

2010 Hospital Authority Convention
醫院管理局研討大會

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Hong Kong Convention & Exhibition Centre



Orchestrated Efforts to Optimize Antibiotic Prescriptions in a Medical Department

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11 May 2010

Core members

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Department of Pathology

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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 (iv, po), azithromycin (po)
- “Big gun” broad-spectrum intravenous antibiotics
 - Ticarcillin-clavulanate (Timentin)
 - Cefoperazon-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.

The photograph shows a presentation board for the United Christian Hospital (UCH) Outpatient Parenteral Antimicrobial Therapy (OPAT) program. At the top, the UCH logo (a green cross over a white figure) and the Hospital Authority logo (a red heart over a white figure) are displayed. Below the logos, the text reads: "基督教聯合醫院 UNITED CHRISTIAN HOSPITAL" and "醫院管理局 HOSPITAL AUTHORITY". A list of names is provided: "Tso EYK, Lai TW, Ngan PL, Lin SY, Leung VKS, Yue CS, Tsang MW, Ng PW, Leung MF, Ho YW, Ng WL, Chu CM". Below this, it says "Department of Medicine & Geriatrics, United Christian Hospital". The main title of the board is "OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY IN UNITED AMBULATORY CARE CENTER" in large, bold, red letters. Underneath, there is a section titled "INTRODUCTION" with the following text: "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." At the bottom, there is a section titled "METHODOLOGY" and a small inset photograph showing a person in a clinical setting.

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 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 alert. The window title is "Lower Urinary Tract Infection due to ESBL E coli - Microsoft Internet Explorer". The email subject is "Lower Urinary Tract Infection due to ESBL E coli". The sender is "Eugene TSO Dr, UCHC AC(M&G)". The email was sent on Tuesday, 8 September, 2009 at 18:00. The recipient is "UCH M&G - Doctors".

The email content is as follows:

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 right shows "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: _____ | *Consultant /AC/SMO/ Team leader's |
| Ward: _____ | Signature: _____ (REQUIRED) |
| Specialty: _____ | 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 \checkmark) **(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 |
| 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) | (Alternative to PO clarithromycin: PO doxycycline 100mg bd or PO azithromycin 500 mg daily) (Alternative to PO clarithromycin: PO doxycycline 100mg bd or PO azithromycin 500 mg daily) |
| COAD infective exacerbation | PO amoxicillin-clavulanate 1g bd | |
| Aspiration pneumonia | PO/IV amoxicillin-clavulanate | |

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



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



[Pyrexia of Unknown Origin](#)



