Nursing Infection Prevention Leaders Academy Brown Bag Session – Surgical Site Infections
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The Definition of a Surgical Site Infection (SSI)

What is it?

An infection occurring within 30 or 90 days after a surgical procedure completed in an Operating Room (This may include an operating room, C-Section room, interventional radiology room, or a cardiac catheterization lab).

But wait…didn't it used to be up to 1 year?

Yes, however, the NHSN definitions changed in 2013 from 1 year to 90 days for certain procedures.

The majority of SSIs will occur during the first two to three weeks after surgery (Ramos et al. 2008).

The Nuts and Bolts of SSI Surveillance


CDC
CENTERS FOR DISEASE™
CONTROL AND PREVENTION


NHSN
National Healthcare
Safety Network

SSI Surveillance

- AAA
- Appendectomy
- Biliary surgery
- Cardiac
- CABG (CBGB/CBGC)
- Gall Bladder
- Colon
- Craniotomy
- C-section
- Spinal Fusion
- Refusion of Spine
- ORIF
- Gastric
- Hysterectomy (Abdominal and Vaginal)
- Hip Replacement
- Knee Replacements
- Kidney Transplant
- Heart Transplant
- Laminectomy
- Nephrectomy
- Ovary
- Pacemaker
- Rectal
- Small Bowel
- Splenectomy
- Thoracotomy
- Exploratory Laparotomy
- Craniotomy
- Ventricular Shunt

SSI Surveillance methodology at UCLA

#SSI

 # procedures per surgical category

X 100

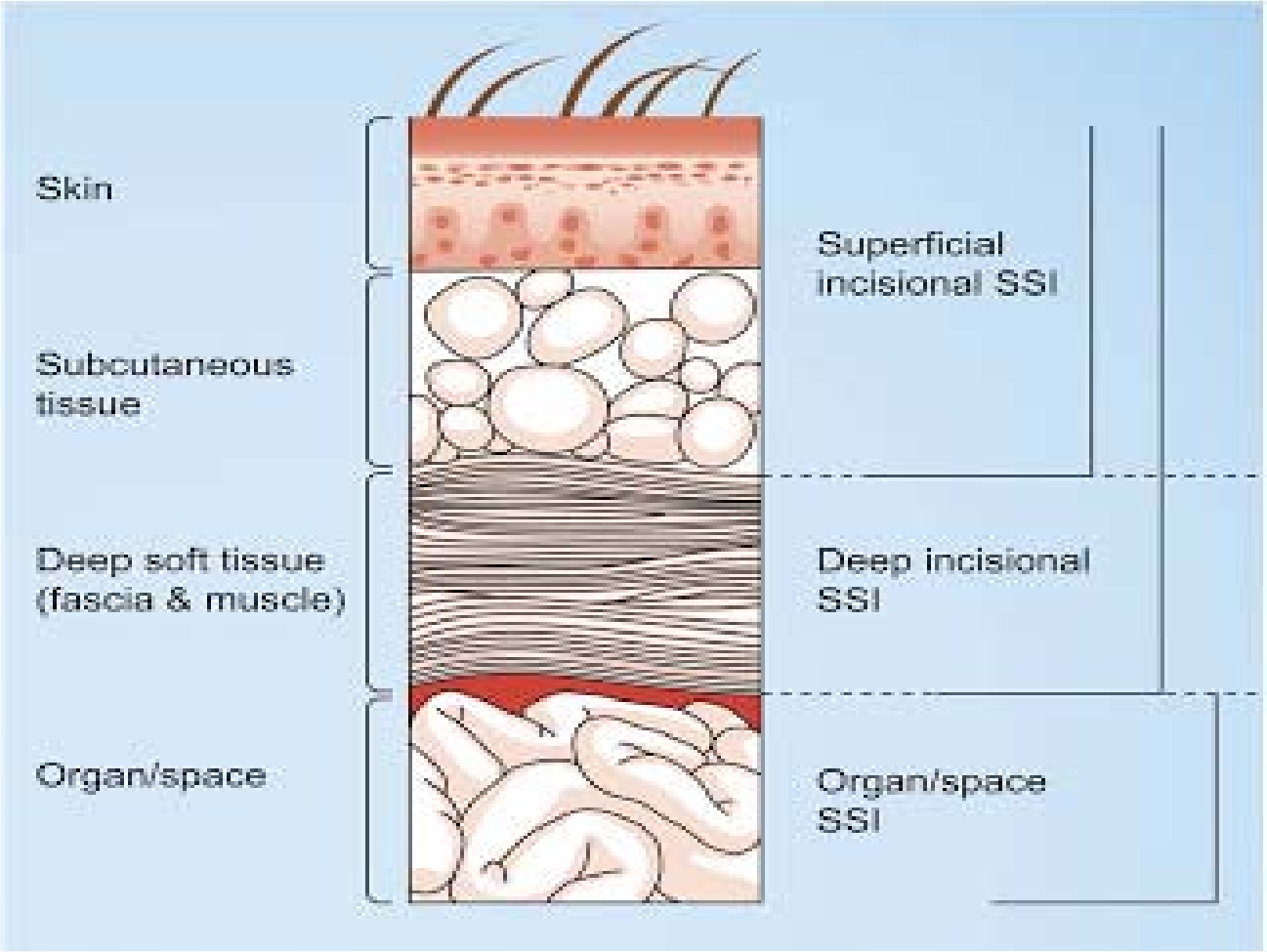
Post-discharge report using 26 ICD-9 codes
OR schedule for I & D, revision
Admissions Report
Positive Cultures (wounds, drains, etc)

Surgical procedure data from Care Connect
Cleaned-up by Infection Prevention

CDC considers an infection at surgical site an SSI for **30 days or 90 days depending on procedure**

CDC Classification of SSIs

For surveillance/regulatory reporting, follow CDC's definitions of classifying what type of infection – 3 categories based off of where infection takes place



Superficial SSI

Superficial incisional SSI

Must meet the following criteria:

Infection occurs within 30 days after any NHSN operative procedure (where day 1 = the procedure date), including those coded as 'OTH'*

and

involves only skin and subcutaneous tissue of the incision

and

patient has at least one of the following:

a. purulent drainage from the superficial incision.
b. organisms isolated from an aseptically-obtained culture of fluid or tissue from the superficial incision.
c. superficial incision that is deliberately opened by a surgeon, attending physician** or other designee and is culture positive or not cultured

   and

   patient has at least one of the following signs or symptoms: pain or tenderness; localized swelling; redness; or heat. A culture negative finding does not meet this criterion.
d. diagnosis of a superficial incisional SSI by the surgeon or attending physician** or other designee .

Deep SSI

Deep incisional SSI

Must meet the following criteria:

Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 3

and

involves deep soft tissues of the incision (e.g., fascial and muscle layers)

and

patient has at least one of the following:

a. purulent drainage from the deep incision.

b. a deep incision that spontaneously dehisces or is deliberately opened by a surgeon, attending physician** or other designee and is culture-positive or not cultured

and

patient has at least one of the following signs or symptoms: fever (>38°C); localized pain or tenderness. A culture-negative finding does not meet this criterion.

c. an abscess or other evidence of infection involving the deep incision that is detected on direct examination, during invasive procedure, or by histopathologic examination or imaging test.

Organ Space SSI

Organ/Space SSI

Must meet the following criteria:

Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 3

and

infection involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure

and

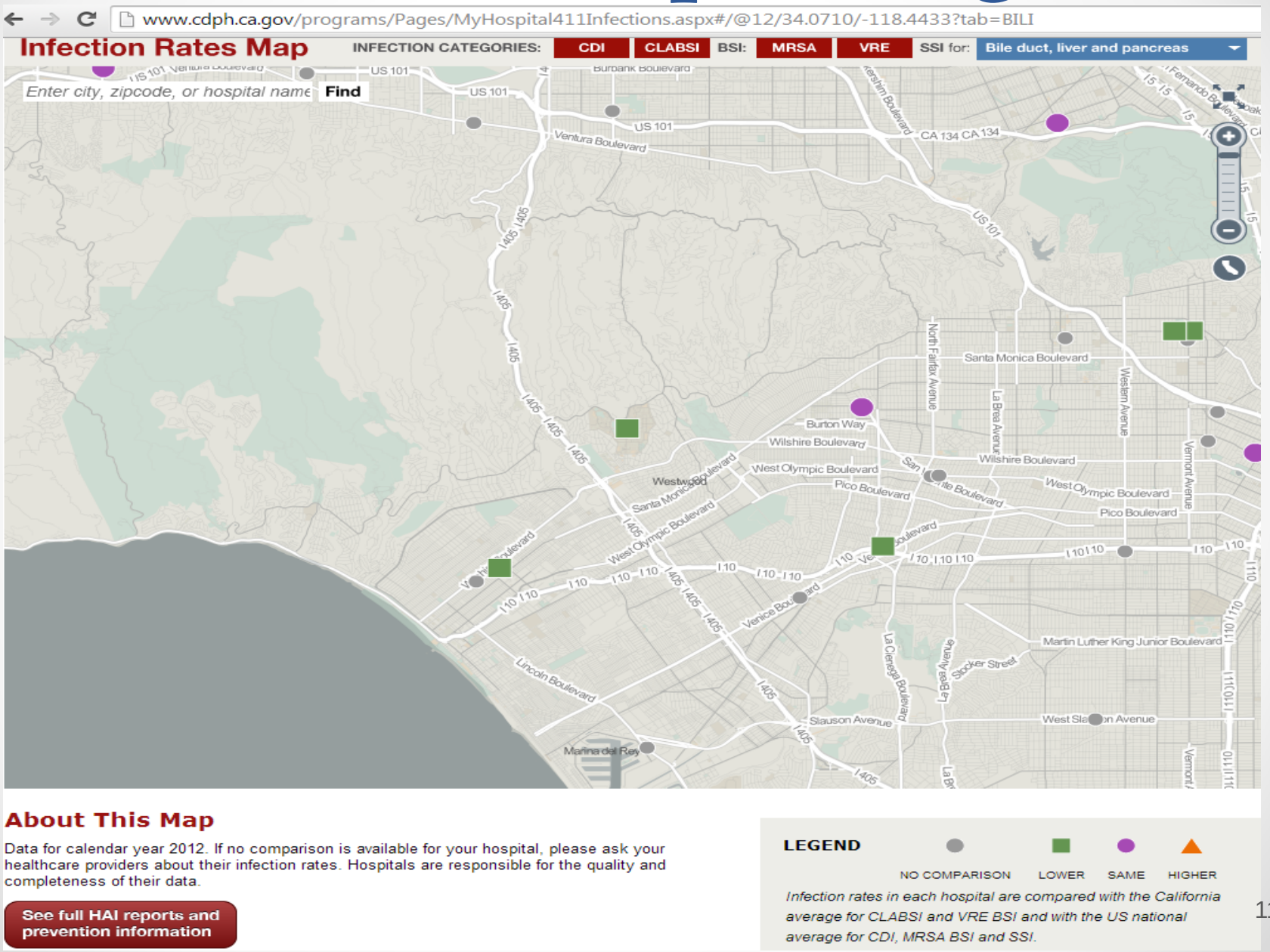
patient has at least one of the following:

a. purulent drainage from a drain that is placed into the organ/space
b. organisms isolated from an aseptically-obtained culture of fluid or tissue in the organ/space
c. an abscess or other evidence of infection involving the organ/space that is detected on direct examination, during invasive procedure, or by histopathologic examination or imaging test

and

meets at least one criterion for a specific organ/space infection site listed in Table 4.

