Antibiotics Awareness Day 2014 cum Infection Control Forum: MR Control in Private Hospital

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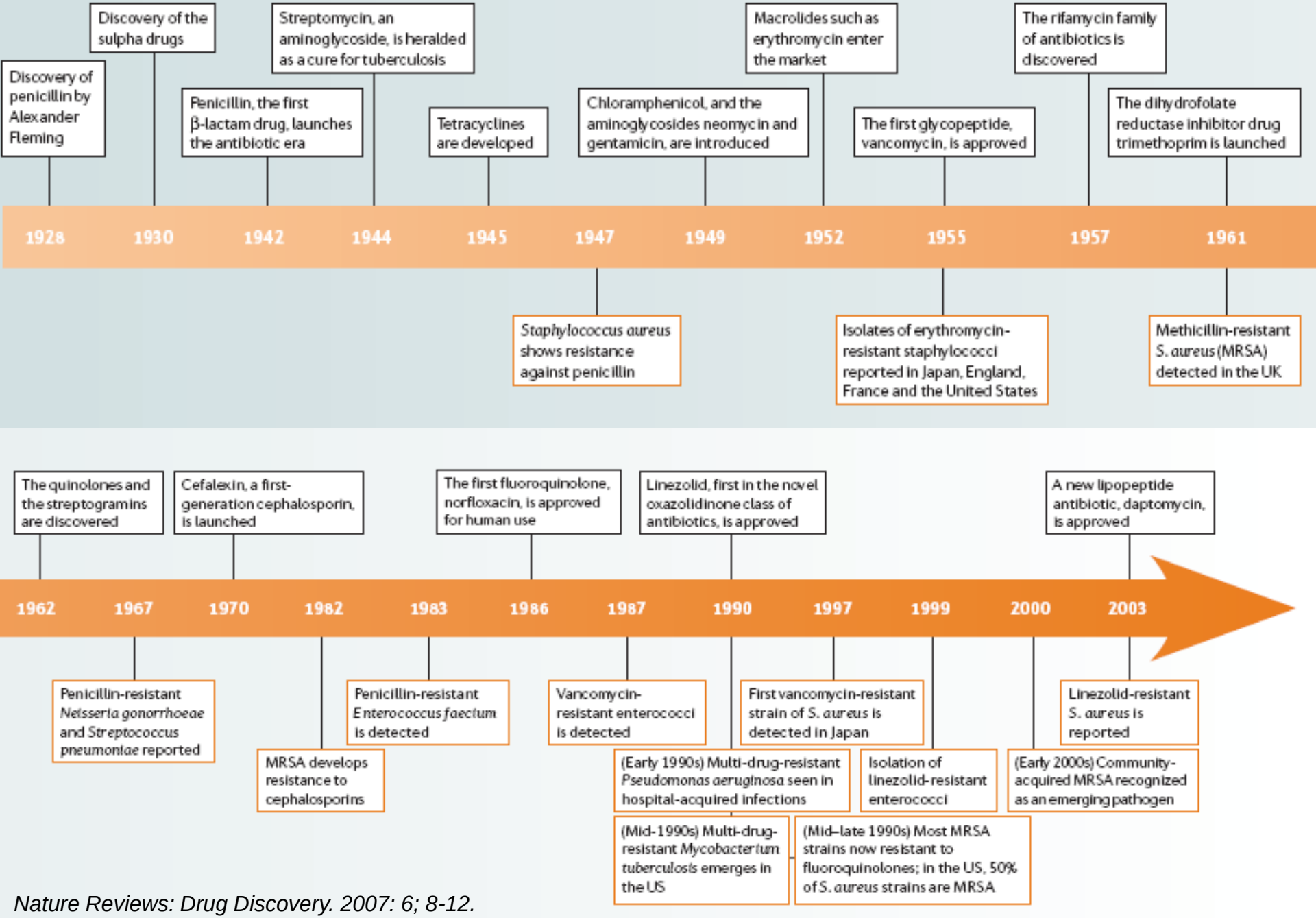
“It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body…there is the danger that the ignorant man may easily under-dose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant.”

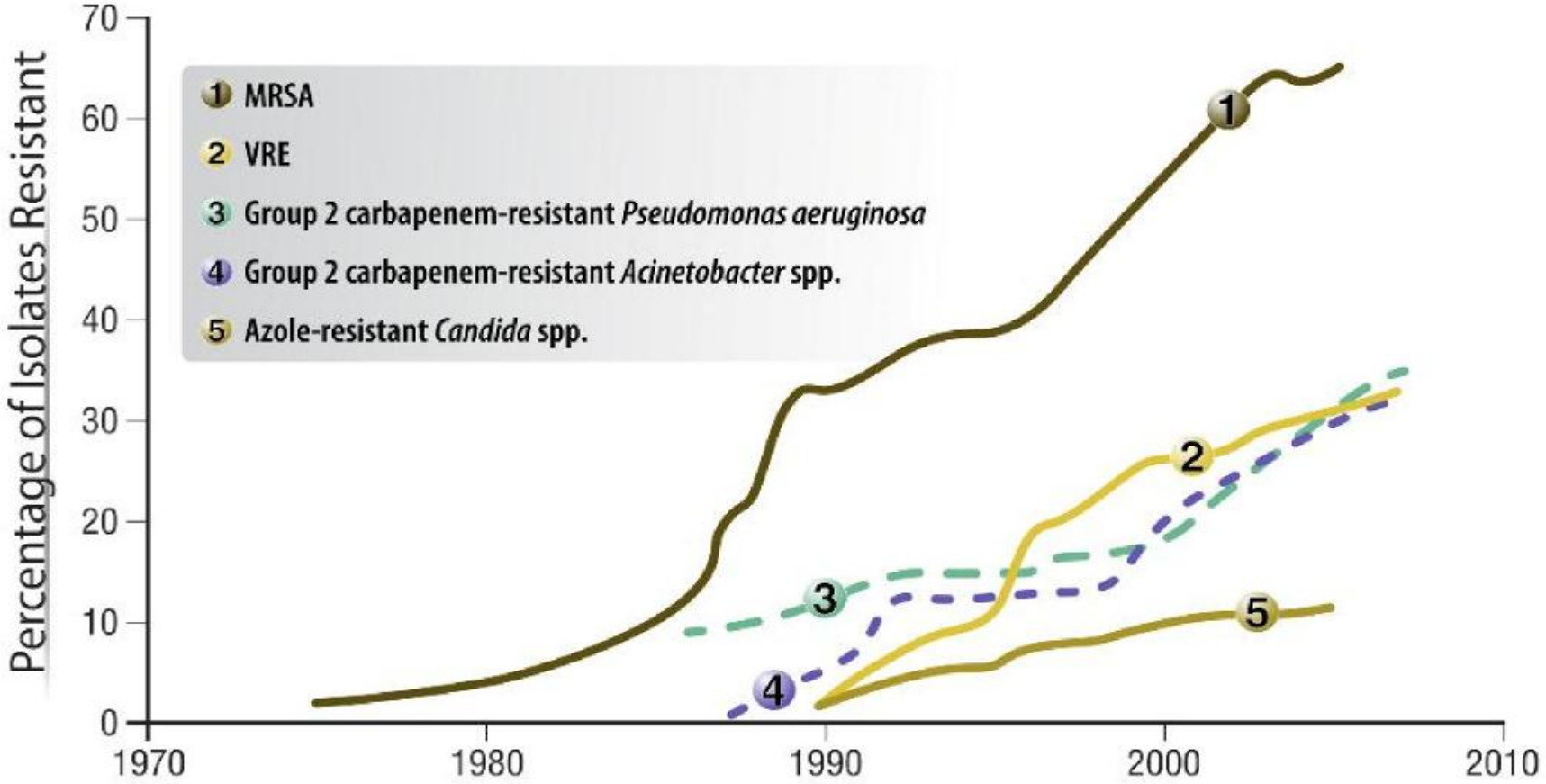
-Alexander Fleming, Nobel prize lecture, 1945

Timeline | Race against time: the introduction of new antibiotic classes and the emergence of resistance



Nature Reviews: Drug Discovery. 2007: 6; 8-12.

Trends in Antimicrobial Resistance



Adapted from Wenzel RP, et al. *Infect Control Hosp Epidemiol.* 2008;29:1012-1018.

Antimicrobial Agent	Prior Antibiotic Exposure (n = 310)	No Prior Antibiotic Exposure (n = 444)	*p*
Cefepime	71.0%	93.0%	<.001
Piperacillin–tazobactam	68.1%	88.5%	<.001
Imipenem/meropenem	80.0%	97.5%	<.001
Ciprofloxacin	60.3%	82.4%	<.001
Gentamicin	73.9%	92.1%	<.001
Multidrug-resistant[b]	37.4%	11.3%	<.001

Table 5. Multivariate analysis of independent risk factors for hospital mortality[a]

Variable	Adjusted Odds Ratio	95% Confidence Interval	*p*
Prior antibiotic exposure	1.70	1.41–2.06	.005
Use of vasopressors	1.83	1.47–2.29	.006
Pseudomonas infection	1.75	1.39–2.21	.016
Inappropriate initial therapy	2.03	1.66–2.49	<.001
Acute Physiology and Chronic Health Evaluation II score (1-point increments)	1.13	1.11–1.15	<.001
Number of organ failures (one–organ increments)	1.93	1.73–2.14	<.001

Crit Care Med 2011; 39:1859

Antibiotics are INAPPROPRIATELY USED in a variety of ways

- Given when they are not indicated
- Continued longer than the clinical conditions required
- Given at the wrong dose i.e. not renal function and weight-based dosing
- Broad spectrum agents are used to treat very susceptible bacteria
- The antibiotic is not targeted to an infection

Optimize Duration of Antibiotic Therapy

- Avoid automatic 10-14-day course of therapy
- New evidence for duration of therapy
  - Uncomplicated urinary tract infection: 3-5 days[1]
  - Community-acquired pneumonia: 3-7 days[2]
  - Ventilator-associated pneumonia: 8 days[3]
  - CR-BSI Coagulase-negative staphylococci: 5-7 days[4]
  - Acute Hem Osteomyelitis in children-21 days[5]
  - Meningococcal meningitis-7 days[6]
  - Uncomplicated secondary peritonitis with source control: 4-7 days[7]
  - Uncomplicated SSTI[8] 5 days

1. *Clin Infect Dis* 1999; 29:745-758
2. *Clin Infect Dis* 2007; 44:S27-72
3. *JAMA* 2003; 290:2588-2598
4. *Clin Infect Dis* 2009; 49:1-45
5. *Pediatr Infect Dis* 2010; 29:1123-1128
6. *N Engl J Med* 1997; 336:708-716
7. *Clin Infect Dis* 2010: 50:133-164
8. *Arch Intern Med* 2004; 164:1669-1674

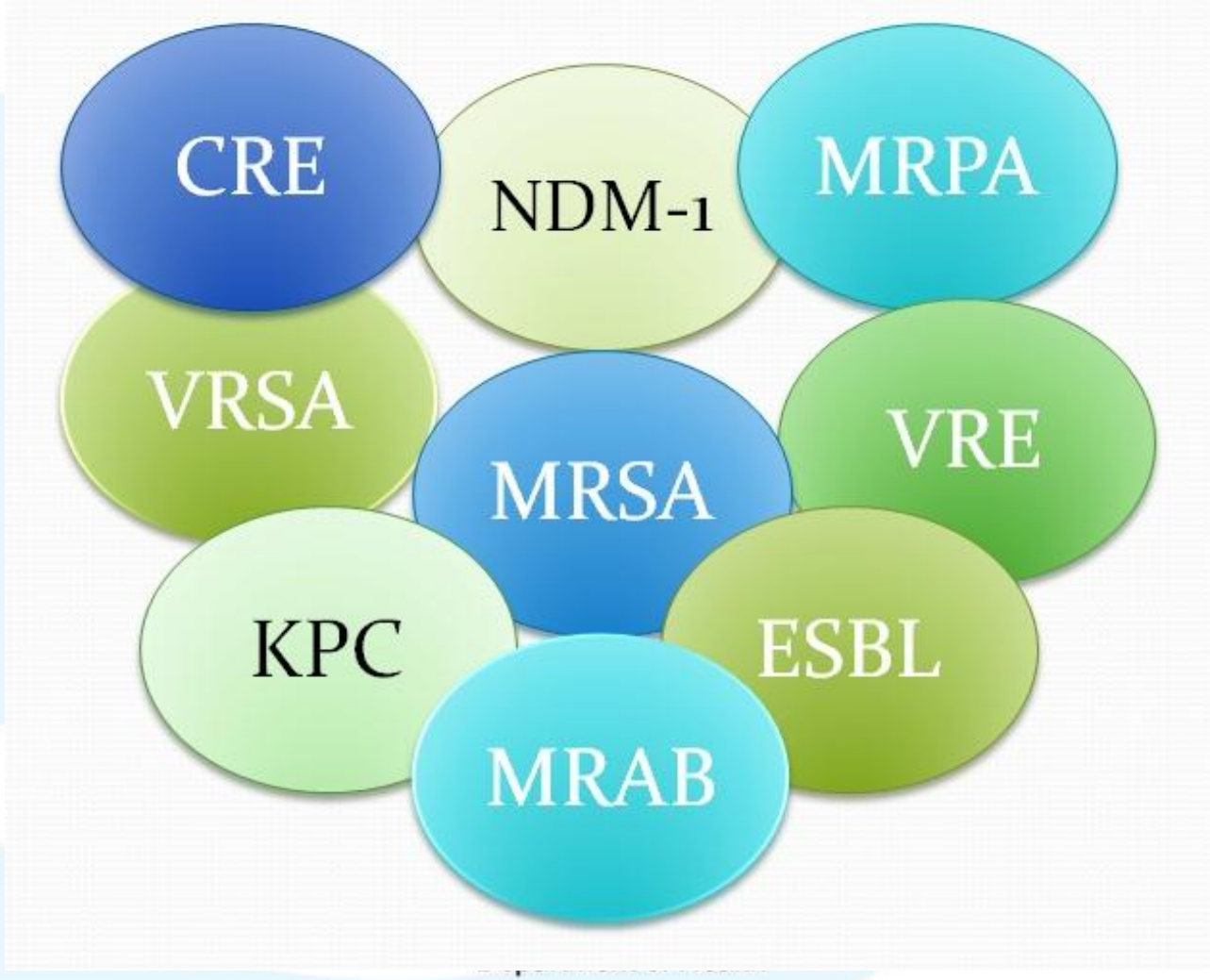
Why We Need To Improve Antibiotic Use?

