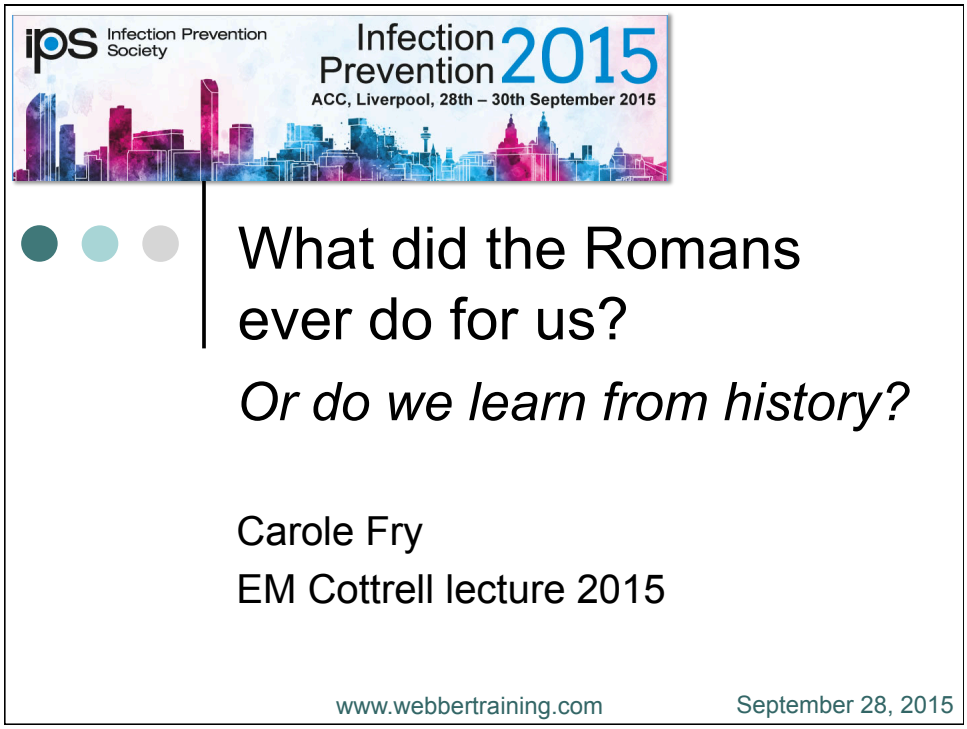
What Did the Romans Ever Do For Us?
Dr. Carole Fry, Public Health England
Broadcast live from the 2015 Infection Prevention Society conference



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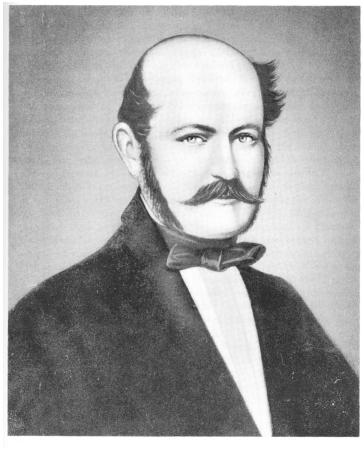
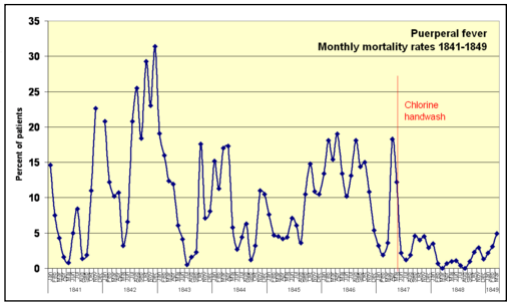
Lets go back to the very beginning….

….as it is a very good place to start

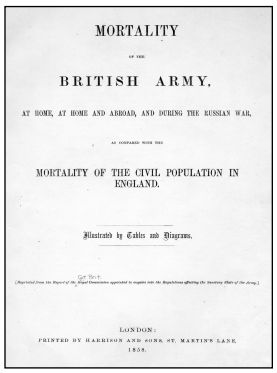
Semmelweis (1818 – 65)



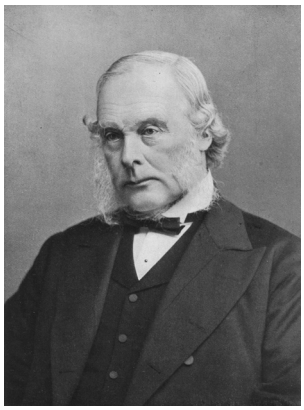


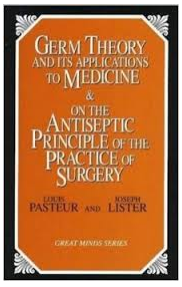
Florence Nightingale

"The very first requirement in a hospital is that it should do the sick no harm."
— Florence Nightingale, *Notes on Nursing: What It Is, and What It Is Not*

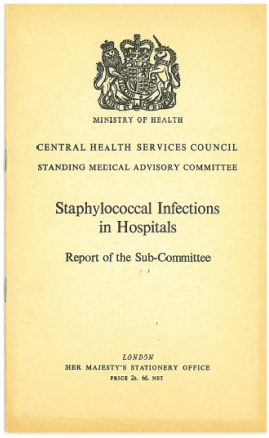

MORTALITY
OF THE
BRITISH ARMY,
AT HOME, AT HOME AND ABROAD, AND DURING THE RUSSIAN WAR,
AS COMPARED WITH THE
MORTALITY OF THE CIVIL POPULATION IN ENGLAND.
Illustrated by Tables and Diagrams.
LONDON:
PRINTED BY HARRISON AND SONS, ST. MARTIN'S LANE.
1858.

