

SSI Surveillance in Hong Kong

Dr. Chen Hong (IDCTC)

Ms. MY Kong (CICO)

Mr. Kelvin Yu (IDCTC)

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Aims and Objectives

1. To standardize the SSI surveillance method among HA hospitals.
2. To look for trend of SSI rates and feedback to clinical units.
3. To monitor the use of prophylactic antibiotics with appropriate types, timing and duration.
4. To identify problems and set out possible solution.

SSI Surveillance in HA

- Individual hospital surveillance since 2002
- HA standard protocol since Aug 2009
- Adopted most principles of CDC-NHSN SSI procedure-associated module and surveillance definitions
- Selected 9 core operative procedures from SUR and ORT for corporate reporting
- Individual hospital are welcome to include non-core operative procedures e.g. cesarean section and cardiac surgery etc.

Governance



Task Force on Infection Control (TFIC)

- Provide advice on SSI policy and direction in HA (in collaboration with Infection Control Branch (ICB), Centre for Health Protection)
- Endorse SSI program and data

SSI Surveillance Work Group

- Review on survey method
- Facilitate communication and promulgation of relevant information and improvement measures to the COCs.
- Members from SUR, ORT, O&G, ICB and Chief Infection Control Officer (CICO)

SSI Surveillance Core Group

- Data analysis by ICB
- Preliminary report verified by hospital infection control teams
- Final report by ICB & CICO office

Hospital Infection Control Team (HICT)

- Collect data
- Liaise with surgical departments for quarterly report of surgeons-specific SSI rates
- Report SSI rates to hospital infection control committee

9 Core Operative Procedures

General surgery:

1. Appendix surgery (both open and laparoscopic)
2. Gallbladder surgery (both open and laparoscopic)
3. Colon surgery (both open and laparoscopic)
4. Breast surgery (with or without breast reconstruction)
5. Rectal surgery (starting from Q3/2010)

Orthopaedic surgery:

6. Hip/Knee surgery (Non traumatic / close traumatic with implants or prosthesis disregard of the size, all foreign material purposely implanted should be included)
7. Dynamic Hip Screw
8. Hip prosthesis including total and partial
9. Knee prosthesis

Scope of SSI Surveillance, All procedures in 2017

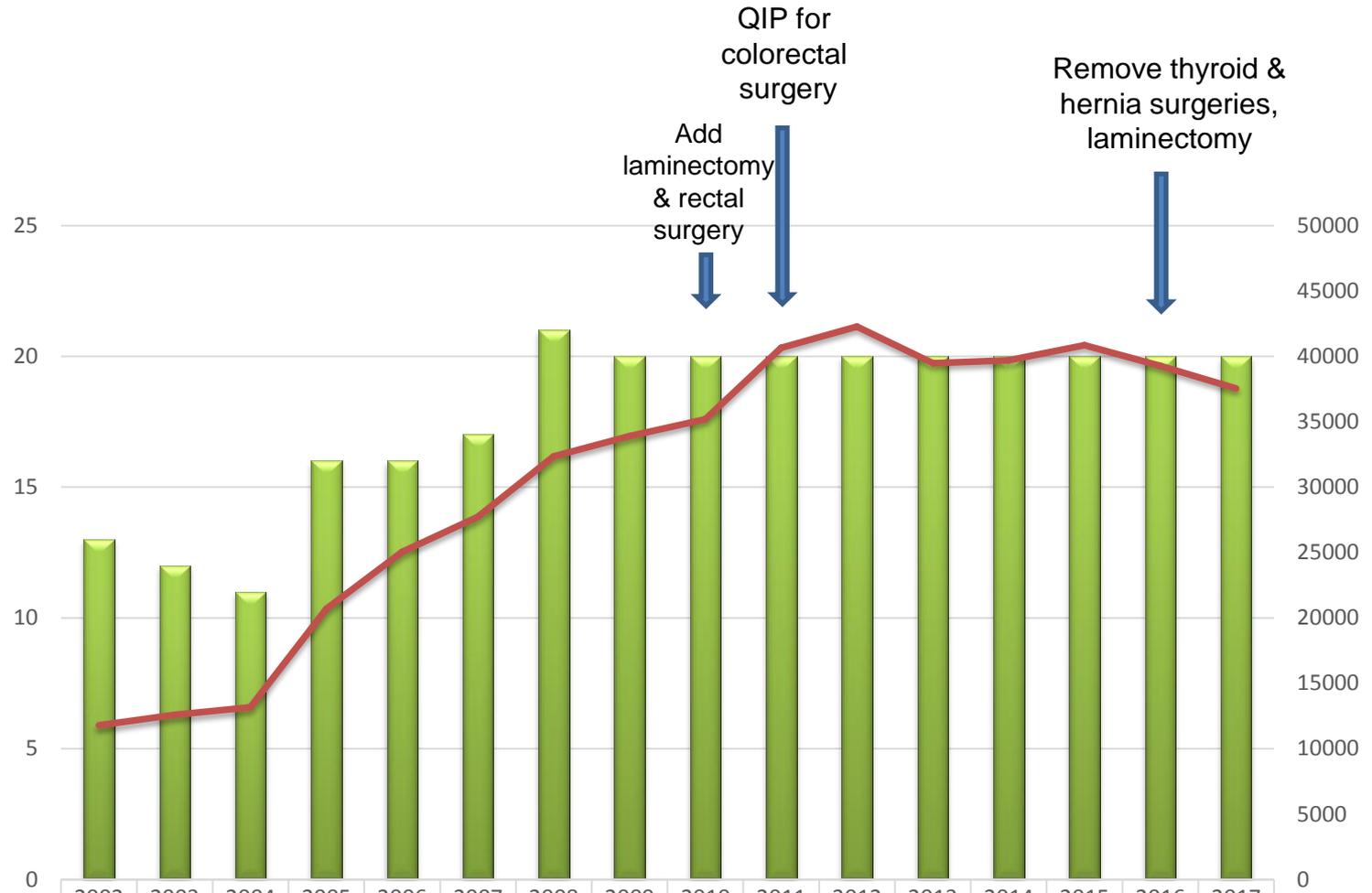
- 20 hospitals

AHNH	NDH	PWH	TKOH
BH	NLTH	PYNEH	TMH
CMC	OLMH	QEH	TWH
DKCH	PMH	QMH	UCH
KWH	POH	RH	YCH

- 38 types of procedures

Appendectomy	Gallbladder Surgery	Miscellaneous	Other nervous system
Breast Surgery	Gastric surgery	Open reduction fracture	Other prosthesis
CABG DONOR SITE (ARM)	Herniorraphy with mesh	Organ transplant	Rectal surgery
CABG DONOR SITE (LEG)	Herniorrhaphy	Other cardiovascular system	Skin graft
CABG-chest & leg	Hip prosthesis	Other digestive surgery	Small bowel surgery
CABG-chest only	Knee prosthesis	Other Endocrine system	Spinal fusion
Cardiac surgery	Laminectomy	Other genitourinary surgery	Splenectomy
Cesarean section	Laparotomy	Other hematologic / lymphatic	Thoracic surgery
Colon surgery	Limb amputation	Other integumentary system	
Dynamic Hip Screw	Liver/pancreas	Other musculoskeletal	

HA SSI Surveillance (Core & Non-core Surgeries)



