Global guidelines (Nov 2016) for Prevention of Surgical Site Infections

World Health Organization

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Conflicts Of Interest

- Nothing to declare

- Next in series of my presentations on Surgical site infections

1) Surgical Site Infections
2) Prevention of Surgical site infections
3) Antibiotic Prophylaxis in General Surgery
4) Laparoscopic port site infections
5) Safe Surgery

– available in my website, www.drbennet.com/presentations

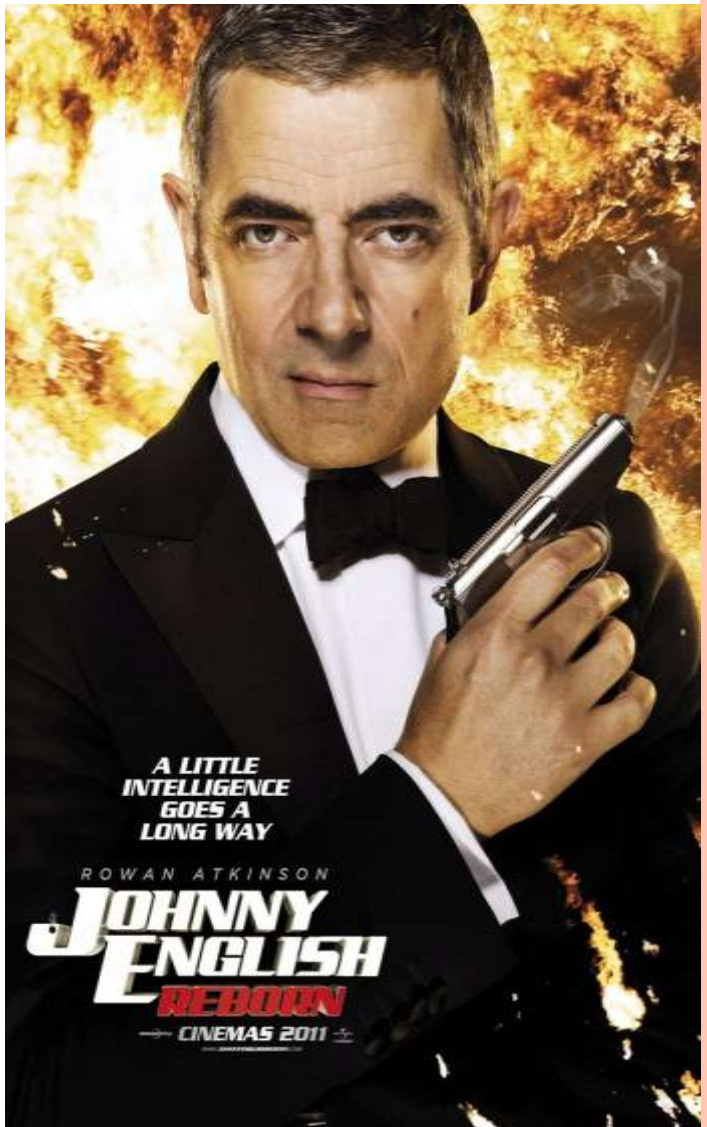
Introduction

- Surgical Site Infection (SSI) – 2nd most frequent Healthcare Associated Infection (HAI) in Europe & USA
- Increasingly, more common than UTI in western countries
- In low & middle-income countries, it affects up to one-third of surgical patients

Lesson For A Surgeon From The Movie "Johnny English Reborn"

- "For years, I believed what happened in Mozambique was my fault, now I realise it was **only partly my fault"**

- SSI multi-factorial
- Prevention needs integration of a range of preventive measures before, during & after surgery
- Implementation NOT standardised



GUIDELINES FOR SSI PREVENTION

- National guidelines (CDC, USA – 1999 & 2014 / NICE, UK – 2008 & 2013 / IDSA - 2014 etc)
- WHO guidelines Nov 2016 – global (even resource poor settings)

- WHO global campaigns – Safe surgery & SSI prevention

1. *Save Lives: Clean Your Hands*
2. *Safe Surgery Saves Lives*

Recommendations

- 29 recommendations covering 23 topics for SSI prevention in the pre, intra & post-op periods
- Recommendation – strong, conditional or no decision
- For each recommendation, the quality of evidence was graded as “very low”, “low”, “moderate” or “high”

