

MRSA Workshop – Local Epidemiology

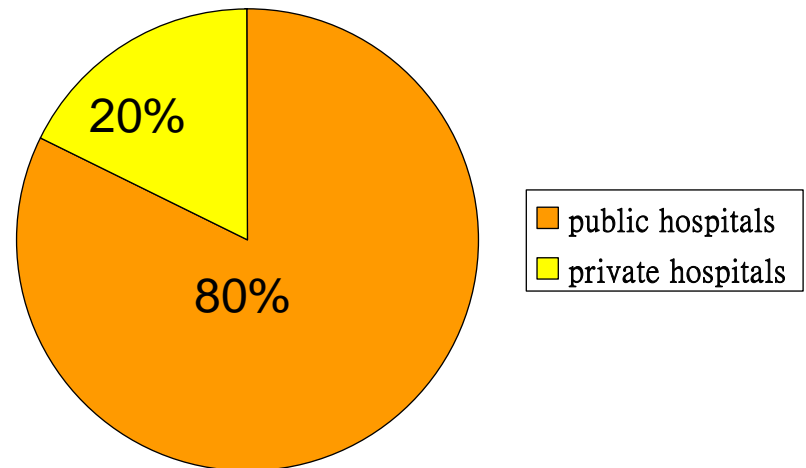
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Overview of MRSA – Local Epidemiology

1. Health Care Setting

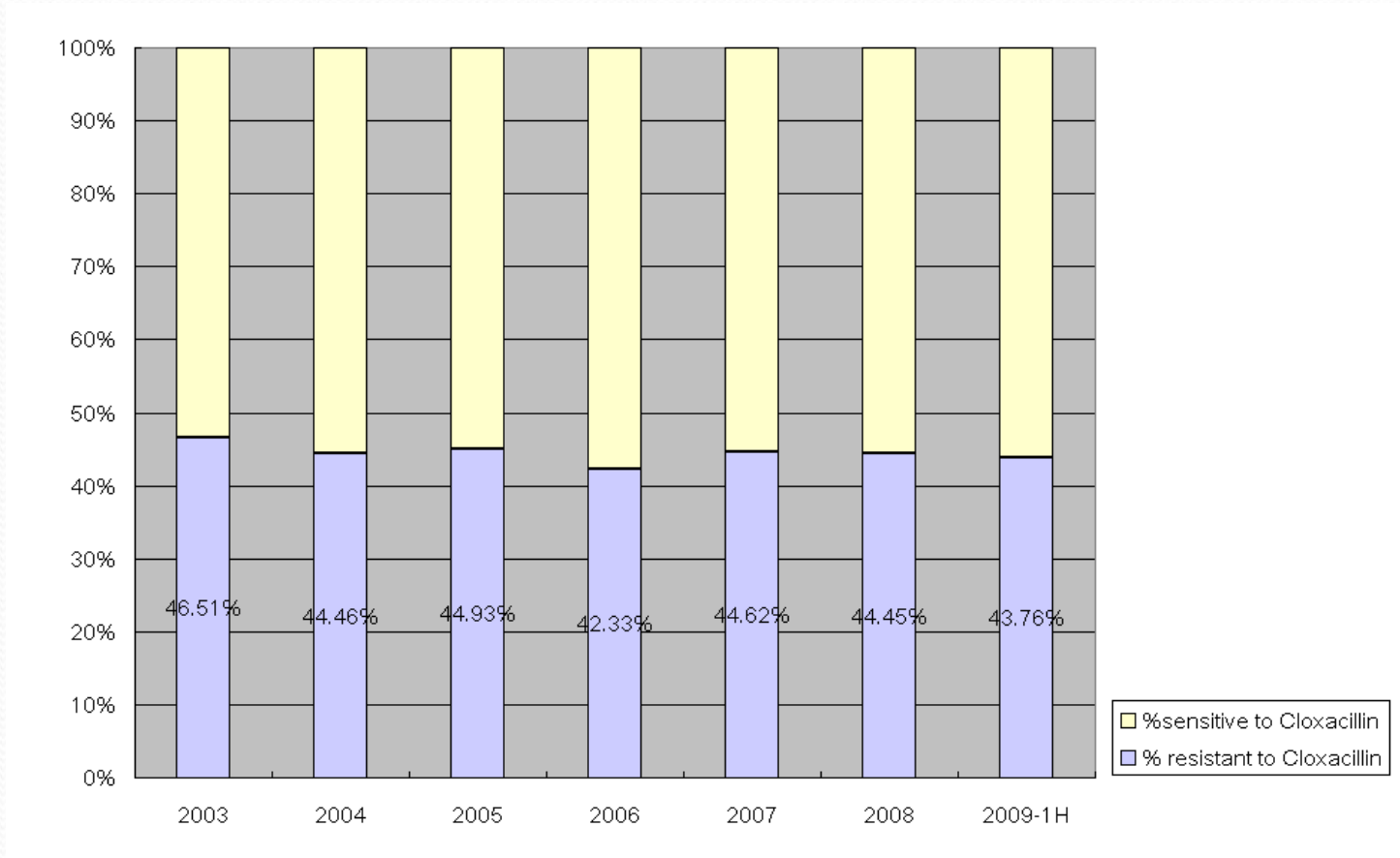
- Public hospitals
 - Overall prevalence
 - Health care burden
 - Constrains for infection control



2. Community

- Long Term Care Facilities

MRSA Proportion among *S. aureus* isolates – HA Inpatients



Inclusion criteria: 1st isolation in in patient episode by organism
The following specimens are included: Bile, Blood Culture, CSF, Joint Fluid, PDF, Respiratory Specimens, Urine, Wound & Pus

MRSA proportion among *S. aureus* isolates – Ambulatory settings (Outpatient)

	No. of pts with SSTIs	<i>S. aureus</i>	MRSA
AEDs	3109	864	78
		% of MRSA/ SA: 9.0%	
GOPCs	1314	460	78
		% of MRSA / SA: 17.0%	
Overall	4423	1324	156
		% of MRSA / SA: 11.8%	

Data source: Enhanced Surveillance Program for CAMRSA at AEDs and GOPCs in 2008

MRSA Proportion among *S. aureus* – Private Hospitals

- CHP in collaboration with 9 private hospitals has launched a Multiple Drug Resistant Organism surveillance program since 2007.
- It is a voluntary reporting program
- The targeted organisms under the surveillance include *Staphylococcus aureus*, *E.coli*, *Streptococcus pneumoniae*, *Salmonella species*, *Haemophilus influenzae* and *Pseudomonas aureginosa*.
- The percentage of MRSA among *S. aureus* isolates ranged from <10% to 30% in 5 private hospitals.

