oneTOGETHER
the power of small actions

Surgical Environment

Quality Improvement Resource

2018 Version 1

Version 1

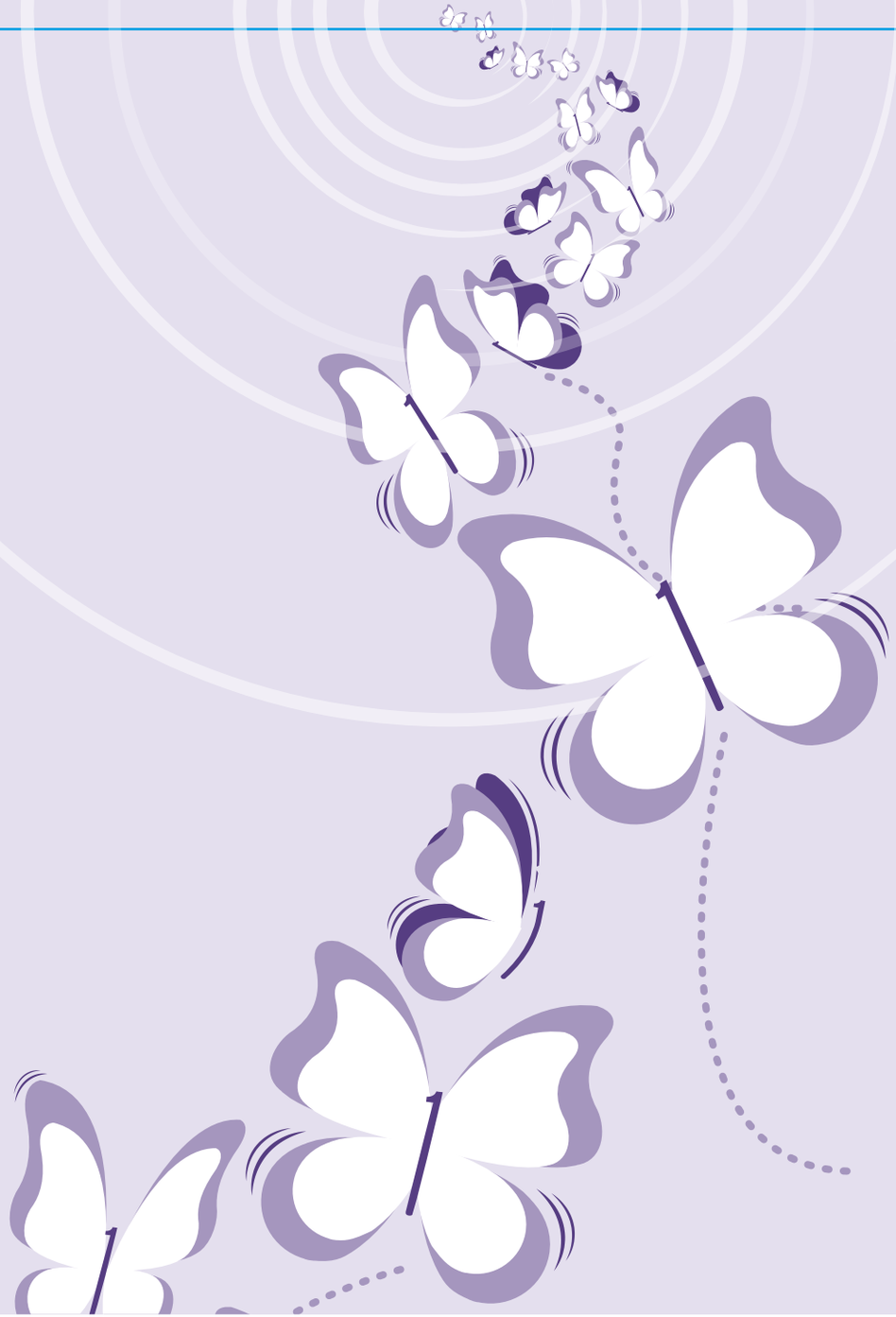
AfPP PROGRESSING SAFER SURGERY

ips Infection Prevention Society

CODP College of Operating Department Practitioners

Royal College of Nursing

3M Science. Applied to Life.™



Contents

1 Introduction to OneTogether

OneTogether is a partnership between leading professional organisations with an interest in the prevention of surgical site infection (SSI). The founding partners are:

- The Association for Perioperative Practice (AfPP)
- Infection Prevention Society (IPS)
- College of Operating Department Practitioners (CODP)
- Royal College of Nursing (RCN)
- 3M Company

The partnership is a quality improvement collaborative which aims to promote and support the adoption of best practice to prevent SSI throughout the patient's surgical journey. We seek to provide resources that make the evidence for practice to prevent SSI accessible to those involved in caring for surgical patients.

Resources created by the OneTogether partnership can be freely downloaded from our website: **www.onetogether.org.uk**

OneTogether Resource Development Group and Acknowledgments

OneTogether Resource Development Group

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Acknowledgements

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Kate Woodhead	Director of KMW Healthcare Consultants Ltd & Technical Editor of Clinical Services Journal

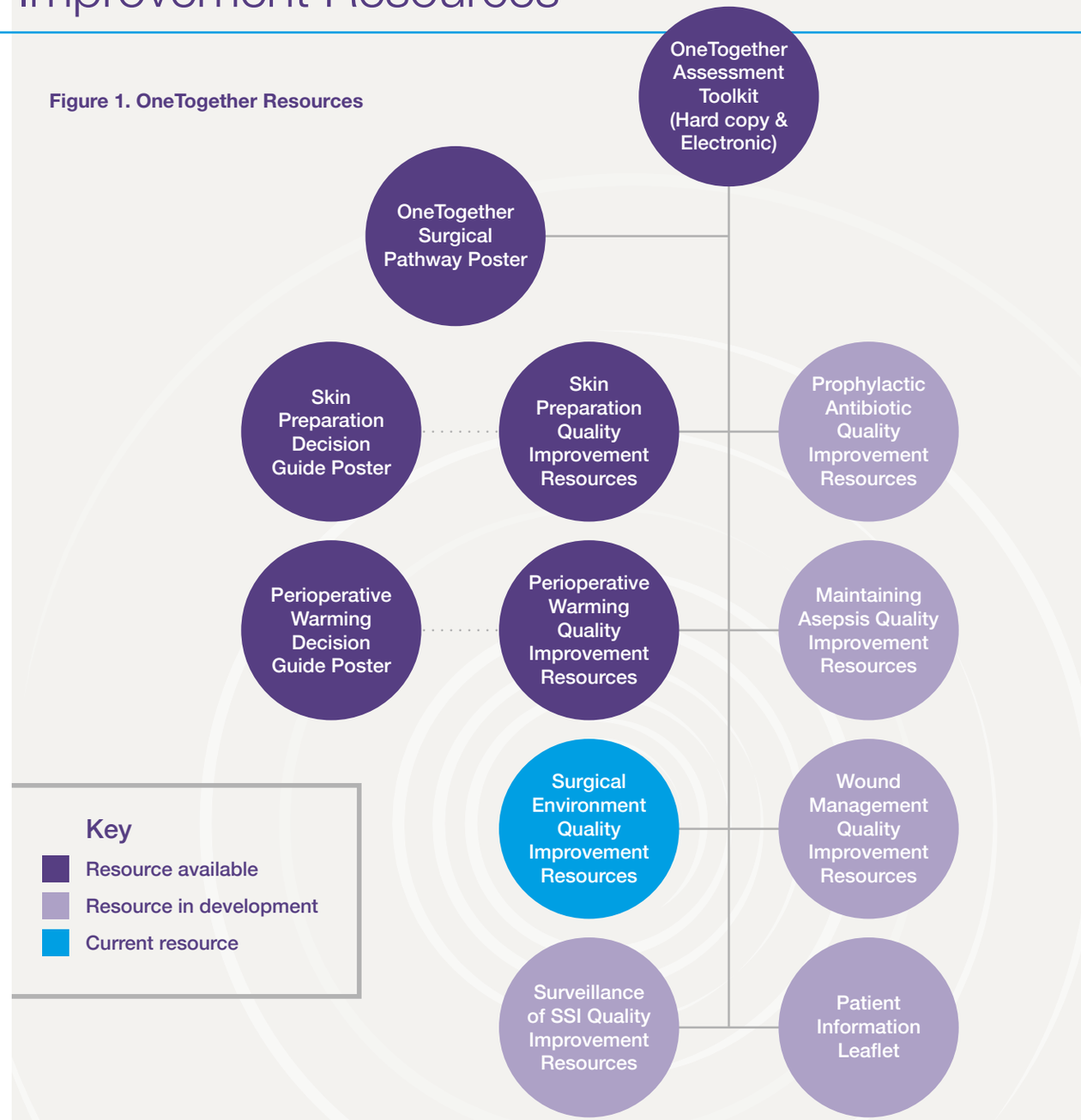
2 Overview of the Quality Improvement Resources