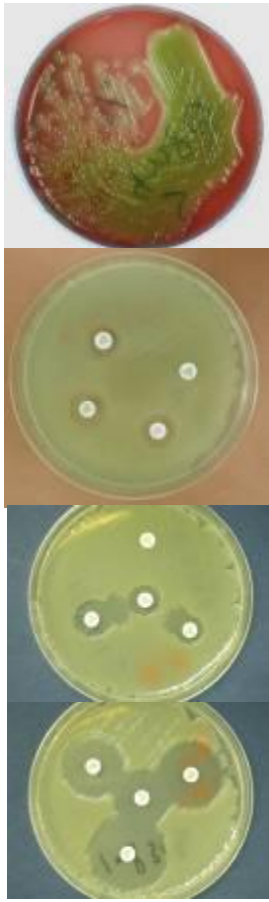
30-50% of antibiotic use in hospitals is unnecessary or inappropriate (CDC, 2014)

Inappropriate use of antibiotic leads to:

- the emergence of resistant bacteria
- colonization or infection with a multidrug-resistant organisms, e.g. MRSA, CRE, VRE, ESBL
- the development of *Clostridium difficile* associated infection
- an increase in the risk of patient harm from side effects
- unnecessary costs

Multidrug Resistant Organisms (MDROs)

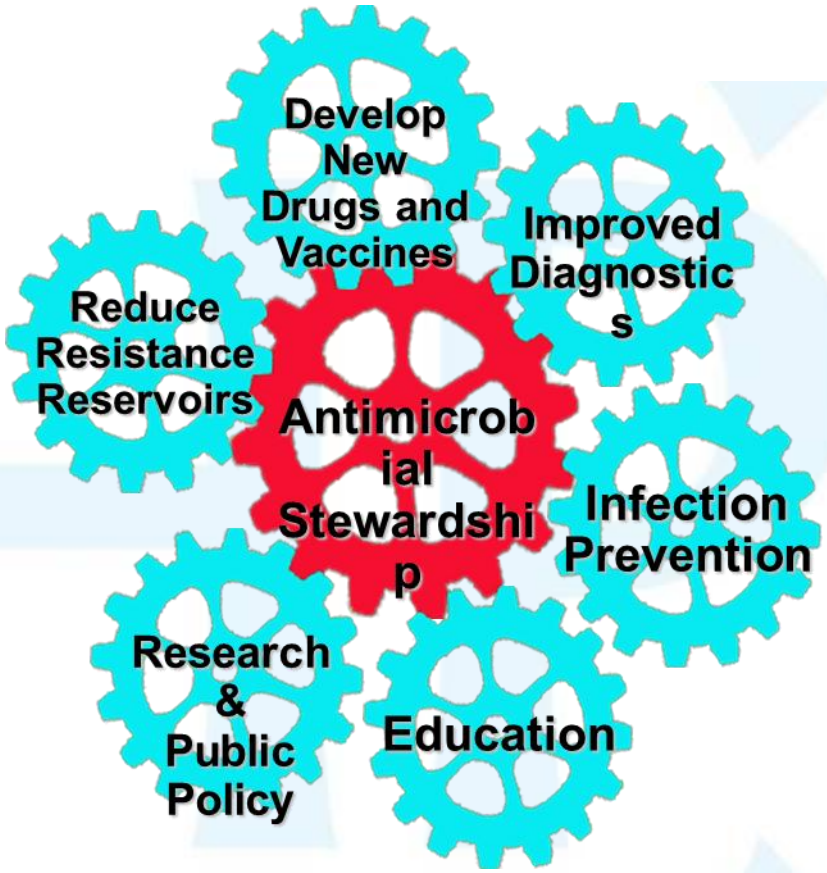




Courtesy : ICB, CHP


The Perfect Storm
Antimicrobial Resistance

Efforts to Control Resistance



Antibiotic Stewardship Program

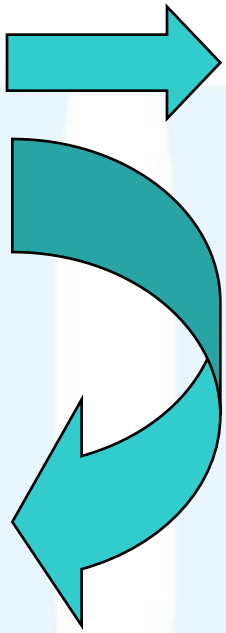
- It is defined as the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance
- It can assist physicians to make an appropriate decision regarding antibiotic use and change antibiotic prescribing behaviors to reduce unnecessary use

Prospective Audit and Feedback
Back-end Approach

Physician writes order

1.) Antibiotic Change/Continued based on Practice Guidelines

2.) Prescribing physician contacted and recommendation made



Antibiotic is Dispensed

At a later date, antibiotics are reviewed

(Targeted list of antibiotics, C/S mismatches, ICU patients, duration)

Formulary Restriction/Preauthorization Front-end Approach

- **Advantages**
  - Direct control over antimicrobial use
  - Effective control of antimicrobial use during outbreaks
  - Decreased inappropriate use of antimicrobials (and thus costs)
- **Disadvantages**
  - Personnel needs
  - Antagonistic relationship (loss of autonomy)
  - Therapy may be delayed
  - De-escalation not addressed
  - ID physicians often exempt
  - Effectiveness in decreasing resistance is less clear

Goals of ASP

- Reduce antibiotic consumption and inappropriate use
- Reduce the emergence of multidrug-resistant organisms and *C. difficile*
- Improve infection cure rates
- Reduce adverse drug events
- Increase adherence of treatment guideline
- Save money

Rational Antibiotic Use in an ICU

- Rational use protocol
  - Antibiotic use controlled by 4 ICU physicians (members of ARC)
  - Written algorithms for use
  - Systematic reassessment at days 3, 7, 10
  - Twice-weekly meetings
- Results
  - Antibiotic use ↓ 36%
  - Resistant nosocomial infections ↓ 52% ($P<10^{-5}$)
  - MRSA ↓ at yr 3; *Enterobacteriaciae* R at yr 4
  - No change in *PsA* resistance or ESBL producers

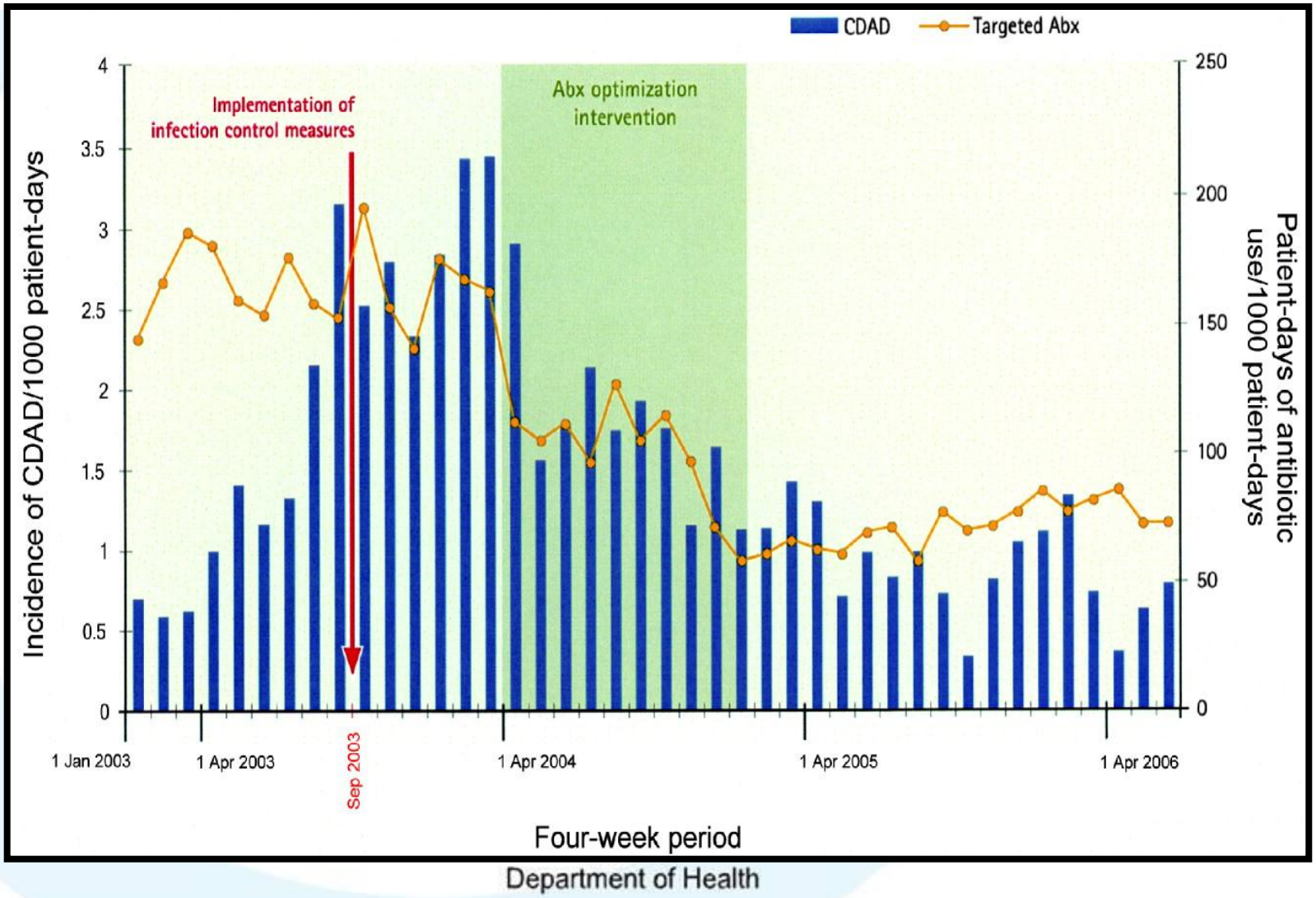
Year	1994	1995†	1996	1997	1998
Total NI* Patients	99	97	105	116	109
Total Days of Antibiotic Use	3,658	3,314	2,974	2,496	2,311
Total Antibiotic Costs (Euro)	64,500	52,200	50,100	40,950	42,00
% Antibiotic Resistance	44%	53%	39%	31%	21%

† Start of program

* NI = Nosocomial infection

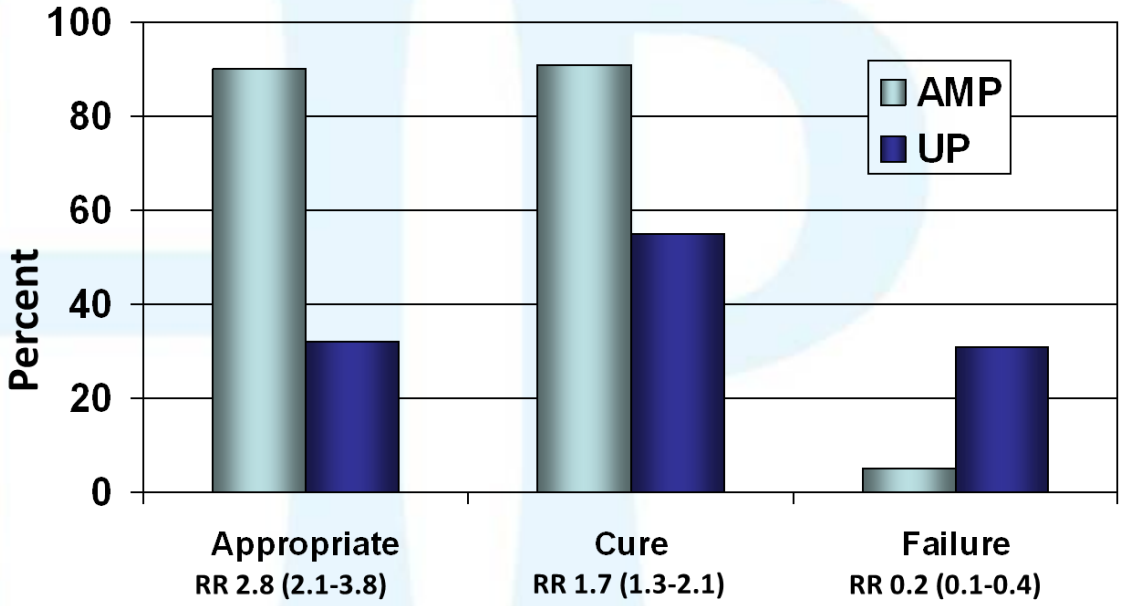
Geissler A et al. *Inten Care Med.* 2003;29:49-54.

Targeted antibiotic consumption and nosocomial *C. difficile* disease
Tertiary care hospital; Quebec, 2003-2006



Valiquette, CID 2007:45 S112

Clinical Outcomes Better With Antimicrobial Management Program



AMP = Antibio
UP = Usual Pr

man N. *Am J Med.* 2006;119:S53.

ASP led to a decrease in the inappropriate use of antibiotics, saving in medical expenses, reduction in the development of antimicrobial resistance and shortening of hospital stay

ORIGINAL PAPER

THE INTERNATIONAL JOURNAL OF CLINICAL PRACTICE

Outcome measurement of extensive implementation of antimicrobial stewardship in patients receiving intravenous antibiotics in a Japanese university hospital

T. Niwa,[1,2] Y. Shinoda,[3] A. Suzuki,[1] T. Ohmori,[1] M. Yasuda,[2] H. Ohta,[2] A. Fukao,[2] K. Kitaichi,[1] K. Matsuura,[1] T. Sugiyama,[3] N. Murakami,[2] Y. Itoh[1]

SUMMARY

Background: Antimicrobial stewardship has not always prevailed in a wide variety of medical institutions in Japan. **Methods:** The infection control team was involved in the review of individual use of antibiotics in all inpatients (6348 and 6507 patients/year during the first and second annual interventions, respectively) receiving intravenous antibiotics, according to the published guidelines, consultation with physicians before prescription of antimicrobial agents and organisation of education programme on infection control for all medical staff. The outcomes of extensive implementation of antimicrobial stewardship were evaluated from the standpoint of antimicrobial use density, treatment duration, duration of hospital stay, occurrence of antimicrobial-resistant bacteria and medical expenses. **Results:** Prolonged use of antibiotics over 2 weeks was significantly reduced after active implementation of antimicrobial stewardship (2.9% vs. 5.2%, $p < 0.001$). Significant reduction in the antimicrobial consumption was observed in the second-generation cephalosporins ($p = 0.03$), carbapenems ($p = 0.003$), aminoglycosides ($p < 0.001$), leading to a reduction in the cost of antibiotics by 11.7%. The appearance of methicillin-resistant *Staphylococcus aureus* and the proportion of *Serratia marcescens* to Gram-negative bacteria decreased significantly from 47.6% to 39.5% ($p = 0.026$) and from 3.7% to 2.0% ($p = 0.026$), respectively. Moreover, the mean hospital stay was shortened by 2.9 days after active implementation of antimicrobial stewardship. **Conclusion:** Extensive implementation of antimicrobial stewardship led to a decrease in the inappropriate use of antibiotics, saving in medical expenses, reduction in the development of antimicrobial resistance and shortening of hospital stay.

