Prevention and Containment of Antimicrobial Resistance

USE ANTIBIOTICS RATIONALLY
Resistance in microbes is a natural phenomenon

- Resistance is unresponsiveness to antimicrobial agents in standard doses
- A natural biological unstoppable phenomenon
- Resistance is generally slow to reverse or irreversible
- All antimicrobial agents have the potential to select drug-resistant subpopulations of microorganisms
Resistance is accelerated through inappropriate use of antimicrobials

- Standard treatment guidelines not provided to physicians or provided but not adhered to
- Drugs available without prescription
- Accessible but poor quality
- Inadequate monitoring
- Irrational self-administration or prescription

Antimicrobial resistance
Resistance is fallout of inappropriate use of antimicrobials in different settings

- In animals and plants:
  - Therapeutic and non-therapeutic (e.g. as growth promoters)
- In community acquired infections
- In hospital-associated infections

- Irrational use of antibiotics is the greatest driver of resistance
  - 50% of antibiotics are prescribed inappropriately
  - 50% of patients have poor compliance
  - 50% of populations do not have access to essential antibiotics
Resistant organisms also move rapidly across borders through humans and the food-chain

- Two outbreaks of methicillin-resistant *Staph. aureus* (MRSA) in hospitals in Canada
  - Origin in North India
- Multidrug-resistant typhoid fever in USA
  - Originated in 6 countries (including India)
- MDR *Salmonella schwarzengrund*
  - Imported through Thai food into Denmark and the USA
- Multidrug resistant *Mycobacteria*
- Resistant malaria at Thai-Cambodia border
- Resistance in H1N1 and HIV are global concerns
Resistance is negating “wonder” drugs
Status of resistance in WHO’s South-East Asia Region

- **Tuberculosis**
  - MDR-TB < 3%: 180000 cases annually
  - XDR-TB: Reported from Bangladesh, India, Indonesia, Thailand
Status of resistance in WHO’s South-East Asia Region

- Malaria

- 400 million people at risk of infection with resistant parasites
Status of resistance in WHO’s South-East Asia Region

- HIV and STIs
  - Data on HIV resistance being generated
  - STIs: Gonorrhoea widely resistant to penicillin & fluoroquinolones
Status of resistance in WHO’s South-East Asia Region

- Kala-azar

- 60% resistance in pentavalent antimony and 25% in pentamidine
Status of resistance in SEAR-2 epidemic prone diseases

- **Cholera**
  - Resistance to Nalidixic acid, fluorazolidone, cotrimoxazole: India
  - Tetracycline resistance: India

- **Shigellosis**
  - Multidrug resistant, causing extensive outbreaks

- **Typhoid fever**
  - MDR *Salmonella typhi* prevalent all over Region
  - Causing 10% Case Fatality Rate (CFR) in children (preantibiotic era: 12.8%)

- **Acute respiratory infections (pneumonias)**
  - 69% of *Strept pneumoniae* resistant to penicillin in Thailand
Status of resistance in SEAR-3
Hospital-associated infections

- **Staphylococcus aureus**
  - >50% isolates in hospitals are methicillin-resistant
  - 48% of patients with bacteraemia died in Thailand

- **Acinetobacter baumannii**
  - >50% of patients infected with resistant strains die

- **Pseudomonas, Klebsiella, Serratia**
  - Multidrug-resistance, persist in hospital settings, and cause huge mortality morbidity
Resistance has huge negative impact on health

- Longer duration of illness
- Longer treatment
- Higher mortality
- Treatment with expensive drugs
- Increased burden on health system
- Negates technological advances in medical sector
  - Complex surgeries
  - Transplantations and other interventions
- Patient acts as reservoir of resistant organisms which are passed to community and health-care workers
- Huge economic impact
Resistence: A global public health issue

- **ECDC:** “antimicrobial resistance is possibly the single biggest threat facing the world in the area of infectious diseases.”
- IHR (2005)
  - PHEIC
- World Alliance on Patient Safety Challenge III
- MDGs (HIV, TB and Malaria)
- Essential Drugs List (use in 120 countries)
- Several WHA Resolutions on rational use of drugs/antimicrobial resistance but little progress
  - WHA37.33
  - WHA51.17
  - WHA54.11
  - WHA58.27
Resistance is a multifaceted problem

- Biological
- Behavioural
- Technical
- Economic
- Regulatory
- Educational
Superbugs* are visible manifestations of our prolonged failure to preserve antibiotics

**Methicillin resistant *Staph aureus*, MDR-and XDR Mycobacteria, ESBL producing Gram negative bacteria and NDM-1 producing enterobacteriaceae bacteria are few examples of superbugs because these fail to respond to large number of commonly used antibiotics.
Possible solutions

- Discover new drugs faster than emergence of resistance
- Rationalize the use of available antimicrobial agents
- Prevent emergence of resistance by reducing selection pressure by appropriate control measures
- Promote discovery, development and dissemination of new antimicrobial agents
Bad bugs need new drugs
Possible solutions

- Discover new drugs faster than emergence of resistance
- Rationalize the use of available antimicrobial agents
- Prevent emergence of resistance by reducing selection pressure by appropriate control measures
- Promote discovery, development and dissemination of new antimicrobial agents

Implementation requires a strategy with comprehensive national initiatives/plans
Regional Strategy on Antimicrobial Resistance

**Goal:** To minimize the morbidity and mortality due to antimicrobial-resistant infection and to preserve the effectiveness of antimicrobial agents in the treatment and prevention of microbial infections.

*Rational Use of Antibiotics*
## Major activities

<table>
<thead>
<tr>
<th>Governance</th>
<th>Regulatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of <strong>national alliances</strong></td>
<td>Development and application of <strong>standard treatment guidelines</strong></td>
</tr>
<tr>
<td>against AMR</td>
<td>in health and veterinary sectors</td>
</tr>
<tr>
<td>Designation of national focal points in</td>
<td>Discourage non-therapeutic use of drugs in animals</td>
</tr>
<tr>
<td>MoH</td>
<td>Restrictions on over-the-counter sale of antimicrobial agents</td>
</tr>
<tr>
<td>Constitution of multisectoral National</td>
<td></td>
</tr>
<tr>
<td>Steering Committee</td>
<td></td>
</tr>
</tbody>
</table>

| Capacity building                         |                                                                              |
|                                           | **Surveillance** of antimicrobial use and resistance                        |
|                                           | Training prescribers for rational use of antimicrobials                     |
|                                           | Reducing disease burden and infection control                              |
|                                           | Undertaking operational research                                           |

| Community participation                   |                                                                              |
|                                           | **Educating** for adherence to recommended regimens                        |
|                                           | Discouraging self-prescription                                              |
Will it work???
(There are success stories from Finland, France and some hospitals in the SEA Region)

Antibiotics are a precious resource

We need to preserve this resource by working together

Combating antimicrobial resistance: No action today, no cure tomorrow