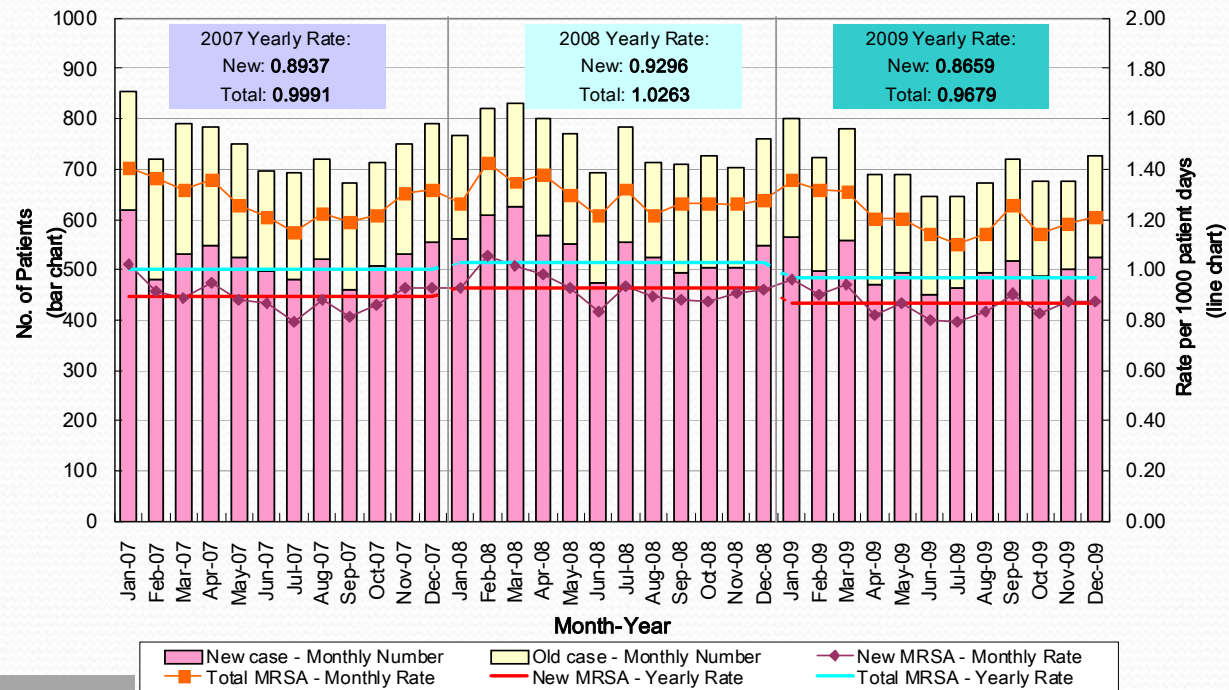
What is the MRSA burden in our Health Care settings ?

Total cases, infection rate, MRSA bacteremia and its all cause mortality rate

Total MRSA cases from Clinical Specimens 2007-2009

- Total average number of MRSA cases / month: **700**
- Yearly : **6736** in 2009
- Around **70%** of MRSA cases are New cases*

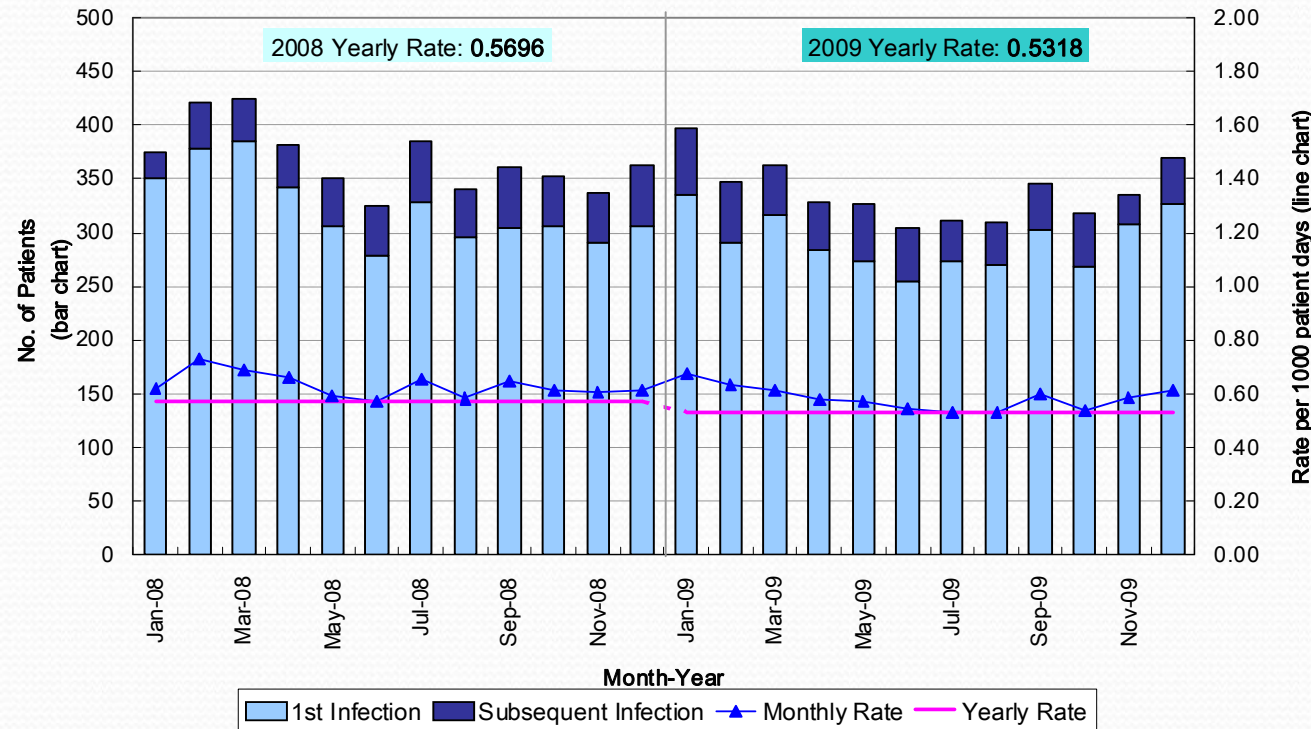
- P: **0.9679** / 1000 bds
- I: **0.8659** / 1000 bds