The OneTogether Quality Improvement Resources are intended to provide practical information for implementing best practice for each of the elements of care across the surgical pathway. These resources can be used as stand-alone documents, but we recommend they are used in conjunction with the OneTogether Assessment Toolkit.

The OneTogether Assessment Toolkit is designed to measure adherence to best practice to prevent surgical site infection (SSI). Following completion of the OneTogether Assessment, healthcare professionals will be able to identify areas of low compliance and develop a prioritised action plan for improvement.

Quality Improvement Resources summarise the evidence underpinning recommended practice and provide a competency assessment checklist. The information they contain is drawn from evidence-based guidelines or expert recommendations from professional bodies.

Figure 1. OneTogether Resources

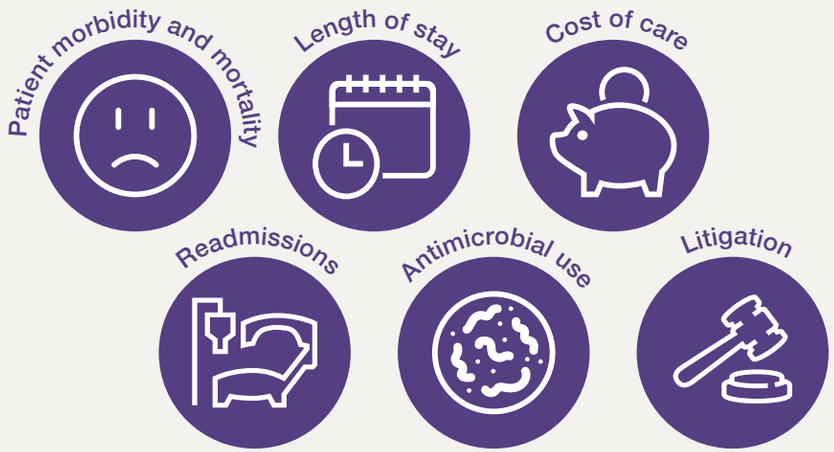


3 Preventing Surgical Site Infection

Surgical site infection (SSI) accounts for more than 15% of all healthcare associated infections and affects at least 5% of patients who have surgery.[1,2]

Impact of SSIs

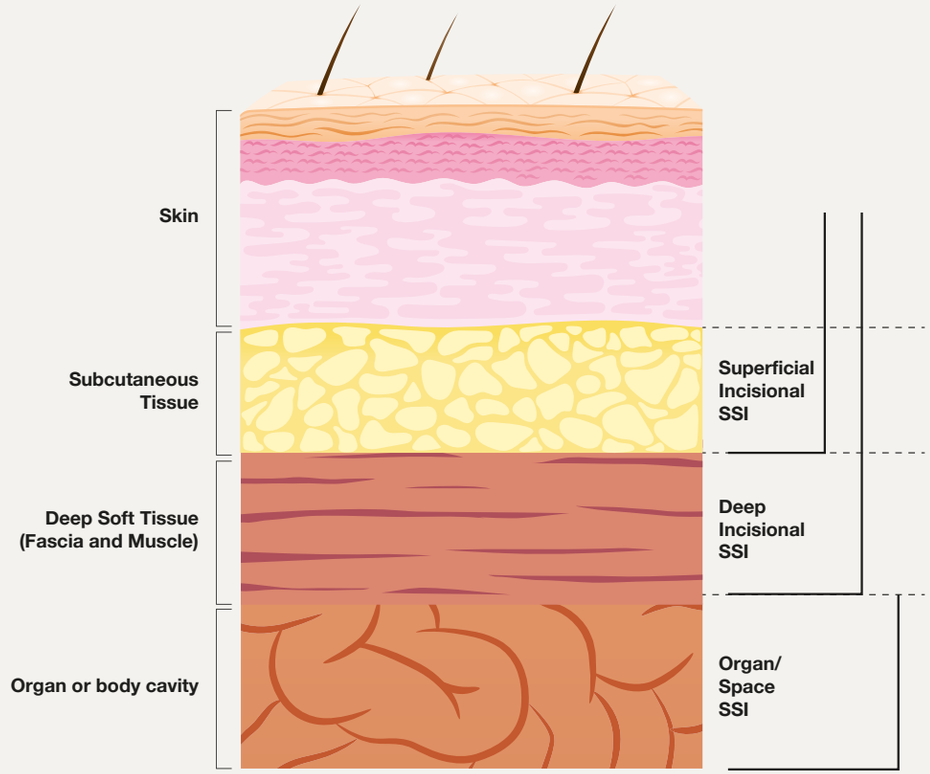
Surgical Site Infections are associated with an increase in:[3,4]



How does SSI occur?

SSI occurs when microorganisms introduced into the incision site during the surgical procedure multiply in the wound and cause signs and symptoms such as inflammation or pus, wound breakdown or fever. Symptoms of SSI may take several days to develop and may not become apparent until after the patient has been discharged from hospital. Most SSIs affect only the superficial tissues, but some affect the deeper tissues or other parts of the body handled during the procedure.[1] (Figure 2)

