

Workshop on Antibiotic Stewardship

**Orchestrated Efforts to Optimize
Antibiotic Prescriptions in a
Medical Department**

Dr. Eugene Tso
Division of Infectious Diseases
Department of Medicine & Geriatrics
United Christian Hospital

18 Jan 2011

**Department of Medicine &
Geriatrics (M&G),
United Christian Hospital (UCH)**

The department that spends most
money for antibiotic prescriptions
in UCH

Core members

Department of Medicine & Geriatrics (M&G)

Dr. Eugene Tso, Infectious Diseases Physician

Dr. Ng Woon Leung, Deputy COS

Dr. Chu Chung Ming, COS

Department of Pathology

Dr. Kitty Fung, Clinical Microbiologist & Infection Control Officer, Chairman of Antibiotic Stewardship Programme in UCH

Department of Pharmacy

Ms. Janis Chan, Pharmacist

Why we need to do it?

- Promote the prompt use of appropriate empirical antibiotics
- Promote a targeted treatment approach for bacterial infection
- Reduce the inappropriate and unnecessary use of broad spectrum “Big gun” antibiotic
- Promote early hospital discharge
 - By reducing unnecessary hospital stay simply because of the need for antibiotic injection

Targeted Antibiotics

- Intravenous amoxicillin-clavulanate (Augmentin)
- Quinolones, azithromycin (po)
- “Big gun” broad-spectrum intravenous antibiotics
 - Ticarcillin-clavulanate (Timentin)
 - Cefoperazone-sulbactam (Sulperazon)
 - Piperacillin-tazobactam (Tazocin)
 - Cefepime
 - Meropenem
 - Imipenem-cilastatin (Tienem)

How we did it?

1. Promotion of Outpatient Parenteral Antimicrobial Therapy - parenteral ceftriaxone and ertapenem (Once daily dosing)



OPAT in UCH 2008

Dr. Eugene YK Tso
Division of Infectious Diseases
Dept of Medicine & Geriatrics
United Christian Hospital
4 June 2008

Our department submitted the proposal and successfully stocked ertapenem in the Hospital Authority Drug Formulary in May 2008.

基督教聯合醫院
UNITED CHRISTIAN HOSPITAL

醫院管理局
HOSPITAL
AUTHORITY

Tso EYK, Lai TW, Ngan PL, Lin SY, Leung VKS, Yue CS, Tsang MW, Ng PW, Leung MF, Ho YW, Ng WL, Chu CM
Department of Medicine & Geriatrics, United Christian Hospital

OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY IN UNITED AMBULATORY CARE CENTER

INTRODUCTION

Outpatient parenteral antimicrobial therapy (OPAT) remains in its infancy in Hong Kong. United Christian Hospital now has OPAT service which aims to improve patient comfort and reduce length of inpatient hospital stay. Instead of being hospitalized for injection of antimicrobial drugs, patients receive injection at our United Ambulatory Care Center (UACC) without overnight hospital stay.

METHODOLOGY

Outpatient Parenteral Antimicrobial Therapy (OPAT)

- The primary goals of outpatient therapy programs are to allow patients to complete treatment safely and effectively in the comfort of their home or another outpatient site and to avoid the inconveniences, complications, and expense of hospitalization (by shortening the length of inpatient hospital stay).

2. Distribution of pocket-sized UCH Guidelines for Empiric Antibiotic Therapy 2008 (15/8/2008)

Table 1 Summary of UCH Guidelines for Empiric Antibiotic Therapy of Selected Infections in Adults (2008)

	Preferred regimen	Alternative regimen
Respiratory tract infections		
Community-acquired pneumonia (CAP)		
1. CAP, outpatient treatment	PO AM-CL ± PO Azithro	
2. CAP, inpatient, non-ICU care	PO/IV AM-CL ± PO Azithro	IV ceftriaxone ± PO Azithro
3. Aspiration pneumonia	IV AM-CL	
4. CAP, <i>Pseudomonas</i> is a concern	IV TC-CL + IV Gent ± PO Azithro	(IV CEF-SB or CFP or PIP-TZ) + IV Gent ± PO Azithro
5. CAP, ICU care or critically ill patients	IV ceftriaxone + IV Azithro ± IV Vanco#	(IV CEF-SB or CFP or PIP-TZ or IMP or MER)* + IV Azithro ± IV Vanco#
Hospital-acquired pneumonia (HAP)		
Hospitalization <4 days + no previous antibiotics	IV AM-CL	IV ceftriaxone
Hospitalization > 4 d, antibiotic received within past 90 d, immunosuppression,	IV TC-CL + IV Gent ± IV Vanco#	(IV CEF-SB or CFP or PIP-TZ or IMP or MER) + IV Gent ± IV Vanco#
Urinary tract infections		
Acute cystitis, uncomplicated	PO nitrofurantoin	PO AM-CL
Acute pyelonephritis, uncomplicated	IV AM-CL	
Skin and soft tissue infections		
Cellulitis/erysipelas		
Outpatient treatment	PO AM-CL or (PO amoxicillin + PO Clox)	PO clindamycin#
Hospitalized patients	(IV Amp + IV Clox) or IV cefazolin or IV cefuroxime or IV AM-CL or IV ceftriaxone	IV clindamycin# or IV Vanco#
Necrotizing fasciitis	IV PIP-TZ	IV PIP-TZ + IV Vanco#
Bite wound (animal or human)	PO/IV AM-CL	
Central nervous system infections		
Brain abscess (non-postoperative)	IV ceftriaxone + IV Metro	
Acute bacterial meningitis	IV ceftriaxone ± IV Amp (if age >50 or immunocompromised) ± IV Vanco#	
Infective endocarditis (native heart valve)	[IV penicillin G 3MU or IV Amp 2g) q4h + IV Gent 1mg/kg q8h ± IV Clox 2g q4h (if acute presentation or injection drug user). Normal renal function is assumed.	
GI/Hepatobiliary tract infection		
Cholangitis, not health-care associated	IV AM-CL	IV ceftriaxone + IV Metro
Hepatic abscess	IV AM-CL + IV Metro	IV ceftriaxone + IV Metro
Spontaneous bacterial peritonitis	IV AM-CL	IV ceftriaxone

Please see the next page for abbreviations and important notes.

3. Regular email alerts to doctors

5/1/2009

Recommendation on the appropriate uses of IV & PO Augmentin

- For mild case and no contraindication for oral intake, PO augmentin is recommended
- Recommended oral augmentin with normal renal function: Augmentin 1g bd (Syrup augmentin 624mg tds if put on Ryle's tube/PEG tube)

6/1/2009

Recommendation on the use of PO clarithromycin (daily cost HK\$ 3) instead of PO azithromycin (daily cost HK\$ 27) for empiric coverage of atypical pneumonia

8/1/2009

Recommendation on the use of once-daily ceftriaxone (rather than cefotaxime)

26/2/2009

Recommendation on stepping down piperacillin/tazobactam (tazocin) to piperacillin if the organism is sensitive to piperacillin

27/8/2009

Recommendation on monitoring optimal trough serum vancomycin concentrations for treating severe MRSA infection

29/8/2009

Email message listing inappropriate antibiotic prescriptions and suggested improvement

1/9/2009

Appropriate uses of tazocin and carbapenem for ESBL infections

8/9/2009

Treatment of lower urinary tract infection due to ESBL E coli

15/9/2009

Collect specimens for culture and sensitivity before 1st dose of antibiotic

An example of email alert sent to M&G Medical Staff



The screenshot shows a Microsoft Internet Explorer window displaying an email. The browser's title bar reads "Lower Urinary Tract Infection due to ESBL E coli - Microsoft Internet Explorer". The address bar contains several icons for email actions: 回覆 (Reply), 全部回覆 (Reply All), 轉寄 (Forward), and a dropdown menu. The email content is as follows:

Lower Urinary Tract Infection due to ESBL E coli
Eugene TSO Dr, UCHC AC(M&G)
寄件日期: Tuesday, 8 September, 2009 18:00
收件者: [UCH M&G - Doctors](#)

Dear colleagues,

Lower Urinary Tract Infection (UTI) due to ESBL E coli is getting more common nowadays.

