National Campaign for the Proper Use of Antimicrobials 2019

Dr.

Outline

- Background
- Human and non human use of antimicrobials
- Abuse of antimicrobials
- Consequences of abuse of antimicrobials
- Antimicrobial resistance
- Drivers and impact of antimicrobial resistance
- Strategic objectives for combating antimicrobial resistance
- Conclusion

What are the antimicrobials?

- **Antimicrobials are drugs used to treat infections in humans and animals.**
- **Antimicrobials work by killing micro-organisms or stopping their growth.**
- **The introduction of antimicrobial agents is considered as one of the most significant milestones in modern medicine.**
- **Prompt antimicrobial therapy for an infected patient can make the difference between cure and death or long-term disability.**

Antimicrobials fall into four categories:

https://www.reactgroup.org/toolbox/understand/antibiotics/

Use of antimicrobials

- Human
- Non human

Non-human use of antimicrobials

- Food producing animals(cattle, sheep, chicken, and fish)
  - to treat disease in sick animals
  - prophylactically to avoid disease in animals at high risk
  - as growth promoters.
- companion animals (including pets)
- plant agriculture (fruits, vegetables, and orchids, etc.)
- industrial applications (oil pipelines, industrial paints).

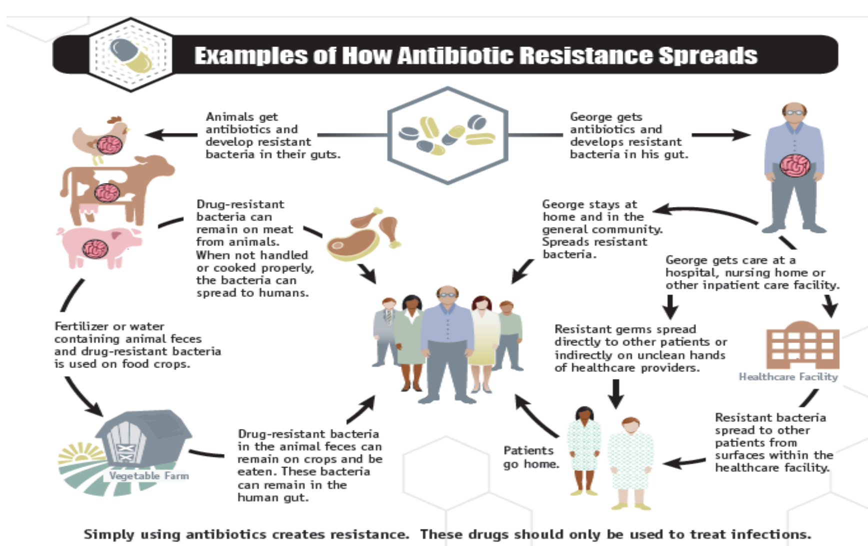
Abuse of antimicrobials

› **Because of their widespread availability and familiarity, generally low cost, and relative safety, antimicrobials are among the most misused of all medicines.**

➢ **According to the recent report by the international coordination group on antimicrobial resistance 2019:**

Currently, it is estimated that more than 50% of antibiotics in many countries are used inappropriately such as for treatment of viruses or use of the wrong (broader spectrum)

- https://www.who.int/antimicrobial-resistance/global-action-plan/optimise-use/antimicrobials/en
- *Report to the secretary-general of the united nations. no time to wait: securing the future from drug-resistant infections. April 2019.*



Source: ANTIBIOTIC RESISTANCE THREATS, 2013. U.S. Centers for Disease Control and Prevention

What are the consequences ?

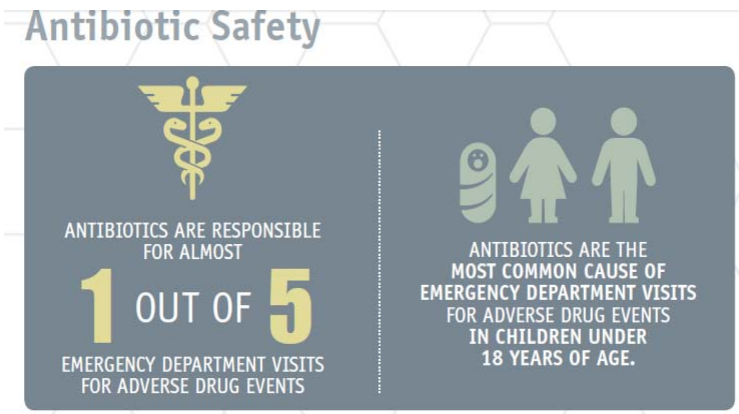
- **Adverse drug events:**
  - **Allergic Reactions**
  - **Drug Interactions and Side Effects**
  - ***C. difficile***
- **Emergence of resistance**

source: antibiotic resistance threats, 2013. US centers for disease control and prevention

Types of Adverse Drug Events Related to Antibiotics

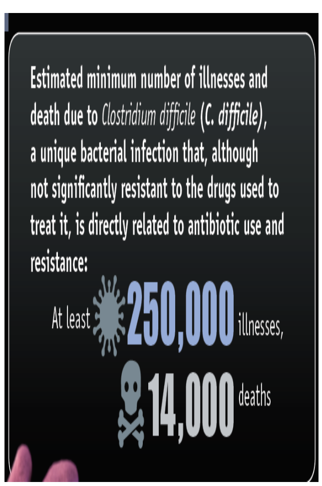
- **Allergic Reactions:**
- **These reactions can range from mild rashes and itching to serious blistering skin reactions swelling of the face and throat, and breathing problems.**
- **Drug Interactions and Side Effects:**
- **Antibiotics can interact with other drugs patients take, making those drugs or the antibiotics less effective.**
- **Some drug combinations can worsen the side effects of the antibiotic or other drug. Common side effects of antibiotics include nausea, diarrhea, and stomach pain.**

According to The US CDC



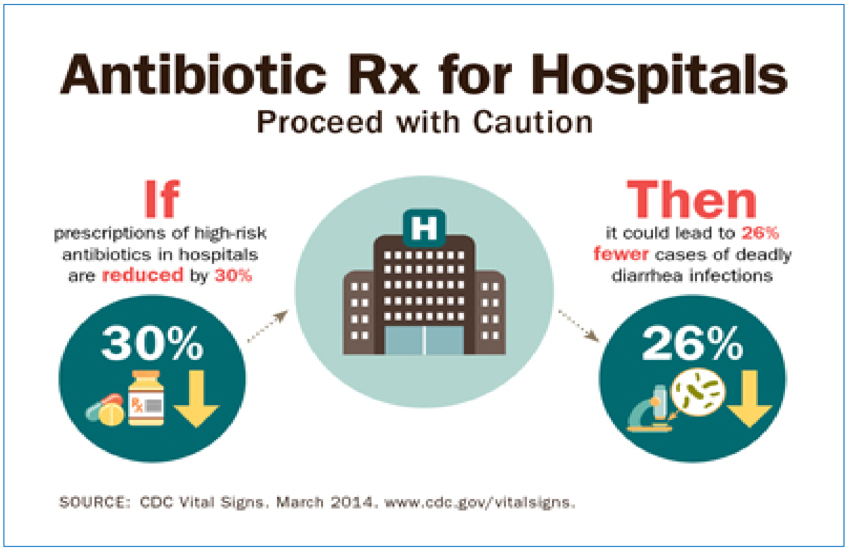
source: antibiotic resistance threats, 2013.U.S. centers for disease control and prevention