Figure 2. Types of surgical site infection



3 Preventing Surgical Site Infection

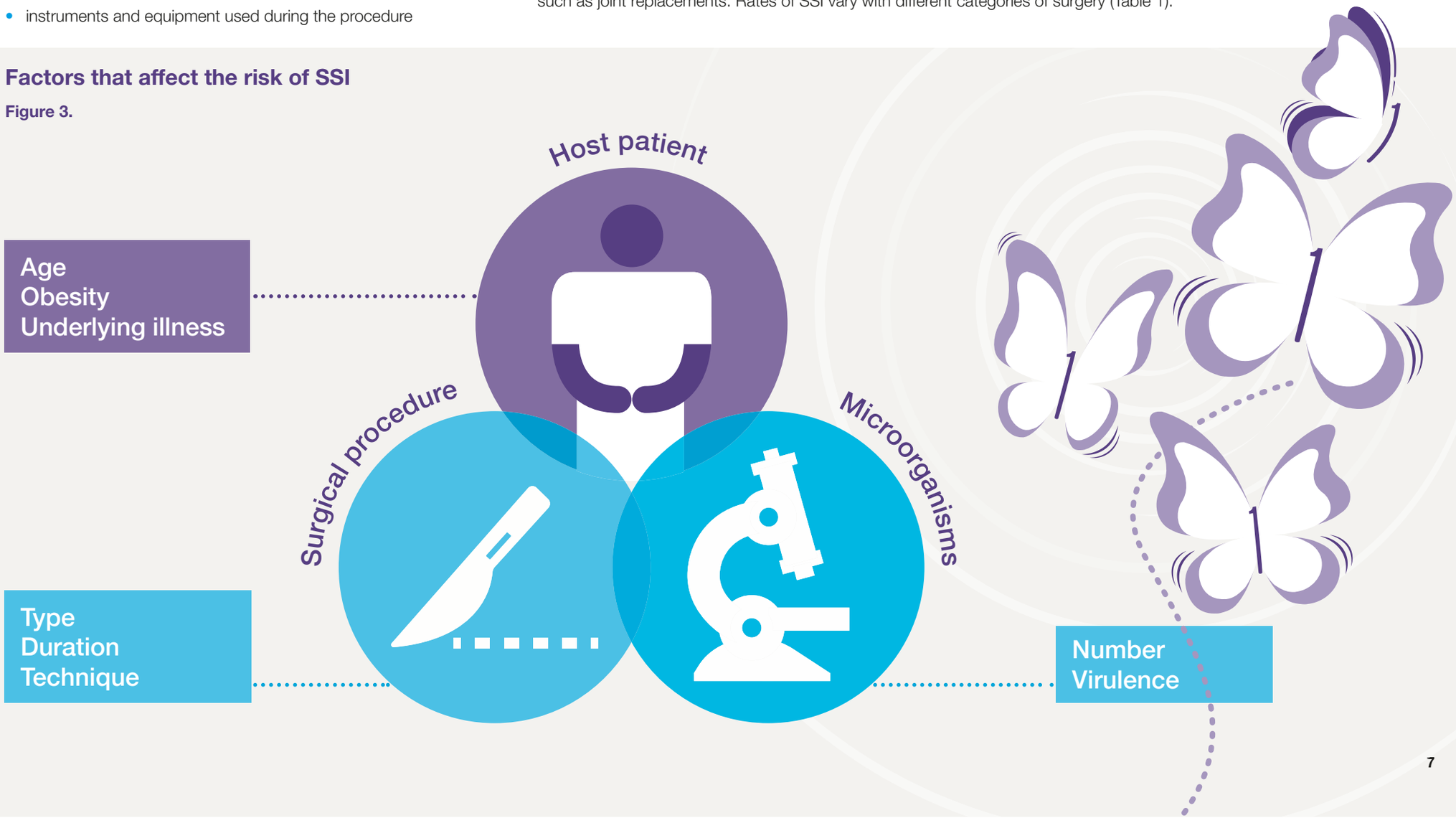
Pathogens that cause SSI may originate from:

- the patient's own microbial flora present on skin and in the body
- the skin or mucous membranes of operating personnel
- the operating room environment
- instruments and equipment used during the procedure

There are several factors which increase the risk that an SSI develops (see Figure 3). The most important is the presence of microorganisms at the site involved in the surgery. Procedures that involve parts of the body with a high concentration of normal flora, such as the bowel, are therefore associated with a higher risk of SSI than those involving sterile tissues, such as joint replacements. Rates of SSI vary with different categories of surgery (Table 1).

Factors that affect the risk of SSI

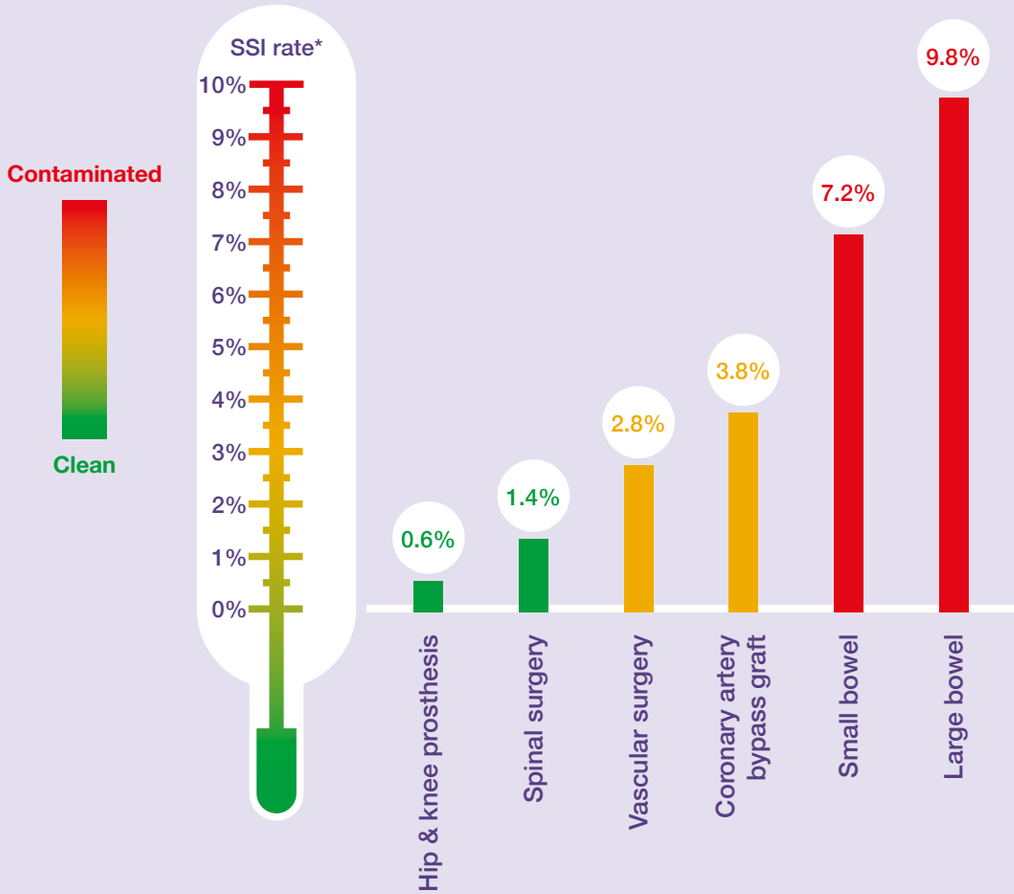
Figure 3.



3 Preventing Surgical Site Infection

Rates of SSI vary with different categories of surgery

Table 1.



*Based on SSI detected in inpatients and readmissions after surgery
Source: Surveillance of Surgical site infection in NHS hospitals in England, 2015/16

Microorganisms can be introduced into the incision site during the procedure. They may be directly introduced from the personnel involved in the operation but also indirectly on airborne particles that settle into the open tissues or on to instruments used in the procedure. The longer the procedure the greater the length of time that tissues are exposed to contamination.

The efficacy of the patients' immune response is also an important factor in determining whether microorganisms in the incision site are able to multiply to cause infection.

The risk of SSI increases with:

- The age of the patient.
- A diminished immune response due to an underlying illness (e.g. diabetes) or immunosuppressive therapy.
- Where local conditions impair healing e.g. obesity.[5]

A surgical technique that minimises damage to tissues and prevents haematoma formation reduces the risk that microorganisms left in the incis

3 Preventing Surgical Site Infection

Practices designed to prevent SSI are an essential part of perioperative care and must be applied consistently to ensure the risk of SSI is minimised.

Procedures to prevent SSI are aimed at:

Minimising the number of microorganisms introduced into the incision site, for example removing microorganisms that normally colonise the skin of patient, maintaining asepsis and managing air quality.

Preventing the multiplication of microorganisms at the incision site, for example using prophylactic antibiotics.

Enhancing the patients' defences against infection, for example by minimising tissue damage and maintaining normal body temperature during the procedure.

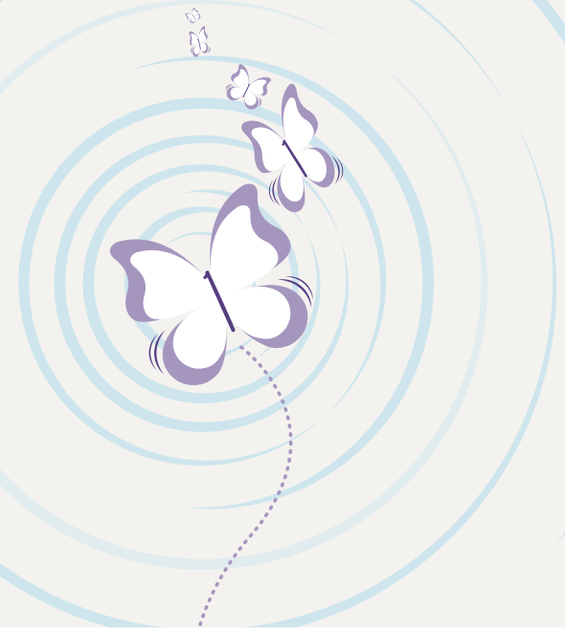
Preventing access of microorganisms into the incision site, for example postoperatively by use of a wound dressing.

