

Infection Prevention Society

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Infection Prevention Society Surgical Site Infection Masterclass

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Surgical Site Infection

Scale, surveillance, solutions



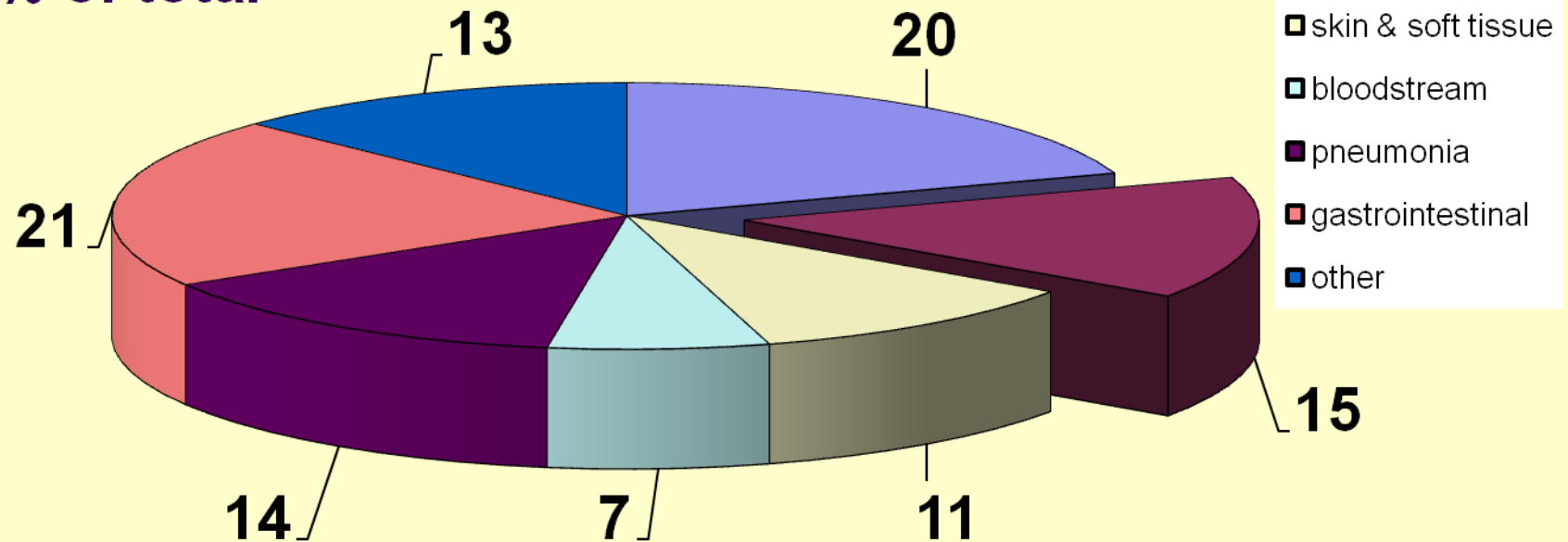
Pauline Harrington
SSI Surveillance Manager

*Healthcare-Associated Infection & Antimicrobial Resistance Dept,
Centre for Infections*

Proportion of HCAI types



Healthcare associated infection % of total



At any one time:

8% of all patients have HCAI

5% of surgical patients have SSI

Adverse impact of SSI

Coello et al 2005



	Median LOS (no SSI)	Extra LOS* (with SSI)	Extra costs* due to SSI (£)
Limb amputation	13.2	21.0	6103
Vascular	7.9	12.2	3545
Large bowel	11.3	9.4	2732
CABG	7.4	13.4	3894
ORLB fracture	9.6	9.9	2877
Hip prosthesis	11.1	11.5	3342
Knee prosthesis	10.3	10.9	3168

*adjusted by age, sex, pre-op stay, ASA score, wound class, duration operation, multiple procedures, emergency, trauma,

Effect of SSI on long term morbidity



Case-control study of 59 SSIs after orthopaedic surgery

14 extra days in hospital (up to 1 year)

↑ hospitalisations and operations

↑ costs x4

↓ quality of life (>5 point ↓ in SF-36 score for 5 domains – esp. physical functioning/role)

**Whitehouse et al 2002
ICHE (2002) 23:183-9**



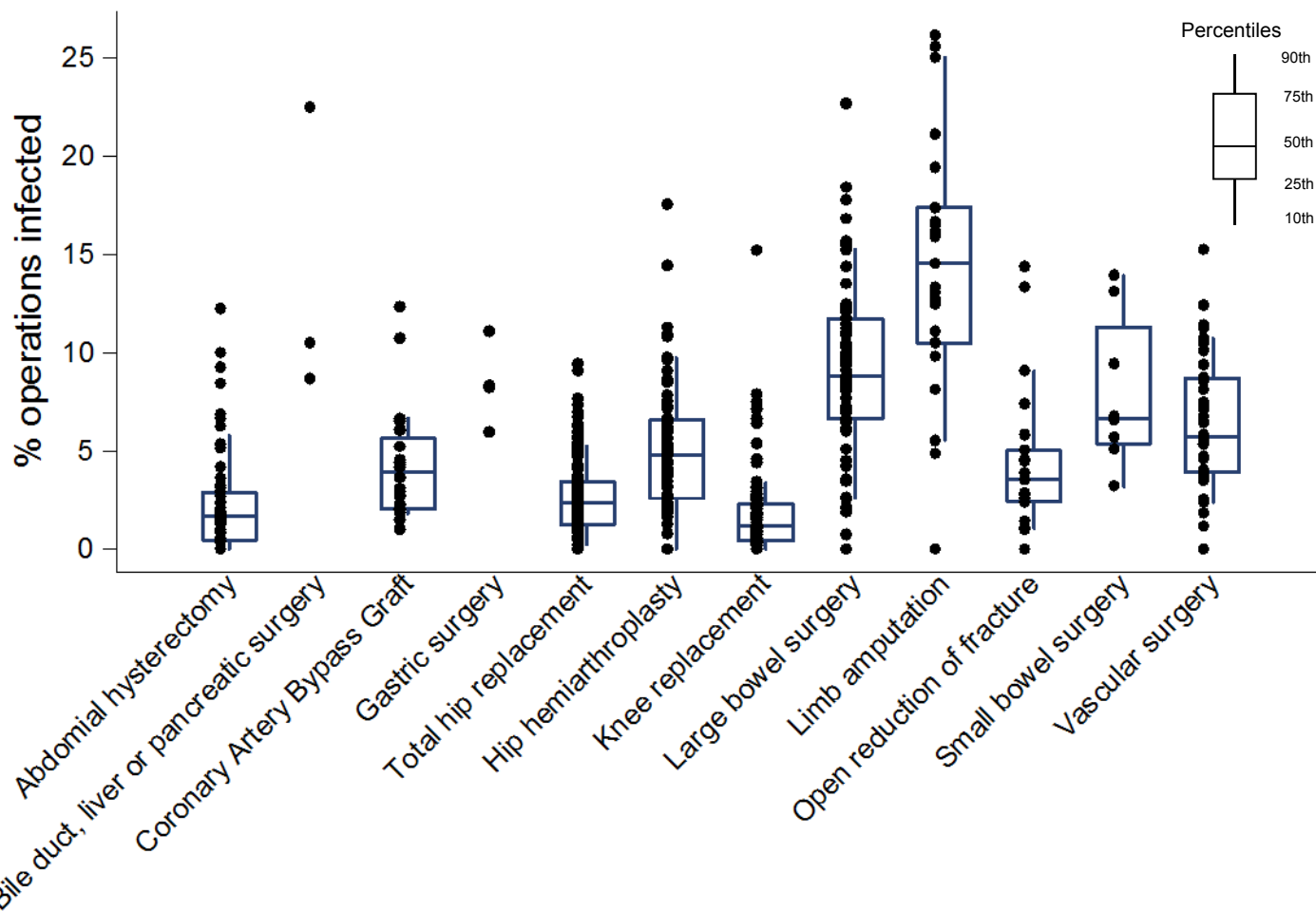
Mortality rates for patients with deep and organ/space SSI

	Adjusted odds ratio SSI vs. no SSI (95%CI)*	p value
Vascular surgery	6.8 (3.0 – 15.4)	<0.001
Large bowel	1.8 (1.1 – 3.2)	<0.04
Hip prosthesis	2.5 (1.3 – 4.6)	0.005

*adjusted by age, sex, pre-op stay, ASA score, wound class, duration operation, multiple procedures, emergency, trauma,

Coello et al 2005

Distribution of the incidence of surgical site infection by category of surgical procedures



October 1997 to December 2003

Surgical Site Infection Surveillance Service



Aims

To establish a national database (& benchmark rates of SSI) to enable comparisons within and between hospitals.

