

การผ่าตัดกับการติดเชื้อ[†] ในโรงพยาบาลชลบุรี

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โรงพยาบาลชลบุรี





Chonburi hospital



Operation success but patients outcome.....

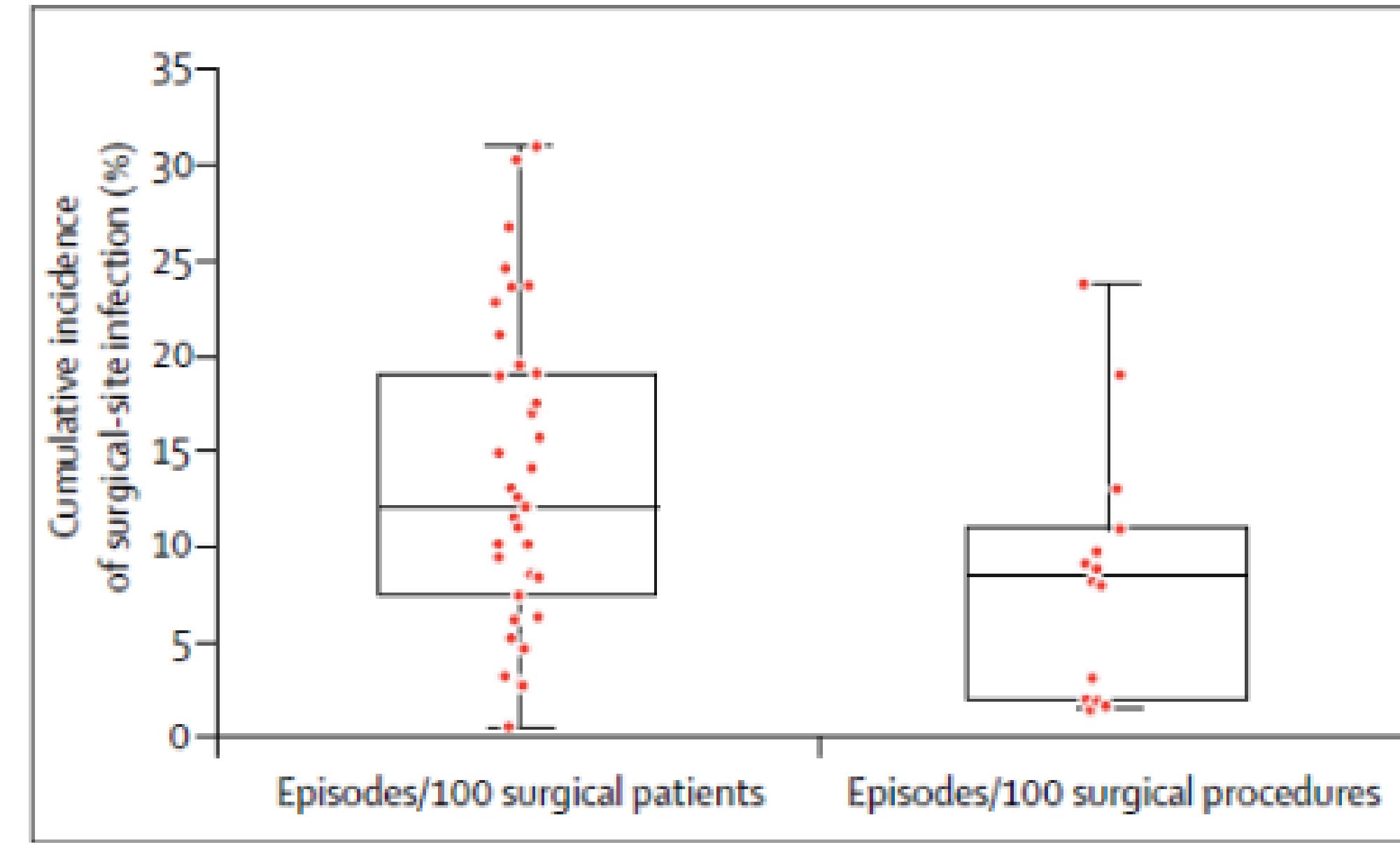


เนื้อหา

- สถานการณ์การติดเชื้อแผลผ่าตัด
- หลักการเกิดการติดเชื้อจากการผ่าตัด
- การติดเชื้อจากการผ่าตัดโรงพยาบาลชลบุรี
- การป้องกันการติดเชื้อจากการผ่าตัด
- การเฝ้าระวังการติดเชื้อจากการผ่าตัด และกระบวนการพัฒนาคุณภาพ



Incidence of surgical site infections (57 studies)



Range:

0.4-30.9 per 100 surg pts

1.2-23.6 per 100 surg procedures

Pooled cumulative incidence:

11.8 per 100 surg pts (95% CI 8.6-16.0)

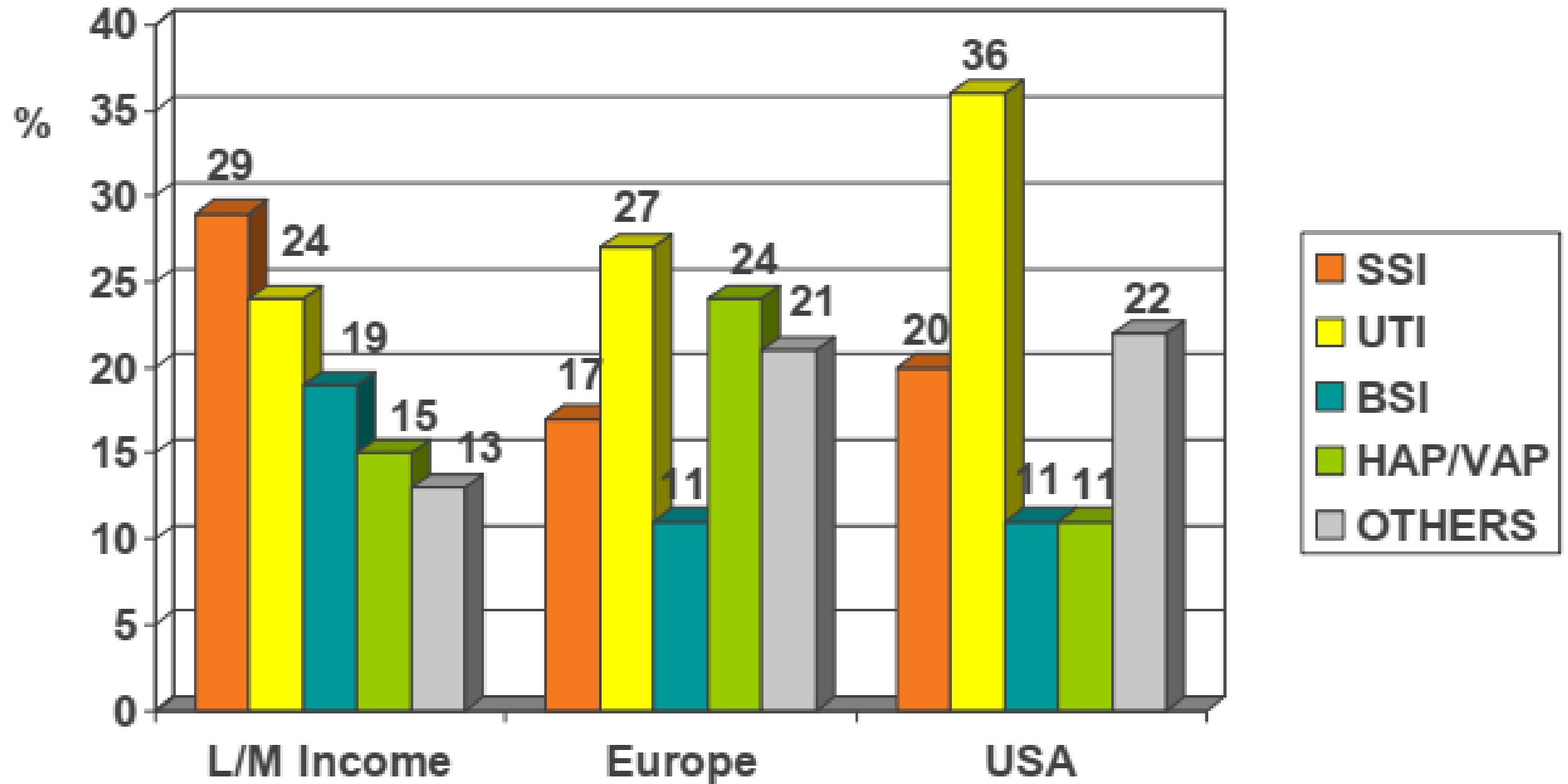
5.6 per 100 surg procedures (95% CI 2.9-10.5)



11.8 / 100 patients

Allegranzi B et al. Lancet 2011; 377:228-41

Type of hospital-acquired infection



2011



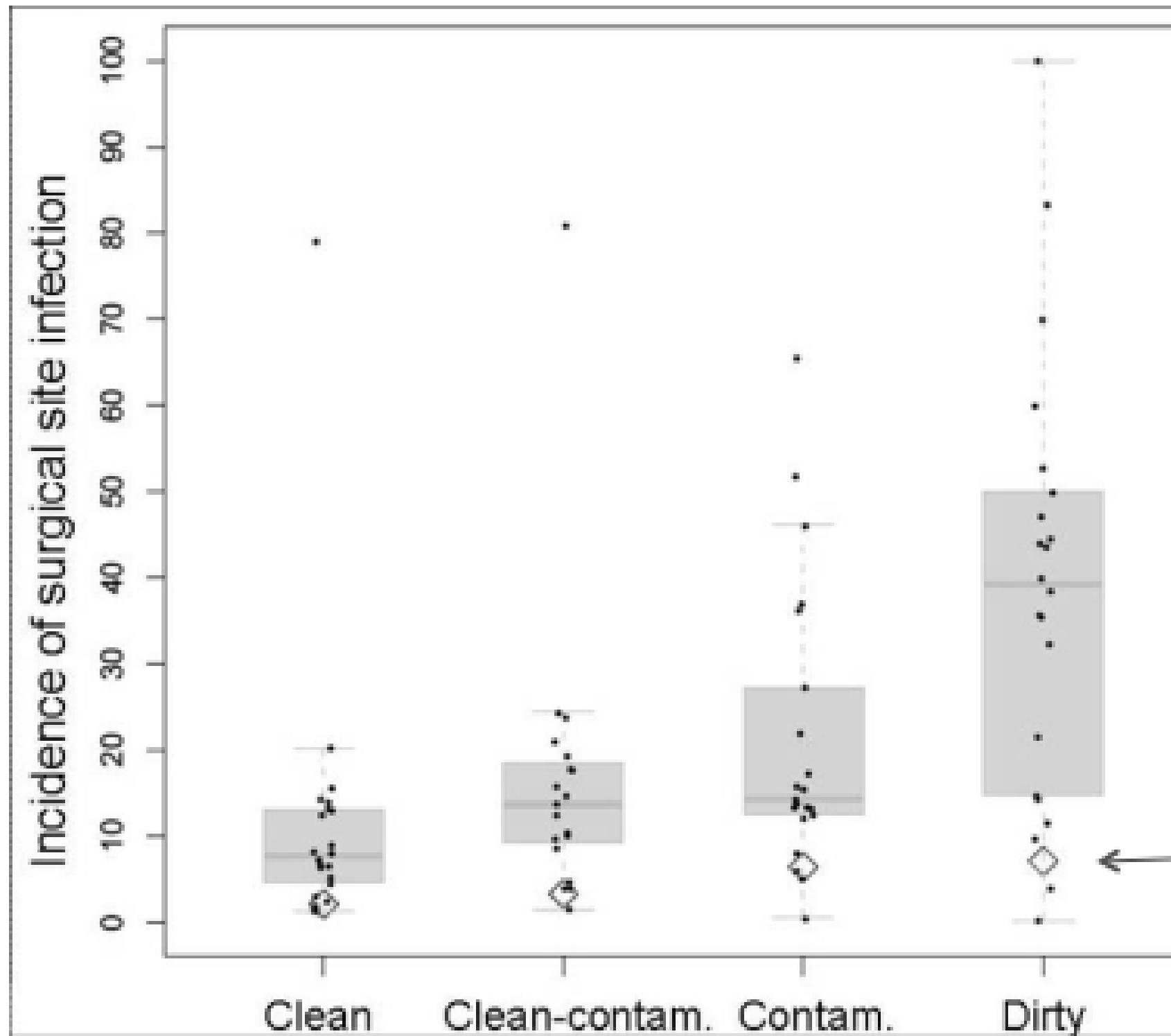
World Health
Organization

Patient Safety
A World Alliance for Safer Health Care

SAVE LIVES
Clean Your Hands

SSI risk in developing countries according to wound classification

2011



SSI pooled means:
11.5, 16.6, 21.3, 38.8
episodes per 100 SP
(from clean to dirty
wound)