Joseph Lister (1827- 1912)





Infection control beginnings


MINISTRY OF HEALTH

CENTRAL HEALTH SERVICES COUNCIL

STANDING MEDICAL ADVISORY COMMITTEE

Staphylococcal Infections in Hospitals

Report of the Sub-Committee

LONDON
HER MAJESTY'S STATIONERY OFFICE

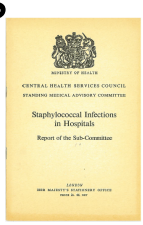
- In 1944, MRC recommended establishing an ICC in every hospital
- Published in 1959 – concern about Staphylococcal sepsis
- Also concerns about penicillin resistance
- Recommended the appointment of an Control of Infection Officer "the success of any scheme of control will depend on **him**"

EM Cottrell

- Theatre superintendant appointed by Dr Brendan Moore in 1959
- To act as a liaison officer to all those concerned with control of infection – record keeping a major part of the role
- Lancet paper stated that the appointment was a 'successful experiment'
- Met resistance in some quarters, but soon other hospitals followed suit

Gardner *et al*. The Infection Control Sister – a new member of the infection control team in general hospitals. Lancet 1962;2:710-711

What goes around comes around?



- Role of the environment/ fomites
- AMR/AMS
- Adequate staffing
- Clear roles and responsibilities
- Monitoring & measuring
- Ventilation
- Hand hygiene
- Mattress cleaning
- Bed spacing
- Epidemiological investigation
- Cohorting
- Good communication and liaison
- New builds not less than 20% single rooms
- Outbreak management & control
- Good documentation & record keeping
- Avoid unnecessary dressing changes…

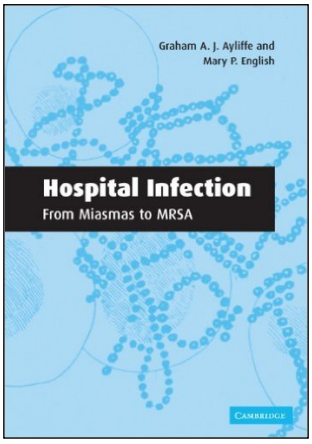
One microbiologist's view

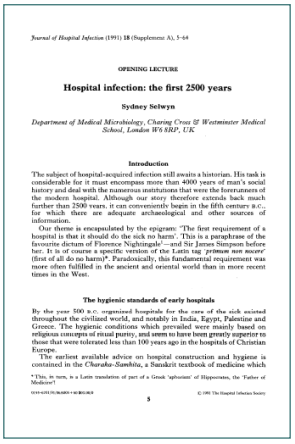
- When reviewing 'Hospital-acquired infection – Ayliffe, Collins & Taylor (1982)

> microbiology laboratory and the nursing administration, to whom alone she is officially responsible. One of the recurrent nightmares of consultant microbiologists must be a sudden outbreak of embarrassing contradictions and confusion in the wards owing to an inexperienced or incautious control of infection nurse. Even without a specific chapter on the prevention of this new hospital hazard, however, its incidence will be greatly diminished by the assiduous use of this sensible little book.

Selywn. S Hard Facts about hospital infection.
BMJ 1982;284: 1895 - 1896

Information sources





Journal of Hospital Infection (1991) **18** (Supplement A), 3–44

OPENING LECTURE

Hospital infection: the first 2500 years

Sydney Selwyn

Department of Medical Microbiology, Charing Cross & Westminster Medical School, London W6 8RP, UK

Introduction

The subject of hospital-acquired infection still awaits a historian. His task is considerable for it must encompass more than 4000 years of man's social history and deal with the numerous institutions that were the forerunners of the modern hospital. Although our story therefore extends back much further than 2500 years, it can conveniently begin in the fifth century B.C., for which there are adequate archaeological and other sources of information.

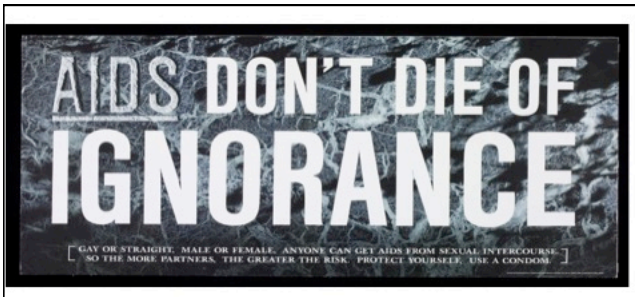
Our theme is encapsulated by the epigram: 'The first requirement of a hospital is that it should do the sick no harm'. This is a paraphrase of the favourite dictum of Florence Nightingale[1]—and Sir James Simpson before her. It is of course a specific version of the Latin tag *primum non nocere* (first of all do no harm)*. Paradoxically, this fundamental requirement was more often fulfilled in the ancient and oriental world than in more recent times in the West.

The hygienic standards of early hospitals

By the year 500 B.C. organized hospitals for the care of the sick existed throughout the civilized world, and notably in India, Egypt, Palestine and Greece. The hygienic conditions which prevailed were mainly based on religious concepts of ritual purity, and seem to have been greatly superior to those that were tolerated less than 100 years ago in the hospitals of Christian Europe.

The earliest available advice on hospital construction and hygiene is contained in the *Charaka-Samhita*, a Sanskrit textbook of medicine which

*This, in turn, is a Latin translation of part of a Greek 'aphorism' of Hippocrates, the 'Father of Medicine'!



Watershed moment in IC

Recommendations for Prevention of HIV Transmission in Health-Care Settings MMWR **August 21, 1987 / 36(SU02);001** published by the Epidemiology Program Office, Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services, Atlanta, Georgia 30333.

→ Blood and body fluid precautions

Perspectives in Disease Prevention and Health Promotion Update: Universal Precautions for Prevention of Transmission of Human Immunodeficiency Virus, Hepatitis B Virus, and Other Bloodborne Pathogens in Health-Care Settings June 24, 1988 / 37(24);377-388

Aim of UP

- To protect HCWs from acquiring a blood borne virus – discovery of HIV was the catalyst for this
- 1988 – all body and body fluids containing visible blood, mucous membranes & non-intact skin to be considered a potential risk regardless of their infection status
- Historically IC precautions dictated by symptoms or confirmed diagnosis

Development of UP

- Lynch & Jackson expanded UP to include all moist body substances – faeces, urine, sputum – greater protection for HCWs
- Over time, UP and BSI merged into standard precautions.
- Realisation, if implemented well, SP prevent cross infection and therefore protect patients also.

