Risk factors for HAI: how many are modifiable in real life?

Mandatory screening at hospital admission 10 years after: a reverse?

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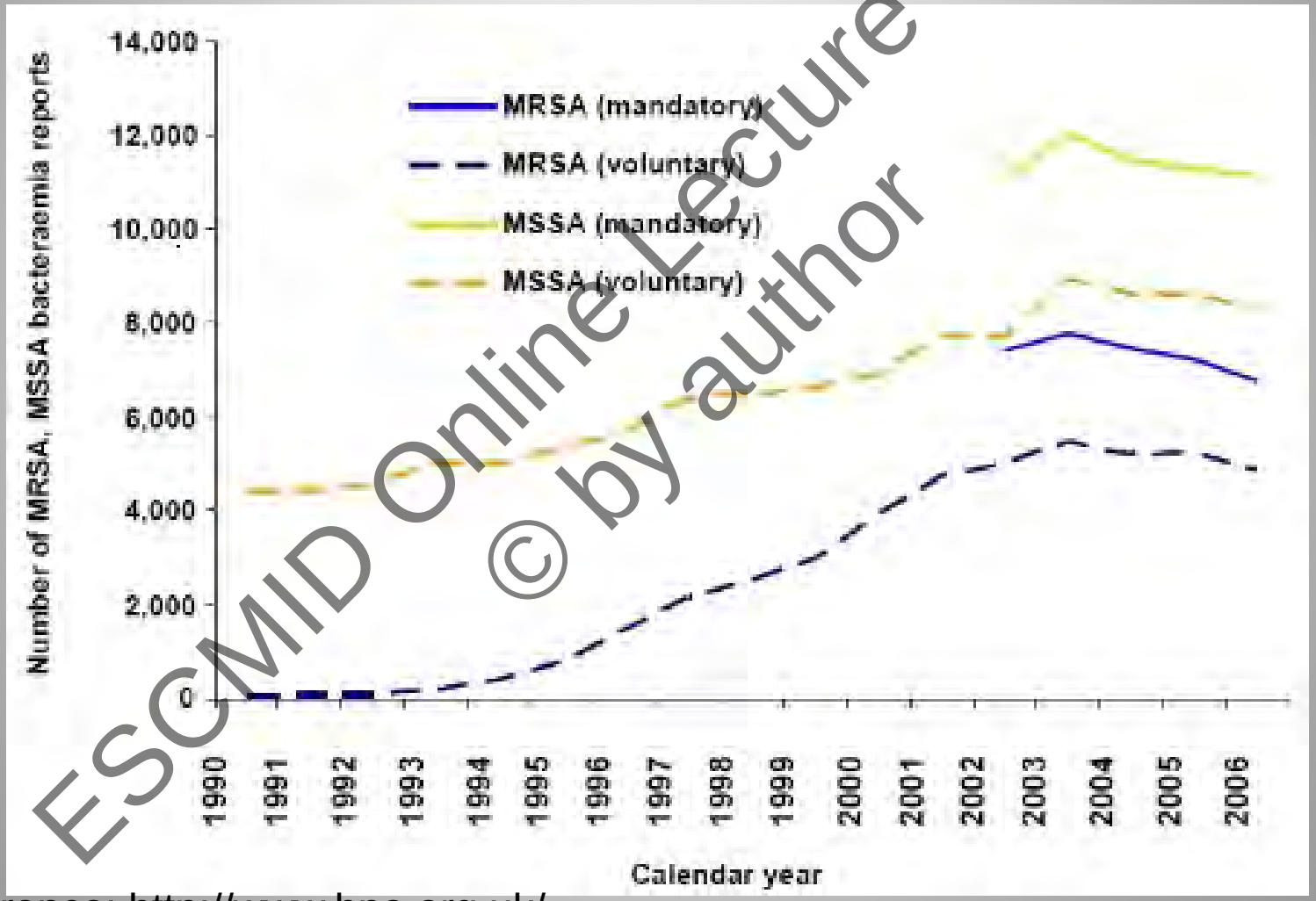
Overview

- Background
- Where are we now?
  - Current UK policy for MRSA screening
  - The evidence in practice process
- Public health principles for screening
  - Decision making criteria
  - The story of MRSA

Background



Reference: http://www.hpa.org.uk/

Lets measure it to see if we can manage it: Mandatory Surveillance

FIGURE 3: Rates of MRSA bacteraemia per 1000 AOBDs identified by HPS from laboratory reporting and laboratory reporting and EARSS combined, by quarter January 2001 to December 2005 in each acute division.