To encourage hospitals to use surveillance data to improve the quality of patient care

Established 1997

Captures data on 150 000 procedures annually

14 categories of surgical procedure

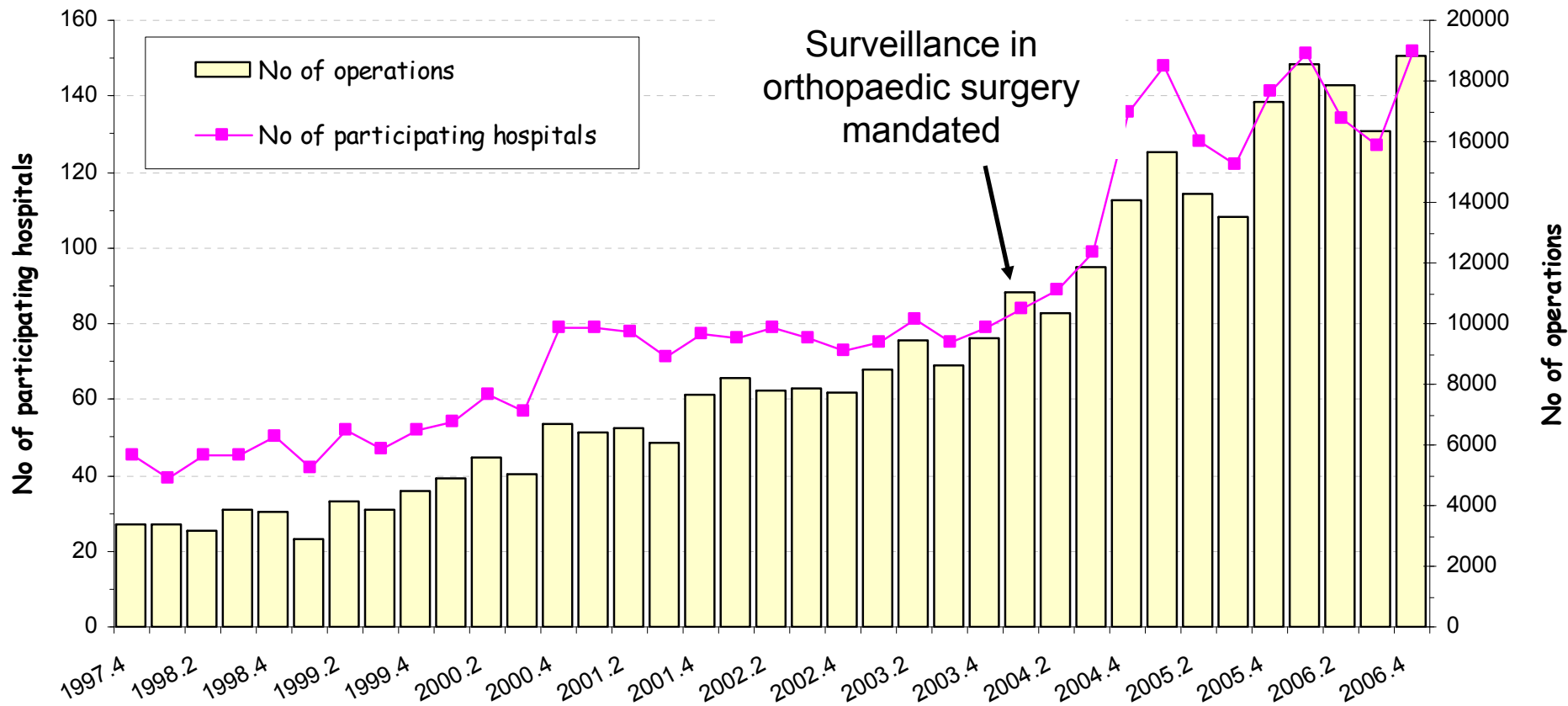
Minimum 3-month surveillance periods

Orthopaedic surveillance mandatory

350 hospitals in England registered



Surveillance of Surgical Site Infection in England, 1997 - 2006





SSI Surveillance

Basic methodology

Targeted at categories of clinically similar operative procedures

Data collection form completed for each relevant operation (**denominator**)

Systematic (active) surveillance after each operation to detect infections (**numerator**)

- Standard case definitions
- In-patient period and re-admissions
- Post-discharge surveillance: optional

Incidence (risk) of Surgical site infection



Numerator

No. infections



Denominator

Patients at risk

X 100 = % infected

Web-based Data handling system



Surveillance data sheet completed for each eligible patient

Patients monitored for SSI whilst in hospital

SSI identified in patients readmitted to hospital

Web-link data entry system

SSI identified post discharge patient questionnaire or other surveillance method

Auto error detection – correct data before submission

Confirm no. procedures & SSI submitted at end of surveillance period

Liaison with hospital

Individual hospital reports

Category	Submitted	In Progress	Totals
Knee replacement	13	0	13
Hip replacement	13	0	13
Totals	26	0	26

Category	Submitted	In Progress	Totals
Knee replacement	115	0	115
Hip replacement	81	0	81
Hip hemiarthroplasty	19	0	19
Totals	215	0	215

Table 1: No of operations and completed post-discharge questionnaires with rates of SSI by current and last 4 periods at your hospital.

Operations & surgical site infections		Your hospital	
		Current period	Last 4 periods
Operations	Total no.	105	413
	No. with PQ given	0	0
	% PQ completed	0.0%	0.0%
Surgical Site Infection	No. inpatient/readmission	5	14
	% infected	2.9%	3.4%
	No. post-discharge confirmed	1	3
	% infected	1.0%	0.7%
	No. patient reported	0	0
	% infected	0.0%	0.0%
All SSI		4	17
% infected		3.8%	4.1%

Compare hospital rate to benchmark

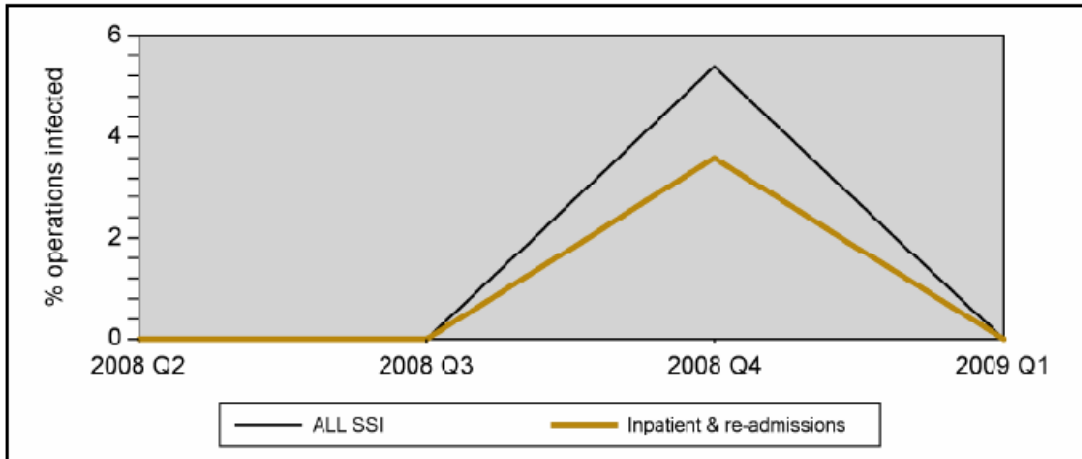
Table 2: Results from all hospitals in this surgical category (last 5 years)

Operations & surgical site infections		All hospitals		
		Without PQ	With PQ	Total
Operations	Total no.	125564	3041	128605
	% PQ completed	-	56.5%	0.0%
Surgical Site Infection	No. inpatient/readmission	1260	25	1285
	% infected	1.0%	0.8%	1.0%
	No. post-discharge confirmed	204	12	216
	% infected	0.2%	0.4%	0.2%
	No. patient reported	No data	16	26
	% infected	No data	0.5%	0.0%
All SSI		1464	53	1527
% infected		1.2%	1.7%	1.2%



Trend in rate of SSI

Category Knee replacement
Data between Apr-2008 and Mar-2009
Hospital Royal Cornwall Hospital (Treliske) [206]



Evaluate trends over time

Trend for the selected period

Year and Period	No. operations	Patient: questionnaire		Inpatient & readmissions		Post discharge confirmed		Patient reported		All SSI *	
		No. Given	% complete	No.	%	No.	%	No.	%	No.	%
2008 Q2	63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2008 Q3	38	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2008 Q4	66	0	0.0	2	3.6	1	1.8	0	0.0	3	5.4
2009 Q1	64	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