What's known

- Antimicrobial stewardship programmes are known to promote appropriate use of antibiotics. But, antimicrobial stewardship has not always prevailed in a wide variety of medical institutions in Japan.

What's new

- Antimicrobial stewardship intervention was found to be effective in reducing the inappropriate use of antibiotics, shortening hospital stay, reducing the MRSA ratio and saving medical expenses in Japanese hospital.
- Frequent monitoring resulted in an increase in the frequency of recommendation by ICT, reduction in antibiotic consumption and further shortening of antibiotic therapy and hospital stay. These findings supported an importance of day 3 bundle.

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Disclosures
None.

Introduction

Antimicrobial resistance is becoming one of major problems during use of antibiotics worldwide (1,2). It has been demonstrated that inappropriate use of antibiotics is the predominant factor that causes an enhancement of antimicrobial resistance (3,4). Therefore, it is important to prevent or minimise the occurrence of antimicrobial-resistant bacteria. It has been reported that inappropriate use of antibiotics in the hospital ranges from 26% to 57% (5–8). The 12-Step Campaign to Prevent Antimicrobial Resistance Among Hospitalized Adult was established by the Centers for Disease Control and Prevention (CDC), in which withdrawal of inappropriate antibiotics is effective in preventing antimicrobial resistance. Antimicrobial stewardship programmes are known to promote appropriate use of antibiotics (6,9). The Infectious Diseases Society of America (IDSA)/Society for Healthcare Epidemiology of America (SHEA) guidelines recommend two core proactive evidence-based strategies for promotion of antimicrobial stewardship, including 'formulary restriction and pre-authorization' and 'prospective audit with intervention and feedback' (10,11). The goal of promoting appropriate use of antibiotics is to improve clinical outcomes by reducing the emergence of drug resistance and minimising drug-related adverse events. Furthermore, it has been shown that implementation of antimicrobial stewardship programmes leads to a reduction in the duration of hospital stay and saving in medical expenses (12).

ASP was associated with a significant stepwise reduction in the use of cephalosporins and fluoroquinolones and a significant decrease in the incidence of *C. difficile* infection

J Antimicrob Chemother 2011; **66**: 2168–2174
doi:10.1093/jac/dkr253 Advance Access publication 14 June 2011

Journal of Antimicrobial Chemotherapy

Impact of guidelines and enhanced antibiotic stewardship on reducing broad-spectrum antibiotic usage and its effect on incidence of *Clostridium difficile* infection

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Objectives: To evaluate the impact of an 'intervention' consisting of revised antibiotic guidelines for empirical treatment of common infections and enhanced stewardship on reducing broad-spectrum antibiotic usage and its effect on incidence of *Clostridium difficile* infection (CDI).

Methods: This was a retrospective, quasi-experimental study using interrupted time series (ITS) over 12 months before and after the intervention. The setting was adult medical and surgical wards in University Hospital Lewisham, an acute general hospital in London. The intervention was introduced in April 2006. Revised guidelines avoided broad-spectrum antibiotics, e.g. fluoroquinolones, cephalosporins, clindamycin, amoxicillin and co-amoxiclav, as they were considered to be 'high risk' for CDI. Instead, 'low risk' antibiotics such as penicillin, clarithromycin, doxycycline, gentamicin, vancomycin, trimethoprim and nitrofurantoin were recommended. Changes in antibiotic usage and incidence of CDI before and after the intervention were compared using segmented regression analysis. The negative binomial model was used to analyse the time series to estimate the CDI incidence rate ratio (IRR) following the intervention.

Results: The intervention was associated with a significant reduction in the use of fluoroquinolones by 105.33 defined daily doses (DDDs)/1000 occupied bed-days (OBDs) per month [95% confidence interval (CI) 34.18–176.48, $P<0.001$] and cephalosporins by 45.93 DDDs/1000 OBDs/month (95% CI 24.11–67.74, $P<0.0001$). There was no significant change in total antibiotic, clindamycin, amoxicillin or co-amoxiclav use. There was a significant decrease in CDI following the intervention [IRR 0.34 (0.20–0.58), $P<0.0001$].

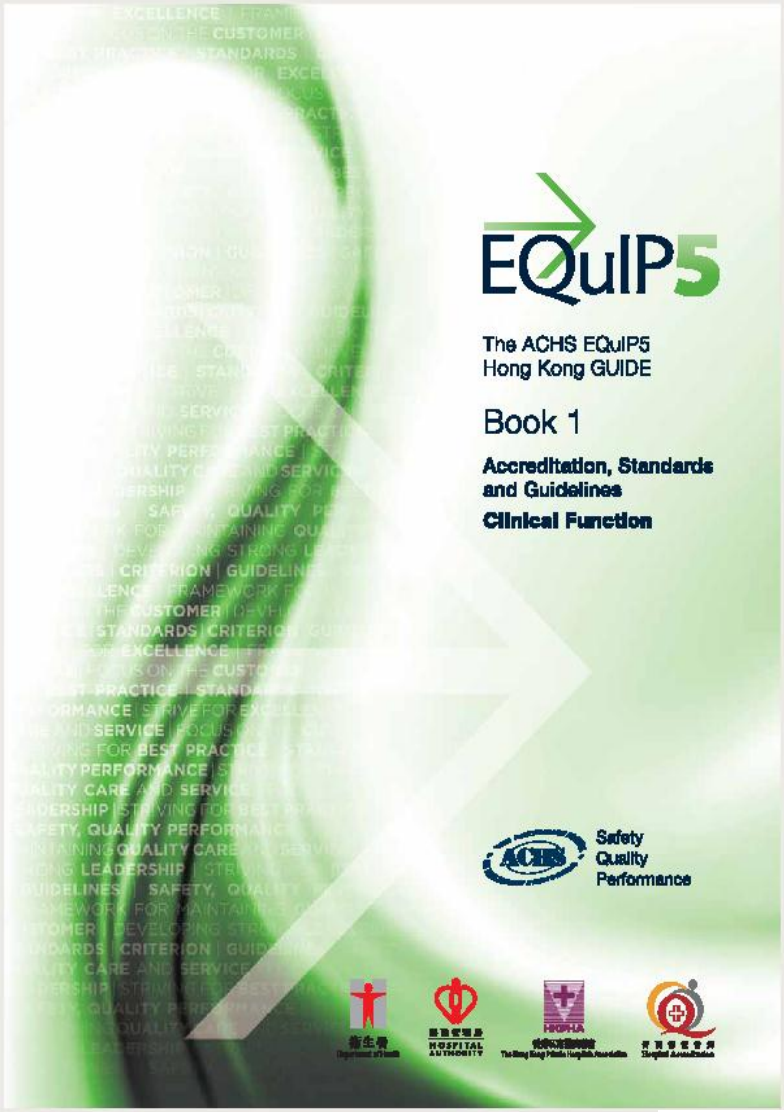
Conclusions: Revised antibiotic guidelines and enhanced stewardship was associated with a significant stepwise reduction in the use of cephalosporins and fluoroquinolones and a significant decrease in the incidence of CDI.

Keywords: antibiotics, fluoroquinolones, cephalosporins, interrupted time series, CDI

Introduction

Clostridium difficile infection (CDI) is the most common healthcare-associated infection (HCAI) in England with a total number of 51 829 cases reported in 2005–06.[1] This incidence rose by 7% in 2006–07, when 55 620 cases were recorded.[2]

CDI is endemic in University Hospital Lewisham, an acute general hospital in South London. Between April 2005 and March 2006, 349 cases of CDI were recorded. At that time our guidelines recommended levofloxacin for treatment of mild to moderate community-acquired pneumonia and norfloxacin for lower urinary tract infection. Cefuroxime was recommended for severe community-acquired pneumonia and pyelonephritis. Ceftazidime and co-amoxiclav were advised when treating hospital-acquired pneumonia and aspiration pneumonia, respectively. In light of the high incidence of CDI at University Hospital Lewisham and reports of association of CDI with widespread use of agents such as fluoroquinolones and



Criterion 1.5.2 (Mandatory)

The infection control system supports safe practice and ensures a safe environment for consumers/patients and healthcare workers

- Guideline should be available on the use of antimicrobials

Antimicrobial-related Infection Control Programs in Private Hospitals

Hospital	Antibiotic Stewardship Program		Antibiotic Prophylaxis Audit		MDROs Surveillance		Antibiotic Usage Guideline in Place		Remarks
	YES	NO	YES	NO	YES	NO	YES	NO	
Canossa Hospital	✓		✓		✓		✓		Reference to IMPACT 4
Evangel Hospital	✓		✓		✓		✓		Reference to IMPACT 4
HK Adventist Hospital	✓		✓		✓		✓ Surgical Prophylaxis Guideline		Reference to Sanford Guide & IMPACT
HK Baptist Hospital	✓		✓		✓		✓		Reference to IMPACT 4
Matilda International Hospital	✓		✓		✓		✓		Reference to Sanford Guide & IMPACT
Precious Blood Hospital Caritas	✓		2013 on UTI		✓		✓		Reference to IMPACT 4
Union Hospital	✓			Planning	✓		✓		Reference to IMPACT 4
St. Paul's Hospital	✓		✓		✓			✓	IMPACT guideline (surgical prophylaxis) sent to all doctors via e-mail
St. Teresa's Hospital	✓		✓		✓		✓		Reference to IMPACT 4
Tsuen Wan Adventist Hospital	✓			Planning	✓		✓		
HK Sanatorium & Hospital	✓			Planning	✓		✓ Surgical Prophylaxis Guideline		Reference to IMPACT 4

Antibiotic Stewardship Program

Use of Antibiotics Audit Form at In-Patient Setting

As now the antimicrobial drug resistance is an important public health threat because it endangers our ability to effectively treat infections, our hospital is putting effort to optimize antimicrobial usage by Antibiotic Stewardship Program. With effective since 1 December 2011, the Antibiotics Audit Form targeting the usage of potent antibiotics is fully implemented in all in-patients in Union Hospital. The logistic of the program is presented in the following flowchart:

Wards or other clinical areas in in-patient setting

Pharmacy

Doctors prescribe potent antibiotics* for in-patients on treatment note

Doctors shall fill in the Antibiotics Audit Form

Nurses shall send the treatment order by scan or e-transmission and the Antibiotics Audit Form by porter to pharmacy

Pharmacy staffs receive the drug order and dispense the Antibiotics to ward

Check if the Antibiotics Audit Form completed?

No

Nurses receive the uncompleted Antibiotics Audit Form from pharmacy

Yes

Pharmacy staffs gather the Antibiotics Audit Form for future analysis

*Potent Antibiotics include Doripenem (Doribax), Ceftazidime (Fortum), Cefepime (Maxipime), Meropenem (Meronem), Cefoperazone (Sulperazon), Piperacillin (Tazocin), Imipenem (Tienam) and Vancomycin.

This is a teamwork program to improve the quality standard of antibiotics use. Should you have any query or comment, please contact our pharmacists at 2608 3330 or infection control nurse at 2608 3930.

Union Hospital

ANTIBIOTICS AUDIT FORM

Clinical Information:	SURNAME			UNIT RECORD NO.
	GIVEN NAME			CHINESE NAME
	SEX	AGE	WARD	ADMITTED DATE & TIME
	ATTENDING DOCTOR			

Diagnosis/ Indication:	Ward/ Division:
	☐ Ward ☐ HDU ☐ ICU ☐ OPT

Treatment:

☐ First Antibiotics Treatment

- ☐ Empirical Treatment
- ☐ Known pathogen treatment for infection

☐ Second Antibiotics Treatment

- ☐ Empirical Treatment
- ☐ Known pathogen treatment for infection

☐ Procedural coverage (e.g. prophylaxis)

Concurrent Antibiotics Treatment
If any, please specify:

Prescription

☐ Fortum *(Ceftazidime)*	☐ Maxipime *(Cefepime)*	☐ Meronem *(Meropenem)*	☐ Sulperazon *(Cefoperazone)*
☐ Tazocin *(Piperacillin + Tazobactam)*	☐ Tienam *(Imipenem + Cilastatin)*	☐ Vancomycin	☐ Zinforo *(Ceftaroline)*

Investigation (done or to be done)

☐ Culture: Site _____ _____

☐ Blood Culture
before Antibiotics administration* _____

☐ Radiological investigations for sepsis
(e.g. CXR, Ultrasound etc) _____

Doctor's signature : _____

Date : _____

PIA-069-16-2664 (02)

Antibiotic Stewardship Program (ASP) in HKSH
(Jul 2010 to Jun 2014)

Methodology

IT Department retrieves a list of patients utilizing audited big guns daily from Pharmacy to ICT

↓

Data collection done by ICNs
- Patients' demographic data
- Laboratory results
- Antibiotic usage & usage

↓

Case audited by Clinical Microbiologists according to the recommendations of IMPACT

Appropriate prescription

Review the case if the big gun is used over 7 days

Inappropriate prescription

Immediate Concurrent Feedback (ICF) is issued to the prescribers

↓

Prescription changes and patient's outcome are tracked afterwards

*Interhospital Multi-disciplinary Programme on Antimicrobial ChemoTheary

“Big Guns” Included In ASP

- Cefepime (Maxipime)
- Ceftazidime (Fortum)
- Imipenem (Tienam)
- Meropenem (Meronem)
- Piperacillin-tazobactam (Tazocin)
- Cefoperazone-sulbactam (Sulperazon)
- Tigecycline (Tygacil)
- Linezolid (Zyvox)
- Vancomycin