Pre-operative measures

1. Preoperative bathing

- Good to bathe / shower before surgery (conditional / moderate)
- Plain or anti-microbial soap (conditional / moderate)
- Chlorhexidene impregnated cloth (No decision)

- Shower, bath or bed bath on or day before surgery (NICE, 2008)
- Shower or bathe – soap (anti-microbial or plain) or an antiseptic agent – at least night before surgery (CDC draft 2014)

2. Nasal Decolonization with mupirocin

- Known nasal carriers of Staph. aureus → peri-op intranasal 2% mupirocin oint ± chlorhexidene bodywash
- Cardiac & Ortho surgery (strong / moderate)
- Other surgeries (conditional / moderate)

- Do not use nasal decontamination (NICE 2008)
- Screen for Staph.aureus (MSSA & MRSA) & treat in high-risk cases (ortho, cardio-thoracic) – IDSA 2014

3. Screening of ESBL colonization & impact on antibiotic prophylaxis

- ESBL screening?
- Change antibiotic prophylaxis in known ESBL carrier / coloniser?
- Change hospital antibiotic prophylaxis, if ESBL prevalence > 10%?
- (No decision)

4. Optimal timing for pre-operative SAP

- Before surgical incision & when indicated (strong / low)
- Within 120 minutes before incision – consider ½ life (strong / moderate)

NICE 2008 – At start of anaesthesia, earlier if tourniquet used

- Consider ½ life, time needed for infusion, protein binding
- Repeat dose, if operation longer than 2 half lives of antibiotic

CDC draft 2014 – Bactericidal concentration in serum & tissues at time of incision

- Dose / kg & re-dosing (No decision)

IDSA 2014 – If needed, 1 hr before, better if < 30mins before

5. Mechanical bowel preparation & use of oral antibiotics - Elective adult Colorectal surgery

- Mechanical bowel preparation & oral antibiotics – Yes (Conditional / moderate)
- Mechanical bowel preparation alone – No (Strong / moderate)

- No mechanical bowel preparation (NICE 2008)
- Mechanical preparation & non-absorbable oral antibiotics in divided doses on day before (CDC 1999)
- ? Risk of Clostridium difficile colitis

6. Hair removal

- No hair removal
- If absolutely necessary, clipper
- Definitely no shaving pre-op or in OT (strong / moderate)

- Electric clipper with single use head, on day of surgery (NICE 2008)
- Only clipper or depilatory agent (CDC 1999)

7. Surgical site skin preparation

- Alcohol-based chlorhexidene solution (strong / low to moderate)
- 2 or 4% ? (no decision)
- Avoid in neonates (paediatrics?)
- Avoid in brain, meninges, eye & middle ear
- (Allow to dry before using diathermy)

- Aqueous or alcohol-based povidone-iodine or Chlorhexidine (NICE 2008)
- Appropriate antiseptic agent (CDC 1999)
- Alcohol-based antiseptic agent (CDC draft 2014)

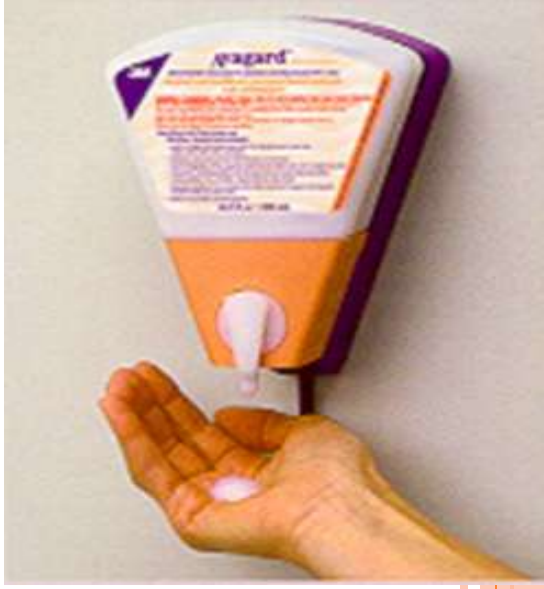
8. Antimicrobial skin sealants

- Cyanoacrylate-based antimicrobial sealants (after skin prep & before incision) – block migration of flora from surrounding skin into surgical site by dissolving over several days post-op – No benefit or harm
- Showing SSI reduction in cardiac surgery ?