Public Reporting



Infection		RRUMC		SMH	
		CDPH[1]	CMS[2]	CDPH[1]	CMS[2]
CLABSI		13 same 1 worse	better	10 same 1 worse	same
	VRE	worse		same	
	MRSA	same		same	
SSI	Liver	better		--	
	C-section	same		same	
	Colon	better	worse	same	same
	CAGB	same			
	Fracture repair	same		same	
	Hip Rep			same	
	Knee Rep			same	
	Small Bowel	same		same	
	Spine Fusion			same	
CAUTI			same		Same

[1]CDPH = Califronia Dept of Public Health
[2]CMS = Medicare Services, Hospital Compare. org

Snapshot: SSI Preventionist's Role

- Time spent in ORs, SPD areas, PACU
- Meeting with different surgical services, anesthesia, surgical departments (includes educational presentations & collaborative projects to reduce SSIs, consultant role)
- Consult with ambulatory areas performing sterilizing/processing or high-level disinfection (HLD)
- Monitor construction projects that involve surgical areas
- Committees (leadership buy-in critical)
- Quality improvement projects and root-cause analysis (when necessary) looking at patient safety concerns as related to surgery


WHY YOU SHOULD CARE!

- 230 million surgeries per year worldwide
- - More common than births (36 million per year)
- - 1 in 25 people undergo surgery each year
- 25% of in-patient surgeries are followed by complication
- - 7 million disabling complications each year
- 0.5 – 5% of patient deaths following surgery
- - 1 million deaths per year
- 50% of all hospital adverse events linked to surgery
- - At least 50% of adverse surgical events are avoidable

- http://www.who.int/patientsafety/challenge/safe.surgery/en

SSIs…They're Expensive

Increases Length of Hospital Stay

- Approx. 7-10 additional postoperative hospital days

Raises Cost

- $3,000-$29,000 per SSI (depending on procedure & pathogen)
- Up to $10 billion annually in the US alone

** Most estimates are based on inpatient costs at time of index operation and do not account for the additional costs of readmissions, post-discharge outpatient expenses, and long term disabilities*

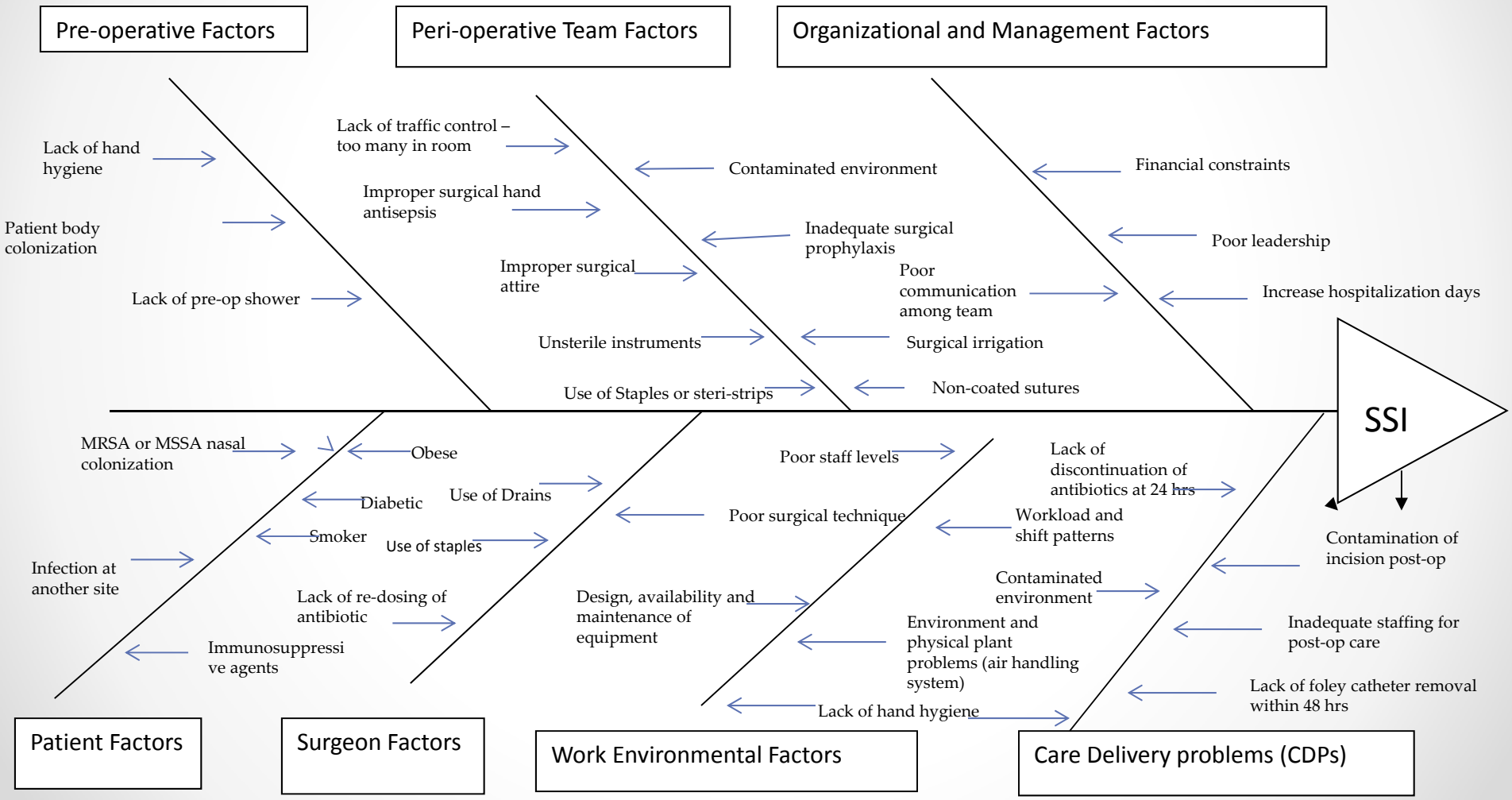
Anderson DJ, etal. Strategies to prevent surgical site infections in acute care hospitals. Infect Control Hosp Epidemiol 2008;29:S51-S61 for individual references

…And They Can Destroy Lives

- http://www.ihi.org/resources/Pages/AudioandVideo/OneIsTooManyViewingInfectionDatafromPatientsPerspective.aspx

Risk is a Myriad Event

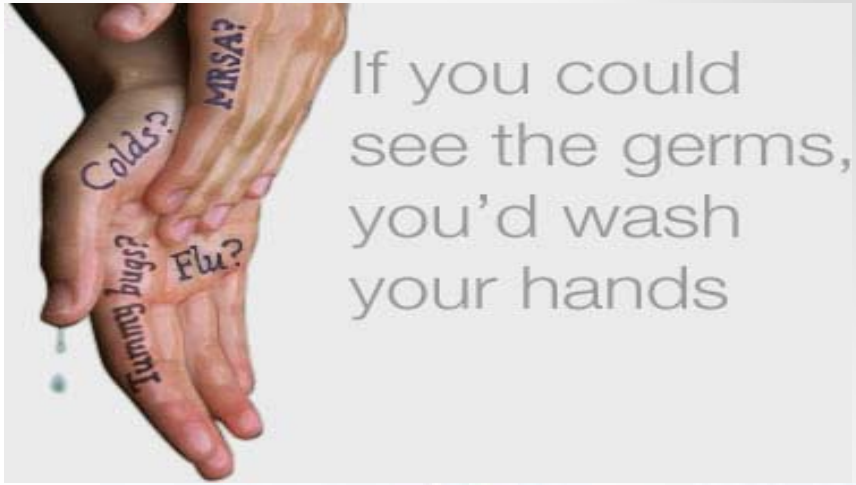
SSI Fishbone Diagram

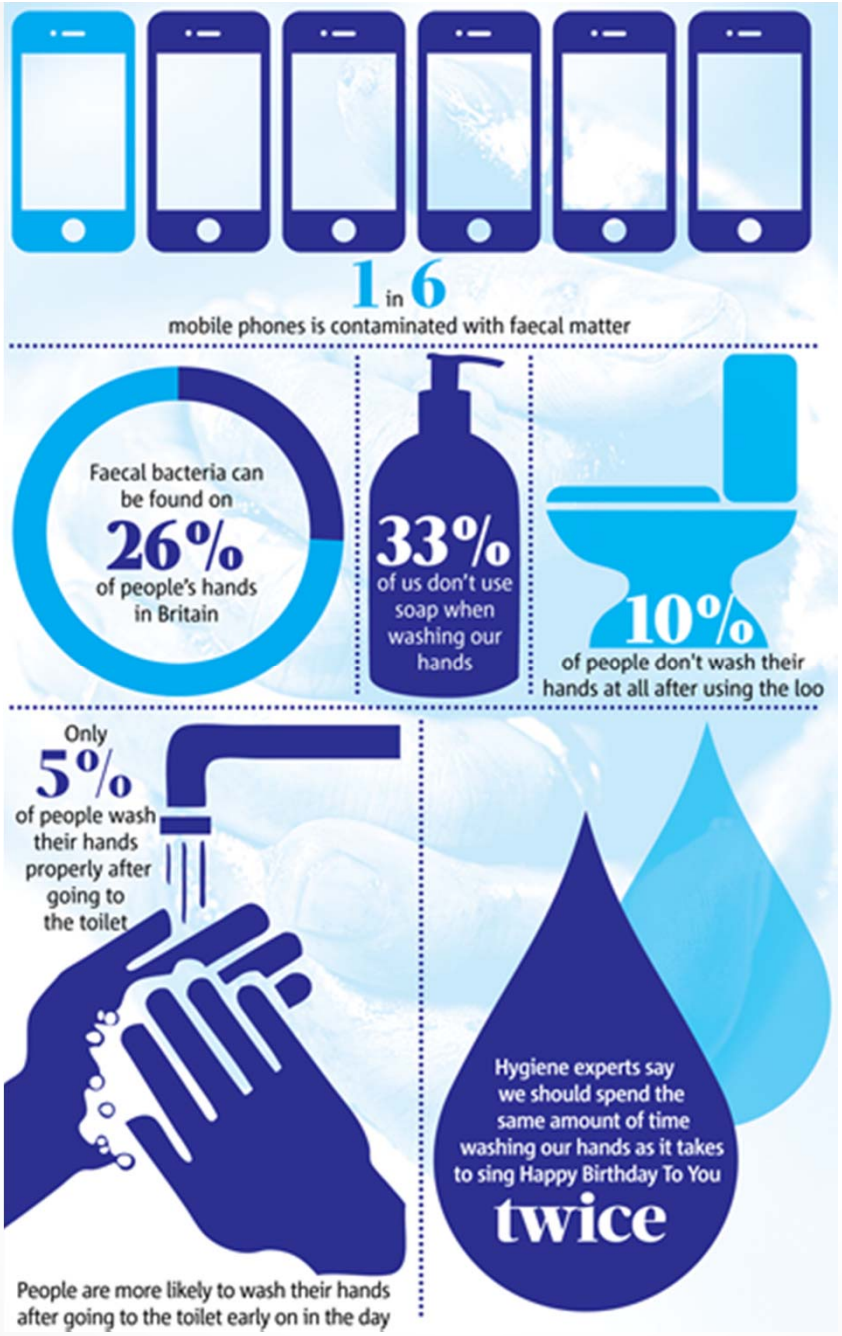


How can I make a

difference?

"Wait, this one's a lawyer. We'd better wash our hands."




