

Antibiotic Prophylaxis for prevention of Surgical Site Infection (SSI)



Dr Alex Aiken

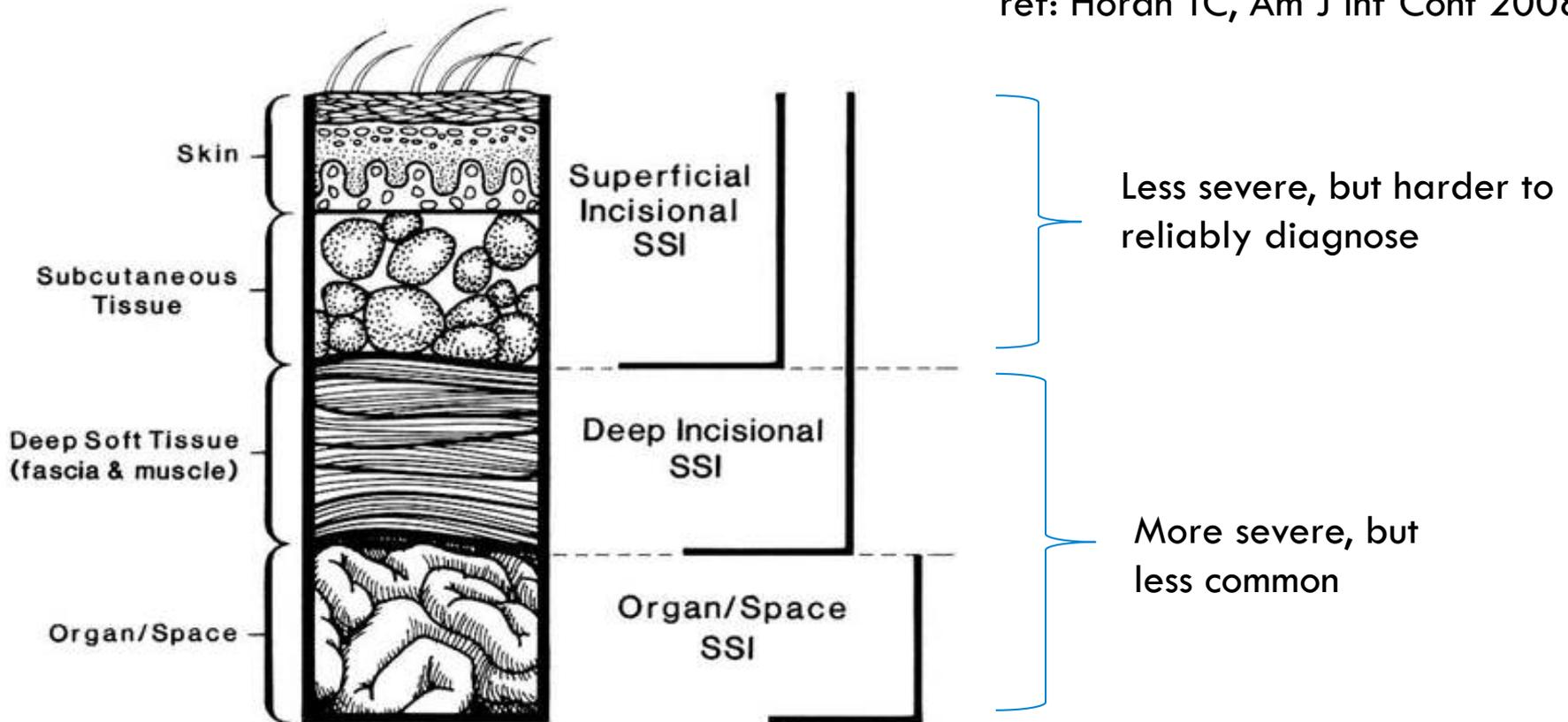
KEMRI-Wellcome Trust Research Programme, Kenya

London School of Hygiene and Tropical Medicine, UK

What is a Surgical Site Infection (SSI)?

CDC/NHSN definition of SSI: “Infection occurring at the operation site within 30 days of the procedure.”

ref: Horan TC, Am J Inf Cont 2008



SSI – how much of a problem?

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Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis

Benedetta Allegranzi, Sepideh Bagheri Nejad, Christophe Combescure, Wilco Graafmans, Homa Attar, Liam Donaldson, Didier Pittet

Summary

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Background Health-care-associated infection is the most frequent result of unsafe patient care worldwide, but few data are available from the developing world. We aimed to assess the epidemiology of endemic health-care-associated infection in developing countries.

Methods We searched electronic databases and reference lists of relevant papers for articles published 1995–2008. Studies containing full or partial data from developing countries related to infection prevalence or