Newly added in Jul 2014

- Daptomycin (Cubicin)
- Ceftaroline fosamil (Zinforo)
- Polymyxin E (Colistin)
- Teicoplanin (Targocid)

Methodology

Hong Kong Sanatorium & Hospital
Infection Control Committee

Antibiotic Stewardship Program
Audit Report on Big Guns Usage

I. Patient Demographic

Date of survey:	Date of admission:	Affix patient label here
Admission Source:	☐Home ☐Nursing home ☐HA hospital ☐Private hospital ☐Others_____	
Allergy History:		
Recent Admission (Date/Place/Diagnosis):		
Admission diagnosis & underlying diseases:		
Operation(s): ○ No ○ Yes, Give details:		

II. Clinical Laboratory Data and Antibiotic Treatment

Past Medical History:	☐ DM ☐ HT ☐ IHD ☐ COAD ☐ ESRF ☐Others_____		
	Immunocompromised ○ No	○ Yes (☐ Transplant ☐ HIV	☐ On long term steroid/immunosuppressant ☐Chemotherapy ☐ Others_____)
Body Temp: °C	Ventilator: ○ No ○ Yes	Inotrope:	Septic Shock: ○ No ○ Yes
WBC:	Neu:	Bil:	BP: (indicate if SBP<100, DBP<60)
ALT:	ALP:	Plt:	SaO_2: (indicate if $SaO_2 \leq 95$)
Ur:	Cr:	Cal CrCl:	CVP: (indicate if CVP≤5 or ≥15)
ESR:	CRP:	O_2 Consumption:	
Astrup pH:	pCO_2:	pO_2:	SO_2:

Organ/System Involved:
☐ Lung ☐ Intra-abdominal ☐ Urinary ☐ IV Catheter-related ☐ Bacteremia
☐ PD-related ☐ Soft tissue ☐ CNS ☐ Others: _____

Treatment:
☐ Prophylaxis: ☐ Surgical, Wound class: ☐ Clean ☐ Clean contaminated ☐ Contaminated ☐ Prosthesis insertion
☐ Non-surgical
☐ Empirical
☐ Known Pathogen: i) ☐ CAI ☐ HAI
ii) Infection diagnosis:

Antibiotic Status:
☐ Not on Antibiotic Previously
☐ Switch from:
☐Concurrent Antibiotic:

III. Big Guns Usage

Antibiotic Name	Dose	Frequency	Start Date	Intended Duration	Prescription By

IV. Outcome Measures

☐ Not Done ☐ Pending for Audit: ☐ Undetermined
☐ Appropriate Prescription ☐ Inappropriate Prescription

Immediate Concurrent Feedback to Prescriber: ○ Yes ○ No

- ☐ Recommendation followed (e.g. switch to suggested antibiotic, dose, etc)
- ☐ Change prescription but not follow specific recommendation
- ☐ Recommendations not followed, i.e. no change of antibiotic, dose, etc
- ☐ Not applicable – patient transfer/discharge/death/treatment already stopped
- ☐ Modify concurrent antibiotics; recommendation followed
- ☐ Modify concurrent antibiotics; recommendation not followed
- ☐ Other _____

- ☐ Deteriorating patient condition
- ☐ Not applicable – patient transfer/discharge/death/treatment already stopped
- ☐ Other: _____

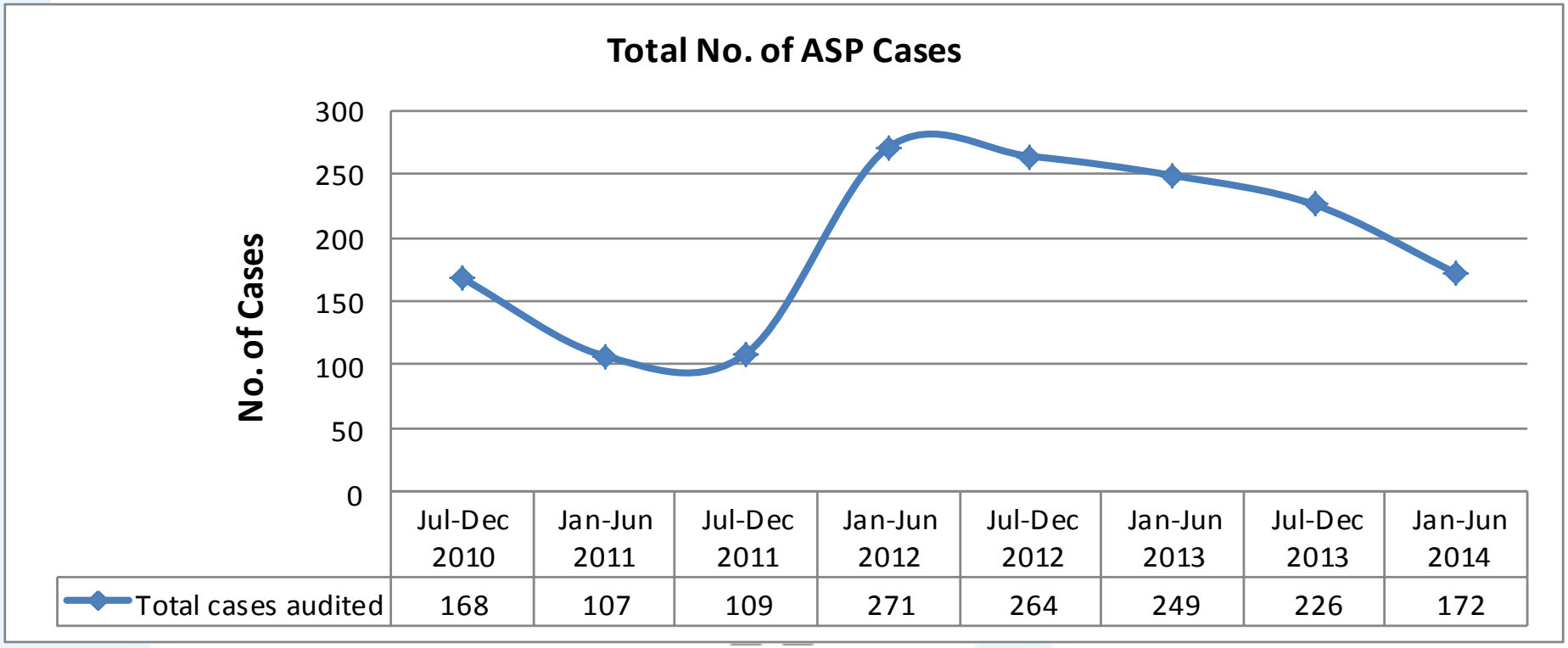
Data Collected By:	Audited By:
Date:	Date:

V. Miscellaneous

Accuracy of Information Provided:	○ Correct	○ Incorrect ☐ Treatment ☐ Organism isolated ☐ Indication ☐ Previous Antibiotic Treatment ☐ Sensitivity ☐ Others:_____
Reason for Appropriate Prescription:	☐ According to ST ☐ Nosocomial Infection ☐ CAPD Peritonitis ☐ Allergy History ☐ Failure of 1st Line Antibiotics ☐ Others_____	☐ Immunocompromised ☐ Empirical Treatment for Neutropenic Fever ☐ Recommended by Microbiologist/ID Physicians ☐ Severe Clinical Infection ☐ Oral Intake/Absorption Unreliable/Impossible
Reason for Inappropriate Prescription:	☐ No evidence of infection/alternative Dx ☐ Colonization/contamination ☐ Redundant combination ☐ Inappropriate route ☐ Inappropriate choice	☐ Use as prophylactic agent ☐ Spectrum too broad ☐ Inappropriate coverage ☐ Inappropriate dosage ☐ Others _____
Remarks:		

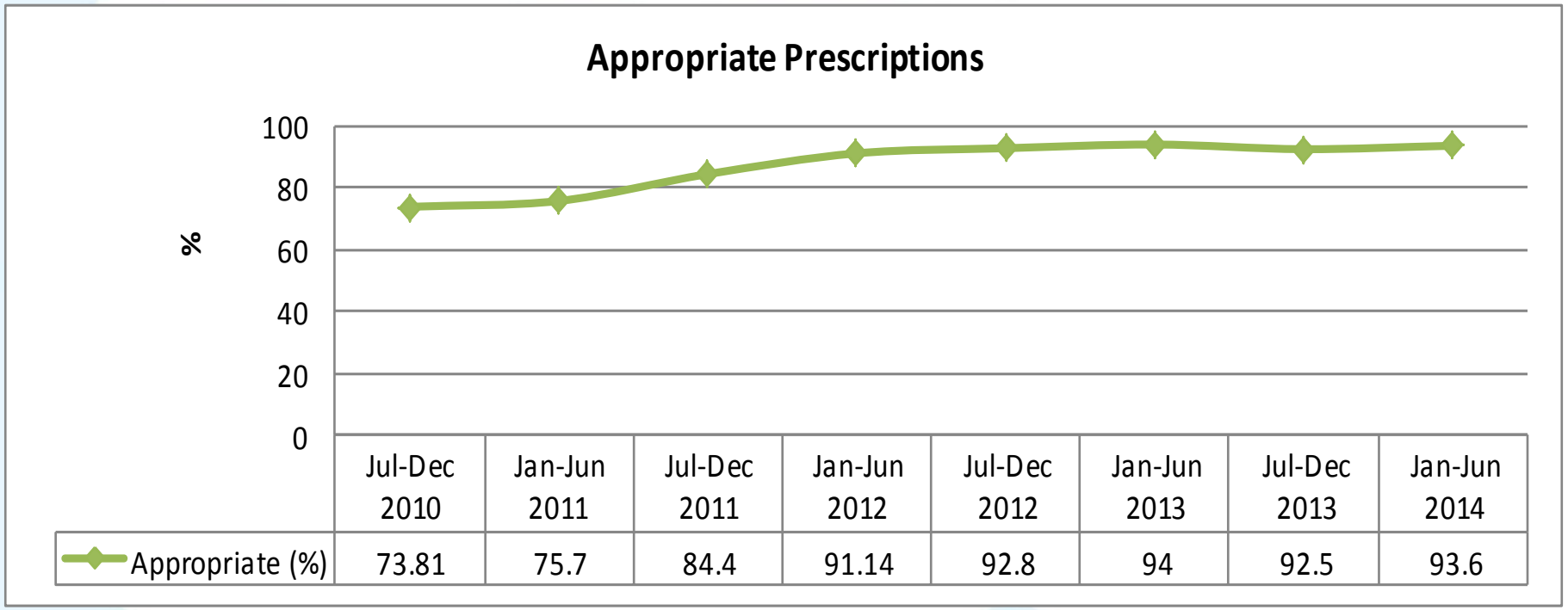
Part I to Part III complete by ICN
Part IV & Part V complete by Microbiology Specialist

Total Number of ASP Cases



	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014
Total cases audited	168	107	109	271	264	249	226	172

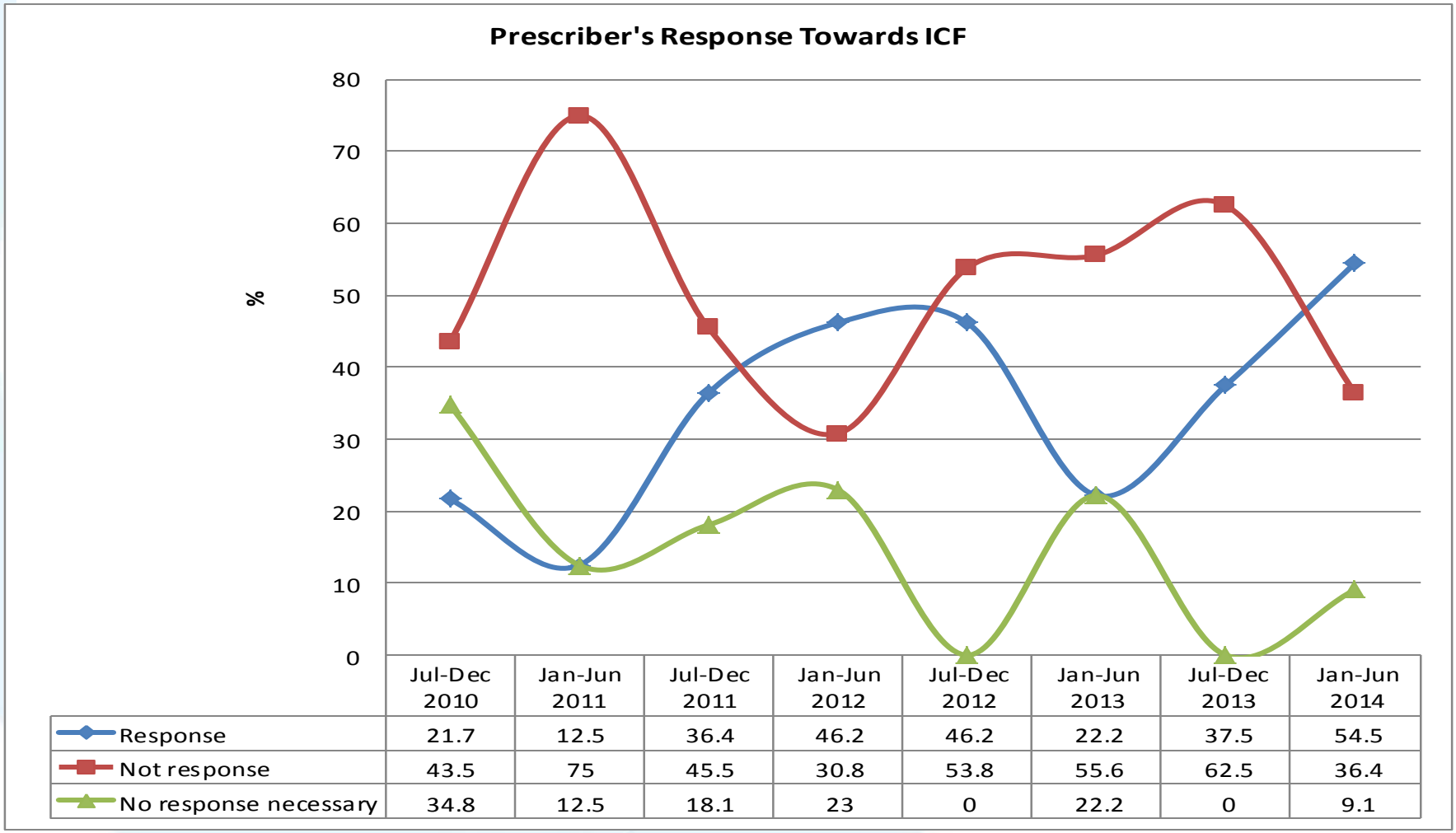
Appropriateness of Prescriptions



Immediate Concurrent Feedback (ICF) Issued to Prescribers

	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014
Number of ICF were issued	23	16	11	13	13	9	8	11
Number of cases followed ICF	5 (21.7%)	2 (12.5%)	4 (36.4%)	6 (46.2%)	6 (46.2%)	2 (22.2%)	3 (37.5%)	6 (54.5%)
Number of case did not follow ICF	10 (43.5%)	12 (75%)	5 (45.5%)	4 (30.8%)	7 (53.8%)	5 (55.6%)	5 (62.5%)	4 (36.4%)
Patient was discharged or death, or treatment had already stopped after ICF was issued	8 (34.8%)	2 (12.5%)	2 (18.1%)	3 (23%)	0	2 (22.2%)	0	1 (9.1%)