- No (conditional / very low)

- No (CDC draft 2014)

9. SURGICAL HAND PREPARATION



- Handscrub with anti-microbial soap & water or alcohol-based handrub before donning sterile gloves (strong / moderate)
- Low resource settings / poor OR water quality / no need for towels / easier & quicker → alcohol handrub (locally made, to WHO specs)

- Wash hands prior to first operation – aqueous antiseptic, with single-use brush
- Subsequent operations – alcohol-based handrub or antiseptic scrub (NICE 2008)

Pre-op &/or intra-operative measures

10. Enhanced nutritional support

- ***Consider*** oral / enteral multiple nutrient-enhanced formulas in underweight adult patients (BMI < 18.5) who undergo major surgery (cardiac / cancer) – (conditional / very low)
- Combination of arginine, glutamine, omega-3 fatty acids & nucleotides

- When to start ? / How long pre-op ? (No decision)
- TPN or Tube feeding NOT solely to prevent SSI

11. Perioperative discontinuation of immunosuppressive agents

- Methotrexate in Rheumatoid arthritis
- Post-transplant
- Infliximab in Crohn's / hidradenitis suppurativa / Psoriasis
- Long-term steroids
- No (Conditional / very low)

- Stop, if possible (IDSA 2014)
- Duration of stopping?

12. Perioperative oxygenation

- **Hyperoygenation**
- Adult patients – GA with ET tube → FiO_2 - 80% intra-op & if possible, 2-6 hrs post-op (Strong / moderate)
- Needs high flow mask post-op
- More benefit in older patients, colorectal surgery (higher SSI rate, anaerobic bacteria)
- Maximum benefit, if with normothermia & normovolemia also
- COPD patients?
- Supplement O_2 to maintain SpO_2 > 95% (NICE 2008)
- High FiO_2 (at least 50%) intra & immediate post-op, normal lung function + normothermia & normovolemia (CDC draft 2014)

13. Maintaining normothermia

- Use patient body warming devices in OR during surgery (Conditional / moderate)
- Normothermia decreases myocardial events, blood loss & transfusion need also
- Fluid warmers / blankets / forced-air warmers
- Body temp > 36 C (96.8 F)
- Duration?
- Avoid inadvertent ‘peri-op hypothermia’ (NICE 2008)
- Maintain peri-op normothermia (CDC draft 2014)
- GA > 1 hr (IDSA 2014)

14. Use of protocols for intensive peri-operative blood glucose control

- Yes, for both diabetic & non-diabetic adults (Conditional / low)
- Optimal blood glucose level ? (No decision)
- Intensive blood glucose <150 mg/dL by Insulin use (IV or subcut or Insulin-dextrose pump) – risk of hypoglycaemia, stroke, death
- Do NOT use Insulin in non-Diabetics (NICE 2008)
- Immediate post-op glucose < 180 mg/dL, but never <110 mg/dL (IDSA 2014)
- Diabetics, Intra-op glucose < 200 mg/dL (Most UK guidelines)
- Peri-op blood glucose <200mg/dL in diabetic & non-diabetics (CDC draft 2014)

15. Maintenance of normovolemia

- Use ‘goal-directed fluid therapy’ intra-op (Conditional / low)

- No universal definition of normovolemia or standardized method for assessment
- GDFT vs liberal vs restricted fluid therapy
- Use of colloid boluses, inotropes or blood transfusions (guided by MAP, lactate, Hb, stroke volume variation, pulse pressure variation, cardiac index etc)

- Maintain adequate perfusion during surgery (NICE 2008)
- Haemodynamic goal-directed therapy (NICE 2013 update)