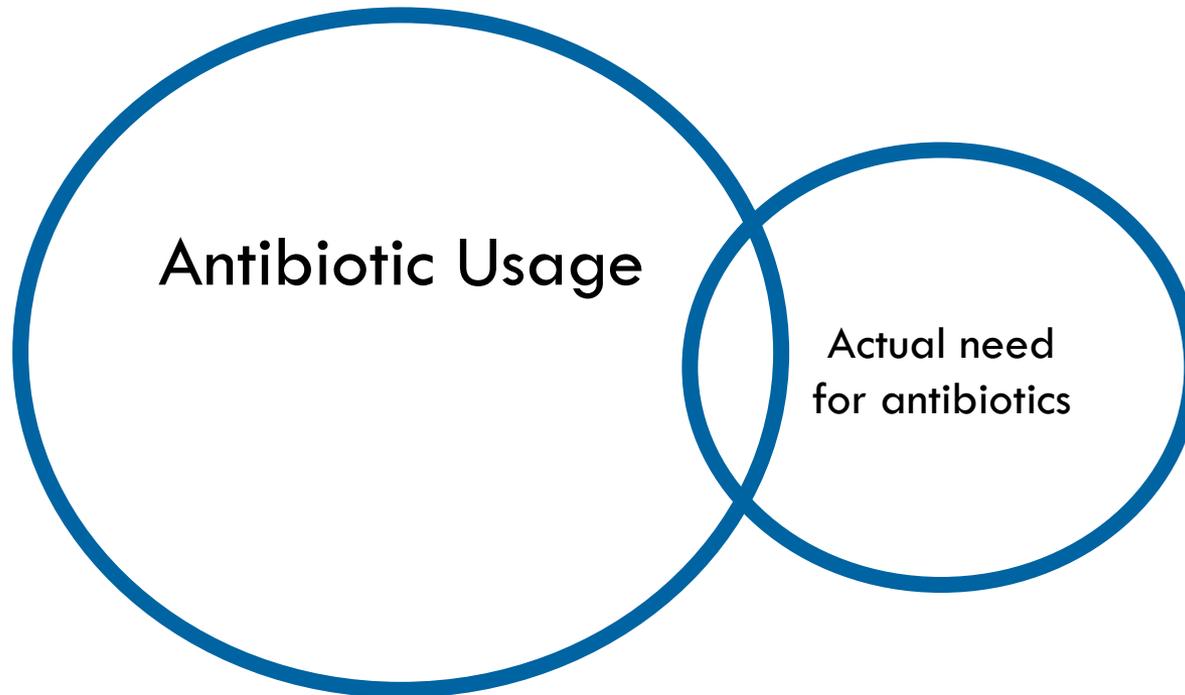
Results: *“Surgical-site infection was the leading infection in hospitals ... , strikingly higher than proportions recorded in developed countries.”*



The “antibiotic problem”

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The problem: mismatch between antibiotic usage and need



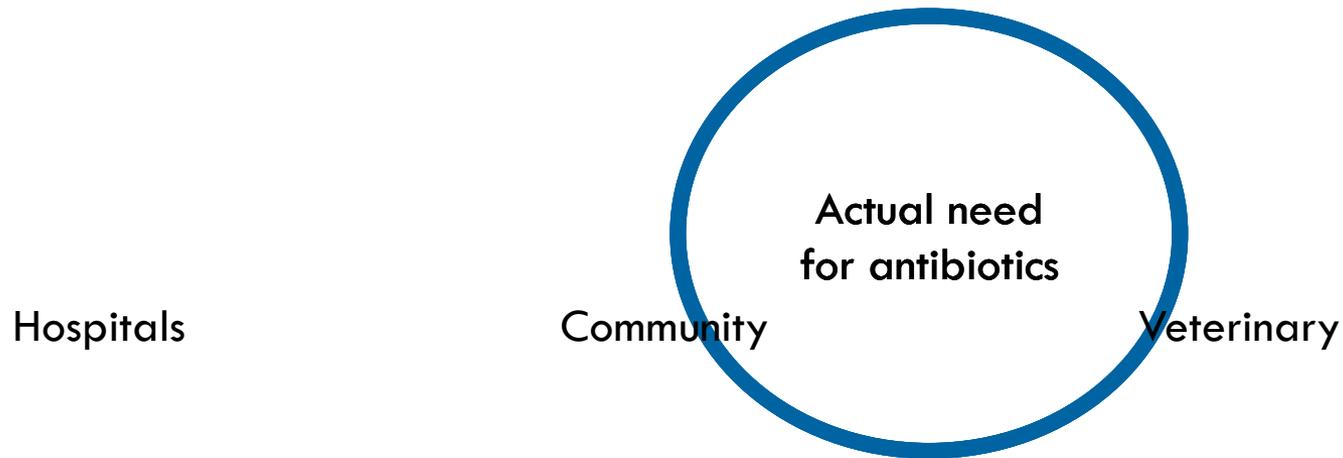
The solution: 1) reduce antibiotic usage 2) align reduced usage with actual need

Antibiotic prophylaxis for prevention of SSI



Need for antibiotics

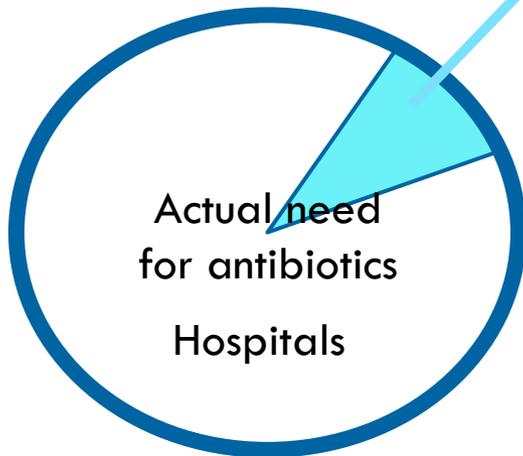
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Antibiotic prophylaxis for prevention of SSI

Surgical antibiotic prophylaxis (AP)

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Surgical Antibiotic Prophylaxis (AP)
to prevent Surgical Site Infections (SSI)