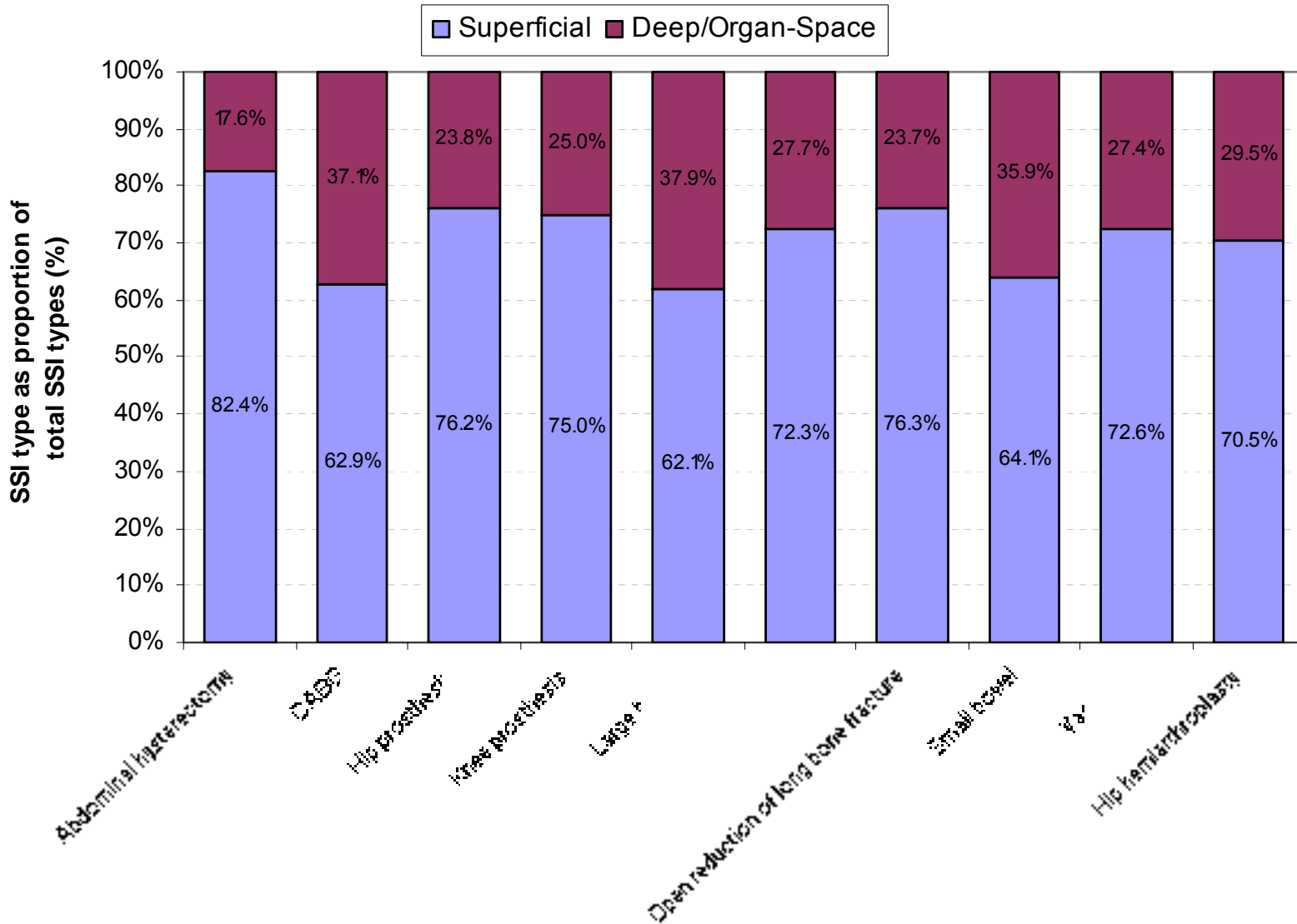
*All SSI = Inpatient & readmission, post discharge confirmed and patient reported

Cumulative incidence by category of surgery (2002-07)

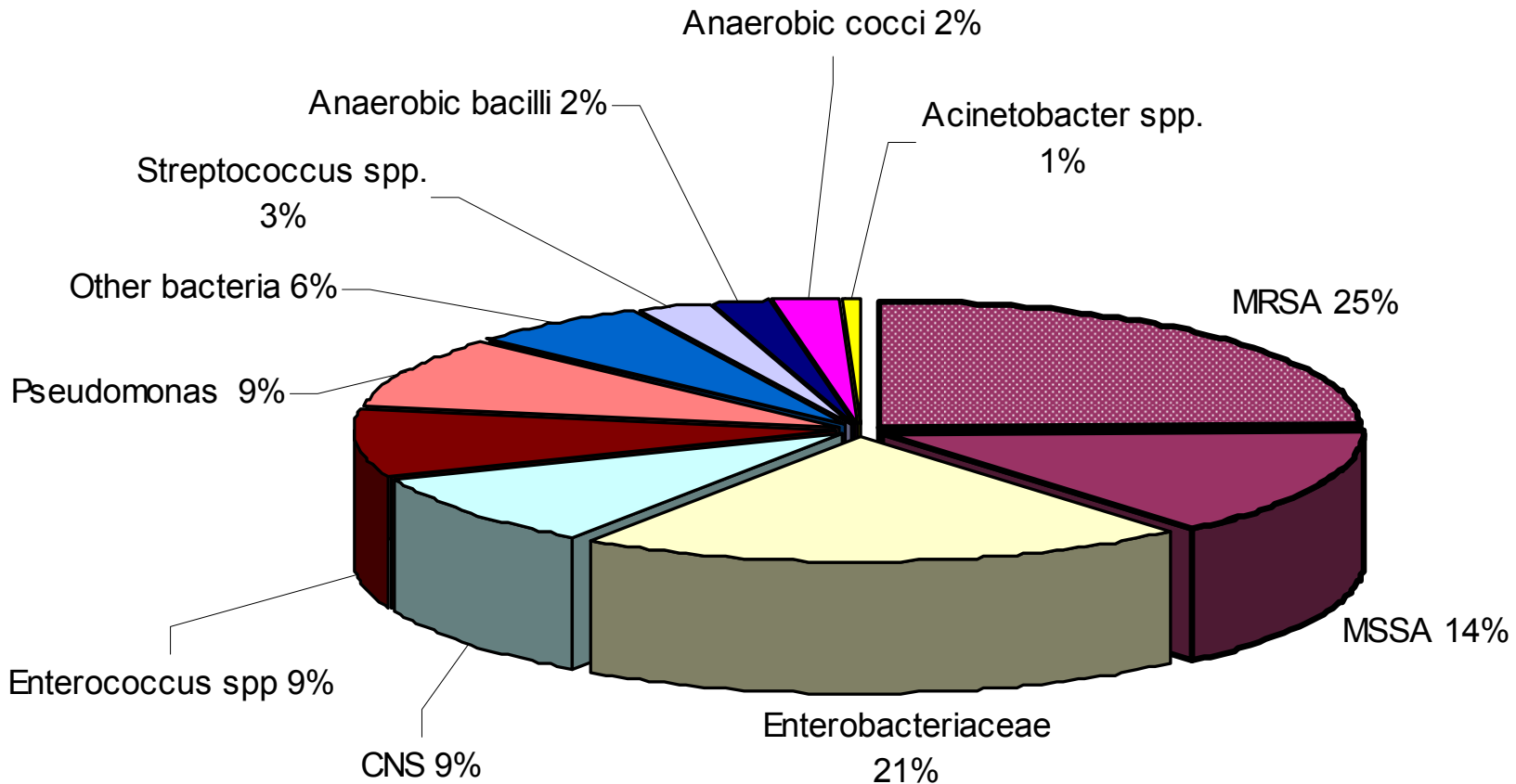


Category	No. hospitals	No. operations	Cumulative incidence (%)
Abdo hysterectomy	45	6178	1.2
CABG	17	21 585	3.95
Vascular	38	6107	3.88
Limb amputation	27	2067	9.24
Hip prosthesis	227	89 544	1.14
Knee prosthesis	214	85 544	0.59
Hip hemiarthroplasty	145	26 331	3.84
Large bowel	40	9108	8.86
Small bowel	13	1649	10.31
TOTAL	261	260 671	