Source of guidance on preventing SSI

The most authoritative guidance on the prevention of SSI can be obtained from high quality systematic reviews of research on the efficacy of interventions. In the main these studies are referenced in the following major guidelines:

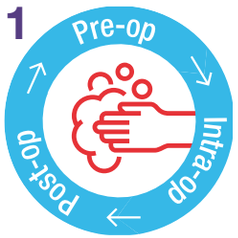
- National Institute for Health and Clinical Excellence (NICE) guideline (2008)
- World Health Organisation (WHO) Guideline (2016)
- Centers for Disease Prevention and Control (CDC)/ Healthcare Infection Control Practices Advisory Committee (HICPAC) guidelines (2017)

Advice contained in the OneTogether Improvement Resources has been drawn from these sources and other reviews of similar quality.



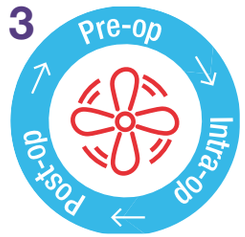
4 The Surgical Environment

The main factors of the environment are:



Theatre Cleanliness

Theatre Staff Discipline



Theatre Ventilation

Why managing the surgical environment is important to prevent SSI

1 Theatre Cleanliness (Section 4.1)

This means ensuring that surfaces and equipment are kept as clean as possible, and decontaminated appropriately.

2 Theatre Staff Discipline (Section 4.2)

This means staff wear appropriate theatre clothing, use aseptic procedures and avoid movement in and out of the operating room during an operation.

3 Theatre Ventilation (Section 4.3)

This means ensuring that a constant supply of filtered air is delivered to the theatre suite.

The purpose of a clean, safe and effective surgical environment is to reduce the risk of contamination entering the patient's operative site and causing a surgical site infection (SSI).

4.1 Theatre Cleanliness

The layout of the operating department facilitates a clean environment and is designed to minimise the risk of patients acquiring infection during the surgical procedures.

Restriction of access aims to minimise the risk of contamination. Access becomes more restricted as you move through the zones of the department;

- **Unrestricted**, such as reception areas and changing rooms, dirty utility and store rooms
- **Semi-restricted**, such as anaesthetic and recovery room areas
- **Restricted**, operating room, prep room and scrub up bay

As the patient travels through each zone, the level of cleanliness increases, with the operating room considered the area with the maximum of hygiene and the cleanest air.

Why is theatre cleanliness important?

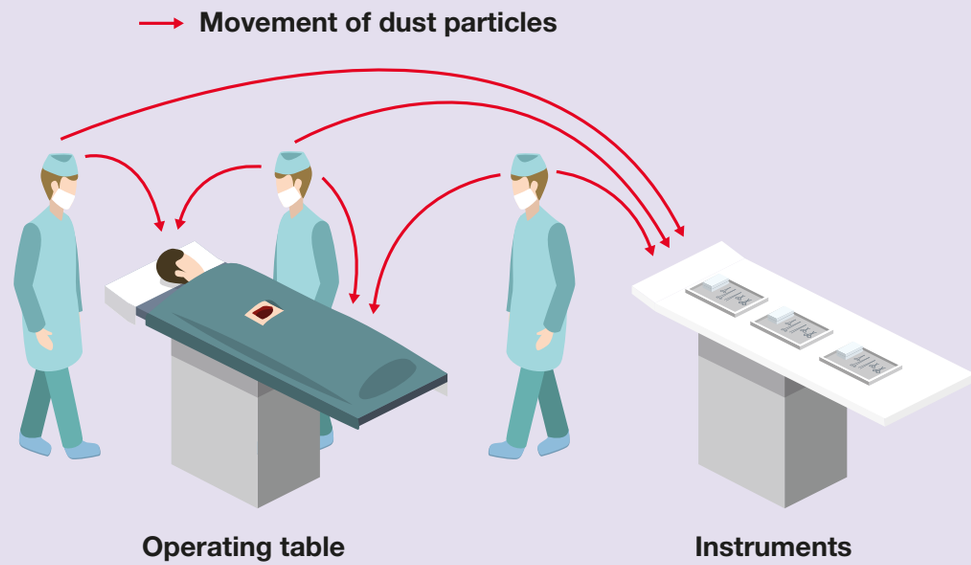
Environmental surfaces and equipment in the theatre environment become contaminated with micro-organisms from body fluids, other organic material or dust.

Dust is largely composed of skin cells and fabric particles that are shed from people in the room, particularly as they move. Many dust particles contain microorganisms.

Dust that settles on equipment close to the site of the operation may fall into the open tissues or sterile field/instruments and cause a surgical site infection.

It is not possible, or practical, to completely remove microorganisms from the environment. Staff will acquire microorganisms on their hands when they touch contaminated surfaces and these can subsequently be transferred to the patient. Decontaminating hands immediately prior to touching the patient is essential.

Figure 4. Pathways of airborne theatre wound contamination



4.1 Theatre Cleanliness

How should you decontaminate the theatre environment?

Ensure surfaces and equipment are kept as clean as possible and decontaminated appropriately.

Decontamination is the combination of processes (including cleaning, disinfection and sterilisation) used to remove micro-organisms to make surfaces, equipment or devices safe. There are three levels of decontamination (Table 2).

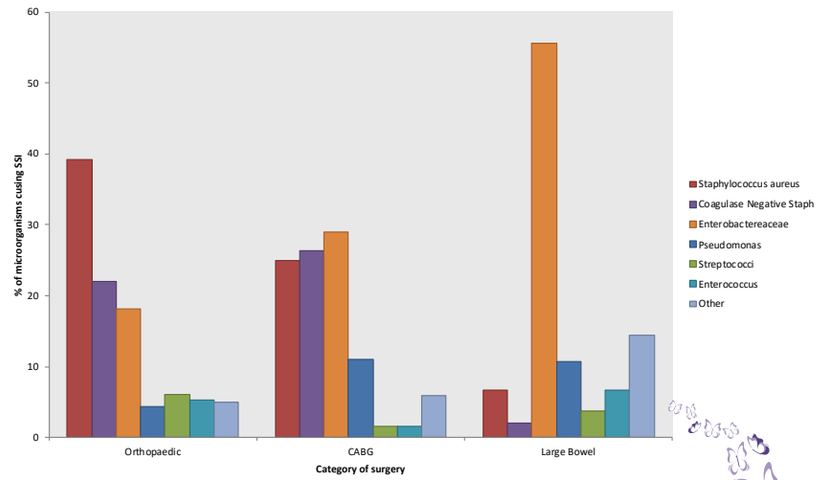
Table 2. 3 levels of decontamination

Level of Decontamination	Description
Cleaning	The physical removal of soil, dirt or dust from surfaces. Detergent lifts dirt and micro-organisms from surfaces.
Disinfection	A process that reduces the number of micro-organisms to a level at which they are not harmful. Disinfection can be achieved by heat or chemicals. Organic material needs to be removed by cleaning before disinfection. Spores are not destroyed by most disinfection processes. The contact time to achieve disinfection varies according to the agent used.
Sterilisation	A process that removes or destroys all microorganisms, including spores. Organic matter needs to be removed by cleaning before sterilisation.

Did you know:

Several microorganisms, including Staphylococci can survive for prolonged periods in the environment and since these organisms normally live on skin, they can accumulate in dust. Staphylococci are an important cause of surgical site infection (Figure 5).

Figure 5. Trends in micro-organisms reported as causing inpatient SSIs, all surgical catergories[5]



4.1 Theatre Cleanliness

When should the theatre environment be cleaned?