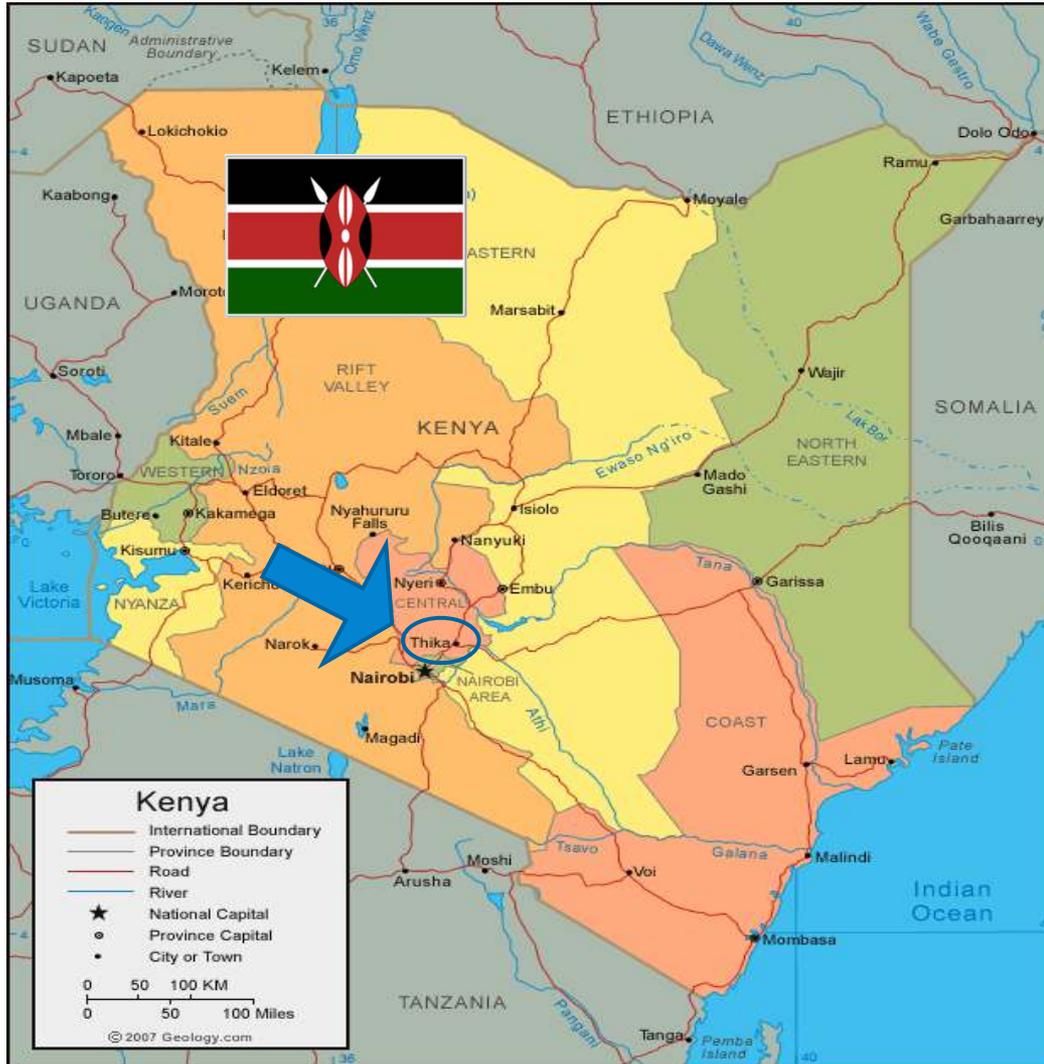
Huge evidence base to support use of AP
eg. Small et al, Cochrane Library, 2010
 Bowater et al, Annals of Surg, 2009

AP should be

- ❑ PRE-operative (0-30 mins before skin incision)
- ❑ Single intra-venous dose
- ❑ Appropriate to local pathogens

Thika Hospital, Central Province, Kenya

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Use of AP in Thika Hospital

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From June 2010 to Feb 2011

98% of surgical patients received:

- Post-operative prescription of 2 or 3 IV agents for 5 to 7 days
 - Normally Penicillin (79%) + Metronidazole (85%)
 - Also Gentamycin (45%), Ceftriaxone (11%) used.
 - Average of 32 doses of iv antibiotics prescribed
 - First dose given several hours post-op
 - Normally switched to oral ampicillin+flucloxacillin after 72 hrs.
- Similar regime (probably) used in most Government Hospitals in Kenya, though private hospitals better.



Intervention: Hospital AP Policy

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Policy Development + Implementation

- Series of seminars (Nov 2010 – Jan 2011) to review evidence and National Guidelines to produce a locally appropriate AP Policy
- “Buy-in” from all senior surgeons and Hospital Director
- Policy implemented from 7th Feb 2011
- Ongoing feedback provided about compliance with policy

Policy Content:

1. All surgical patients to receive PRE-operative AP
2. Drugs used
 - Ampicillin 2g + Metronidazole 500mg for most surgery
 - Ceftriaxone 2g for Orthopaedic surgery
3. No routine post-operative antibiotics should be given
(for Clean and Clean-Contaminated Surgery)

Why Ampicillin for AP ?

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Advantages

- ❑ Cheap drug (approx US\$0.50 for dose)
- ❑ Non-toxic, generally safe
- ❑ $t_{1/2} = 1$ hour
- ❑ Reasonable coverage
- ❑ Good tissue penetration
- ❑ Not otherwise used in TL5H
- ❑ On Kenya Essential Medicines List