Type of SSI by category of procedure



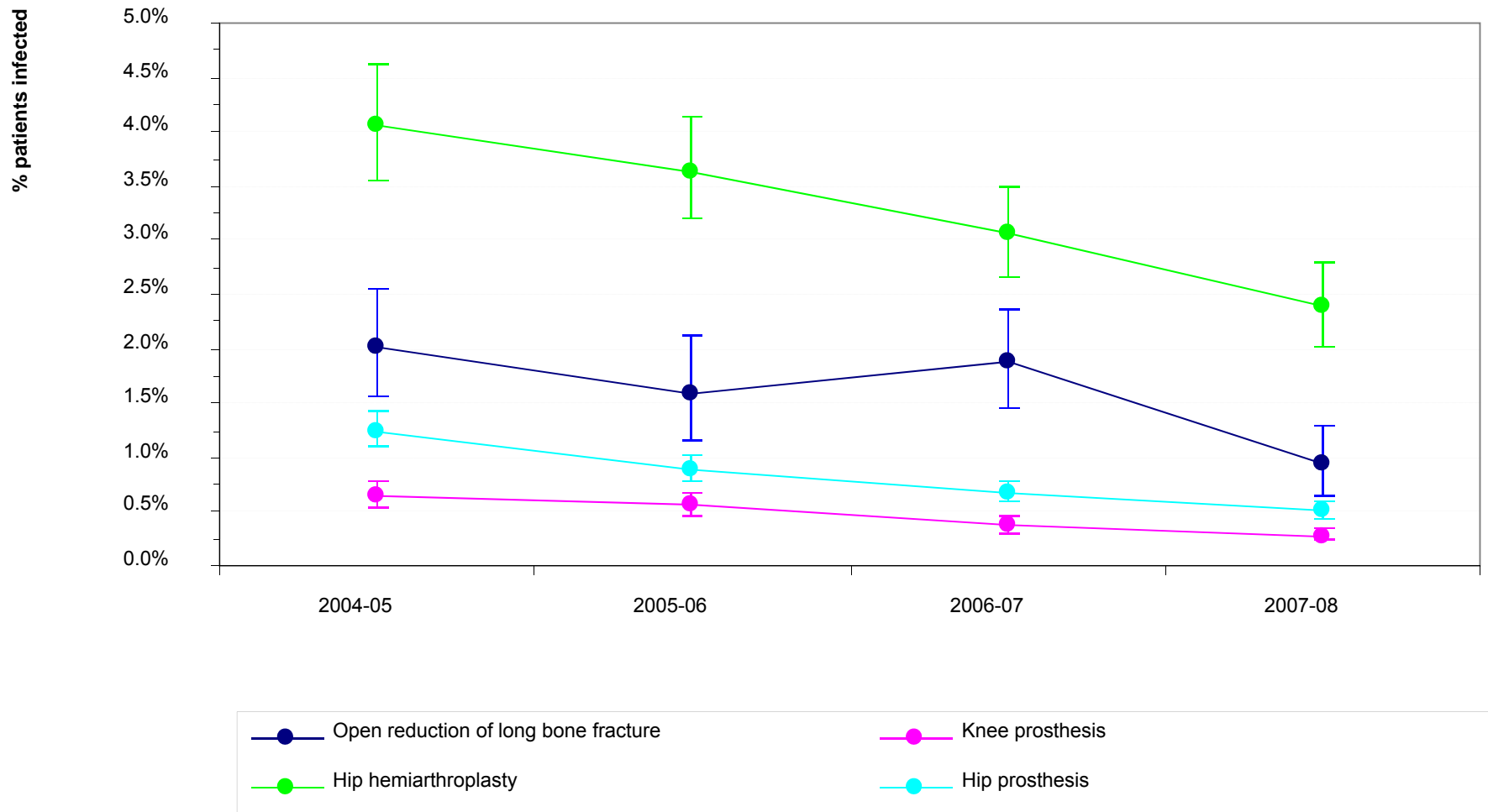
Micro-organisms reported as causing SSI (all categories 2002-07)