Allegranzi B et al.
Lancet 2011;377:228-41

◊ NNIS reports

ວັດທະນາການຕິດເຫຼືອຈາກການຜ່າຕັດ

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2011-2021

Worldwide incidence of surgical site infections in general surgical patients:
A systematic review and meta-analysis of 488,594 patients



- The pooled 30-day cumulative incidence of **SSI was 11% (95% CI 10%-13%)**.
- Multivariable meta-regression showed SSI is significantly associated with duration of surgery (estimate 1.01, 95% CI 1.00-1.02, P = .014)



Clinical Practice Guideline

2009

Guidelines for the Prevention of Surgical Site Infection: The Surgical Infection Society of Thailand Recommendations (Executive Summary)

Lohsiriwat V, MD, PhD¹, Chinswangwatanakul V, MD, PhD¹, Lohsiriwat D, MD¹, Rongrungruang Y, MD²,
Malathum K, MD³, Ratanachai P, MD⁴, Butsripoom B, MS, PhD⁵, Asdornwised U, MS, PhD⁶, Boontham P, MD, PhD⁷,
on behalf of the Surgical Infection Society of Thailand

"Surgical site infection (SSI) is a common and potentially preventable complication after surgery affecting up to one in six patients"

Classification of surgical procedures by risk of infection

| Type of procedure | Definition | Wound infection rate (%) | Example | Need for prophylaxis |
|--------------------|--|--------------------------|---|--------------------------------------|
| Clean | Atraumatic; no inflammation encountered, no break in technique; gastro-intestinal, genitourinary and respiratory tracts not entered | 1.5–4.2 | Inguinal hernia repair | Not usually required |
| Contaminated | Gastro-intestinal or respiratory tract entered but without spillage; oropharynx, appendectomy, sterile genitourinary or biliary tract entered; minor break in technique | <10 | Cholecystectomy (no spillage) | Usually required |
| Clean-contaminated | Acute inflammation; infected bile or urine; gross spillage from gastro-intestinal tract; major lapse in technique; fresh traumatic wound (12–24 h) | 10–20 | Appendectomy | Required |
| Dirty and infected | Established infection; transection of clean tissues to enable collection of pus; traumatic wound with retained devitalised tissue; faecal contamination; delayed treatment | 20–40 | Sigmoid colectomy (Hartmann's procedure) for faecal peritonitis | Treatment required (not prophylaxis) |



Gaps in SSI surveillance in LMIC

Slide WHO 2014

No data from many countries

Inconsistent use of

- Definitions and surveillance methodologies

No data from many countries

Inconsistent use of

- Definitions and surveillance methodologies

- Post-discharge surveillance

Use of N of patients as denominator

Limited data on

- Microbiology and antibiotic resistance

NNIS index and other risk factors



World Health
Organization

Patient Safety

A World Alliance for Safer Health Care

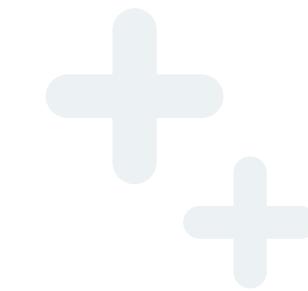
SAVE LIVES

Clean Your Hands

อัตราการติดเชื้อจาก การผ่าตัด โรงพยาบาลชลบุรี

| ปีงบประมาณ | SSI (cleaned wound) |
|---------------|---------------------|
| 2562 | 026 |
| 2563 | 0.27 |
| 2564 | 034 |
| 2565 | 0.15 |
| 2566 (6เดือน) | 0.08 |

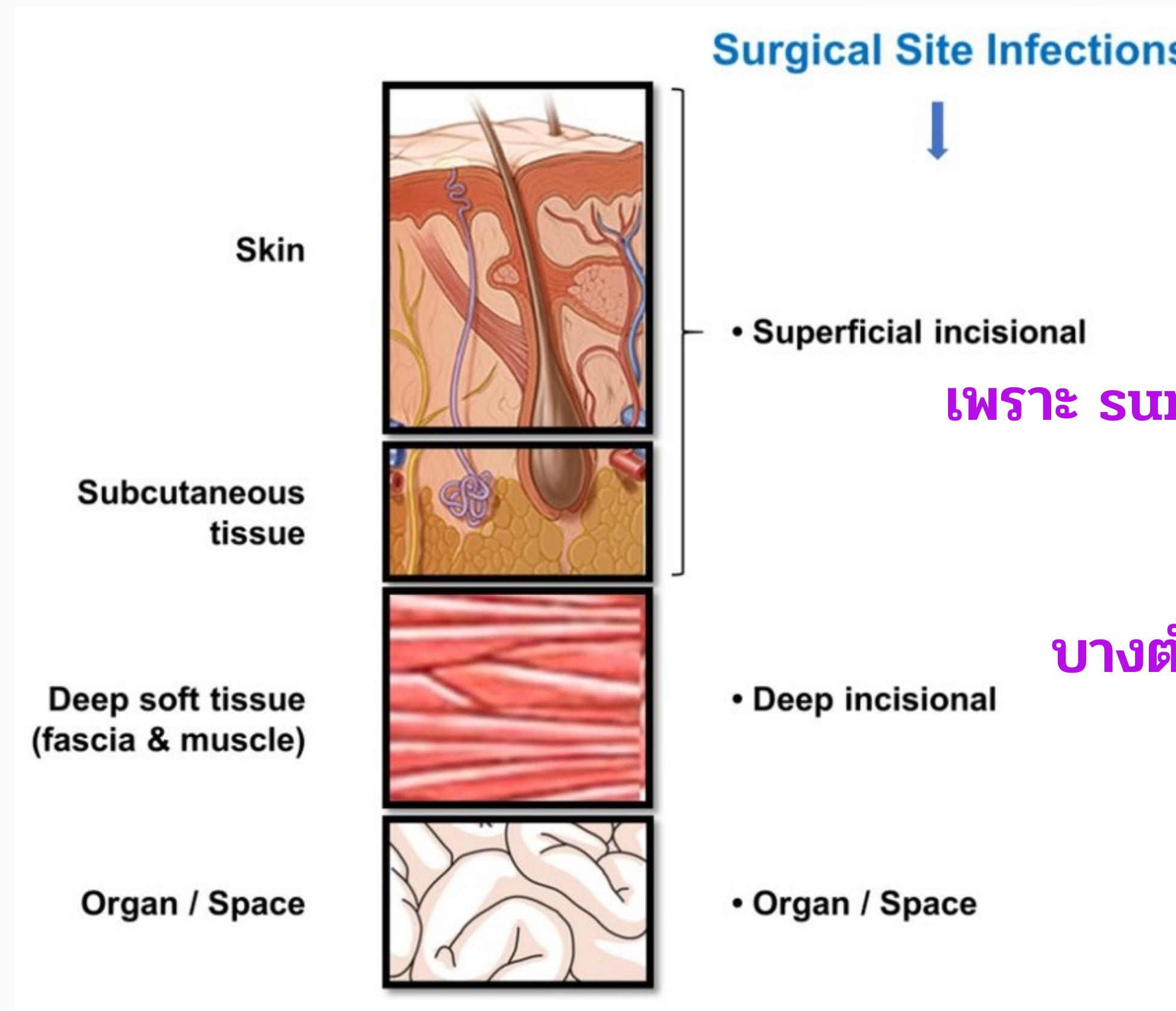




What should we do next?



Classification of surgical wounds infection



เพราฯ surgical site infection มีหลายระดับ
บางตำแหน่งวินิจฉัยง่าย
บางตำแหน่งวินิจฉัยยาก
บางตำแหน่งใช้เวลานานกว่าจะมีอาการ



Epidemiologic triad



Agent infectivity

(virulence;
addictive qualities, etc.)

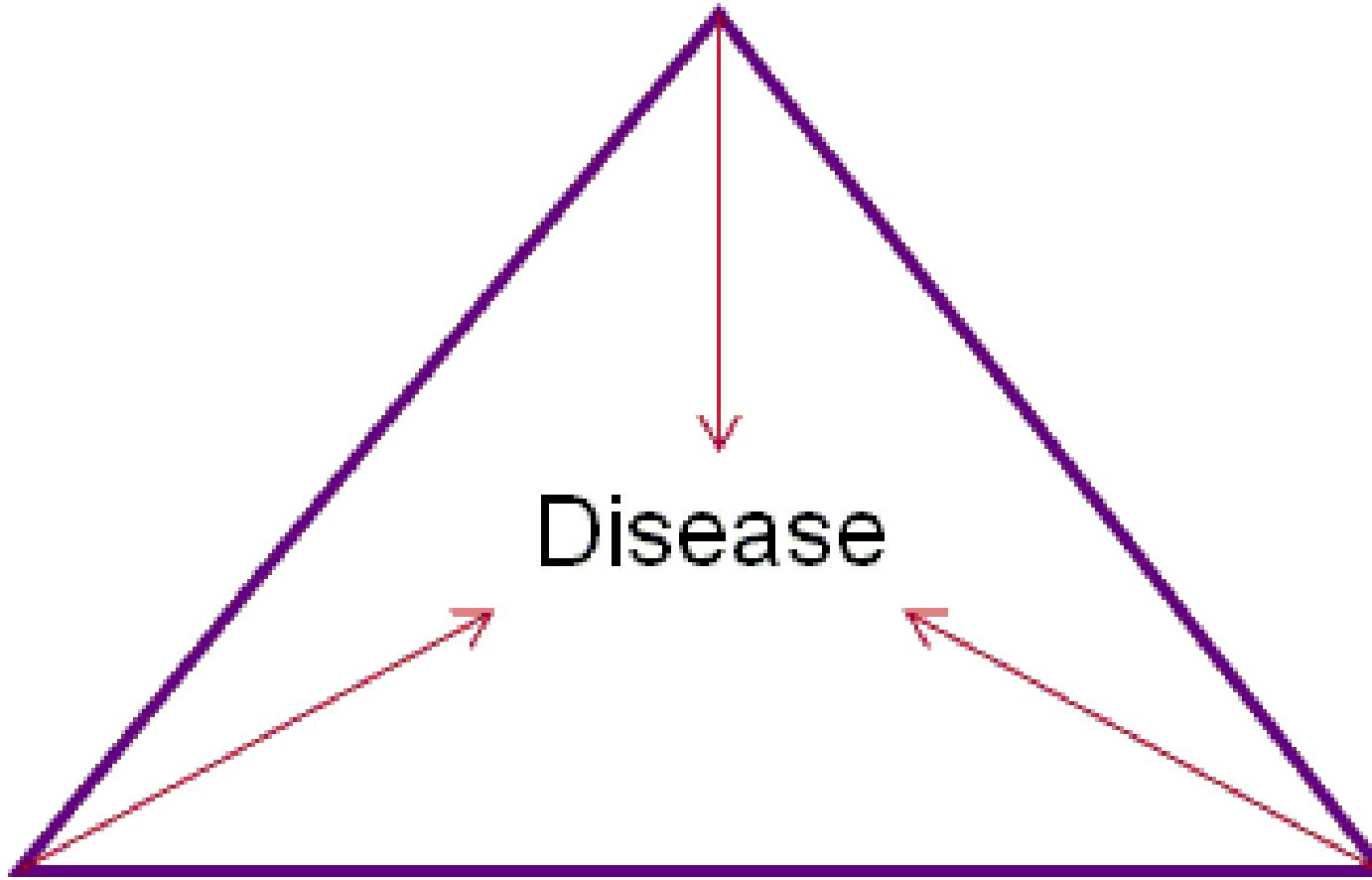
Disease

Environmental exposure

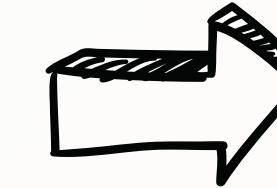
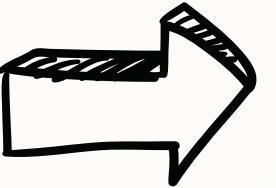
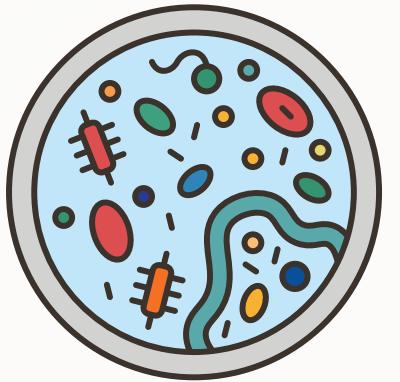
(climate; building design;
sanitation;
social environment;
access to health care, etc)

Host susceptibility

(genetics; resiliency;
nutritional status;
motivation, etc.)