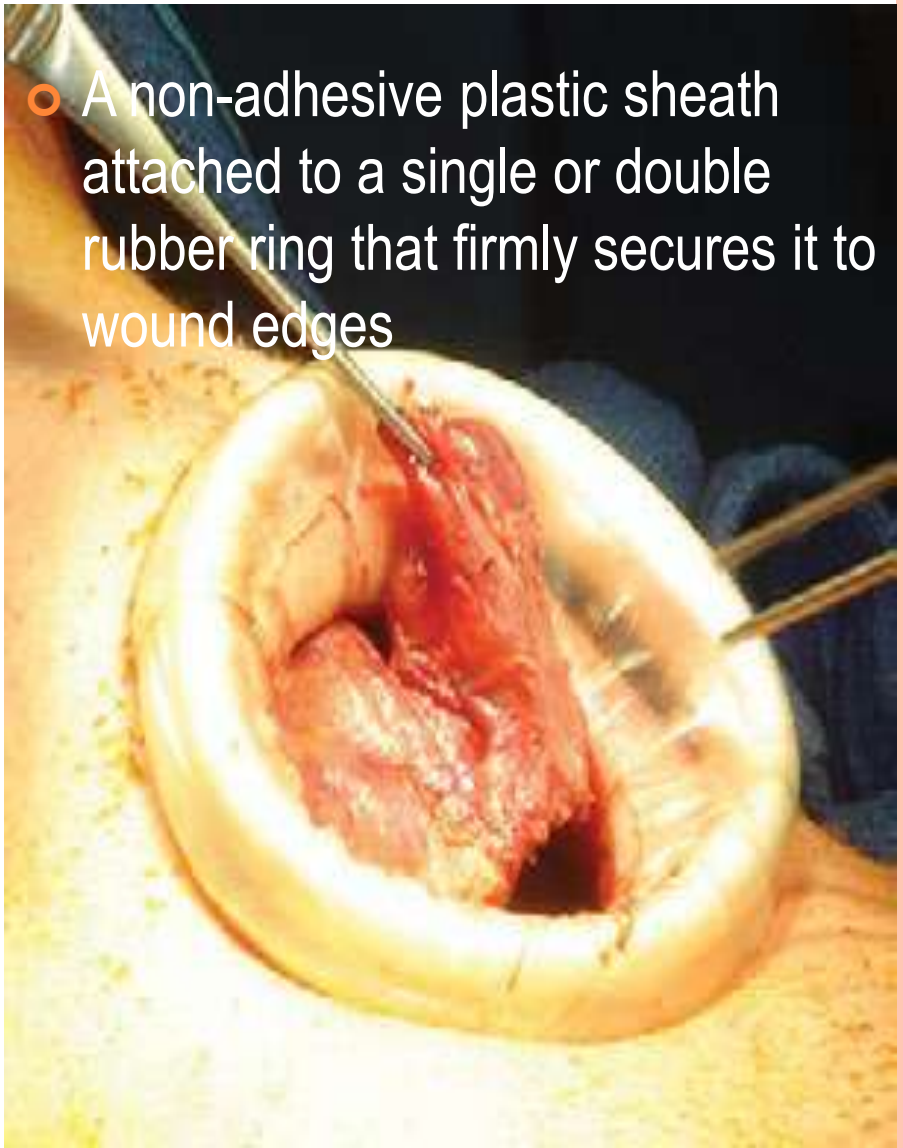
16. Drapes & gowns

- Use either sterile, disposable non-woven or sterile, reusable woven drapes & gowns (Conditional / moderate to very low)
- No difference in SSI
- Do NOT use disposable, adhesive, incise drapes with or without antimicrobial properties (Conditional / low to very low)

- If incise drape required, use iodophor-impregnated drape (NICE 2008)

17. WOUND PROTECTOR DEVICES

- ***Consider*** wound protector devices in clean-contaminated, contaminated & dirty abdominal surgery (Conditional / very low)
- Use in GI & biliary surgery (IDSA 2014)
- May reduce SSI after laparotomy (NICE Update 2013)



18. Incisional wound irrigation

- Saline irrigation of incisional wounds before closure (No recommendation – insufficient evidence)
- ***Consider*** wound irrigation with aqueous Povidone Iodine solution, particularly in clean & clean-contaminated wounds (Conditional / low)
- Do NOT use antibiotic wound irrigation (Conditional / low)