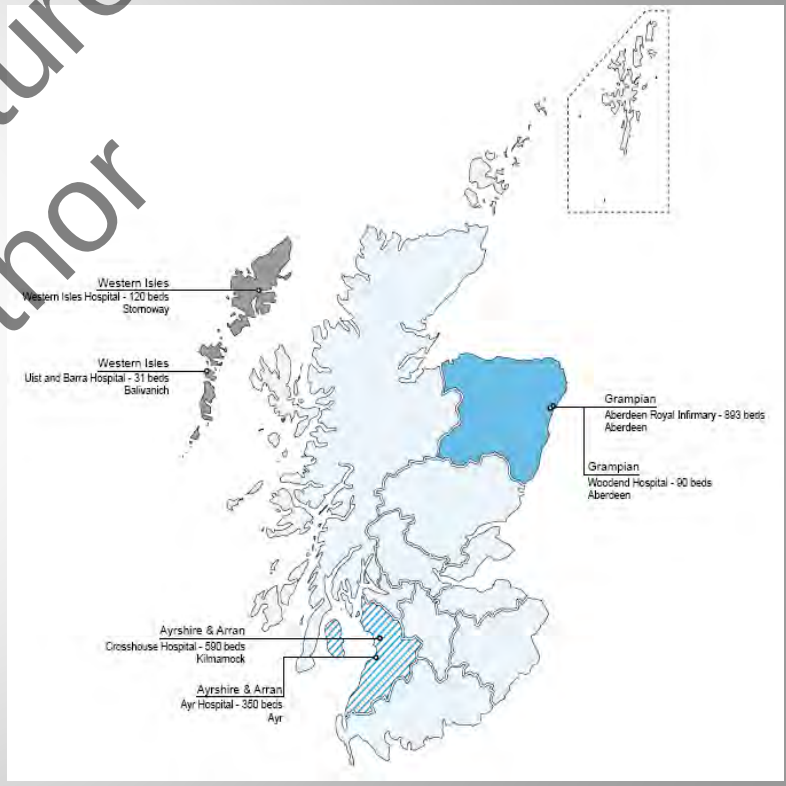
To cut a long story short

Background- policy translation

Event	Date
S. aureus bacteraemia surveillance begins	2001
HAI national policy initiatives based on generic IPC measures	2002
Health Technology Assessment (HTA) on screening commissioned- first organism specific policy initiative (MRSA/ MSSA rates were stable)	July 2004
HTA published- pro universal nasal, but more research needed	October 2007
HPS commissioned to undertake Pathfinder Programme	October 2007
Universal nasal screening implemented in Pathfinder hospitals	August 2008
Interim Report published on formative results	March 2009
SGHD announce interim policy for screening pending final report	April 2009
Report submitted to SGHD on summative results	December 2009
Policy announced on universal clinical risk assessment (CRA)	February 2011
Implementation of CRA	March 2012
Evaluation of MRSA screening programme	March 2013
Other parts of the UK still thinking…..	

Pathfinder study: design, setting and participants

- Large (n= 81,438) prospective cohort study
- 3 NHS boards (regions of 5 hospitals) (Grampian, Ayrshire and Arran and Western Isles)
- All in patient (overnight stay) admissions over one year (August 2008- July 2009)
- Exclusions: day cases, psychiatry, obstetrics and paediatrics



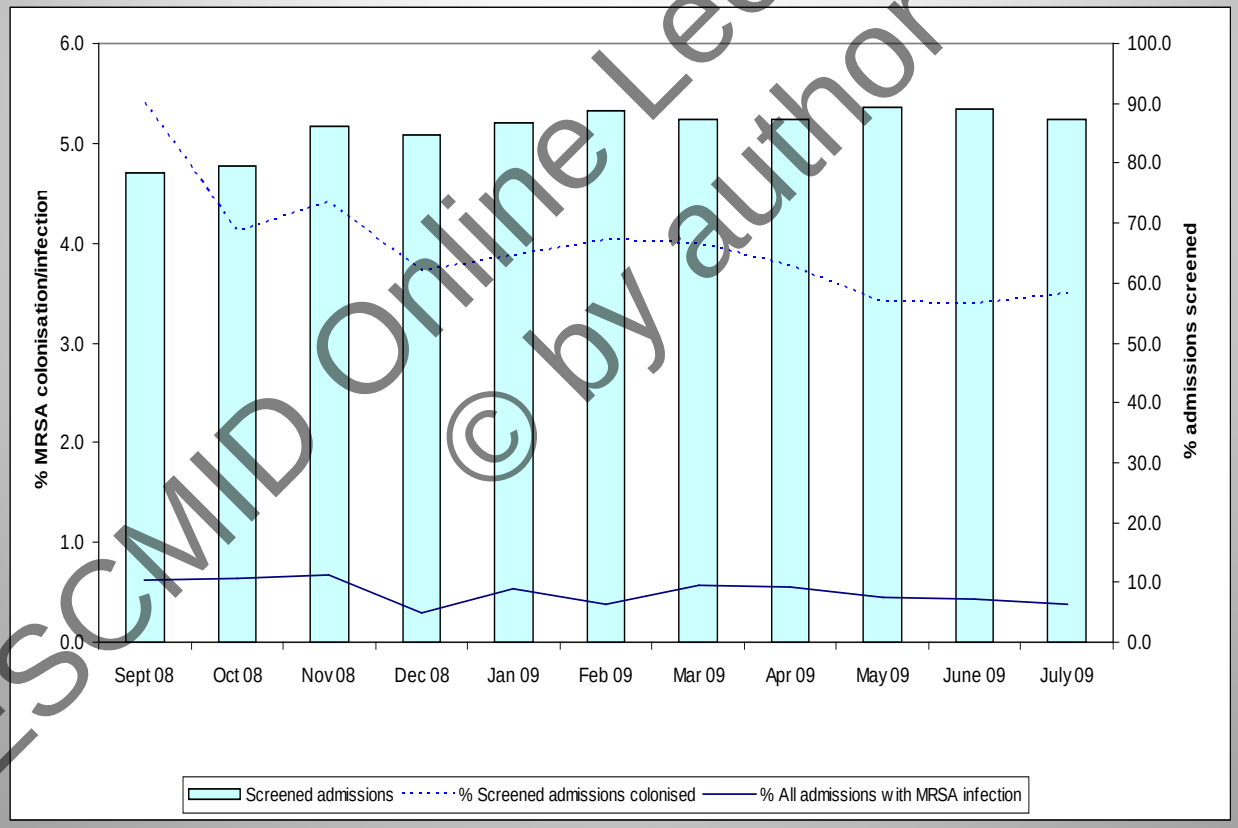
Ref:
•Health Protection Scotland, National Services Scotland, NHS Scotland MRSA Screening Pathfinder Programme Final Report Volume 1: An investigation of the Clinical Effectiveness of MRSA Screening 2011, Health Protection Scotland [Report] Available at:http://www.documents.hps.scot.nhs.uk/hai/mrsa-screening/pathfinder-programme/mrsa-pathfinder-vol1-2011-02-23.pdf
•Reilly J, Stewart S, Christie P, Allardice G, Starri A, Smith A, Masterton R, Gould IM, Williams C (2012) Universal screening for MRSA in acute care: risk factors and outcome from a multicentre study *Journal of Hospital Infection* 80(1):31-5.