Pathogenesis of SSI



Pathogens

- endogenous
- exogenous
- hematogenous

contamination
&
proliferation
of bacteria

Environment

Host & Agent

Infection /
inflammation
at surgical site



Risk factors for Surgical site infection

patient-level factors

- Sex, Age, Frailty
- Patient dependence
- Socioeconomic factors
- lifestyle smoking, alcohol drinking
- Co-morbidity
- medication



Risk factors for Surgical site infection

Operative-level factors

- Procedure characteristics
- Incision class
- Type of surgery
- Elective versus emergency procedure
- Case complexity
- Duration of operation
- Blood loss/blood transfusions
- Medical device implantation



Risk factors for Surgical site infection

Institutional-level factors

- Current environment
- Safety culture
- Hospital Size
- Experience Physician



Risk factors related to SSI

Table 2 - Final logistic regression model of the independent variables measured in relation to Surgical Site Infection, Belo Horizonte, MG, Brazil, 2011

| Variables | OR* | 95% CI† | P value |
|--|-----|-----------|---------|
| Length of preoperative hospital stay >24 h | 1.9 | 1.6 – 2.3 | < 0.001 |
| Duration of surgery (in hours) | 1.3 | 1.3 – 1.4 | < 0.001 |
| PCSW‡ | | | |
| Clean-contaminated | 1.5 | 1.3 – 1.9 | < 0.001 |
| Contaminated | 2.7 | 2.1 – 3.4 | < 0.001 |
| Dirty/Infected | 2.0 | 1.3 – 3.2 | 0.001 |
| ASA Index§ | | | |
| II | 1.5 | 1.2 – 1.9 | < 0.001 |
| III | 2.3 | 1.8 – 3.1 | < 0.001 |
| IV/V | 1.9 | 1.1 – 3.4 | 0.031 |

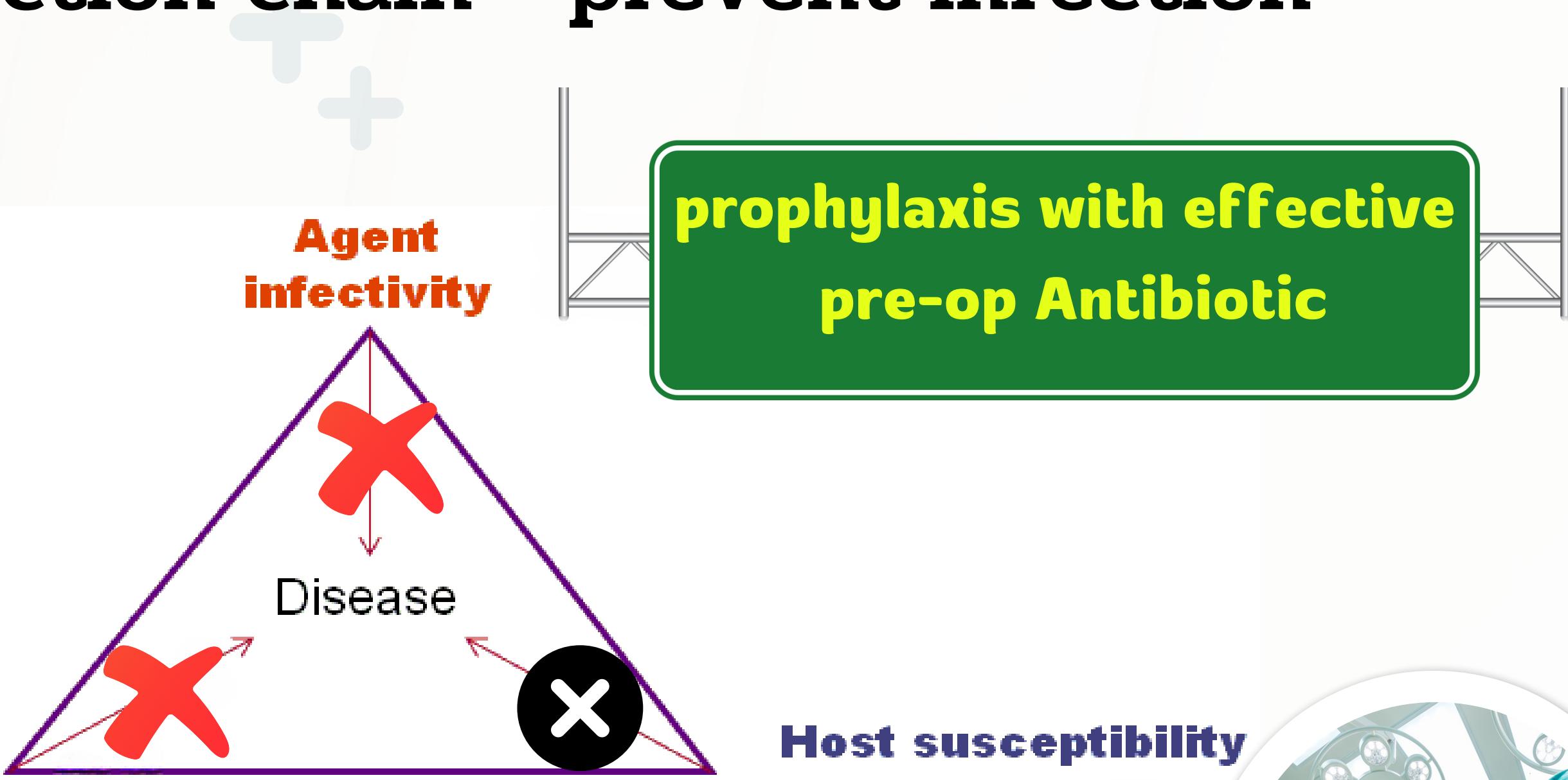
* Odds Ratio; † Confidence interval; § American Society of Anesthesiologists; ‡ Wound Class.; LLR χ^2 of the final model: 290.61; Pseudo R²: 0.0585.



Which are the significant SSI risk factors in your hospital?

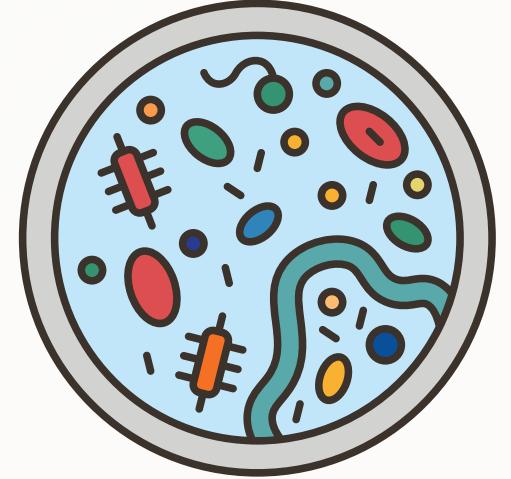


Break infection chain = prevent infection



risk modification
and health literacy





Pathogens

- endogenous
- exogenous
- hematogenous

Host & Agent

Common surgical infection pathogen



Clean wound

- *S.aureus*
- Coagulase-negative Staphylococci

Clean-contaminated wound

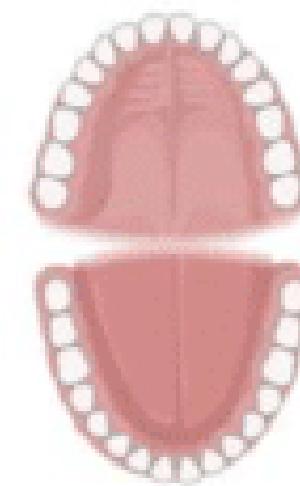
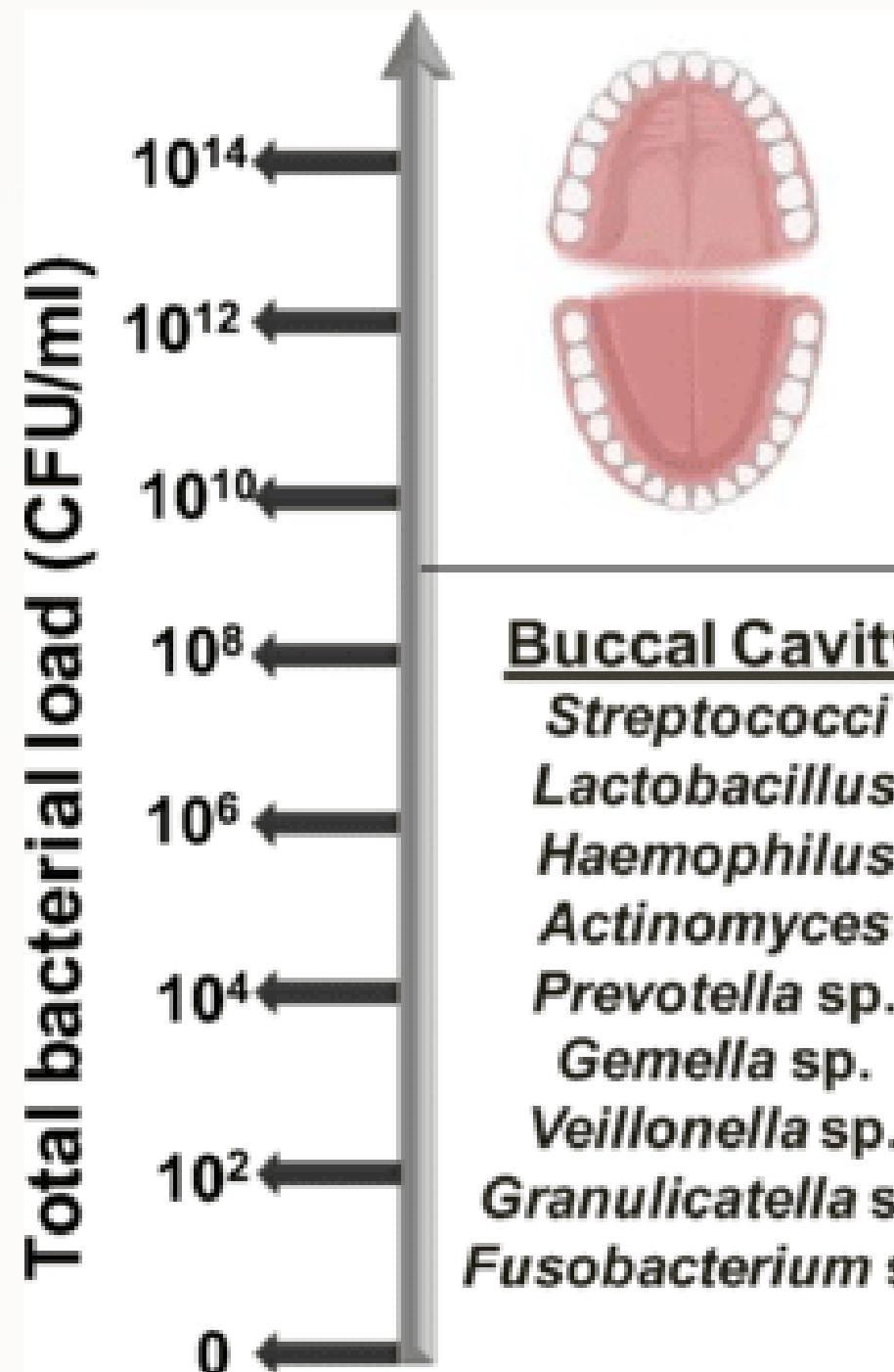
- Skin flora
- gram negative pathogen