Lectures

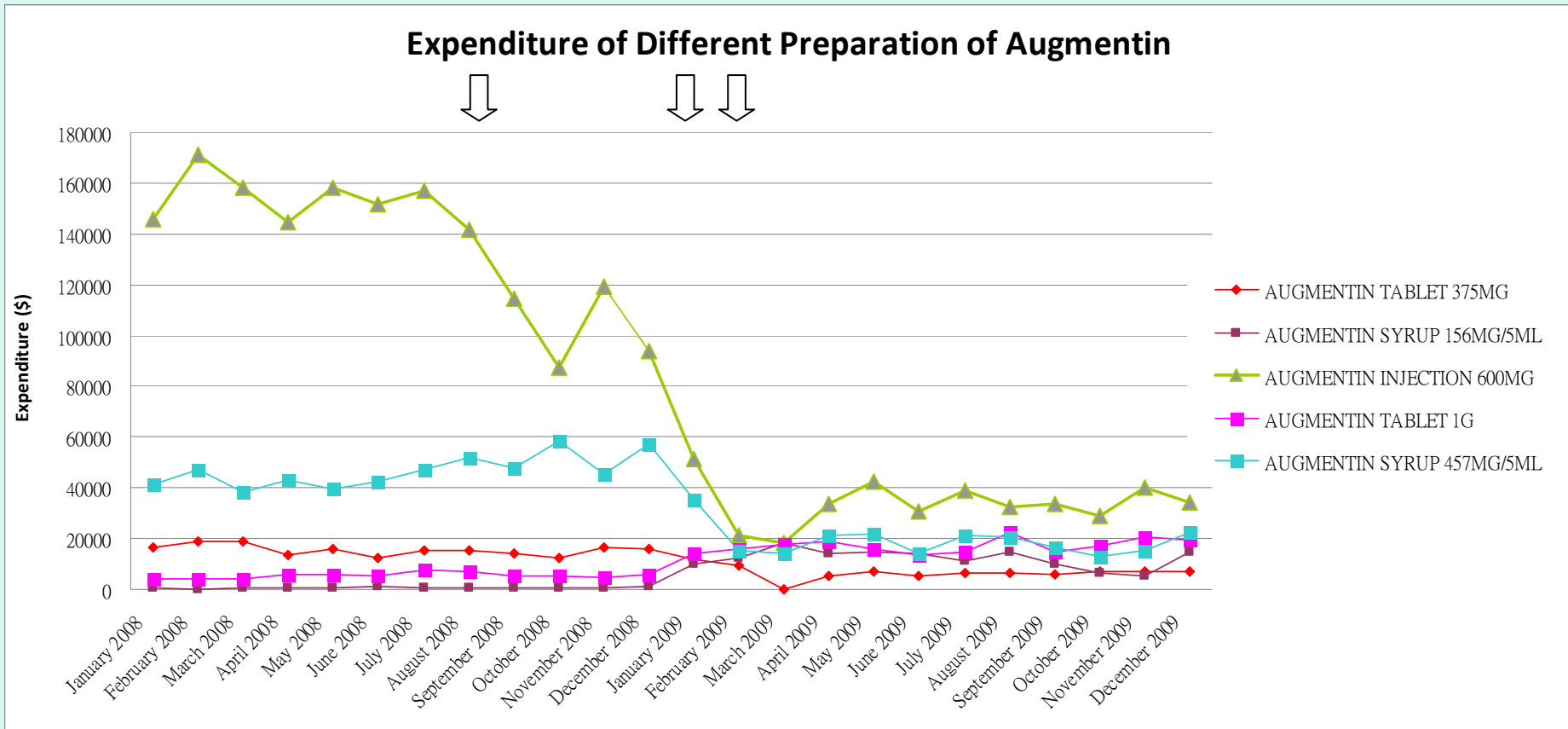
| Lectures | Speaker | Date |
|---|-----------------------------------|-----------|
| Two men with left hip pain | Dr. YO Lam | 9 Apr 10 |
| A Man with GE Symptom and Rapidly Progressive Facial Cyanosis | Dr. Miranda Tsui & Dr. Eugene Tso | |
| <i>Chlamydomphila pneumoniae</i> and <i>Mycoplasma pneumoniae</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