MRSA Infection Rate

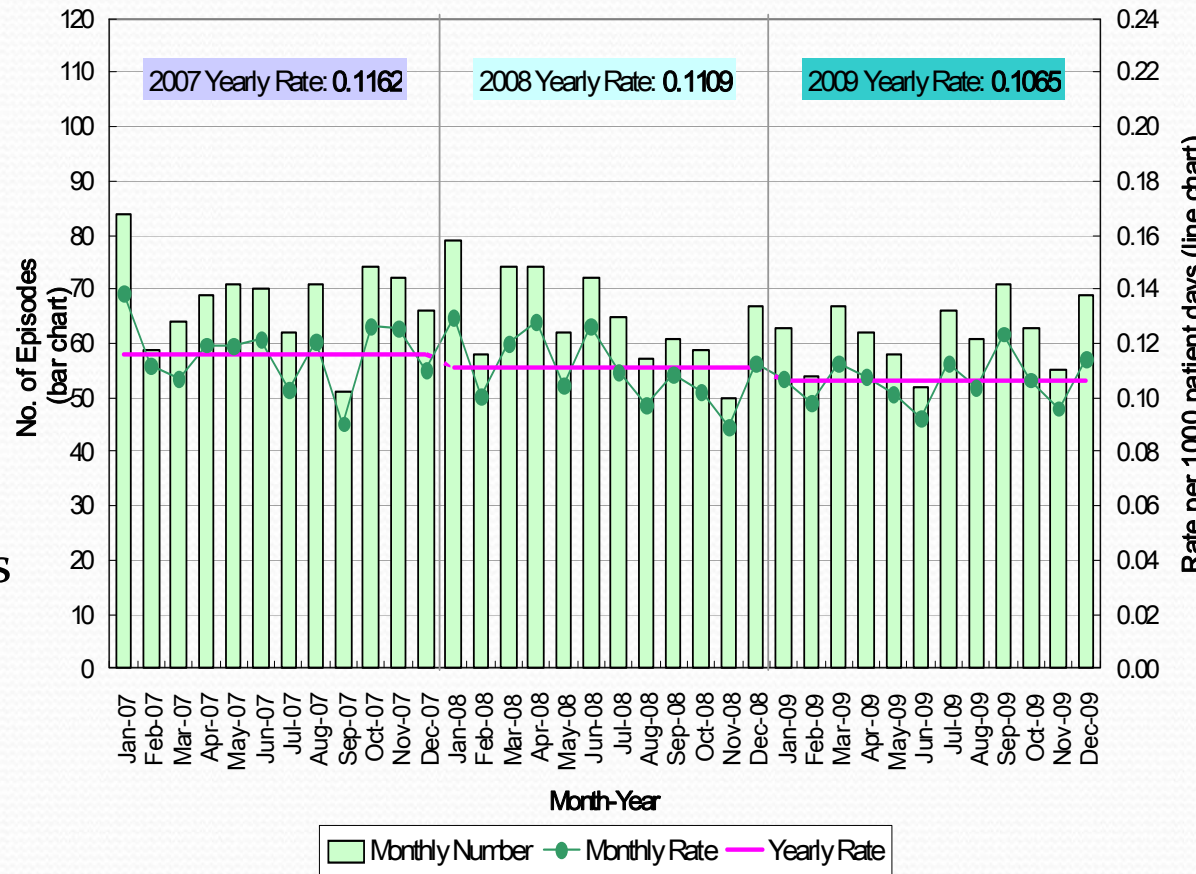
- Clinical assessment by ICNs base on CDC Nosocomial Infection
- 50% of patients are identified to have MRSA infection