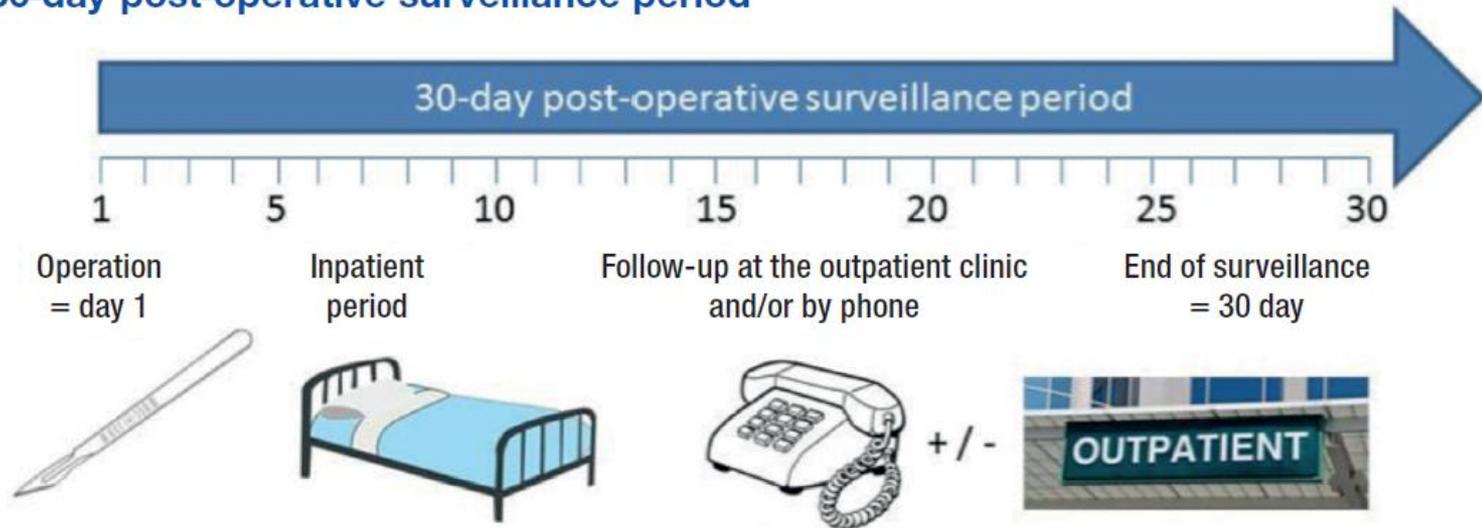
 No. of participating hospitals	13	12	11	16	16	17	21	20	20	20	20	20	20	20	20	
 No. of SSI records	11778	12586	13164	20688	25040	27715	32344	33890	35185	40642	42267	39475	39683	40839	39258	37531

Post-operative Data Collection

- Surveillance team: Hospital Infection Control Nurses
- HA-wide database



30-day post-operative surveillance period



Timely Data Collection

1. Daily review OT list for new cases
2. Review patients' records for indices of infection
3. Inspect the wound to look for evidence of wound infection when indicated
4. Make telephone calls to patients on D30 postoperatively
5. Discuss with infection control officers / microbiologists for any uncertain cases
6. Verify and submit data to SSI surveillance platform according to the timeline

Source of Data

- Inpatient and post-discharge notes
- OT record
- Anesthetic record
- Microbiological laboratory results
- Radiological findings
- Telephone calls

SSI Surveillance Platform



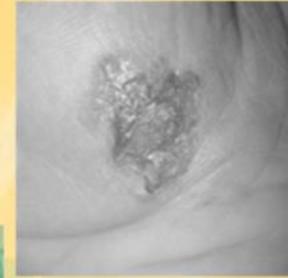
Surgical Site
Infection



Cluster
Reporting



Surgical Site Infection



User ID:

Password:

Domain:

Key Functions

- Create wound records from OT list
- Generate reports e.g. SSI rates, surgeon infection rates
- Monitor by control charts

Surgical Site Infection Business Information Systems Team 2

Current Login User : [Home](#) [About](#) [Help](#) [SSI Information](#)

[Wound Records](#) [Downloads](#) [Reports](#) [Maintenance](#) [Statistics](#) [Administrations](#) [Logout](#)

WELCOME TO SSI

Insert New Records

Hi, what records do you want? [Check it out!!](#)

Search & Update

Description	Count
✓ Pending records with OT date on or before 04 Dec 2018 (30 days)	0

New Reports Shared by CICO

Report Summary	Report Uploaded Date	Signed-off By	Sign-off
ssi.kpl.corp.2017.xlsx	2018-07-06 15:49	X	

2018 Q3 Frozen Day

JAN 2019
7 MON

2018 Q3 frozen day - 7 Jan 2019 17:00

Remaining Days: 4

Uncompleted OT records: **0**

Unopened core OT records: **18**

SSI Record Input

 **Surgical Site Infection** EPR Home

Business Information Systems Team 2

Current Login User : Home About Help SSI Information

Wound Records Downloads Reports Maintenance Statistics Administrations Logout

DATA FOR WOUND SURVEILLANCE

UNIT :

HN : HKID : NAME : SEXAGE : / Years

ADM DATE : (dd/mm/yyyy) DAY SURG. : WARD/BED : /

OT START DATETIME : (dd/mm/yyyy H:mm) OT END DATETIME : (dd/mm/yyyy H:mm) DURATION : [mins]

OT TYPE : TEAM : PROCEDURE NO. :

OT REF. NO. : SSI OT THEATRE : STATUS : Pending

SURGEON : WOUND CLASS :

PROPHYLAXIS : No Prophylaxis ANTIBIOTIC INTRA-OP : No POST-OP : No

Antibiotics 1 : dose Antibiotic Intra-Op : dose Post-Op : dose

Antibiotics 2 : dose Antibiotic Intra-Op : dose Post-Op : dose

Antibiotics 3 : dose Antibiotic Intra-Op : dose Post-Op : dose

Overall Compliance :

UNDER DISEASE : 1. 2. 3.

FINAL DISP. : DISP. DATE : (dd/mm/yyyy) DISP. NOTE :

DIAGNOSIS :

OPERATION :

Hide operations...

ICD9 : ICD9 EXT : APPROACH : POSITION OF INCISION :

OPERATION (LOCAL) :

Advanced Searching

ASA SCORE : Not Graded

Lap Converted to Open :

MESH :

Risk Stratification

- Risk factors e.g. BMI, blood glucose, surgical antibiotic prophylaxis etc.
- NHSN SSI definitions i.e. superficial, deep and organ/space SSI
- Wound classification i.e. clean, clean contaminated, contaminated and dirty
- ASA score i.e. 1 – 5
- Duration cutpoint
- Risk index category