1 in 6
mobile phones is contaminated with faecal matter
Faecal bacteria can be found on
26%
of people's hands in Britain
33%
of us don't use soap when washing our hands
10%
of people don't wash their hands at all after using the loo
Only
5%
of people wash their hands properly after going to the toilet
People are more likely to wash their hands after going to the toilet early on in the day
Hygiene experts say we should spend the same amount of time washing our hands as it takes to sing Happy Birthday To You
twice

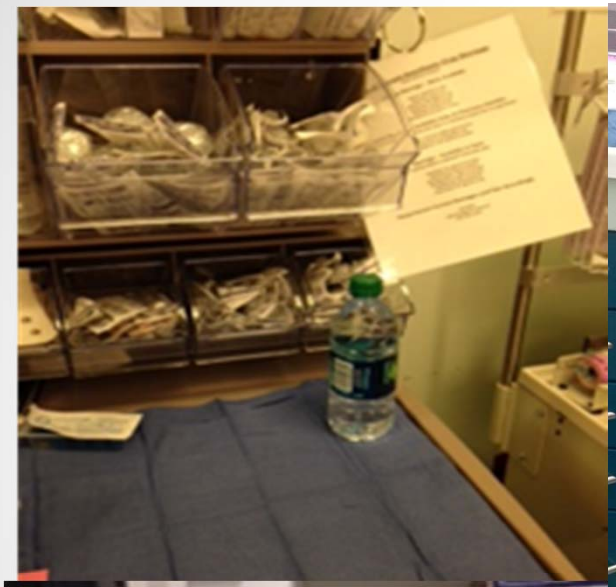
Pre-Operative

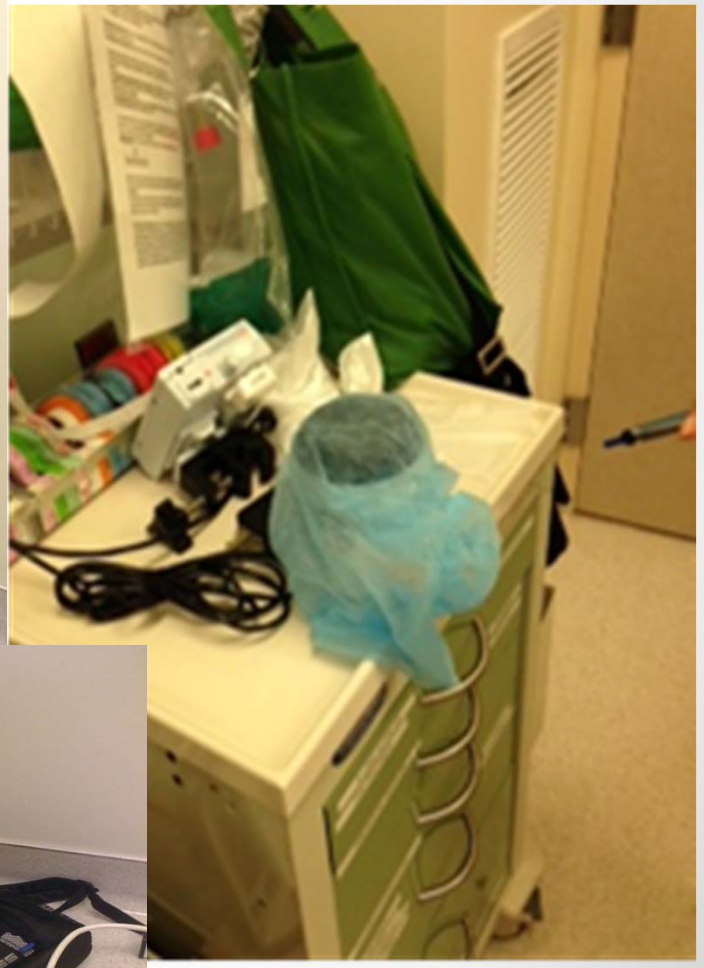
- Education
- Patient Advocate
- S. aureus decolonization
- Chlorhexidine bathing
- Help patients stay warm prior to going back to the OR

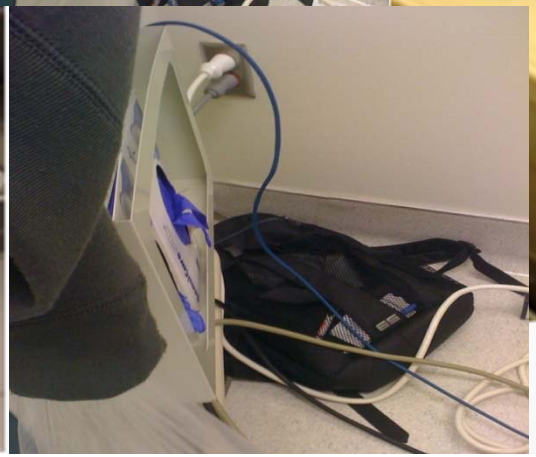
Peri-operative

- Evaluate whether you have a safe OR:
  - Traffic control (includes limiting number of staff in the room during surgery, number of in/out doors during surgery; doors should not be propped open)
  - Compliance with surgical attire
  - Proper surgical skin scrub
  - Proper skin prep with alcohol based antiseptics
  - Effective sterilization of instruments
  - Monitoring and preventive maintenance of air handling systems
  - Adequate surgical prophylaxis
  - Warming of the patient before and during surgery
  - Hair clipping (no shaving) outside the operating room
  - Use of wound separators to prevent tissue contamination
  - Careful handling of tissues by surgical staff
  - Disinfection of the environment during room turnovers and terminal cleaning
  - Safe medication handling procedures
  - Safe storage of supplies.

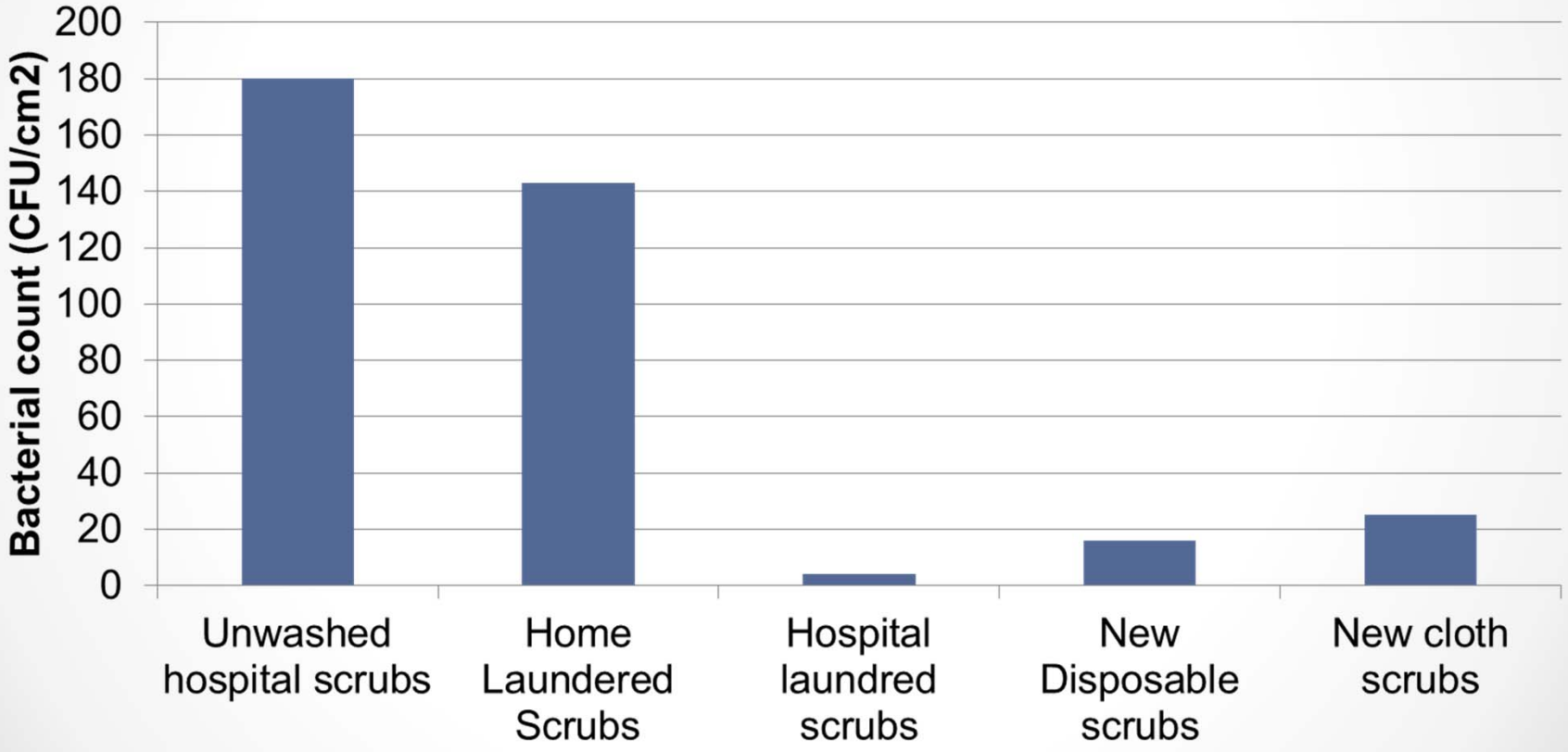
If it were your surgery would you be ok with this?