• Infection rate
0.5318 / 1000 bds



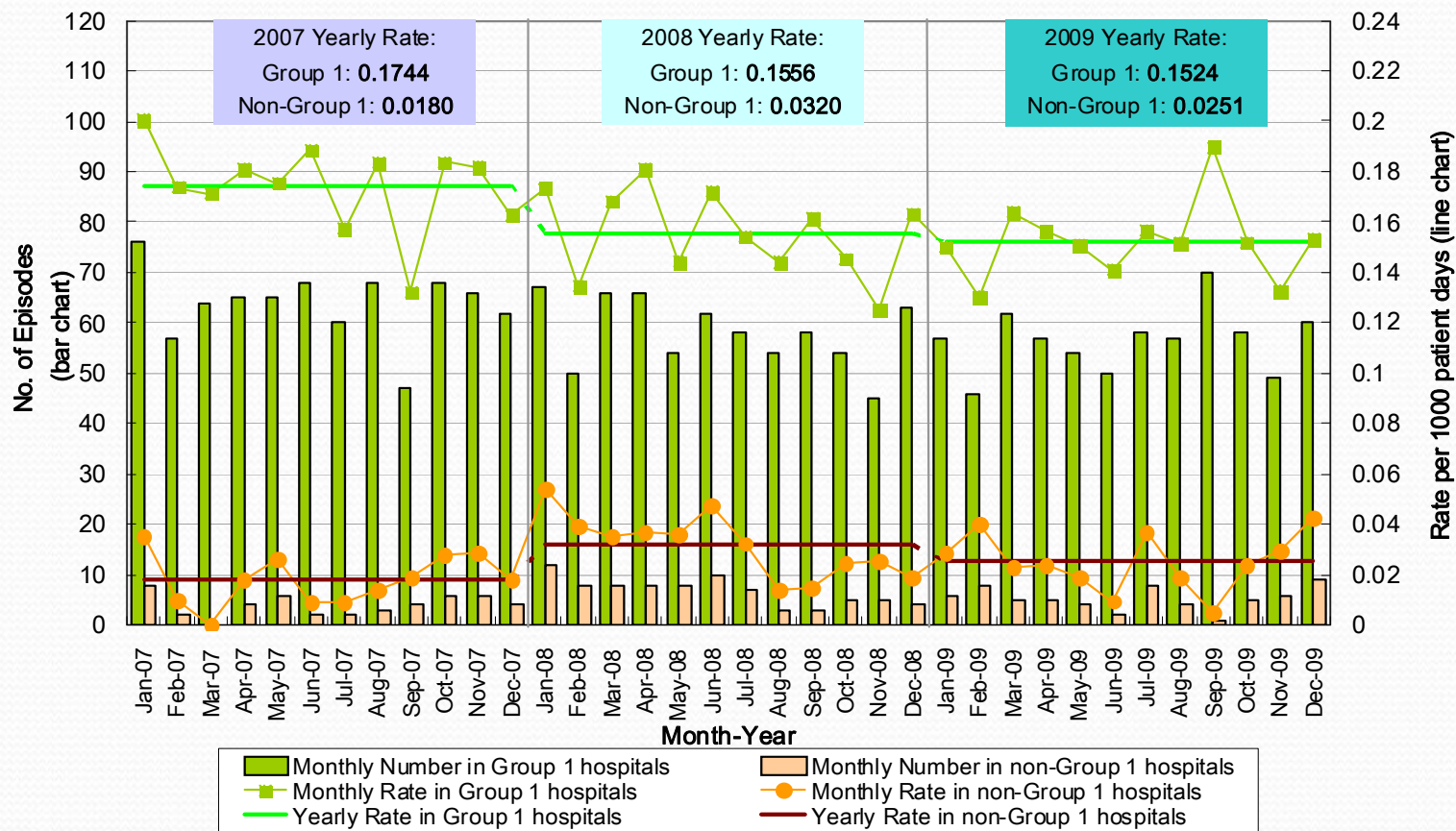
MRSA Bacteremia 2007- 2009

- 10% of MRSA patients are complicated by bacteremia yearly
- MRSA bacteremia rate is **0.1065** /1000 bds in 2009
- MRSA bacteremia rate for acute beds **0.1676** / 1000 bds



Gp 1 vs non-Gp 1 Hospitals on MRSA Bacteremia

- Group 1: 0.1524/ 1000 beds vs Non Group 1 : 0.0251 / 1000 bds
- **RR: 3.91** (95% exact CI 2.93, 5.30) (p<0.001)



Hardest hit Specialties:

Specialty where specimen was collected	Relative risk when compared with ... (95% exact CI; p-value)			
	Medicine <i>0.23 / 1000 bd</i>	Cardiothoracic surgery <i>0.13 / 1000 bd</i>	Surgery <i>0.12 / 1000 bd</i>	Hospice <i>0.10/1000 bd</i>
ICU/HDU <i>0.69/ 1000 bd</i>	2.97 (2.10, 4.09; <0.001)	5.14 (2.03, 16.69; <0.001)	5.75 (3.84, 8.49; <0.001)	7.20 (3.32, 17.80; <0.001)

§A p value of less than 0.0125 would be considered statistical significant

1. Top three high risk specialties: ICU/HDU, Medicine, and Cardiothoracic surgery
2. The RR for MRSA bacteremia for ICU/HDU patient is almost three times higher than a medical patient

All cause Mortality for MRSA bacteremic patients

Mortality rate	<i>Discharge date - specimen collection date</i>	
	<i><= 7 days mortality</i>	<i><= 30 days mortality</i>
HK	23.2%	38.4%
UK BMJ 2008; 333: 281-6	-	34%
Canada Infect Control Hosp Epidemiol 2006 27: 1219-1225;	20.3%	-
Paris Am J Respir Crit Care Med 2004; 170: 786-792	-	32% (28days)
Taiwan Am J Infect Control 2008; 36:118-22	-	27.6%
Belgium Arch Intern Med 2002; 162: 2229-2235	-	53.2% (ICU)

Length of Stay

- Average Length of stay for inpatients from Major Hospitals 2007/2008:

5.5 days

Source: Table 4.2 In-patient Services Statistics , Hospital Authority Statistical Report 2007/2008

- Median duration of hospitalization for MRSA cases:

14 days

IQR: 5-35 days

MRSA surveillance Program: 2007-2009

Year	2007	2008	2009	Change (09vs 07)
No of MRSA cases	6991	7197	6736	↓ 3.6%
MRSA rate	0.9991	1.0263	0.9679	↓ 3.1%
MRSA infection rate	-	0.5696	0.5316	↓ 7.2%
No. of MRSA bacteremia episodes	813	778	741	↓ 8.9%
MRSA bacteremia rate	0.1162	0.1109	0.1065	↓ 8.3%
No. of MRSA bacteremia episodes for Acute beds	766	703	676	↓ 11.7%
MRSA bacteremia rate for Acute beds	0.1903	0.1712	0.1676	↓ 11.9%
No. of MRSA invasive infections	969	916	851	↓ 12.2%
Rate of MRSA invasive infection	0.1385	0.1306	0.1223	↓ 11.7%

* Rate per 1000 patient bed days

Onset time

Period	Cluster	Acute Bed MRSA Bacteremia /1000 Acute Patient Days	ONSET		
			Hospital-apportioned episodes Nosocomial (≥ 48 hours after hospital admission)	All other episodes Community (<48 hours after hospital admission)	Unknown
2008	HKEC	0.2192	47.87%	40.43%	11.70%
	HKWC	0.1244	47.76%	44.78%	7.46%
	KCC	0.1977	54.55%	40.91%	4.55%
	KEC	0.1271	34.55%	58.18%	7.27%
	KWC	0.1920	52.31%	44.62%	3.08%
	NTEC	0.1145	49.35%	44.16%	6.49%
	NTWC	0.2277	48.57%	44.76%	6.67%

Previous hospitalization within the year: **92.2%**

They are **NOT** CAMRSA

Possibly:

Endogenous source (colonization to infection)

Revolving Door Phenomenon / Frequent Fliers



Constrain factors - Staffing??