Issues of size, bias and variables

- Size
  - I whole board (region) recommended for one full year by HTA. Estimated 90000 admissions, detect a 1% difference in colonisation at 95% power before and after implementation.
- Potential Bias addressed by
  - Trained data collectors/ ICT confirmed infection met CDC definitions
  - Audit of SICPs and TBPs at two points during the year
  - No historical or control comparator, therefore routinely available data (first non screening clinical isolates of MRSA) used to further test any potential associations between the intervention and outcome
- Variables
  - Uptake, colonisation status, risk factors (intrinsic and extrinsic), infection during stay
  - Pharmacy dispensing data on Mupirocin
  - Reference laboratory data on Mupirocin resistance

Results - outcome

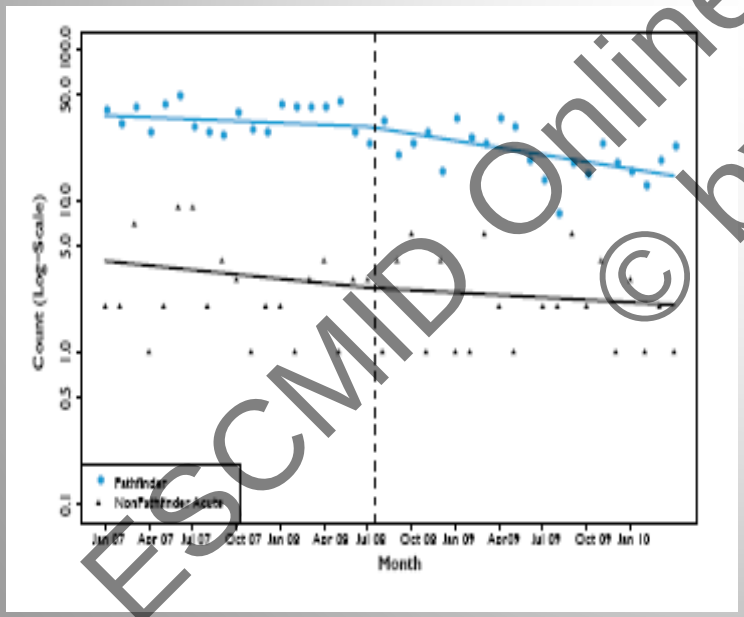
Incidence of Colonisation, infection and uptake of screening during the study year



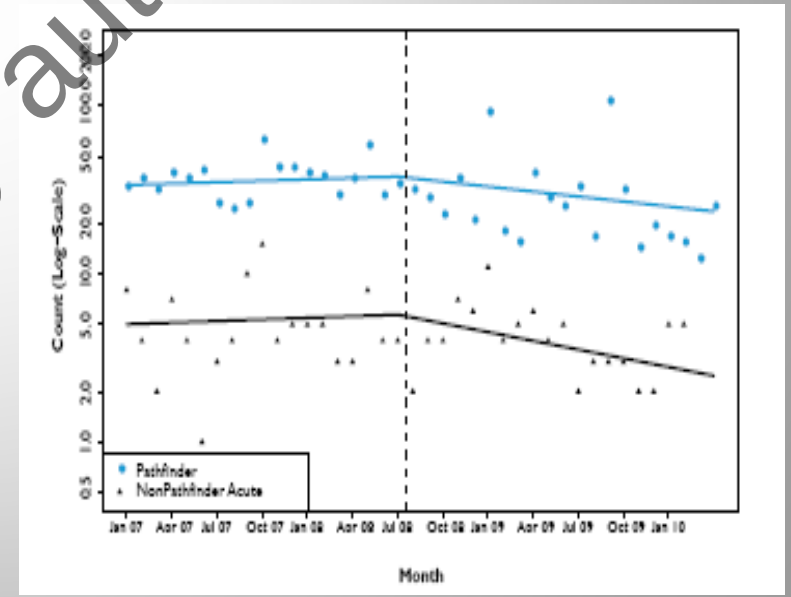
Results

Comparison of MRSA first new clinical isolates in Pathfinder hospitals compared with non Pathfinder acute hospitals from January 2007 to April 2010 the change point (or date that universal screening was implemented) was end of July 2008 (Presented on a logarithmic scale).