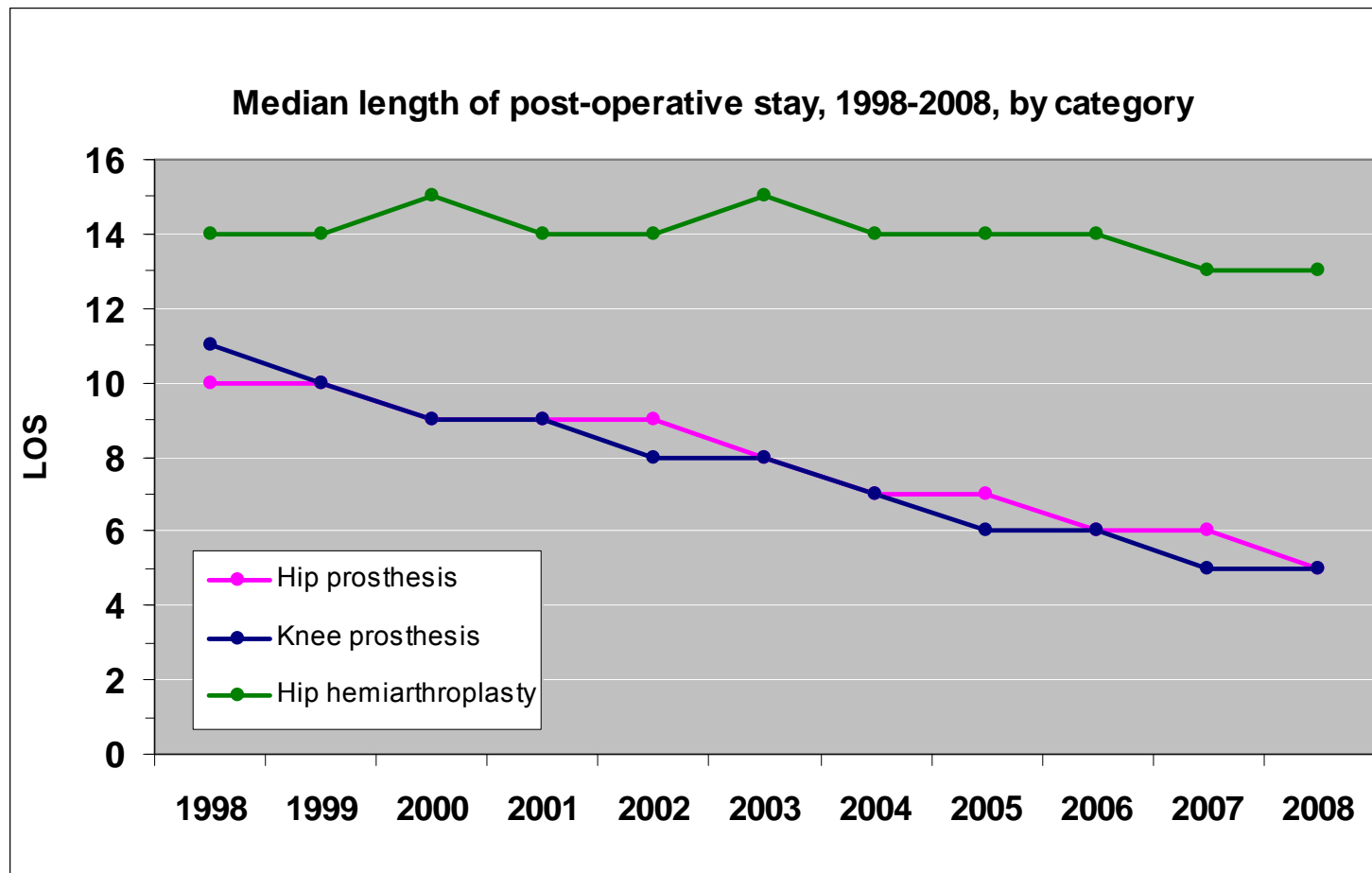
Number of organisms = 4034

Reductions in rates of SSI

Mandatory surveillance in orthopaedics

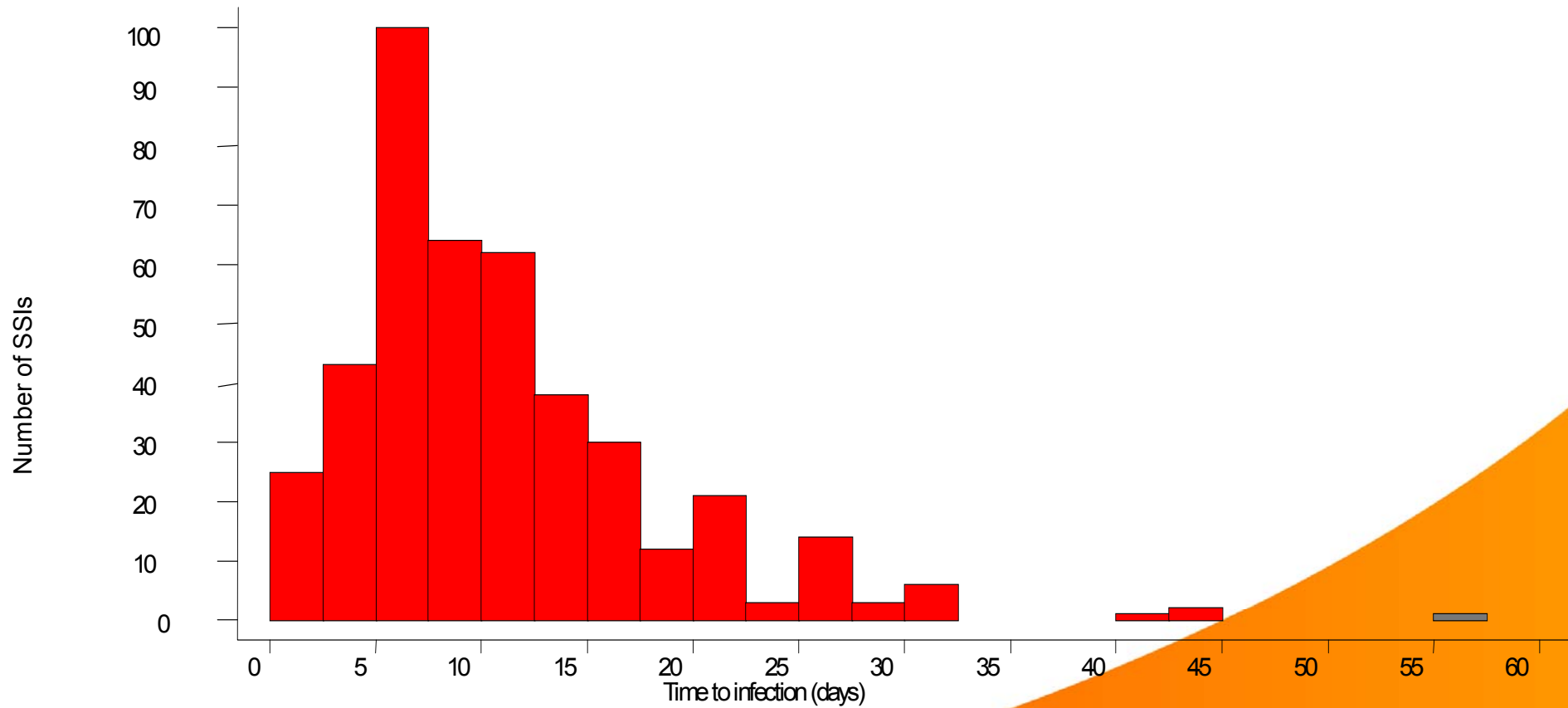


Changes in healthcare delivery impact on approach to surveillance....



Decreasing length of stay following elective surgery

Time to infection



Barrett et al, HPA, 2000

PDS methods: literature review

Key findings

Efficiency of method depends on healthcare system

HCW reporting (e.g. GP, community nurse)

- poor response rate, low sensitivity/specificity

Outpatient clinic reporting

- High response rate (but may not always have OP visit)
- poor sensitivity/specificity

Patient reporting

- High response rates reported (70-80%) but may be affected by age/ethnicity
- Poor +ve predictive value (over-report wound problems as SSI)
- Good –ve predictive value (report no problem with wound as no SSI)

PDS methods used by SSISS hospitals (2007) n = 61



	No. using method	(%)
Readmission with SSI	12	(20)
OP clinic or HCW routine visit	25	(22)
GP reporting	1	(2)
HCW postal questionnaire	23	(38)
Microbiological reports	13	(21)
Patient reporting	24	(39)
•Postal questionnaire	5	
•Telephone questionnaire	14	
•Self-reporting	5	
Combination of methods	26	(43)

Incorporation of standard PDS methods into SSISS protocol (from July 08)



1. Systems to identify patients readmitted with SSI (required)

- Receiving wards
- PAS systems alerts
- Flag medical notes
- A&E staff made aware
- Bed managers made aware

2. Systems to report SSI detected at OP clinic/return to hospital or confirmed by HCW visit (optional)

- Confirm that meet case definitions
- Patients asked to contact surveillance administrator if problems with wound

3. Patient reporting (optional)

- Postal questionnaire at 30 days post-op
 - Phone reminder if not returned
 - Phone interview patient and/or GP to confirm reported SSI

Post-discharge Patient Wound Surveillance Questionnaire



Staff use only.

Please enter your hospital name, address and the name of the person responsible for collecting the questionnaire at the hospital in this box.

Surgical wound healing post discharge questionnaire

**To be completed by hospital staff*

Hospital number	
Full name	
Date of birth	

OR

Place addressograph here:

Date of operation ____/____/____ Date form to be completed ____/____/____
(30 days after operation)

Category of procedure _____

Dear Patient,

We are monitoring all patients with surgical wounds, to detect patients who develop wound infection after surgery.

Please complete the following questionnaire and return it in the envelope provided on the 30th day after your operation (See above for this date) or as soon as possible after that day.

Have you had any problems with the healing of your wound?

YES NO

If you have answered **NO** you do not need to continue with the rest of the form but it is very important that you return it to the hospital in the envelope provided. Thank you for taking the time to do this. If you have answered **YES**, please read the following carefully and complete the rest of the form.

Since you were discharged from hospital after your operation have you noticed any of the following symptoms?

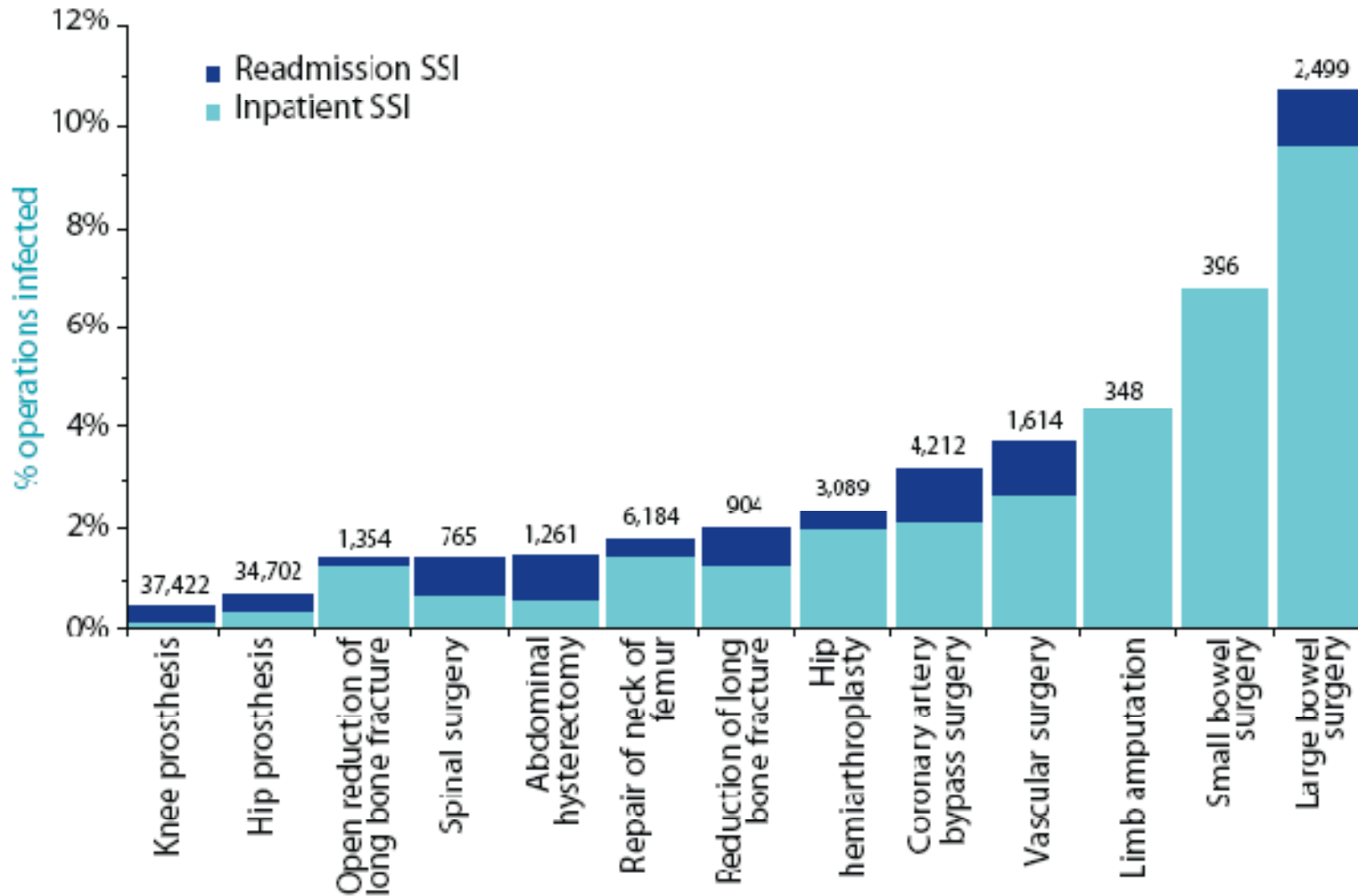
Was there any discharge or leakage of fluid from any part of the wound?