Standard Principles in England

- Epic 1introduced standard principles for preventing hospital acquired infections which went beyond clinical practice

Also adopted the term standard precautions

- Environment
- Hand hygiene
- Appropriate use of PPE
- Safe use of sharps

Evidence base?

SP7 Use an alcohol-based hand rub for decontamination of hands before and after direct patient contact and clinical care, except in the following situations when soap and water must be used:
- when hands are visibly soiled or potentially contaminated with body fluids; and
- when caring for patients with vomiting or diarrhoeal illness, regardless of whether or not gloves have been worn.

Class A

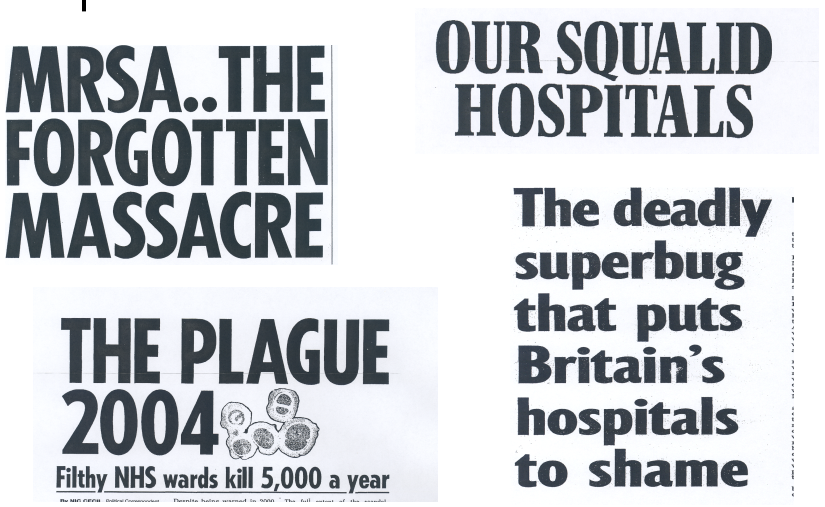
epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

H.P. Loveday[a]*, J.A. Wilson[a], R.J. Pratt[a], M. Golsorkhi[a], A. Tingle[a], A. Bak[a], J. Browne[a], J. Prieto[b], M. Wilcox[c]

It's getting complicated

CDC now recommend:
- standard precautions
- transmission based precautions
  - contact precautions – wear gown & gloves (+/- isolation) patients with diarrhoea, MDRO, draining wounds, uncontrolled secretions, pressure ulcer (~15% US inpatients)
  - droplet precautions
  - airborne precautions

MRSA


MRSA..THE FORGOTTEN MASSACRE
OUR SQUALID HOSPITALS
The deadly superbug that puts Britain's hospitals to shame
THE PLAGUE 2004
Filthy NHS wards kill 5,000 a year

MRSA


GUIDE TO HOSPITAL
MRSA WARD
MRSA CLINIC
MRSA SPECIALIST UNIT
DEPT. OF MRSA
MRSA OLOGY
search ID: grin508
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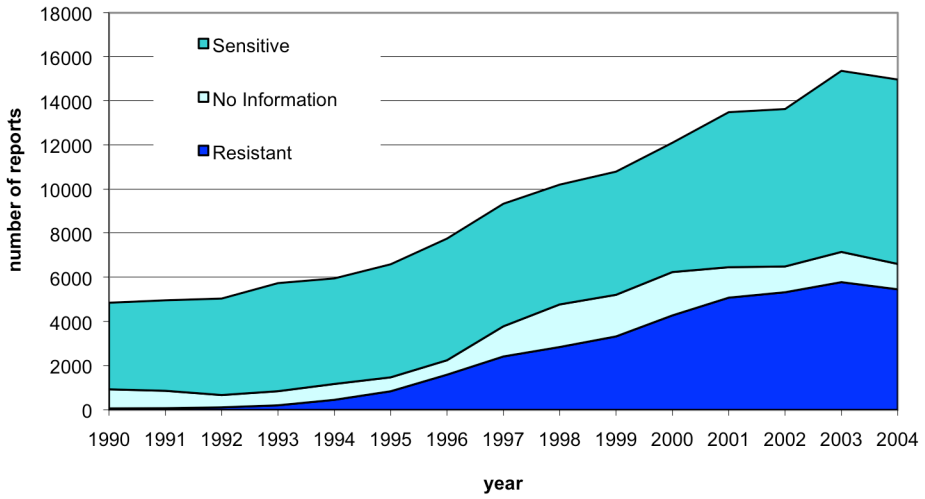
***Staphylococcus aureus* bacteraemia and methicillin susceptibility (voluntary reporting scheme): England and Wales, 1990 - 2004**