The extent of risk, and therefore the cleaning frequency, is determined by the function of the area. In healthcare settings areas are assigned to one of four risk categories (Table 4), which determines the extent of cleaning and the degree of auditing required.[7]

Because of the high risk activity undertaken patients are at increased risk of infection. Operating theatres are defined as very high risk functional areas.

How should you clean?

Cleaning should always start with higher level surfaces (e.g. operating lights), moving towards the lower level surfaces and from cleanest area to dirtier area.

Dry dust removal is important to prevent the accumulation of microorganisms.

How to monitor the cleanliness of the environment?

Areas allocated a very high-risk category must be subject to continual informal monitoring as well as a formal schedule of auditing. Weekly audits should be undertaken until the lead cleaning manager and infection prevention and control team are satisfied that consistently high standards are being achieved, after which the audit frequency may be reduced to no less than monthly.[7]

Table 4. Degree of cleaning and auditing

Risk Categories	Audit Requirements	Example Areas
Very High	• Consistently high cleaning standards must be maintained • Continuous informal monitoring • Formal auditing no less than monthly	Operating Theatres, ICUs, SCBUs, Accident and Emergency (A&E) departments
High	• Continuous informal monitoring • Formal auditing at least every 2 months	General wards (acute, nonacute and mental health), sterile supplies
Significant	• Continuous informal monitoring • Formal auditing at least every 3 months	Pathology, outpatient departments, laboratories
Low	• Continuous informal monitoring • Formal auditing at least 6 monthly	Administrative areas, nonsterile supply areas, record storage and archives

4.1 Theatre Cleanliness

What should be used to clean theatre areas?

Detergent and water, detergent-based wipes or microfibre cloths and water can be used for daily cleaning of surfaces.

Surfaces contaminated with blood and body fluids must be treated with disinfectant after cleaning.

Detergent and water and/or disinfectant solutions should be discarded immediately after use and the bucket emptied and stored clean and dry.

Cleaning equipment

Cleaning equipment can become heavily contaminated with bacteria which are able to multiply in the cleaning solutions and equipment. Disposable mops and cloths are preferable, but if reusable mops/cloths are used they should be decontaminated by laundering after each use and at least daily.

Personal protective equipment (PPE)

PPE should be worn by staff undertaking cleaning e.g., plastic aprons and non-sterile gloves.

When patients have a multidrug resistant organism or a transmissible infection it may be necessary to decontaminate surfaces using disinfectant and advice should be sought from the local infection control team.

Drying

After cleaning areas must be allowed to air dry.

Disinfection of Surfaces

Disinfection is required in the following situations;

- Surfaces contaminated by blood or bodily fluids
- Surfaces in contact with a patient with a specific infection risk (e.g. a patient with a antimicrobial resistant pathogen or infectious disease)

Cleaning remains an essential first step prior to the use of disinfectants to remove organic material.

What to use?

Surfaces should be disinfected with a chlorine based solution determined by local policy and the infection prevention team.

Control of Substances Hazardous to Health (COSHH)

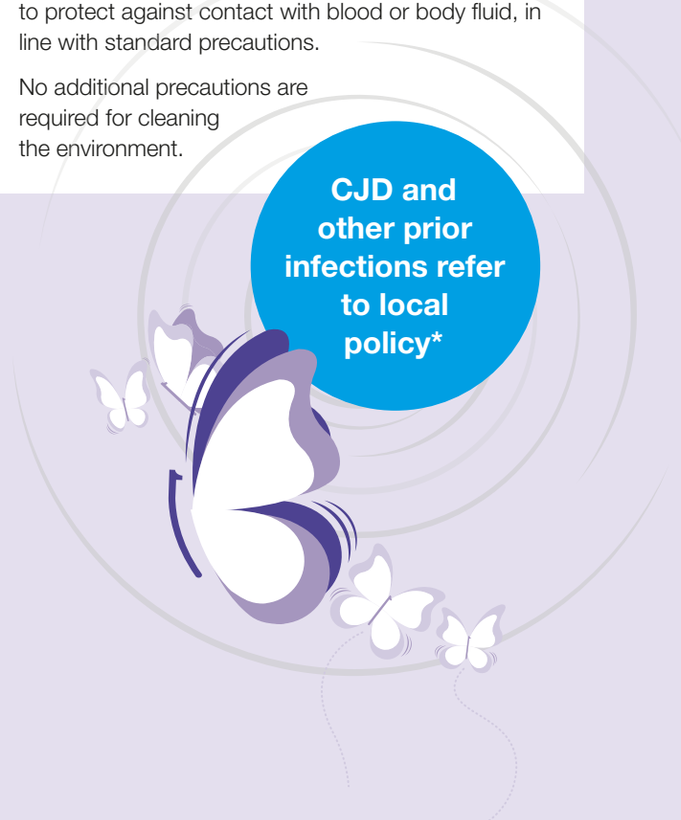
Under COSHH regulations, all persons need to know the safety precautions to take so as not to endanger themselves or others through exposure to substances hazardous to health. This is relevant to all chemicals used for decontamination.[8]

Risk of CJD[9]

Variant CJD (vCJD) was first reported as a human prion disease in 1996, there is evidence that vCJD affects the lymphoreticular systems and can therefore be detected in lymph nodes, tonsils and spleen.

If an operation is performed on patients known to have CJD or be ‘at increased risk’ (as a result of family or medical history), protective clothing should be used to protect against contact with blood or body fluid, in line with standard precautions.

No additional precautions are required for cleaning the environment.



4.1 Theatre Cleanliness

How should you decontaminate theatre equipment?

The method used to decontaminate theatre equipment is defined according to the level of risk associated with their intended use (Table 3).

Table 3. Decontamination risk level selection

Risk	Description	Recommendations
Critical	Items introduced into a sterile body area or in close contact with mucous membrane e.g. surgical instruments*	**Sterilisation**
Semi-critical	Items in close contact with mucous membranes that cannot be sterilised e.g. some endoscopes or in contact with blood or body fluids.	**Disinfection**
Non-critical	Items in contact with intact skin or has no direct contact with patient e.g.Theatre lights.	**Cleaning**

*Surgical instrument management is covered by OneTogether in the Maintaining Asepsis Quality Improvement Resource

Decontamination of theatre equipment

Large portable machines such as ultra sound or XRAY equipment can accumulate dust when not in use. These items must therefore be cleaned before being brought into the operating room and again after use.

4.1 Theatre Cleanliness

Table 5. Sample of regular cleaning frequency with responsibilities

Element	Frequency	Responsibility
Floor	• Dust removal two full cleans daily • Wet mop two full cleans daily • Machine clean weekly • Strip & reseal yearly	Housekeeper
Ceiling	• Dust monthly • Wash yearly	Housekeeper
Theatre table	• Between patients	Theatre Practitioner
Walls	• Check clean daily • Dust weekly • Washing yearly	Housekeeper
Drip stands	• Clean contact points after each use	Theatre Practitioner
Medical gas equipment	• One full clean daily	Theatre Practitioner

Who should clean theatre areas?

Staff should be properly trained to ensure they are competent in their designated roles. Training for staff to achieve correct levels of competency must be available (see section 5 competency assessment check list)

Staff undertaking cleaning of a very high-risk area must be assessed as competent in understanding the requirements of that area and in using all cleaning equipment and appropriate solutions.

Responsibility for cleaning of each area must be clearly designated to specific personnel.[7]

Responsibility for cleaning of equipment must be clearly designated to specific personnel, including cleaning immediately prior to and after use.

A theatre cleaning schedule should outline the daily, monthly and annual cleaning tasks and the person responsible for ensuring the cleaning is performed.

Table 5 sets out an example sample of a regular cleaning frequency guide for the environment and devices that are kept within an operating theatre. Cleaning schedules must be based on a framework such as this and agreed within the multidisciplinary team.

4.2 Theatre Staff Discipline

In order to reduce the risk of surgical site infection, the risk of microbial contamination of the surgical site from the theatre environment needs to be minimised.

