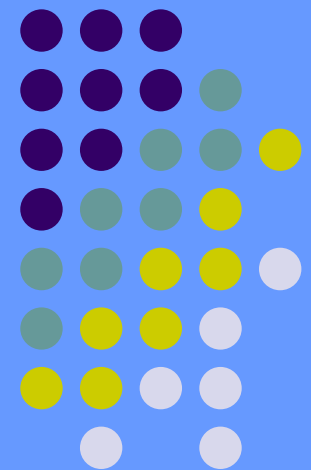


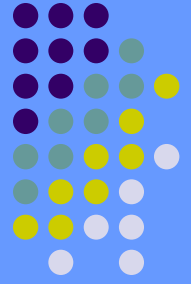
# BASIC CONCEPTS OF INFECTION CONTROL

## The Costs of Hospital Infections

International Federation of  
Infection Control



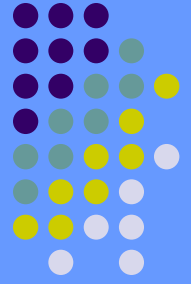
# Abbreviations



- MDR
  - Multi-drug resistance/resistant
- IC
  - Infection prevention and control
- ICT
  - Infection control team
- HAI
  - Hospital-acquired infection
  - Healthcare-associated infection



# HAIs



- HAIs are common
  - ~1 in 10 patients have HAI
  - An additional 10-60% of infections present after discharge





# HAIs

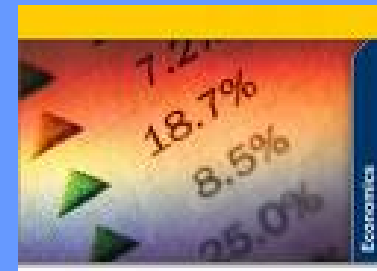
- Cause morbidity and mortality
- Should be controlled as part of general duty of patient care
- Has an economic impact
  - On hospital services
  - On costs of national health care



# Economic Consequences of HAI



- Measurement is difficult
- Financial impact varies between different healthcare systems and different times
- HAI has a significant impact of healthcare costs





# Effect on Hospital Costs

- HAI delays patient discharge
- Blocks beds
- Increases treatment costs
- Increases the number of investigations
- Increases the costs of infection prevention and control



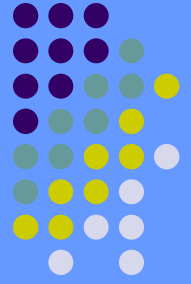
# HAI Increases Costs Outside Hospital



- Patients discharged while still infected increase treatment costs in GP or community services
- Additional costs fall on patients due to increased absence from work and on their relatives because of visiting time and travel
- HAI is often the subject of litigation
  - Costs may be very large



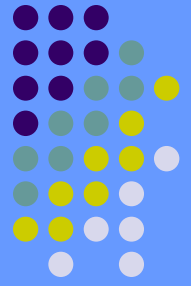
# HAI Increases Other Costs



- Unit costs
- Lengthens waiting lists
- Prevents contracts from being fulfilled
- Patient morbidity
  - Has large community and society costs difficult to quantify
- Loss of reputation
  - For whole hospital or individual units
  - Affects contracts and patient referral



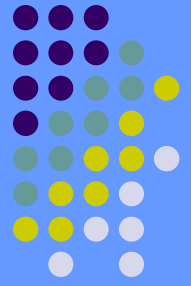
# Overall Cost Estimates



- Measurement is difficult
- Costs vary with country and time
- Several studies have shown the magnitude of the problem



# Overall Cost Estimates



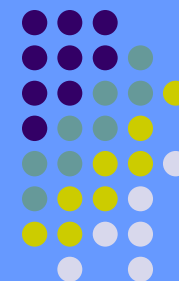
- Studied 4000 adult patients
- English district general (community) hospital
- Between 1994-5



Plowman R, Graves N, Griffin M, et al.  
Socio-economic burden of hospital  
acquired infection. London: PHLS; 1999.

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# Socio-economic Burden of HAI



- 7.8% of patients had HAI in hospital
  - 19% of patients not diagnosed in hospital and 30% of those who were reported symptoms of HAI after discharge
- Infected patients stayed in hospital ~ 2.5 times longer than uninfected patients, an average of 11 additional days

Plowman R, Graves N, Griffin M, et al.  
Socio-economic burden of hospital  
acquired infection. London: PHLS; 1999.





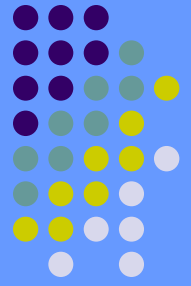
# Socio-economic Burden of HAI

- 13% of infected patients died compared with 2% of uninfected
  - Death rate was 7 times higher for infected patients adjusted for age, sex, comorbidity and other factors

Plowman R, Graves N, Griffin M, et al.  
Socio-economic burden of hospital  
acquired infection. London: PHLS; 1999.