• Nurse to Patient Ratio:

1. The average nurse to patient ratio ranges from 1:5 to 1:7 in acute medical wards for morning and evening shift
2. Wastage beyond 4% (stretched, coping capacity) will lead to deterioration below 1:5 to 1:9 in acute hospitals
3. 2 nurse(s) per night shift / ward in acute settings; 1 in extended care ward

Nurse-Patient Ratios – General Wards

no. of patients = 29 (= 34 beds x 85% occupancy)

Specialty	Acute Hospital			Extended Care Hosp.		
	Nurse/ward	Shifts/day	N-pt ratio	Nurse/ward	Shifts/day	N-pt ratio
Med/Oncol/Hospice	16-21	10.3-13.6	1:5-7	10-13	6.-8.4	1:9-10
Surgery	15-20	9.7-13.0	1:5-7	10-13	6.5-8.4	1:9-10
Paed& Adol	15-19	9.7-12.3	1:6-7	13-14	8.4-9.1	1:6-7
Obstetrics	14-18	9.1-11.6	1:6-8	---	---	---
Gynae	14-17	9.1-11.0	1:6-8	10-13	6.5-8.4	1:7-10
Ortho	14-17	9.1-11.0	1:6-8	10-13	6.5-8.4	1:7-10
Geriatric/Infirmary	14-17	8.4-11.0	1:6-9	10-13	6.5-8.4	1:7-10
Rehab	13/14-17	8.4-11.0	1:6-9	---	---	---
Day Surgery	66% of in-patient staffing			Remarks : Night shift = 2nurses in acute ward: 1 in extended ward		

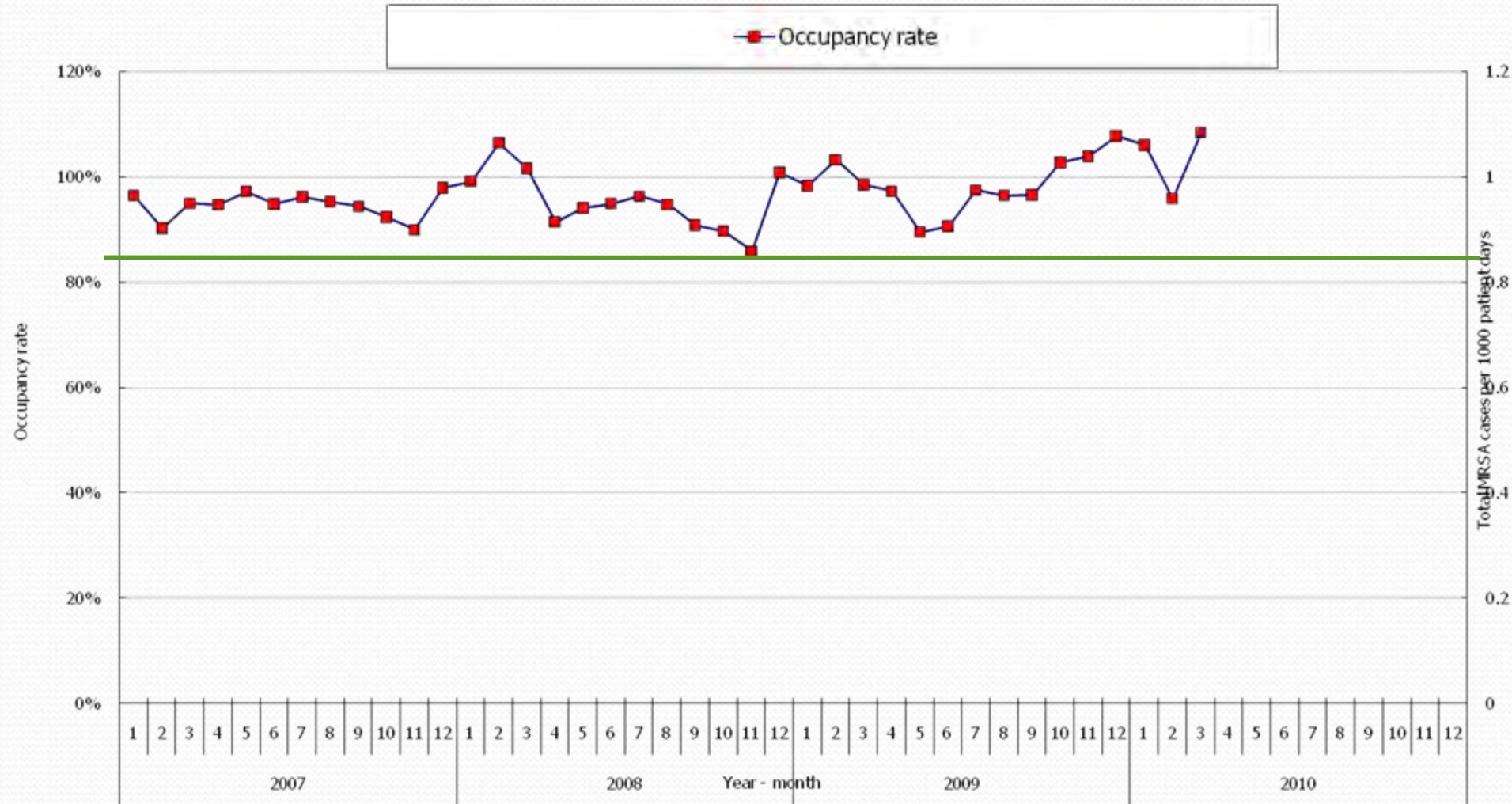
Constrain factors – Bed Occupancy Rate

- **Bed Occupancy Rate** (*major hospitals as overall*):
83.4%

Source: Table 4.2 In-patient Services Statistics , Hospital Authority Statistical Report 2007/2008