Staff practices aimed at achieving this are known collectively as theatre discipline.

In order to maintain theatre discipline, a number of practices should be followed that include:

Minimising movement of people in and out of the operating area

Why should theatre doors be kept closed during an operation?

The direction of air flow can be reversed when doors are opened or left open, particularly if there is any temperature differential between the areas.

Movement of staff between the theatre and other rooms during the operation should be kept to a minimum to ensure that the pressure differentials and air flows are not disrupted.

How should theatre movement be controlled?

Each perioperative environment should have established controls intended to minimise the number of personnel and the throughput of traffic.[10]

- Staff awareness of local policy
- All equipment & instrumentation required for procedure should be available in the operating room prior to start of operating list
- Doors kept closed through out the procedure
- Clearly defined areas with restricted movement
- Spot checks/audit

Appropriate theatre wear

Sterile gowns worn by personnel involved in the operation and drapes used to cover the patient, help to prevent bacteria shed from the skin escaping. In order to do this the material needs to be closely-woven and impermeable so that micro-organisms cannot get through pores in the fabric. They can be made of reusable textiles (which must be sufficiently durable to provide protection after many cycles of processing) or non-woven synthetic material intended to be disposable.[11,18]

Effective hand decontamination will also reduce the risk of transferring microorganisms during the procedure, and this is most likely to be achieved if hand jewellery, artificial nails and nail polish are removed before decontamination takes place NICE Guideline. SSI surveillience.[12]

4.3 Theatre Ventilation

Why is ventilation important?

Air contains micro-organisms on airborne particles such as skin cells, dust, lint carried on clothing or respiratory droplets. Aerosols can also be generated from tissues when power tools are used.

If dust is allowed to collect on surfaces it can become airborne when disturbed.

In theatre, the main source of airborne micro-organisms is from the staff who are present.

The number of airborne microbial particles in an operating room depends on the number of people who are present and how much they move. Airborne micro-organisms can enter surgical wounds either by

- Falling directly into wounds.
- Landing on exposed instruments or surgeons' hands and then being transferred into the wound.

The risk of micro-organism settling into the wounds therefore increases with the area of exposed instruments and the duration of the procedure.

What does the theatre ventilation system do?

Operating theatres have specialised air ventilation systems which aims to

a) dilute and remove airborne contamination and

b) minimise the transfer of microorganisms from less clean to clean areas by controlling air movement.

Theatre ventilation systems are also required to maintain adequate room temperature and humidity and remove anaesthetic gases.

Diluting and removing particles

Particles are removed from air supplied to the theatre by high-grade (HEPA) filters. Particles shed by people in the room need to be controlled by:

- restricting access so that only staff required to perform the operation are present.
- using close weave or disposable gowns and drapes that minimise the escape of skin scales.
- directing a constant supply of filtered air into the room to dilute the particles.

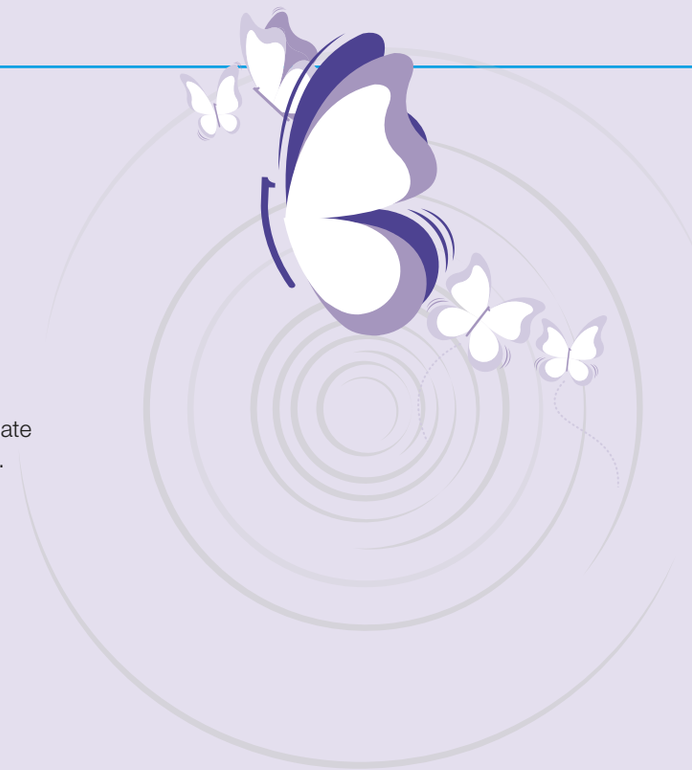
Directing air from clean to less clean areas

The transfer of particles from adjacent spaces can be controlled by

a) Creating differential pressures that direct air-flow from the cleanest room towards the least clean rooms.[11] This is called plenum ventilation.

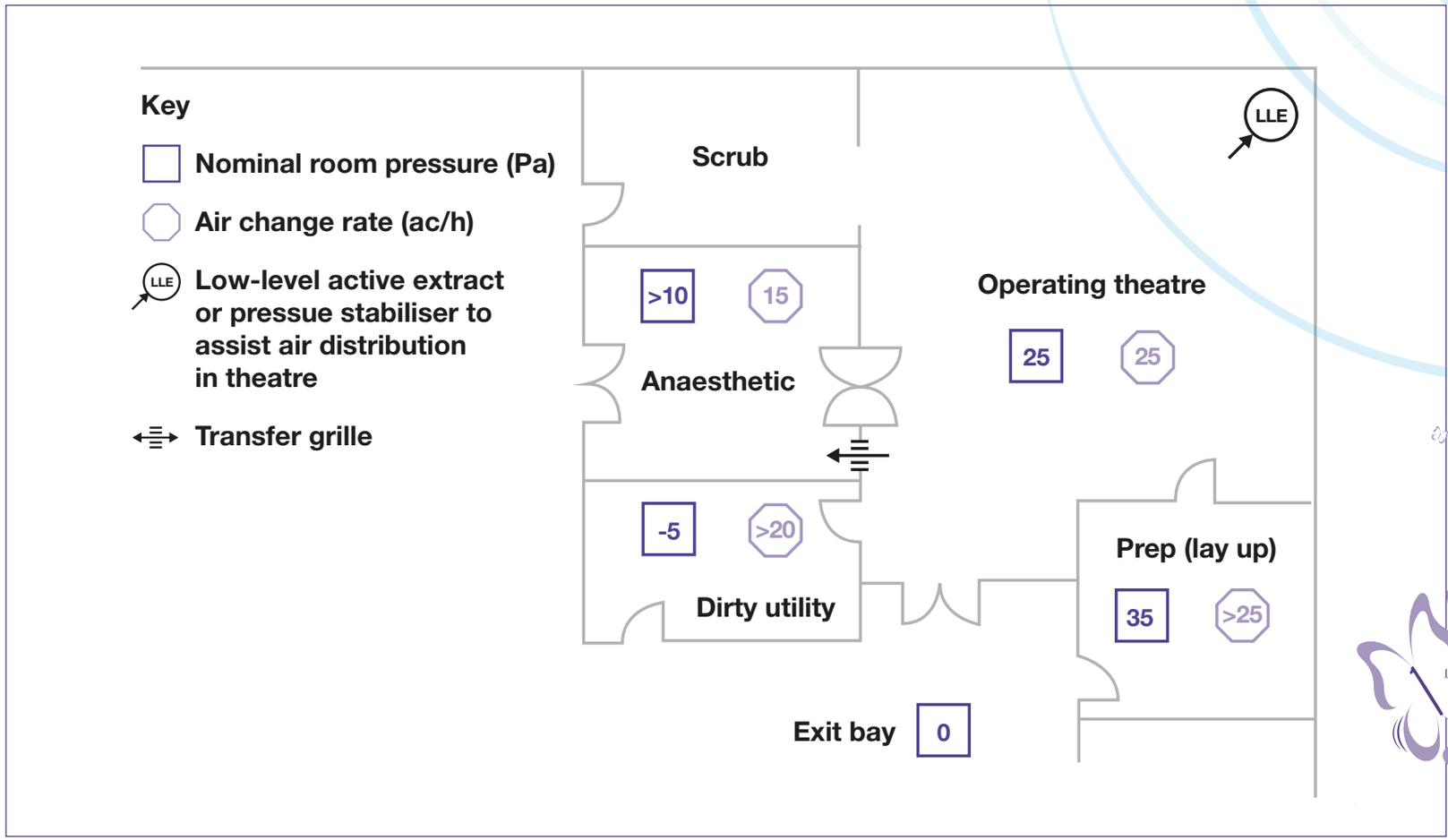
b) Transfer grilles in the doors that enable air to pass in either direction between rooms of equal pressure.

c) Pressure stabilisers that allow air movement in one direction only. These assist in maintaining room pressure differentials and directing airflow from clean to less clean areas.