Concerns

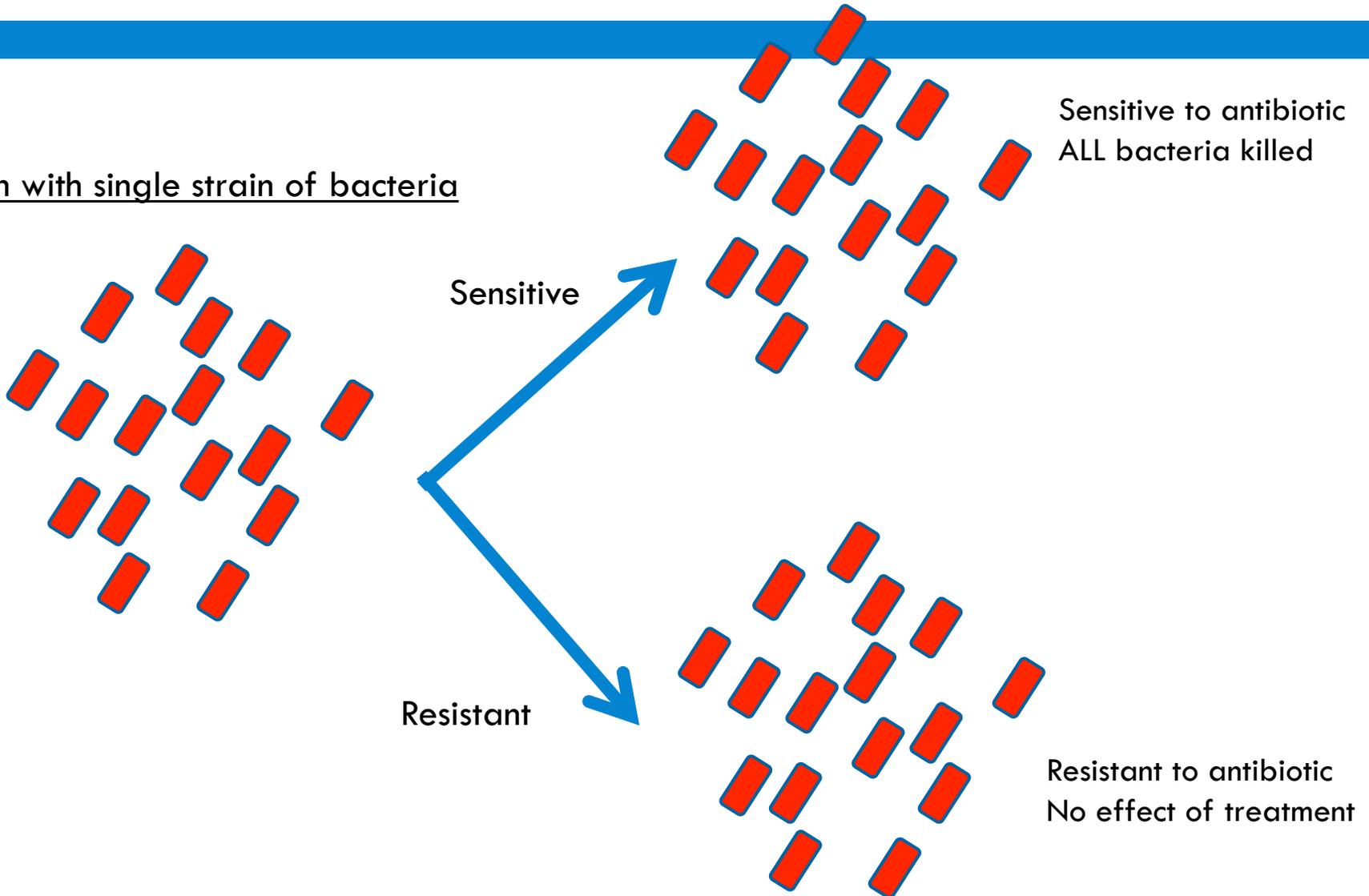
Possible allergic reactions – but rare
Ampicillin resistance is common in clinical isolates in Kenya