C.difficile

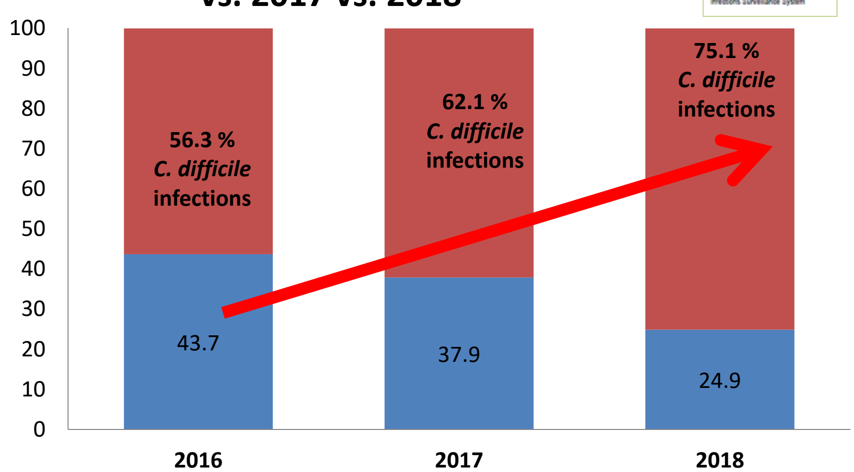


- **In The USA almost 250,000 people each year require hospital care for C. difficile infections.**
- **In most of these infections, the use of antibiotics was a major contributing factor leading to the illness.**
- **At least 14,000 people die each year in the United States from C. difficile infections.**
- **Many of these infections could have been prevented.**

source: antibiotic resistance threats, 2013. US.centers for disease control and prevention



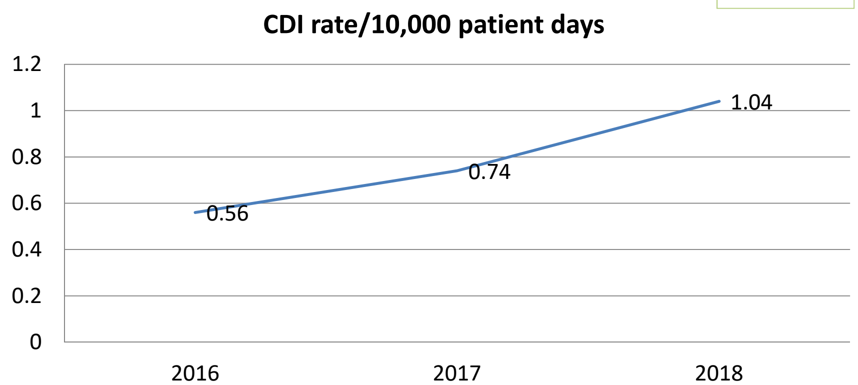
% *C. difficile* infections out of all gastrointestinal HAI reported, in all in-patient locations under surveillance, 2016 vs. 2017 vs. 2018



C. difficile Infection(CDI) Incidence rate/10,000 patient days in all in- patient locations under surveillance, 2016 vs. 2017 vs. 2018

Kuwait

KNHSS
Kuwait National Healthcare-associated Infections Surveillance System



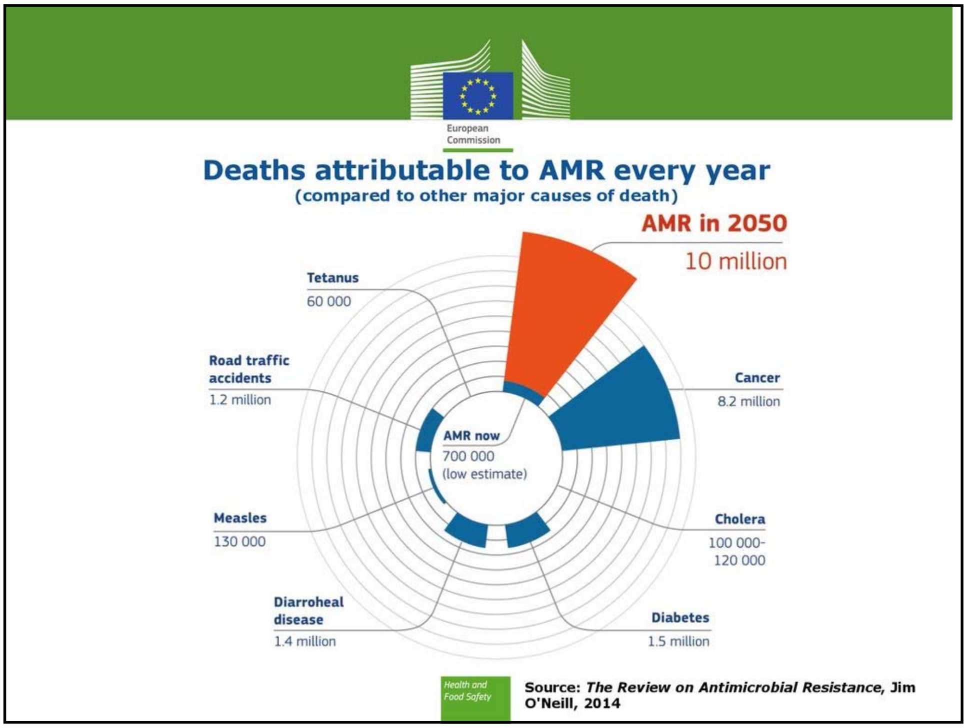
The problem of Antimicrobial resistance

According to the report to the secretary-general of the united nations .April 2019

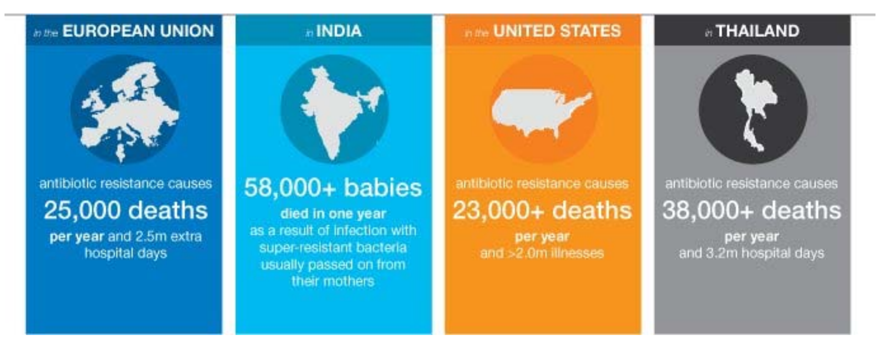
Alarming levels of resistance have been reported in countries of all income levels, with the result that common diseases are becoming untreatable, and lifesaving medical procedures riskier to perform.

World Health Organization

Drug-resistant diseases already cause at least 700,000 deaths globally a year, including 230,000 deaths from multidrug-resistant tuberculosis, a figure that could increase to 10 million deaths globally per year by 2050 under the most alarming scenario if no action is taken. Around 2.4 million people could die in high-income countries between 2015 and 2050 without a sustained effort to contain antimicrobial resistance.