4.3 Theatre Ventilation

Figure 6. Typical theatre layout, associated room pressure and air change rate



Air pressure is highest in the preparation room where instruments are laid up and flows from there into the operating room.

4.3 Theatre Ventilation

What types of ventilation could be used?

There are two types of theatre ventilation[19,20,21]

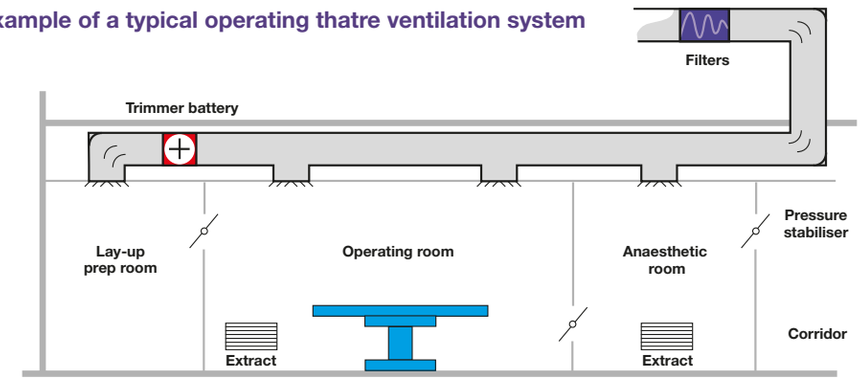
- Conventional
- Ultra Clean

Conventional theatre ventilation systems

These are based on filtered turbulent air diffused downwards with the location of the supply points and extractors designed to ensure that air is changed in all parts of the room. Air is forced into the theatre through filters in the ceiling which remove particles and bacteria. The clean turbulent air dilutes the air and particles already in the room, and the volume of air in the room is changed at between 15 and 35 times per hour (See Fig 7).

Fig 7. Conventional Theatre Ventilation System

Example of a typical operating thatre ventilation system



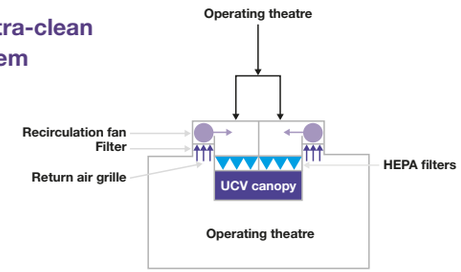
Ultra-clean air (UCA) ventilation

Ultra-clean air or laminar flow ventilation systems have been recommended to reduce the incidence of infection in orthopaedic surgery, particularly prosthetic hip and knee replacements. Such procedures are susceptible to infection even if only small numbers of bacteria are introduced into the wound because the non-human implant enables bacteria to grow more easily.

These ventilation systems direct high volumes of filtered air in parallel streams to the zone in which an operation is performed from a canopy over the operating table. This increases the dilution effect by generating 600 air changes per hour and driving out all particles from the laminar flow zone.

The large airflow means that the air supplied is re-circulated to reduce operating costs.

Figure 8. Example of an Ultra-clean Air theatre ventilation system



How should instruments be laid-up and managed in ultraclean air theatres?

Instruments should be laid-up under the UCA canopy in order to minimise airborne contamination.

If the preparation room is used for lay-up, pressure stabilisation is required to ensure airflow between the two rooms is not disrupted.

Instruments trays should also be placed under the canopy for the duration of the operation to ensure that they have the same level of protection from airborne contamination. Any benefit of UCA is likely to be reduced if instruments are not located under the canopy.

4.3 Theatre Ventilation

Evidence for efficacy of ultraclean air in preventing SSI

Early studies suggested laminar flow systems were associated with a reduction in wound infection rates.[13]

However, there is now an emerging body of evidence that indicates they do not reduce the risk of surgical site infection, and may even increase the risk, possibly due to turbulent airflow around equipment, wound tissue desiccation and temperature reduction.[14,15]

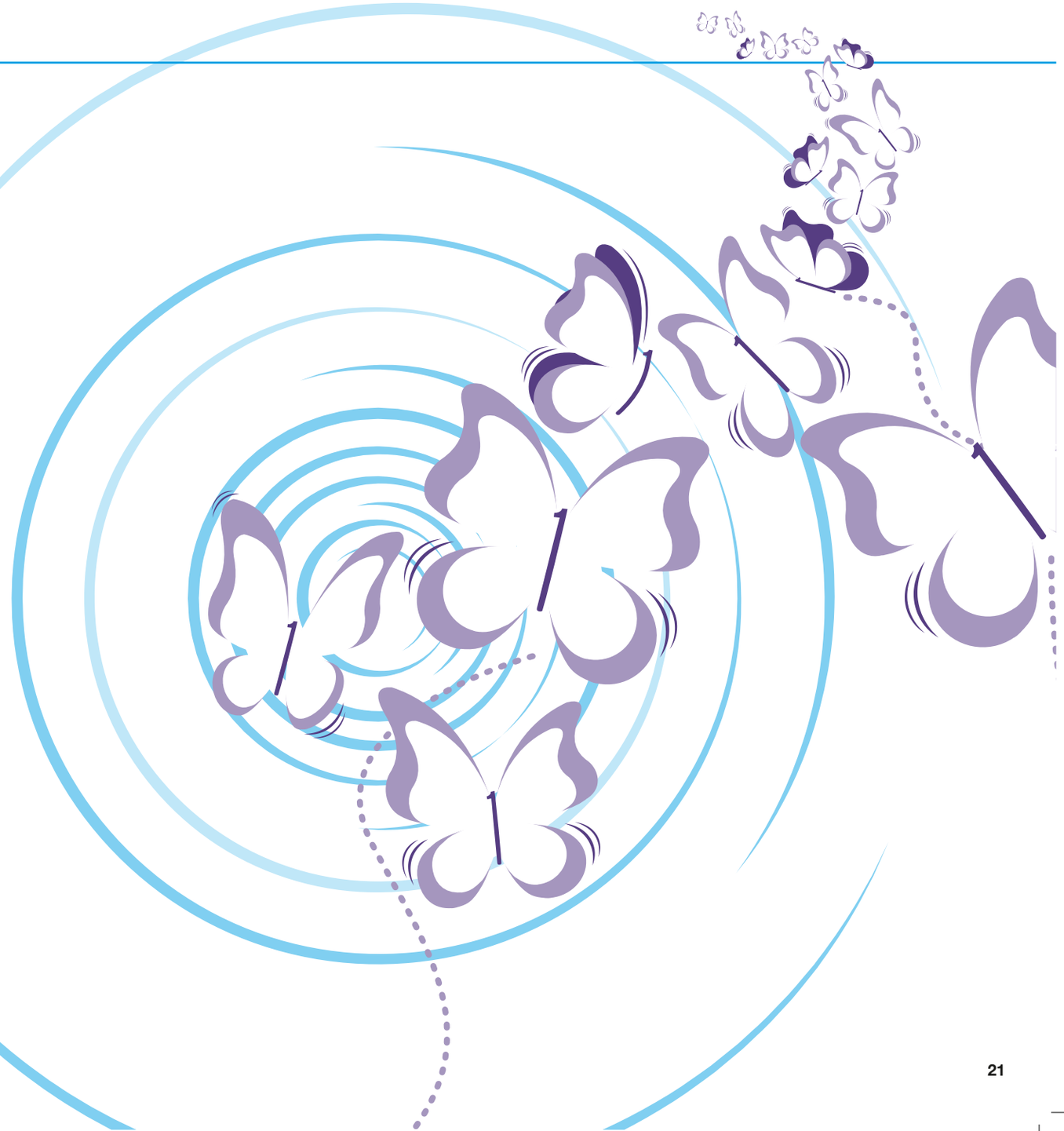
There is no direct evidence that laminar flow systems are disrupted by forced air warming devices and warming the patient is essential to reduce the risk of SSI.[15] The additional costs of installing, running and maintaining ultra-clean air ventilation may not be justified by any effect on the reduction of SSI.