But

- ❑ Prophylaxis is to reduce inoculum rather than treat an infection

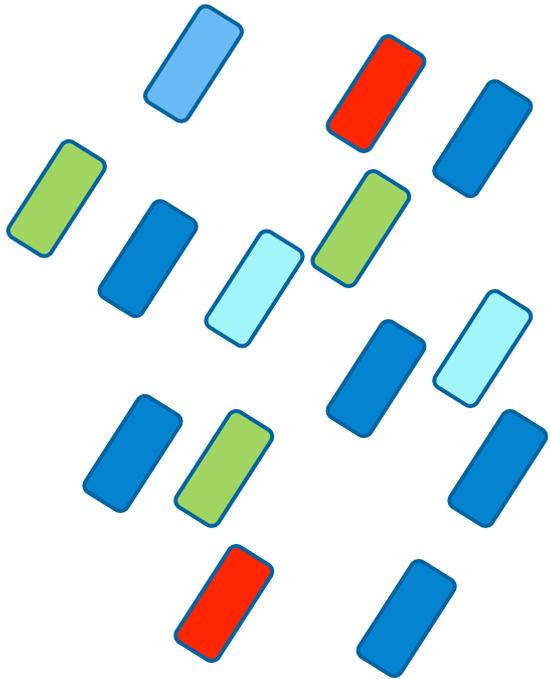
ANTIBIOTIC TREATMENT

Infection with single strain of bacteria



ANTIBIOTIC PROPHYLAXIS

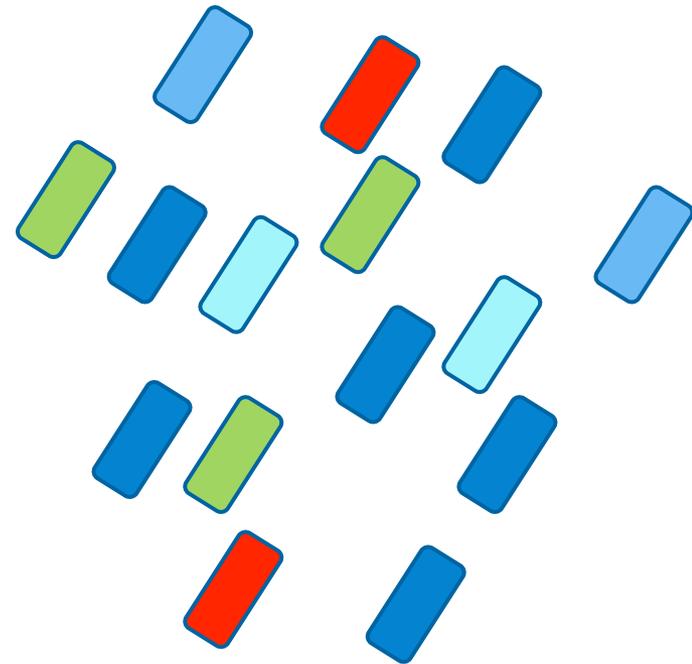
Diverse bacterial contamination



Antibiotic
Prophylaxis



Reduction in bacterial population

 = bacteria resistant to antibiotic

Some bacteria killed even if some antibiotic resistance is present



Results of intervention

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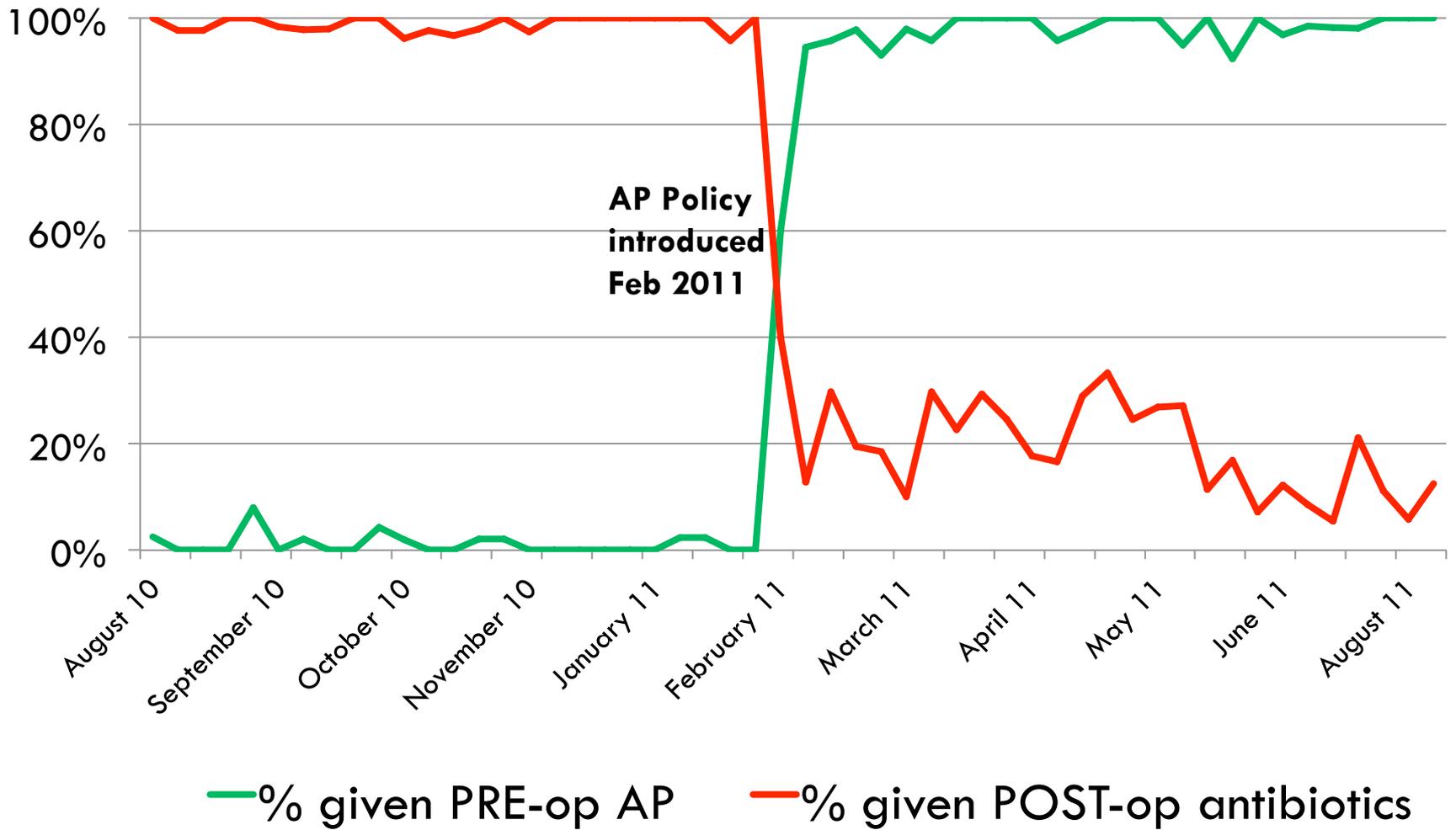
Monitoring the effects of AP Policy introduction on

1. Use of antibiotics in surgical patients
2. Rate of SSI
3. Pathogens and antibiotic resistance with SSI

Data collection is ongoing...