- ***Consider*** intra-op irrigation of deep or subcutaneous tissues with aqueous iodophor solution (CDC Draft 2014)
- Do not use wound irrigation or intracavity lavage (NICE 2008)
- Perform antiseptic wound lavage (IDSA 2014)

19. Prophylactic negative pressure wound therapy

- Yes, if primarily closing high-risk surgical incisions in adults (Conditional / low)
- Surrounding soft tissue/skin damage, low blood flow, bleeding/hematoma, dead space, intra-op contamination
- Abdominal & cardiac surgery

- Useful in lower limb trauma surgery (NICE 2008)

- ? Cost-effective

20. Use of surgical gloves

- Double-gloving ?
- Changing gloves during surgery ?
- Type of gloves ?
- (No recommendation – insufficient evidence)

- Consider wearing 2 pairs of sterile gloves if high risk of glove perforation & result of contamination serious (NICE 2008)
- All members of operative team should double-glove & change gloves when perforation observed (IDSA 2014)

21. Changing of surgical instruments

- Using a new set of sterile instruments for fascial, subcutaneous & skin closure (No recommendation – insufficient evidence)
- Logical in colorectal surgery or in diffuse peritonitis, but no evidence

22. ANTIMICROBIAL-COATED SUTURES

- Triclosan-coated sutures, independent of type of surgery (Conditional / moderate)

- Not necessary (CDC draft 2014)
- Do not use routinely (IDSA 2014)
- May be useful in laparotomies (NICE update 2013)

- Antibacterial & antifungal agent found in toothpaste, antiseptic hand wash etc
- Prohibited in 'handwashes' – FDA (Sept 2017) – lack of efficacy

23. Laminar flow OR ventilation

- Do NOT use laminar flow ventilation systems in arthroplasty surgery (Conditional / low to very low)
- Fans or cooling devices (No recommendation – insufficient evidence)
- Natural ventilation (No recommendation – insufficient evidence)

- Not recommended – CDC 2003
- No difference in infections in hip & knee arthroplasties – large databases – > 4.5 lakh patients

POST-OPERATIVE MEASURES

24. Surgical antibiotic prophylaxis (SAP) prolongation

- Do NOT continue antibiotics after completion of surgery (Strong / moderate)

- Stop within 24 hours for all surgeries (IDSA 2014)
- Consider single dose antibiotic prophylaxis IV on starting anaesthesia (NICE 2008)
- Discontinue antibiotics within 24hrs (48hrs for cardiac) (CDC 1999)
- Clean & clean-contaminated surgery – No further antibiotic after surgical incision closure, even in presence of a drain (CDC draft 2014)

25. Advanced dressings

- Do NOT use advanced dressings on primarily closed surgical wounds (Conditional / low)
- Hydrocolloid, hydrogels, fibrous hydrocolloid, silver / polyurethane matrix hydrocolloid dressings & vapour-permeable films
- Higher costs

- Antimicrobial dressings – no recommendation (CDC draft 2014)
- Appropriate interactive dressing (NICE 2008)
- Silver nylon dressing better than gauze (NICE Update 2013)

26. Antimicrobial prophylaxis in presence of drain & optimal time for wound drain removal

- Do NOT continue 'prophylactic antibiotic' when wound drain present (Conditional / low)
- Optimal time of wound drain removal to prevent SSI (No recommendation – remove when clinically indicated)

- In clean and clean-contaminated surgery – No further antibiotic after surgical incision closure, even in presence of a drain (CDC draft 2014)

Take Home Messages

- CDC 1999 – Core & supplemental strategies
- WHO 2016 – Strong vs conditional / no recommendations

Strong recommendations

1. Nasal decontamination in cardiac / ortho
2. Pre-op antibiotic prophylaxis & stop after surgery
3. Hair removal with clipper
4. Alcohol based Chlorhexidene skin prep
5. Antimicrobial soap handscrub or alcohol handrub
6. Peri-op hyperoxygenation

Conclusion

- Guidelines most successfully implemented in an enabling environment supportive of ‘patient safety culture’
- Translation into practice in Surgical services & Operating rooms → achieve a reduction of harm due to SSI in the patient’s surgical journey

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Thanks

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