Some of these ESBL E coli strains are sensitive to drugs such as Augmentin/Quinolones/nitrofurantoin. You can use one of the above drugs (oral form) to treat a patient with lower UTI due to ESBL E coli (provided that the strain is sensitive).

Please do not routinely use IV carbapenem/tazocin to treat such cases (which can actually be treated by cheaper oral antibiotics). Otherwise, it simply wastes money and may prolong length of inpatient stay.

Tso

The browser's status bar at the bottom shows a lock icon and the text "Unknown Zone (Mixed)".

4. Implementation of Augmentin early IV-to-PO switch programme (5/2/2009)

- For case put on IV augmentin, 2 days of IV augmentin will be supplied by the pharmacy.
- If the case MO decides on continuation of IV augmentin for 2 more days, they must read the Augmentin IV-to-Oral Switch Reminder Form and fill-in the indication.

**AUGMENTIN IV-TO-ORAL SWITCH REMINDER
ANTIBIOTIC STEWARDSHIP PROGRAMME (ASP) - UCH**

Please **FAX/SEND** completed form together with **DRUG ORDER** to pharmacy

*** IV Augmentin may NOT be supplied if this form is not filled-in completely**

Please affix gum label	Case MO's Signature: _____
ID No: _____	Dr. Name _____
Sex: _____ Age: _____	Dect phone : _____
Patient Name: _____	
Ward: _____	*Consultant /AC/SMO/ Team leader's
Specialty: _____	Signature: _____ (REQUIRED)
	Date: _____

Dear doctor,

Oral Amoxicillin-clavulanate (Augmentin) has an excellent bioavailability (90%/60%) and is the preferred form for clinically stable patients who can tolerate oral intake.

In order to optimize the use of Augmentin and for cost containment, **IV to PO Switch** should be done as soon as patient's conditions allow.

Recommended dosing regimen

A. Patients tolerate oral medication:

CrCl >30 mL/min: **Augmentin 1g bd po** (can be cut to 2 portions for easier swallowing)
CrCl 10 to 30 mL/min: (Augmentin 375mg + amoxil 250mg) bd po
CrCl <10 mL/min: Augmentin 375mg bd po

B. Patients put on Ryle's tube/ PEG tube:

CrCl > 30 mL/min: **Syrup Augmentin 624mg tds**
CrCl 10 to 30 mL/min: Syrup Augmentin 624mg bd
CrCl < 10 mL/min: Syrup Augmentin 312mg bd

***Reason(s) for continuing 2 days supply of IV Augmentin is/are (please ✓) (REQUIRED)**

- Patient who remains seriously ill or septicemic
- NPO including drugs
- Severe nausea or vomiting, GI obstruction, motility disorder, malabsorption syndrome, continuous nasogastric suctioning
- Others - **MUST** specify indication: _____

Note:

1. *Random audit will be performed
2. Daily Cost (HA cost as at Feb 2009) for IV Augmentin 1.2g Q8H (\$84); PO Augmentin 1g BD (\$3.2);
Syr Augmentin 624mg tds (\$10.8)

5. Distribution of UCH Guidelines for Empiric Antimicrobial Therapy of Selected Infections in Adults 2009 based on latest UCH antibiotic susceptibility results (14/8/2009)

UCH Guidelines for Empiric Antimicrobial Therapy of Selected Infections in Adults (2009)		Page 3
	Preferred regimen	Alternative regimen
Respiratory tract infections		
Community-acquired pneumonia (CAP) <i>Perform NPA x Influenza A/B antigen, RT-PCR influenza (swine) & viral culture if influenza is suspected clinically (applies to current pandemic)</i>		
Mild	PO/IV amoxicillin-clavulanate + <u>PO clarithromycin</u> 500mg bd	Consider PO levofloxacin 500mg daily if penicillin allergy and tuberculosis is not a consideration
Moderate severity	IV ceftriaxone 1g daily + <u>PO clarithromycin</u> 500mg bd	
Severe, <i>Pseudomonas</i> is considered	IV cefoperazone-sulbactam 1g q12h + PO clarithromycin 500mg bd ± IV gentamicin 3.5mg/kg daily	(IV ticarcillin-clavulanate 3.2g q8h or IV cefepime 1g q12h or IV piperacillin-tazobactam 4.5g q8h) + PO clarithromycin 500mg bd ± IV gentamicin 3.5mg/kg daily
	<i>(Alternative to PO clarithromycin: PO doxycycline 100mg bd or PO azithromycin 500 mg daily)</i>	<i>(Alternative to PO clarithromycin: PO doxycycline 100mg bd or PO azithromycin 500 mg daily)</i>
Fulminant <u>life-threatening</u> CAP	IV imipenem-cilastatin 500mg q6h + (IV azithromycin 500mg q24h or IV levofloxacin 500mg q24h) ± IV amikacin 15mg/kg/day ± IV vancomycin 15mg/kg q12h ± PO oseltamivir bd (during influenza season/pandemic)	IV piperacillin-tazobactam 4.5g q8h + (IV azithromycin 500mg q24h or IV levofloxacin 500mg q24h) ± IV amikacin 15mg/kg/day ± IV vancomycin 15mg/kg q12h ± PO oseltamivir bd (during influenza season/pandemic)
COAD infective exacerbation	PO amoxicillin-clavulanate 1g bd	
Aspiration pneumonia	PO/IV amoxicillin-clavulanate	

All useful guidelines archived on <http://uch.home/id&mb/> for rapid access



KEC Online Infectious Diseases & Microbiology Lectures



Keyword Search :

No. of Visitors since 10/6/07 : 60967

Terms of Use: KEC Online Infectious Diseases & Microbiology Lectures website is an archive of lectures presented in the Kowloon East Cluster. The materials contained in this website reflect the views of the speakers. You should verify all information and data before treating patients or using any therapies described in these materials. For subscription of regular email alert on the Lectures, Discussion Forum, Latest News and upcoming Grand Round, please email to Ms. Gary Wong at wongkhg@ha.org.hk



[Q&A Forum and Latest News on Infectious Diseases](#)



[Photos](#)




[UCH Guidelines for Empiric Antimicrobial Therapy of Selected Infections in Adults 2009](#)



[Clinical Approach to Adult Patients with Sepsis](#)



[Pyrexia of Unknown Origin](#)