1. Use of antibiotics for AP in Thika Hospital

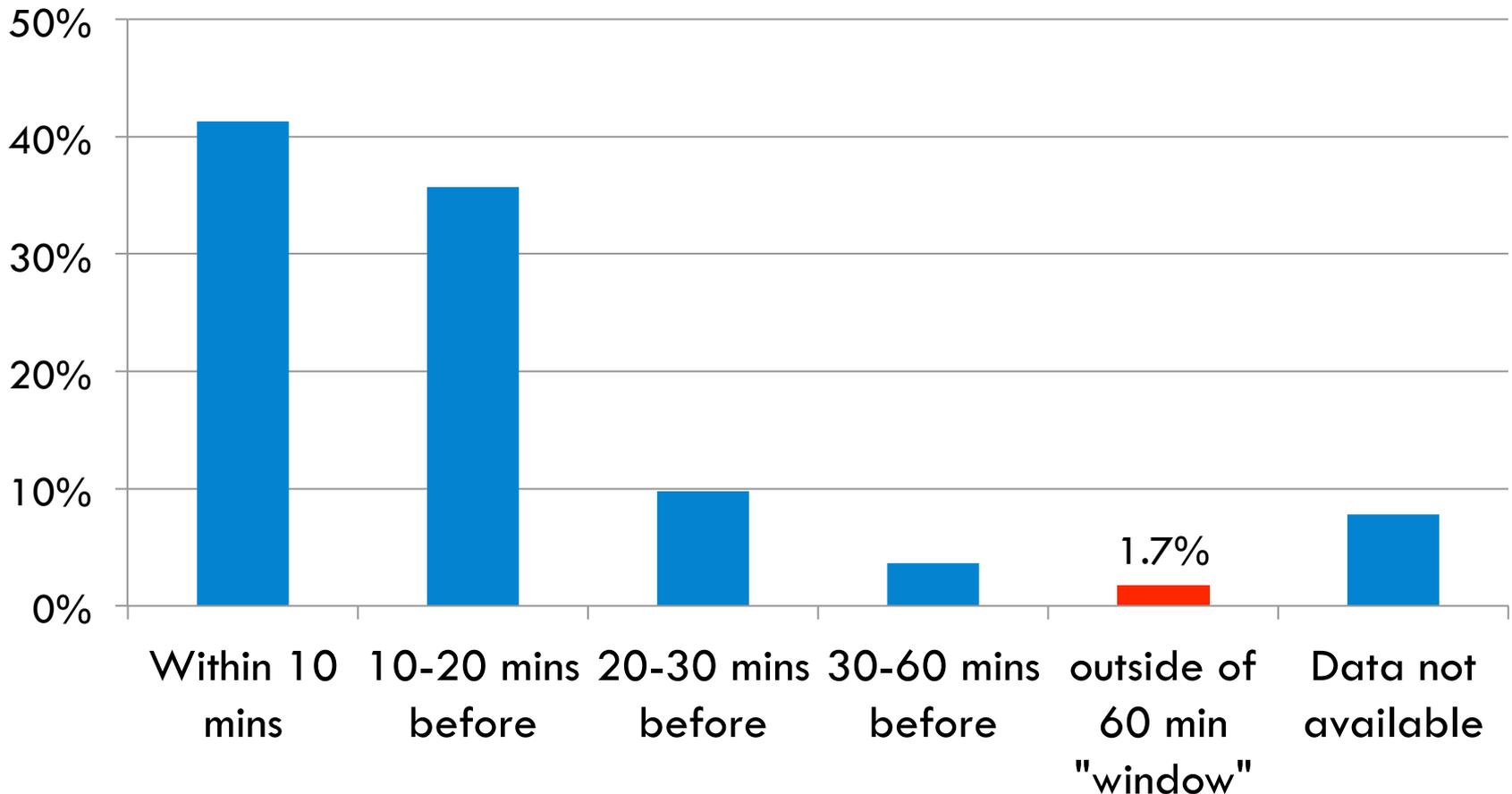
AP used in Clean and Clean-Contaminated Operations



1. Use of antibiotics for AP in Thika Hospital

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Timing of pre-op AP, relative to skin incision



2. Rate of SSI

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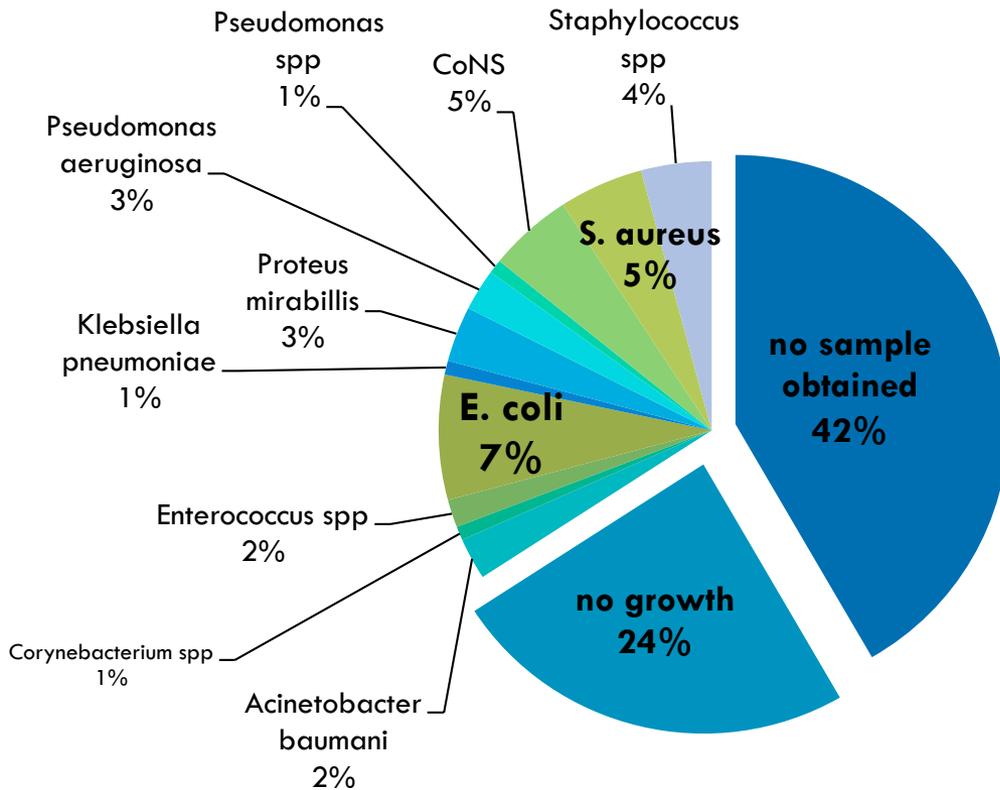
Type of Surgical Site Infection (Clinical Diagnosis)	Post-operative abx ONLY ("old" regime)	Pre-operative AP +/- post-op abx ("new" regime)*
Any SSI (%)	77 (7.1%)	71 (5.4%)
SSI reported by <u>phone only</u> (%)	32 (2.9%)	30 (2.3%)
Superficial SSI (%)	32 (2.9%)	30 (2.3%)
Deep SSI (%)	10 (0.9%)	7 (0.5%)
Organ-Space SSI (%)	3 (0.3%)	4 (0.3%)
All Operations (%)†	1,094 (100%)	1,304 (100%)*