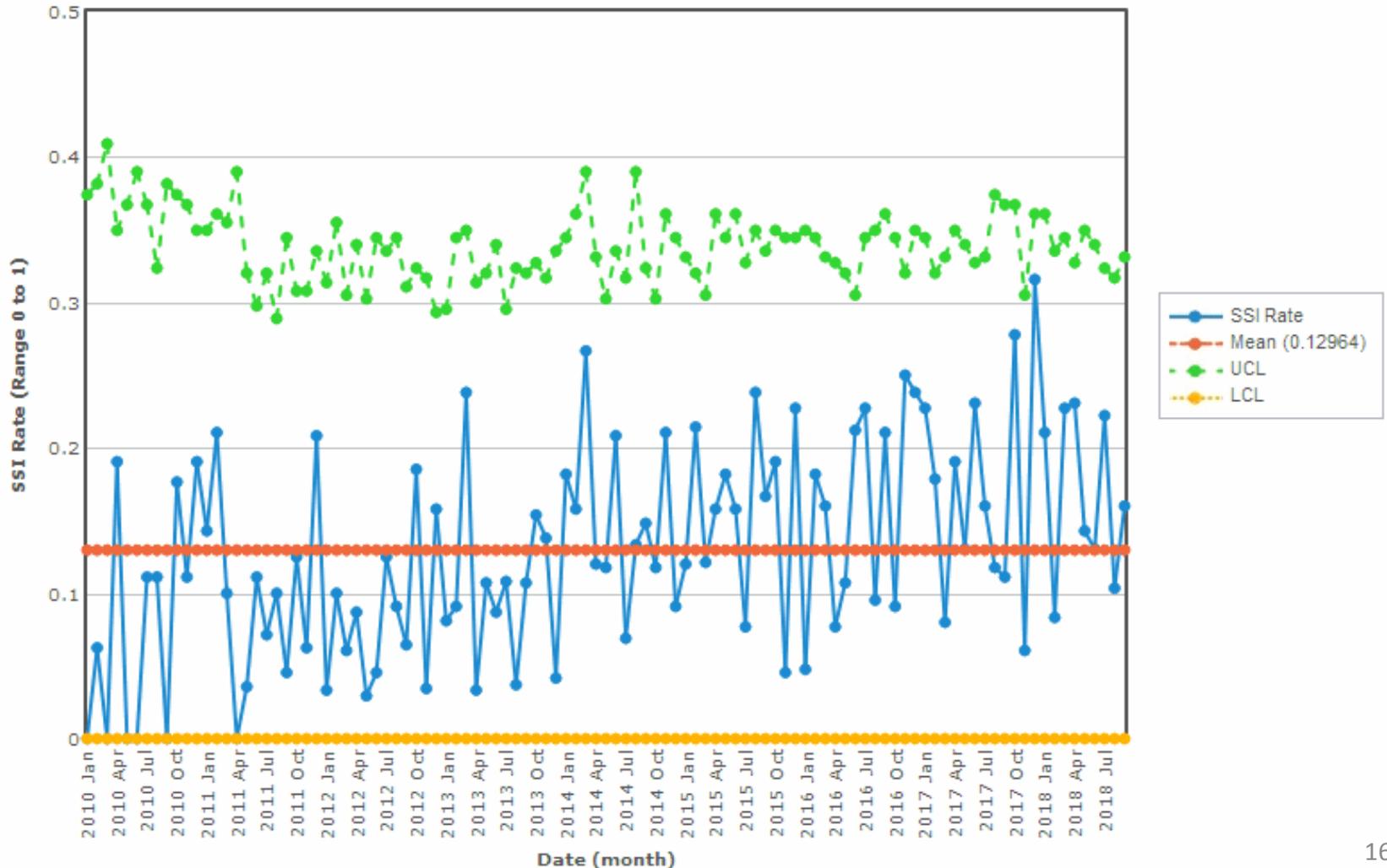
SSI Rates by Operative Procedure and Risk Index Category

The SSI rates per 100 operative procedures are calculated by dividing the number of SSIs by the number of specific operative procedures and multiplying the results by 100.

NH SN CODE	OPERATIVE PROCEDURE CATEGORY	DURATION CUT POINT (min)	RISK INDEX	01 Jan 2018 - 31 Dec 2018 NO. OF PROCEDURES	NO. OF SSI	SSI RATES PER 100 OPERATIVE PROCEDURES
APPY	Appendectomy	81	0	1	0	0
APPY	Appendectomy	81	1	5	0	0
APPY	Appendectomy	81	2	51	10	19.61
APPY	Appendectomy	81	3	10	0	0
			Sub-Total	67	10	14.93
LAP APPY	Lap Appendectomy	81	0	11	0	0
LAP APPY	Lap Appendectomy	81	1	90	6	6.67
LAP APPY	Lap Appendectomy	81	2	114	4	3.51
LAP APPY	Lap Appendectomy	81	3	22	1	4.55
			Sub-Total	237	11	4.64
BRST	Breast surgery	196	0	185	3	1.62
BRST	Breast surgery	196	1	50	1	2
BRST	Breast surgery	196	2	1	0	0
			Sub-Total	236	4	1.69
CHOL	Cholecystectomy	99	1	15	1	6.67
CHOL	Cholecystectomy	99	2	41	3	7.32
CHOL	Cholecystectomy	99	3	17	1	5.88
			Sub-Total	73	5	6.85
LAP CHOL	Lap Cholecystectomy	99	0	88	0	0
LAP CHOL	Lap Cholecystectomy	99	1	68	1	1.47
LAP CHOL	Lap Cholecystectomy	99	2	66	0	0
LAP CHOL	Lap Cholecystectomy	99	3	17	0	0
			Sub-Total	239	1	0.42
COLO	Colon surgery	187	0	33	2	6.06
COLO	Colon surgery	187	1	132	14	10.61
COLO	Colon surgery	187	2	89	16	17.98
COLO	Colon surgery	187	3	34	4	11.76
			Sub-Total	288	36	12.5
LAP COLO	Lap Colon surgery	187	0	29	2	6.9
LAP COLO	Lap Colon surgery	187	1	36	1	2.78

Control Charts for Trend Monitoring

STATISTIC FOR CONTROL - SSI RATE
FOR THE PERIOD OF 01 JAN 2010 TO 30 SEP 2018
CORE OT CODE: COLO



Feedback of SSI Rates at Hospital Level

Hospital ICT would

- monitor local SSI rates;
- provide performance feedback including SSI rate and surgical antibiotic prophylaxis compliance to the departments and surgeons quarterly;
- investigate to look into causes for high SSI rate;
- coordinate with the surgeons, OT and ward nurses to drive for improvements;
- report to infection control committee.

SSI Reduction Program for Colorectal Surgeries (Aug 2011)

Surgical Site Infection Reduction Programme for Colorectal Surgeries Information Sheet

Performance of Colon Surgery in HA hospitals (2008-2010)

Risk Index	HK 2008 SSI Rate per 100 procedures	HK 2009 SSI Rate per 100 procedures	HK 2010 SSI Rate per 100 procedures
0	5.842	6.667	5.296
1	10.000	9.491	8.807
2	21.782	20.097	16.873
3	32.822	42.857	38.462

Background
Surgical site infections (SSI) is one of the most common health care associated infections. Applying strategies for the prevention of surgical site infection helps to reduce surgical patients' morbidity, mortality and length of stay, and save cost for the healthcare institutions. SSI surveillance is mandatory in HA hospitals and SSI rate has been included as one of the key performance indicators (KPI) in HA hospitals since 2008. Among the core operations included in the SSI surveillance programme, results indicate that there are room for improvement in colon surgeries when comparing to overseas data. [1]

5 target actions have been identified:

1) Appropriate choice of antibiotics prophylaxis: Use Augmentin for surgical prophylaxis for colorectal surgeries. Comparing Augmentin with Cefuroxime plus metronidazole, Augmentin has additional coverage for the common *Enterococcus* species. *Enterococcus* spp. is the second commonest organisms isolated in SSI wounds of colorectal surgeries. The local resistance rate among *E. coli*, the commonest SSI pathogens for colorectal SSI, is also higher for Cefuroxime than for Augmentin. Among *E. coli* isolated in HA hospitals, prevalence of resistance towards Augmentin and Cefuroxime are 12% and 30% respectively.