The Growing Crisis Worldwide



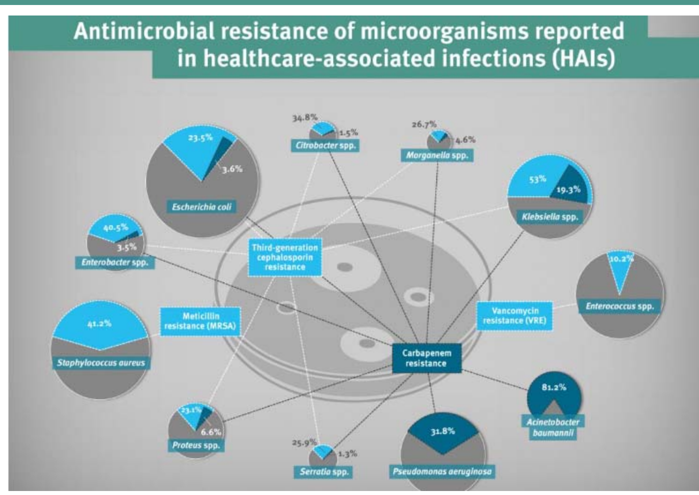
.http://www.cdc.gov/drugresistance/pdf/antibiotic_resistant_fs.pdf. Accessed December 21, 2015

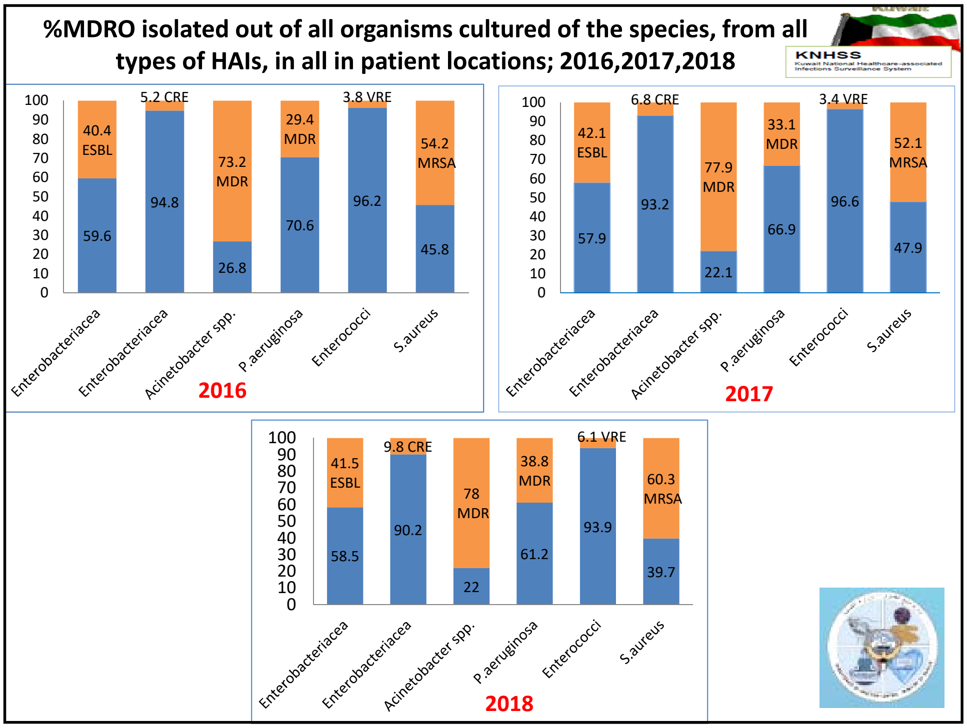
In 2016, 490 000 people developed multi-drug resistant TB globally, and drug resistance is starting to complicate the fight against HIV and malaria, as well.

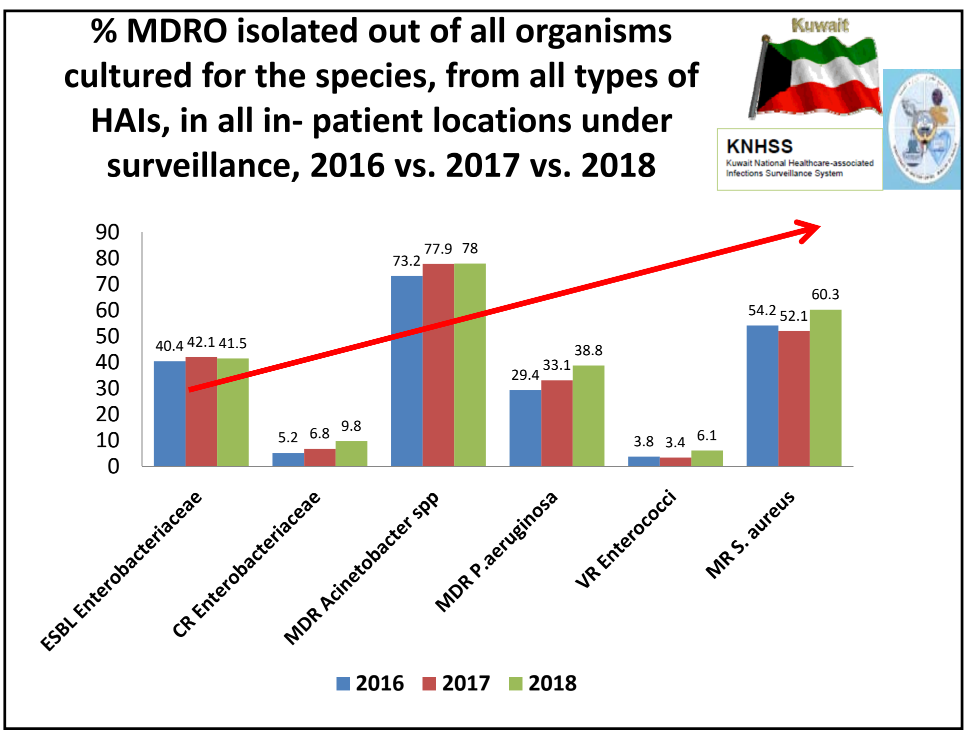
https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance

In 2011 and 2012, ECDC coordinated the first EU-wide point prevalence survey (PPS) to collect data on healthcare-associated infections (HAIs) and on antimicrobial use in European hospitals.

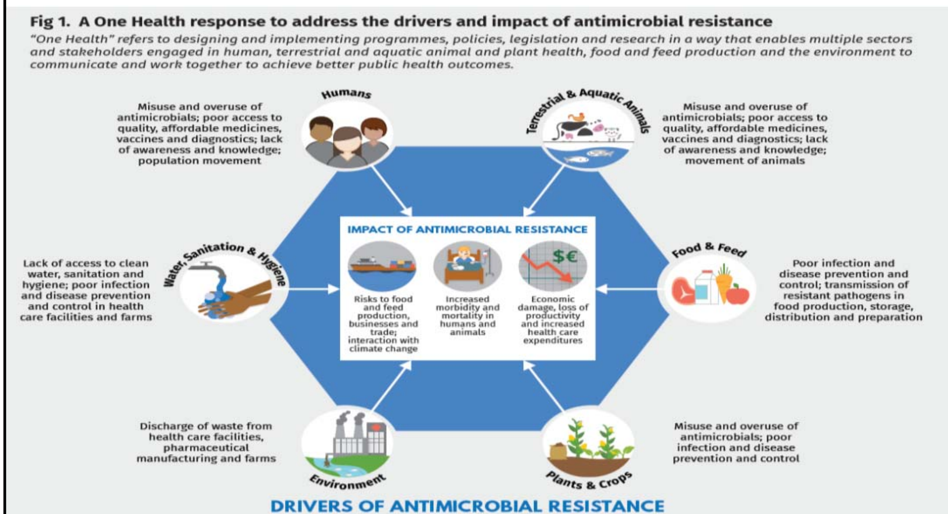
All countries used the same standardised protocol that had been developed during a two-year collaborative effort involving more than 100 European and international experts.