Contaminated wound

- Skin flora
- gram negative pathogen
- Anaerobes

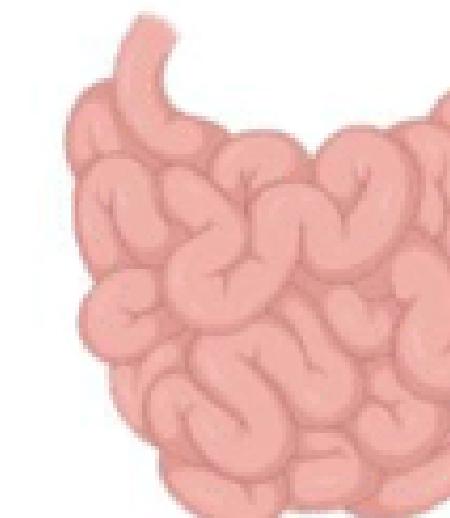


List of commensal microorganisms and their total load at various body parts



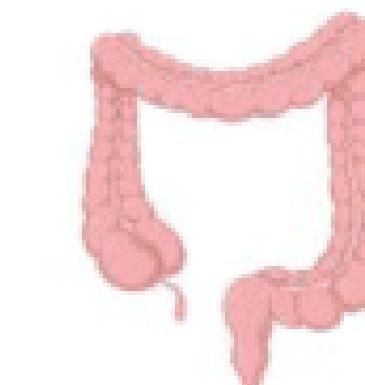
Small Intestine

Bacteroides
Clostridia
Streptococci
Lactobacilli
Enterococci
 γ -proteobacteria
E. coli
High G+C microbes



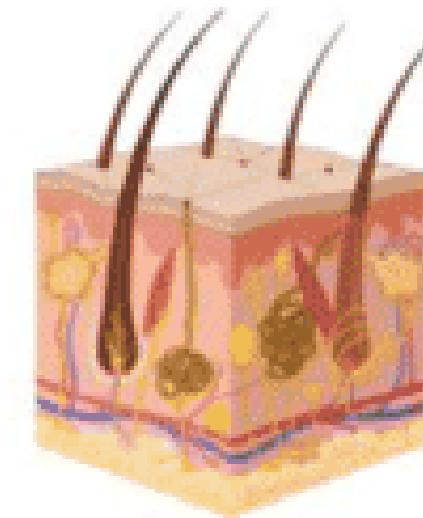
Large Intestine

Bacteroides
Clostridia
Prevotella sp.
Eubacteria
Ruminococci
Streptococci
Bifidobacteria
Enterococci
Lactobacilli
Fusobacteria



Female Reproductive tract

Lactobacillus
Actinobacteria
Bacteroidetes
Firmicutes
Proteobacteria
Gardnerella



Skin

Corynebacterium
Micrococcus
Propionibacterium
Pseudomonas
Rothia
Staphylococcus
Malassezia

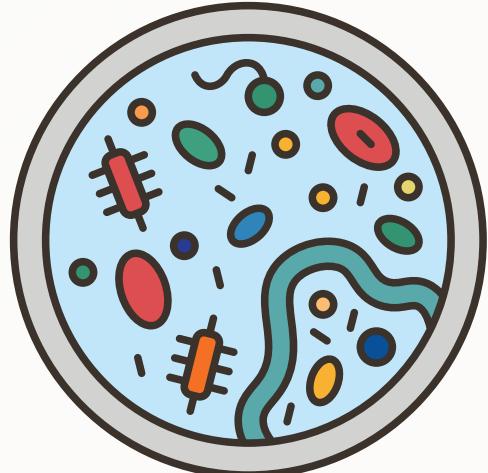




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Next challenge: SSI management in an outbreak of AMR situation





Pathogens

- **endogenous**
- exogenous
- hematogenous

Host & Agent

pathogens (AMR) control

Endogenous

- Antibiotic appropriate used

Exogenous

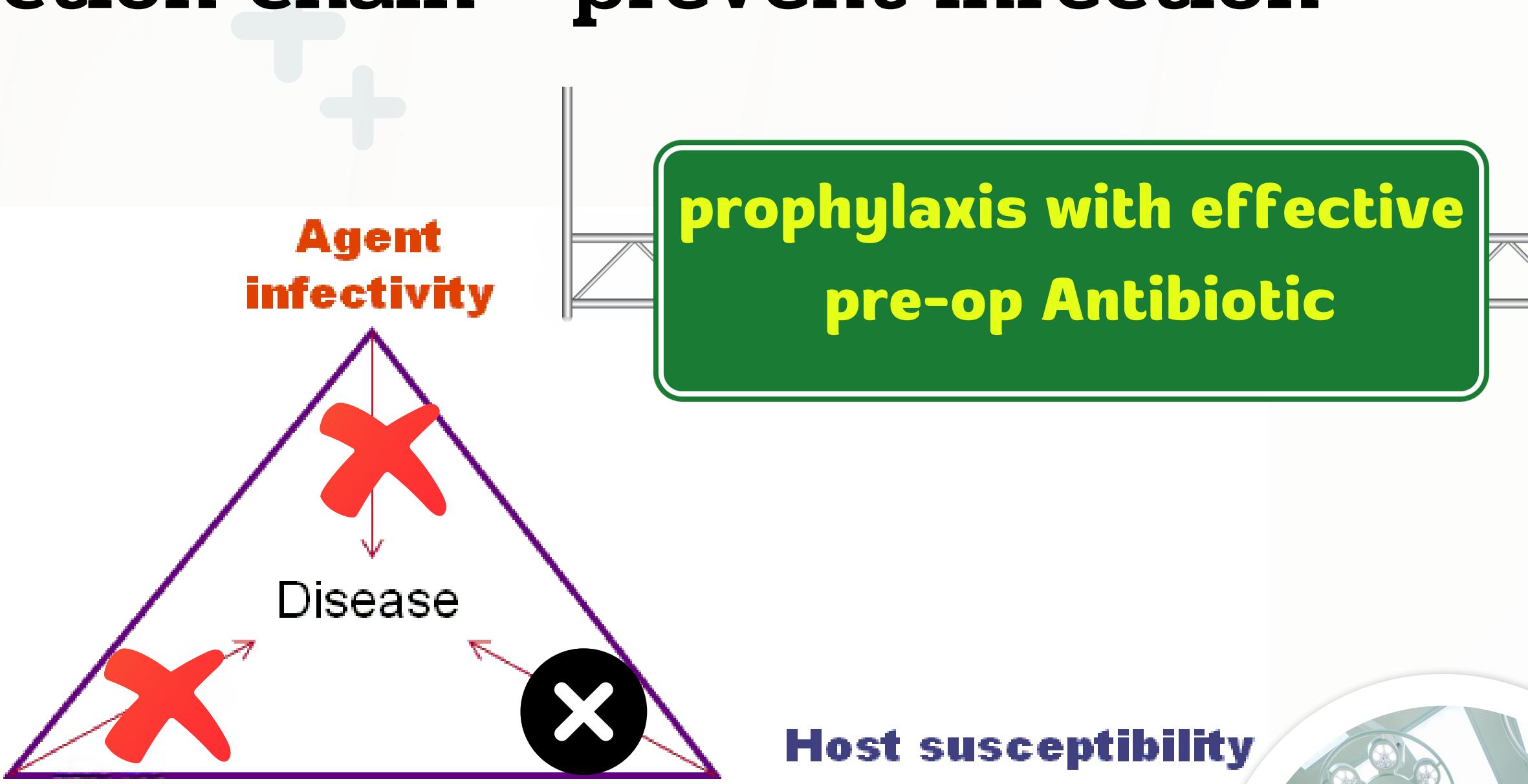
- Appropriate antibiotic prophylaxis regimen, dose, duration
- cleaning, bathing

Hematogenous

- control active infection
- prevent nosocomial BSI



Break infection chain = prevent infection



risk modification
and health literacy



DO THE RIGHT THING AT THE RIGHT TIME TO STOP SURGICAL SITE INFECTION

Recommendations for safe surgical care



- ACTION** SUPPORTED BY
- Patient bathes or showers prior to surgery with either plain or antimicrobial soap.
- Use 2% chlorhexidine decolonization in known nasal carriers of *Methicillin-resistant Staphylococcus aureus* in cardiac and orthopaedic surgery (immediately after surgery).
- Do NOT remove patient hair; if absolutely necessary, remove with a clipper, do not shave.
- Administer surgical antibiotic prophylaxis in the 120 minutes preceding surgical incision (depending on the type of operation and its half-life of the antibiotic).
- Prepare hands for surgery by scrubbing, using the correct technique with a suitable antimicrobial soap and water OR an alcohol-based handrub (either cleaning sterile gloved).
- Carry out mechanical bowel preparation always combined with administering preoperative oral antibiotics in adult patients undergoing elective colorectal surgery.
- Consider administering oral or enteral multiple contrast-enhanced enemas in underweight patients (undergoing major surgical operations).
- Do NOT discontinue immunosuppressive medication.
- Clean and sterilize/desinfectate surgical instruments and other equipment.
- Clean and prepare operating room environment.



- ACTION** SUPPORTED BY
- Do NOT use laminar airflow ventilation systems (not beneficial to patient undergoing total orthopaedic surgery).
- Use either disposable sterile non-woven or reusable sterile woven drapes and surgical gowns.
- Do NOT use plastic adhesive tissue drapes (either those with or those without antimicrobial properties).
- Use alcohol-based solution containing chlorhexidine gluconate for skin preparation.
- Do NOT use antimicrobial soaps after surgical site skin preparation.
- Administer 80% fraction of inspired oxygen (F_O2) to adults undergoing general anaesthesia with endotracheal intubation.
- Consider using a warming device.
- Consider using a protocol for intensive blood glucose control (for both diabetic and non-diabetic adult patients).



- ACTION** SUPPORTED BY
- Consider using goal-directed therapy.
- Consider irrigating incisional wound with an aqueous solution (isotonic saline) before closure (to clean and close contaminated wounds).
- Do NOT perform antibiotic wound irrigation.
- Consider using wound protector devices (to clean contaminated, contaminated and dirty abdominal procedures).
- Consider prophylactic negative pressure wound therapy (simply in closed surgical incisions in high-risk wounds).
- Consider using triclosan-coated sutures.
- Maintain scrubs and discipline in the operating room.
- Do NOT use advanced dressings of any sort (or normal dressing, normal).

The WHO Global guidelines for the prevention of surgical site infection outline recommendations for safe surgical care that can significantly reduce the risk of surgical site infection.
Whenever a routine surgical procedure is performed, actions should be taken by patients and health workers to translate these recommendations into practice.
Applying all recommendations will improve the quality of care and patient safety and reduce antimicrobial resistance.
In addition to surgical hand preparation, hand hygiene action (the 5 Moments for hand hygiene) apply to pre-, intra- and postoperative periods.
Only the right human and financial resources, with senior administrator commitment, can ensure these actions happen every time at the right time.
<http://www.who.int/infection-prevention/en/>



Guidelines for the Prevention of Surgical Site Infection: The Surgical Infection Society of Thailand Recommendations (Executive Summary)