† = for CLEAN and CLEAN-CONTAMINATED surgery only

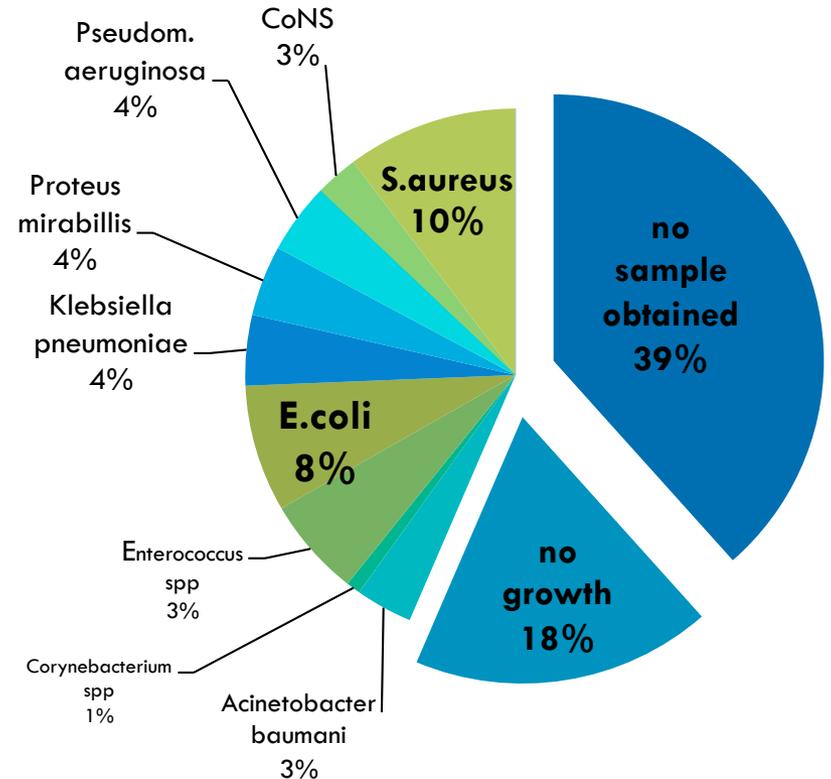
* = 36 operations since 7th Feb which were not documented to get AP excluded

3. Antibiotic resistance in SSI cases

Isolates “before” Policy change
(n=120)



Isolates “after” Policy change
(n=117)



3. Antibiotic resistance in SSI isolates

Drug	Species tested against	BEFORE AP Policy % Sensitive	AFTER AP Policy % Sensitive
Ampicillin	E.coli, Proteus spp., Enterococci, K.pneumo	23% (3/13)	19% (4/21)
Gentamicin	E.coli, Proteus spp., Staph spp. , E.cloacae, Acinetobacter	52% (11/21)	66% (16/24)
Cefotaxime	E.coli, Proteus spp. E.cloacae, K. Pneumo	45% (5/11)	53% (9/17)
Ciprofloxacin	E.coli, Proteus spp., Pseudomonas spp., Staph spp. E.cloacae	78% (18/23)	73% (19/26)