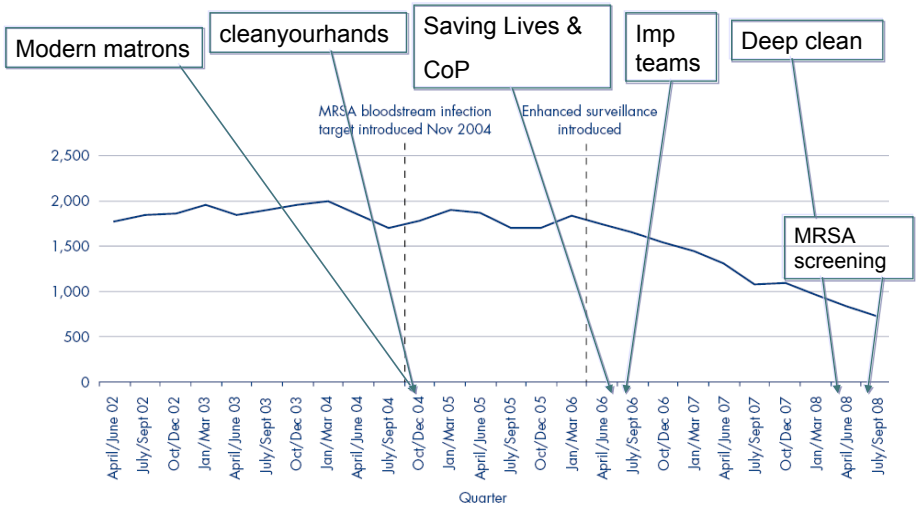
MRSA Target

- Announcement in November 2004 to 'halve MRSA infections by 2008'
- Baseline 2003-04; Start date April 2005
  - Monthly returns
- Performance management
- MRSA objectives followed – aimed at outliers

Achievable?

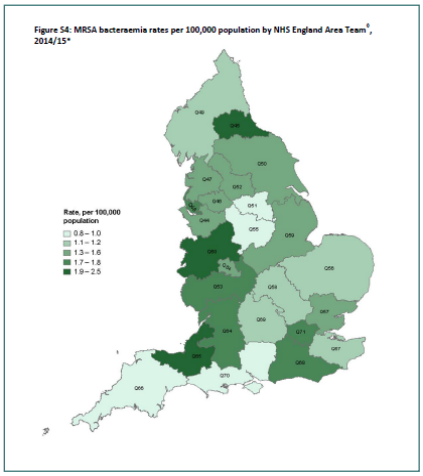
- Surveyed ICTS believed on average that 15% reduction in HAI was achievable (NAO 2000)
- First national infection reduction target

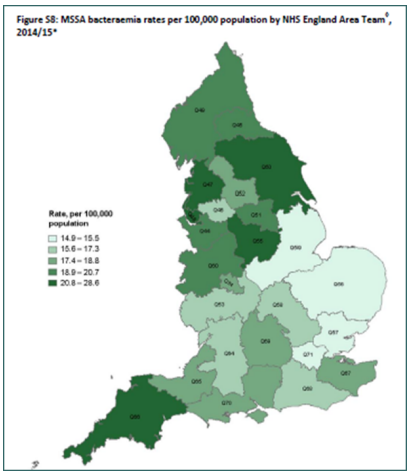
MRSA bacteraemias & interventions



The control of meticillin-resistant *S.aureus* blood stream infections in England. Duerden B, Fry C, Johnson A and Wilcox M. Open Forum Infect Dis (Spring 2015) 2 (2)

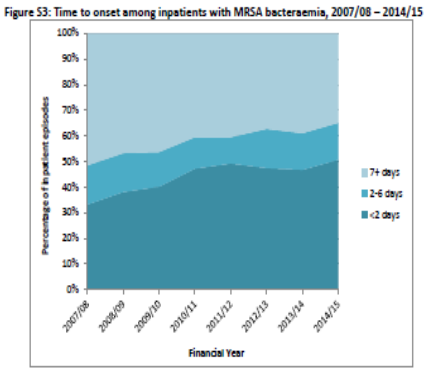
MRSA vs MSSA

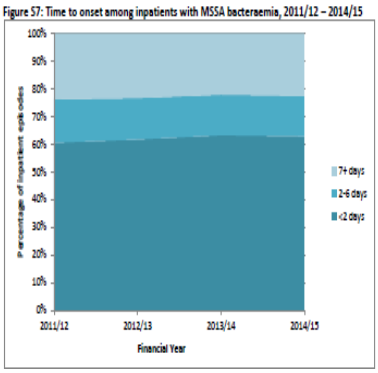




Source: PHE annual commentary 2014/15

Time to onset bacteraemia





Source: PHE annual commentary 2014/15

Staphylococcus aureus – the next challenge?

- Report of meticillin susceptible, vancomycin-resistant *Staphylococcus aureus*
- Conclusion 'Emergence of vancomycin resistance in MSSA would indicate that this resistance trait might be poised to disseminate rapidly among *S.aureus* and represents a major public health threat'.

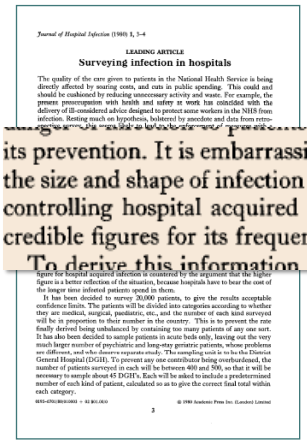
Panesso D *et al*. EID. Vol 21: 10: October 2015

Surveillance

'When you can measure what you are speaking about, and express it in numbers, you know something about it.'

Lord Kelvin, Popular Lectures and Addresses, 1889

Surveillance in the UK



Journal of Hospital Infection (1980) 1, 3–4

LEADING ARTICLE

Surveying infection in hospitals

The quality of the care given to patients in the National Health Service is being directly affected by soaring costs, and cuts in public spending. This could and should be cushioned by reducing unnecessary activity and waste. For example, the present preoccupation with health and safety at work has coincided with the delivery of ill-considered advice designed to protect some workers in the NHS from infection. Resting such on hypothesis, bolstered by anecdote and data from retro-

its prevention. It is embarrassing to admit, in the first issue, that we have no idea of the size and shape of infection in hospitals in the United Kingdom. Action aimed at controlling hospital acquired infection cannot be well-founded in the absence of credible figures for its frequency.

To derive this information, a national prevalence survey of hospital infection is

Again for hospital acquired infection is measured by the regimen for the higher figure is a better reflection of the situation, because hospitals have to bear the cost of the longer time infected patients spend in them.