Ayrshire and Arran

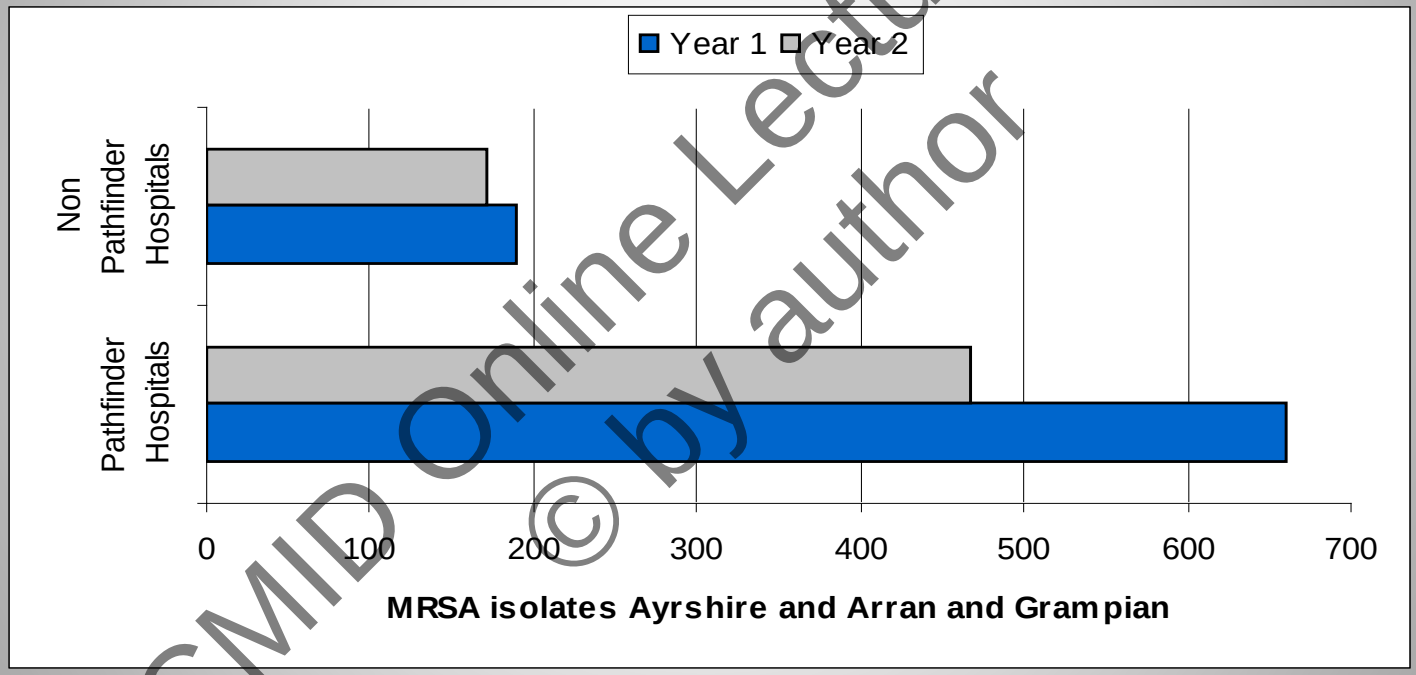


Grampian



REF: Health Protection Scotland. NHS Scotland MRSA Screening Pathfinder Programme - Update Report. 2010. Glasgow, Health Protection Scotland.

Results - outcome: Poisson regression of combined data



This indicates that the percentage change from year one to year two for the pathfinder and non pathfinder hospitals was significantly different. In particular the MRSA clinical isolates for the pathfinder hospitals was decreasing at a significantly greater rate than for the non pathfinder hospitals (P= 0.042).

Results - Were there any unintended consequences?

- MSSA: no significant increase seen
- Other AMR: no significant increase seen
- No significant increase in mupirocin resistance seen but requires longer term monitoring
- Deferral: only 14 patients in the year

Results - Interventions associated with MRSA screening

- A third of patients received both the interventions during their stay
- Decolonisation
  - 44% of patients who were positive had this initiated during their stay
- Isolation
  - 48% were isolated at some point during their stay

Ref: Reilly J, Stewart S, Christie P, Allardice G, Smith A, Masterton R, Gould I, Williams C, Christie P (2010) Universal screening for meticillin-resistant Staphylococcus aureus: interim results from the NHS Scotland pathfinder project *Journal of Hospital Infection*, 74 (1): Pages 35-41

Screening Strategy issues identified

- **Issues with screening**
  - Turn around time of test (48 hours)
  - Known positive (previous positive) on admission
  - *Role of CRA on admission important in current acute care context*
  - *New technologies required (costs)*

- **Issues with interventions**
  - Length of stay (average 3 days) +TAT
  - Availability of isolation
  - Patient movement/ bed management
  - *Role of preadmission screening important*
  - *Role of bed management to manage risk of transmission*

Ref: Reilly J, Stewart S, Christie P, Allardice G, Smith A, Masterton R, Gould I, Williams C, Christie P (2010) Universal screening for meticillin-resistant Staphylococcus aureus: interim results from the NHS Scotland pathfinder project *Journal of Hospital Infection*, 74 (1): Pages 35-41