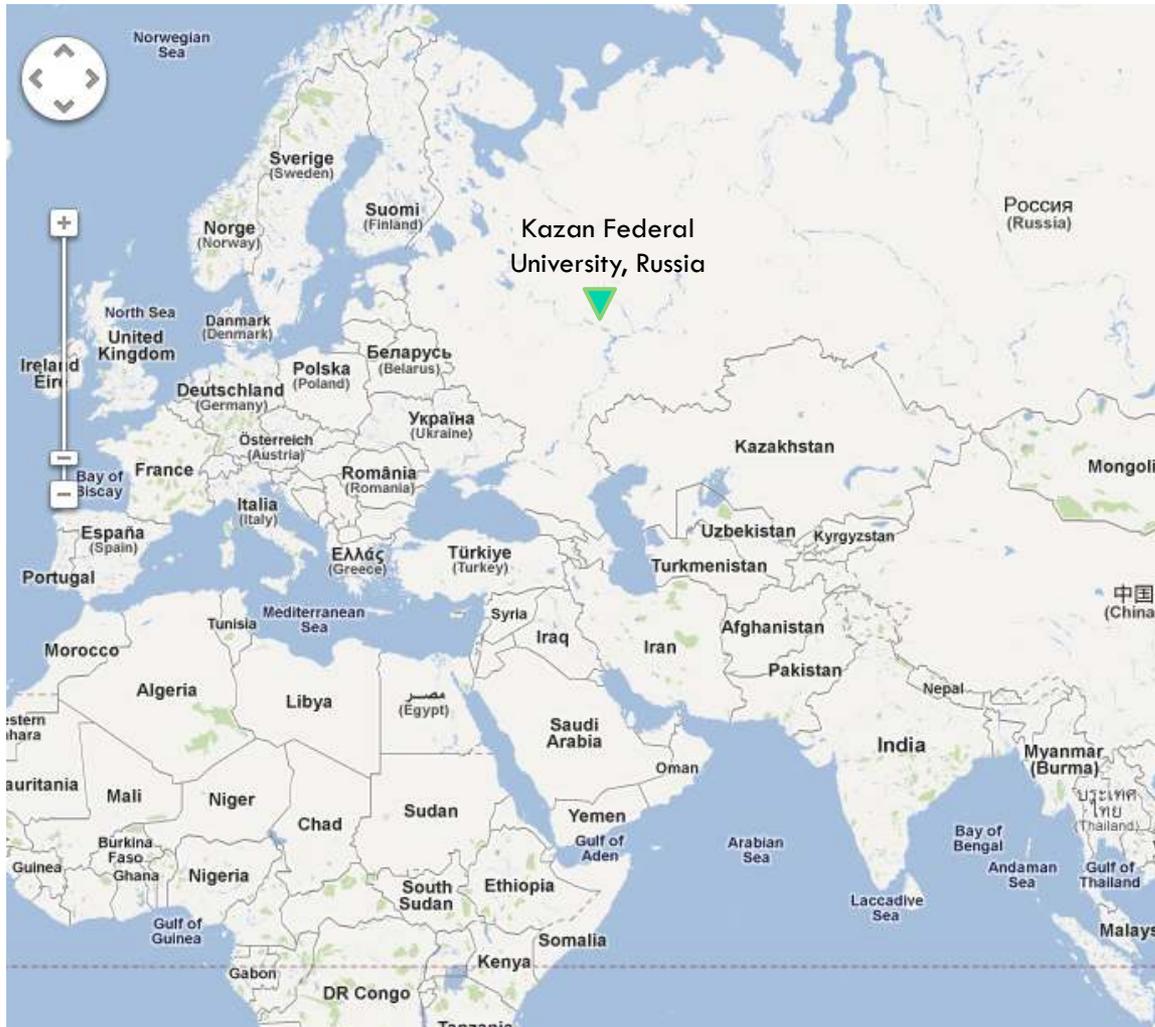


Summary of results

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1. Policy introduction has “rationalised” antibiotic use and reduced overall antibiotic consumption
but
 - Development of AP Policy took many months
 - Implementation of AP Policy was “challenging”
2. Possibly small reduction in SSI rate
3. No major impact on pathogens or drug resistance

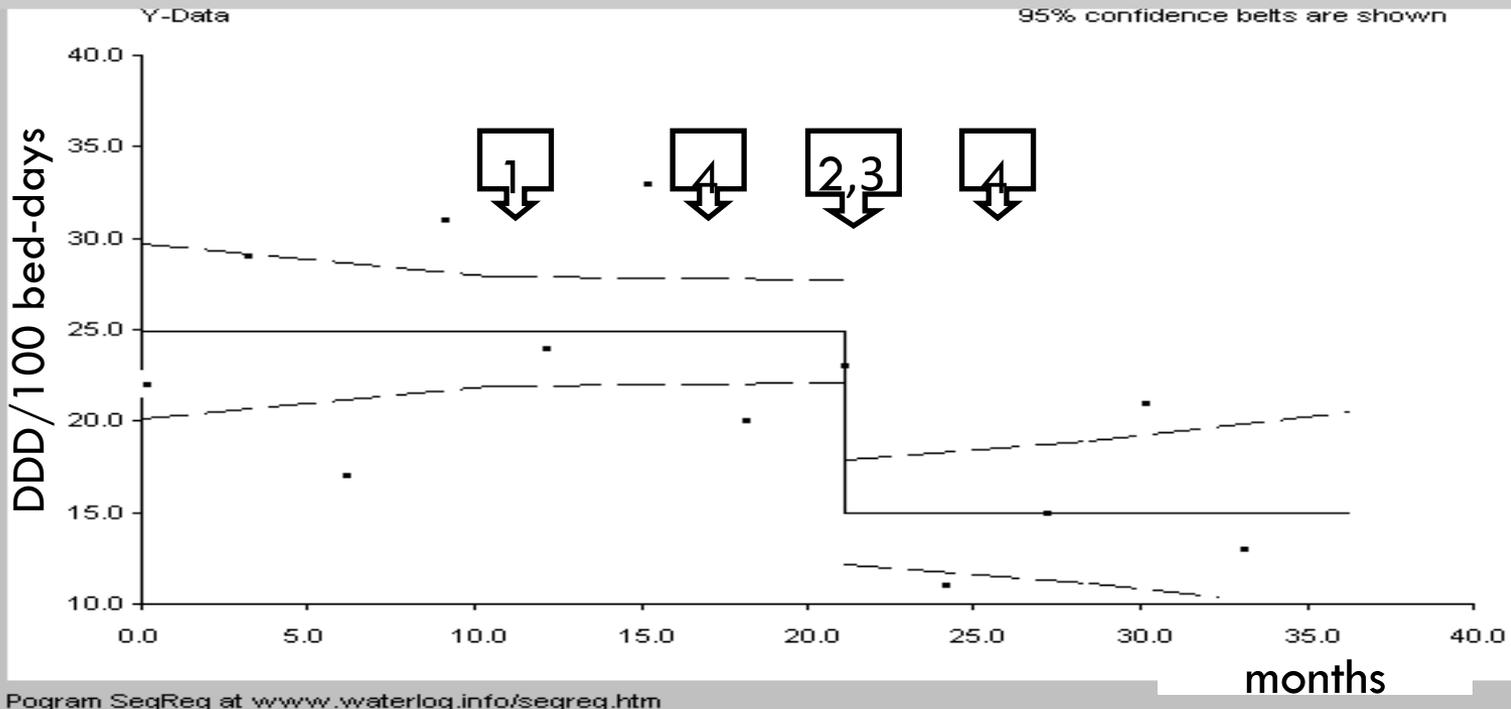
Could this approach be applied elsewhere?



IMPROVING ANTIBIOTIC PRESCRIBING: INTRODUCTION OF PERIOPERATIVE ANTIBACTERIAL PROPHYLAXIS

Anna A. Korableva^{1,2}, Ekaterina V. Yudina^{1,2}, Razilay V. Davletshina¹, Rustem F. Gaifullin¹, Lilia E. Ziganshina²
1 Republican Clinical Hospital N1, Kazan, 2 Kazan Federal University

Fig. 1. Change of use of systemic antibiotics (DDD/100 bed-days) at the department of vascular surgery following interventions , 2007-2009



(2) official order on the implementation of PABP was issued (Oct 2008);

(3) changes in the list of drug prescriptions for registration of the first pre-operative antibiotic dose was introduced (Oct 2008);

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