2) Right timing of antibiotics prophylaxis: except for quinolones and vancomycin, antibiotics prophylaxis should be given at time of induction of anaesthesia or within 1 hours before surgical incision

3) Redose of surgical prophylaxis is needed if operation duration exceeds 2 half-lives of the antibiotics given or if massive intraoperative blood loss occur

Recommended redosing time for common surgical prophylaxis[2]

Antibiotics	Half-life (normal RFI)	Recommended redosing interval
Cefuroxime	1-2 hrs	3-4hrs
Metronidazole	8 hrs	8 hrs
Amoxicillin-clavulanate (Augmentin)	1.5 hrs	2-3 hrs
Ampicillin-sulbactam	1.2-1.5 hrs	2-3 hrs
Cefazolin	1.5-2 hrs	2-6 hrs
Vancomycin	5-11 hrs	6-12 hrs

4) Prevention of perioperative hypothermia: Keep post-operative core temperature >36°C. Thermoregulatory balance is compromised if anesthesia time is greater than one hour. The median duration for colon surgery was 150min. Mild perioperative hypothermia triggers thermoregulatory vasoconstriction. The reduced level of oxygen lowers resistance to infection and impaired wound healing. It has been shown SSI rate can triple if a patient became hypothermic in colorectal surgery.[3] Strategies for maintaining normothermia in patients include using warm IV fluids and warm blankets.

5) Use 2% chlorhexadine-in-alcohol for skin preparation
Comparing with povidone iodine, it has been shown that the use of 2% chlorhexadine in alcohol can reduce the overall SSI rate by 41% in clean contaminated surgeries particularly those superficial and deep incisional infections.[4]

1. Appropriate choice of antibiotic prophylaxis
2. Right timing of antibiotics prophylaxis
3. Redose of surgical prophylaxis is needed if operation duration exceeds 2 half-lives of the antibiotics given or if massive intraoperative blood loss occur
4. Prevention of perioperative hypothermia
5. Use 2% chlorhexadine-in-alcohol for skin preparation

References:
1. Simoons-Swift, et al., National Healthcare Safety Network (NHSN) report: data summary for 2008 through 2009, issued December 2009. Am J Infect Control, 2009, 37(10): p. 783-805.
2. SIOC and ICI, Recommendation on Prevention of Surgical Site Infection, 2009, Centre of Health Protection Department of Health (DH)
3. Burns, A., D.L. Sessler, and R. Lenhardt, Perioperative normothermia to reduce the incidence of surgical-wound infection and shorten hospitalization. Study of Wound Infection and Temperature Group. N Engl J Med, 2006, 354(10): p. 1229-35.
4. Derouiche, R.O., et al., Chlorhexidine-Alcohol versus Povidone-Iodine for Surgical-Site Antisepsis. N Engl J Med, 2010, 363(1): p. 18-26.

Data Analysis at Corporate Level

- SSI rates per 100 operative procedures are calculated for the different types of operative procedures and stratified by risk index.
- Standardized infection ratios (SIR) are also calculated using indirect standardization with CDC's National Healthcare Safety Network (NHSN) 2009, adjusted by ASA score, wound class and operation duration (O/E ratio).
- $SIR < 1$ indicates a better performance of HA.
- SSI rates and SIR, HA overall and by individual hospitals, are reported yearly.

O/E Ratio (standardized infection ratio)

- ▶ Ratio of observed to expected
 - ▶ Observed: primary target of interest
 - ▶ Expected: comparing group, e.g. from other unit, hospital, benchmark

$$SIR = \frac{\text{No. of observed infections (O)}}{\text{No. of expected infections (E)}}$$

- ▶ $SIR > 1$ → More observed than expected
- ▶ $SIR = 1$ → Observed equal to expected
- ▶ $SIR < 1$ → Less observed than expected

RESULTS OF SSI SURVEILLANCE HONG KONG 2017

All reported procedures by cluster, 2017

Procedures	HKE	HKW	KCC	KEC	KWC	NTE	NTW	Total
Cesarean section	852	955	1703		1249	1699	1595	8053
Dynamic Hip Screw	458	193	504	479	922	641	491	3688
Breast Surgery	382	542	286	447	1111	340	491	3599
Gallbladder Surgery	392	371	286	521	804	539	514	3427
Knee prosthesis	162	618	452	292	731	518	374	3147
Appendectomy	348	174	304	330	660	403	435	2654
Hip prosthesis	247	209	365	433	647	441	310	2652
Colon surgery	267	245	354	286	584	420	409	2565
Rectal surgery	133	131	142	144	246	111	85	992
Other musculoskeletal		925			59	1		985
Miscellaneous		626			3	41		670
Cardiac surgery		381	226			44		651
Thoracic surgery		359	267					626
CABG DONOR SITE (LEG)		163	201			159		523
CABG-chest & leg		165	184			141		490
Liver/pancreas		252				182		434
Laminectomy		123			116	145		384
Open reduction fracture		25			199		86	310
Herniorraphy with mesh		295						295
Spinal fusion		127			51	69		247
Other nervous system		193			9	1		203
Other Endocrine system		202						202
Other integumentary system		175						175
Small bowel surgery		52			5	73		130
Gastric surgery		18				89		107
Organ transplant		107						107
Herniorrhaphy		88						88
Skin graft		29						29
Laparotomy		11				12		23
Other genitourinary surgery		18						18
Other prosthesis		5			7			12
Splenectomy		11						11
CABG-chest only		5	1			3		9
CABG DONOR SITE (ARM)		3				5		8
Other cardiovascular system		6						6
Limb amputation		6						6
Other digestive surgery		3				1		4
Other hematologic / lymphatic		1						1
Total	3241	7812	5275	2932	7403	6078	4790	37531

SSI Results – HA corporate 2017

Core Operations		Risk Index*	2017			NHSN (Table 22)			p-value (2017 vs NHSN benchmark)				
			No. of SSI	No. of procedures	SSI Rate per 100 procedures	No. of SSI	No. of procedures	SSI Rate per 100 procedures					
Appendix surgery	Open	0,1	7	103	6.796	60	5,211	1.151	<0.001				
		2,3	44	302	14.570								
		All	51	405	12.593								
	Lap	0,1	36	1,464	2.459								
		2,3	47	785	5.987								
		All	83	2,249	3.691								
	Open & Lap	0,1	43	1,567	2.744					23	663	3.469	<0.001
		2,3	91	1,087	8.372								<0.001
		All	134	2,654	5.049								
Gallbladder surgery (Inpatient)	Open	0	0	12	0.000	15	6,481	0.231	0.001				
		1	3	271	1.107								
		2,3	33	407	8.108								
		All	36	690	5.217								
	Lap	0	10	991	1.009								
		1	8	780	1.026								
		2,3	24	848	2.830								
		All	42	2,619	1.604								
	Open & Lap	0	10	1,003	0.997					35	5,726	0.611	0.148
		1	11	1,051	1.047					42	2,445	1.718	<0.001
		2,3	57	1,255	4.542								
		All	78	3,309	2.357								