Summary of the pathfinder study

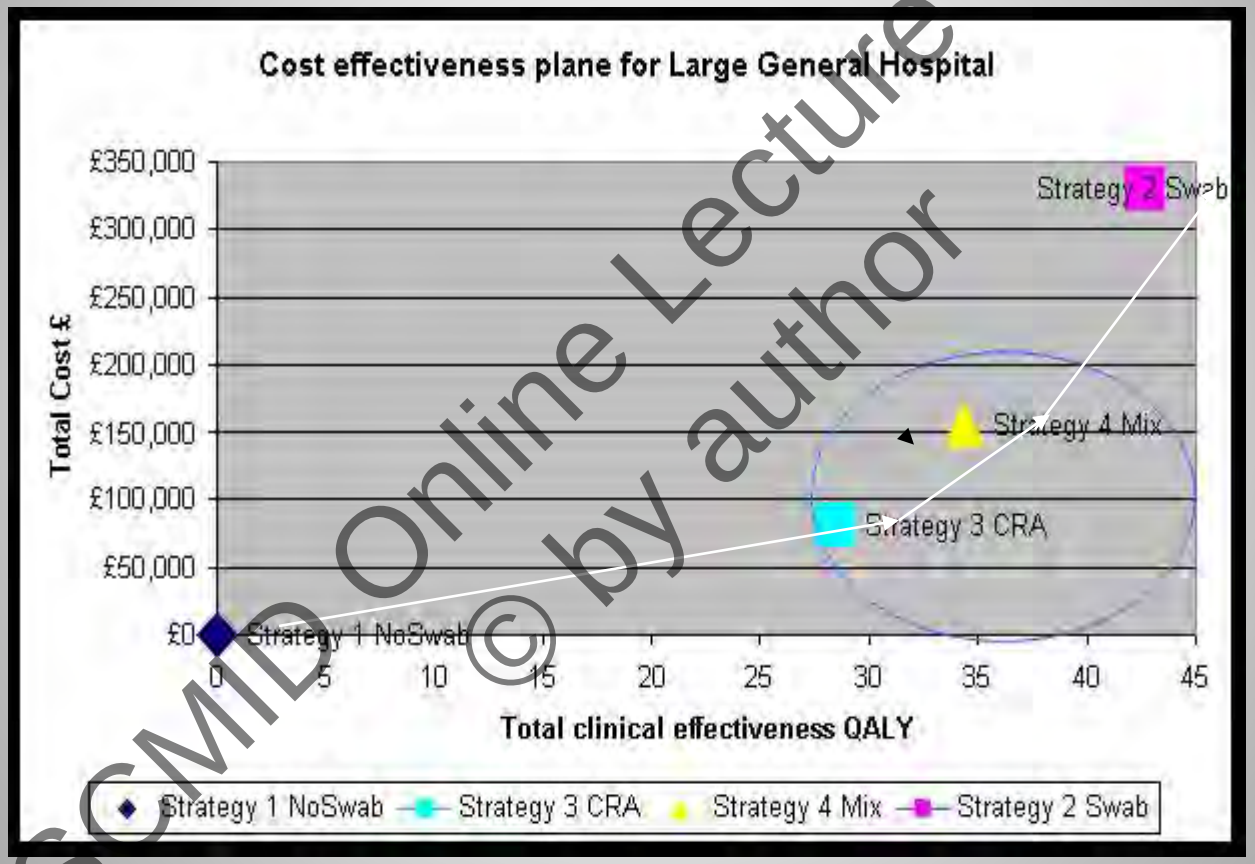
- The prevalence of colonisation decreased during the year
- There was a reduction in MRSA infections associated with the screening intervention.
- Short length of stay (median 3-4 days overall) often compromises the ability to apply laboratory results to interventions
- Turnaround time of the test should be minimised (service redesign and new technologies)
- Assessing risk of colonisation looks promising as an adjunct to, or approach for, universal screening.
- Early indication of potential benefit of the intervention at a cost……but…….

…….but questions remain about the most clinical and cost effective approach...

- There is little point in screening if you cannot intervene in a timely manner so as to reduce risk of infection
- At €/ £15million a year, is it a wise investment?
- Clinical Risk Assessment may offer better value for money

Christie P et al (2011) The Value of Nasal Swabbing versus Full Body Screening or Clinical Risk Assessment to Detect MRSA colonisation at Admission to Hospital. http://www.documents.hps.scot.nhs.uk/hai/mrsa-screening/pathfinder-programme/mrsa-pathfinder-admissions-2011-02-23.pdf

Decision making- reverse?



Results of this study presented at ECCMID 2011 and available at: http://www.documents.hps.scot.nhs.uk/hai/mrsa-screening/pathfinder-programme/mrsa-pathfinder-admissions-2011-02-23.pdf

Getting back to basics in decision making: Public health principles for investing in screening

- The condition
- The test
- The treatment
- The programme effectiveness

Ref: http://www.screening.nhs.uk/criteria

Wilson JMG, Jungner G. Principles and practice of screening for disease. Public Health Paper Number 34. Geneva: WHO, 1968.

The Condition

- **The condition should be an important public heath problem**
  - MRSA infection is a risk to individual patients who carry the organism then are vulnerable in hospital
  - The presence in hospital of patients colonised with MRSA who are not isolated or treated present a risk of cross infection to other hospital patients
  - The number of hospital isolates of MRSA reported in UK rose throughout the 1990s
  - Presumed 7% prevalence of colonisation on admission (observed 5% in pathfinder)
  - Presumed 1% transmission of colonisation and 20-60% develop infection
  - MRSA infections account for at least 20% of all HAI at any one time
  - Patients with HAI stay in hospital 70% longer than those without
  - 1829 deaths due to or contributed by MRSA infection each year in Scotland
  - UK now seeing a significant reduction in MRSA bacteraemia (pre universal screening being introduced)

Ref: Ritchie K, Craig J, Eastgate J, Foster L, Kohli H, Iqbal K, *et al*. The clinical and cost effectiveness of screening for meticillin-resistant *Staphylococcus aureus* (MRSA). Edinburgh: NHS Quality Improvement Scotland 2007

The Condition

- All cost-effective primary prevention interventions should have been implemented as far as practicable

HIS Guidelines (Coia et al 2006)
Surveillance
Active screening and targeted isolation and cohorting
Hand hygiene
Targeted enhanced contact precautions
Avoidance of excessive and inappropriate antibiotic use
Decolonisation of colonised patients
Room cleaning on discharge
Cleaning and decontamination
Management of environment and equipment

The Test

- The test should be acceptable to the population
  - The test is acceptable
  - In current practice consent is not routinely sought
    - Legal and ethical issues
    - Patient information inclusive of PPV and NPV and efficacy of treatment required to inform consent
    - Consequences of results: Negative impact of isolation

Ref: Currie K et al (2010) MRSA screening: Patient and staff acceptability : http://www.documents.hps.scot.nhs.uk/hai/mrsa-screening/pathfinder-programme/mrsa-pathfinder-vol3-2011-02-23.pdf

The Treatment

- There should be an effective treatment or intervention for patients identified through early detection with evidence of early treatment leading to better outcomes than late treatment
  - Isolation
    - Evidence that isolation results in a reduction of MRSA infection
    - Availability and access issues result in use of cohorting- Absence of evidence for cohorting
  - Decolonisation
    - Efficacy difficult to establish due to variability in study designs and protocols (Cochrane review- not convincing)
    - HTA 53% pooled efficacy from available RCTs
    - Not clear how long a patient remains decolonised
    - Length of stay complications/TAT/ treatment completion

Ref: Ritchie K, Craig J, Eastgate J, Foster L, Kohli H, Iqbal K, *et al*. The clinical and cost effectiveness of screening for meticillin-resistant *Staphylococcus aureus* (MRSA). Edinburgh: NHS Quality Improvement Scotland; 2007.