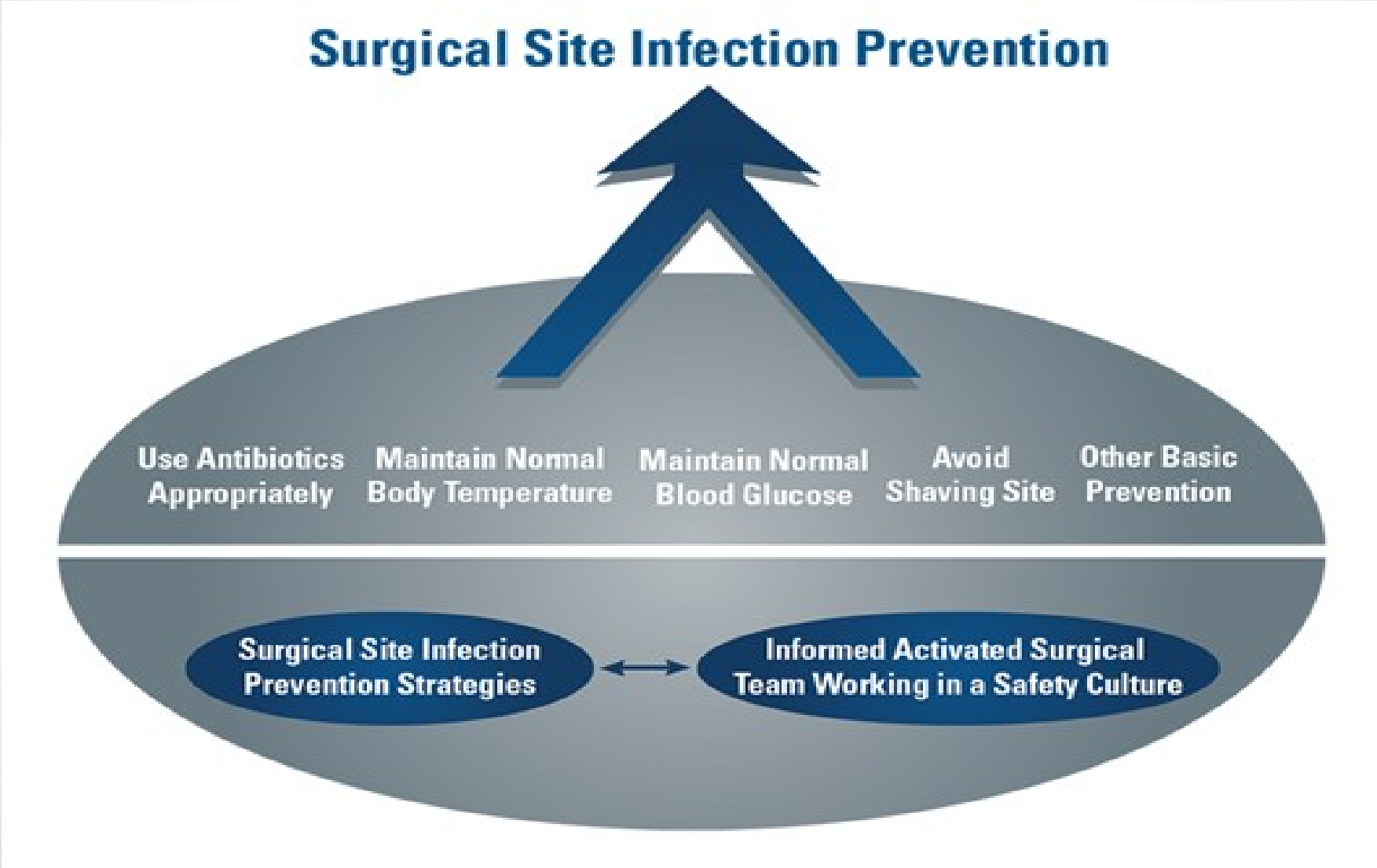


Home laundered v. hospital laundered scrubs

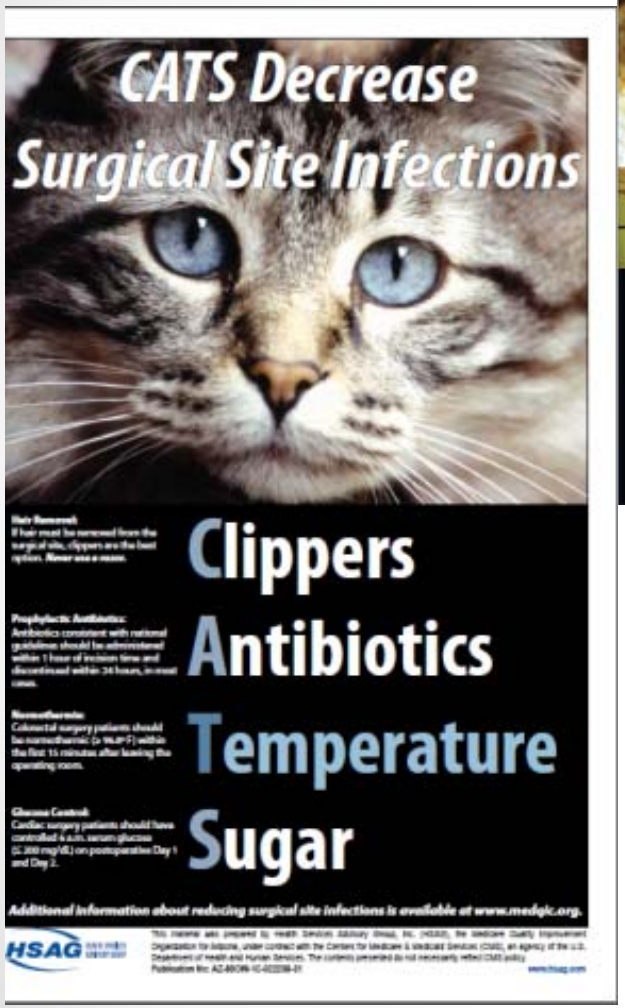


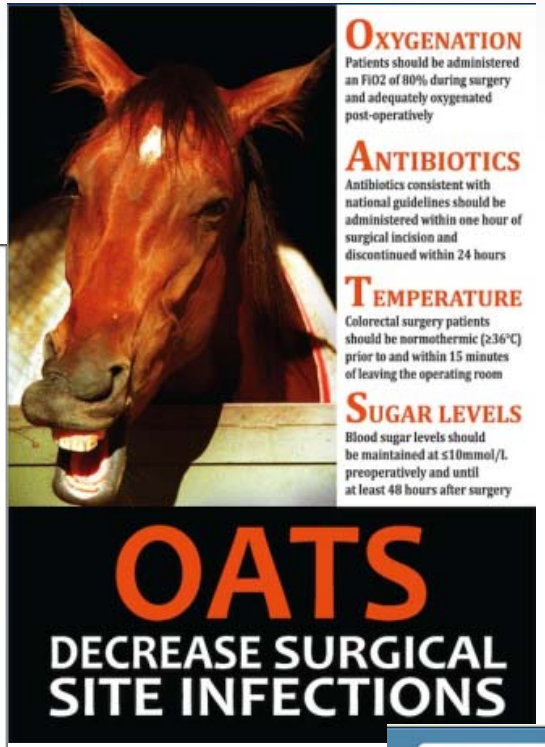
- Nordstrom et al. Am J Infec Cont. 40(2012) 539-43

Peri-operative



- http://www.kchealthcare.com/hai-watch/hai-threats-solutions/surgical-site-infections.aspx





BEAGLES stands for:

B: Beta Blockers

E: Environmental Control

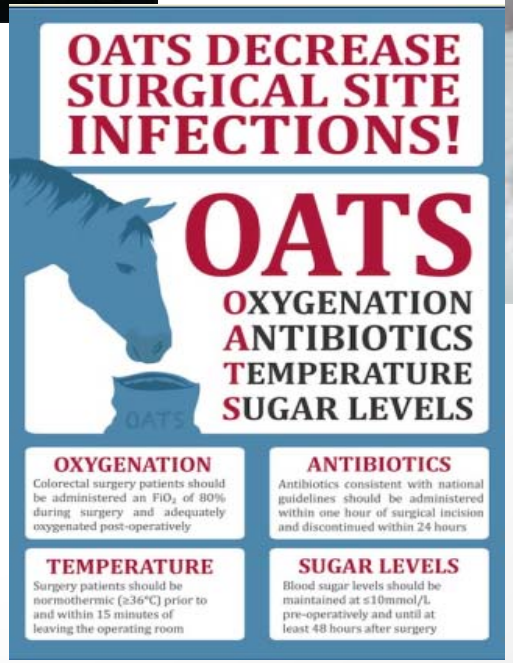
A: Antibiotics

G: Glucose Control

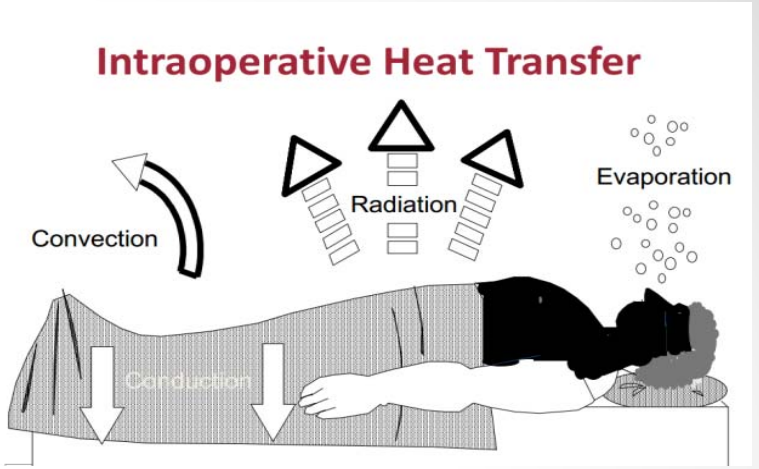
L: Leadership Support

E: Embolism Prevention

S: Skin Preparation



Peri-operative

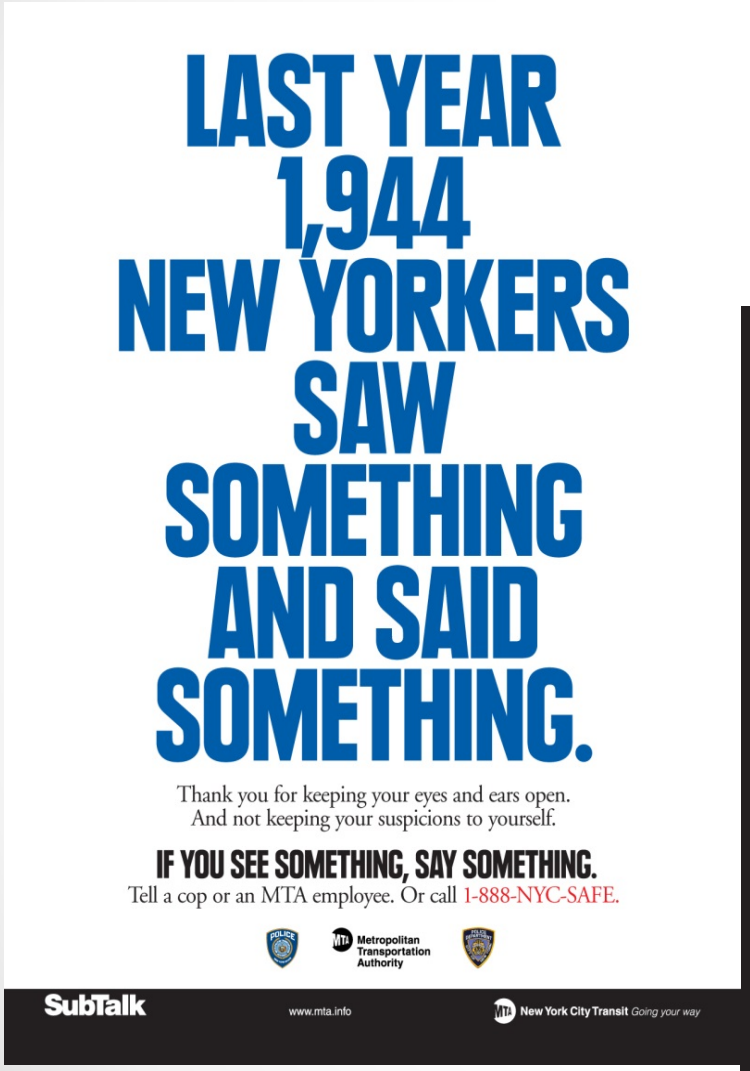


- Help to maintain Normothermia

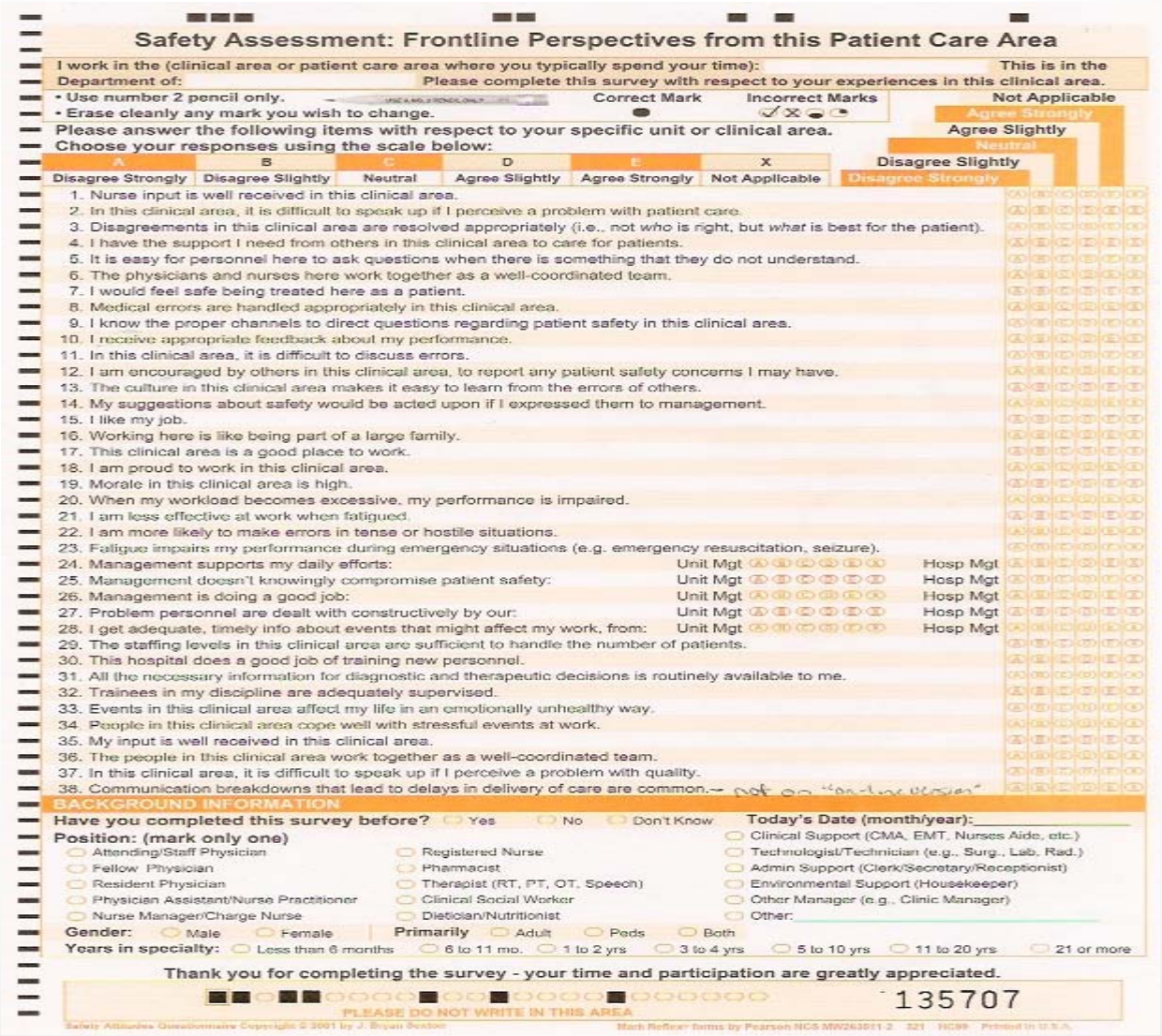
"correlated impaired wound healing, adverse cardiac events, altered drug metabolism with *hypothermia"*

"study by Kurtz, et al (1996), found that incidence of culture-positive surgical site infections among those with mild perioperative hypothermia was three times higher than the normothermic perioperative patients. In this study, mild perioperative hypothermia was associated with delayed wound closure and prolonged hospitalization. In a meta-analysis of outcomes and costs, Mahoney and Odom (1999), demonstrated that hypothermia is associated with a significant increase in adverse outcomes, including an increased incidence of infections. The authors also concluded that hypothermia is associated with an increased chance of blood products administration, myocardial infarction, and mechanical ventilation. These adverse outcomes resulted in prolonged hospital stays and increased healthcare expenditures."

Culture of Safety/Just Culture



Safety Attitudes Questionnaire (SAQ)



Safety Assessment: Frontline Perspectives from this Patient Care Area

I work in the (clinical area or patient care area where you typically spend your time): This is in the
Department of: Please complete this survey with respect to your experiences in this clinical area.

- Use number 2 pencil only. Correct Mark Incorrect Marks
- Erase cleanly any mark you wish to change.

Please answer the following items with respect to your specific unit or clinical area.
Choose your responses using the scale below:

A	B	C	D	E	X
Disagree Strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly	Not Applicable

Not Applicable
Agree Strongly
Agree Slightly
Neutral
Disagree Slightly
Disagree Strongly

1. Nurse input is well received in this clinical area.
2. In this clinical area, it is difficult to speak up if I perceive a problem with patient care.
3. Disagreements in this clinical area are resolved appropriately (i.e., not *who* is right, but *what* is best for the patient).
4. I have the support I need from others in this clinical area to care for patients.
5. It is easy for personnel here to ask questions when there is something that they do not understand.
6. The physicians and nurses here work together as a well-coordinated team.
7. I would feel safe being treated here as a patient.
8. Medical errors are handled appropriately in this clinical area.
9. I know the proper channels to direct questions regarding patient safety in this clinical area.
10. I receive appropriate feedback about my performance.
11. In this clinical area, it is difficult to discuss errors.
12. I am encouraged by others in this clinical area, to report any patient safety concerns I may have.
13. The culture in this clinical area makes it easy to learn from the errors of others.
14. My suggestions about safety would be acted upon if I expressed them to management.
15. I like my job.
16. Working here is like being part of a large family.
17. This clinical area is a good place to work.
18. I am proud to work in this clinical area.
19. Morale in this clinical area is high.
20. When my workload becomes excessive, my performance is impaired.
21. I am less effective at work when fatigued.
22. I am more likely to make errors in tense or hostile situations.
23. Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).
24. Management supports my daily efforts: Unit Mgt Hosp Mgt
25. Management doesn't knowingly compromise patient safety: Unit Mgt Hosp Mgt
26. Management is doing a good job: Unit Mgt Hosp Mgt
27. Problem personnel are dealt with constructively by our: Unit Mgt Hosp Mgt
28. I get adequate, timely info about events that might affect my work, from: Unit Mgt Hosp Mgt
29. The staffing levels in this clinical area are sufficient to handle the number of patients.
30. This hospital does a good job of training new personnel.
31. All the necessary information for diagnostic and therapeutic decisions is routinely available to me.
32. Trainees in my discipline are adequately supervised.
33. Events in this clinical area affect my life in an emotionally unhealthy way.
34. People in this clinical area cope well with stressful events at work.
35. My input is well received in this clinical area.
36. The people in this clinical area work together as a well-coordinated team.
37. In this clinical area, it is difficult to speak up if I perceive a problem with quality.
38. Communication breakdowns that lead to delays in delivery of care are common.

BACKGROUND INFORMATION

Have you completed this survey before? Yes No Don't Know Today's Date (month/year):

Position: (mark only one)

- Attending/Staff Physician
- Fellow Physician
- Resident Physician
- Physician Assistant/Nurse Practitioner
- Nurse Manager/Charge Nurse
- Registered Nurse
- Pharmacist
- Therapist (RT, PT, OT, Speech)
- Clinical Social Worker
- Dietician/Nutritionist
- Clinical Support (CMA, EMT, Nurses Aide, etc.)
- Technologist/Technician (e.g., Surg., Lab, Rad.)
- Admin Support (Clerk/Secretary/Receptionist)
- Environmental Support (Housekeeper)
- Other Manager (e.g., Clinic Manager)
- Other:

Gender: Male Female Primarily Adult Peds Both

Years in specialty: Less than 6 months 6 to 11 mo. 1 to 2 yrs 3 to 4 yrs 5 to 10 yrs 11 to 20 yrs 21 or more

Thank you for completing the survey - your time and participation are greatly appreciated.

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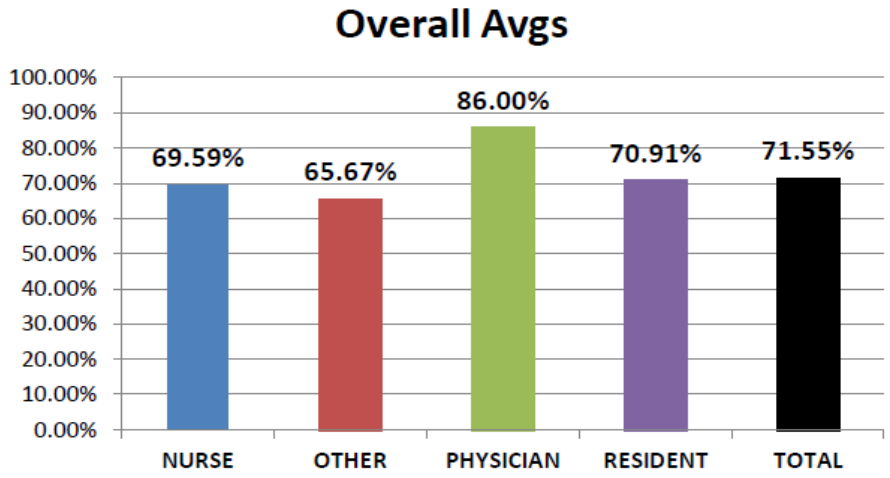
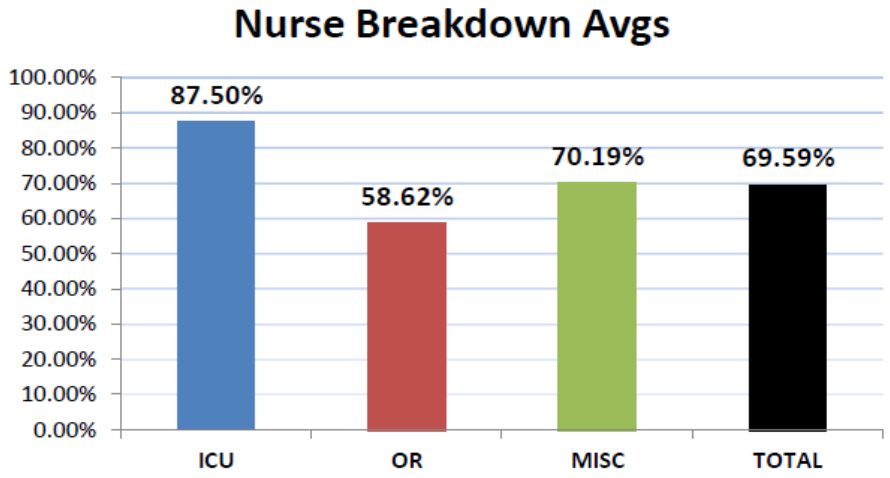
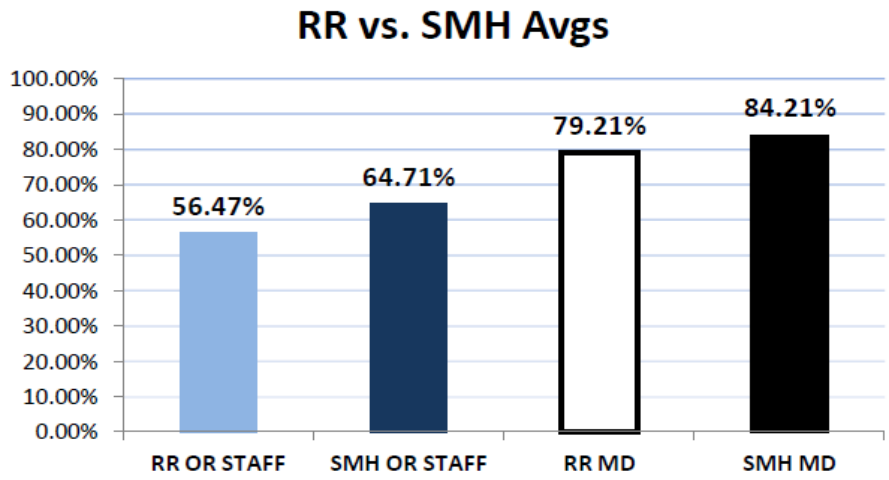
PLEASE DO NOT WRITE IN THIS AREA