It has been decided to survey 20,000 patients, to give the results acceptable confidence limits. The patients will be divided into categories according to whether they are medical, surgical, paediatric, etc., and the number of each kind surveyed will be in proportion to their number in the country. This is to prevent the rate finally derived being unbalanced by containing too many patients of any one sort. It has also been decided to sample patients in acute beds only, leaving out the very much larger number of psychiatric and long-stay geriatric patients, whose problems are different, and who deserve separate study. The sampling unit is to be the District General Hospital (DGH). To prevent any one contributor being overburdened, the number of patients surveyed in each will be between 400 and 500, so that it will be necessary to sample about 45 DGH's. Each will be asked to include a predetermined number of each kind of patient, calculated so as to give the correct final total within each category.

0195-6701/80/010003 + 02 $01.00/0 © 1980 Academic Press Inc. (London) Limited

3

…while in the US - SENIC

THE EFFICACY OF INFECTION SURVEILLANCE AND CONTRO PROGRAMS IN PREVENTING NOSOCOMIAL INFECTIONS IN US HOSPITALS

ROBERT W. HALEY,* DAVID H. CULVER,† JOHN W. WHITE,‡ W. MEADE MORGAN, T. GRACE EMORI,§ VAN P. MUNN* and THOMAS M. HOOTON*,¶

Haley, R. W. (SENIC Project, CDC, Atlanta, GA 30333), D. H. Culver, J. W. White, W. M. Morgan, T. G. Emori, V. P. Munn and T. M. Hooton. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. *Am J Epidemiol* 1985;121:182–205.

In a representative sample of US general hospitals, the authors found that the establishment of intensive infection surveillance and control programs was strongly associated with reductions in rates of nosocomial urinary tract infection, surgical wound infection, pneumonia, and bacteremia between 1970 and 1975–1976, after controlling for other characteristics of the hospitals and their patients. Essential components of effective programs included conducting organized surveillance and control activities and having a trained, effectual infection control physician, an infection control nurse per 250 beds, and a system for reporting infection rates to practicing surgeons. Programs with these components reduced their hospitals' infection rates by 22%. Since relatively few hospitals had very effective programs, however, only 6% of the nation's approximately 2 million nosocomial infections were being prevented in the mid-1970s, leaving another 28% to be prevented by universal adoption of these programs. Among hospitals without effective programs, the overall infection rate increased by 18% from 1970 to 1976.

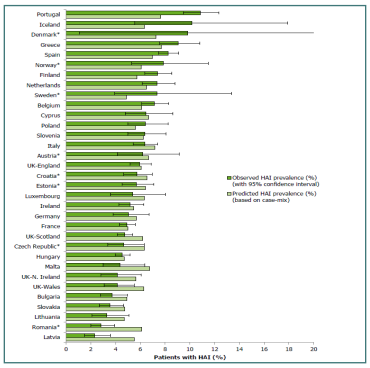
cost control; costs and cost analysis; cross infection; evaluation studies; health services research; health surveys; hospitals

In the acute-care hospitals in the United States in 1976, an estimated 2.1 million nosocomial (hospital-acquired) infec complicated the 37.7 million admis

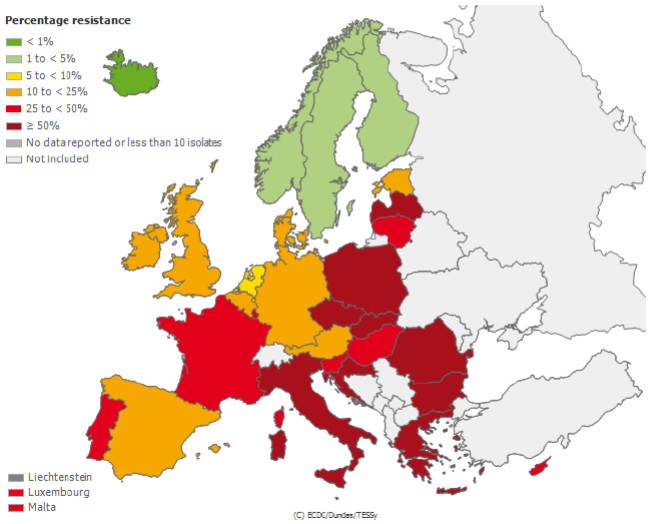
- Initiated by CDC in 1974
- 6586 hospitals
- HAI rates could be reduced with an effective IC programme (↓32%) and 1 ICN: 250 beds
- Hospitals without an effective programme HAI rates ↑

HCAI prevalence

- 6 % of patients in Acute Hospitals had a HCAI in 2011
- Estimated 243,746 patients per year
- Prevalence of HCAI decreasing; in 2006 prevalence was 8.2%
- Pneumonia/Lower respiratory tract, Urinary tract infections & Surgical site infections account for c. 60% of all HCAI
- Top three HCAI pathogens: *E. coli* 17%, *S. aureus* 15%, & *C. difficile* 12.4%
- Next PPS: 2016



Proportion of 3rd gen. cephalosporins Resistant (R) *Klebsiella pneumoniae* Isolates in Participating Countries in 2013



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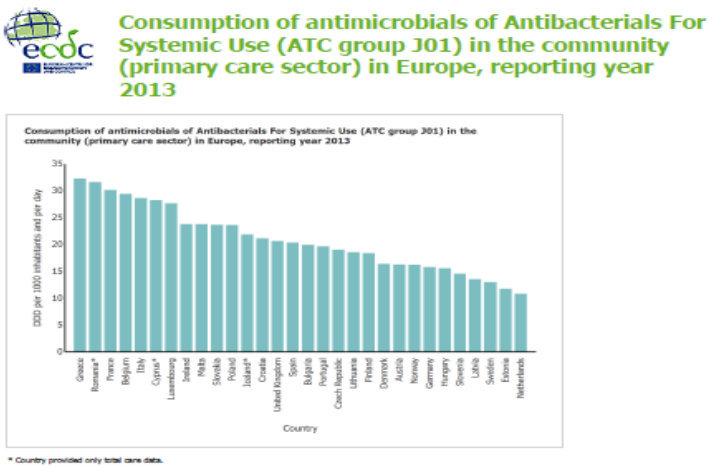