%MDRO isolated out of all organisms cultured of the species, from all types of HAIs, in all in patient locations; 2016,2017,2018
KNHSS
Kuwait National Healthcare-associated Infections Surveillance System
5.2 CRE
3.8 VRE
40.4 ESBL
59.6
94.8
73.2 MDR
26.8
29.4 MDR
70.6
96.2
54.2 MRSA
45.8
Enterobacteriacea
Acinetobacter spp.
P.aeruginosa
Enterococci
S.aureus
2016
6.8 CRE
3.4 VRE
42.1 ESBL
57.9
93.2
77.9 MDR
22.1
33.1 MDR
66.9
96.6
52.1 MRSA
47.9
2017
9.8 CRE
6.1 VRE
41.5 ESBL
58.5
90.2
78 MDR
22
38.8 MDR
61.2
93.9
60.3 MRSA
39.7
2018


% MDRO isolated out of all organisms cultured for the species, from all types of HAIs, in all in- patient locations under surveillance, 2016 vs. 2017 vs. 2018
Kuwait
KNHSS
Kuwait National Healthcare-associated Infections Surveillance System
40.4 42.1 41.5
5.2 6.8 9.8
73.2 77.9 78
29.4 33.1 38.8
3.8 3.4 6.1
54.2 52.1 60.3
ESBL Enterobacteriaceae
CR Enterobacteriaceae
MDR Acinetobacter spp
MDR P.aeruginosa
VR Enterococci
MR S. aureus
2016
2017
2018

Drivers and impact of antimicrobial resistance



https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_final_report_EN.pdf

Impact of antimicrobial resistance on human health

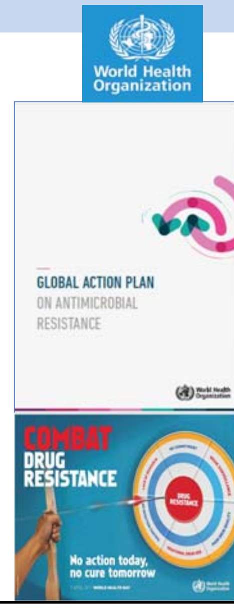
In most cases, antibiotic-resistant infections require:

- **prolonged and/or costlier treatments**
- **Extended hospital stay**
- **Greater disability and death**

https://www.cdc.gov/drugresistance/about.html

Strategic objectives for combating antimicrobial resistance

- **1- Awareness and education.**
- **2- Surveillance of antimicrobial resistance.**
- **3- Infection prevention and control.**
- **4- Optimal use of antimicrobial medicines in human and animal health**
- **5- Increasing investment in new medicines, diagnostic tools, vaccines and other interventions.**



Strategic objective1: Awareness and education

Improve awareness and understanding of antimicrobial resistance through effective communication, education and training

- **Raising awareness of antimicrobial resistance and promoting behavioral change targeting different audiences in human health, animal health and agricultural practice as well as consumers is critical to tackling this issue.**
- **the use of antimicrobial agents and resistance in school curricula will also promote a better understanding and awareness from an early age.**

Strategic objective 2:
Surveillance of antimicrobial resistance

GLASS
Global AMR Surveillance System

Strengthen the knowledge and evidence base through surveillance and research

- **Information on: the incidence, prevalence, range across pathogens and geographical patterns related to antimicrobial resistance is needed to be made accessible in a timely manner in order to guide the treatment of patients; to inform local, national and regional actions; and to monitor the effectiveness of interventions.**
- **Strengthen surveillance in animal health and agriculture Sectors.**

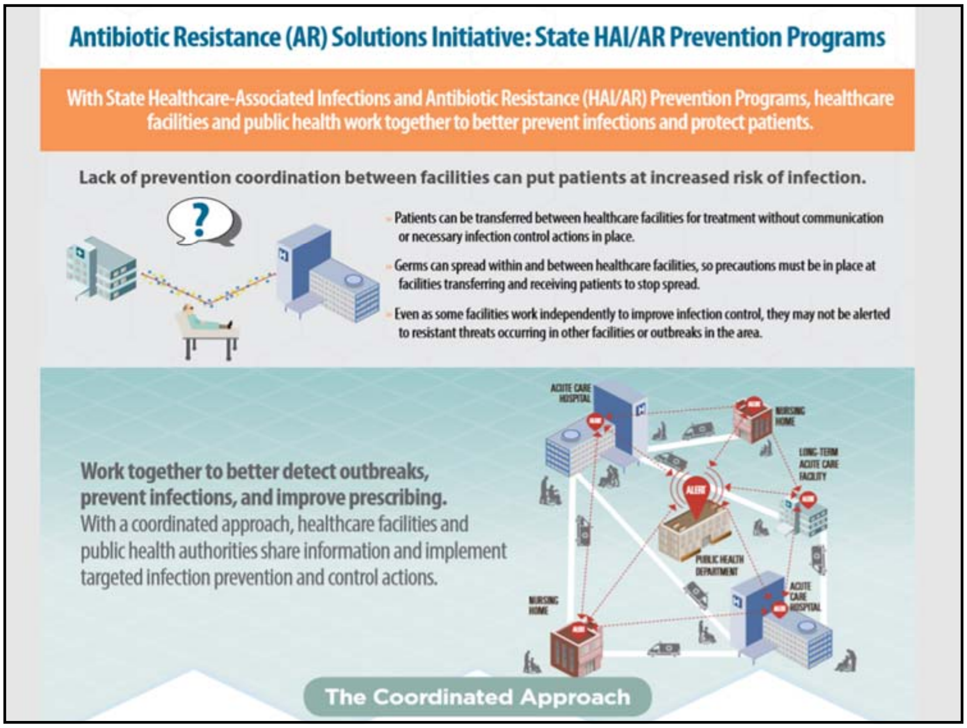
Strategic obgective3:
Effective sanitation, hygiene and Infection prevention and control

- **Better hygiene and infection prevention measures are essential to limit the development and spread of antimicrobial-resistant infections and multidrug-resistant bacteria.**

Selected IPC practices for prevention of emergence and spread of antimicrobial-resistant microorganisms

- Hand hygiene
- Patient placement
- Barrier precautions
- Aseptic practices
- Appropriate antimicrobial usage
- Sterilization and disinfection
- Environmental hygiene and waste management
- Facility environmental design for appropriate IPC practices

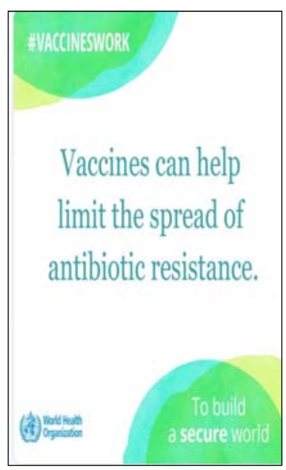
In healthcare



Strategic obgective3:
Effective sanitation, hygiene and Infection prevention and control. Cont.

- Vaccination is an appropriate infection prevention measure and should be encouraged.
- Vaccinating humans and animals is a very effective way to stop them from getting infected and thereby.

  preventing the need for antibiotics.
- Strengthen animal health and agricultural practices.



Strategic objective 4:
Optimal use of antimicrobial medicines in human and animal health

- To increase the longevity of antimicrobials, clinical, pharmacy, and veterinary practices must eliminate unnecessary dispensing.
- Evidence based prescribing through effective, rapid, low-cost diagnostic tools are needed to optimize use of antimicrobials for humans and animals.
- Adjusting patients' and the agricultural industry's inappropriate and unregulated use of antimicrobial agents.
- Regulations for antibiotic distribution, quality, and use could preserve the effectiveness of antibiotics as a public good.

Improve Antibiotic Prescribing- Antibiotic Stewardship Programs

- Programs that are dedicated to improving antibiotic use.
- These programs improve patient quality of care and safety

through :

- ✓ Increasing infection cure rates,
- ✓ reducing treatment failures, and
- ✓ increasing frequency of correct prescribing for therapy and prophylaxis.