Yes No

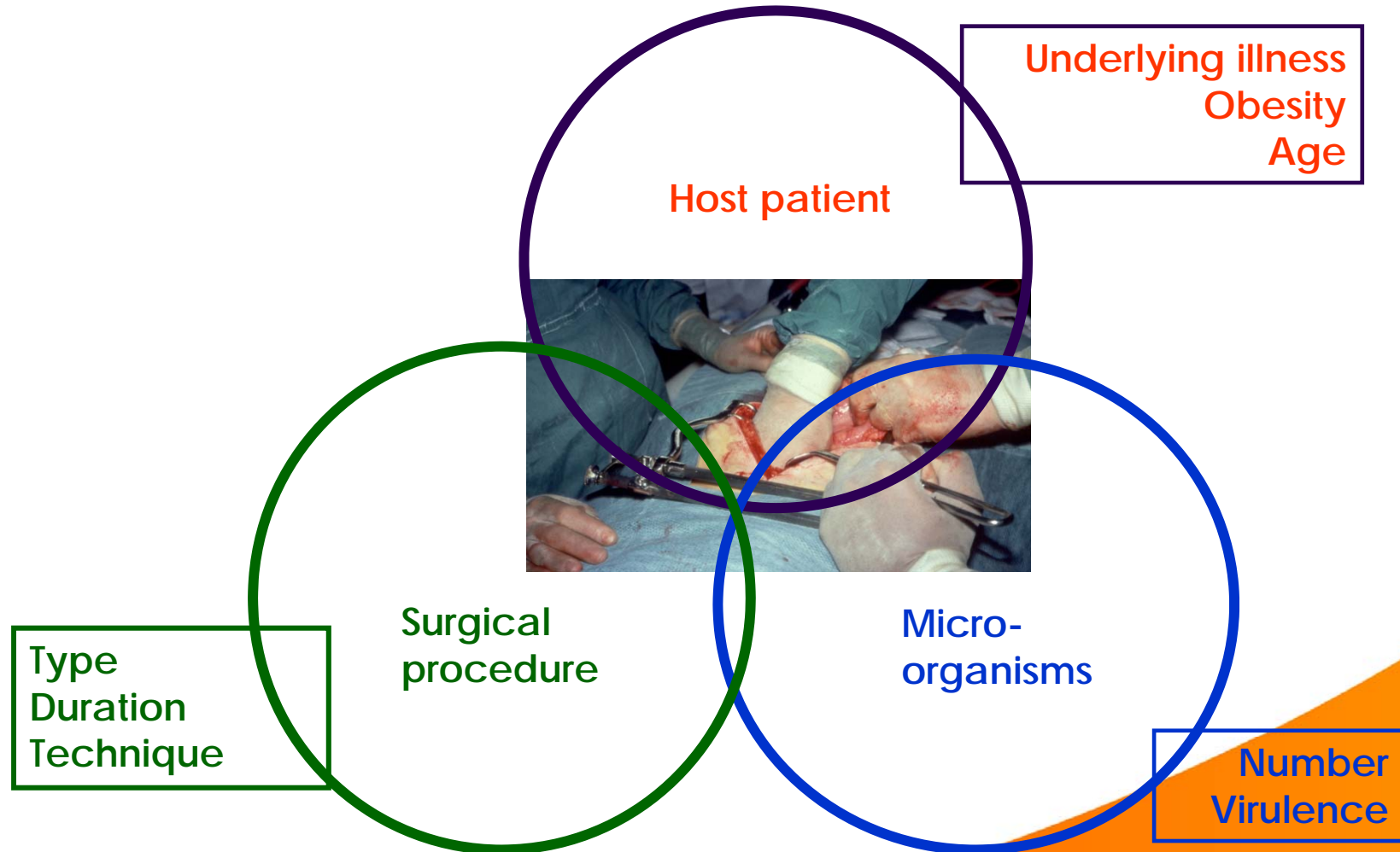
If yes, was it either:

- Clear or blood stained
- Yellow/green (pus)
- Other-please specify

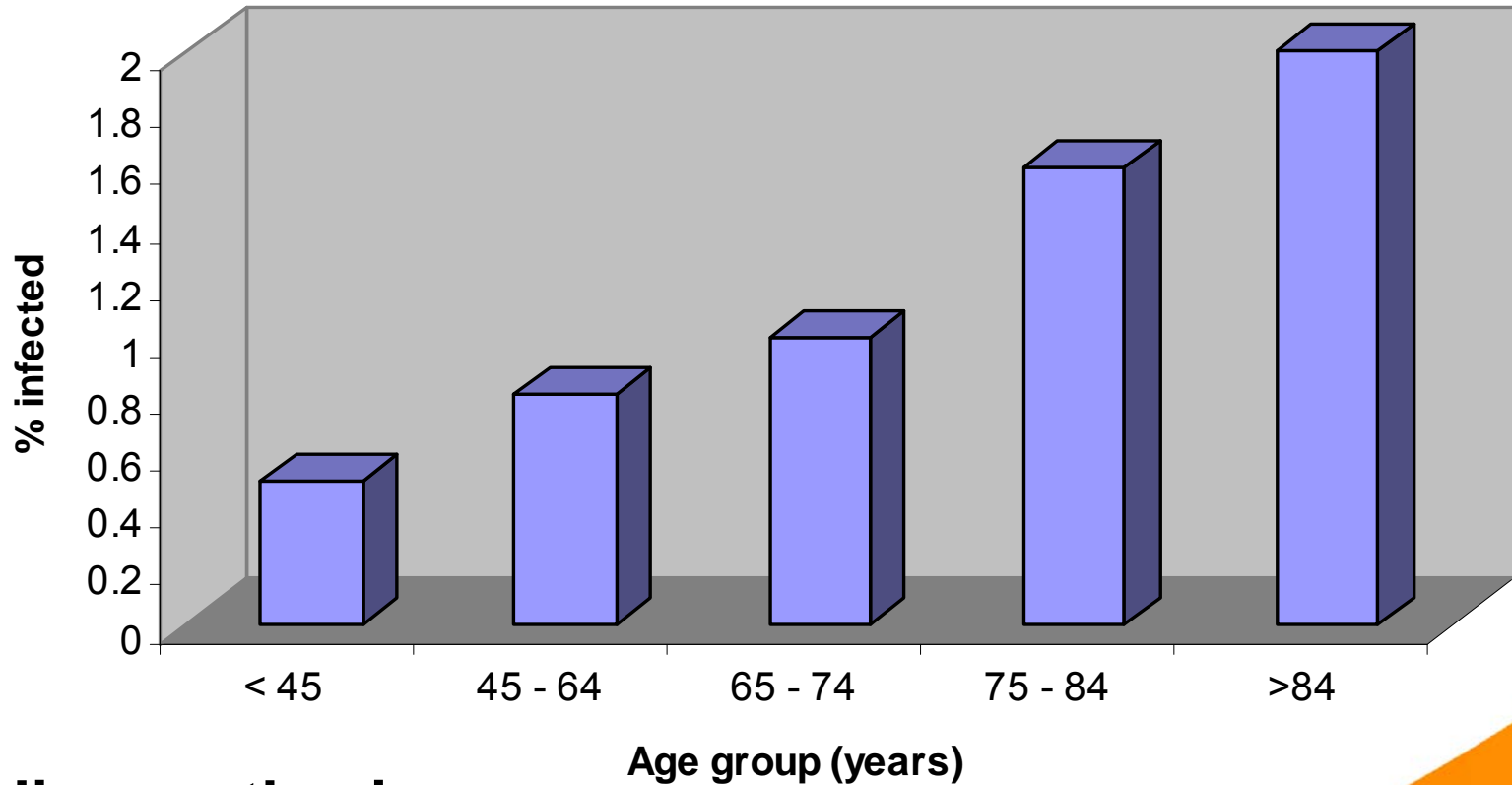
Rates of SSI including readmission infections (2008)