SSI Results – HA corporate 2017

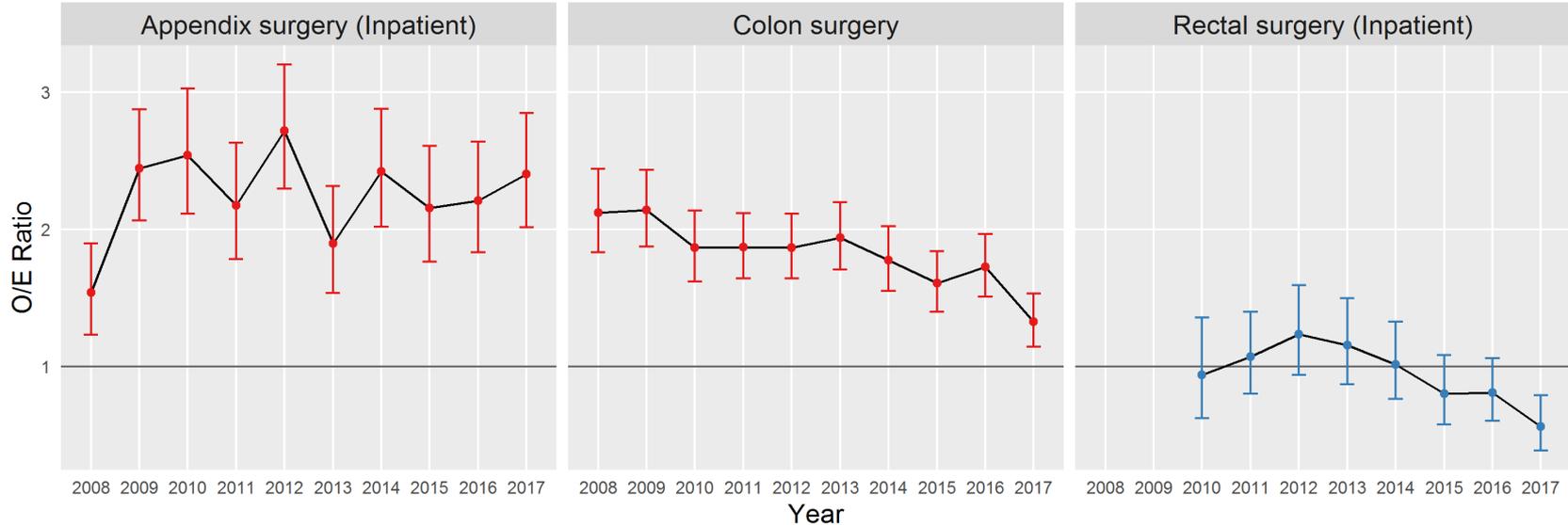
Core Operations		Risk Index*	2017			NHSN (Table 22)			p-value (2017 vs NHSN benchmark)				
			No. of SSI	No. of procedures	SSI Rate per 100 procedures	No. of SSI	No. of procedures	SSI Rate per 100 procedures					
Gallbladder surgery (Outpatient)	Open	0	0	0	NaN								
		1,2,3	0	0	NaN								
		All	0	0	NaN								
	Lap	0	0	62	0.000								
		1,2,3	1	56	1.786								
		All	1	118	0.847								
	Open & Lap	0	0	62	0.000					6	5,696	0.105	1.000
		1,2,3	1	56	1.786					15	4,379	0.343	0.184
		All	1	118	0.847								
Colon surgery	Open	0	28	366	7.650								
		1	67	692	9.682								
		2	50	428	11.682								
		3	11	70	15.714								
		All	156	1,556	10.026								
	Lap	0	5	415	1.205								
		1	21	462	4.545								
		2	6	125	4.800								
		3	0	4	0.000								
		All	32	1,006	3.181								
	Open & Lap	0	33	781	4.225					683	17,126	3.988	0.709
		1	88	1,154	7.626					1,686	30,159	5.590	0.005
		2	56	553	10.127					945	13,387	7.059	0.009
		3	11	74	14.865					139	1,468	9.469	0.155
		All	188	2,562	7.338								

SSI Results – HA corporate 2017

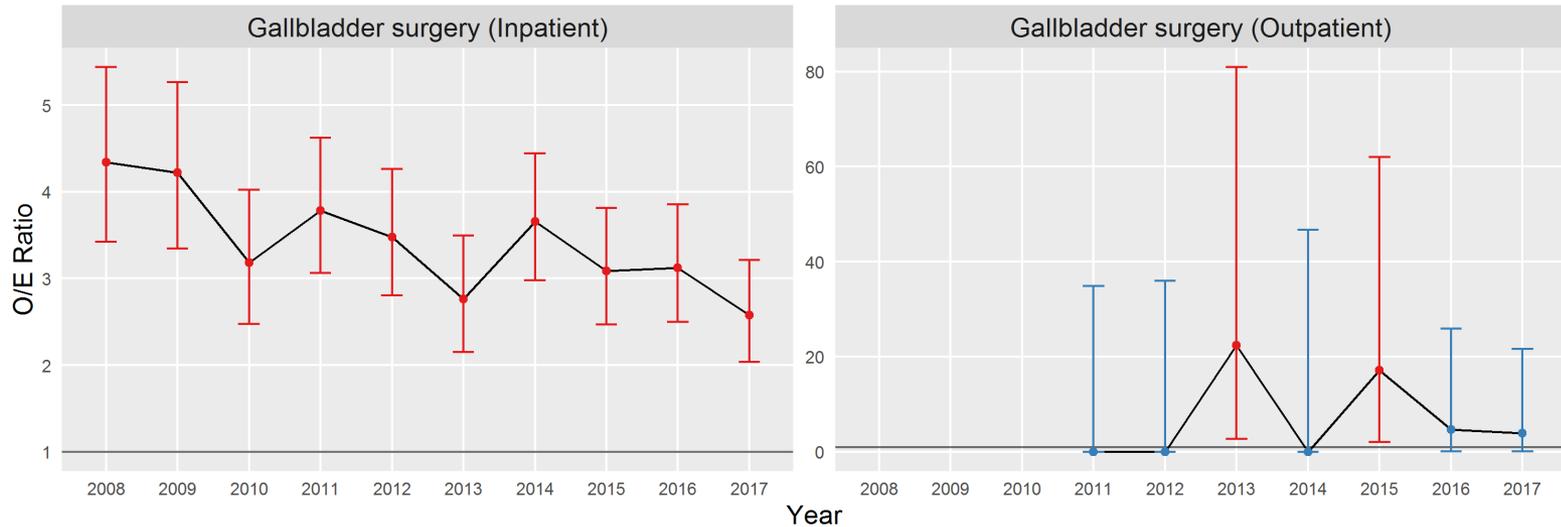
Core Operations		Risk Index*	2017			NHSN (Table 22)			p-value (2017 vs NHSN benchmark)
			No. of SSI	No. of procedures	SSI Rate per 100 procedures	No. of SSI	No. of procedures	SSI Rate per 100 procedures	
Rectal surgery	Open	0	0	64	0.000				
		1,2	9	133	6.767				
		3	1	4	25.000				
		All	10	201	4.975				
	Lap	0	6	417	1.439				
		1,2	17	369	4.607				
		3	0	3	0.000				
		All	23	789	2.915				
	Open & Lap	0	6	481	1.247	12	346	3.468	0.050
		1,2	26	502	5.179	62	776	7.990	0.055
		3	1	7	14.286	12	45	26.667	0.664
		All	33	990	3.333				
Breast surgery (Inpatient)	Open & Lap	0	23	2,479	0.928	14	1,478	0.947	1.000
		1	9	502	1.793	42	1,422	2.954	0.197
		2,3	0	22	0.000	15	236	6.356	0.625
		All	32	3,003	1.066				
Breast surgery (Outpatient)	Open & Lap	0	14	584	2.397	3	944	0.318	<0.001
		1,2,3	3	12	25.000	7	659	1.062	<0.001
		All	17	596	2.852				
Cesarean section	Open & Lap	0	88	5,395	1.631	409	70,675	0.579	<0.001
		1	43	2,417	1.779	786	79,653	0.987	<0.001
		2,3	7	241	2.905	333	20,855	1.597	0.116
		All	138	8,053	1.714				
Dynamic Hip Screw	Open & Lap	0	11	1,420	0.775				
		1	46	2,193	2.098				
		2	5	75	6.667				
		3	0	0	NaN				
		All	62	3,688	1.681				
Knee prosthesis	Open & Lap	0	6	1,826	0.329	409	70,675	0.579	0.206
		1	5	1,154	0.433	786	79,653	0.987	0.068
		2,3	1	142	0.704	333	20,855	1.597	0.731
		All	12	3,122	0.384				
Hip prosthesis	Open & Lap	0	8	965	0.829	334	49,576	0.674	0.547
		1	39	1,481	2.633	938	65,046	1.442	0.001
		2,3	7	202	3.465	379	15,769	2.403	0.348
		All	54	2,648	2.039				