- **Oversea Recognized Threshold : 85%**
 1. Borg also found a significant correlation between bed occupancy and the MRSA infection rates . Moreover, the introduction of additional beds to a ward during periods of high demand directly contributed to extra cases of MRSA. An extra bed added to a four bed room may lead to a three fold increased risk of acquiring MRSA, even when the staff numbers are increased to accommodate the increased patient load [*J Hosp Infect 2003; 54:316-8*]
 2. Hospital with occupancy rates of more than 90% had a 10.3% greater incidence of MRSA infection than those with occupancies below 85% [DH (UK), Hospital organization, specialty mix and MRSA. Report no 9163. Dec 2007]

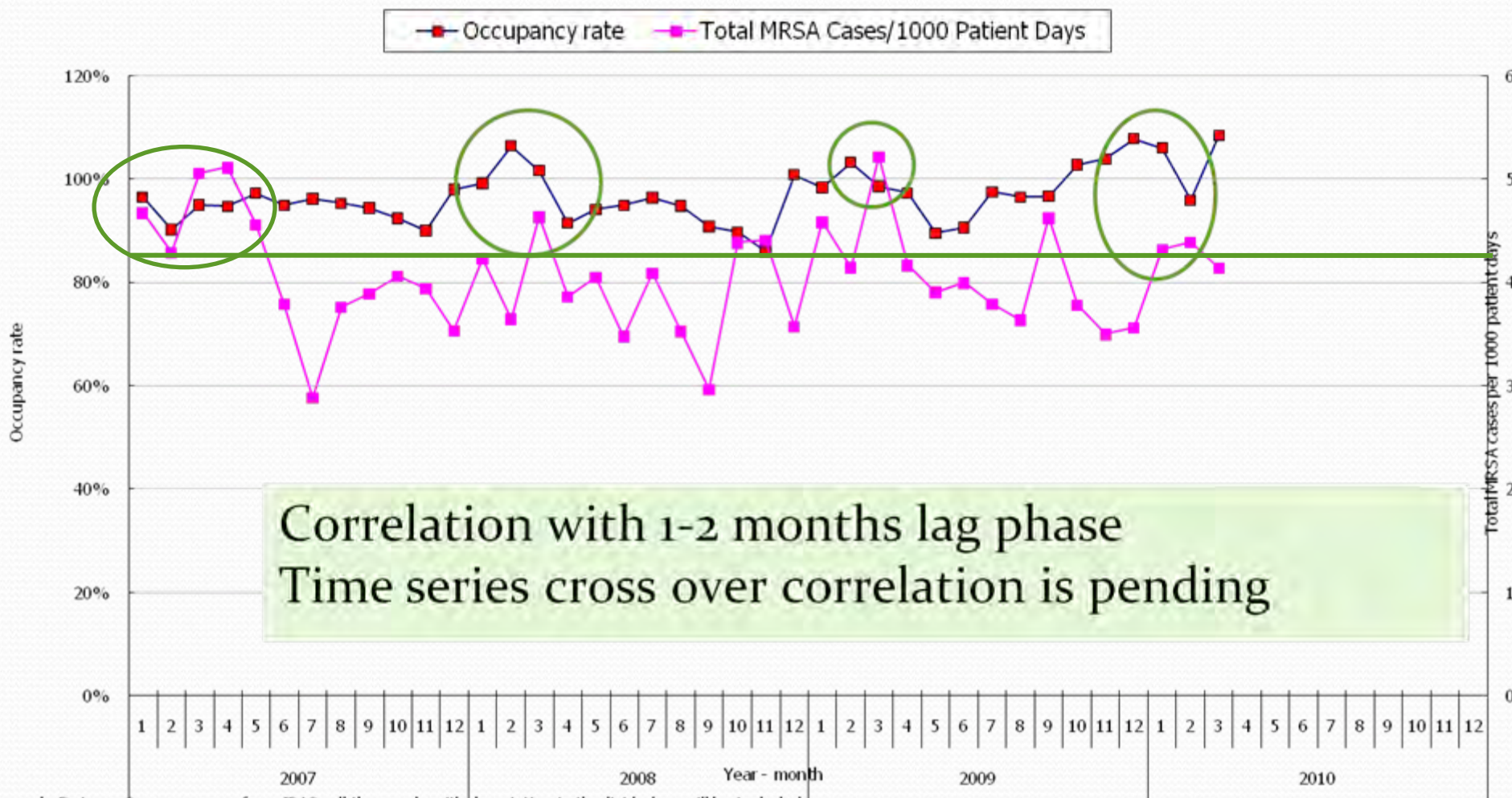
Occupancy rate and MRSA of all the MED wards in QEH since Jan 2007



Remark: Data on occupancy, all the wards with the description with the list below will be included:
 MED+Skin, MED/MSM/Skin, MED Isolation Ward, MED Admission Ward, MED (Isolation), MED & Skin, MED, Med, MASU, Infection Observation Ward, CCU (ICU), CCU