The Screening Programme

- There should be evidence from Randomized Controlled Trials (RCTs) that the screening programme is effective in reducing mortality or morbidity
  - No RCT evidence available
  - Observational data and systematic review indicates cost and clinical effectiveness of CRA in hospitals with prevalence <5%
  - ?Unintended consequences
    - Emergence of other pathogenic organisms
    - Physical or psychological harm to patients

Ref :Harbarth S et al (2011) Update on screening and clinical diagnosis of MRSA IJAA 37:110-117

The Screening Programme

- The benefit from the screening programme should outweigh the physical and psychological harm (caused by the test, diagnostic procedures and treatment).
  - Physical benefit is reduction of MRSA in hospitalised patients
  - Psychological experience unknown
    - Diagnosed non colonised patient viewed screening positively after the event
    - Reassurance in programme reducing risk
    - Stigma and psychological impact of isolation indicated in some literature

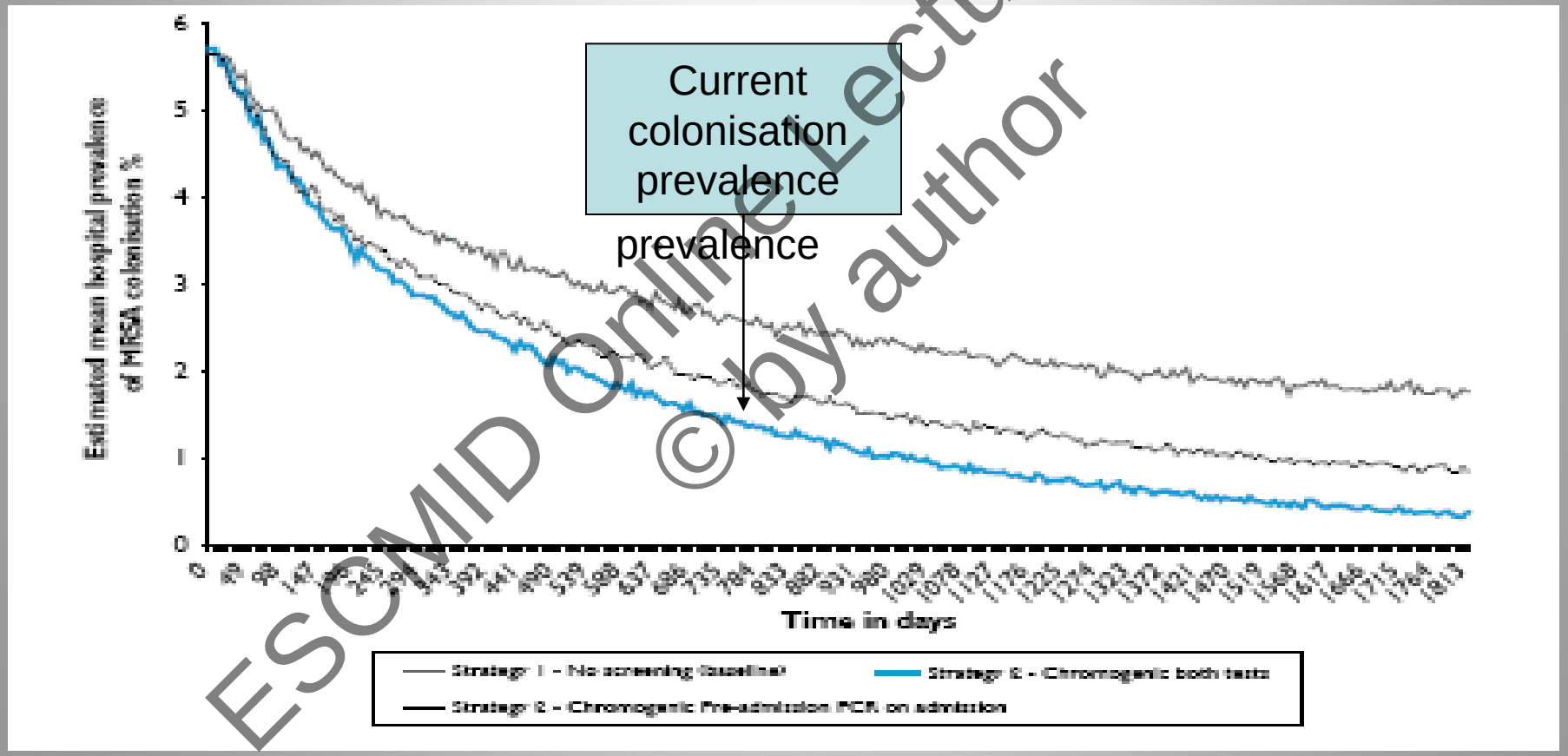
Ref: Currie K et al (2010) MRSA screening: Patient and staff acceptability : http://www.documents.hps.scot.nhs.uk/hai/mrsa-screening/pathfinder-programme/mrsa-pathfinder-vol3-2011-02-23.pdf