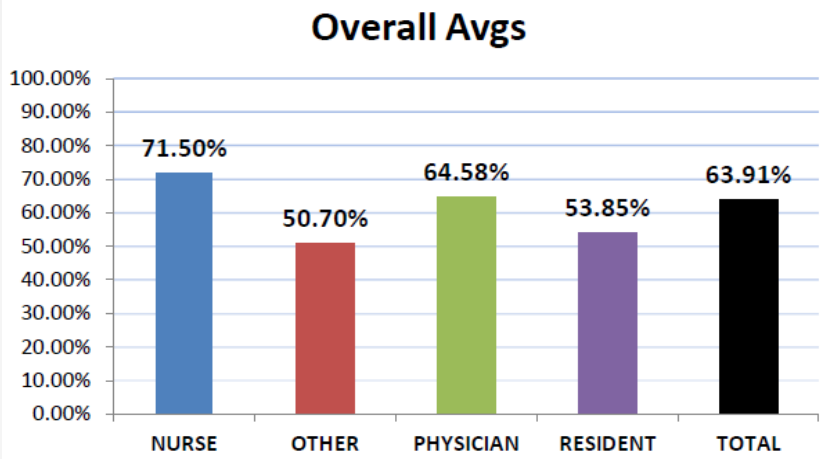
Nurse Input is well Received

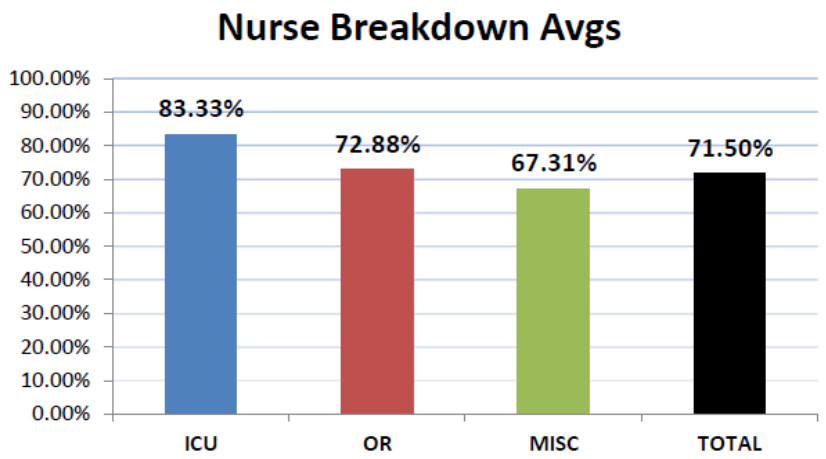


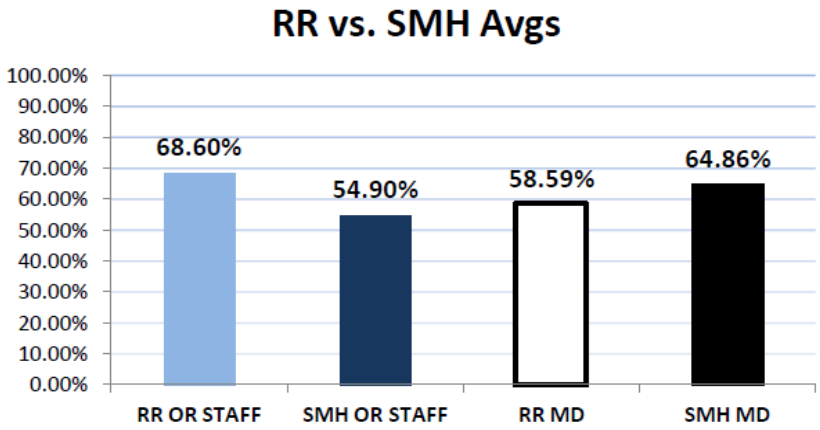




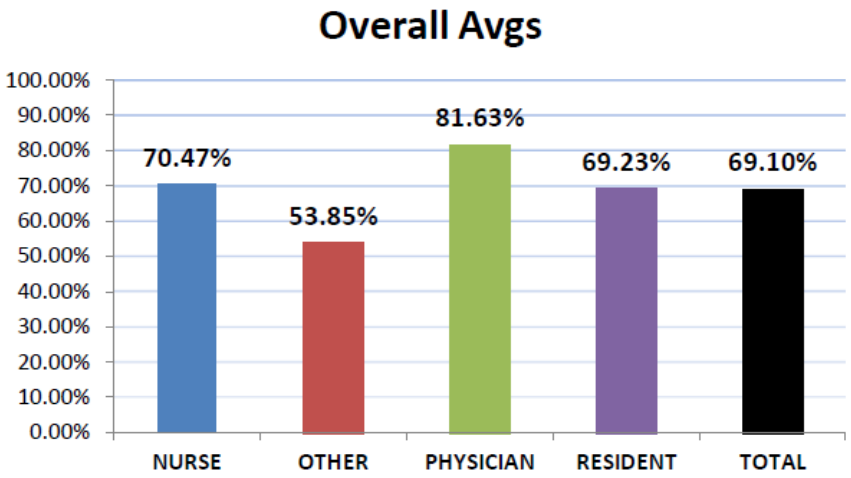
All staff has an equal voice when expressing patient safety concerns

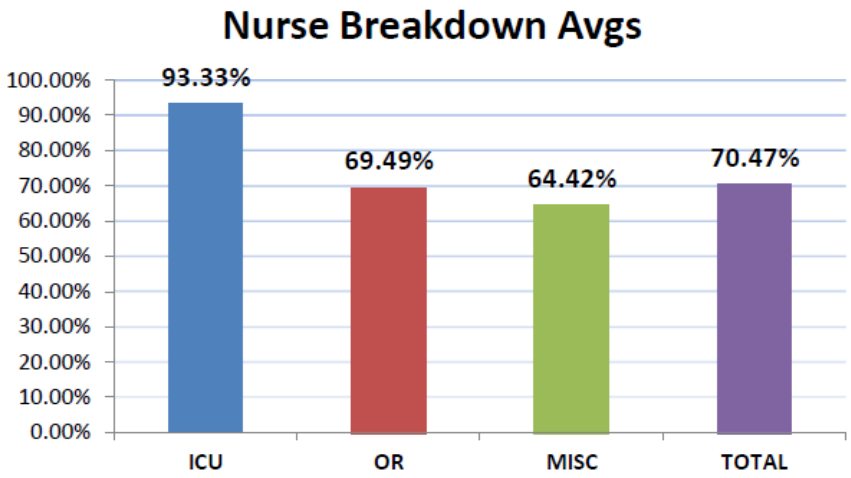


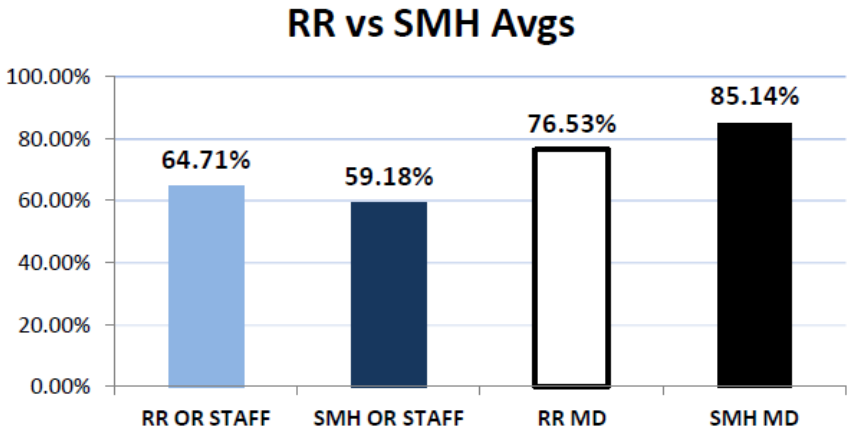




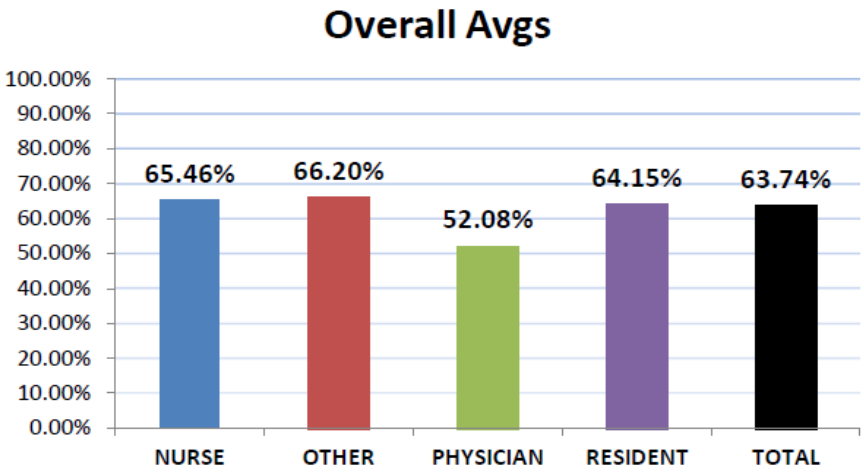
Physicians and nurses work together as a well-coordinated team

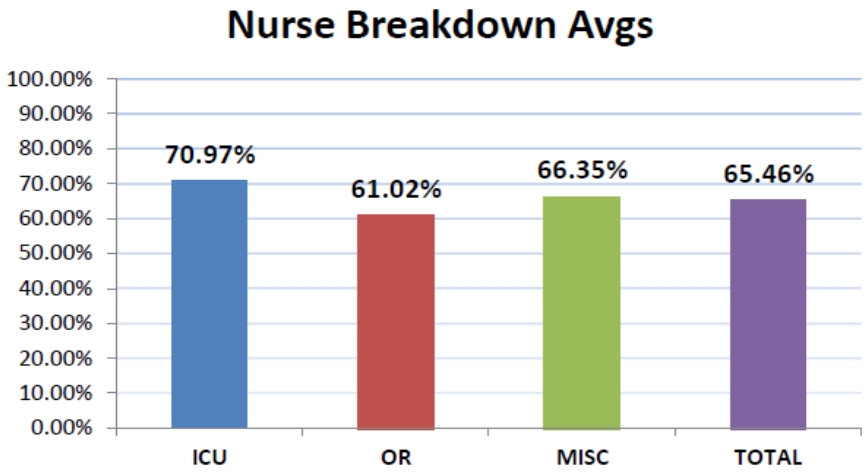


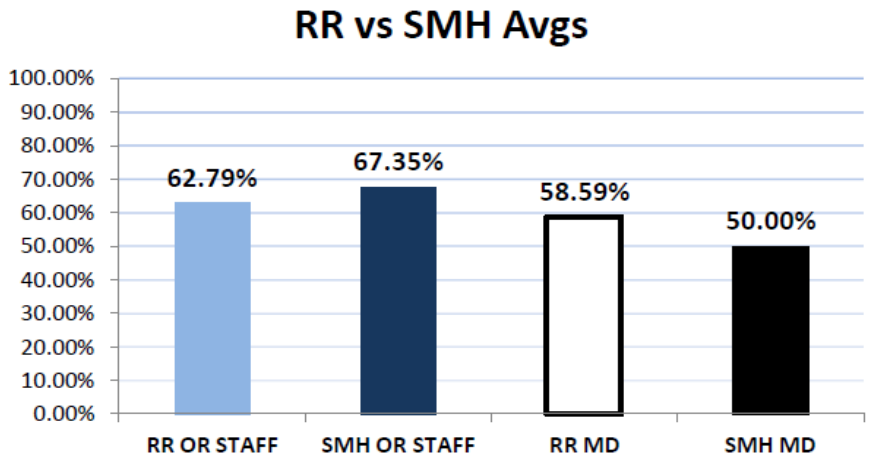




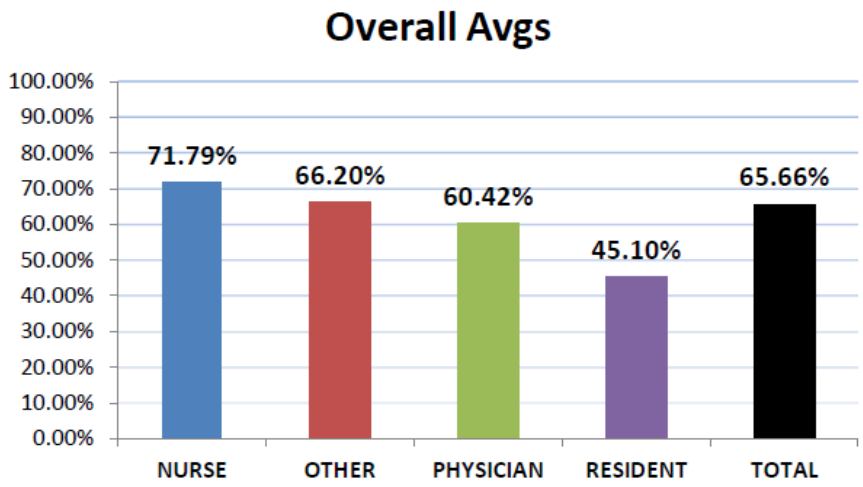
The culture makes it easy to learn from the errors of others