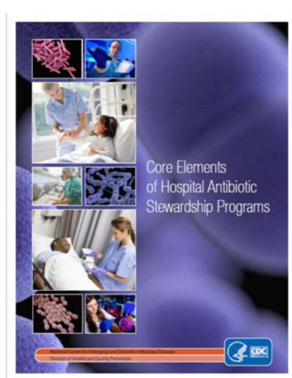
- *Stach LM, Hedican EB, Herigon JC, Jackson MA, Newland JG. Clinicians' Attitudes Towards an Antimicrobial Stewardship Program at a Children's Hospital. Journal of the Pediatric Infectious Diseases Society. September 1, 2012 2012;1(3):190-197.*
- *Kaki R, Elligsen M, Walker S, Simor A, Palmay L, Daneman N. Impact of antimicrobial stewardship in critical care: a systematic review. The Journal of antimicrobial chemotherapy. Jun 2011;66(6):1223-1230.*
- *Nowak MA, Nelson RE, Breidenbach JL, Thompson PA, Carson PJ. Clinical and economic outcomes of a prospective antimicrobial stewardship program. American journal of health-system pharmacy : AJHP : official journal of the American Society of Health-System Pharmacists. Sep 1 2012;69(17):1500-1508.*

What is Antimicrobial Stewardship?

- **Strategic multidisciplinary and facility specific efforts to optimize antimicrobial prescribing**
  - Right drug
  - Right dose
  - Right duration
  - Recognize when not needed

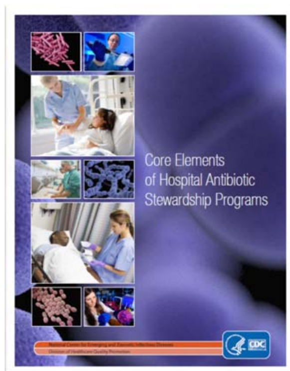
The Core Elements of Hospital Antibiotic Stewardship Programs. CDC

Core Elements of Hospital Antimicrobial Stewardship Programs



- **Leadership Commitment**
- **Accountability**
- **Drug Expertise**
- **Action**
- **Tracking**
- **Reporting**
- **Education**

Core Elements of Hospital Antimicrobial Stewardship Programs



- ❑ Leadership Commitment
- ❑ Accountability
- ❑ Drug Expertise
- ❑ Action
- ❑ Tracking
- ❑ Reporting
- ❑ Education

Core Elements of Hospital antibiotic Stewardship Programs

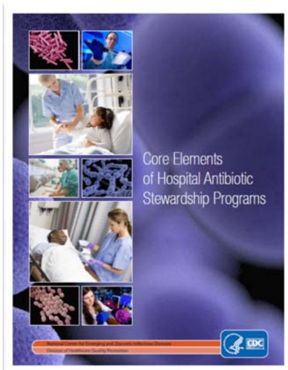
Leadership Commitment:

Dedicating necessary human, financial and information technology resources.

Accountability and Drug Expertise :

- **Stewardship program leader:** Identify a single leader who will be responsible for program outcomes. Physicians have been highly effective in this role.
- **Pharmacy leader:** Identify a single pharmacy leader who will co-lead the program.
- **Key support group:**
  - Clinicians and department heads
  - Infection preventionists and hospital epidemiologists
  - Quality improvement staff
  - Laboratory staff
  - Information technology staff
  - Nurses

Core Elements of Antimicrobial Stewardship Programs



- Leadership Commitment
- Accountability
- Drug Expertise
- Action
- Tracking
- Reporting
- Education

Action

- Implement **Policies** and **Interventions** to Improve Antibiotic Use
- Implement **policies** that support optimal antibiotic use.
- Utilize **specific interventions** that can be divided into three categories: **broad**, **pharmacy driven** and **infection and syndrome specific**
- Avoid implementing too many policies and interventions simultaneously; always prioritize interventions based on the needs of the hospital as defined by measures of overall use and other tracking and reporting metrics.

Policies that support optimal antibiotic use

- **Document dose, duration, and indication for all courses of antibiotics so they are readily identifiable and accessible.**
- **Develop and implement facility specific treatment recommendations. based on national guidelines and local susceptibilities pattern**

Interventions to improve antibiotic use

A- **Broad interventions** (These active interventions are the most effective)

- **Antibiotic "Time outs":**
- a reassessment of the continuing need and choice of antibiotics when the clinical picture is clearer and more diagnostic information is available. All clinicians should perform a review of antibiotics 48 hours after antibiotics are initiated.
- **Prior authorization**
- Restrict the use of certain antibiotics based on the spectrum of activity, cost, or associated toxicities. This ensures their use is reviewed with an antibiotic expert before therapy is initiated.
- **Prospective audit and feedback**
- An physician or pharmacist reviews orders and intervenes with modification of order and feedback to prescriber results in improved use, decreased costs.

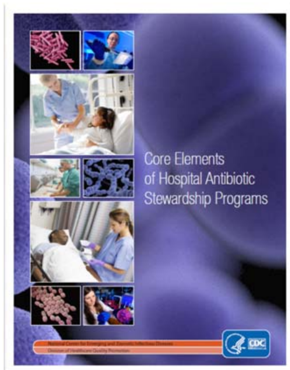
B- Pharmacy-driven Interventions

- **Automatic changes from intravenous to oral antibiotic therapy** in appropriate situation
- **Dose adjustments** in cases of organ dysfunction
- **Dose optimization**
- **Automatic alerts in situations where therapy might be unnecessarily duplicative**
- **Time-sensitive automatic stop** orders for specified antibiotic prescriptions, especially antibiotics administered for surgical prophylaxis.
- **Detection and prevention of antibiotic-related drug-drug interactions–** e.g. interactions between some orally administered fluoroquinolones and certain vitamins.

C. Infection and syndrome specific interventions:

- **Community-acquired pneumonia**.
- **Urinary tract infections (UTIs)**
- **Skin and soft tissue infections.**
- **Surgical prophylaxis**
- **Empiric coverage of methicillin-resistant *Staphylococcus aureus* (MRSA) infections**.
- ***Clostridium difficile* infections.**
- **Treatment of culture proven invasive infections.**

Core Elements of Antimicrobial Stewardship Programs



- Leadership Commitment
- Accountability
- Drug Expertise
- Action
- Tracking
- Reporting
- Education

Tracking

Monitoring antibiotic prescribing and resistance patterns by:

1- Antibiotic Use Process measures :(**Auditing**)

- Perform periodic assessments of the use of antibiotics or the treatment of infections to determine the quality of antibiotic use

2- Antibiotic Use Measures:(Consumption)

- *Days of therapy (DOT*):counts of antibiotics administered to patients per day

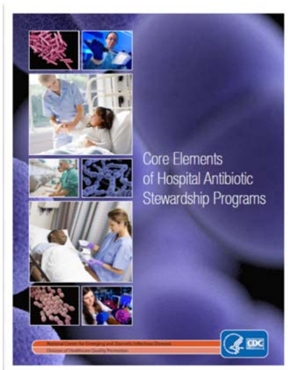
  or

  Defined daily dose (DDD):number of grams of antibiotic used

3- Outcome measures:

- rates of hospital onset CDI
- % of patients develop resistant super-infections

Core Elements of Antimicrobial Stewardship Programs



- ❑ Leadership Commitment
- ❑ Accountability
- ❑ Drug Expertise
- ❑ Action
- ❑ Tracking
- ❑ Reporting
- ❑ Education

Reporting:

Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff

- **Education**
- **Educating clinicians about resistance and optimal prescribing:**

- **Regular updates on antibiotic prescribing, antibiotic resistance, and infectious disease management that address both national and local issues.**
- **posters and flyers**
- **didactic presentations which can be done in formal and informal settings**
- **newsletters or electronic communication to staff groups.**