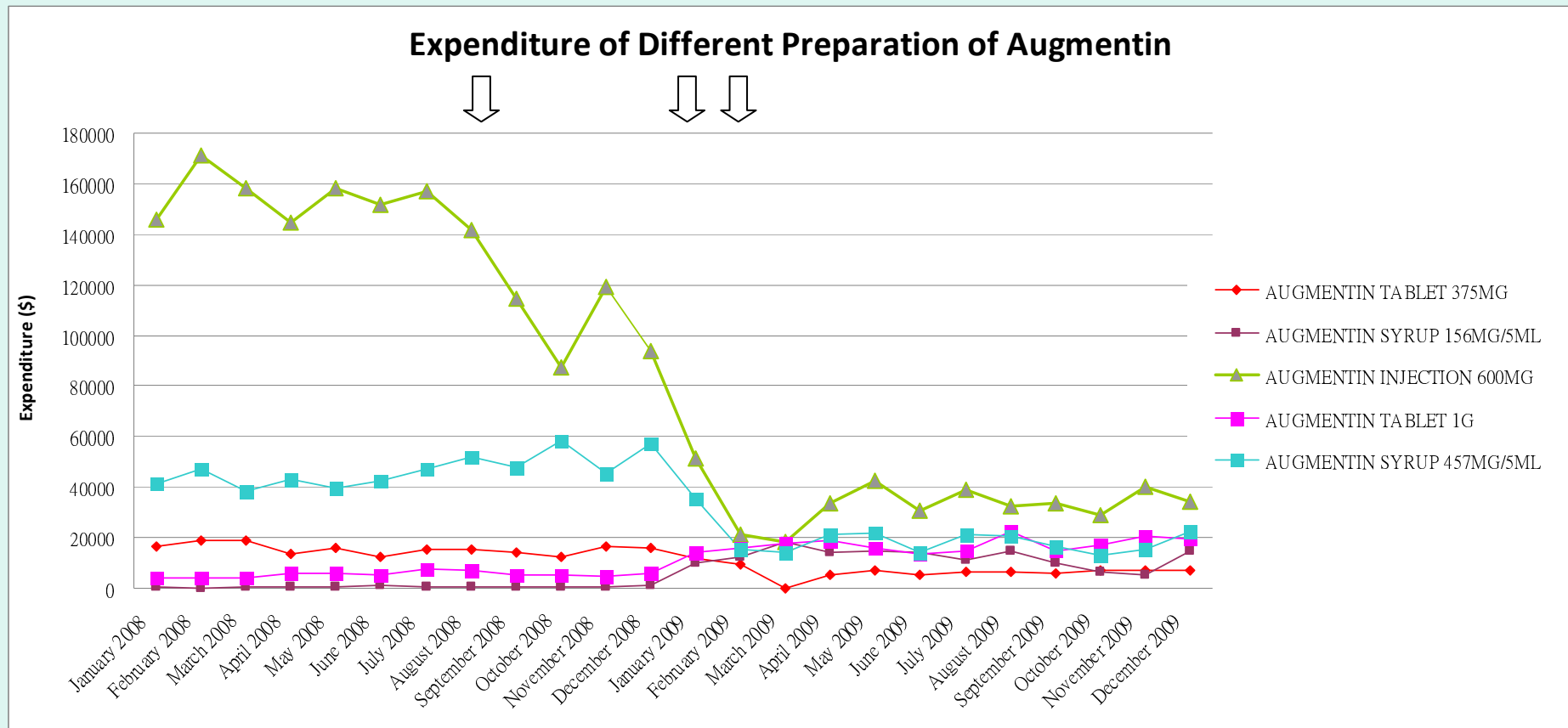
 Lectures	Speaker	Date
Two men with left hip pain	Dr. YO Lam	9 Apr 10
A Man with GE Symptom and Rapidly Progressive Facial Cyanosis	Dr. Miranda Tsui & Dr. Eugene Tso	
<i>Chlamydomphila pneumoniae</i> and <i>Mycoplasma pneumoniae</i>	Dr. Steven Tseung	22 Jan 10
Guillain Barre Syndrome 吉巴氏綜合症 (For video version --> click HERE)	Dr. PW Ng	15 Jan 10
Archive of old news		
Beta-lactamase Detection in PHLC	Dr. YW Chu	11 Dec 09
A Young Man with Fever and Deranged Liver Function	Dr. Steven Tseung	7 Dec 09
Late-onset Group B Streptococcal Infection	Dr. Desmond Chan	19 Nov 09
New Antiviral Agents for Severe Human Swine Influenza Pneumonia: What does the future hold?	Dr. Eugene Tso	30 Oct 09
Risk assessment guidelines for infectious diseases transmitted on aircraft	Dr. CK Liu	16 Oct 09
Cost-effective Antifungal Therapies for Opportunistic Mycoses	Mr. Andy Chan	25 Sep 09
2009 Update on Management of Intravascular Catheter Related Infection	Dr. CT Lun	16 Sep 09
<i>Stenotrophomonas maltophilia</i>	Dr. Eugene Tso	7 Sep 09
Antibiotic Desensitization: Principles & Practice	Mr. Barry Fan	21 Aug 09

Results

Prescribing Behaviour

In 2009 (compared with 2008): we achieved a significant drop in expenditure on IV augmentin and augmentin syrup (457mg/5ml); a “slight” rise in the expenditure on Augmentin 1g bd and augmentin syrup (156mg/5ml).

Reduction in overall augmentin expenditure (2009 vs 2008): HK\$ 1393048



15/8/2008: Distribution of UCH antibiotic pamphlet for Empiric Antibiotic Therapy 2008

5/1/2009: Email alert → recommend PO augmentin for mild case, use cost-effective PO augmentin preparations (1g tablet, 156mg/5ml syrup)

5/2/2009: Implementation of Augmentin early IV-to-oral switch programme

Usage of IV Augmentin 2009 Vs 2008

Year	No. of cases given IV augmentin	No. of doses of IV augmentin given	Average no. of doses of IV augmentin given for each case	Average duration of IV augmentin (if given q8h)
2008	6600	79763	12.08	4.02 days
2009	4075	29946	7.34	2.44 days

Reduce 49817 injections by nurses

Average time taken for preparation and administration of IV Augmentin ~3-4 minutes

Total time required

2008: 4809 hrs

2009: 2288 hrs

Save 2521 hours of nurses' time

Consumable items for setting up an IV access

– 20G Angiocatheter x 1	\$5.8
– MicroCLAVE Connector x 1	\$4.87
– Tegaderm x 1	\$0.74
– Normal saline for injection x 1	\$0.5058
– 5mL syringe x 1	\$0.0624

Total cost for setting up IV access for injection of IV augmentin

2008: HK\$ 79056

2009: HK\$ 48811

Save HK\$ 30244 in 2009 (c.f. 2008) !!!