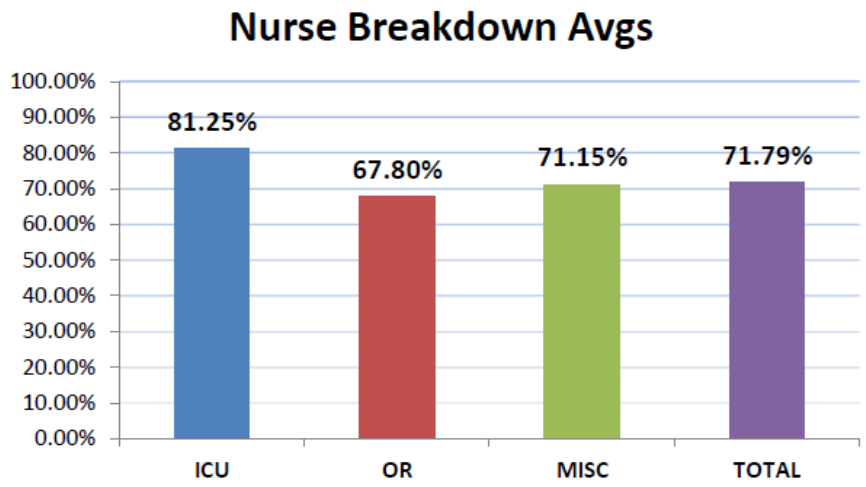


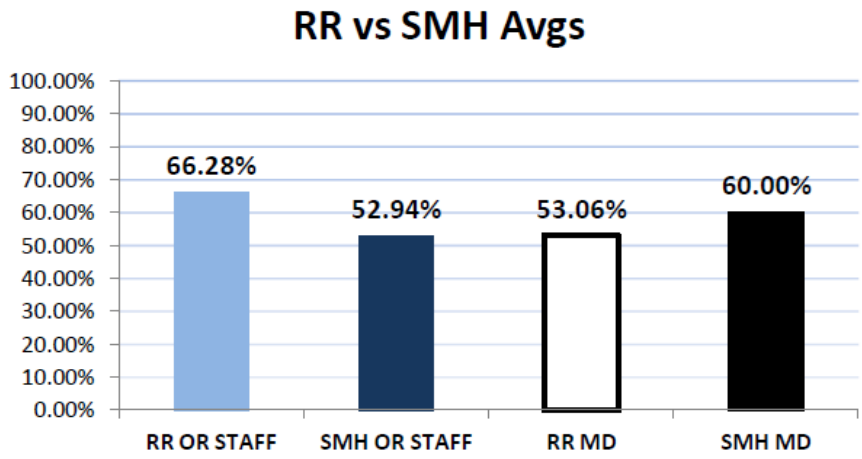




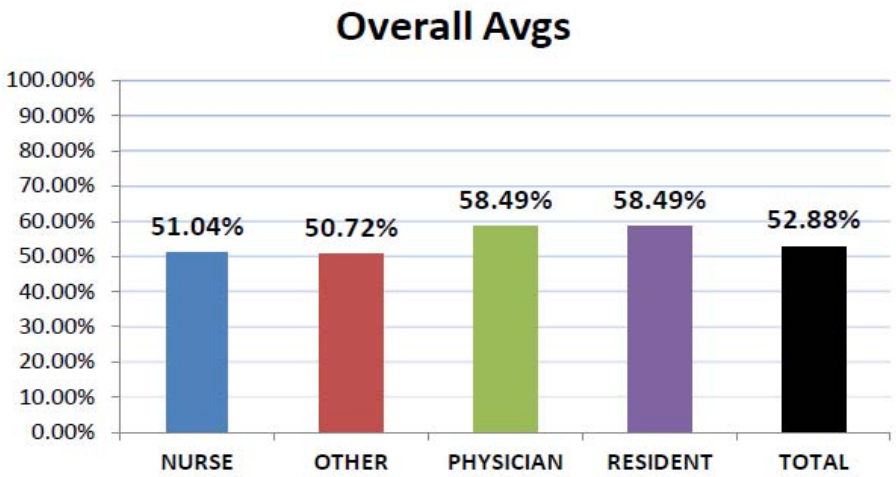
My suggestions about safety would be acted upon if I expressed them here

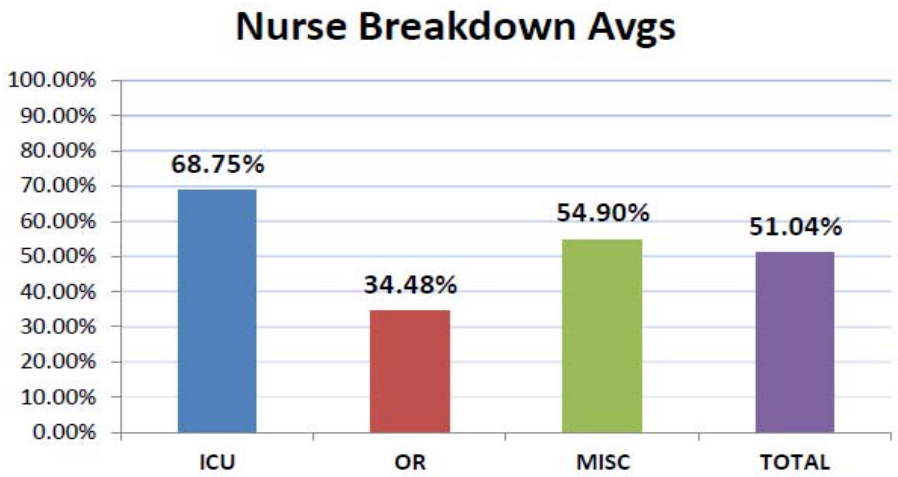


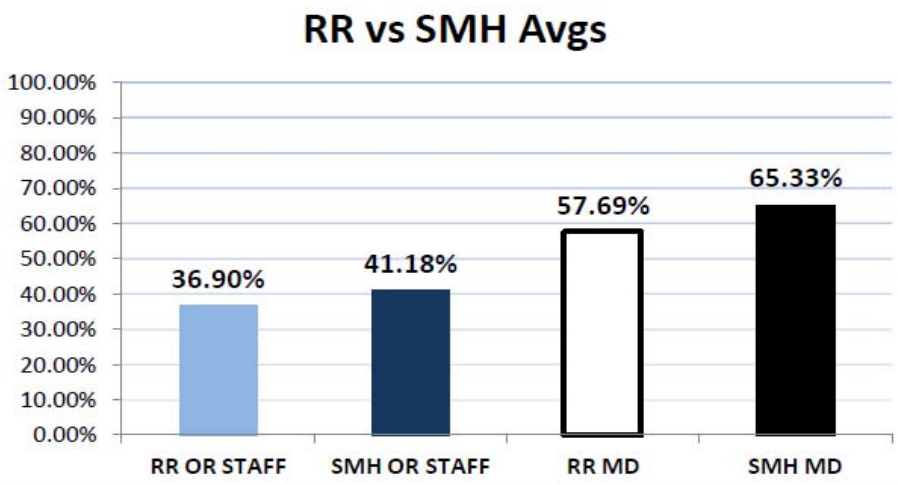




Staff morale on my unit is high







Post-Operative

- Ensure wounds remain covered with an interactive dressing for at least the first 48 hours post-surgery (allows wound to seal and become impervious to microbial contamination
- Immediately report/record signs of discharge or inflammation in a wound
- Advocate for drains to be removed at earliest possible opportunity
- Teach patient how to care for their wound
  - Includes washing, bathing, details of what to look for and who/when to call if there are concerns

Preventing SSIs UC-wide (CHQI Grant)

Pre-operative

Peri-operative

Post-operative

Pre-operative components

Surgery	Pre-op Patient Education	Pre-op CHG*	Pre-op Mupirocin	Assess Compliance with CHG	If did not complete CHG offer morning of surgery
Colorectal	x	3 treatments	None	x	x
Hip Arthroplasty	x	7 treatments	7 days	x	x
Knee Arthroplasty	x	7 treatments	7 days	x	x
Laminectomy	x	7 treatments	7 days	x	x
Spinal Fusions	x	7 treatments	7 days	x	x

*Including a CHG treatment the day of surgery

Peri-operative

SMARTLINK™ OR Counting System Overview

Activity Monitoring System- OR (AMS-OR)

The AMS-OR system provides a record of movement in and out of OR spaces and provides automated reporting **24/7**

SMARTLINK ™ Technology
- Activity Counters
- Integrated Wireless Modules
- Repeater