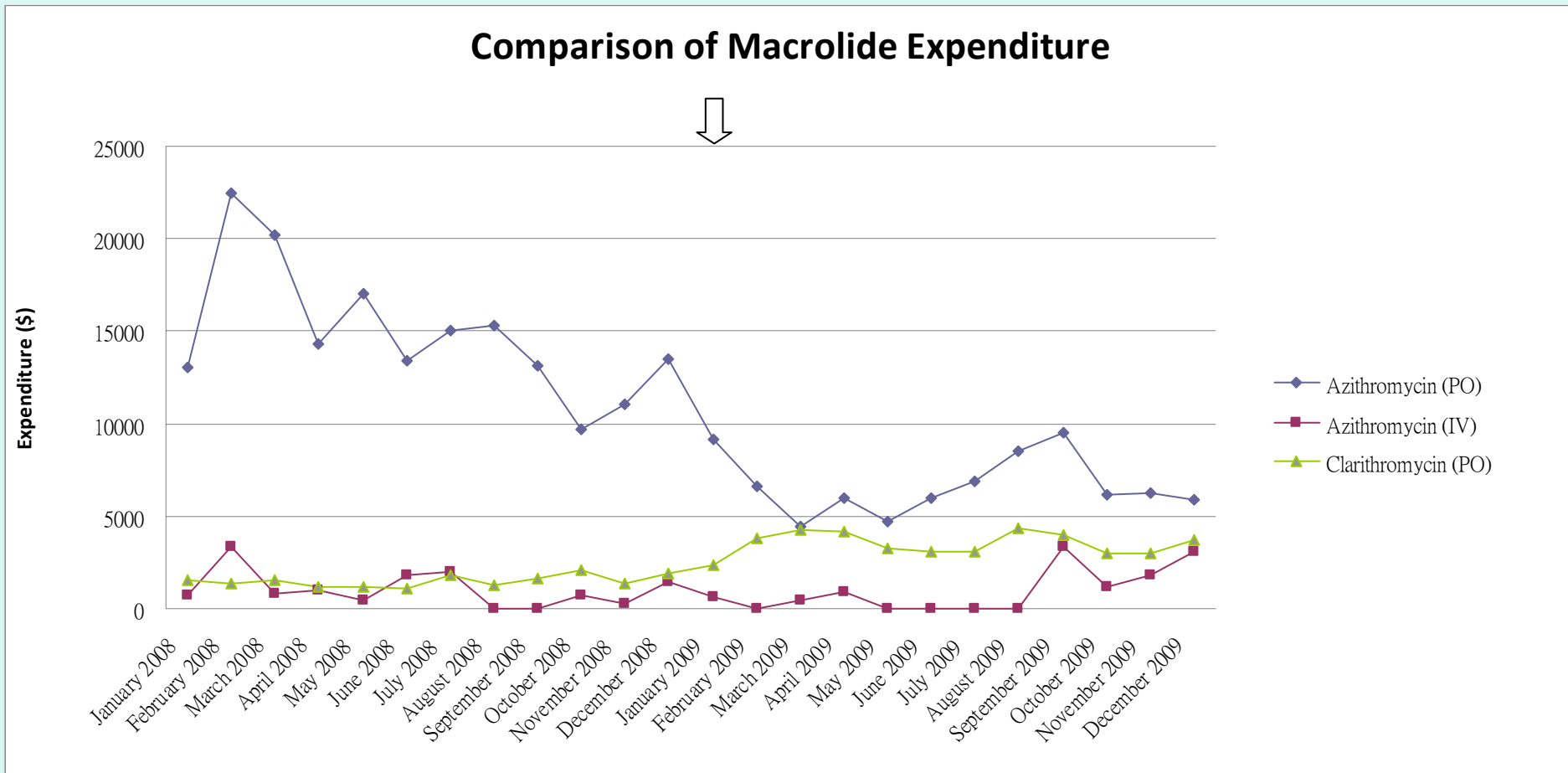
| | No. used in 2008 | No. used in 2009 | Reduction in no. | Price (HK\$) per item | Reduction in expenses (HK\$) |
|--------------------------------|---------------------|---------------------|---------------------|--------------------------|---------------------------------|