Cases Followed Immediate Concurrent Feedback

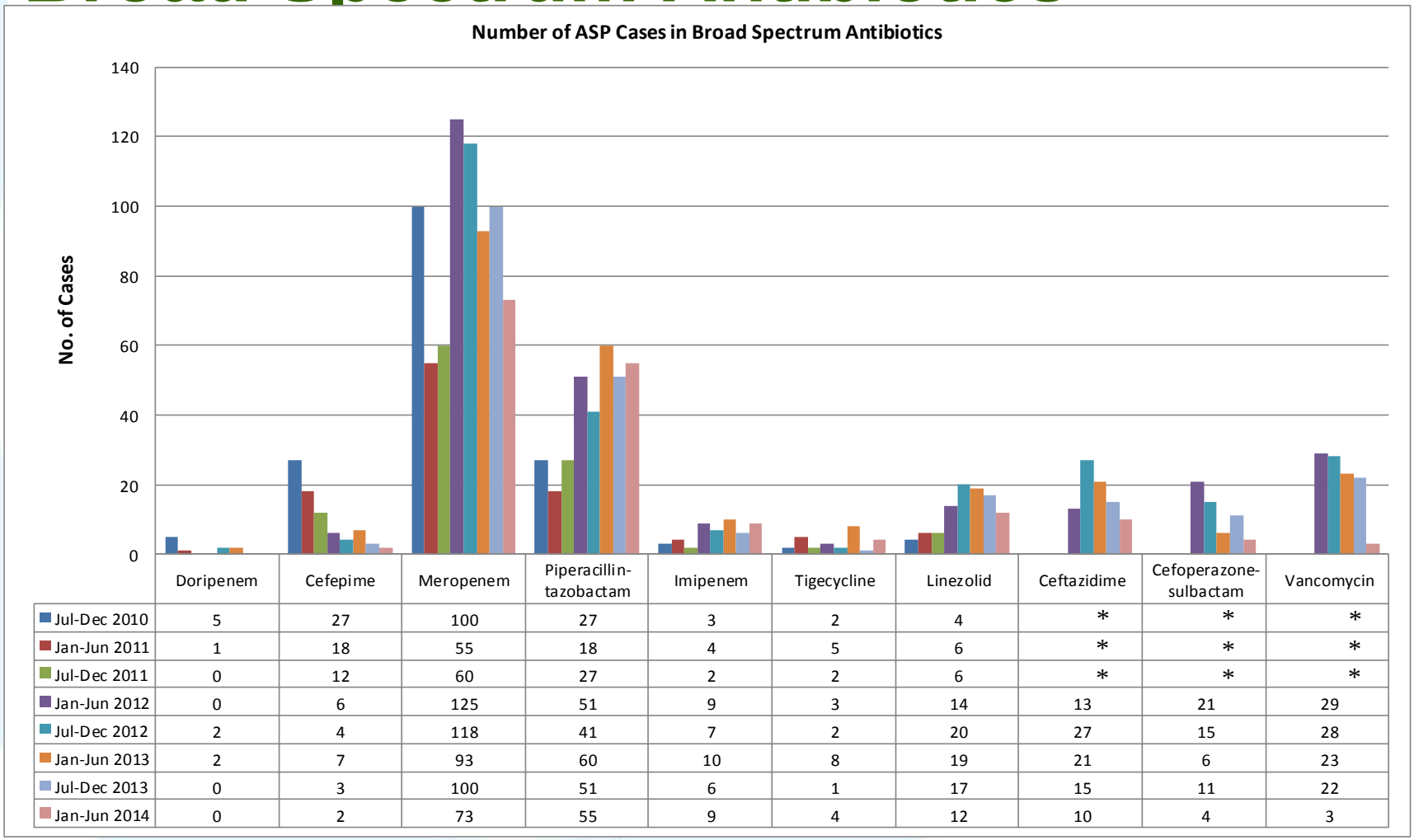


	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014
Response	21.7	12.5	36.4	46.2	46.2	22.2	37.5	54.5
Not response	43.5	75	45.5	30.8	53.8	55.6	62.5	36.4
No response necessary	34.8	12.5	18.1	23	0	22.2	0	9.1

Reasons for Inappropriate Prescription

	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014
No evidence of infection/alternative diagnosis	2	2	1	4	4	5	6	1
Inappropriate choice	-	-	-	2	-	1	1	2
Use as prophylactic agent	-	1	2	1	1	0	1	0
Spectrum too broad	19	19	14	11	14	7	8	7
Inappropriate coverage	1	5	-	6	1	2	1	2
Inappropriate dosage	-	-	-	1	-	0	0	1
Others	Community acquired infection	-	Renal impairment	No history of Pseudomonas aeruginosa colonization	-	-	-	-

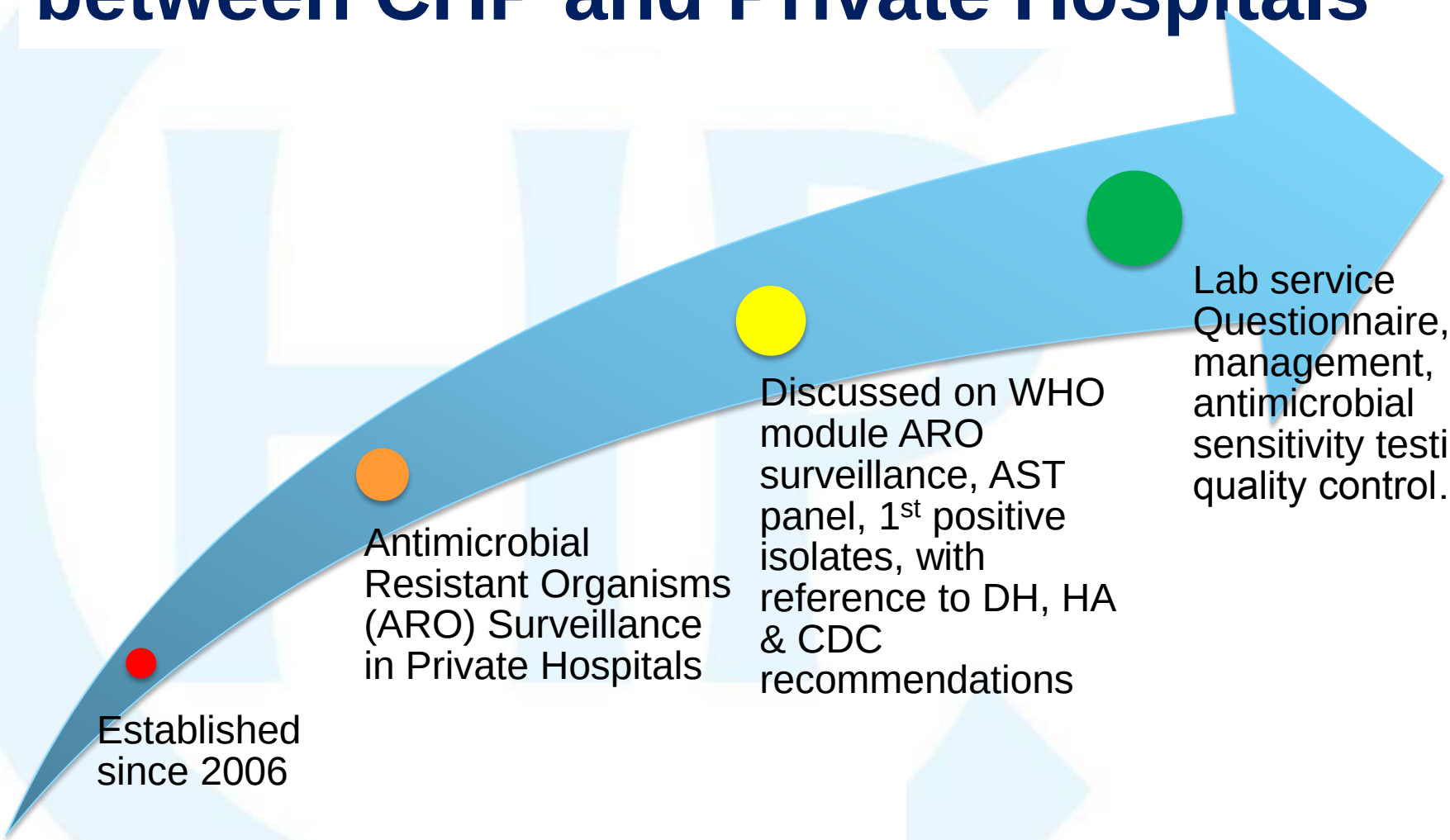
Number of ASP Cases in Broad Spectrum Antibiotics



	Doripenem	Cefepime	Meropenem	Piperacillin-tazobactam	Imipenem	Tigecycline	Linezolid	Ceftazidime	Cefoperazone-sulbactam	Vancomycin
Jul-Dec 2010	5	27	100	27	3	2	4	*	*	*
Jan-Jun 2011	1	18	55	18	4	5	6	*	*	*
Jul-Dec 2011	0	12	60	27	2	2	6	*	*	*
Jan-Jun 2012	0	6	125	51	9	3	14	13	21	29
Jul-Dec 2012	2	4	118	41	7	2	20	27	15	28
Jan-Jun 2013	2	7	93	60	10	8	19	21	6	23
Jul-Dec 2013	0	3	100	51	6	1	17	15	11	22
Jan-Jun 2014	0	2	73	55	9	4	12	10	4	3

Antimicrobial Resistance Surveillance

The establishment of collaboration between CHP and Private Hospitals



Working Group of Collaboration between CHP & Private Hospitals on Safe Use of Antibiotics & Infection Control

- Increase collaboration between CHP & Private Hospitals related to infection control
- Enhance communication & experience sharing among members
- Establish a central database related to antibiotics use & resistance, with regular update to members

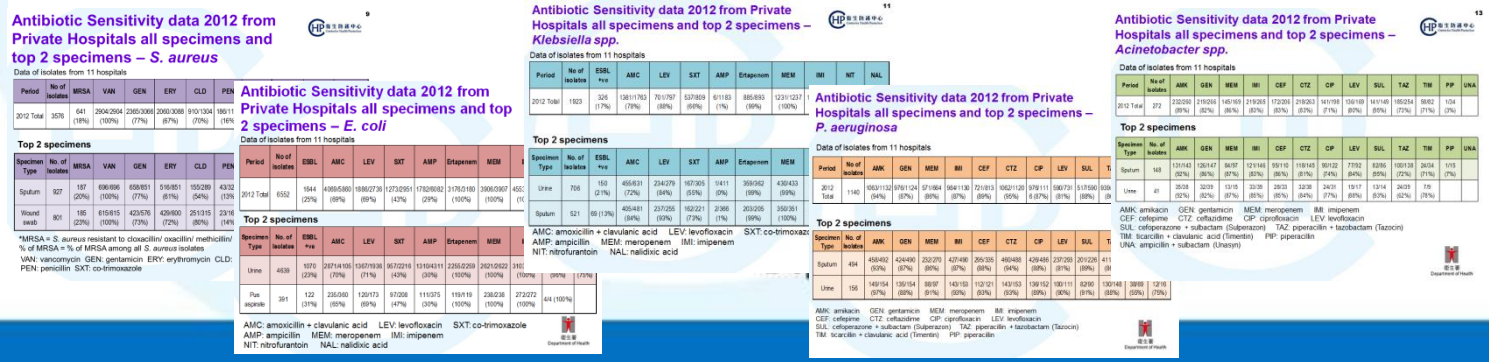
Working Group 2014

Chairman Dr Dr WONG Tin Yau, Andrew & Co-Chairman Dr YUNG Wai Hung, Raymond

- Infection Control Branch, CHP
- Canossa Hospital (Caritas)
- Evangel Hospital
- Hong Kong Adventist Hospital
- Hong Kong Baptist Hospital
- Hong Kong Sanatorium & Hospital
- Matilda International Hospital
- Precious Blood Hospital
- St. Paul's Hospital
- St. Teresa's Hospital
- Union Hospital
- Tsuen Wan Adventist Hospital

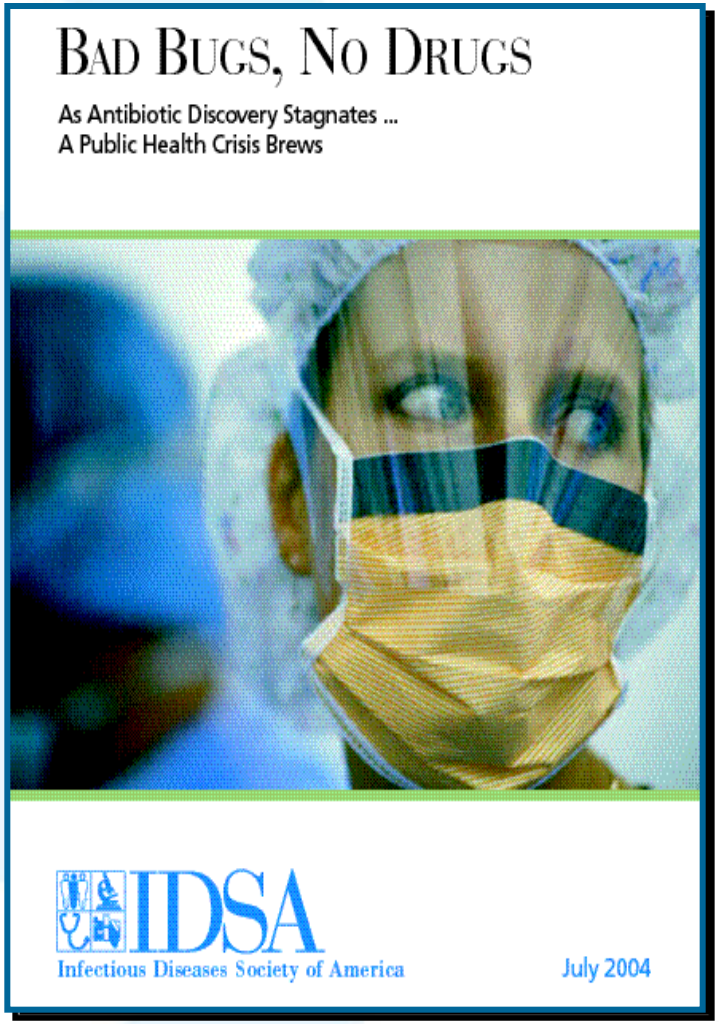
What have we done?