No. of consumable items used for administration of IV augmentin



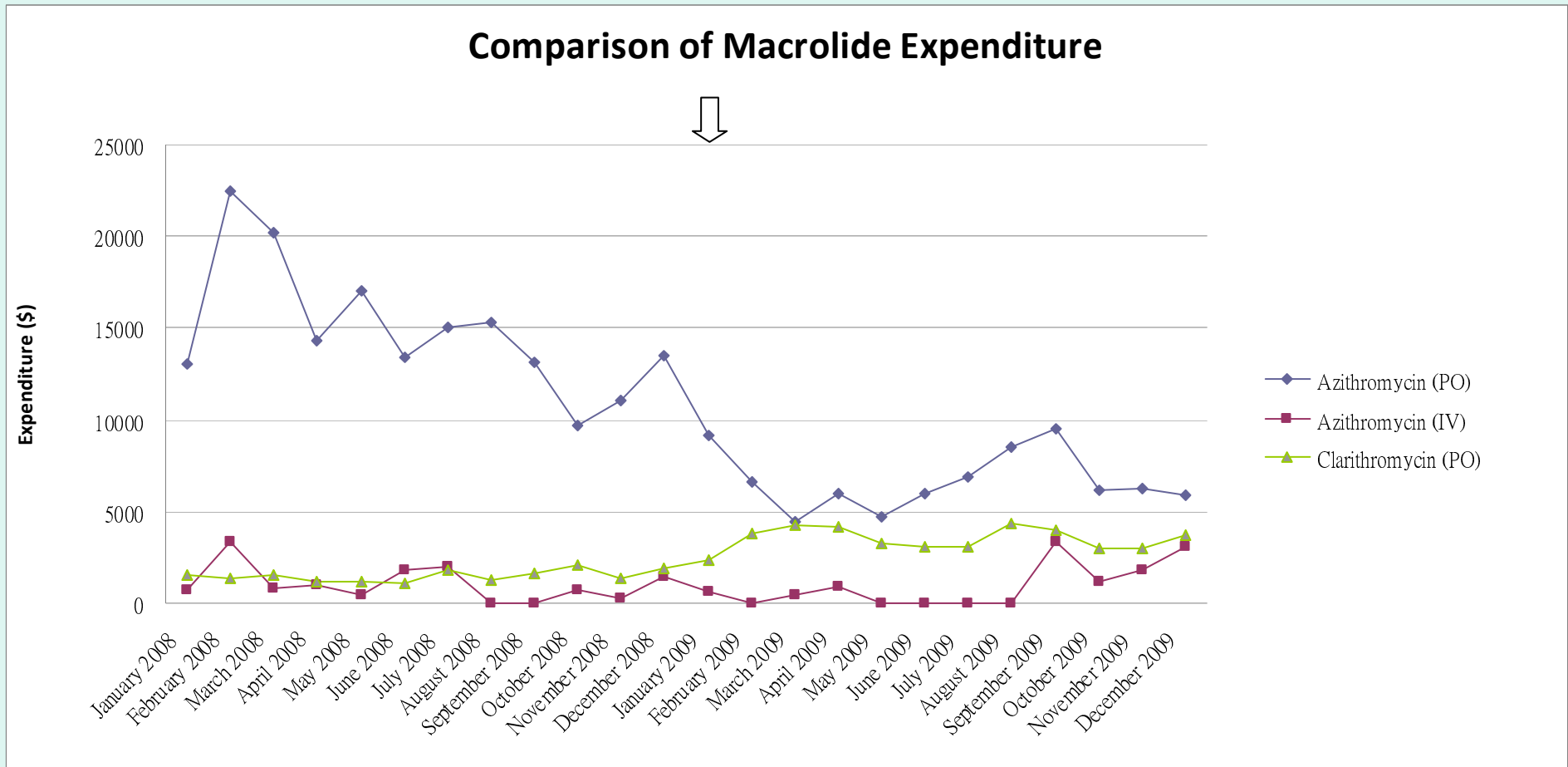
	No. used in 2008	No. used in 2009	Reduction in no.	Price (HK\$) per item	Reduction in expenses (HK\$)
Water for injection	129045	51133	77912	0.5796	HK\$45,157
Normal saline for injection	79763	29946	49817	0.5058	HK\$25,197
10ml syringe	30481	8759	21722	0.0747	HK\$1,623
5ml syringe	79763	29946	49817	0.0624	HK\$3,109
20ml syringe	49282	21187	28095	0.1985	HK\$5,577
Needle (21 gauge)	49282	21187	28095	0.16	HK\$4,495
TOTAL					HK\$85,157

Save HK\$ 85157 in 2009 (c.f. 2008) !!!

Impact of Augmentin Early IV-to-PO switch programme (2009 vs 2008)

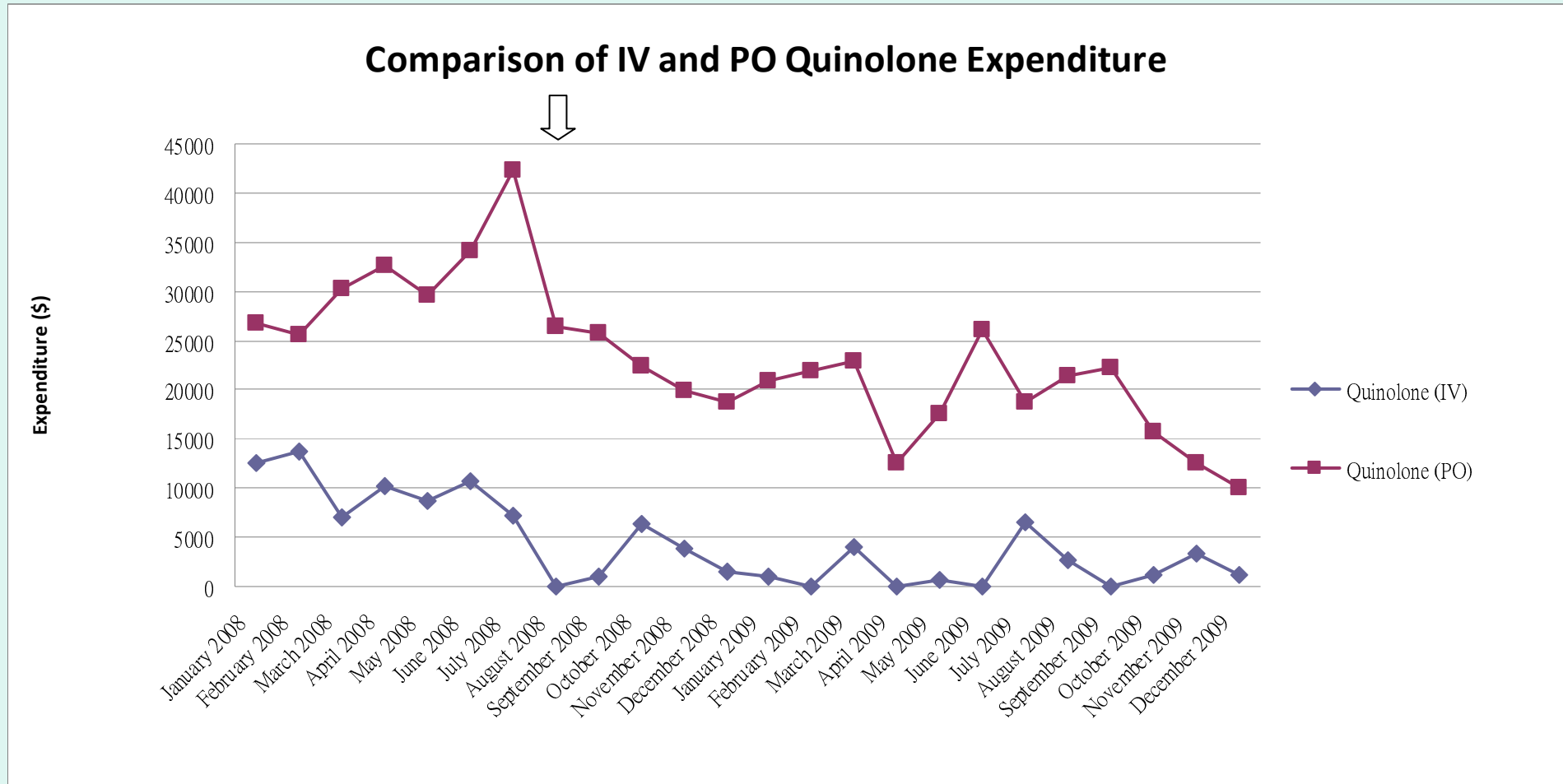
- Save HK\$ 1393048 for drug cost
- Reduce 49817 IV injections by nurses
- Save 2521 hours of nurses' time for injections
- Save HK\$ 30244 for consumable items used for setting up IV accesses
- Save HK\$ 85157 for consumable items used for administration of IV augmentin