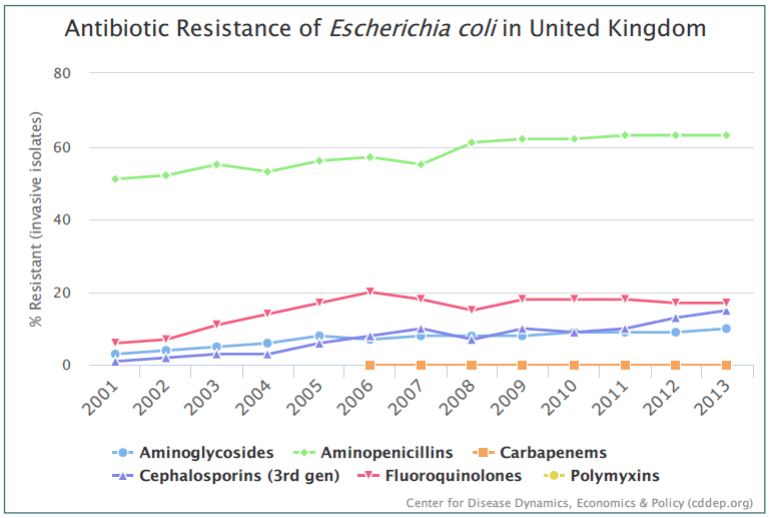

http://resistancemap.cddep.org/

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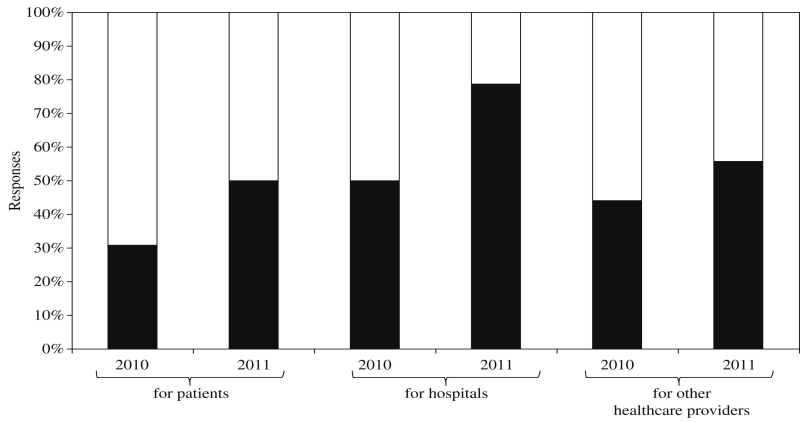
Data – we've got lots

Public reporting of HCAI

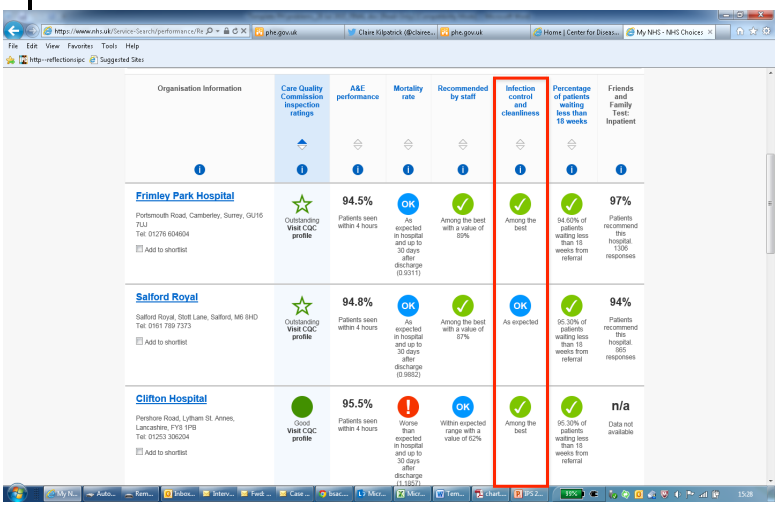
- MRSA bacteraemias - followed by
  - Orthopaedic SS1
  - Glycopeptide resistant enterococci
  - *Clostriduim difficile* infection
  - meticillin sensitive *Staphylococcus aureus*
  - E.coli bacteraemias

Public reporting



Martin, M: Zingg,W: Hansen,S: Gastermeir, P et al. JHI 83 (2013) 94-98

Do these data inform the public?



Source: NHS Choices

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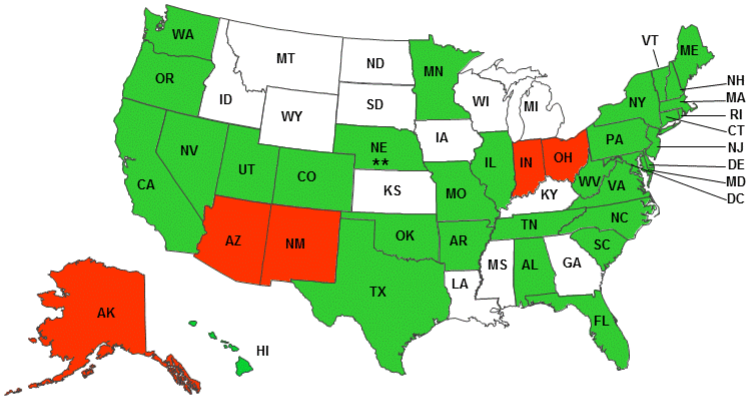
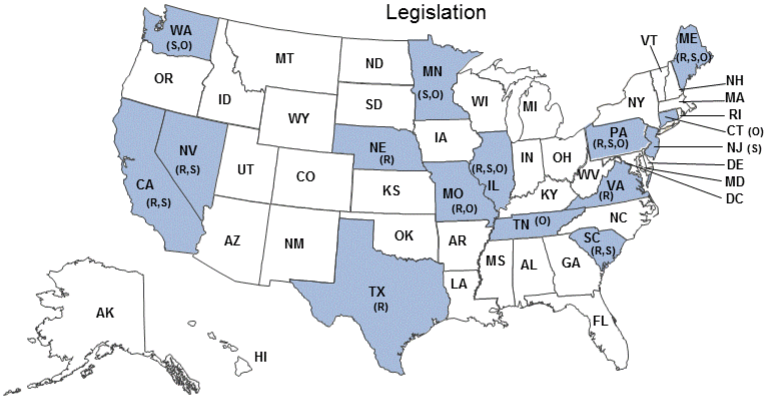
State HAI Reporting Laws