Network Gateway
- Receives data and sends to the Amazon Cloud for processing

Performance Dashboard & Reporting Tools
- Provide near real-time measurements

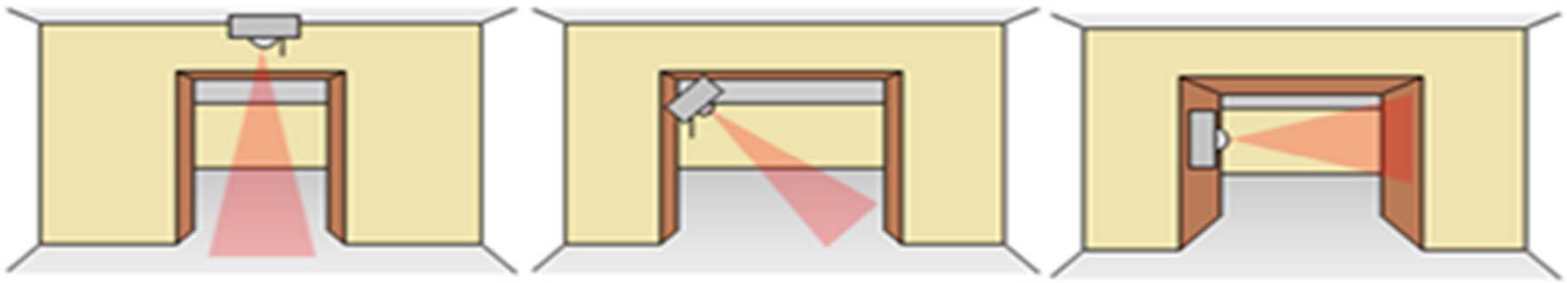
Courtesy Gojo Industries

Peri-operative

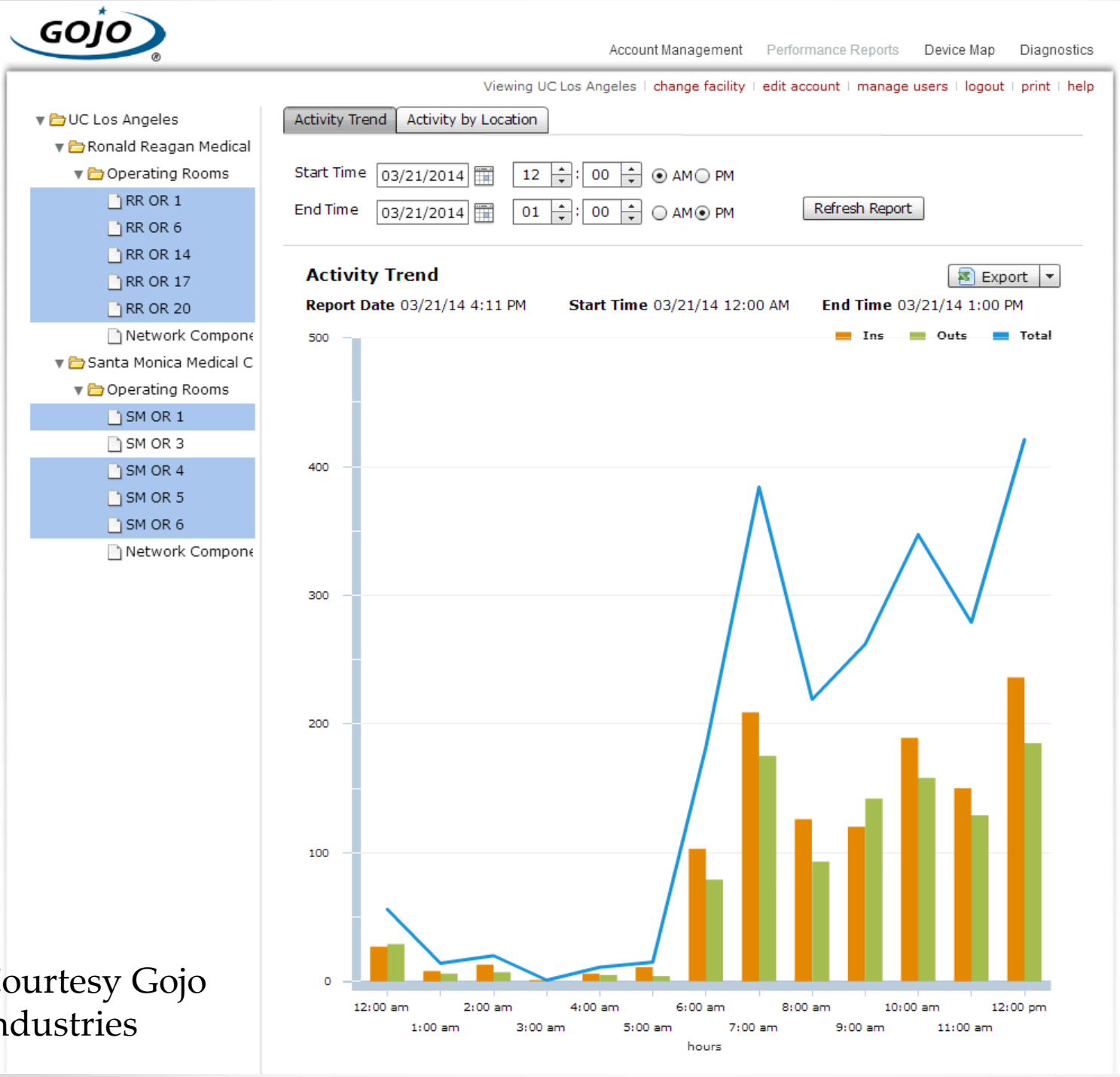
Activity Counter

Selecting a Location

Typically, the Activity Counter will be mounted on the ceiling, either directly or with a mounting bracket, just inside the doorway to a room. Alternatively, the Activity Counter can be mounted on a wall or in a doorway. These alternate mounting arrangements are useful in situations where there are obstructions on the ceiling, or the doorway is sufficiently wide that pedestrian traffic cannot be guaranteed under the Activity Counter.

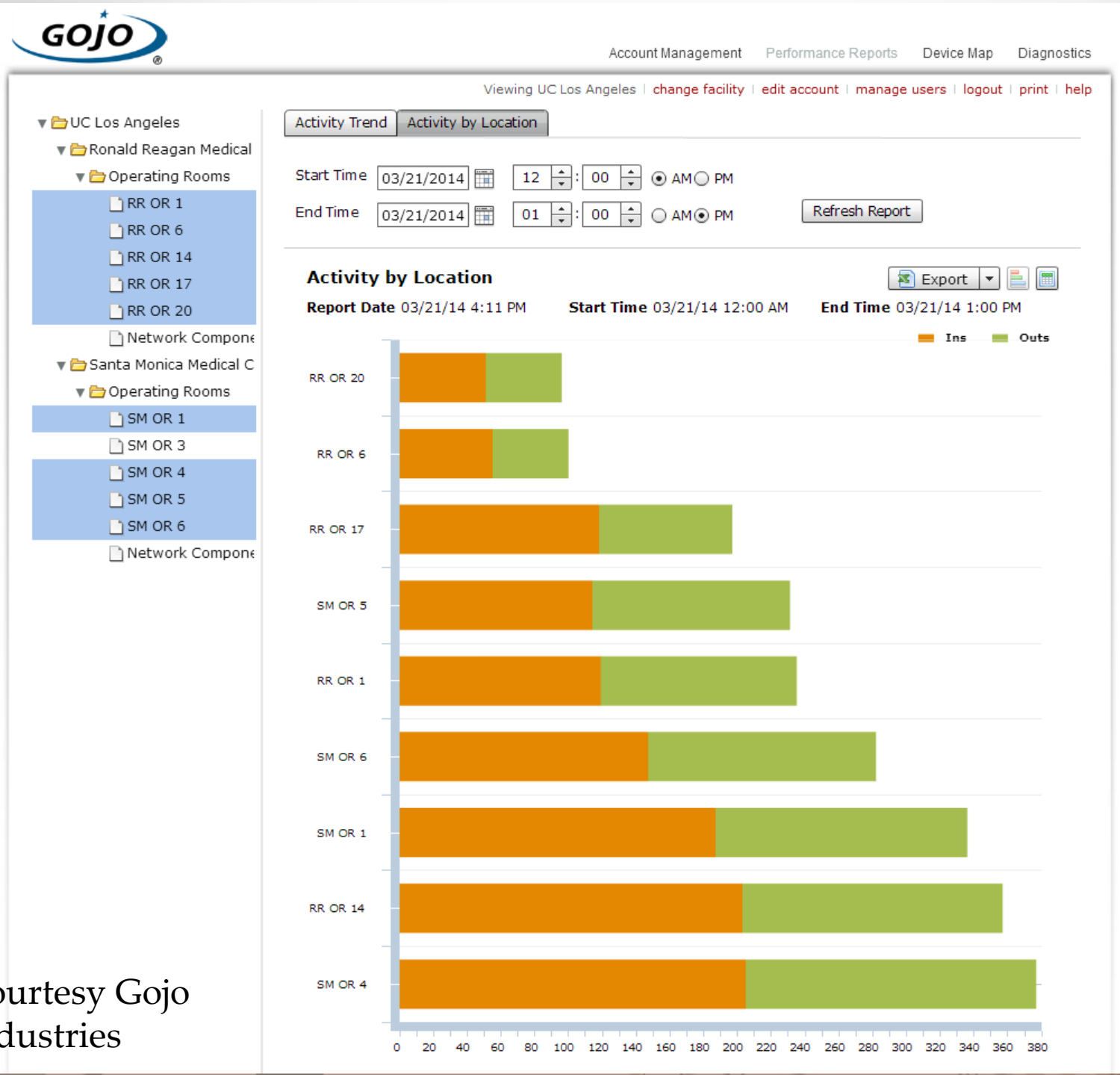


Courtesy Gojo Industries



Data from midnight last night to today at 1pm. Shows trend of activity for selected time period

Courtesy Gojo Industries



Courtesy Gojo Industries

Data from midnight last night to today at 1pm. Compares activity for each OR for the selected time period

Peri-operative Antibiotic Prophylaxis

Antibiotic	Adults	Pediatrics[1]	Re-dosing interval[2,3]	Comments[4]
Cefazolin (Ancef)	**2 grams (3 grams if ≥120 kg)**	**30 mg/kg**	**4 hours**	**Administer 60 min prior to incision**
Vancomycin	**15 mg/kg (maximum 2 grams)**	**15 mg/kg**	**N/A**	**Administer 2 hours before incision**
Clindamycin	**900 mg**	**10 mg/kg**	**6 hours**	
Gentamicin	**5mg/kg**	**2.5 mg/kg**	**N/A**	**Use adjusted body weight (ABW) for obese patients**

[1]Pediatric doses should not exceed the usual adult dose
[2]Patients with renal insufficiency may require prolonged re-dosing intervals
[3]If excessive blood loss (>1.5 L) re-dose all antibiotics
[4]If tourniquet is to be used in the procedure, the entire dose of antibiotic should be infused prior to its inflation

Bratzler DW, Dellinger EP, Olsen KM, et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. *Am J Health-Syst Pharm.* 2013; 70:195–283.

Case Study #1

- 45 year-old male patient had colon resection on 6/18
- Three days later…
  - Upper aspect of patient's abdominal wound has purulent drainage with some redness and induration
  - Wound swabbed and specimen sent for culture; culture ends up growing *Enterobacter* spp. And *E. coli*
  - Patient started on antibiotics

Is this an SSI?

Yes, this is a superficial SSI (purulent drainage from incision, redness, positive culture)

Case Study #2

- Patient presents to ED with acute abdomen and is admitted to the OR on the same day for colon resection (COLO). Peritoneal abscess noted at time of surgery. Incision is closed primarily w/ a JP drain in an adjacent stab wound.

- Even on antibiotics, patient continues to have low-grade fevers, abdominal pain, and purulent drainage via JP drain. Patient returned to OR on 8/6 for new exploration; new abscesses were found.

- Is this an SSI?
- **Yes**, this is considered an organ space SSI. The patient had known abscess at time of surgery but condition worsened after the surgery.

Case Study #3

- Jane Doe had a spinal fusion (FUSN) on 1/22 performed
- 2/1-Increased back pain; Temp 38°C
- 2/2 MRI reveals abscess in the spinal epidural space
- Surgeon opened wound in the OR & drained abscess; specimen to lab for culture; notes 'infected hematoma"; antibiotics begun for epidural abscess
- Culture positive for *Pseudomonas aeruginosa*

- Would this be an SSI?
- **Yes**, this would be an organ space SSI.

- It REALLY does begin with ‘U’
- We are all responsible for patient safety and helping to prevent SSIs

CAN PREVENT SSIs!

Contact Info

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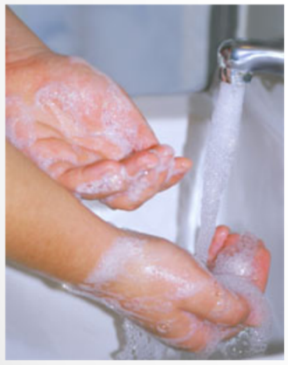

Wash, wash, wash your hands,
Get them very clean,
Do the rub, do the scrub,
Germs are very mean.

Wash, wash, wash your hands,
We should sing this twice,
Do the rub, do the scrub,
Being clean is nice!

QUESTIONS?