Significantly decreased expenditure on PO azithromycin; slightly increased expenditure on PO clarithromycin



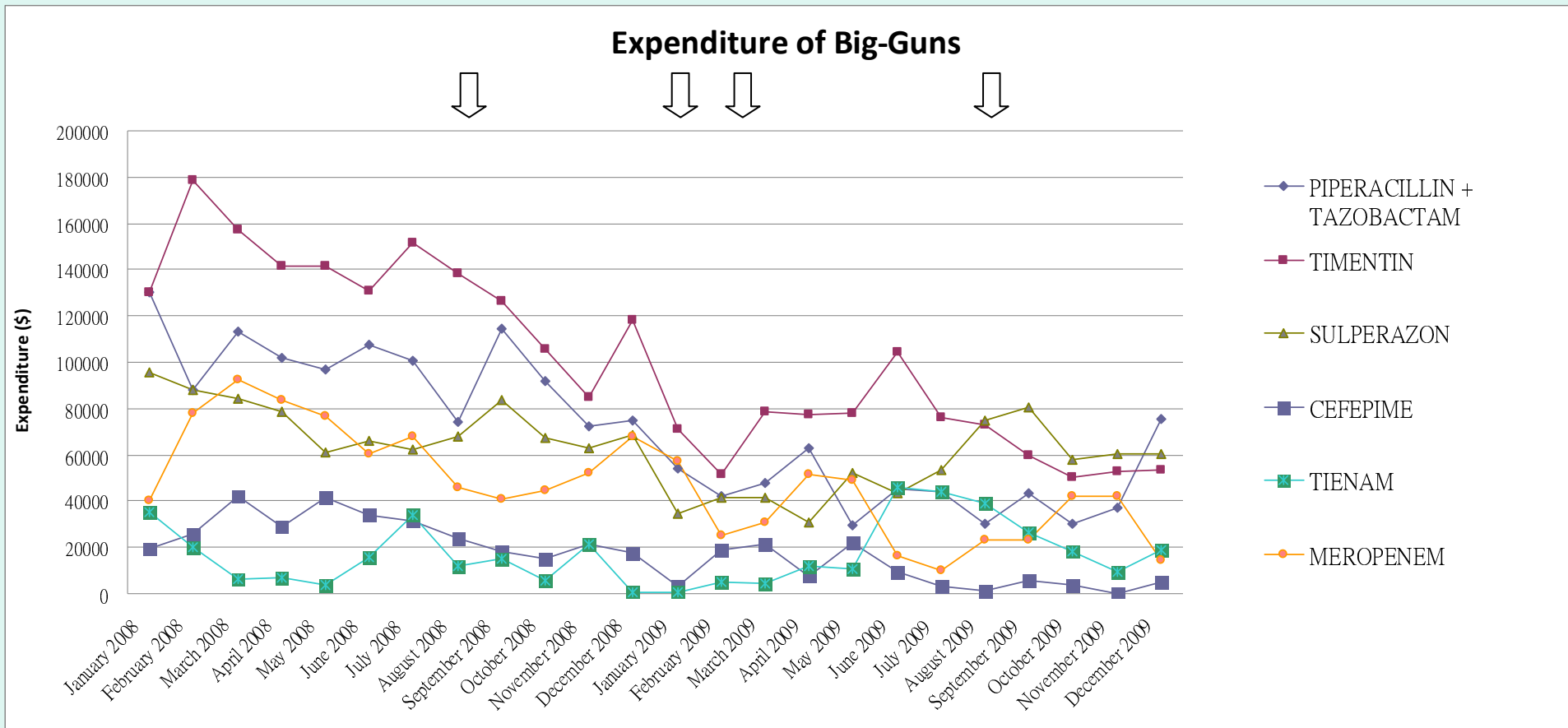
6/1/2009: Email alert → recommend PO clarithromycin (daily cost HK\$ 3) instead of PO azithromycin (daily cost HK\$ 27) for cost-effective coverage of atypical pneumonia

Significantly decreased expenditure on quinolones (both IV and PO)



15/8/2008: Distribution of UCH antibiotic pamphlet for Empiric Antibiotic Therapy 2008

Significantly decreased expenditure on ticarcillin-clavulanate (timentin), piperacillin-tazobactam (tazocin), cefoperazone-sulbactam (sulperazon), cefepime and meropenem



- 15/8/2008: Distribution of UCH antibiotics pamphlet for Empiric Antibiotic Therapy 2008 to M&G doctors
- 5/1/2009: Email alert → Recommendation on the appropriate uses of IV & PO Augmentin. For mild case and no contraindication for oral intake, PO augmentin is recommended
- 26/2/2009: Email alert → step down IV tazocin to IV piperacillin if the isolate is sensitive to the latter
- 14/8/2009: Distribution of *UCH Guidelines for Empiric Antimicrobial Therapy of Selected Infections in Adults 2009*