Summary of the PH principles

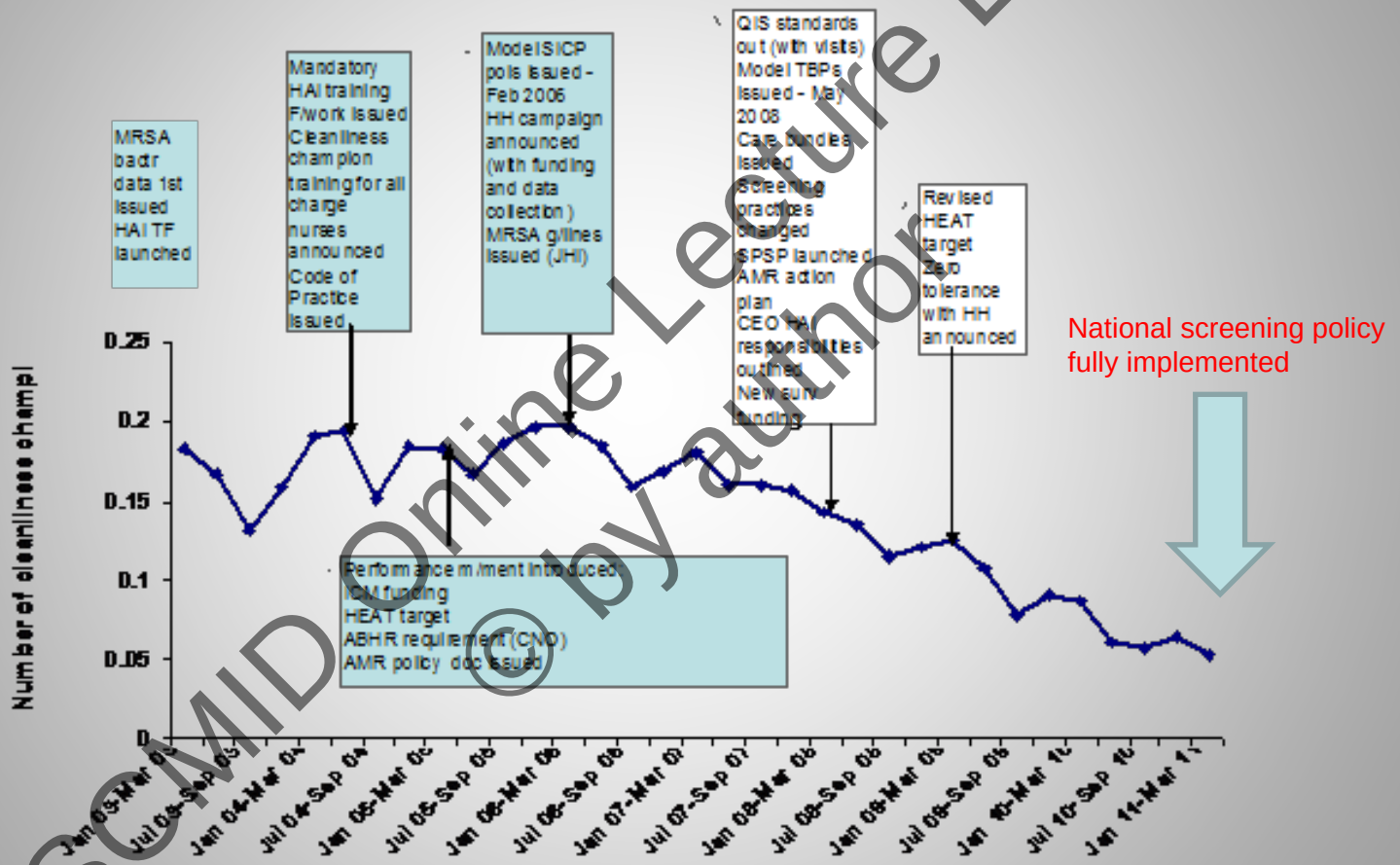
- A worldwide consensus exists that MRSA infection in hospital patients is an important public health problem
- There is a paucity of specific and robust data on which to base a screening programme
- Policy transference can take 5 years-by which time it may be too late….
- These principles might help with future decision making with MRSA screening and for other HAI targets for screening
- So where are we now…….????

So where are we now?

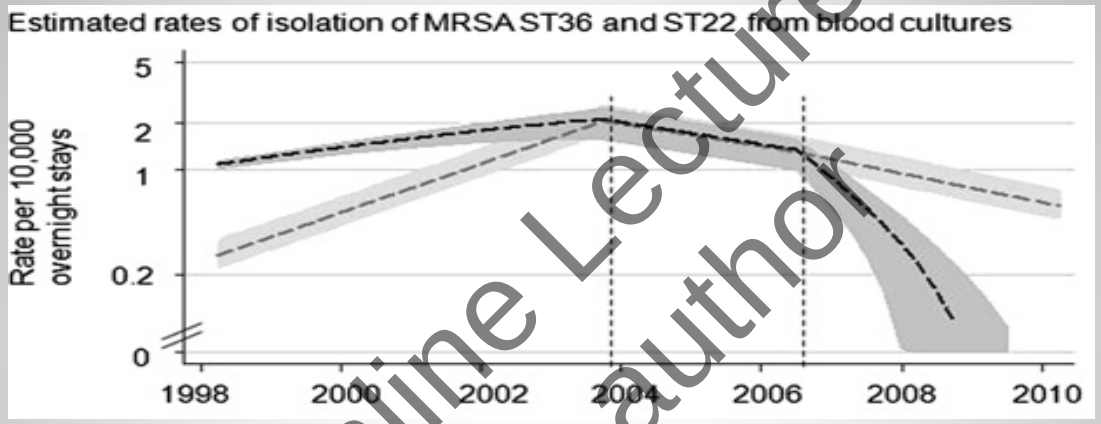
Change in percentage prevalence over time for Strategy 1 (no screening) set as a baseline compared with strategy 2 for ChromChrom and Chrom PCR for **tertiary referral** hospital and Pathfinder data for year one with a starting MRSA colonisation prevalence of 5.5%