Evidence Based

Improve patient safety

Antimicrobial Stewardship Programs

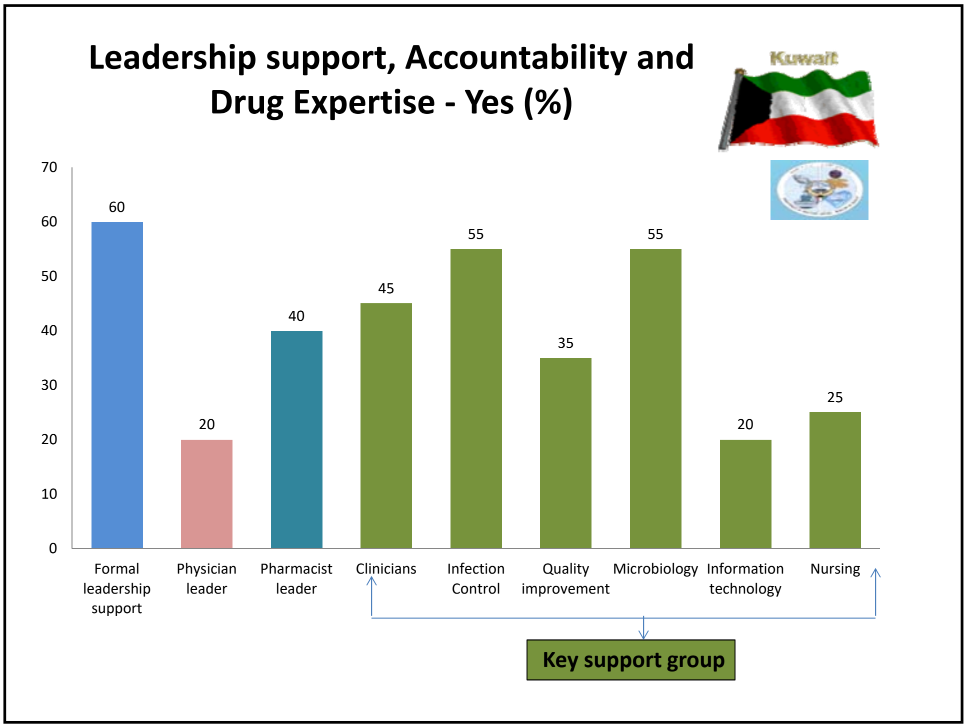
Improve community resistance profiles

Financially self-supporting

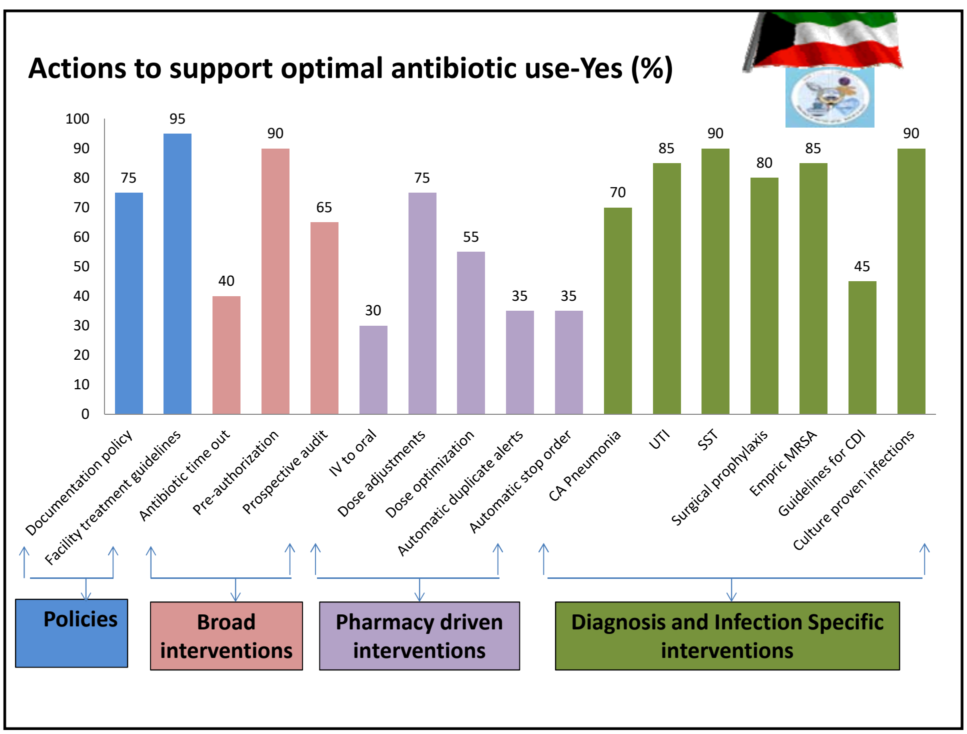
Dellit TH. Clin Infect Dis 2007 Jan 15;44(2):159

Checklist for Core Elements of Hospital antimicrobial Stewardship Programs

Survey conducted in all Kuwait MOH hospitals 2019

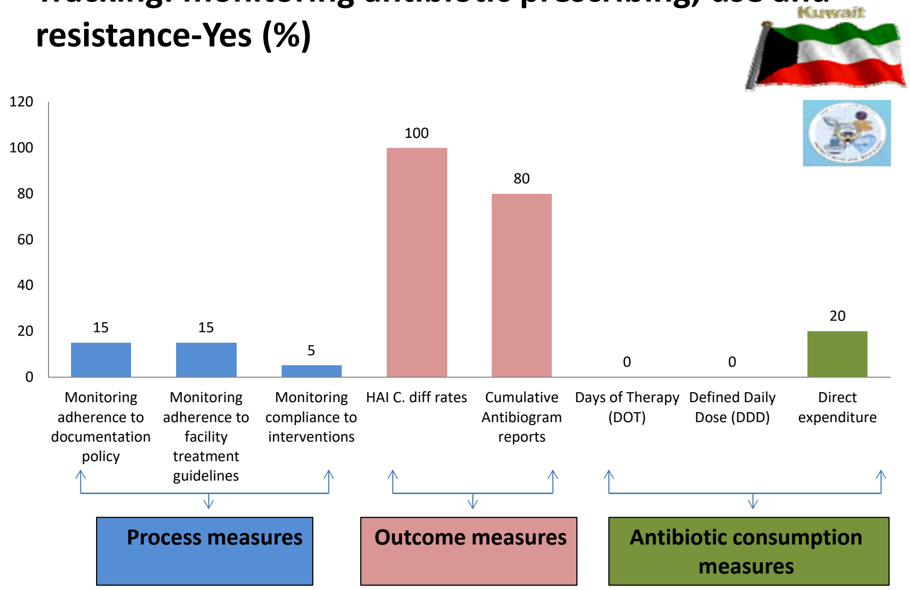


Leadership support, Accountability and Drug Expertise - Yes (%)
Kuwait
70
60
50
40
30
20
10
0
60
20
40
45
55
35
55
20
25
Formal leadership support
Physician leader
Pharmacist leader
Clinicians
Infection Control
Quality improvement
Microbiology
Information technology
Nursing
Key support group