- Conducted regular meetings
- Ad hoc subgroup, e.g. Hand Hygiene Campaign 2014 Working Group
- Monitoring of the antibiotic sensitivities of the five selected bacteria
  - ICB collated antibiotic sensitivities data on the five selected bacteria from each private hospital, analyze and tabulate the data
  - The aggregated data was then be shared in the meetings and newsletters among healthcare professionals in private hospitals for internal references
- Surveillance of MDROs
- Experience sharing on infection control against VRE, MRSA etc.



Bad Bugs, No Drugs[1]

- Declining research investments in antimicrobial development[2,3]
- The Antimicrobial Availability Task Force of the IDSA identified problematic pathogens including gram-negative bacteria[2]
- Problematic pathogens can "escape" the activity of antibacterial drugs[3]
  - "**ESKAPE**"(ES**C**APE) pathogens include
    - ***E****scherichia coli*
    - ***S****taphylococcus aureus*
    - ***K****lebsiella pneumoniae*(***C.****difficle*)
    - ***A****cinetobacter baumannii*
    - ***P****seudomonas aeruginosa*
    - ***E****nterobacter* spp



1. Infectious Diseases Society of America. *Bad Bugs, No Drugs: As Antibiotic Discovery Stagnates, A Public Health Crisis Brews*.
July, 2004. http://www.idsociety.org/WorkArea/showcontent.aspx?id=5554. Accessed January 15, 2009. 2. Talbot GH, et al.
Clin Infect Dis. 2006;42:657-68. 3. Boucher HW, et al. *Clin Infect Dis*. 2009;48:1-12.

Antibiotic sensitivities of the five selected bacteria:

- ***Staphylococcus aureus***
- ***Escherichia coli***
- ***Klebsiella* species**
- ***Pseudomonas aeruginosa***
- ***Acinetobacter* species**

Monitor the trend of change regarding:

- ✓ **Overall sensitivity pattern from all specimens**
- ✓ **Sensitivity patterns of the top two specimens for each bacteria**
- ✓ **Important specimen type e.g. blood**

Antibiotic Sensitivity data 2013 from Private Hospitals – *S. aureus*

Data of isolates from 10 hospitals

All specimens

Period	No. of Isolates	MRSA	VAN	GEN	ERY	CLD	PEN	Linezolid	SXT	Fusidic acid	Rifampicin
2013 Total	4013	807 (20%)	3204/3204 (100%)	2711/3027 (90%)	2295/3396 (68%)	1159/1668 (69%)	262/2383 (11%)	2065/2066 (100%)	3162/3248 (97%)	1411/1446 (98%)	672/699 (96%)

Blood & Top 2 specimens

Specimen Type	No. of Isolates	MRSA	VAN	GEN	ERY	CLD	PEN	Linezolid	SXT	Fusidic acid	Rifampicin
Blood	49	10 (20%)	39/39 (100%)	29/32 (91%)	31/40 (78%)	18/24 (75%)	1/28 (4%)	29/29 (100%)	36/36 (100%)	19/19 (100%)	9/10 (90%)
Sputum	1101	266 (24%)	782/782 (100%)	808/917 (88%)	652/977 (67%)	224/378 (59%)	95/761 (12%)	502/502 (100%)	734/752 (98%)	329/336 (98%)	122/130 (94%)
Wound swab	947	224 (24%)	742/742 (100%)	557/608 (92%)	480/738 (65%)	372/485 (77%)	29/332 (9%)	610/611 (100%)	783/824 (95%)	389/408 (95%)	107/110 (97%)

*****MRSA = *S. aureus* resistant to cloxacillin/ oxacillin/ methicillin/ cefoxitin
% of MRSA = % of MRSA among all *S. aureus* isolates

VAN: vancomycin GEN: gentamicin ERY: erythromycin CLD: clindamycin
PEN: penicillin SXT: co-trimoxazole

% of MRSA +ve in specimen cultured with *S. aureus*

	2012 (11 hospitals)	2013 (10 hospitals)	P value
Total no. of isolate	3576	4013	
Blood	15% (5/34)	20% (10/49)	0.5067
Sputum	20% (187/927)	24% (266/1101)	0.0317
Wound swab	23% (185/801)	24% (224/947)	0.7838

PHLSB Data

Bacterial pathogen isolation and percentage of antimicrobial resistance - out-patient setting, in 2014

The presented figures refer to specimens received during the designated month.

Nasal swab specimens

Organism	Drugs*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Staphylococcus aureus	No.	3	1	3	2	4	3	4	0	3			
	Penicillin	100%	100%	100%	100%	75%	0%	75%	-	67%			
	Oxacillin [MRSA]	33%	0%	0%	0%	25%	0%	25%	-	0%			
	Clindamycin	0%	100%	0%	50%	25%	0%	0%	-	33%			
	Erythromycin	0%	100%	0%	50%	25%	0%	0%	-	33%			
	Gentamicin	33%	0%	0%	0%	0%	33%	0%	-	0%			

Throat swab specimens

Organism	Drugs*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Beta-haemolytic streptococcus of Lancefield Group A, C & G	No.	6	3	2	4	4	7	2	4	2			
	Penicillin	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	Erythromycin	50%	33%	100%	25%	25%	29%	50%	50%	0%			

Sputum specimens

Organism	Drugs*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	De
Streptococcus pneumoniae	No.	5	13	6	7	20	8	9	9	9			
	Penicillin	40%	46%	33%	71%	35%	63%	22%	22%	11%			
	Erythromycin	80%	77%	83%	100%	75%	100%	78%	89%	89%			

http://www.chp.gov.hk/en/data/1/10/641/697/3346.html

Bacterial pathogen isolation and percentage of antimicrobial resistance - out-patient setting, in 2014

The presented figures refer to specimens received during the designated month.

Nasal swab specimens

Organism	Drugs*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Staphylococcus aureus	No.	3	1	3	2	4	3	4	0	3			
	Penicillin	100%	100%	100%	100%	75%	0%	75%	-	67%			
	Oxacillin [MRSA]	33%	0%	0%	0%	25%	0%	25%	-	0%			
	Clindamycin	0%	100%	0%	50%	25%	0%	0%	-	33%			
	Erythromycin	0%	100%	0%	50%	25%	0%	0%	-	33%			
	Gentamicin	33%	0%	0%	0%	0%	33%	0%	-	0%			

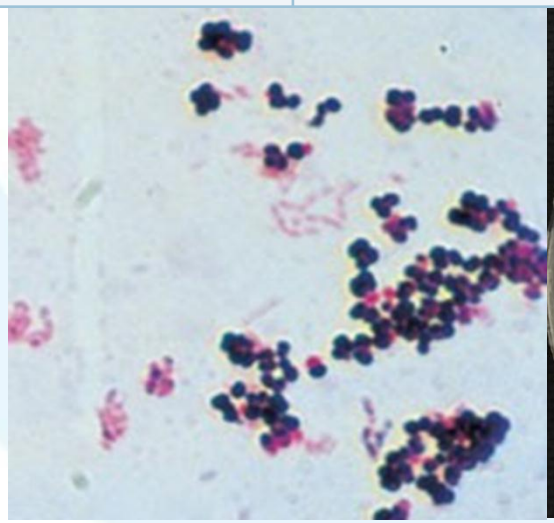
Soft tissue specimens

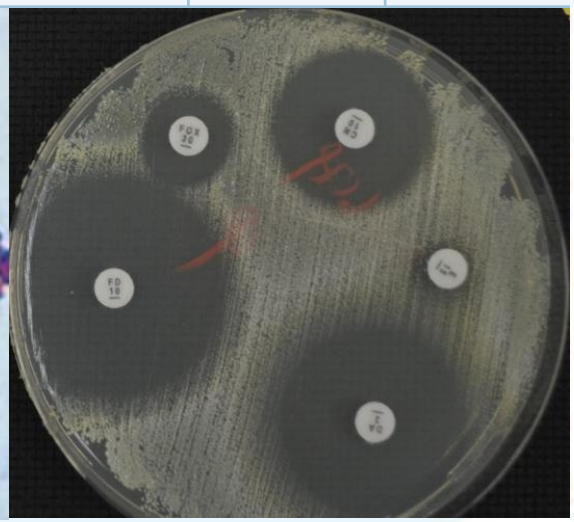
Organism	Drugs*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Staphylococcus aureus	No.	79	60	83	90	69	72	73	75	68			
	Oxacillin [MRSA]	19%	15%	23%	17%	19%	17%	19%	20%	24%			

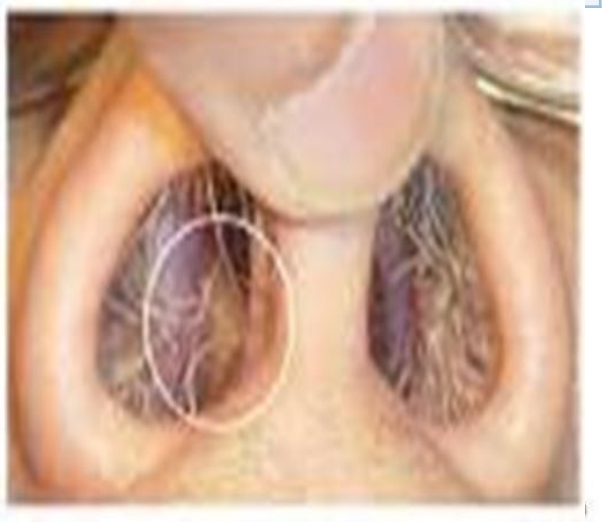
http://www.chp.gov.hk/en/data/1/10/641/697/3346.html

MRSA in HA hospitals

MRSA		2009	2010	2011	2012	2013 (up to June)
MRSA / total SA		-	-	42.83% (10870/ 25382)	43.60% (11725/ 26891)	46.13% (10900/ 23629)
No of cases		6735	7227	7551	8315	7944
No of infection		3702	3794	4152	4664	3997
MRSA Bacteremia in Acute Beds/ 1,000 Acute patient days	Number	676	599	611	591	549
	Overall	0.17%	0.15%	0.15%	0.14%	0.15%
	≥ 2 days of admission	0.07%	0.060%	0.06%	0.06%	0.06%







Courtesy : CICOHA

Antibiotic Sensitivity data 2013 from Private Hospitals – *E. coli*

Data of isolates from 10 hospitals

All Specimen

Period	No. of Isolates	ESBL	AMC	LEV	SXT	AMP	Ertapenem	MEM	IMI	NIT	NAL
2013 Total	7627	1909 (25%)	5103/6968 (73%)	3476/5025 (69%)	2573/4569 (56%)	2057/7096 (29%)	5120/5126 (100%)	5511/5517 (100%)	5033/5035 (100%)	2857/3124 (91%)	154/550 (28%)

Blood & top 2 specimens

Specimen Type	No. of Isolates	ESBL	AMC	LEV	SXT	AMP	Ertapenem	MEM	IMI	NIT	NAL
Blood	228	69 (30%)	124/190 (65%)	95/157 (61%)	56/120 (47%)	49/226 (22%)	147/147 (100%)	185/185 (100%)	136/136 (100%)		
Urine	5452	1273 (23%)	3691/4931 (75%)	2457/3461 (71%)	1969/3378 (58%)	1517/5064 (30%)	3573/3574 (100%)	3838/3840 (100%)	3456/3457 (100%)	2843/3109 (91%)	153/549 (28%)
Pus aspirate	466	116 (25%)	307/430 (71%)	226/308 (73%)	129/241 (54%)	115/446 (26%)	313/313 (100%)	339/339 (100%)	325/325 (100%)	2/2 (100%)	

AMC: amoxicillin + clavulanic acid LEV: levofloxacin SXT: co-trimoxazole
AMP: ampicillin MEM: meropenem IMI: imipenem
NIT: nitrofurantoin NAL: nalidixic acid

% of ESBL+ve in specimen cultured with *E. coli*

	2012 (11 hospitals)	2013 (10 hospitals)	P value
Total no. of isolate	6552	7627	
Blood	24% (46/191)	30% (69/228)	0.1580
Urine	23% (1070/4639)	23% (1273/5452)	0.7364

Bacterial pathogen isolation and percentage of antimicrobial resistance - out-patient setting, in 2014

The presented figures refer to specimens received during the designated month:

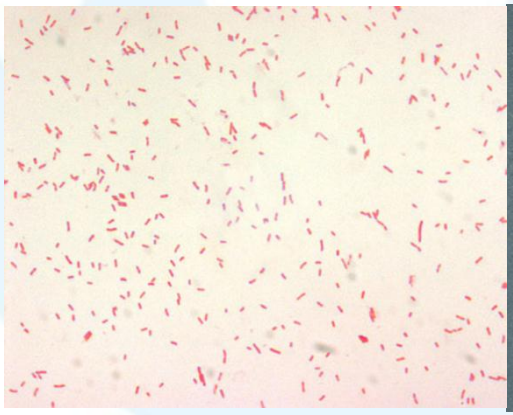
Urine specimens

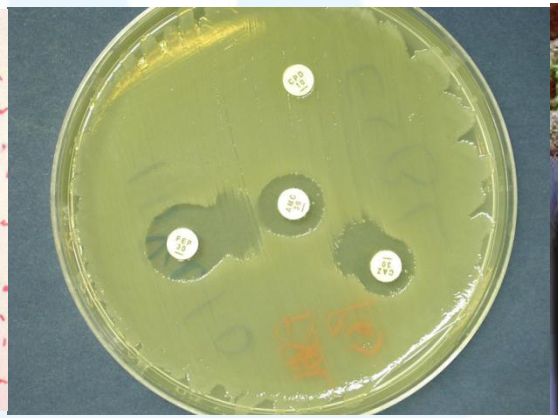
Organism	Drugs*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Escherichia coli	No.	391	376	494	464	401	473	546	528	544			
	Ampicillin	67%	60%	67%	70%	70%	68%	65%	69%	66%			
	Amoxicillin + clavulanic acid	5%	6%	6%	9%	6%	7%	6%	7%	7%			
	Nalidixic acid	70%	66%	74%	72%	67%	66%	70%	69%	67%			
	Nitrofurantoin	2%	2%	2%	1%	1%	2%	2%	3%	3%			
	Co-trimoxazole	36%	31%	40%	43%	41%	43%	43%	40%	40%			
	Levofloxacin	30%	38%	33%	31%	32%	29%	29%	33%	30%			
	ESBL+	17%	18%	18%	20%	19%	18%	19%	18%	22%			
*Klebsiella pneumoniae^*	No.	56	64	71	80	79	48	97	104	108			
	Amoxicillin + clavulanic acid	13%	11%	7%	6%	11%	6%	7%	6%	11%			
	Nalidixic acid	20%	20%	24%	13%	13%	23%	15%	13%	16%			
	Nitrofurantoin	23%	31%	37%	28%	30%	25%	34%	44%	28%			
	Co-trimoxazole	23%	19%	18%	15%	14%	19%	20%	14%	22%			
	Levofloxacin	14%	13%	15%	6%	9%	2%	5%	7%	6%			
	ESBL+	11%	6%	6%	10%	4%	15%	18%	10%	5%			
*Proteus mirabilis^^*	No.	54	54	62	55	54	49	69	61	73			
	Ampicillin	43%	33%	29%	42%	44%	27%	36%	38%	33%			
	Amoxicillin + clavulanic acid	4%	4%	3%	7%	9%	6%	1%	8%	3%			
	Nalidixic acid	35%	35%	31%	31%	41%	27%	33%	36%	32%			
	Co-trimoxazole	35%	24%	13%	25%	35%	20%	30%	34%	19%			
	Levofloxacin	15%	13%	13%	24%	24%	16%	20%	21%	25%			

http://www.chp.gov.hk/en/data/1/10/641/697/3346.html

ESBL in HA hospitals

ESBL		2009	2010	2011	2012	2013 (up to June)
ESBL +ve / All E coli and K spp.		-	25%	25.37%	25.76%	23.77%
Total no of cases		-	-	13070	14224	12081
ESBL BSI per 1,000 patient bed days	Number	-	-	1564	1722	1569
	Overall	-	-	0.22%	0.23%	0.25%
	≥ 2 days of admission	-	-	0.06%	0.06%	0.06%





Courtesy : CICOHA

Antibiotic Sensitivity data 2013 from Private Hospitals – *Klebsiella* spp.

Data of isolates from 10 hospitals

All specimens

Period	No. of Isolates	ESBL +ve	AMC	LEV	SXT	AMP	Ertapenem	MEM	IMI	NIT	NAL
2013 Total	2231	362 (16%)	1607/2058 (78%)	1281/1553 (82%)	904/1247 (72%)	13/1800 (1%)	1543/1551 (99%)	1692/1701 (99%)	1489/1494 (100%)	176/460 (38%)	53/106 (50%)

Blood and top 2 specimens

Specimen Type	No. of Isolates	ESBL +ve	AMC	LEV	SXT	AMP	Ertapenem	MEM	IMI	NIT	NAL
Blood	63	5 (8%)	40/51 (78%)	37/45 (82%)	27/33 (82%)	0/49 (0%)	44/44 (100%)	54/54 (100%)	44/44 (100%)		
Urine	814	172 (21%)	547/732 (75%)	456/564 (81%)	329/481 (68%)	3/614 (0%)	551/554 (99%)	607/608 (100%)	532/532 (100%)	176/459 (38%)	52/105 (50%)
Sputum	534	74 (14%)	396/502 (79%)	313/381 (82%)	171/241 (71%)	4/455 (1%)	372/372 (100%)	409/412 (99%)	351/351 (100%)		

AMC: amoxicillin + clavulanic acid LEV: levofloxacin SXT: co-trimoxazole
AMP: ampicillin MEM: meropenem IMI: imipenem
NIT: nitrofurantoin NAL: nalidixic acid

% of ESBL+ve in specimen cultured with *Klebsiella spp.*

	2012 (11 hospitals)	2013 (10 hospitals)	P value
Total no. of isolate	1923	2231	
Blood	8% (4/52)	8% (5/63)	0.9613
Sputum	13% (69/521)	14% (74/534)	0.7709
Urine	21% (150/706)	21% (172/814)	0.9559

Bacterial pathogen isolation and percentage of antimicrobial resistance - out-patient setting, in 2014

The presented figures refer to specimens received during the designated month:

Urine specimens

Organism	Drugs*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Escherichia coli	No.	391	376	494	464	401	473	546	528	544			
	Ampicillin	67%	60%	67%	70%	70%	68%	65%	69%	66%			
	Amoxicillin + clavulanic acid	5%	6%	6%	9%	6%	7%	6%	7%	7%			
	Nalidixic acid	70%	66%	74%	72%	67%	66%	70%	69%	67%			
	Nitrofurantoin	2%	2%	2%	1%	1%	2%	2%	3%	3%			
	Co-trimoxazole	36%	31%	40%	43%	41%	43%	43%	40%	40%			
	Levofloxacin	30%	38%	33%	31%	32%	29%	29%	33%	30%			
	ESBL+	17%	18%	18%	20%	19%	18%	19%	18%	22%			
*Klebsiella pneumoniae^*	No.	56	64	71	80	79	48	97	104	108			
	Amoxicillin + clavulanic acid	13%	11%	7%	6%	11%	6%	7%	6%	11%			
	Nalidixic acid	20%	20%	24%	13%	13%	23%	15%	13%	16%			
	Nitrofurantoin	23%	31%	37%	28%	30%	25%	34%	44%	28%			
	Co-trimoxazole	23%	19%	18%	15%	14%	19%	20%	14%	22%			
	Levofloxacin	14%	13%	15%	6%	9%	2%	5%	7%	6%			
	ESBL+	11%	6%	6%	10%	4%	15%	18%	10%	5%			
*Proteus mirabilis^^*	No.	54	54	62	55	54	49	69	61	73			
	Ampicillin	43%	33%	29%	42%	44%	27%	36%	38%	33%			
	Amoxicillin + clavulanic acid	4%	4%	3%	7%	9%	6%	1%	8%	3%			
	Nalidixic acid	35%	35%	31%	31%	41%	27%	33%	36%	32%			
	Co-trimoxazole	35%	24%	13%	25%	35%	20%	30%	34%	19%			
	Levofloxacin	15%	13%	13%	24%	24%	16%	20%	21%	25%			

http://www.chp.gov.hk/en/data/1/10/641/697/3346.html

Antibiotic Sensitivity data 2013 from Private Hospitals – *P. aeruginosa*

Data of isolates from 10 hospitals

All specimens

Period	No. of Isolates	AMK	GEN	MEM	IMI	CEF	CTZ	CIP	LEV	SUL	TAZ	TIM	PIP
2013 Total	1462	1364/1455 (94%)	1277/1452 (88%)	829/985 (84%)	1136/1389 (82%)	940/1022 (92%)	1337/1448 (92%)	1187/1411 (84%)	797/1031 (77%)	676/808 (84%)	1192/1294 (92%)	266/564 (47%)	124/139 (89%)

Blood and top 2 specimens

Specimen	No. of isolates	AMK	GEN	MEM	IMI	CEF	CTZ	CIP	LEV	SUL	TAZ	TIM	PIP
Blood	19	19/19 (100%)	18/19 (95%)	15/16 (94%)	16/18 (89%)	14/14 (100%)	18/19 (95%)	18/19 (95%)	14/15 (93%)	12/12 (100%)	17/17 (100%)	1/4 (25%)	2/2 (100%)
Sputum	652	611/651 (94%)	580/649 (89%)	349/417 (84%)	500/614 (81%)	380/418 (91%)	594/646 (92%)	514/628 (82%)	309/422 (73%)	272/326 (83%)	526/570 (92%)	116/218 (53%)	63/74 (85%)
Other resp	212	181/212 (85%)	152/212 (72%)	122/171 (71%)	140/212 (66%)	153/180 (85%)	178/211 (84%)	152/208 (73%)	115/181 (64%)	121/161 (75%)	176/209 (84%)	40/126 (32%)	1/2 (50%)

AMK: amikacin GEN: gentamicin MEM: meropenem IMI: imipenem
CEF: cefepime CTZ: ceftazidime CIP: ciprofloxacin LEV: levofloxacin
SUL: cefoperazone + sulbactam (Sulperazon) TAZ: piperacillin + tazobactam (Tazocin)
TIM: ticarcillin + clavulanic acid (Timentin) PIP: piperacillin

Antibiotic Sensitivity data 2013 from Private Hospitals – *Acinetobacter spp.*

Data of isolates from 10 hospitals

All specimens

Period	No. of Isolates	AMK	GEN	MEM	IMI	CEF	CTZ	CIP	LEV	SUL	TAZ	TIM	PIP	UNA
2013 Total	389	328/368 (89%)	338/385 (88%)	247/291 (85%)	315/364 (87%)	255/304 (84%)	321/382 (84%)	273/330 (83%)	232/282 (82%)	200/212 (94%)	242/299 (81%)	85/107 (79%)	49/57 (86%)	111/125 (89%)

Top 2 specimens

Specimen	No. of isolates	AMK	GEN	MEM	IMI	CEF	CTZ	CIP	LEV	SUL	TAZ	TIM	PIP	UNA
Blood	6	6/6 (100%)	5/6 (83%)	2/3 (67%)	4/6 (67%)	3/3 (100%)	3/6 (50%)	5/6 (83%)	3/3 (100%)	2/2 (100%)	2/5 (40%)		1/1 (100%)	1/1 (100%)
Sputum	225	202/218 (93%)	207/224 (92%)	156/176 (89%)	194/213 (91%)	153/172 (89%)	189/222 (85%)	169/192 (88%)	143/159 (90%)	129/134 (96%)	143/167 (86%)	38/52 (73%)	29/36 (81%)	59/66 (89%)
Wound swab	47	37/39 (95%)	43/45 (96%)	27/30 (90%)	37/40 (93%)	31/34 (91%)	42/45 (93%)	36/40 (90%)	22/26 (85%)	19/20 (95%)	26/30 (87%)	12/13 (92%)	12/12 (100%)	12/13 (92%)

AMK: amikacin GEN: gentamicin MEM: meropenem IMI: imipenem
CEF: cefepime CTZ: ceftazidime CIP: ciprofloxacin LEV: levofloxacin
SUL: cefoperazone + sulbactam (Sulperazon) TAZ: piperacillin + tazobactam (Tazocin)
TIM: ticarcillin + clavulanic acid (Timentin) PIP: piperacillin
UNA: ampicillin + sulbactam (Unasyn)

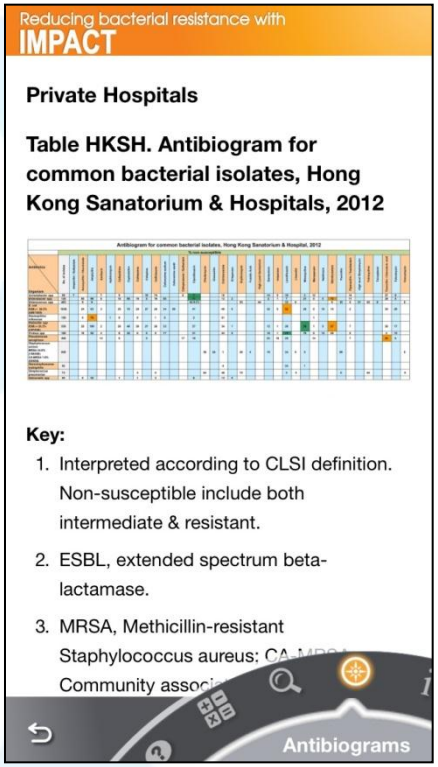
Dissemination of data – way forward

- Add tables of aggregated data to the IMPACT mobile apps
- Further publicize the 3-year data from 2011 to 2013 when available

iPhone & iPod

iPad

Android version:



The 4th edition of "Reducing bacterial resistance with IMPACT" guidelines (Search "IMPACT" in Apps Store)

Example from IMPACT apps

Reducing bacterial resistance with **IMPACT**

Antibiogram for common bacterial isolates, Hong Kong Sanatorium & Hospital, 2012

% non-susceptible

Organism / Antibiotics	No. of isolates	Ampicillin / Sulbactam	Amoxycillin / Clavulanate	Ampicillin	Amikacin	Azithromycin	Ceftazidime	Cephalothin	Cefotaxime	Cefepime	Ceftriaxone	Cefuroxime sodium	Cefuroxime axetil	Cefoperazone / Sulbactam	Ciprofloxacin	Clindamycin	Cloxacillin	Cotrimoxazole	Ertapenem	Erythromycin	Fusidic Acid	High Level Gentamicin	Gentamicin	Imipenem	Levofloxacin	Linezolid	Minocycline	Meropenem	Netilmicin	Nitrofurantoin	Penicillin	Piperacillin / Tazobactam	High level Streptomycin	Tetracycline	Teicoplanin	Ticarcillin / Clavulanic acid	Tobramycin	Vancomycin
Acinetobacter spp	59	7			7		9			10	74			8	7			10					14	9	10		3	12				14				27	9	
Enterobacter spp	136		95	99	0		18	98	19	5	19	50			11			13	2				2	1	7		21	0	0	72		11				29	5	
Enterococcus spp	483		9	9											42.9 (7)					93		44			32	0				5	10	0	31	82	0			0
E. coli ESBL+ 26.5% (488/1838)	1838		24	83	3		28	70	28	27	28	34	50		41			48	0				32	0	52		28	0	15	10		2				36	29	
Haemophilus influenzae	150		0	76		1	0		0		1	5			2			51										1										
Klebsiella spp ESBL+ 20.2% (107/530)	530		25	100	2		26	40	26	21	26	33			27			34	1				12	1	26		26	1	5	57		7				28	17	
Proteus spp	160		18	52	4		6	32	6	5	6	17			31			44	0				18	1	17		78	0	13	96		0				2	15	
Pseudomonas aeruginosa	406				13		6			5				17	19								23	18	25			14				7				50	6	
Staphylococcus aureus MRSA 24.0% (158/658) CA-MRSA 7.6% (50/658)	658															36	24	1		40	4		19		24	0	5				99							0
Stenotrophomonas maltophilia	92																	4							24		1											
Streptococcus pneumoniae	73								3		0					64		48		73					3	0					0			64				0
Salmonella spp	92		8	32			1		1		3				8			13	0																			