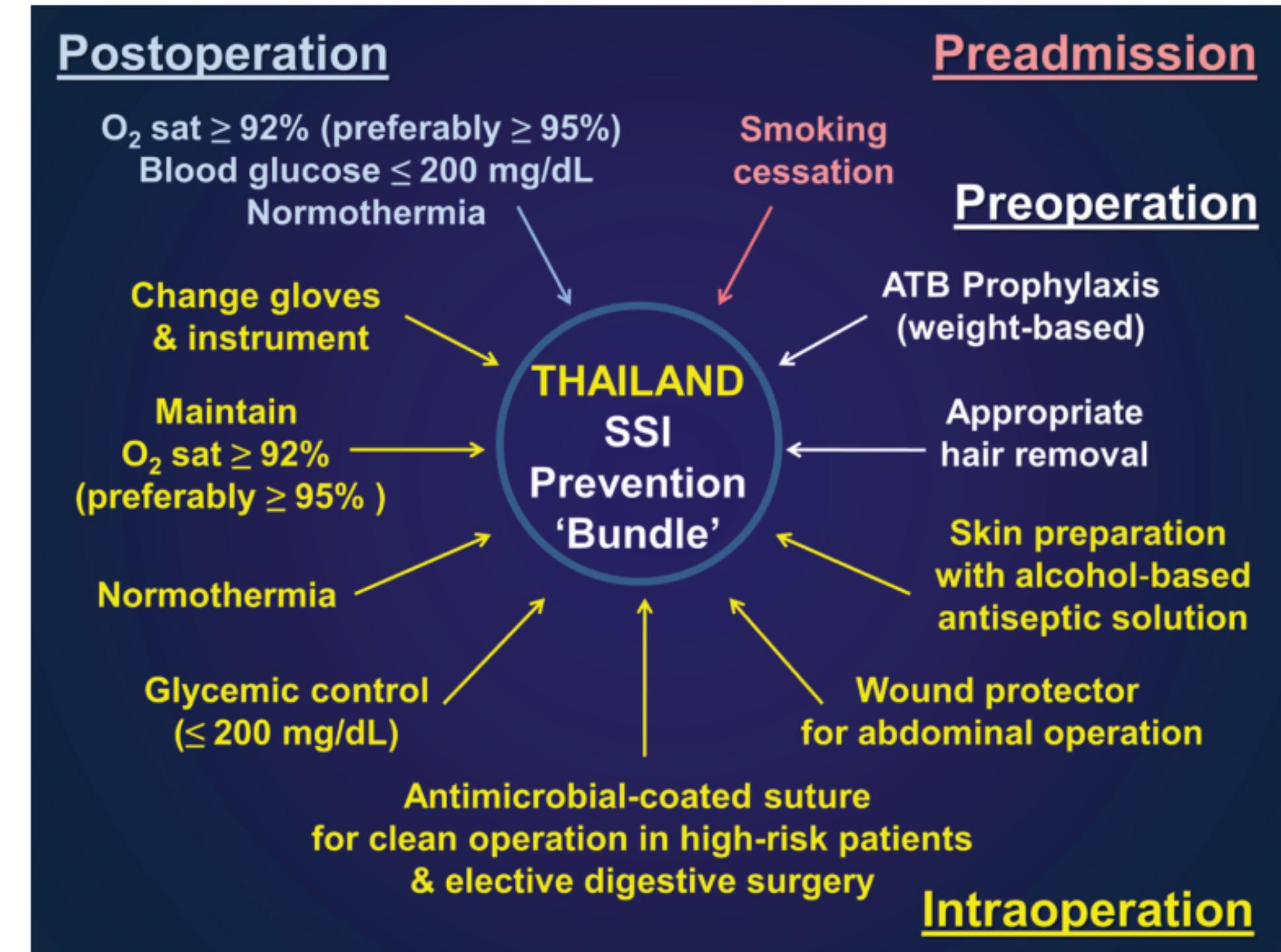
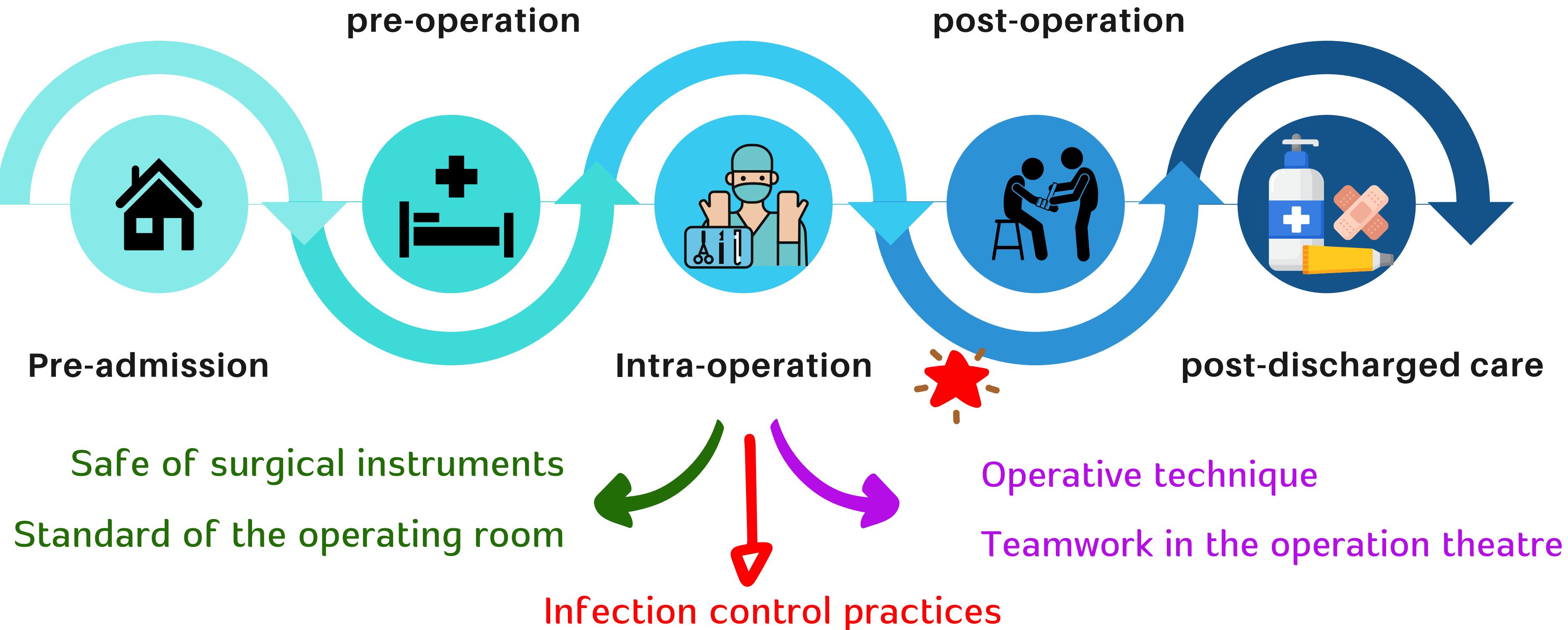


Figure 1. The Surgical Infection Society of Thailand (SIST) recommendations for preventing incisional surgical site infection (SSI) - supported by level 1 or high level of evidence. Notably, these 10 recommendations are grouped into "Thailand's SSI Prevention Bundle".



SSI PREVENTION THROUGHOUT THE SURGICAL PATIENT JOURNEY





Chonburi hospital

PREVENT SSI BY

Integrate all as a team

Engage patient & family as a partner





Maintain standards and have special control measures in COVID-19 pandemic situation





Surgical Infection Society Guidance for Operative and Peri-Operative Care of Adult Patients Infected by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2)

- 1. Organization of Operating Room Flow**
- 2. COVID-19 Operating Room Precautions to Minimize Unnecessary Contact and Delay in Transport**
- 3. Peri-Operative Considerations**
- 4. Safe and Appropriate Removal of PPE in the Correct Sequence**
- 5. High-Risk Procedures for Aerosolization and Potential Viral Particle Transmission**



High-Risk Procedures for Aerosolization and Potential Viral Particle Transmission

Bronchoscopy
Endotracheal intubation
Laparoscopy, including diagnostic laparoscopy
Open lung surgery
Percutaneous endoscopic gastrostomy
Esophagogastroduodenoscopy
Colonoscopy
Tracheal surgery, including tracheostomy and percutaneous tracheostomy



Aerosolizing procedures: ICU/OR safety recommendations for COVID-19-positive patients.

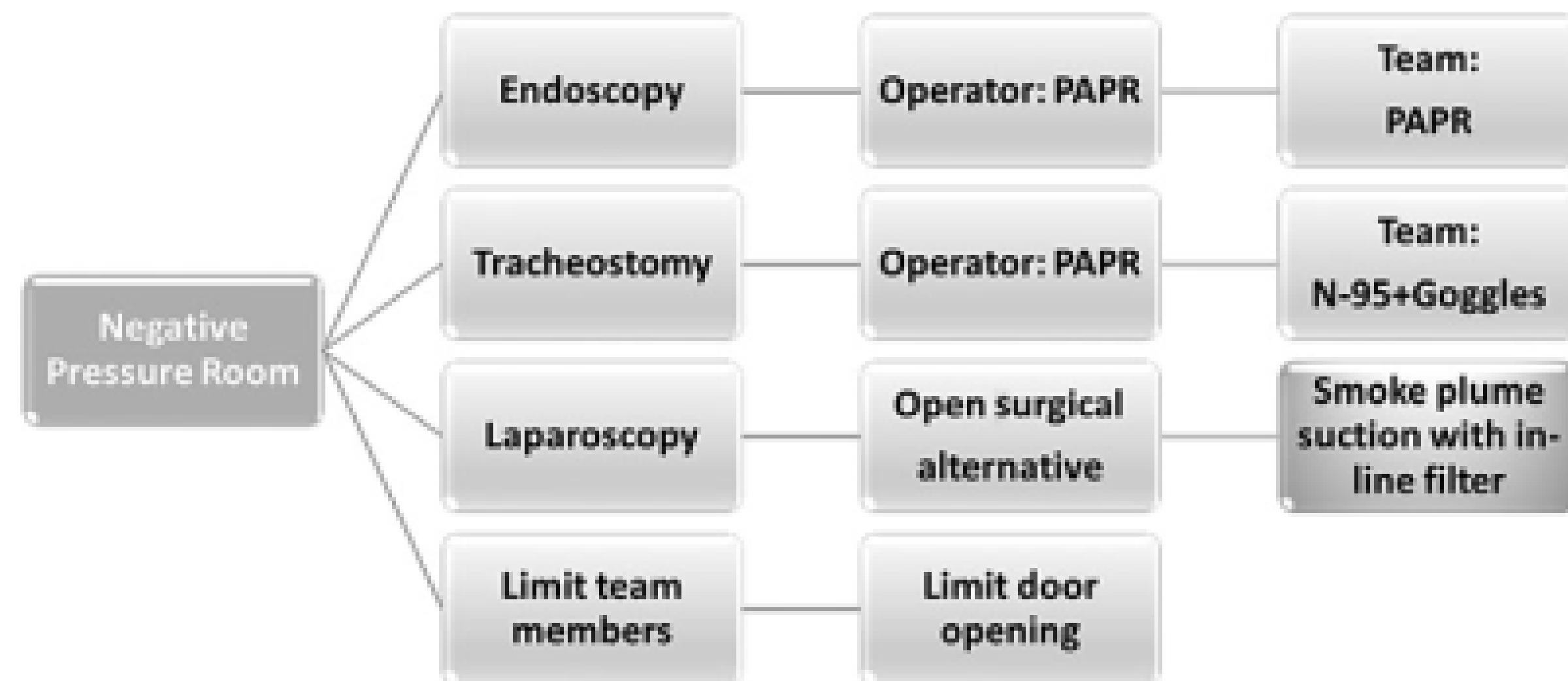


FIG. 1. Aerosolizing procedures: ICU/OR safety recommendations for COVID-19-positive patients. ICU = intensive care unit; OR = operating room; COVID-19 = coronavirus disease 2019; PAPR = powered air-purifying respirator.