Results

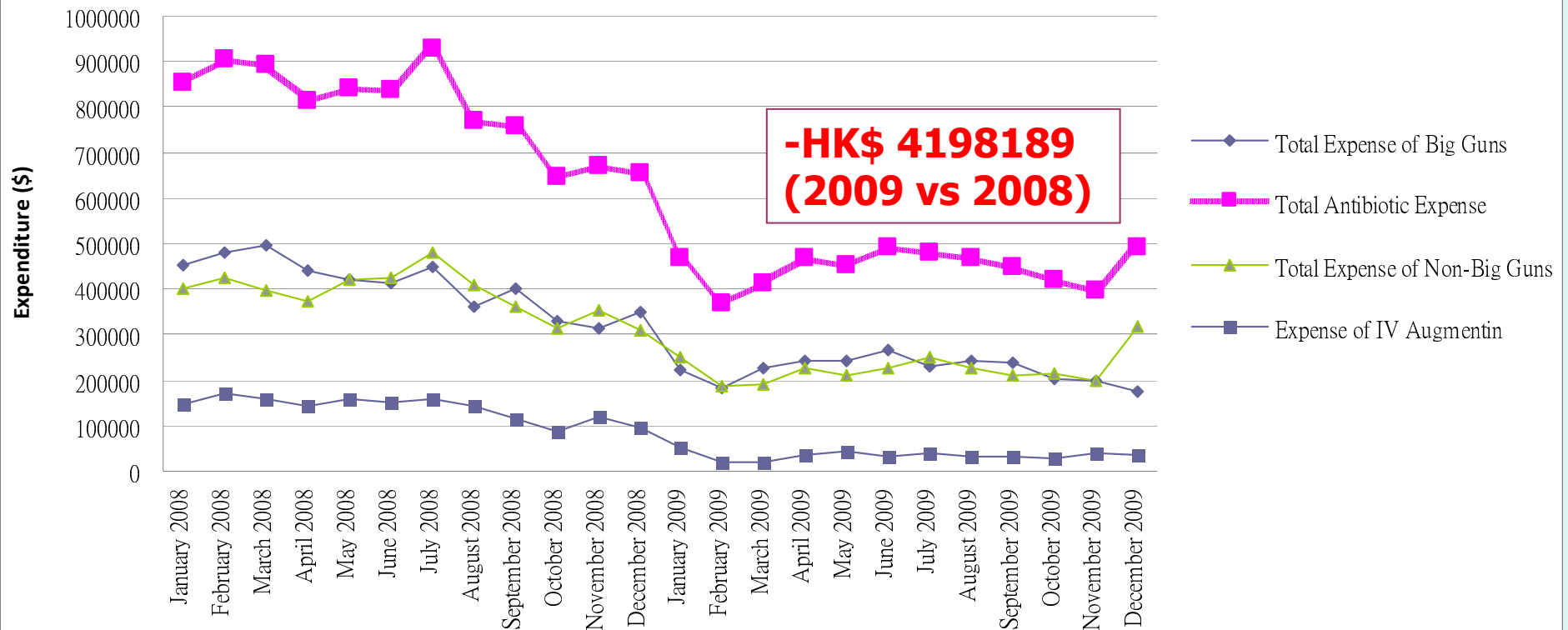
Overall impact

2009 vs 2008

→ Overall decrease in expenditure on all antibacterial drugs: HK\$ 4198189

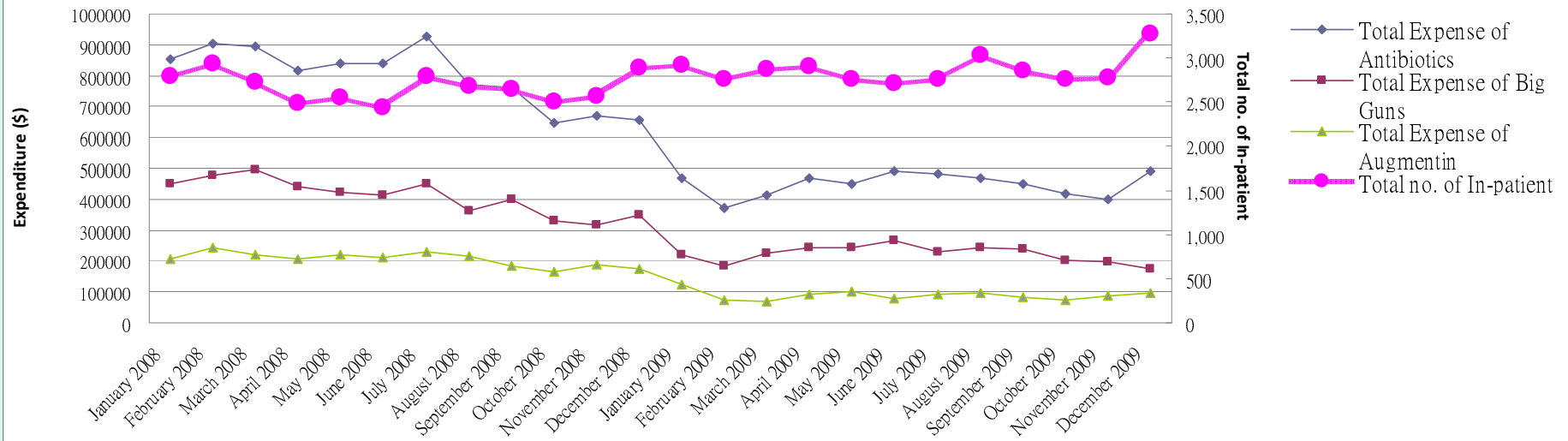
- Decreased expenditure on big gun antibiotics
- Decreased expenditure on non-big gun antibiotics
 - Especially IV augmentin

Expenditure of Antibiotics in M&G



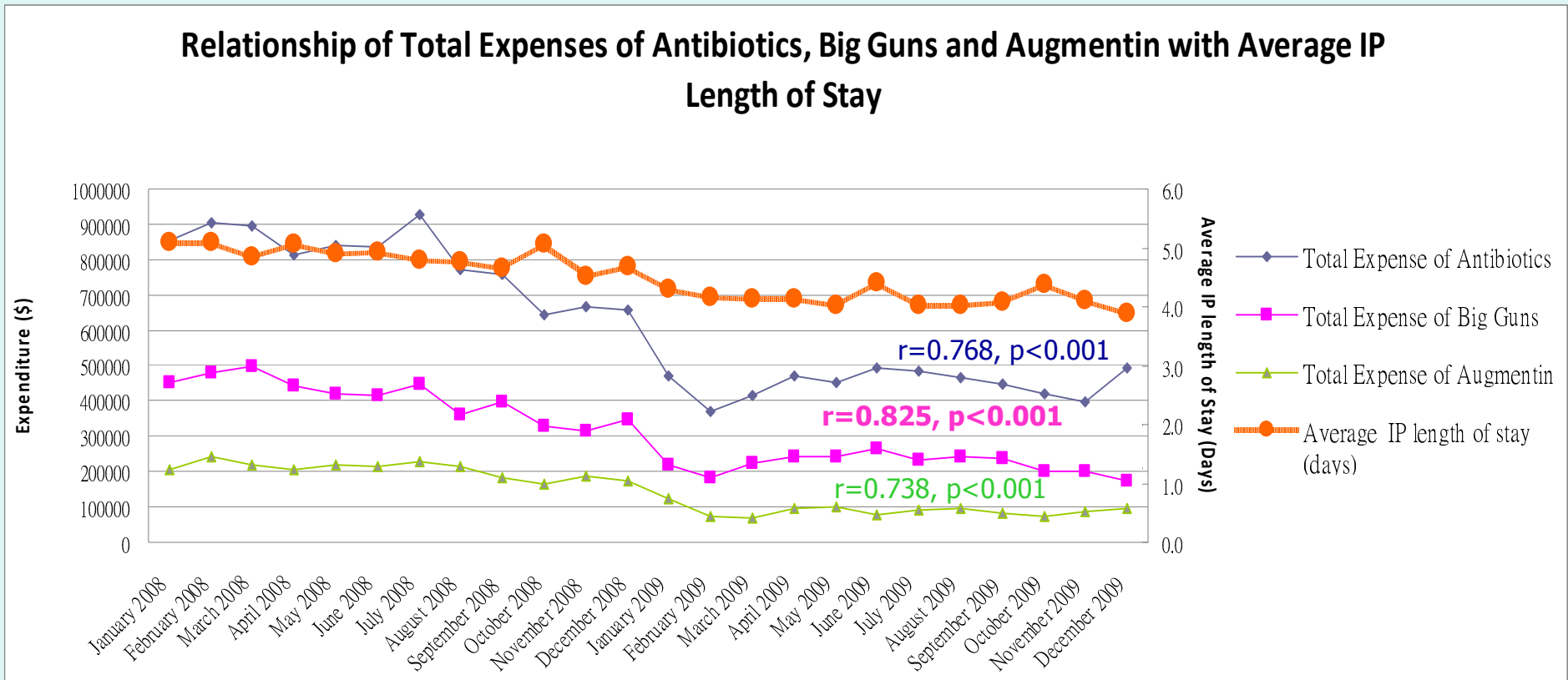
The reduction in expenditure was achieved while the number of M&G inpatients increased by 7.5% in 2009 (c.f. 2008)

Relationship of Total Expenses of Antibiotics, Big Guns and Augmentin with Total No. of In-patient



Reduction in the average length of inpatient stay (for all M&G inpatients): 15.1% (2009 vs 2008)