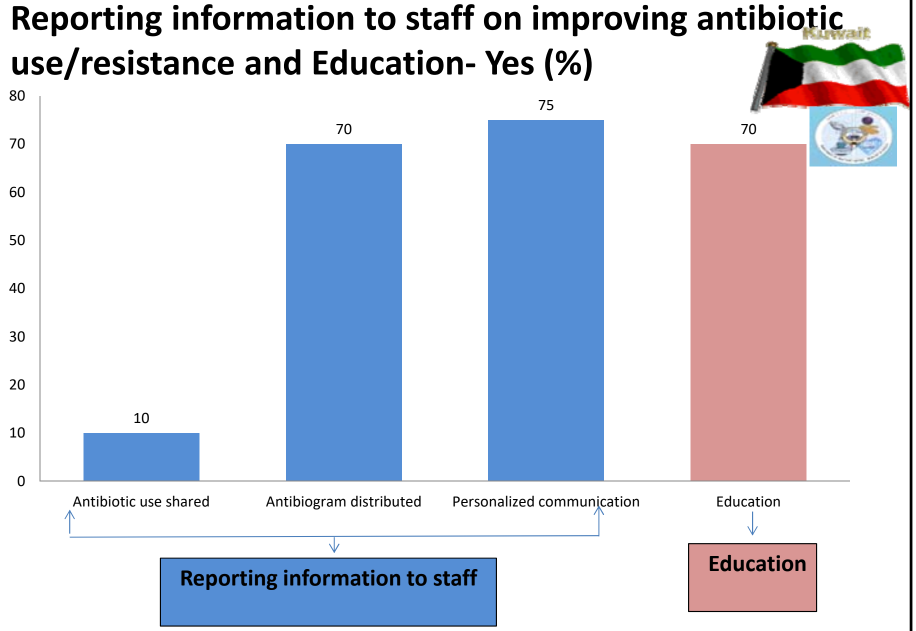


Actions to support optimal antibiotic use-Yes (%)
100
90
80
70
60
50
40
30
20
10
0
75
95
40
90
65
30
75
55
35
35
70
85
90
80
85
45
90
Documentation policy
Facility treatment guidelines
Antibiotic time out
Pre-authorization
Prospective audit
IV to oral
Dose adjustments
Dose optimization
Automatic duplicate alerts
Automatic stop order
CA Pneumonia
UTI
SST
Surgical prophylaxis
Empric MRSA
Guidelines for CDI
Culture proven infections
Policies
Broad interventions
Pharmacy driven interventions
Diagnosis and Infection Specific interventions

Tracking: monitoring antibiotic prescribing, use and resistance-Yes (%)



Reporting information to staff on improving antibiotic use/resistance and Education- Yes (%)



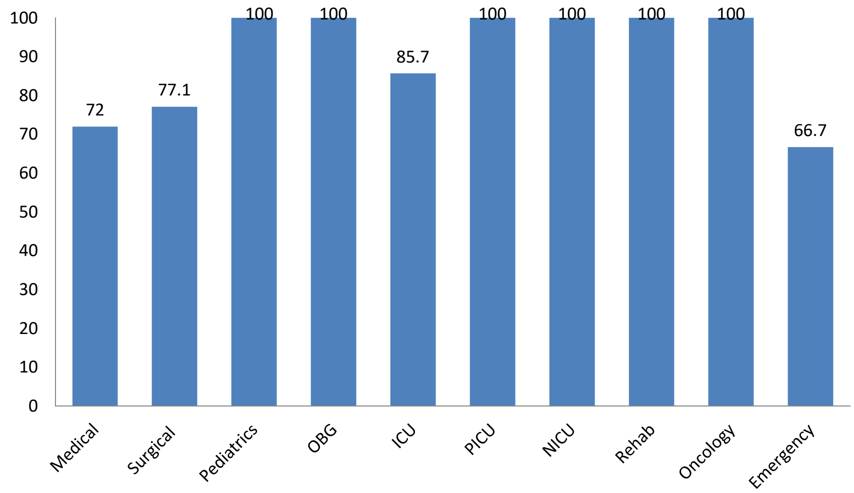
Checklist for the facility specific antimicrobial guidelines

Survey conducted for all clinical departments in all Kuwait MOH hospitals 2019

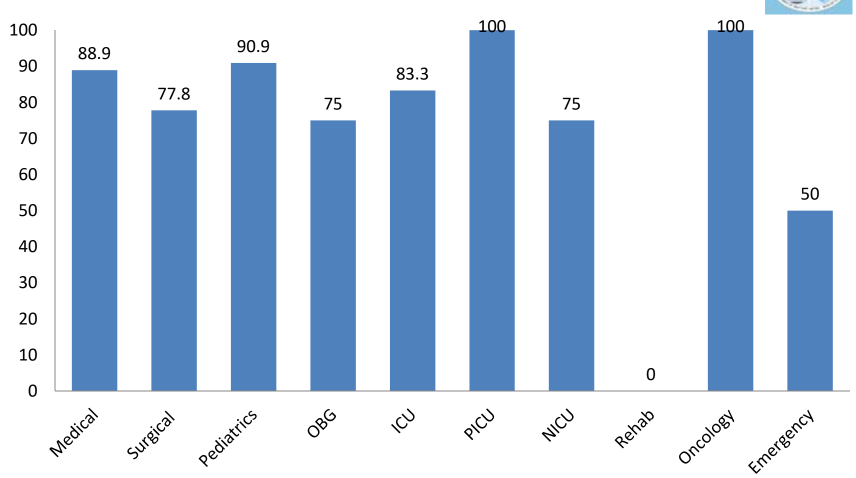
For all clinical departments prescribing antibiotics in Ministry of Health hospitals- Yes (%)

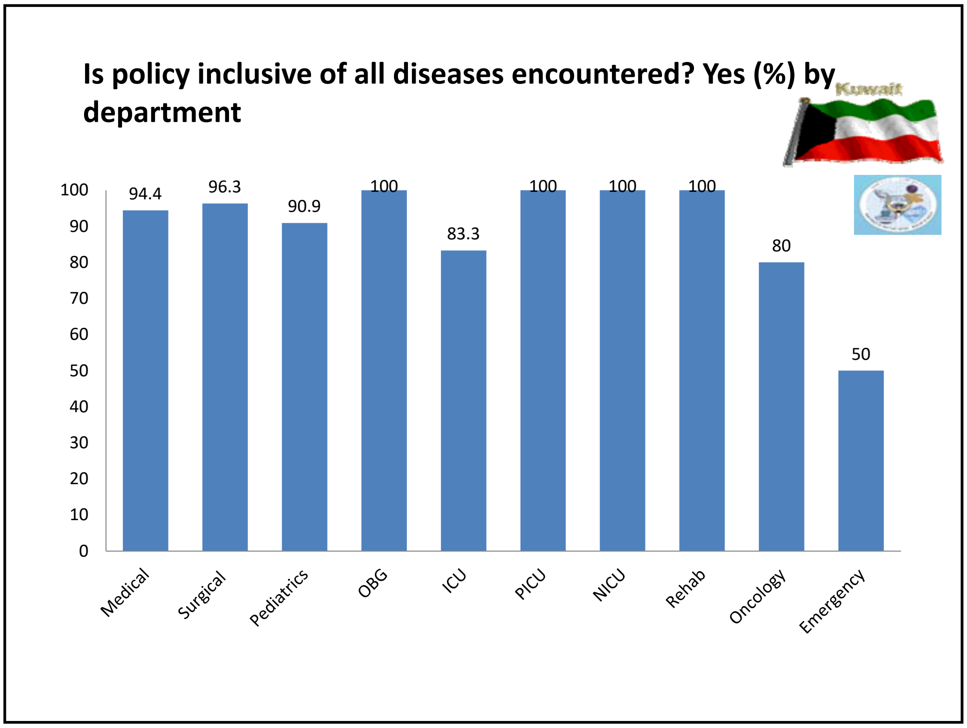
Clinical department antibiotic policy specific questions	Yes (%)
Is policy available for department?	82.7
Is policy recently updated (< 2 years)?	82.7
Is policy inclusive of all diseases encountered?	92.6
Is policy inclusive of dose, duration, timing (frequency) and route of administration for each indication (all elements present)?	76.5
Is policy inclusive of dose for each indication?	96.3
Is policy inclusive of duration for each indication?	79.0
Is policy inclusive of timing (frequency) for each indication?	100
Is policy inclusive of route of administration for each indication?	97.5
Is policy disseminated to all physicians in that department?	82.7