| Water for injection | 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)

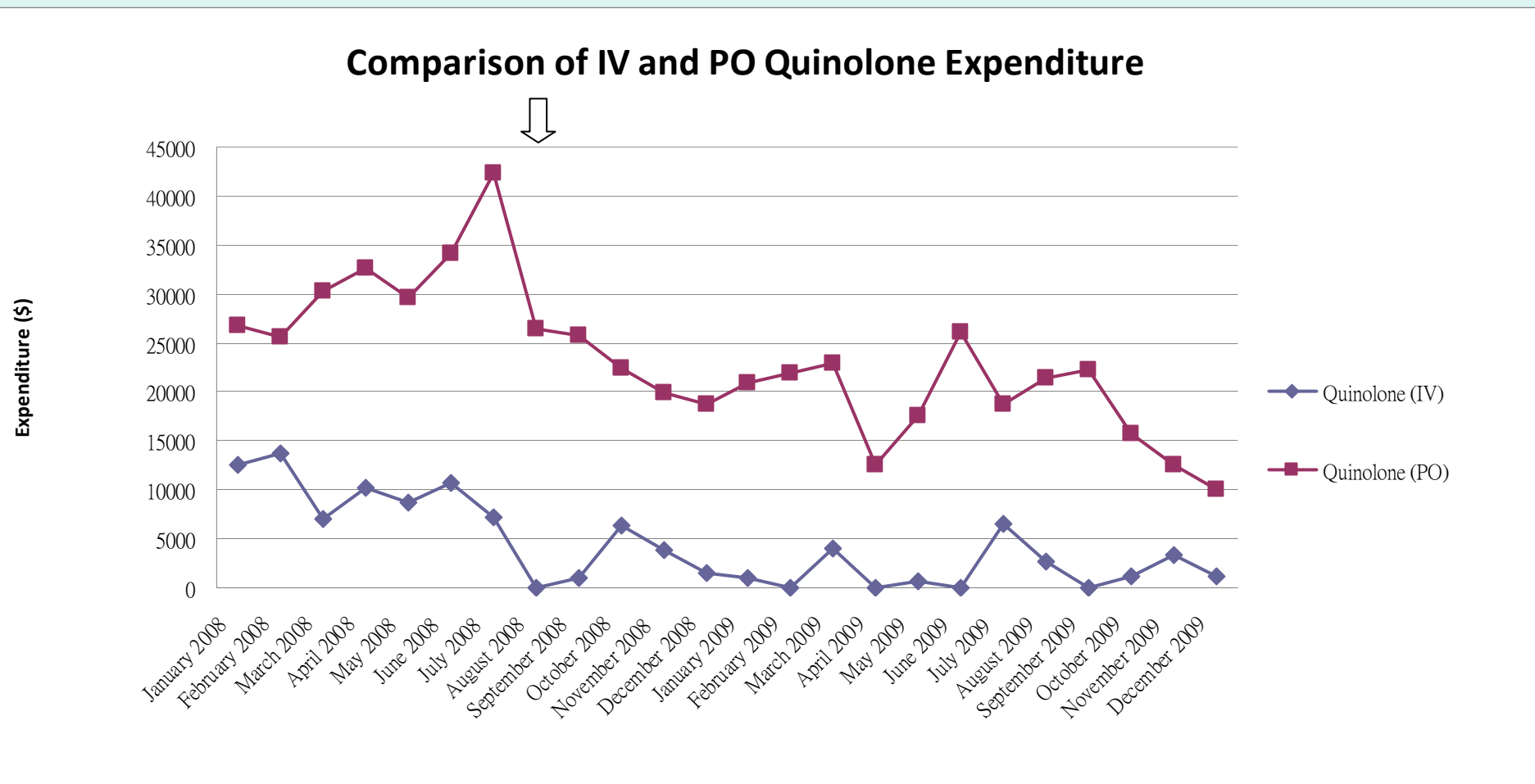
- Save HK\$ 1393048 for drug cost
- Reduce 49817 IV injections by nurses
- Save 2521 hours of nurses' time for injections
- Save HK\$ 30244 for consumable items used for setting up IV accesses
- Save HK\$ 85157 for consumable items used for administration of IV augmentin