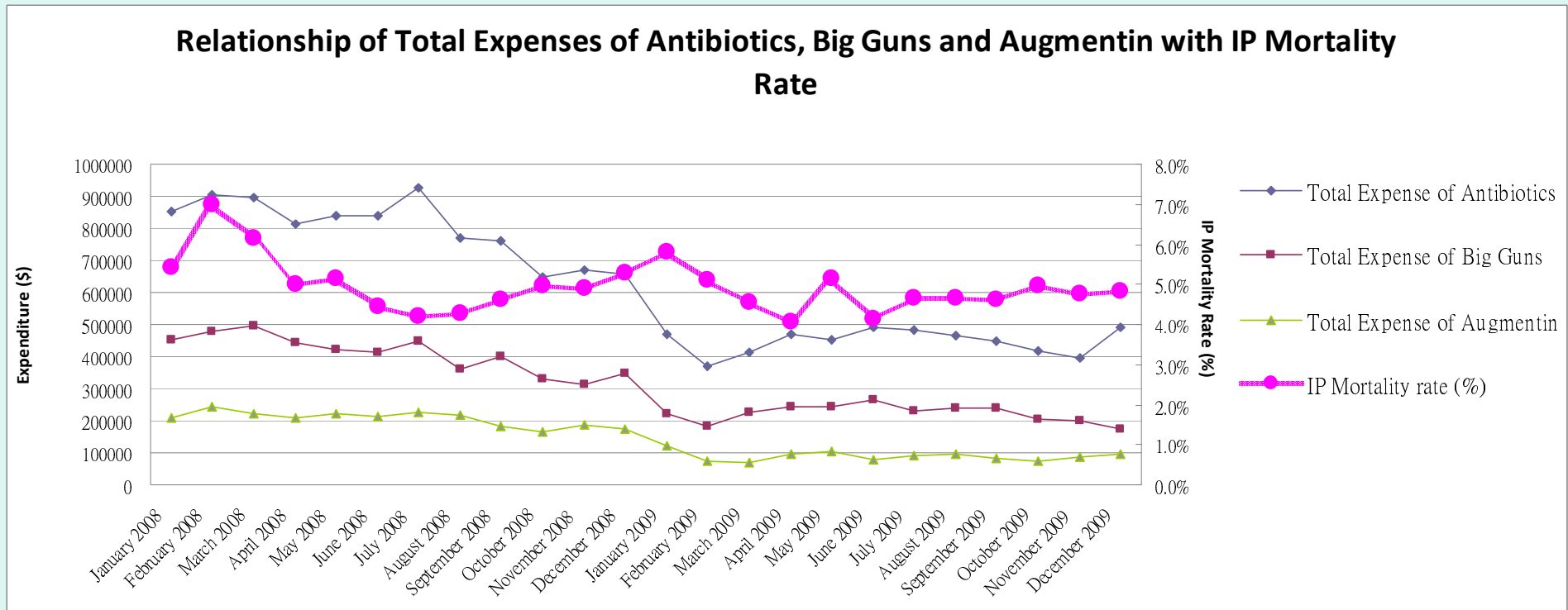
This shortening of average length of inpatient stay (days) is significantly correlated with the reductions in expenditure on antibiotics (especially big-gun broad spectrum intravenous antibiotics)



r= Spearman's rank correlation

The reduction in antibiotic expenditure did not lead to an increased mortality rate

Instead, the inpatient mortality rate decreased by 6.9% in 2009 (cf. 2008)



Incidents of needlestick injuries for nurses working in M&G Dept

- **2008: 4 incidents**

- A nurse got injury to her Lt hand (dorsal aspect) when withdrawing needle from heparin block .
- Two nurses got injury to her Lt middle finger because of patient movement during iv injection
- A nurse got injury to the finger when picking up used needle for injection from the kidney dish

- **2009: Nil**

Tips for success

- Teamwork
 - Within the M&G department
 - Collaborated effort by microbiologist and pharmacy
- Open and clear communications/educations
- Simple, easily accessible guideline
- Regular email alerts
- Administrative interventions to safeguard abuse

Success needs to be sustained

Table 1: UCH Guidelines for Empiric Antimicrobial Therapy of Selected Infections in Adults (2009)

	Preferred regimen	Alternative regimen
Respiratory tract infections		
Community-acquired pneumonia (CAP)		
Mild	PO/IV AM-CL + PO Clarithro	Consider PO Levo if patient has Pen allergy and tuberculosis is not considered
Moderate severity	IV ceftriaxone + PO Clarithro	
Severe, <i>Pseudomonas</i> is considered	IV CEF-SB + PO Clarithro ± IV Gent <i>(Alternative to PO Clarithro: PO Doxy or PO Azithro)</i>	(IV TC-CL or IV CFP or IV PIP-TZ) + PO Clarithro ± IV Gent <i>(Alternative to PO Clarithro: PO Doxy or PO Azithro)</i>
Fulminant life-threatening CAP	IV IMP + (IV Azithro or IV Levo) ± IV AMK ± IV Vanco ± PO oseltamivir	IV PIP-TZ + (IV Azithro or IV Levo) ± IV AMK ± IV Vanco ± PO oseltamivir
COAD infective exacerbation	PO AM-CL	
Aspiration pneumonia	PO/IV AM-CL	
Hospital-acquired pneumonia (HAP):		
HAP, hospitalization ≤4 days + no previous antibiotics	PO/IV AM-CL	IV ceftriaxone
HAP, hospitalization >4 days, antibiotic received within past 90 d or immunosuppression	IV CEF-SB ± IV Gent ± IV Vanco	(IV TC-CL or IV CFP or IV PIP-TZ or IV IMP) ± IV Gent ± IV Vanco
Urinary tract infections		
Acute cystitis	PO nitrofurantoin	PO AM-CL
Acute pyelonephritis	PO/IV AM-CL	IV ceftriaxone
Skin and soft tissue infections		
Cellulitis/erysipelas		
Mild to moderate severity	PO AM-CL	PO clindamycin (if CA-MRSA is suspected)
Severe	IV ceftriaxone	IV Vanco (if CA-MRSA is suspected)
Neurotizing fasciitis	IV IMP ± IV Vanco (if CA-MRSA is a concern)	IV PIP-TZ ± IV Vanco (if CA-MRSA is a concern)
Pyomyositis; psoas abscess	IV → PO AM-CL	
Bite wound (animal or human)	PO AM-CL	
Decubitus ulcer (infected)	PO AM-CL	
Central nervous system infections		
Brain abscess (non-postoperative)	IV ceftriaxone + IV Metro	
Acute bacterial meningitis	IV ceftriaxone ± IV Amp (if age >50 or immunocompromised)	
Infective endocarditis (native heart valve)	(IV Pen G or IV Amp) + IV Gent ± IV Clox (if acute presentation or injection drug user).	
GI/Hepatobiliary tract infection		
Cholangitis; cholecystitis; liver abscess (bacterial); secondary peritonitis	IV → PO AM-CL or (IV cefuroxime + IV Metro ± IV Amp)	IV ceftriaxone + IV Metro
Spontaneous bacterial peritonitis	IV ceftriaxone	IV → PO AM-CL
Acute severe diarrhoea, community acquired	PO CIP	
Neutropenic fever (neutrophil count < 0.5 x 10 ⁹ /L)		
Low risk	PO AM-CL + PO CIP	
High risk	IV TC-CL + IV Gent	IV CEF-SB + PO/IV Vitamin K
Severe life threatening	IV IMP + IV AMK ± IV Vanco	
Severe life-threatening sepsis	IV IMP ± IV AMK ± IV Vanco	IV PIP-TZ ± IV AMK ± IV Vanco
Head & neck infection		
Cervical fascial space infections (Ludwig's angina, retropharyngeal space, Lemierre's syndrome)	IV → PO AM-CL	
Epiglottitis	IV ceftriaxone	IV → PO AM-CL
Acute sinusitis	PO AM-CL	

Note for Table 1: CA-MRSA=community associated methicillin resistant *Staphylococcus aureus*. AM-CL=Amoxicillin-clavulanate; AMK=amikacin; Amp=ampicillin; Azithro=azithromycin; CEF-SB=cefoperazone-sulbactam; CFP=cefepime; CIP=Ciprofloxacin; Clarithro=clarithromycin; Clox=cloxacillin; Doxy=doxycycline; Gent=gentamicin; IMP=imipenem-cilastatin; Levo=levofloxacin; MER=meropenem; Metro=metronidazole; Pen=penicillin; PIP-TZ=piperacillin-tazobactam; TC-CL=ticarcillin-clavulanate; Vanco=vancomycin.