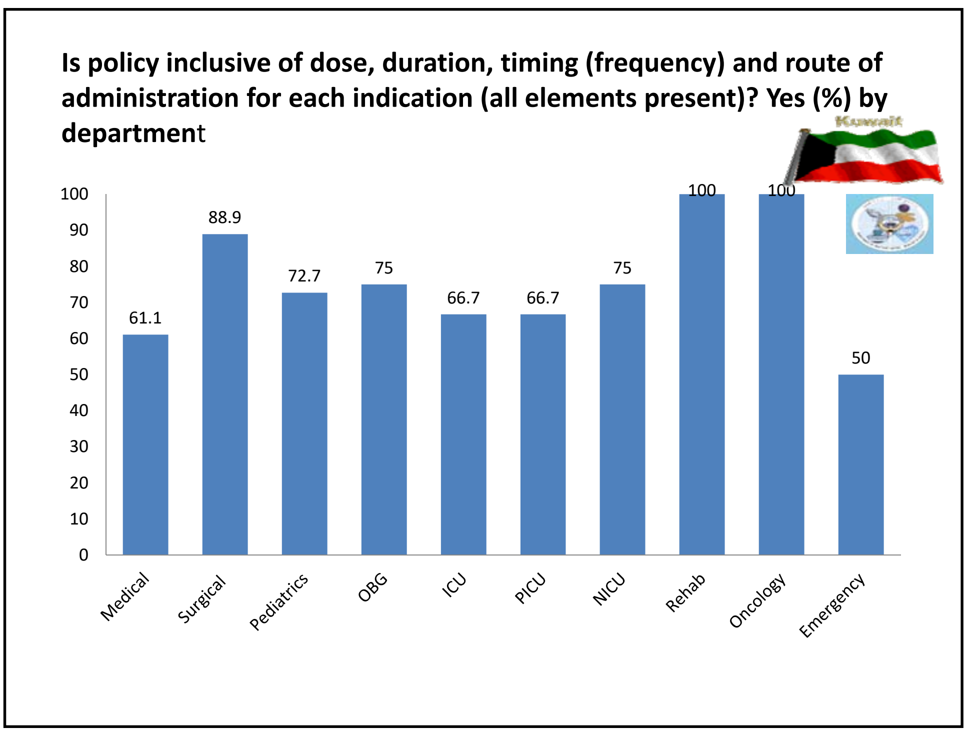
Is policy available for department? Yes (%) by department



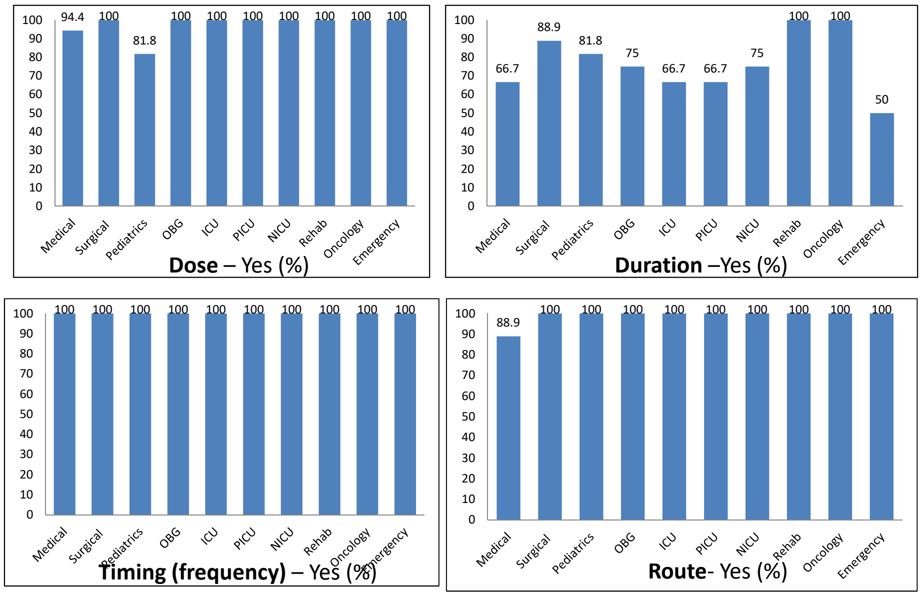
Is The policy recently updated (< 2 years)? Yes (%) by department



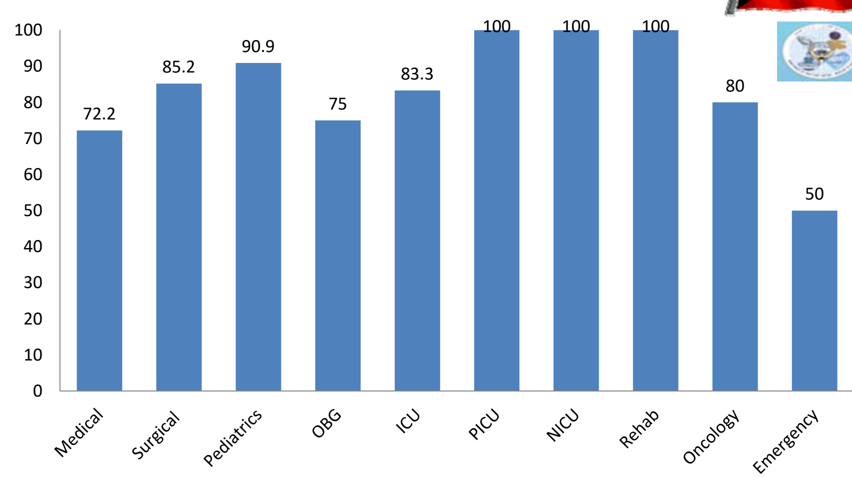

Is policy inclusive of all diseases encountered? Yes (%) by department
Kuwait
100
90
80
70
60
50
40
30
20
10
0
94.4
96.3
90.9
100
83.3
100
100
100
80
50
Medical
Surgical
Pediatrics
OBG
ICU
PICU
NICU
Rehab
Oncology
Emergency


Is policy inclusive of dose, duration, timing (frequency) and route of administration for each indication (all elements present)? Yes (%) by department
Kuwait
100
90
80
70
60
50
40
30
20
10
0
61.1
88.9
72.7
75
66.7
66.7
75
100
100
50
Medical
Surgical
Pediatrics
OBG
ICU
PICU
NICU
Rehab
Oncology
Emergency

Individual elements -Yes (%) by department



Is policy disseminated to all physicians in that department? Yes (%) by department



Stop using antibiotics in healthy animals to prevent the spread of antibiotic resistance

- **WHO has launched new guidelines on use of medically important antimicrobials in food-producing animals in 2017**,

- These guidelines recommend that farmers and the food industry should stop using antibiotics routinely to promote growth and prevent disease in healthy animals**.**

Strategic objective5: Increase investment in new medicines, diagnostic tools, vaccines and other interventions

- **Research and development of new antimicrobial medicines, diagnostic tools, and vaccines must be reinvigorated.**
- **The majority of pharmaceutical companies are no longer researching a new antibiotic which is a global concern for human and animal health**

Conclusion and recommendations for the antimicrobial stweardship and the antibiotic policy surveys

Antimicrobial stewardship is partially implemented in the MOH hospitals .So we recommend the following:

- More formal leadership support
- Greater accountability and improved drug expertise in the form of physician and pharmacist leaders. Key personnel must be involved in all aspects.
- Focus on increasing broad and pharmacy driven interventions to support optimal antibiotic use.
- Enhance tracking and monitoring of antibiotic prescribing, use and resistance using process and antibiotic consumption measures.
- Increased reporting of information to staff.

- **Antibiotic policies are mostly available in different clinical departments. So we recommend:**
  - Distribute the policy to all physicians of each department
  - Ensure the policy included the duration of therapy for each indication.

Takeaway message

- Antimicrobial resistance is a worldwide serious public heath problem including Kuwait.
- It is a complex problem that affects all of society and is driven by many interconnected factors.
- Coordinated action is required to minimize the emergence and spread of antimicrobial resistance.

HANDLE ANTIBIOTICS WITH CARE

Thank you!