SSI Results – HA corporate (Surgery)

SSI O/E Ratio using NHSN09 Benchmark (2008 - 2017)

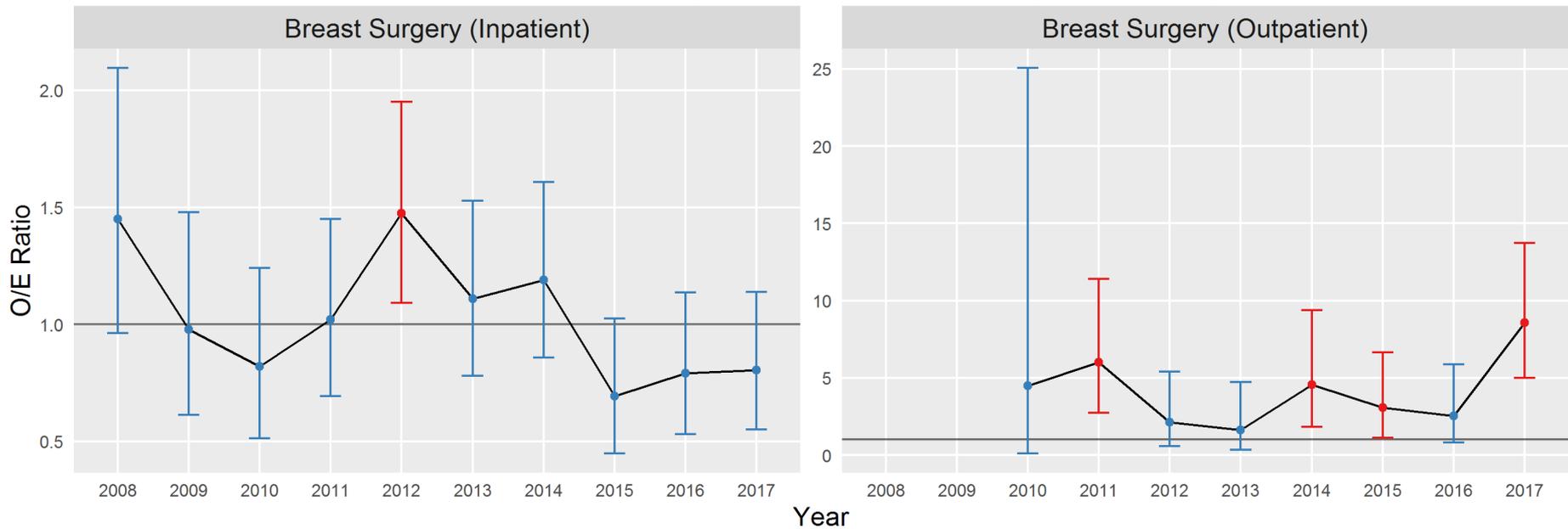


SSI O/E Ratio using NHSN09 Benchmark (2008 - 2017)



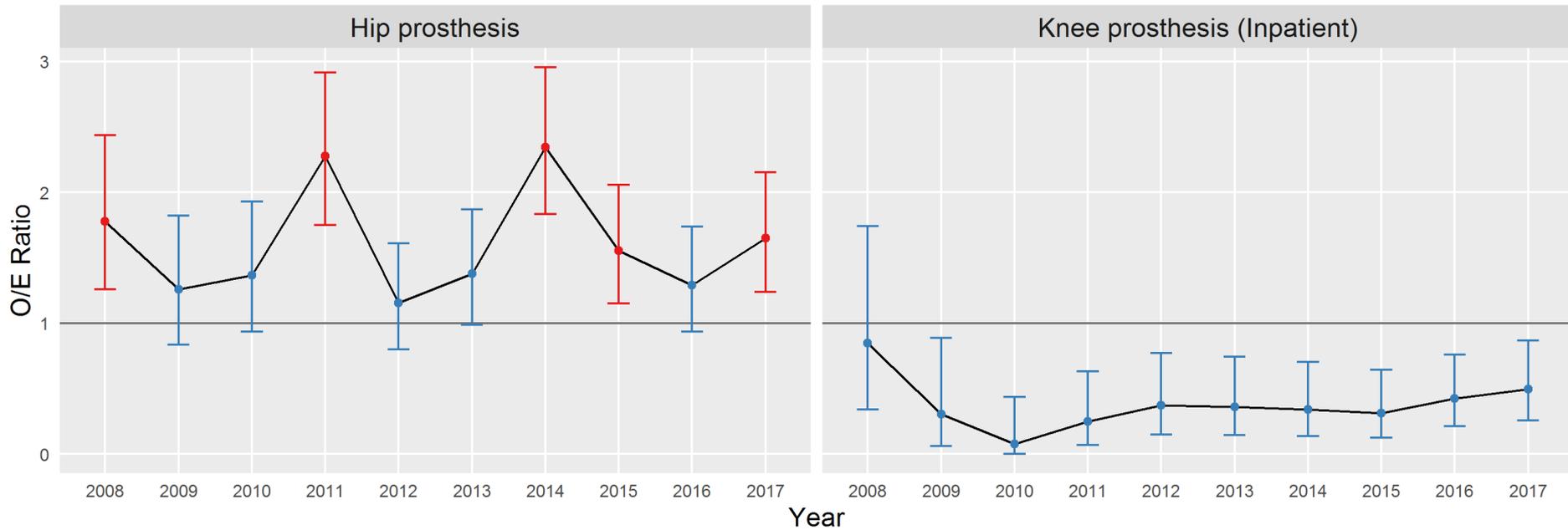
SSI Results - HA corporate (Surgery)

SSI O/E Ratio using NHSN09 Benchmark (2008 - 2017)



SSI Results - HA corporate (O&T)