# HAI a Significant Cause of Mortality



- HAI was the direct cause of ~5,000 deaths
- Contributed to 15,000
- In the USA, HAI amongst the top 10 causes of death

Plowman, et al.

Wenzel RP, Edmond MB. The Impact of Hospital-Acquired Bloodstream Infections. *Emerg Infect Dis* 2001;7:174-7

Haley RW, et al. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. *Amer J Epidemiol*

© IFIC:2005;121:182-205



# Socio-economic Burden of HAI



- The extrapolated national cost of HAI for hospital inpatients was ~£1 billion
  - Equals 1% of the national budget or 27,400-bedded general hospitals
- The national annual post-discharge costs estimated to be £ 56 million
  - Also GP costs of £ 8.4 million, hospital outpatients £ 27 million, community nursing services £ 21 million



Plowman, et al.

© IFIC:2008

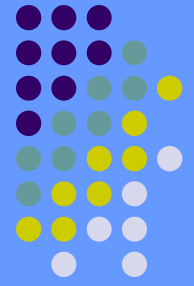
# Other Studies of Cost & Increased Length of Stay



Date of Study (Author)	Country	Type of HAI (Number in study)	Increased LOS (days)	Cost/case (£)
1981 (Haley)	USA	All (177)	1	891
1983 (Girady)	France	Neonatal (61)	6.7	1118
1989 (Mugford)	UK	Caesarean (41)	2.1	1011
1992 (Kappstein)	Germany	ICU Pneumonia (34)	10.1	5533
1993 (Coello)	UK	UTI (36)	3.6	498
1993 (Coello)	UK	Wound (12)	10.2	1553
1996 (Wilcox)	UK	Cdif	21	4107
1998 (Zoutman)	Canada	Wound (108)	10.2	1780
1999 (Plowman)	UK	All (309)	11	3000



Wilcox MH, Dave J. The cost of hospital-acquired infection and the value of infection control. J Hosp Infect 2000;45:81-4  
 © IFIC 2008



# Costs of Outbreaks

- Cox et al estimated additional costs generated in a large outbreak of MRSA over 3 years in an English district general hospital as £400,000
- A smaller MRSA outbreak (Mehter) cost £7,000
- An outbreak of MDR GNB infections increased costs by about £35,000

Cox RA, Conquest C, Mallaghan C, Marples RR. A major outbreak of methicillin-resistant *Staphylococcus aureus* caused by a new phage-type (EMRSA-16). J Hosp Infect 1995;29:87-106.

Mehtar S. How to cost and fund an infection control programme. J Hosp Infect 1993;25:57-69.



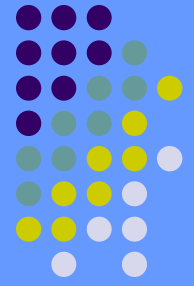


# Costs of Outbreaks

- Kim measured the costs of MRSA in a Canadian hospital
- By extrapolation they calculated that MRSA cost all Canadian hospitals \$42-59 million annually

Kim T, Oh PI, Simor AE. The economic impact of methicillin resistant *Staphylococcus aureus* in Canadian hospitals. Infect Control Hosp Epidemiol 2001;22:99-104





# Cost-benefit of Infection Control

- SENIC study of 1974-1983
- US hospitals with 1 fulltime ICN per 250 beds, an IC doctor, moderately intense surveillance, and a system for reporting wound infection rates to surgeons reduced HAI rates by 32%
- In other hospitals the HAI rate increased by 18%



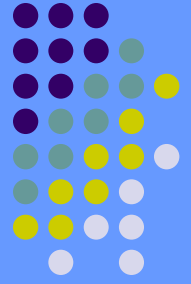
Haley RW, Culver DH, White JW, et al. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. *Amer J Epidemiol* 1985;121:182-205



# Cost-Benefit of IC

- The SENIC study estimated that the annual cost of HAI in US hospitals was \$1 billion (1974 dollars)
- The costs of IC teams was \$72 million annually
  - 7% of the infection costs
  - Team = 0.2 ICD, 1 ICN, 1 clerk – per 250 beds
- If IC prevented only 7% of infections the costs would be covered





# Conclusions

- The costs of HAI are huge
  - Include patient morbidity and mortality, hospital and community medical costs, the impact of blocked beds, and wider socio-economic costs
- IC staff and programmes cost much less
  - With only a small degree of effectiveness can pay for themselves
- Investment in IC is therefore highly cost effective





# Key Points

- Healthcare-associated infections (HAI) delay patient discharge and increase treatment costs
- HAI are accompanied by increasing numbers of laboratory and imaging investigations
- HAI increase infection prevention and control costs, including epidemiological investigations and medical, nursing and management time