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 of quinolones (both IV and PO)



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

Results

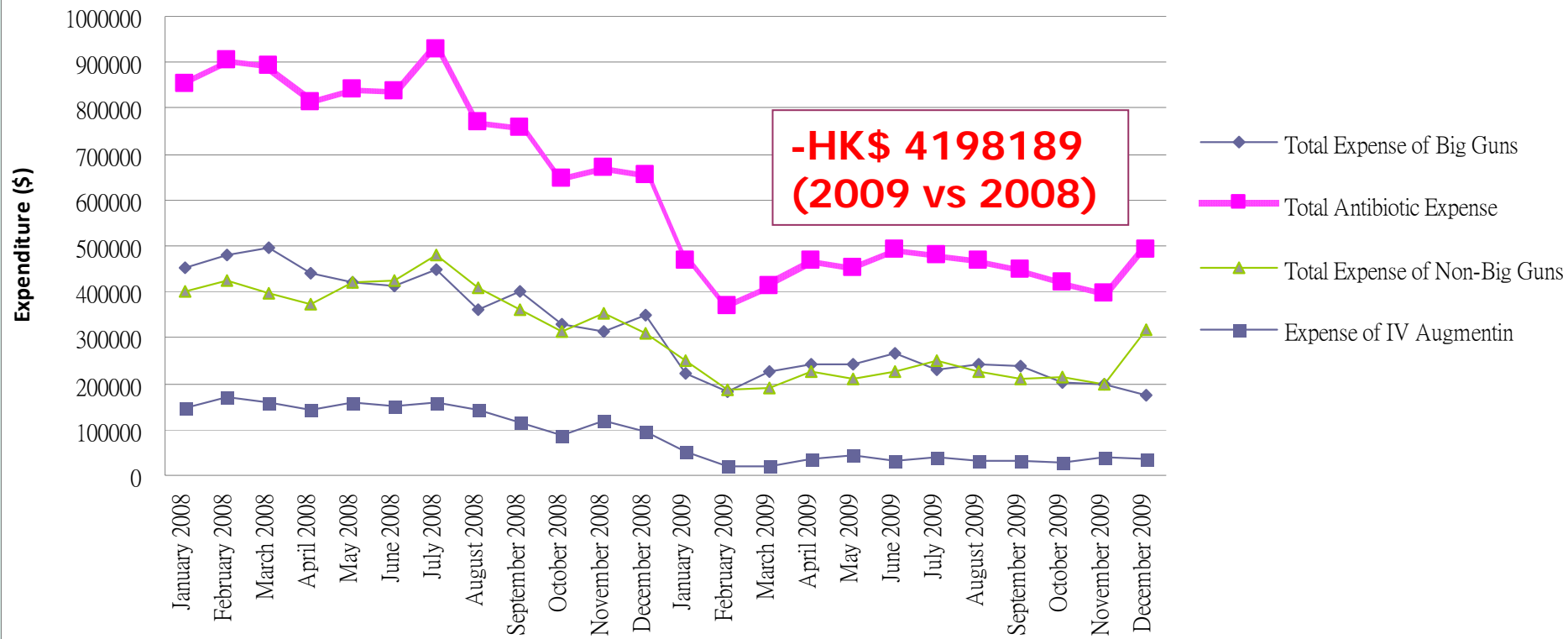
Overall impact

2009 vs 2008

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

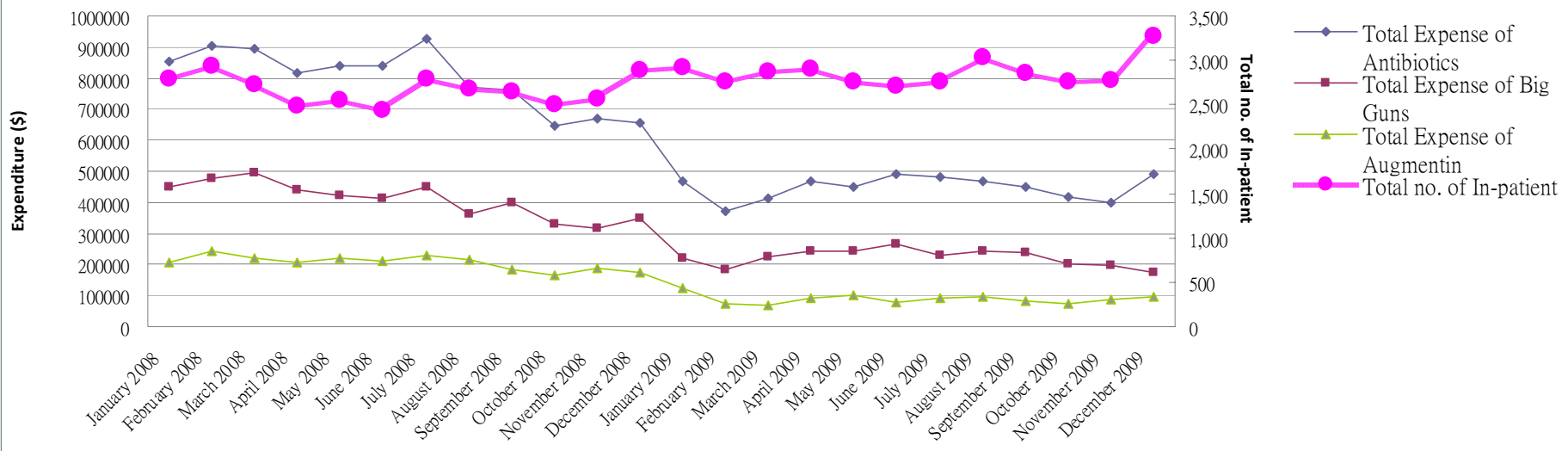
- Decreased expenditure on big gun antibiotics
- Decreased expenditure on non-big gun antibiotics
 - Especially IV augmentin

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)