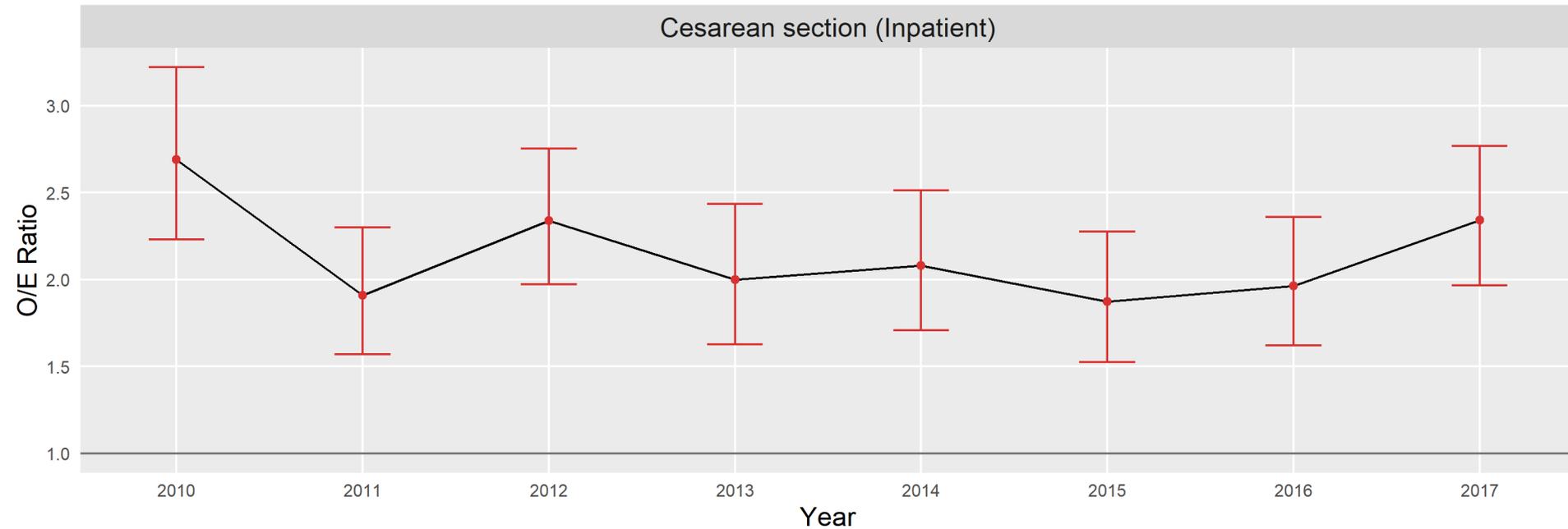
SSI O/E Ratio using NHSN09 Benchmark (2008 - 2017)



SSI Results - HA corporate (O&G)

SSI O/E Ratio using NHSN09 Benchmark (2008 - 2017)

Cesarean section (Inpatient)

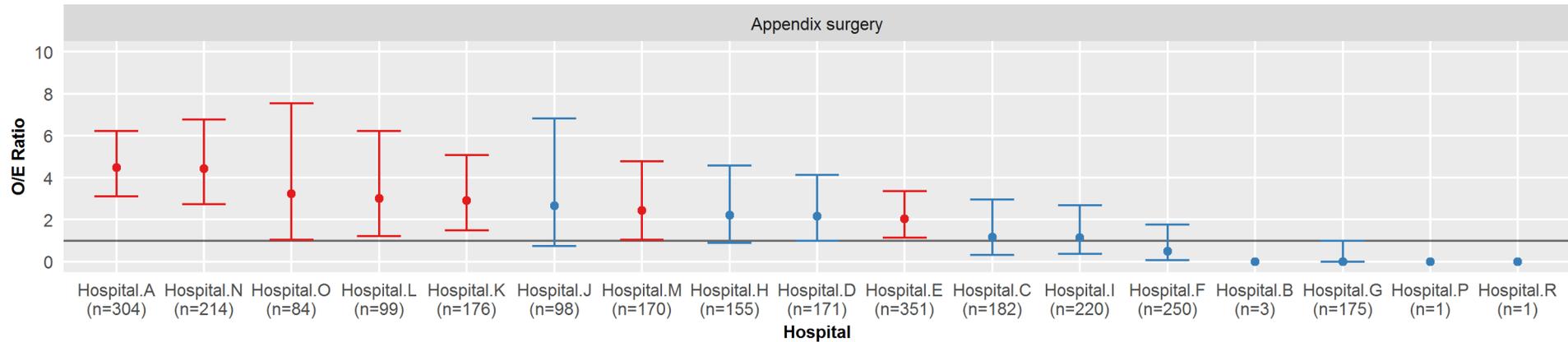


Comparing Hospitals 2017 with NHSN 2009

SSI Results – By hospital vs NHSN 2009 (Surgery)

SSI O/E Ratio for individual hospitals using NHSN09 Benchmark (2017)

Appendix surgery



*Confidence interval will not be shown if n < 50.

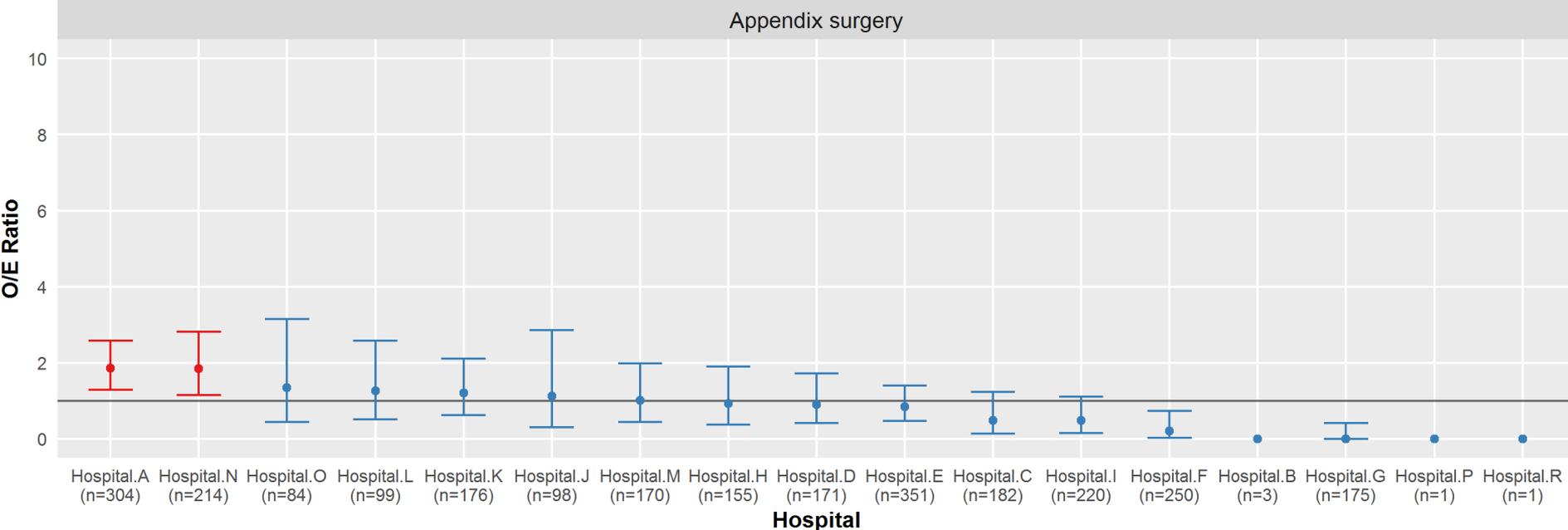
Hospitals with SSI significantly higher than NHSN 2009 benchmark in 2017

	Hospital																	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Appendix surgery	X				X						X	X	X	X	X			
Colon surgery	X											X						
Gallbladder surgery (Inpatients)	X					X		X	X		X	X	X					
Gallbladder surgery (Outpatients)																		
Rectal surgery																		
Breast surgery (Inpatients)																		
Breast surgery (Outpatients)	X								X		X							
Hip prosthesis								X				X						
Knee prosthesis																		
Cesarean section	X			X	X									X				

Comparing Hospital with HK Benchmark 2017

Individual Hospitals vs HA Corporate 2017 (Surgery)

SSI O/E Ratio for individual hospitals using HA 2017 Benchmark (2017)



*Confidence interval will not be shown if n < 50.