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Next challenge

Cleaning the operating theatre and medical instruments



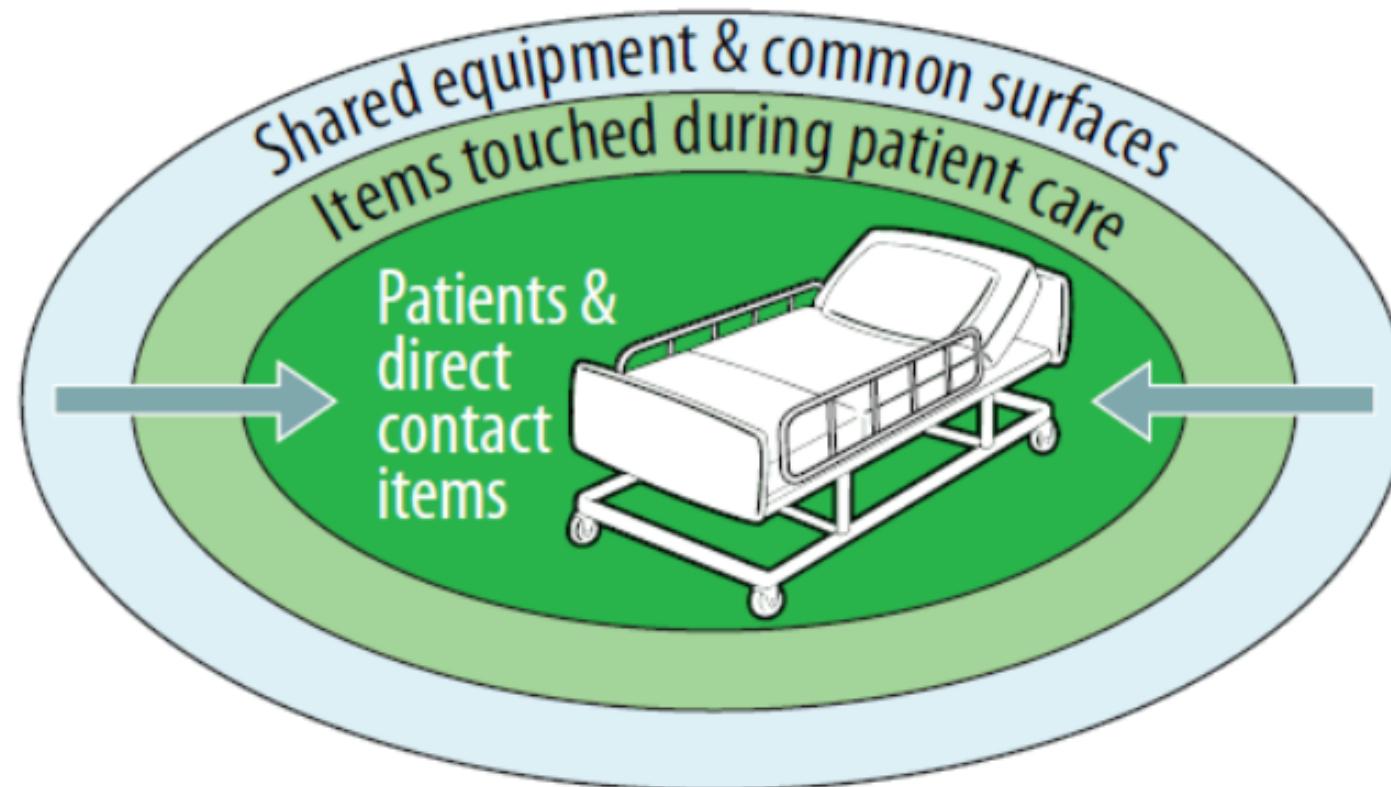


Figure 9. Example of a cleaning strategy from cleaner to dirtier areas

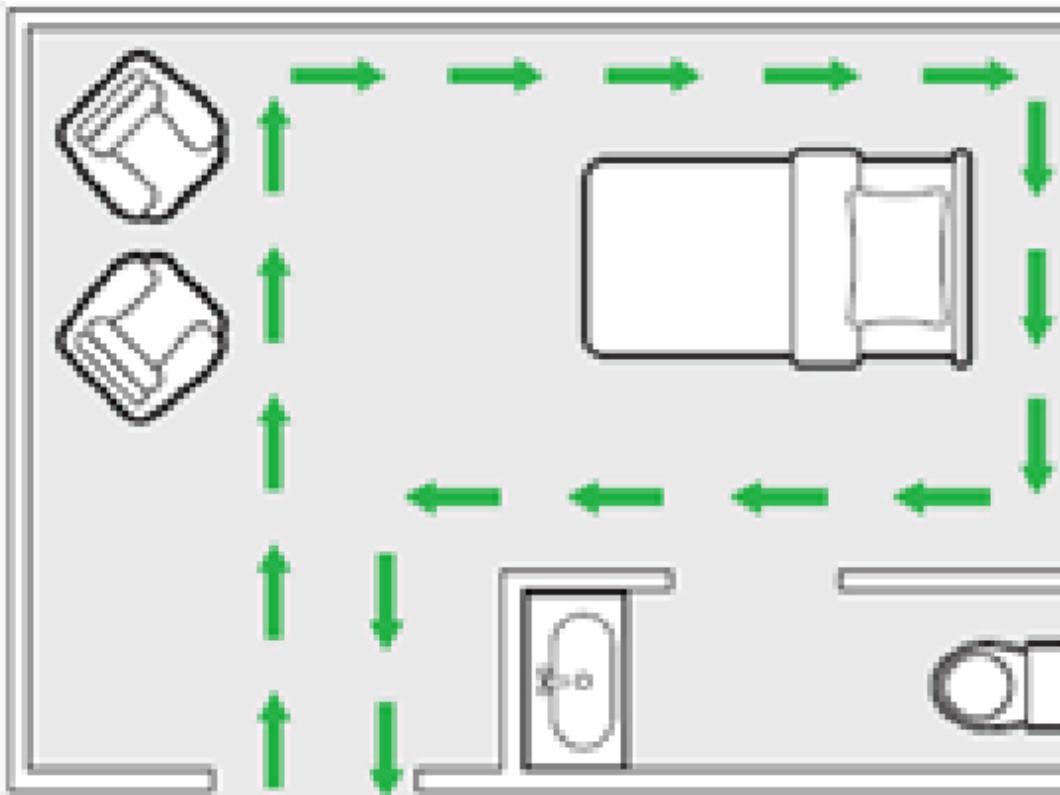


Figure 10. Example of a cleaning strategy for environmental surfaces, moving in a systematic manner around the patient care area



4. Environmental Cleaning Procedures

Best Practices for Environmental Cleaning in Global Healthcare Facilities with Limited Resources

- Proceed From Cleaner To Dirtier
- Proceed From High To Low (Top To Bottom)
- Proceed in a Methodical, Systematic Manner
- Immediately Attend to Body Fluid Spills



Operating rooms

Operating rooms are highly specialized areas with a mechanically controlled atmosphere where surgical procedures are performed. These require environmental cleaning at three distinct intervals throughout the day:

- before the first procedure
- between procedures
- after the last procedure (i.e., terminal cleaning)

| Frequency | Process |
|---|---|
| Scheduled basis (e.g., weekly, monthly) | At the same time as daily terminal cleaning, clean and disinfect: <ul style="list-style-type: none">• low-touch surfaces not cleaned every day (unless visibly soiled), including:<ul style="list-style-type: none">◦ ceilings◦ walls◦ insides of cupboards |





really clean ?
AMR still there?





last challenge

engage patient and family to
take responsibility for SSI
prevention bundles



Improve health literacy = improve outcome

"As a former nurse, trauma surgeon, and public health director [I realized] there was a wall between us and the people we were trying to serve.

Health care professionals do not recognize that patients do not understand the health information we are trying to communicate.

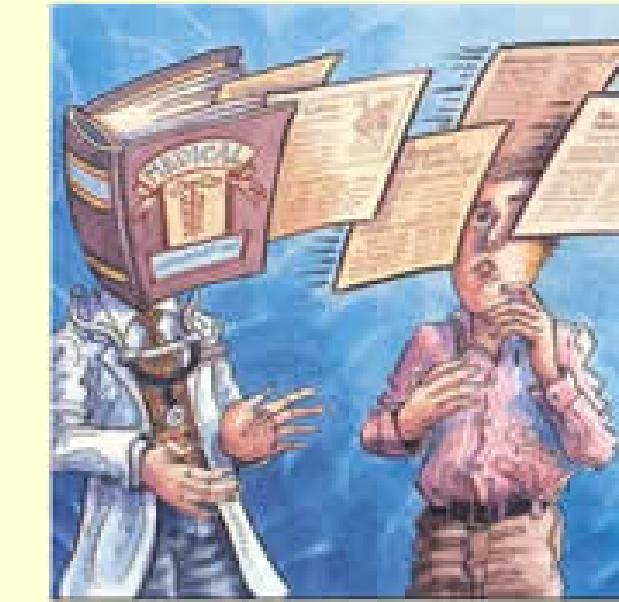
We must close the gap between what health care professionals know and what the rest of America understands."