Risk factors for SSI



Risk of SSI increases with age



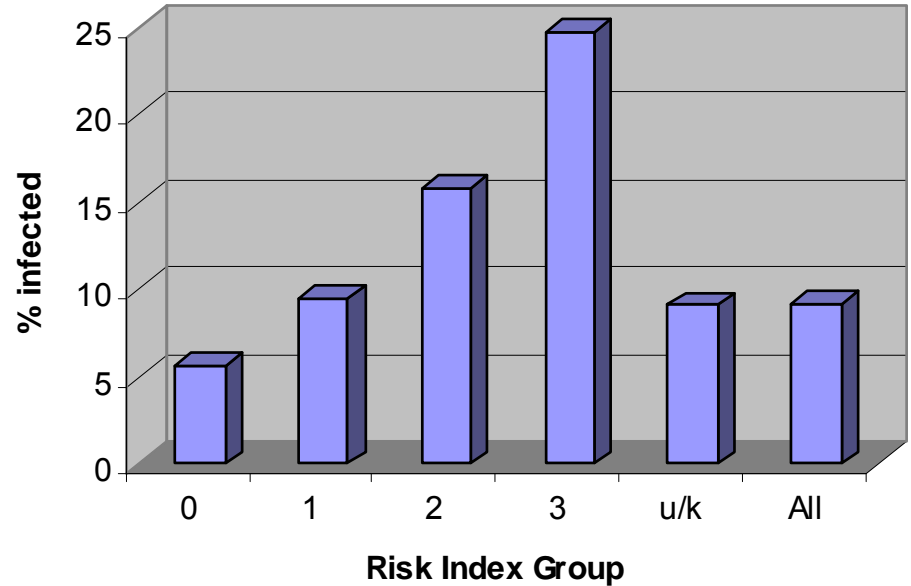
Hip prosthesis

Risk of SSI doubled in >85 vs <45 years ($p < 0.001$)

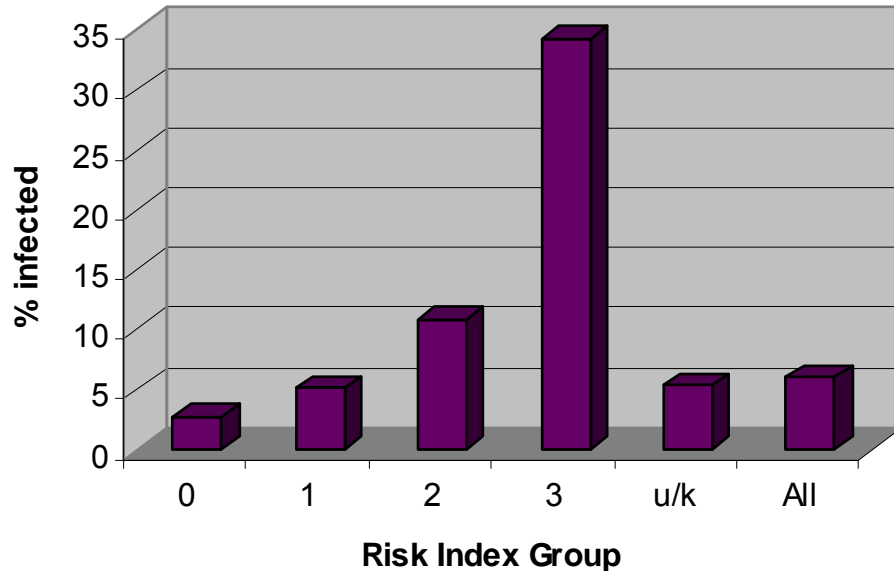
Risk index

1. ASA pre-op score > 3
2. Contaminated/dirty wound class
3. Duration of surgery >T time

Large bowel surgery



Vascular surgery

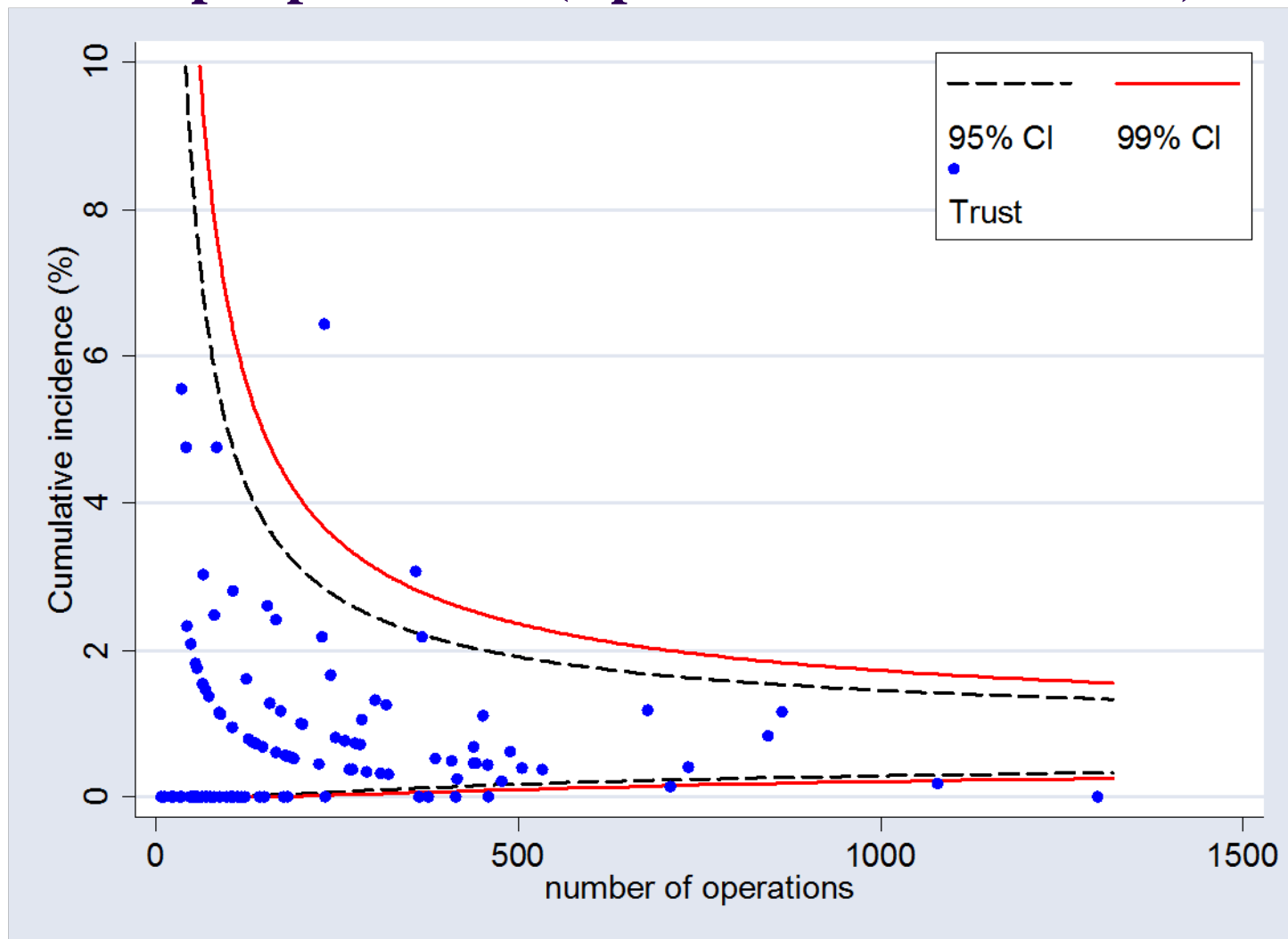


**Each operation
allocated a score
between 0 and 3**

Funnel plot illustrating hospitals with 'problem rates' (SSISS)



Hip replacement (April 2006 - March 2007)