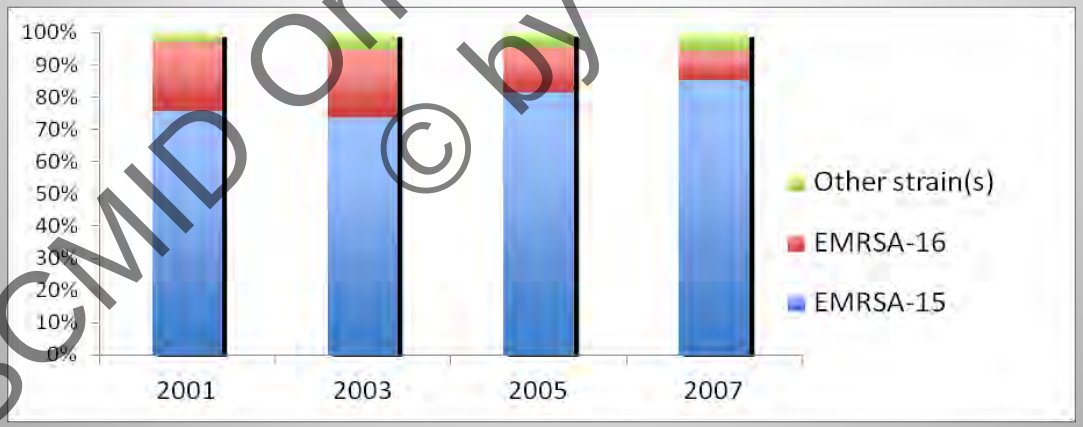


What was the impact on outcome?

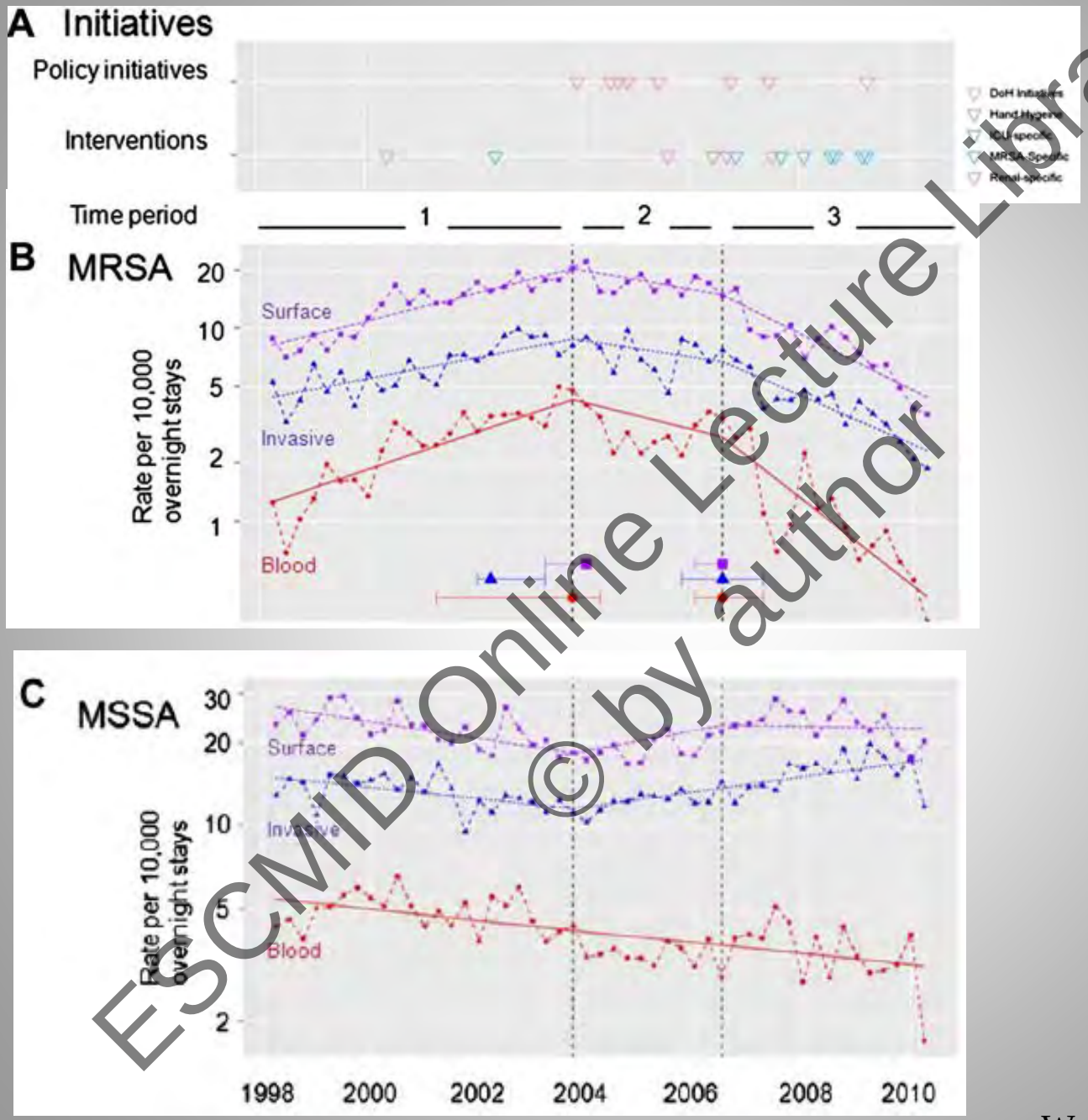


A note of caution…..on potential confounders





Ellington et al. JAC 2010
Wyllie et al. BMJ Open 2011



Wyllie et al. BMJ Open 2011

Summary- is colonisation modifiable is real life?

- Universal screening may work in endemic settings, but at a cost
- CRA appears to offer value for money as an effective IPC approach
- Further evaluation of CRA and screening needed (adjusting for confounders)
- Screening needs to be set in the context of a broader strategy for prevention and control of MRSA and other HAI (Public health principles)
- Research, policy, politics and practice impact on how modifiable risk factors are in real life

For more information on the studies:

http://www.hps.scot.nhs.uk/haiic/sshaip/mrsascreeningprogramme.aspx