Hospital Bed Occupancy

Occupancy rate and MRSA of all the MED wards in QEH since Jan 2007



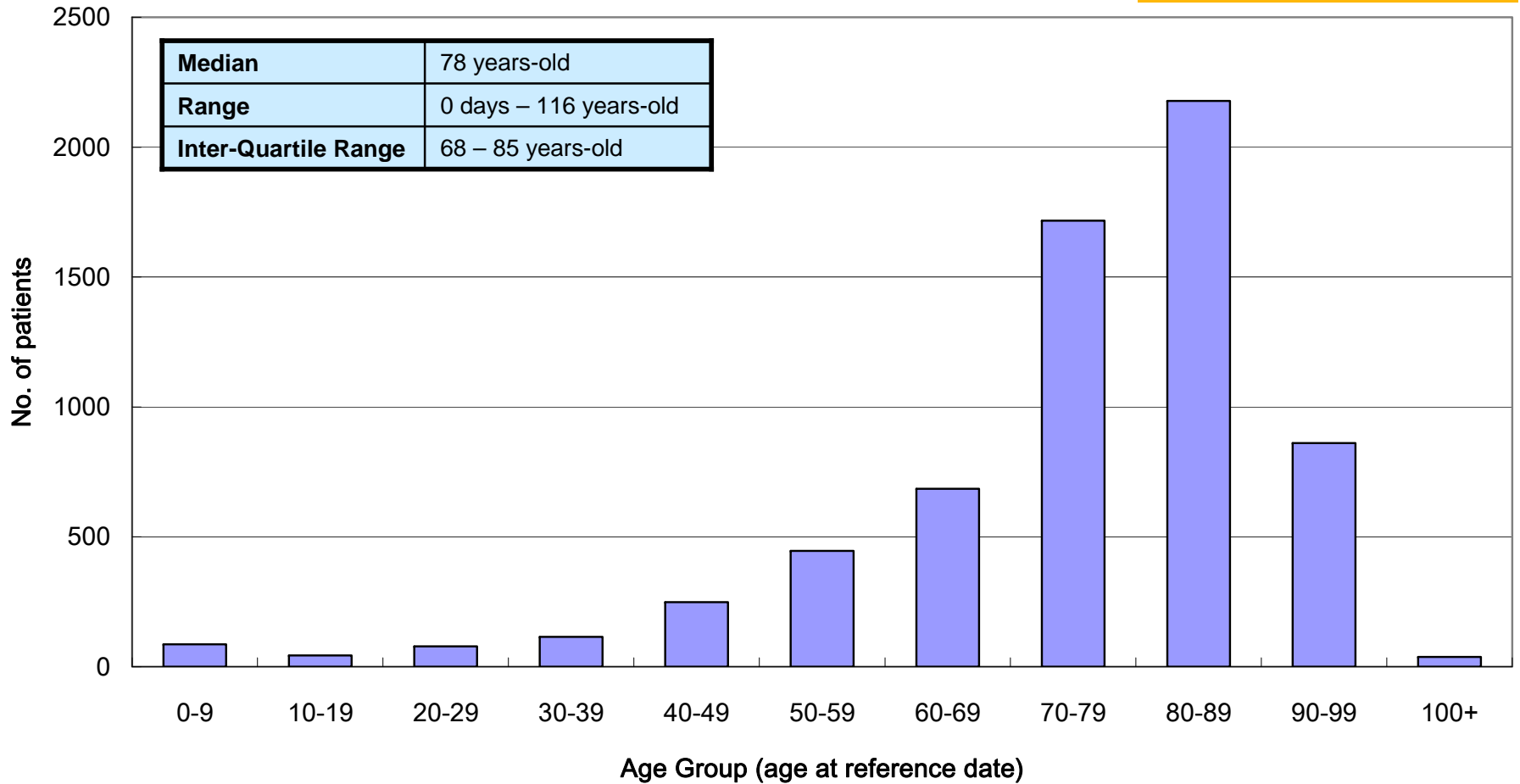
Correlation with 1-2 months lag phase
 Time series cross over correlation is pending

Remark: Data on Occupancy are from IPAS, all the wards with description in the list below will be included:
 MED+Skin, MED/MSM/Skin, MED Isolation Ward, MED Admission Ward, MED (Isolation), MED & Skin, MED, Med, MASU, Infection

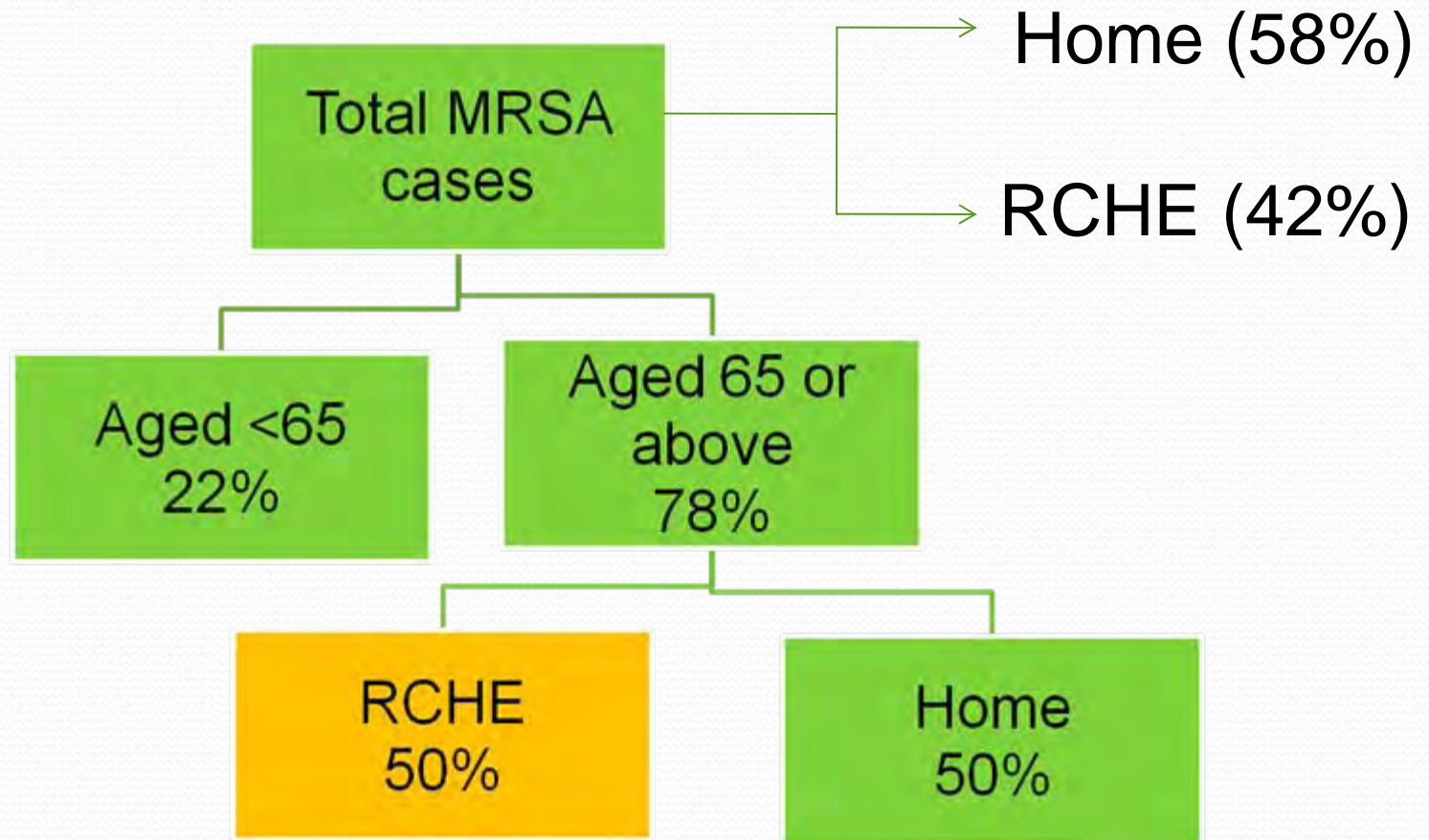
**What is going on in the
community – institution ?**