**Dr. Richard Carmona,
Former U.S. Surgeon General**

mentioned health literacy in
200 of last 260 speeches

Mismatched Communication



Clinician Process: Giving information

Patient Process: Understanding, remembering, and acting on information



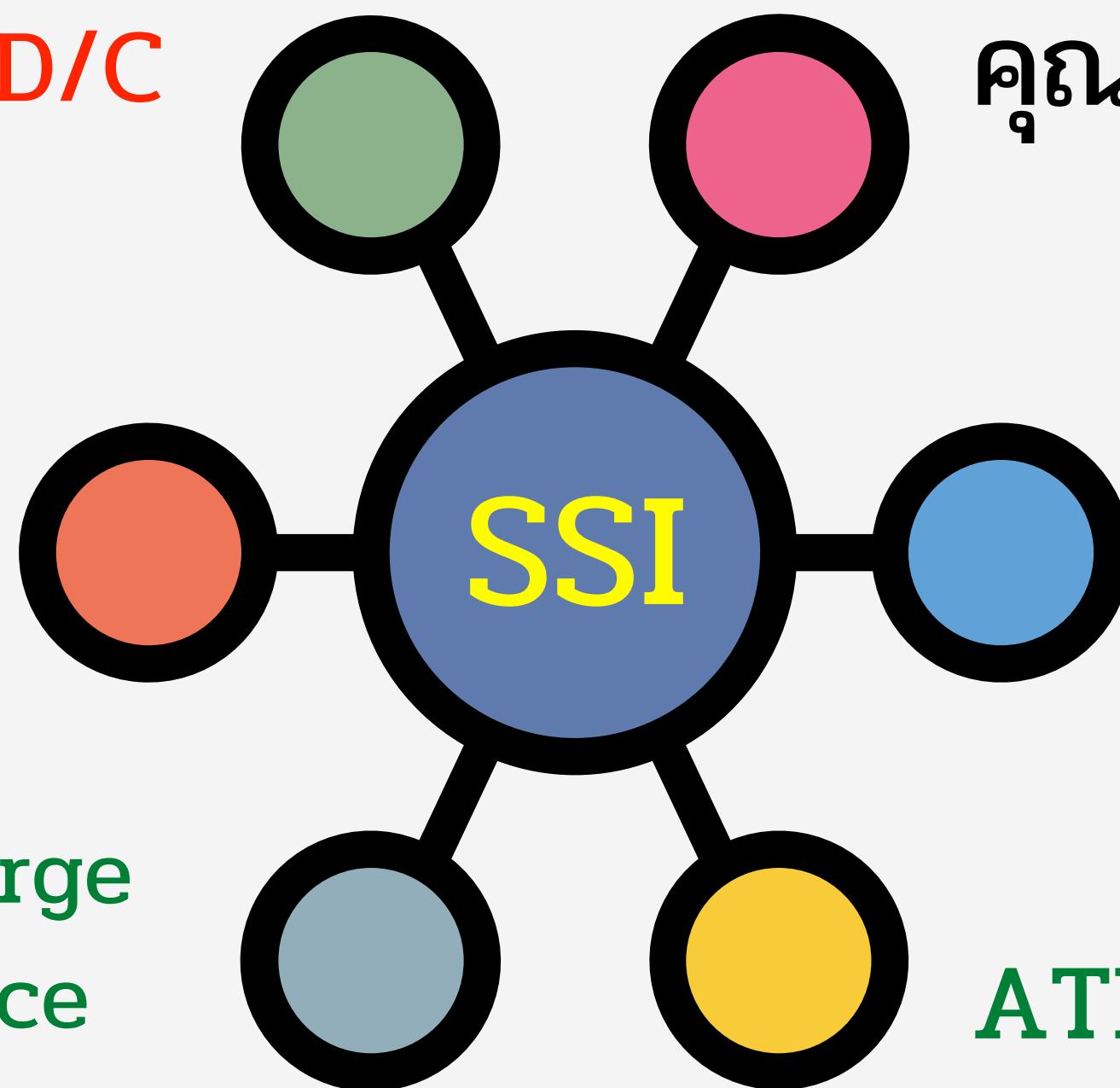


ปัญหาการติดเชื้อแผลผ่าตัด THA หน่วยงาน orthopedic มีการติดเชื้อทุกปี

คุณภาพการดูแลหลัง D/C

NI case review โดย
ICWN และทีม

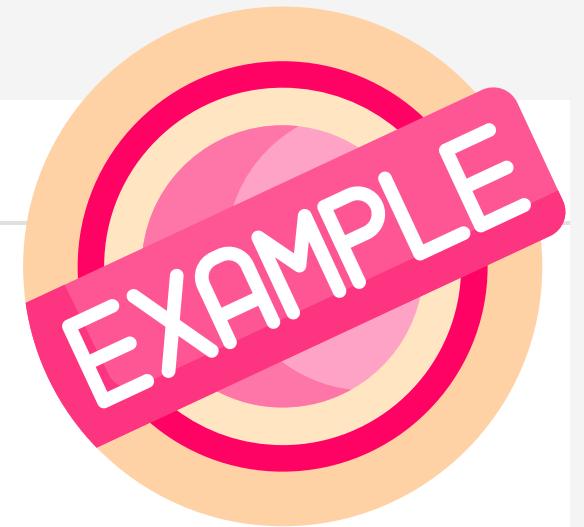
Post discharge
surveillance



คุณภาพห้องผ่าตัด

SSI bundle

ATB pre-op prophylaxis



ผลการตรวจประเมินอัตราการไหลเวียนอากาศ พด.2565

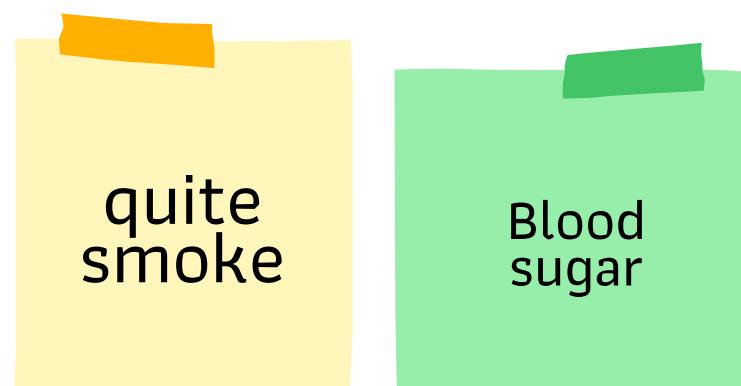
| ลำดับ | แผนก | จุดตรวจวัด | Total Air Supply Volume per hour (m ³) | Room Volume (m ³) | Air Change Rate per hour (ACH) | CDC 2003 |
|-------|--------------------------------|------------------|--|-------------------------------|--------------------------------|----------|
| 1 | กลุ่มงานห้องผ่าตัด | ห้องผ่าตัด 1 | 2483.7 | 180 | 13.80 | 15 |
| 2 | | ห้องผ่าตัด 2 | 1677 | 108 | 15.53 | 15 |
| 3 | | ห้องผ่าตัด 3 | 1201.9 | 108 | 11.13 | 15 |
| 4 | | ห้องผ่าตัด 4 | 1404.2 | 108 | 13.00 | 15 |
| 5 | | ห้องผ่าตัด 5 | 1989 | 108 | 18.42 | 15 |
| 6 | | ห้องผ่าตัด 7 | 3244 | 108 | 30.04 | 15 |
| 7 | | ห้องผ่าตัด 9 | 3519 | 108 | 32.58 | 15 |
| 8 | | ห้องผ่าตัด 10 | 2715 | 108 | 25.14 | 15 |
| 9 | | ห้องผ่าตัด 12 | 1161 | 108 | 22.00 | 15 |
| 10 | | ห้องผ่าตัด 13 | 1300 | 108 | 12.04 | 15 |
| 11 | | ห้องผ่าตัด 14 | 3497 | 108 | 32.38 | 15 |
| 12 | | ห้องผ่าตัด 16 | 2372 | 108 | 21.96 | 15 |
| 13 | ห้องผ่าตัด (Excellence Center) | ห้องผ่าตัด 1 | 4454 | 184.314 | 24.17 | 15 |
| 14 | | ห้องผ่าตัด 2 | 4338 | 177.201 | 24.48 | 15 |
| 15 | | ห้องผ่าตัด 3 | 3747 | 177.186 | 21.15 | 15 |
| 16 | | ห้องผ่าตัด 4 | 3764 | 173.745 | 21.66 | 15 |
| 17 | OR Minor | ห้องผ่าตัดเล็ก 1 | 1701 | 70.56 | 24.11 | 15 |



การพัฒนาระบวนการ safety surgery

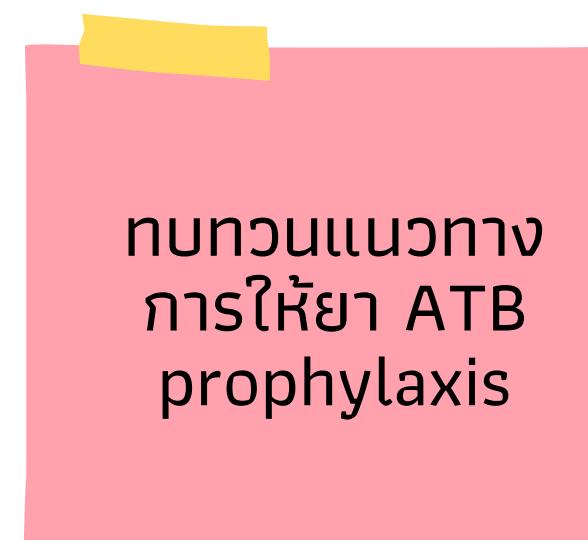
1

ทบทวนกระบวนการ
เตรียมผู้ป่วยก่อนผ่าตัด



2

antibiotic prophylaxis



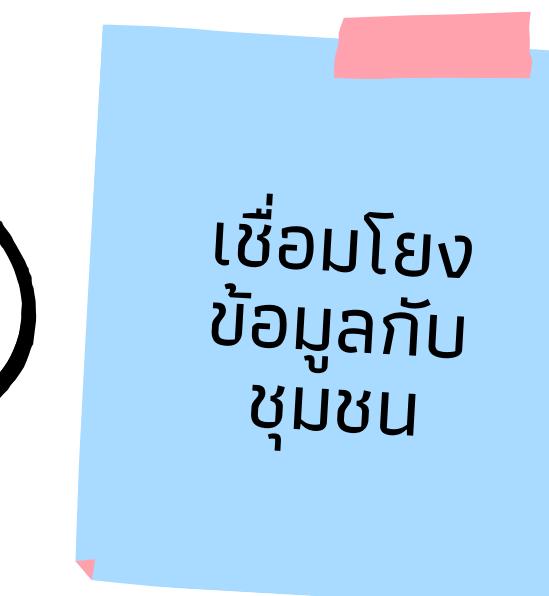
3

safety surgery tracer



4

post discharge surveillance



5

review SSI case



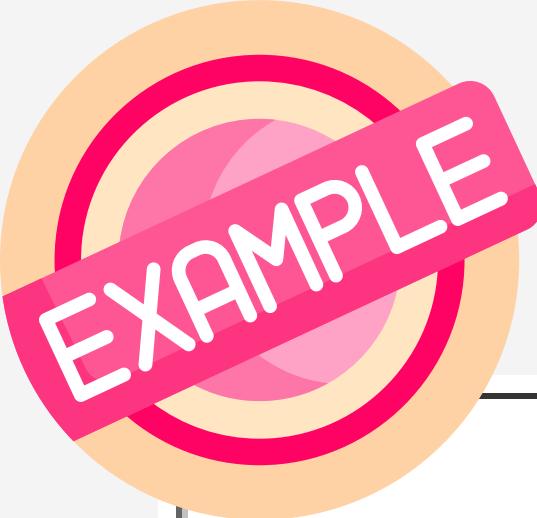
EXAMPLE

safe surgery tracer

| เตรียมการก่อนผ่าตัด | เตรียมตัวก่อนเข้าห้องผ่าตัด | Anesthesia | Operation | หลังผ่าตัด |
|---|---|---|--|--|
| <p>Blood sugar (mg%)</p> <p><input type="checkbox"/> < 200 <input type="checkbox"/> > 200</p> <p><input type="checkbox"/> ไม่ได้ตรวจ</p> <p>อาบน้ำก่อนผ่าตัด</p> <p><input type="checkbox"/> อาบปกติ <input type="checkbox"/> ใช้ CHG bath</p> <p><input type="checkbox"/> ไม่ได้อาบน้ำ</p> <p>ชื่อการผ่าตัด</p> | <p>ให้ ATB ก่อนไป OR ที่ห้องผู้ป่วย</p> <p><input type="checkbox"/> ให้ <input type="checkbox"/> ไม่ให้</p> <p><input type="checkbox"/> ให้เพื่อรักษาการติดเชื้อ อันจากยั่งแส้ว</p> <p><input type="checkbox"/> ให้เป็น prophylaxis ก่อนไป OR เวลาที่ให้.....</p> <p><input type="checkbox"/> ไม่ได้ให้แต่น้ำยาไปให้ที่ OR</p> <p><input type="checkbox"/> ไม่มีคำสั่งให้ ATB</p> | <p>ลงมีดวันที่.....เวลา.....</p> <p>ระยะเวลาผ่าตัด</p> <p><input type="checkbox"/> < 4ชม. <input type="checkbox"/> > 4ชม.</p> <p>ให้ ATB ก่อนลงมีดหรือไม่</p> <p><input type="checkbox"/> ใช้ ชนิด/dose.....</p> <p>เวลา.....</p> <p><input type="checkbox"/> ไม่ใช้</p> <p>ให้ ATB ชั่วระหว่างผ่าตัดหรือไม่</p> <p><input type="checkbox"/> ใช้ ชนิด/dose.....</p> <p>เวลา.....</p> <p><input type="checkbox"/> ไม่ใช้</p> | <p>ประเภทผ่าตัด</p> <p><input type="checkbox"/> Clean <input type="checkbox"/> Clean contaminate</p> <p><input type="checkbox"/> Contaminate <input type="checkbox"/> dirty</p> <p>มีการใส่ Drain หลังผ่าตัด</p> <p><input type="checkbox"/> ใช้ <input type="checkbox"/> ไม่ใช้</p> | <p>มีคำสั่งให้ ATB ต่อเนื่องหลังผ่าตัด</p> <p><input type="checkbox"/> ใช้ ชนิด/dose.....</p> <p>ระยะเวลา <input type="checkbox"/> 1วัน <input type="checkbox"/> 3วัน</p> <p><input type="checkbox"/> ยังไม่มีกำหนดหยุด</p> <p><input type="checkbox"/> ไม่ใช้</p> <p>มีการติดตาม Blood sugar หลังผ่าตัด</p> <p><input type="checkbox"/> ใช้ <input type="checkbox"/> ไม่ใช้</p> |