For detail, please refer to *UCH Guideline for Empiric Antibiotic Therapy of Selected Infections in Adults (2009)* at http://uch.home.idmb/lecture/Empiric_Antimicrobial_Therapy.pdf



United Christian Hospital

ANTIBIOTICS PAMPHLET 2010

January 1, 2009-December 31, 2009

Jointly prepared by the
Microbiology section (Dept of Pathology),
Division of Infections Diseases (Dept of M & G),
and the Dept of Pharmacy

Full version is available in uch.home
under Infection Control website

Percentage Susceptibility of Common Bacterial Isolates^a from All Specimens Types in UCH 2009 (Jan 1- Dec 31)

Organism (No. of isolates)	Percentage Susceptibility of Common Bacterial Isolates ^a from All Specimens Types in UCH 2009 (Jan 1- Dec 31)																											
	Ampicillin	Ampicillin-sulbactam	Amoxicillin-clavulanate	Penicillin (oral)	Penicillin (parenteral)	Ticarcillin-clavulanate	Piperacillin	Piperacillin-tazobactam	Cefuroxime (parenteral)	Ceftriaxone ^d	Ceftazidime	Cefepime	Cef- sulbactam	Imipenem	Ciprofloxacin	Levofloxacin	Gentamicin	Amikacin	Cotrimoxazole	Erythromycin	Clindamycin	Cloxacillin	Fusidic acid	Nitrofurantoin ^b	Minocycline	Rifampicin	Vancomycin	
<i>Acinetobacter species</i> (357)		75				60	59			72	76	76	72	57	67	70	87	62										
<i>E. coli</i> (5528) ^c	26		70			70 ^d	94 ^d	71	52 ^d	93 ^d	93 ^d	100 ^d	62	68	97 ^d	55								94				
<i>Enterobacter species</i> (450)	4		8			69 ^d	80 ^d	68	78 ^d	99 ^d	93 ^d	100 ^d	91	98	98 ^d	86								39				
<i>Haemophilus influenzae</i> (862)	71		100					100						100														
<i>Klebsiella species</i> (1835) ^c	0		77			71 ^d	87 ^d	77	80 ^d	95 ^d	94 ^d	99 ^d	81	94	99 ^d	75								47				
<i>Proteus species</i> (960)	22		56			92 ^d	94 ^d	63	91 ^d	99 ^d	95 ^d	100 ^d	63	84	97 ^d	61								0				
<i>Pseudomonas aeruginosa</i> (1739)						94	95			95	98 ^d	90	97	89	85 ^d	98	98 ^d											
<i>Pseudomonas species</i> (75)						85	94			92	92 ^d	92	98	88	90 ^d	88	85 ^d	54 ^d										
<i>Serratia species</i> (210)	0		1			73 ^d	87 ^d	0	89 ^d	97 ^d	90 ^d	100 ^d	90	91	97 ^d	96								2				
<i>Stenotrophomonas maltophilia</i> (128)						98	18			53		50	0	69	82													
Coagulase negative <i>Staphylococcus</i> (1185)														64	64	97	79	53	67	39	83	97	98	95	100			
<i>Enterococcus species</i> (950)	92												59 ^d											97			99	99
Non-pneumococcal <i>Streptococcus species</i> (2385)						96								94			60 ^d	50	66									100
<i>Staphylococcus aureus</i> (1961)													65	74	92	98	59	60	68	96	100	94	98	100				100
<i>Streptococcus pneumoniae</i> ^e (400)				39	95									98					25									100

Percentage Susceptibility of Common Bacterial Isolates^a from Blood Specimens

<i>E. coli</i> (580)	29	66	71			79	95	72	75	93	94	100	67	68	99	55													
<i>Klebsiella species</i> (200)	0	78	83			81	92	82	89	97	95	100	86	94	99	79													
<i>Pseudomonas aeruginosa</i> (48)						91	95			93	100	91	100	89	89	100	100	0											
Coagulase negative <i>Staphylococcus</i> (212)														60	58	98	77	50	68	35	80			100	95	100			
<i>Enterococcus species</i> (40)	82																											100	
Non-pneumococcal <i>Streptococcus species</i> (95)				96																								100	
<i>Staphylococcus aureus</i> (137)													56	71	91	99	59	59	86	95				91	98	100			

- a. Non-duplicate isolates from all units. Interpreted according to CLSI.
- b. Urine isolates only
- c. ESBL-producing rates were 25.8% for *E. coli* and 11.6% for *Klebsiella species*
- d. Second line antimicrobials will not be tested for non-invasive isolates (e.g urine isolates) if they are susceptible to first line drugs
- e. For *S. pneumoniae*, MIC₅₀ 0.06 (=susceptible to oral penicillin), MIC₂ 2 (=susceptible to parenteral penicillin) for non-CSF isolates. Susceptibility to azithromycin & clarithromycin can be predicted by testing erythromycin

Cost comparison of selected IV antimicrobials

Antibiotics	Usual dosage	Cost (HK\$/day)
Aminoglycosides		
Gentamicin * (3.5mg/kg/day) (IV)	180mg daily	7
Amikacin *(15mg/kg/day) (IV)	750mg daily	90
Penicillins		
Ampicillin (IV)	0.5-1g q6h	7-14
Cloxacillin (IV)	0.5-1g q6h	17-34
Amoxicillin-clavulanate (Augmentin IV/PO)	1.2g q8h/1g q12h	85/3
Ampicillin-sulbactam (IV Unasyn)	1.5g q8h	96
Ticarcillin-clavulanate (IV Timentin)	3.2g q8h	156
Piperacillin (IV)	4g q8h	114
Piperacillin-tazobactam (IV Tazocin)	4.5g q8h	270
Cephalosporins		
Cefuroxime (IV)	750mg q8h	15
Cefazolin (IV)	1g q8h	12
Ceftriaxone (IM)		55
Ceftriaxone (IV)	1g daily	29
Cefoperazone-sulbactam (IV Sulperazon#)	1g q12h	120
Cefepime (IV)	1g q12h	204
Ceftazidime (IV)	1g q8h	260
Carbapenems		
Meropenem (IV)	500mg q8h	407
Imipenem + cilastatin (IV Tienam#)	500mg q8h	234
Ertapenem (IV)	1g daily	228
Fluoroquinolones		
Moxifloxacin (IV/PO)	400mg daily	220/17
Levofloxacin (IV/PO)	500mg daily	250/5
Ciprofloxacin (IV/PO)	400mg /500mg q12h	280/2
Macrolide		
Clarithromycin (IV/PO)	500mg q12h	120/3
Azithromycin (IV/PO)	500mg daily	155/24
Others		
Metronidazole (IV)	500mg q8h	12
Vancomycin (IV)	1g q12h	54
Teicoplanin (IV)	200-400mg daily	380-760
Linezolid (IV/PO)	600mg q12h	824/802
Tigecycline (IV)	50mg q12h	648
Fluconazole (IV/PO)	200mg q24h	375/4

Approximate cost updated as of 11/3/2010 in HA

* Dosage for a typical 50kg person; Price is rounded to nearest \$

Cost for generic substitute

Dosage Adjustment of Selected Antibiotics for Patient with Renal Impairment

This presentation was also given in:



Thank you