Hospitals with SSI significantly higher than HA Corporate benchmark in 2017

	Hospital																	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Appendix surgery	X													X				
Colon surgery	X																	
Gallbladder surgery (Inpatients)																		
Gallbladder surgery (Outpatients)																		
Rectal surgery																		
Breast surgery (Inpatients)	X																	
Breast surgery (Outpatients)											X							
Hip prosthesis																		
Knee prosthesis																		
Dynamic Hip Screw												X						
Cesarean section																		

DISCUSSION

Discussion

Corporate level:

- Review and update surveillance protocol
- Support surveillance system enhancement
- Internal and external benchmarking
- Collaborate with COC members related to SSI surveillance
- Formulate SSI reduction program for specific type of surgery

Role of Post-Discharge D30 Telephone Survey

Code	Procedure	No. of procedure	No. of total SSI	No. of SSI after discharge	% of SSI after discharge	Total SSI rate (per 100 procedure)	SSI rate without post discharge survey (per 100 procedure)	Median days from OT to infection	Median days from OT to discharge
CSEC	Cesarean section	8,053	138	124	89.9%	1.714	0.174	9	3
BRST	Breast Surgery	3,003	32	28	87.5%	1.066	0.133	18	2
KPRO	Knee prosthesis	3,122	12	10	83.3%	0.384	0.064	20	6
APPY	Appendix surgery	2,654	134	76	56.7%	5.049	2.185	9	6
CHOL	Gallbladder surgery	3,309	78	38	48.7%	2.357	1.209	7	9
HPRO	Hip prosthesis	2,648	54	24	44.4%	2.039	1.133	13	19
DHS	Dynamic Hip Screw	3,688	62	16	25.8%	1.681	1.247	13	22
REC	Rectal surgery	990	33	8	24.2%	3.333	2.525	11	25
COLO	Colon surgery	2,562	188	37	19.7%	7.338	5.894	8	19

Comparison with Surveillance (Protocol) in Other Countries

	NHSN 2009	Public Health England 2013	ECDC 2.2 2016	Australian 2017	NHS (National Service Scotland) 2017	WHO 2018	NHSN 2018
Surveillance Definition	CDC-NHSN	CDC-NHSN 2013	ECDC (~ as CDC-NHSN)	CDC-NHSN with local modification (refer to state and territory surveillance protocols)	CDC-NHSN 2015	CDC-NHSN 2017	CDC-NHSN 2018
Risk Stratification	NHSN (0-3)	NHNS (0-3) Also include BMI, gender, type of surgery (Em/EI)	NHSN (0-3)	NHSN (0-3)	NHSN (0-3)	NHSN (0-3) Also include age, sex, type of surgery(Em/EI), time and choice of antimicrobial prophylaxis	Depends on procedure including Diabetes, ASA score, gender, age, BMI.

Comparison with Surveillance (Protocol) in Other Countries

	NHSN 2009	Public Health England 2013	ECDC 2.2 2016	Australian 2017	NHS (National Service Scotland) 2017	WHO 2018	NHSN 2018
Criteria for selection of procedures		Common, Associated with high risk of infection or have far-reaching consequences when infection occur	Caesarean section, arthroplasty of hip and knee, cholecystectomy	Common procedures and other procedures like laminectomy, colectomy, appendectomy and cholecystectomy	Caesarean section Hip arthroplasty,	Common surgeries	Mandatory procedures: Colon surgery and abdominal hysterectomy surgery
Mandatory vs voluntary Procedures		Four mandatory orthopaedic modules (hip prosthesis, knee prosthesis, repair of neck of femur and reduction of long bone fracture)		Mandatory procedures were determined by states and territories	Elective large bowel and vascular procedures	In low-resource settings, prioritized types of surgeries could include caesarean section and/or open fracture reductions	

Comparison with Surveillance (Protocol) in Other Countries

	NHSN 2009	Public Health England 2013	ECDC2.2 2016	Australian 2017	NHS (National Service Scotland) 2017	WHO 2018	NHSN 2018
Benchmark	Pooled mean infection rate and percentile by Risk Index Category	Pooled Mean Rate for participating hospitals for the most recent 5 years	SSI rates across countries were compared with EU overall rates in the same year	Benchmarking against health service organizations	Comparison between NHS boards using national rate as benchmark	National networks allow inter-hospital comparisons and benchmarking	Model built by data of NHSN2015
Post-discharge Surveillance		Should cover 70% of operation by D30 questionnaire Detection at readmission Outpatient clinic FU Systematic review by community-based trained healthcare professional	Detection at readmission Outpatient clinic or private clinic FU IC staff obtains information from surgeon / patient using telephone, questionnaire	Case finding in the outpatient or primary care settings Regular auditing of outpatient records	Readmission surveillance for 30 days (voluntary for caesarean section) post operatively or 90 days if an implant is left in place Post operatively 10 days for caesarean section	Health posts or clinic FU Across the whole 30-day period, a total of three reviews of the patient is recommended. Ideally, these would be spaced out so that these occur at roughly the end of week 1, week 2 and week 4 Phone FU when face-to-face consultations are unfeasible	Review of medical records Visit ICUs & wards Surgeon survey by mail or phone Patient survey by mail or phone

Comparison with Surveillance (Protocol) in Other Countries

	NHSN 2009	Public Health England 2013	ECDC2.2 2016	Australian 2017	NHS (National Service Scotland) 2017	WHO 2018	NHSN 2018
Discontinuation of Surveillance		Day 30 if no implant 1 year for deep or organ/space infections if implant is in place	Day 30 if no implant Day 90 for deep or organ/space infections if implant is in place	Day 30 if no implant 1 year if an implant is in place	Day 30 if no implant Day 90 if an implant is in place	Day 30	Day30 or 90 depends on procedure
Incidence							
SSI per 100 procedures	Y	Y	Y	Y	Y	Y	Y
SSI per 1000 patient days	N	N	Y	N	Y	N	N

Comparison with Surveillance (Protocol) in Other Countries

	NHSN 2009	Public Health England 2013	ECDC2.2 2016	Australian 2017	NHS (National Service Scotland) 2017	WHO 2018	NHSN 2018
Data Feedback		<p>Identifying hospital with high or low rates of SSI</p> <p>Feedback results to ward and theatre staff</p>	<p>The result from the surveillance provides European reference data for adjusted SSI rates and compliance with key preventive measures</p>	<p>One to one during teaching</p> <p>Unit-based data fed back during IC ward rounds and departmental meetings</p> <p>Trend data for comparison</p> <p>Public reporting</p> <p>Benchmarking against health service organization</p>	<p>Active feedback to all members of the surveillance team (e.g. surgeons, ward and theatre staff, community staff, infection control team and management)</p> <p>Reports are available on SSIRS which enables facility to compare local data with national</p>	<p>Large handwritten wallcharts</p> <p>Morbidity and mortality meetings (or equivalent)</p> <p>Direct discussion with individual surgeons</p>	<p>Feedback results to surgeons</p> <p>Between State and State-National comparison is available</p>

Thank You