How should ventilation be measured and monitored?

The air handling and filtration system should be checked regularly by the estates department who are responsible for changing the filters at required intervals.[16]

It is not necessary to use settle plates to routinely test the operation of theatre ventilations systems.

The ventilation system should be assessed by the infection control team after any substantial modification to an operating theatre and before new theatres are used.[17]



5 Competency Assessment Checklist

Prepare, monitor and maintain the safety and cleanliness of the theatre environment	Demonstrated to preceptee	Assessment of competence by preceptor		
		6 weeks	3 months	6 months
Criteria	**Signature/date**	**Signature/date**	**Signature/date**	**Signature/date**
Demonstrate the ability to control acceptable levels of temperature, light, humidity, ventilation and pollutants				
Ensure that people entering the environment are identified correctly and their reason for entry is established				
Ensure doors are kept closed, and entrance and exit controlled to reduce traffic				
Demonstrate correct procedure for dealing with spillages promptly and safely				
Demonstrate the correct selection of appropriate cleaning equipment and materials				
Demonstrate the correct dilution of cleaning agents				
Demonstrate the correct procedure for cleaning theatre and associated equipment				
Demonstrate the safe use of cleaning equipment and materials to minimise risks to self and others				
Demonstrate correct waste disposal without delay in a safe manner				

5 Competency Assessment Checklist

Underpinning Knowledge	Discussed with preceptee Signature/date	Knowledge achieved Signature/date	Assessment method
Demonstrate the ability to control acceptable levels of temperature, light, humidity, ventilation and pollutants			
Explain the reasons for theatre design and the acceptable levels of temperature, light, humidity, ventilation, pollutants - and methods of measuring and monitoring levels			
Identify the reporting procedures for breakdowns in levels of environmental factors			
Discuss situations in which levels of environmental factors may need to be compromised			
Discuss the sources, transmission routes and destruction of pathogenic organisms			
Discuss the relationship between cleanliness and infection prevention			
Identify different cleaning agents, their usage in clinical areas and why it is important toprepare them correctly			
Define COSHH and how it is relevant in the theatre environment			
Describe the potential risks when using and storing cleaning materials and equipment and the ways to minimise such risks			
Identify the potential risks when using and storing cleaning materials and ways to minimise these risks			
Discuss the principles of the theatre cleaning procedure in line with associated guidance			
Describe the different methods of disposal of all types of waste, explaining the differences between hazardous and non-hazardous waste			

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Appendix A: Standards and Guidance

Reducing the risk of Surgical Site Infection (SSI)

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1. Skin Preparation

1.1 Washing

Recommendation

NICE recommends that patients should shower or have a bath (or be assisted to shower, bath or bed bath) using soap, either the day before, or on the day of surgery.[1]

1.2 Hair Removal

Recommendation

NICE recommends that razors should not be used for hair removal because they increase the risk of SSI. If hair must be removed, then clippers with disposable heads are recommended.[1]

1.3 Skin Disinfection

Recommendation

NICE recommends that the skin should be disinfected immediately prior to the incision with chlorhexidine or povidone-iodine (alcoholic or aqueous solution).[1]

1.4 Reducing Skin Recolonisation

Recommendation

NICE recommends that if an incise drape is used, this should be iodophore impregnated unless the patient has an iodine allergy.[1]

2. Prophylactic Antibiotics

Recommendation

NICE recommends that there must be a local guide to antibiotic prescribing including advice on appropriate surgical prophylaxis.[1]

Surgical prophylaxis should be given intravenously on induction of anesthesia or within 60 mins before the incision is made.[2]

In most circumstances a single dose of antibiotic with a long enough half-life to achieve activity throughout the operation is sufficient.[3]

3. Perioperative Warming

Recommendation

NICE recommends that all patients should be assessed within the hour prior to surgery for their risk of perioperative hypothermia and their temperature measured using a site that produces a direct measure or direct estimate of core temperature.

Active warming should commence on the ward/emergency department at least 30 minutes prior to induction of anaesthesia for all patients (and immediately if their temperature is below 36°C).

The patient's core temperature should be 36°C or above before they are transferred to theatre, unless there is a need to expedite surgery.

Patients having anaesthesia for longer than 30 minutes, or at a higher risk of perioperative hypothermia are warmed from induction of anaesthesia using forced-air warming.

The patient's temperature should be measured and documented before induction of anaesthesia and then every 30 minutes until the end of surgery.

Induction of anaesthesia should not begin unless the patient's temperature is 36.0°C or above.

Intravenous fluids (500 ml or more) and blood products should be warmed to 37°C using a fluid warming device.

Irrigation fluids should be warmed in a thermostatically controlled cabinet to a temperature of 38°C to 40°C.

The patient's temperature should be monitored and documented every 15 minutes in recovery.

The patient should not be transferred to the ward, until their temperature is 36°C or above.[4]

4. Maintaining Asepsis

Recommendation

All pre sterilised instruments must be checked for evidence that they have been sterilised and that the packs are intact.

Instruments should be set up in a clean area, as close to the procedure time as possible. All prepared instruments must be closely observed at all times.

Staff who undertake procedures which require skills such as aseptic technique, must be trained and demonstrate proficiency before being allowed to undertake these procedures independently.[5,6]

5. Surgical Environment

Recommendation

An effective air changing ventilation system should be in operation and regularly monitored.

The doors to the operating theatre should remain closed and traffic in and out of theatre restricted to a minimum to ensure efficiency of the ventilation.

The number of personnel present in theatre should be kept to a minimum.[5]

There is a process to ensure equipment is cleaned prior to admission into the operating theatre.

6. Wound Management

Recommendation

NICE recommends that surgical incisions should be covered with an appropriate interactive dressing at the end of the operation.[1]

7. Surveillance

Recommendation

The risk of SSI should be monitored using a standardised surveillance methodology to provide feedback to surgeons and the surgical team about the quality of infection prevention in the operating theatre.

Monitoring of infection rates is essential to provide patients with accurate information about the risk of SSI associated with the operation.[6,7]

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www.codp.org.uk

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www.rcn.org.uk

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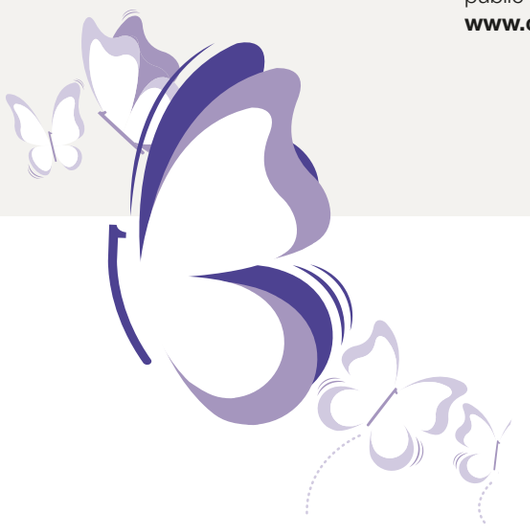

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