Using surveillance to change practice

Hospital beats the super-bug

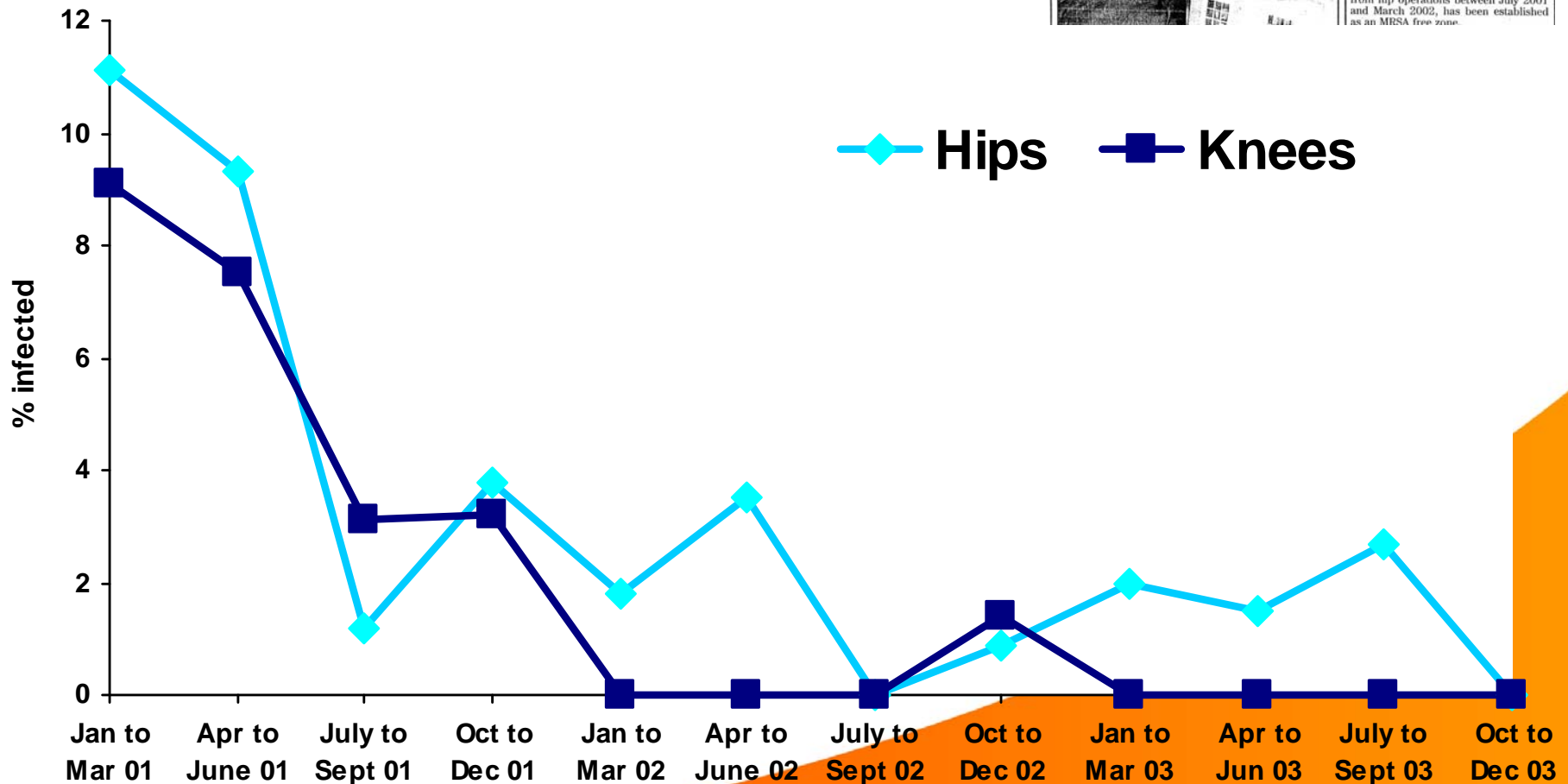


A SUPER-BUG which plagues hospitals across the UK has been wiped out of part of the Alexandra Hospital, it was announced this week.

Vicki Gumbley

Patients who undergo hip or knee replacements in Ward 16 of the Woodrow Drive hospital can rest assured they will not pick up the dangerous MRSA infection, which can cause major problems.

The ward, which saw 142 patients recover from knee operations and 137 from hip operations between July 2001 and March 2002, has been established as an MRSA free zone.



Making surveillance work



Measurement

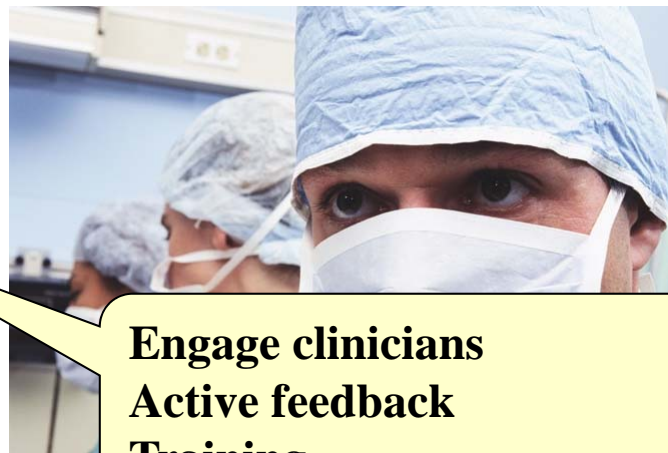


Knowledge



Action

Case definitions
Accurate data
Systematic collection
Planning



Engage clinicians
Active feedback
Training

Audit & evaluate practice
Stimulate change
What can be improved & how?

Using surveillance data to improve practice

examples from participating hospitals



Audit/review practice in theatres & wards

- theatre environment
- pre-operative preparation
- surgical technique
- wound management
- management of patients with MRSA

Strategic programmes

- adopt *Saving Lives* high impact intervention for SSI
- create disciplined culture - encourage staff to challenge poor practice
- training and supervision of junior staff
- theatre/ward audit programme
- ring-fenced beds for elective surgical admissions

Raise awareness of infection control

- develop partnerships between clinical staff & ICT
- education/training on infection control



Reduction of surgical site infections after Caesarean delivery using surveillance

S. Bärwolff ^{a,d,*}, D. Sohr ^{a,d}, C. Geffers ^{a,d}, C. Brandt ^{a,d}, R.-P. Vonberg ^{b,d}, H. Halle ^c, H. Rüden ^{a,d}, P. Gastmeier ^{b,d}

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^d German National Reference Centre for the Surveillance of Nosocomial Infections

Received 13 January 2006; accepted 2 June 2006
Available online 8 August 2006



When continuous surgical site infection surveillance is interrupted: The Royal Hobart Hospital experience

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Hobart, Australia and Sydney, Australia

1: Arch Orthop Trauma Surg. 2005 Oct;125(8):526-30. Epub

Reduction of orthopaedic wound infections in 21 hospitals.

Gastmeier P, Sohr D, Brandt C, Eckmanns T, Behnke M, Ruden H.

Institute of Medical Microbiology and Hospital Epidemiology, Medical School Hannover, Carl-Neuberg-Str. 1, 30625 Hannover, Germany. Gastmeier.Petra@mh-hannover.de

INTRODUCTION: The German national nosocomial infections surveillance system (KISS) has been collecting surveillance data from hip and knee prosthesis operations since 1997. The

1: Int J Qual Health Care. 2006 Apr;18(2):127-33. Epub 2006

Reduced risk of surgical site infections through surveillance in a network.

Geubbels EL, Nagelkerke NJ, Mintjes-De Groot AJ, Vandenbroucke-Grauls CM, Grobbee DE, De Boer AS.

Department of Infectious Diseases Epidemiology, National Institute of Public Health and the Environment, The Netherlands.

OBJECTIVE: To estimate the effect of multicentre surveillance for nosocomial infections on patients' risk of surgical site infection (SSI). **DESIGN:** Prospective multi-centre cohort study, from January 1996 to December 2000. **SETTING:** Acute care hospitals

Effectiveness of a nationwide nosocomial infection surveillance system for reducing nosocomial infections

P. Gastmeier ^{a,*}, C. Geffers ^b, C. Brandt ^b, I. Zuschneid ^b, D. Sohr ^b, F. Schwab ^b, M. Behnke ^b, F. Daschner ^c, H. Rüden ^b

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Received 27 May 2005; accepted 24 April 2006
Available online 3 July 2006

Summary



SSI account for 15% of HCAI and are an important cause of morbidity

SSISS provides a mechanism of benchmarking rates of SSI in 14 categories of procedure

Benchmarking needs to be enhanced by developing a standard approach to PDS

There is evidence that rates of SSI can be reduced through participation in national SSI surveillance systems

High quality infection control practice can reduce the risk of SSI