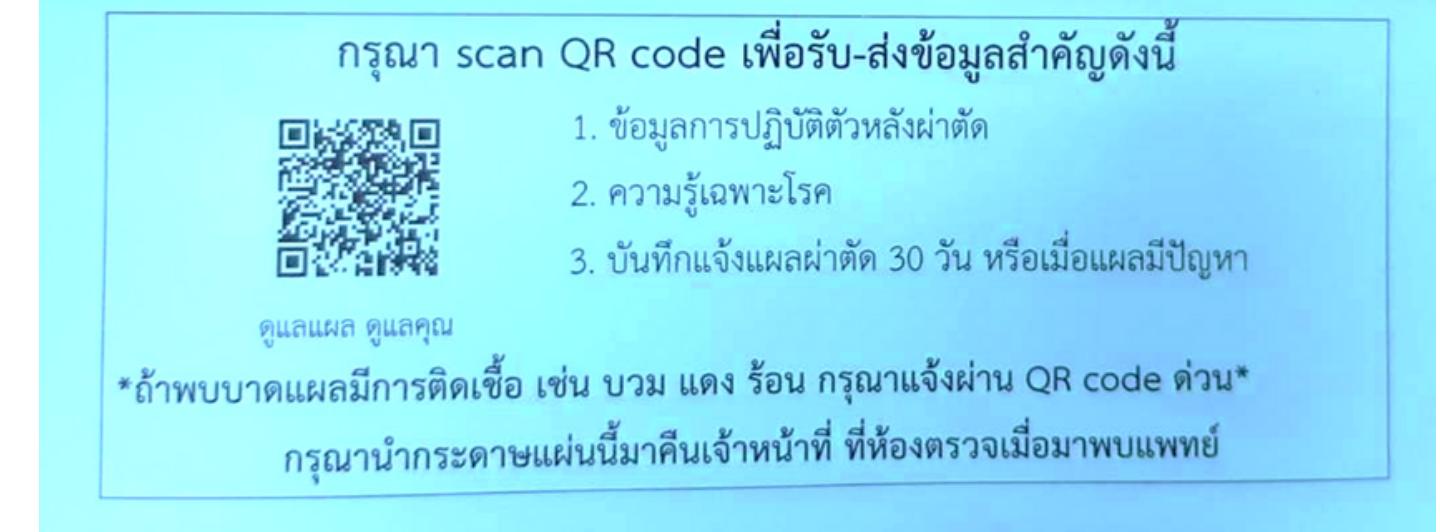
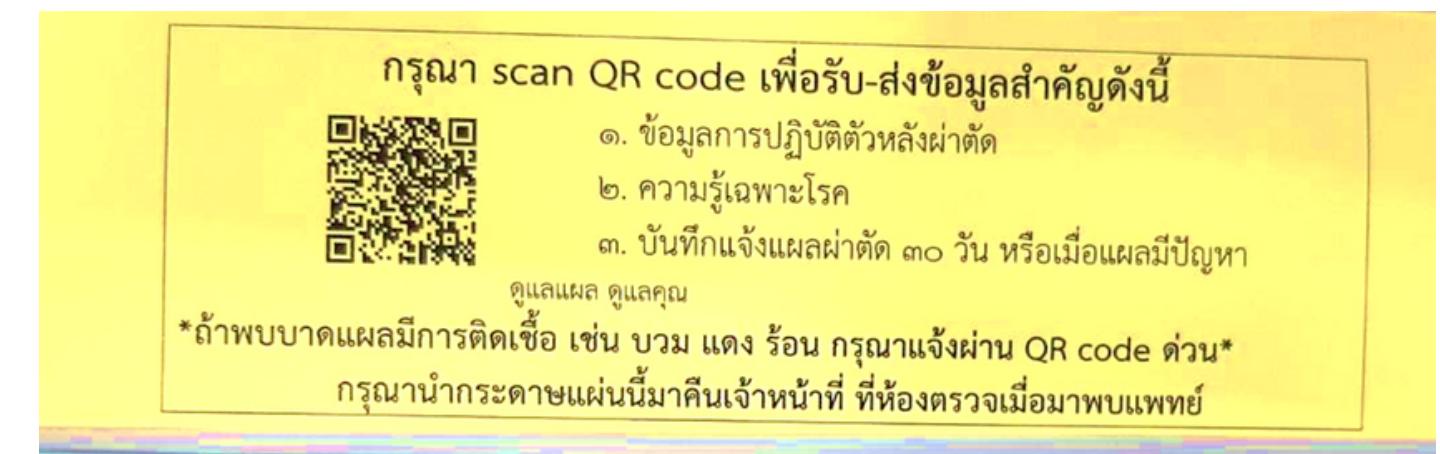
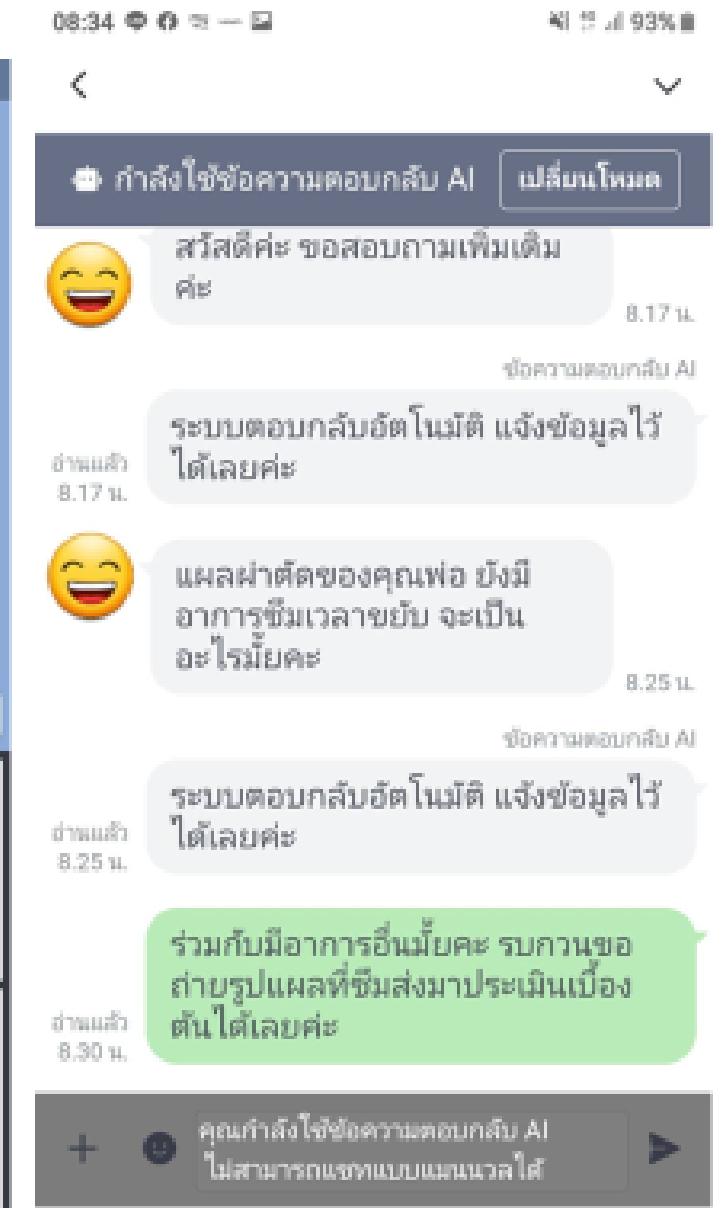
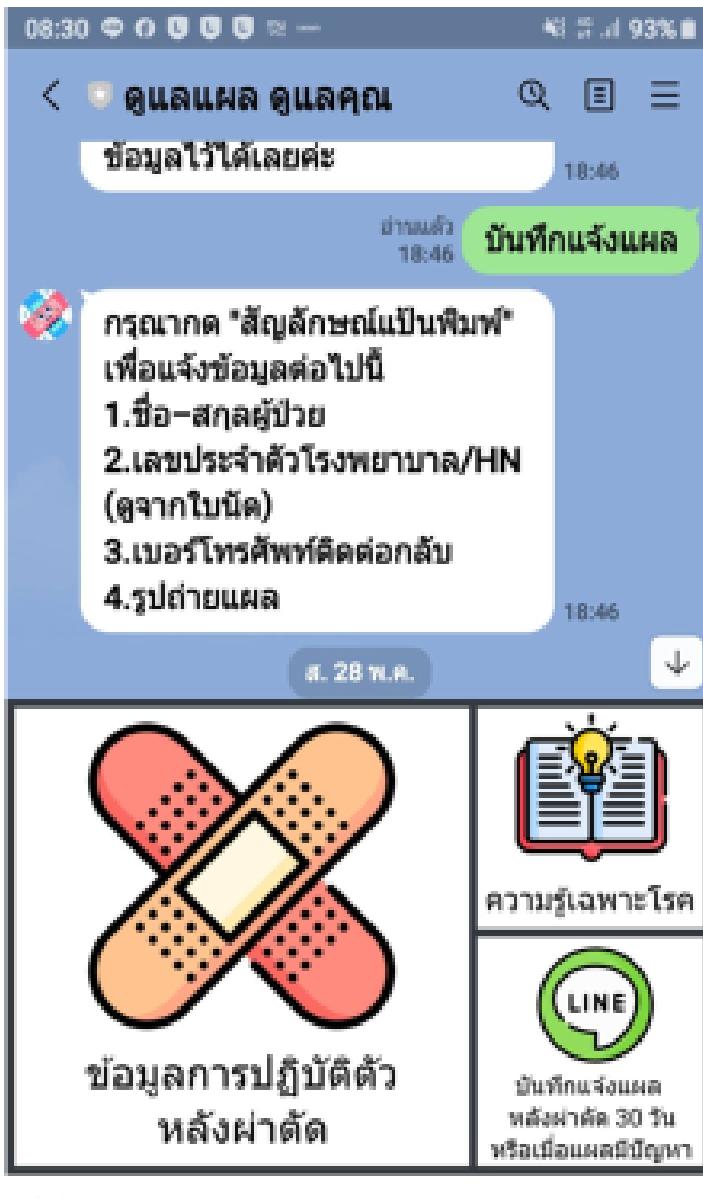
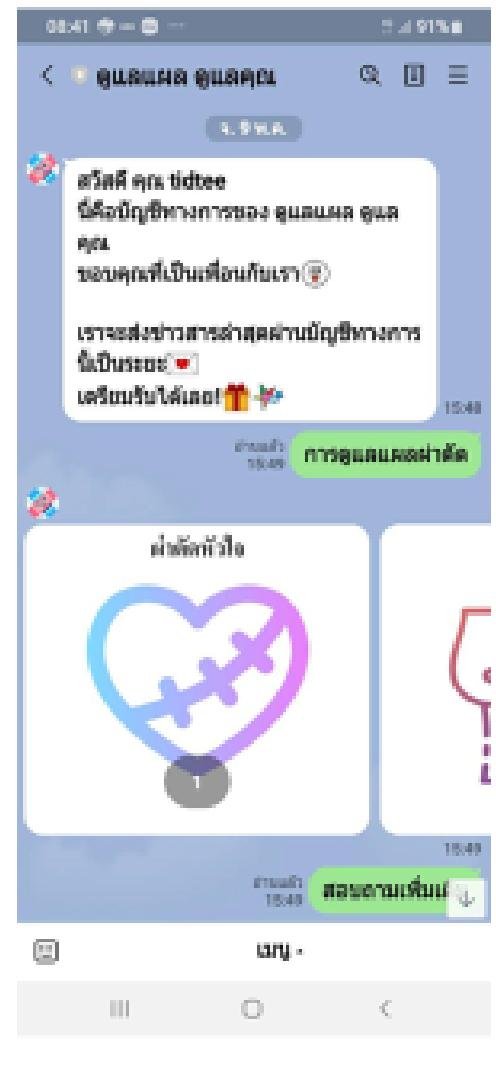
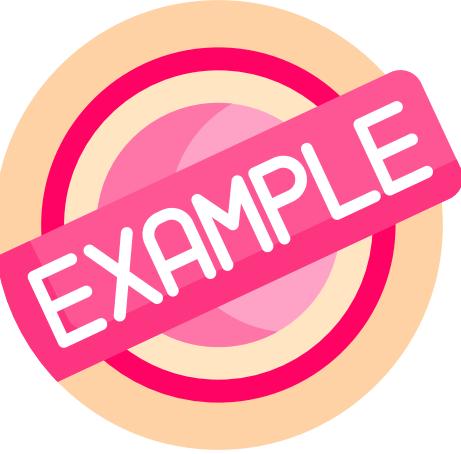
ติดสติกเกอร์ชื่อผู้ป่วย

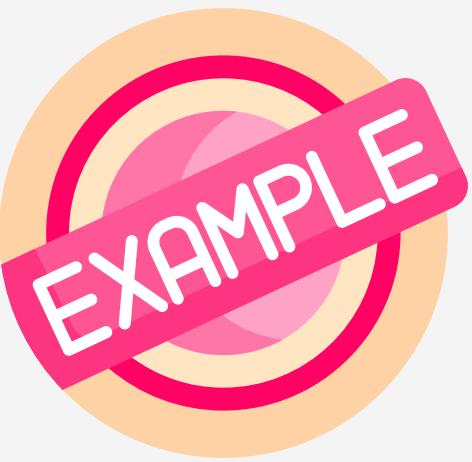
Version 1-20/4/56



ผลการประเมินตามใบ tracer SSI bundle

| หัวข้อ | เริ่มเก็บข้อมูลวันที่ 1-20 พค. 2565 | | | | |
|---|-------------------------------------|------------|---|-------------|-----------------|
| | ปฏิบัติ | ไม่ปฏิบัติ | %ปฏิบัติ | %ไม่ปฏิบัติ | รวมครั้งประเมิน |
| การให้ยาAntibiotic prophylaxis ถูกต้อง | | | | | |
| - ก่อนผ่าตัดไม่เกิน 1 ชั่วโมง | 100 | 3 | 97.09 | 2.91 | 103 |
| - ให้ re-dosing Antibiotic ถ้าผ่าตัดนานเกิน 4 ชั่วโมง | | | ยังไม่สามารถประเมินได้ เนื่องจากยังมีความ คลาดเคลื่อนในการใช้ใบ tracer | | |
| อัตราการควบคุมน้ำตาลก่อนผ่าตัด < 200 | 130 | 2 | 98.48 | 1.52 | 132 |





คุณภาพการดูแลผู้ป่วยหลัง D/C

1. ใน case Total Hip Arthroplasty สร้างระบบ case manager เพื่อช่วยกำกับดูแล ให้ข้อมูลผู้ป่วย/ญาติ ก่อน/หลัง Discharge
2. ระบบการติดตามข้อมูล SSI ผ่าน line official จะช่วยตอบคำถาม และ มีคำแนะนำการปฏิบัติตัวหลังการผ่าตัดชนิดต่างๆ



Thank
you!