States with study laws
Mandates public reporting of infection rates
** Voluntary

MRSA Laws

Highlighted States have Enacted MRSA Legislation



Enacted MRSA Law

R – Reporting Laws or Bills
S – Screening Laws or Bills
O – Other Laws or Bills (e.g., studies, pilots, other infection control requirements)

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Public reporting

- Difficult for the public to interpret
- Public are consumers
- Risk of hospital league tables
- Currently a blunt instrument
- No strong evidence that public reporting improves patient safety

Public reporting of data

- Transparency important
- Risk of skewed reporting/data to avoid sanctions
- Need to agree granularity of reporting eg: organisation, unit, clinician
- 'Destructive triangulation has arisen between administrators, clinicians & infection control departments that has lead to consequences beyond those intended by monitoring agencies'.

Horowitz, HW. Infection control: Public reporting, disincentives & bad behaviour. AJIC 43 (2015) 989 - 91

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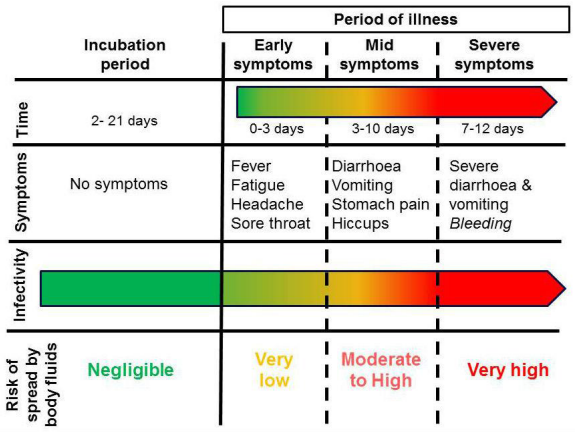
Infectivity increases as disease progresses



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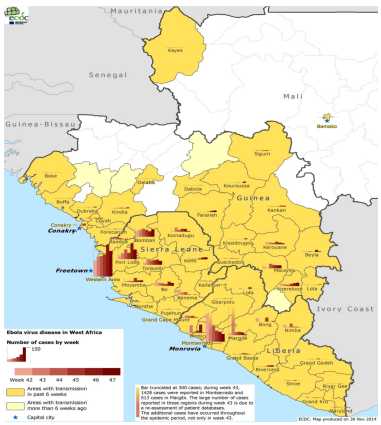
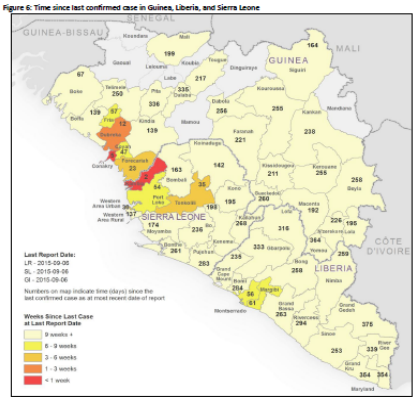
EVD epidemic West Africa



ECDC November 2014

EVD epidemic West Africa



WHO sitrep 09/09/15

Risk to HCWs

- Health-care workers have frequently been infected while treating patients with suspected or confirmed EVD. This has occurred through close contact with patients when infection control precautions are not strictly practiced.

Table 5: Ebola virus disease infections in health workers in Guinea, Liberia, and Sierra Leone

Country	Cases	Deaths
Guinea	196	100
Liberia*	378	192
Sierra Leone	307	221[‡]
Total	881	513

Prevention of transmission

In the absence of an effective vaccine, rigorous adherence to infection prevention and control practice is required:

- Personal protective equipment
- Hand hygiene
- Spatial separation
- Clean to dirty workflows
- Discipline in donning and doffing
- Training

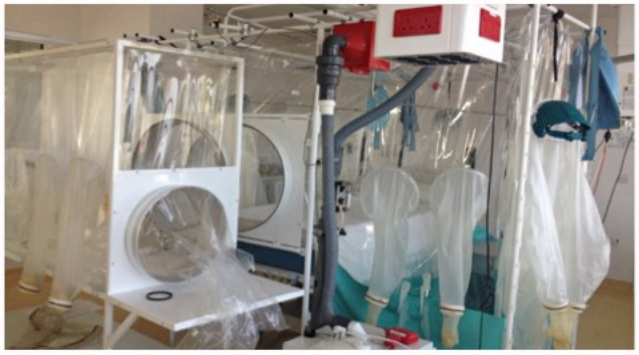
Staff safety is paramount

- All clinical activity needs to be planned – healthcare workers should only proceed when it is safe to do so, and if they have the appropriate level of training
- Clean to dirty work flows should be maintained