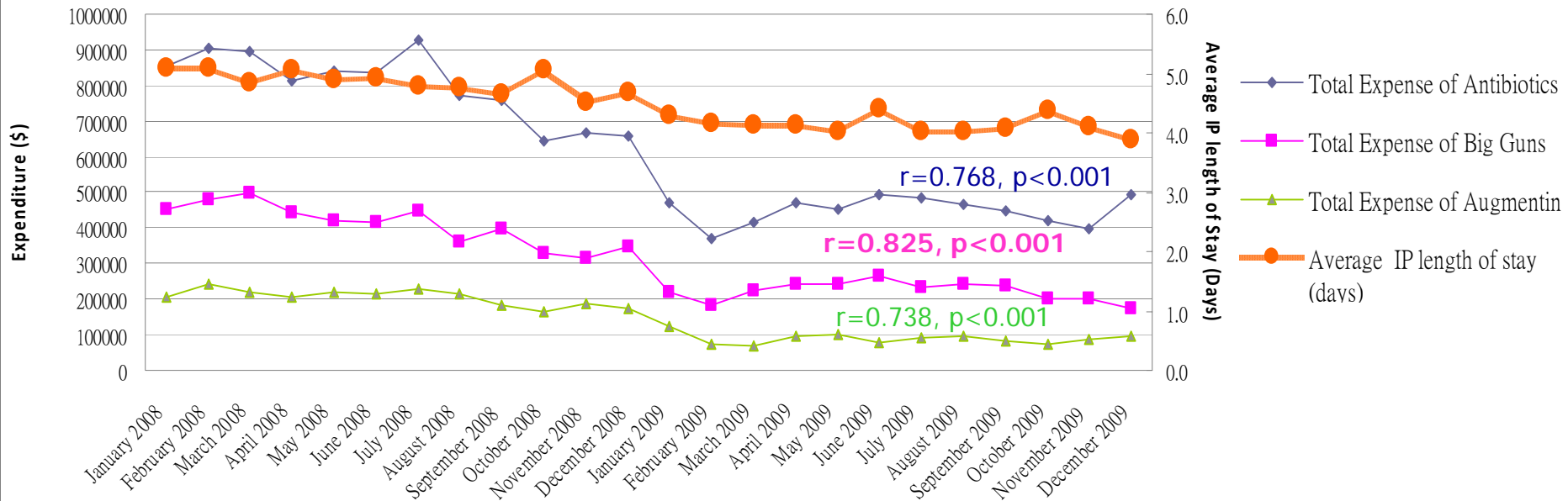
Relationship of Total Expenses of Antibiotics, Big Guns and Augmentin with Total No. of In-patient



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)

Relationship of Total Expenses of Antibiotics, Big Guns and Augmentin with Average IP Length of Stay

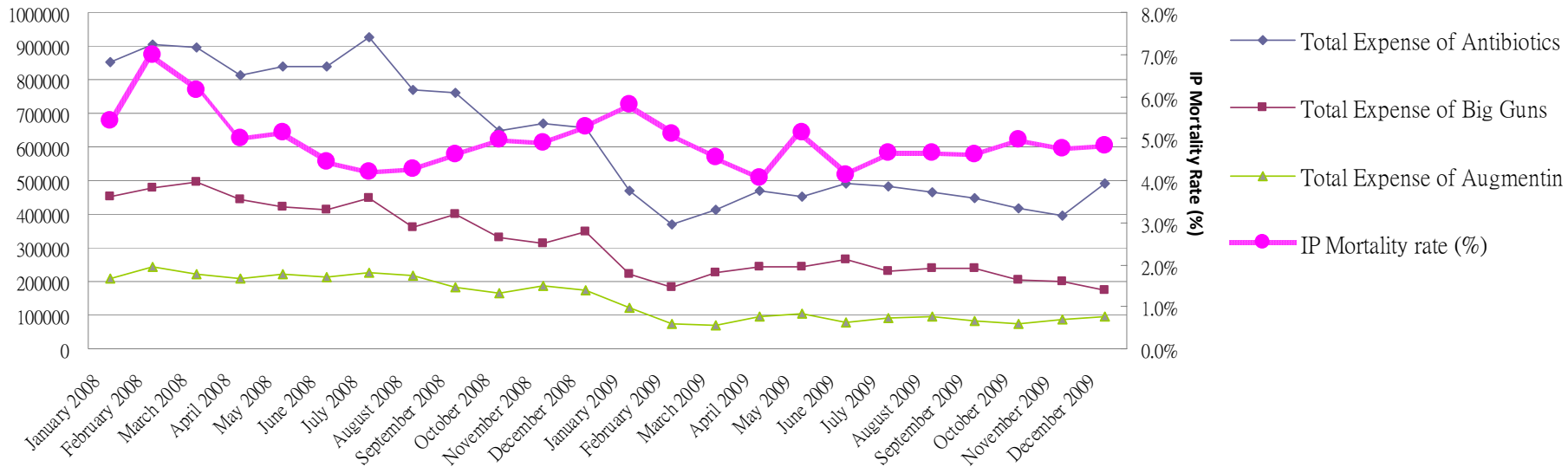


r= Spearman's rank correlation

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)

Relationship of Total Expenses of Antibiotics, Big Guns and Augmentin with IP Mortality Rate



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

Thank you