carmeli Y. Predictive factors for multidrug-resistant organisms. In: *Role of Ertapenem in the Era of Antimicrobial Resistance* [newsletter]. Available at: http://www.invanz.co.il/secure/downloads/IVZ_Carmeli_NL_2006_W-226364-NL.pdf. Accessed 7 April 2008;
Dimopoulos G, Falagas ME. *Eur Infect Dis*. 2007;49–51; Ben-Ami R, et al. *Clin Infect Dis*. 2006;42(7):925–934; Pop-Vicas AE, D'Agata EMC. *Clin Infect Dis*. 2005;40(12):1792–1798; Shah PM. *Clin Microbiol Infect*. 2008;14(suppl 1):175–180.

"Antibiotic Care Bundles"

- **Site of Infection**

- **Risk stratification for MDRs**

- **Local microbiology data**

- **De-escalation**

Combine all four to make education and "Evidence based" antibiotic protocol

How to optimize therapy based on PK/PD

Time dependent antibiotics:

1. Give frequent doses
2. Give prolonged infusion

Concentration dependent antibiotics

1. Give single shot of high dose

Conclusion

- **Overall understanding on all class of antibiotics & related issues of resistance.**

- **Emphasis on local microbiology data to select right antibiotics.**

- **Patients' risk stratification to evaluate patient's condition & suspect antimicrobial resistance.**

- **De-escalation strategy to optimize appropriate antibiotic right from the first dose.**

Thank You!