Staff safety

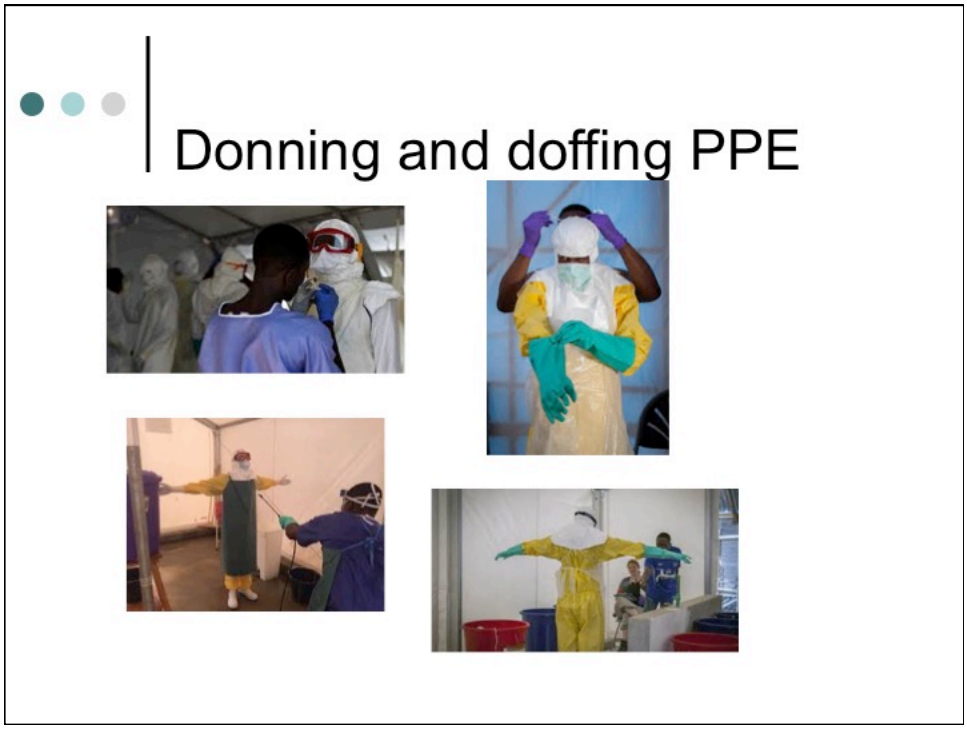
- The need for clear instructions for putting on and removal of personal protective equipment (PPE)
- PPE buddies must be trained
- Healthcare facilities need to plan in advance how they will manage suspect cases and the staffing implications, eg maximum PPE working times, need for breaks

Trexlor isolator



Patient transport isolator


EVD treatment centres
Ebola Treatment Centre
Kerry Town
Sierra Leone
EBOLA
CAN BE
BEATEN


Donning and doffing PPE

Conclusions – what next?

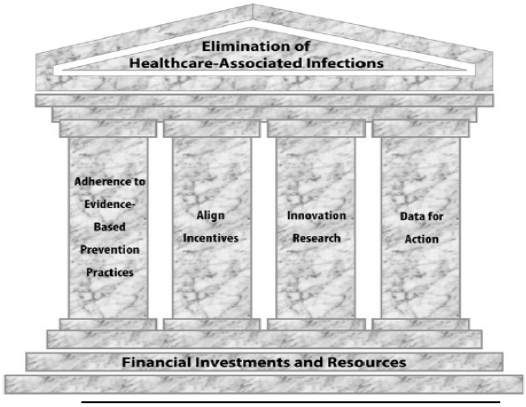
US approach – aspirational?

AJIC white paper

Moving toward elimination of healthcare-associated infections: A call to action

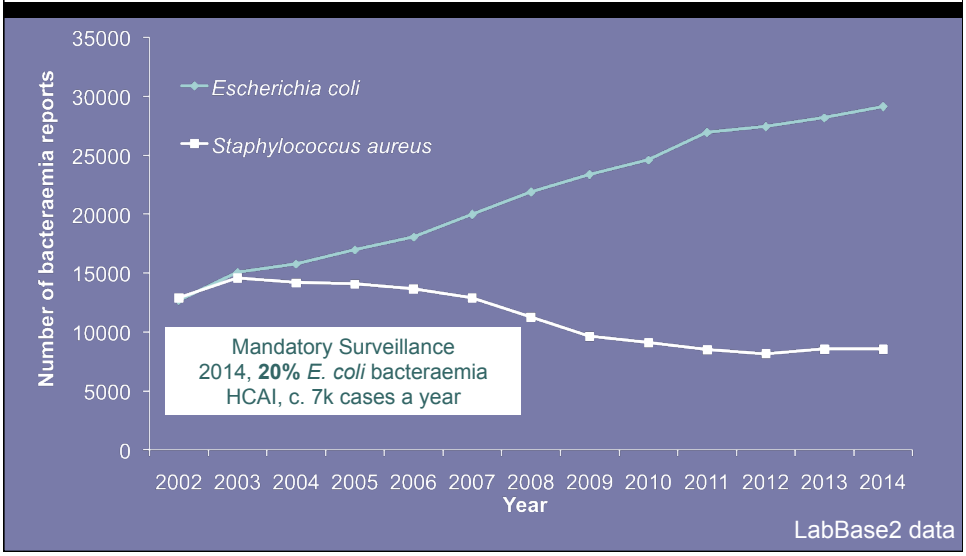
Denise Cardo, MD,[a] Penelope H. Dennehy, MD,[b] Paul Halverson, DrPH, MHSA, FACHE,[c] Neil Fishman, MD,[d] Mel Kohn, MD, MPH,[e] Cathryn L. Murphy, RN, PhD, CIC,[f] Richard J. Whitley, MD, FIDSA,[g] and the HAI Elimination White Paper Writing Group

APIC pillars of HAI elimination



Public Health England

E. coli bacteraemia



Conclusions

- Progress over last 10 years, with dramatic changes
- Changes in HCAI prevalence related to reductions in incidence of MRSA and CDI
- Increasing incidence & prevalence Gram negative resistance
- ICU (all ages) & Surgical specialties - highest risk
- Cognisant of the ever changing health and social care infrastructures

Conclusions

Whilst we have to look to the future, we must also learn from the past.

Thank you

What Did the Romans Ever Do For Us?
Dr. Carole Fry, Public Health England
Broadcast live from the 2015 Infection Prevention Society conference

Thanks to Teleclass Education

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