Key:

1. Interpreted according to CLSI definition. Non-susceptible include both intermediate & resistant.
2. ESBL, extended spectrum beta- lactamase.
3. MRSA, Methicillin-resistant Staphylococcus aureus; CA-MRSA, Community associated Methicillin- resistant Staphylococcus aureus.
4. Unless otherwise stated, the resistance figure is based on analysis of more than 10 isolates. When the number of isolates is £10, the actual number is indicated in parenthesis.

indicate 10% or more increase in non-susceptibility rate compared to year 2011

indicate 10% or more reduction in non-susceptibility rate compared to year 2011

Resistance of common bacterial isolates, St Paul's Hospital, 2012

Organism	No. of isolates tested	% resistant																								
		Amikacin	Ampicillin	Amoxicillin+clavulanate	Azithromycin	Cefuroxime	Ciprofloxacin	Ceftriaxone	Ceftazidime	Erythromycin	Clarithromycin	Clindamycin	Ertapenem	Cefoxitin	Cefepime	Nitrofurantoin	Gentamicin (HLAR)	Gentamicin	Linezolid	Penicillin	Levofloxacin	Meropenem	Imipenem	Netilmicin	Cotrimoxazole	Vancomycin	Piperacillin+tazobactem
Escherichia coli	659	1	64	35		26		25					0		25	2		29			28	0			42		
Enterococcus species	58		2				14										29		0							0	
Klebsiella pneumoniae	111	1	100	32		31		29					1		29	38		12			14	0			31		
Klebsiella species	52	0	100	23		17		6					0		6	20		10			11	0			21		
Proteus mirabilis	48	2	44	21		8		6					0		6	97		19			27	0			35		
Pseudomonas aeruginosa	88	2					9		3						6			5			11		10				3
Staphylcoccus aureus	221			34	45	34					46	40		35					0					1		0	
Streptococcus species	123				50			7		50		45								0	12					0	

According to Clinical and Laboratory Standards Institute, 2012

Resistance of common bacterial isolates, St Teresa's Hospital, 2012

Organism	No. of isolates tested	% nonsusceptible																							
		Amikacin	Ampicillin	Amoxicillin+clavulanate	Cefotaxime	Ceftazidime	Ceftriaxone	Cefuroxime (IV)	Cephalothin	Chloramphenicol	Ciprofloxacin	Clindamycin	Cotrimoxazole	Erythromycin	Gentamicin	Imipenem	Levofloxacin	Linezolid	Methicillin #	Penicillin	Piperacillin+tazobactam	Nitrofurantoin *	Tetracycline	Vancomycin
Acinetobacter species	52-53	8				32					43				25	32					34			
Escherichia coli	1012-1321		68	46				27	50		33		45		29							2		
Enterococcus species	94-117		30														25						87	<1
Haemophilus influenzae	303		57	0				0					79											
Klebsiella species	404-405		100	18				17	22				16		7									
Pseudomonas aeruginosa	247-249	4				6					9				10	8					3			
Salmonella species	219-253		46			3	2			17	7		20											
Staphylococcus aureus	975-996												2	33	11				15	85				0
MSSA	824-844												2	27	7				0	82				0
MRSA	151-152												4	64	30				100	100				0
Streptococcus agalactiae	273-327											47		51			16			0				0
Streptococcus pneumoniae §	65-68			26	27		23	46		7			56	81						61			79	0

Cefoxitin disc was used to determine methicillin susceptibility
* Only 395 urinary *E. coli* isolates were tested.

§ MIC distribution for the *Streptococcus pneumoniae* isolates (n=68) were as follows:
Penicillin oral (nonmeningitis breakpoints): sensitive ≤0.06 mg/L (36.8%, 25/68), intermediate 0.12-1 mg/L (23.5%, 16/68), resistant ≥2 mg/L (39.7%, 27/68)
Cefotaxime (nonmeningitis breakpoints): sensitive ≤1 mg/L (72.1%, 49/68), intermediate 2 mg/L (11.8%, 8/68), resistant ≥4 mg/L (16.2%, 11/68).

Overall antibiotic sensitivities of the five selected bacteria

		AMK	AMC	AMP	CEF			CTZ					CIP	CLD		ERY		GEN	IMI	LEV		MEM	NAL	NIT	PEN	PIP	TAZ		TIM	SXT	UNA	VAN		
2013 (10 hospitals), % sensitive	No. of isolates identified	Amikacin	Amoxicillin +clavulanic acid	Ampicillin	Cefepime	Cefoperazone +sulbactam	Cefotaxime	Ceftazidime	Ceftazidime	Ceftriaxone	Cefuroxime	Ciprofloxacin	Clindamycin	Ertapenem	Erythromycin	Fusidic acid	Gentamicin	Imipenem	Levofloxacin	Linezolid	Meropenem	Nalidixic acid	Nitrofurantoin	Penicillin	Piperacillin	Piperacillin +tazobactam	Rifampicin	Ticarcillin +clavulanic acid	Trimethoprim +sulfamethoxazole	Unasyn	Vancomycin	MRSA	ESBL
Staphylococcus aureus	4013												69		68	98	90			100				11			96		97		100	20	
Escherichia coli	7627		73	29			74	74		73	69			100				100	69		100	28	91					56				25
Klebsiella species	2231		78	1			80	81		81	71			99				100	82		99	50	38					72				16
Pseudomonas aeruginosa	1462	94			92	84			92			84					88	82	77		84				89	92		47					
Acinetobacter species	389	89			84	94			84			83					88	87	82		85				86	81		79		89			

Working case definition of CRE, MRPA and MDRA for surveillance purpose

- CRE case definition: Enterobacteriaceae with carbapenemase gene PCR +ve
- MRPA case definition: *P. aureginosa* isolate which is concomitant resistant to the 12 indicator antibiotics from the 5 antibiotic classes (refer to the definition table on Slide 14 of the powerpoint)
- MDRA case definition: *Acinetobacter* isolate which is concomitant resistant to the 13 indicator antibiotics from the 5 antibiotic classes (refer to the definition table on Slide 15 of the powerpoint)
- For any suspected isolates, indicator antibiotics that have not been tested would be taken as resistant
- If the sensitivity pattern to an indicator antibiotic is reported as ‘Intermediate’, it shall NOT be counted as resistant

Feedback from Private Hospitals on MRPA MDRA & CRE data in 2013:

- Three hospitals reported no. of MRPA (total = 0) and no. of MDRA (total = 1)
- Two hospitals reported no CRE for *E coli* and *Kleb.* spp identified
- Two hospitals have remarks mentioning MRAB and MRPA in the dataset

Data from Private Hospitals - MDRO Superbugs

	No. of resistance isolates / Total no. of isolates tested (% of resistance)		
	2011	**2012**	**2013**
MRSA*	464 / 3457 (13.4%)	641 / 3576 (17.9%)	672 / 3292 (20.4%)
VRSA**	0 / 2753 (0.0%)	0 / 2904 (0.0%)	0 / 3072 (0.0%)
VRE	Not reported	Not reported	Not reported
CRE – *E. coli*^^	4 / 3492 (0.1%)	3 / 3680 (0.1%)	5 / 3409 (0.1%)
CRE – *Klebsiella*^^	7 / 1095 (0.6%)	9 / 1124 (0.8%)	9 / 931 (1.0%)
ESBL – *E. coli**	1487 / 6251 (23.8%)	1644 / 6552 (25.1%)	1600 / 6509 (24.6%)
ESBL – *Klebsiella**	285 / 1850 (15.4%)	326 / 1923 (17.0%)	286 / 1743 (16.4%)
MDRA^	1 / 258 (0.4%)	11 / 215 (5.1%)	19 / 147 (12.9%)
MRPA^	3 / 815 (0.4%)	2 / 922 (0.2%)	4 / 873 (0.5%)

* Data of **bacteria isolates** from 10, 11 and 9 hospitals for year 2011, 2012 and 2013 respectively.
** Data of **isolates tested** for Vancomycin from 9, 10 and 8 hospitals for year 2011, 2012 and 2013 respectively.
^ **Non-aggregated** data of bacteria isolates from 6, 7 and 5 hospitals for year 2011, 2012 and 2013 respectively.
Resistance to the 12/13 antibiotics from 5 antibiotic classes.
^^ **Non-aggregated** data of isolates tested from 6, 7 and 5 hospitals for year 2011, 2012 and 2013 respectively
Both in- and out-patient data of isolates were included.
Both clinical and screening specimens were included.

Our fight against antibiotic resistance is going to continue and your support is vital to keep the Antibiotic Stewardship and Surveillance Program viable and sustainable both in the Hospitals and Community.

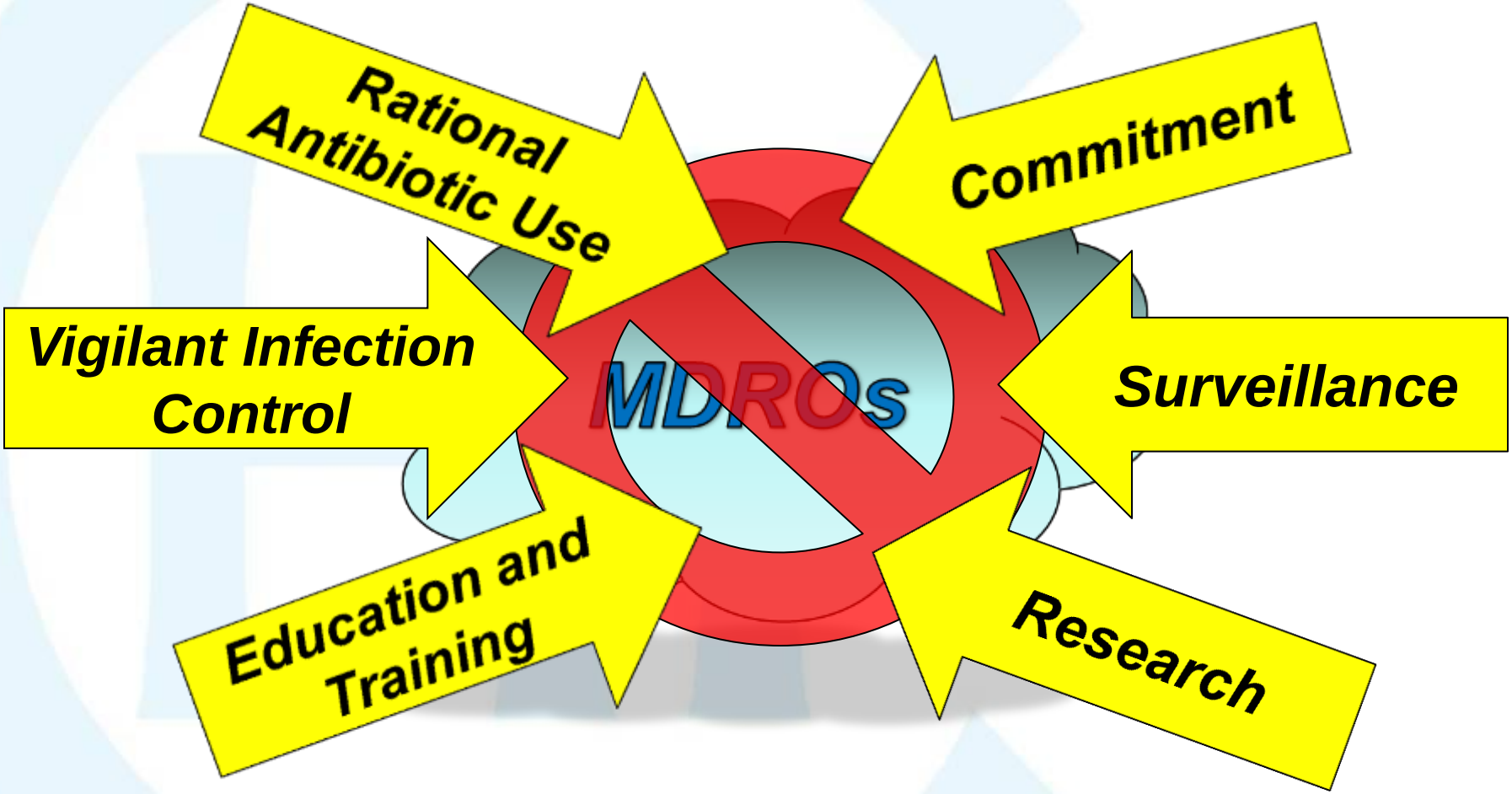
Ecological Issues:

- Animal Growth Promoters
- Environmental Control
- Proper Precautions
- Over the Counter Sale


2006


Pharmacy
LOW PRICES
$722
IBUPROFE

Way Forward



Courtesy : ICB, CHP

Strategies for Medical Staff Ownership

Politics are Important!

Bad Bugs, No Drugs[1]

- Declining research investments in antimicrobial development[2,3]
- The Antimicrobial Availability Task Force of the IDSA identified problematic pathogens including gram-negative bacteria[2]
- Problematic pathogens can "escape" the activity of antibacterial drugs[3]
  - "**ESKAPE**"(ES**C**APE) pathogens include
    - ***E**scherichia coli*
    - ***S**taphylococcus aureus*
    - ***K**lebsiella pneumoniae*(***C.**difficle*)
    - ***A**cinetobacter baumannii*
    - ***P**seudomonas aeruginosa*
    - ***E**nterobacter* spp

1. Infectious Diseases Society of America. *Bad Bugs, No Drugs: As Antibiotic Discovery Stagnates, A Public Health Crisis Brews*.
July, 2004. http://www.idsociety.org/WorkArea/showcontent.aspx?id=5554. Accessed January 15, 2009. 2. Talbot GH, et al.
Clin Infect Dis. 2006;42:657-68. 3. Boucher HW, et al. *Clin Infect Dis*. 2009;48:1-12.


THANKS