Age Distribution for new MRSA cases

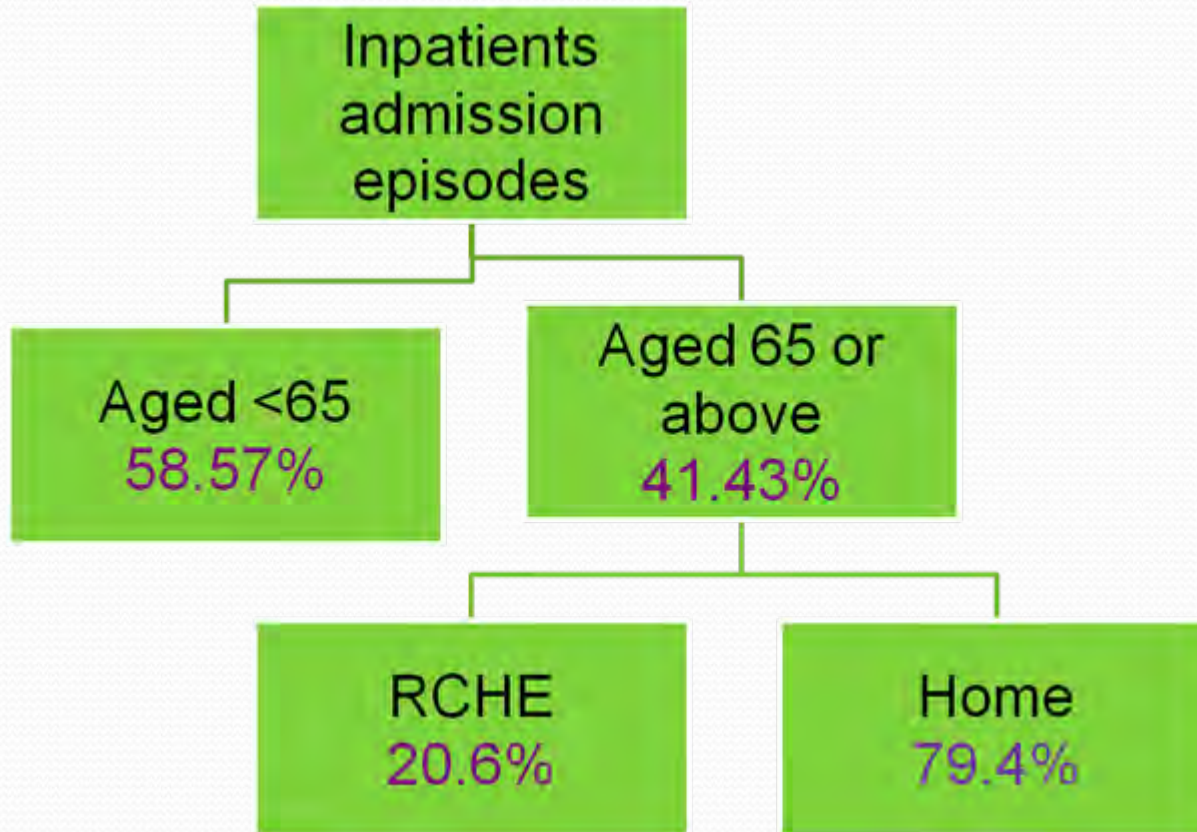
63% are male



How many of the MRSA cases are residents from RCHE?



Are RCHE residents the major pool of hospital inpatient admissions ?



1. Among inpatients who aged ≥ 65 years old, only 20.6% of them are RCHEs residents
2. This RCHE proportion accounts for 8.52% of Inpatients

Prevalence of MRSA in RCHEs in Hong Kong

Jan 2005

RCHEs: 13

No of residents: 949

- Results:
 1. 27/949 (2.8%)
 2. No MRSA was found in 2 RCHEs
 3. The rate of MRSA carriage in the other 11 facilities ranged from 1.9% to 4.2%
 4. Functional immoridity (OR, 5.4), history of hospital admission (OR, 2.3) and use of nebulized medication (OR, 5.4) were significant associated with MRSA colonization

Prevalence of MRSA in RCHEs in Hong Kong

June – Dec 2005

- Tertiary wide study: 487/775 RCHEs (62.8%)
- Number for residents sampled: 1563/ 72199 (2.16%)
- Results:
 1. 80 MRSA +ve residents (5.1%) [95% CI, 4.1-6.3%]
 2. No MRSA carriage was found in 2 remote regions (IS and SK)
 3. The rates in the other 16 regions range between 1.3% and 8.1%
 4. MRSA strains were recovered from residents in 73 (15%) of the 487 RCHEs.

A Cluster Randomized controlled Trial on the effectiveness of infection control intervention program on Methicillin resistant *Staphylococcus aureus* 2Q09 – 4Q10 (ongoing)

Baseline

- RCHE with bed capacity 50-300 (private owned or government subsidized)
- Location in the districts of Kowloon City, Yau Tsim Mong, Wong Tai Sin
- Body sites sampled: nostrils, +/- CSU or wound if present
- Total number of RCHEs sampled: 36
- Number of consented: 2872
- Response rate: 80%
- Number of MRSA +ve residents: 590
- Prevalence rate: **21%** (590/ 2872)

Acknowledgement

- CCIDER, HA
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- Infection Control Practice Team, IDCTC, HA



Thank you