Global Alliance for Infections in Surgery

Prevention of healthcare-associated infections

Prevention of healthcare associated infections

Contents

Preface

Healthcare-associated infections (HCAIs) are infections that occur while receiving health care. Patients with medical devices (central lines, urinary catheters, ventilators) or who undergo surgical procedures are at risk of acquiring HCAIs.
HCAIs remain a major clinical problem in terms of morbidity, mortality, length of hospital stay and overall direct and not-direct costs in all regions of the world. Despite guidelines to direct HCAIs prevention strategies, compliance with infection prevention and control is often poor.
We hope this manual will draw attention to the need to change practices.

Massimo Sartelli

Be a champion to stop infections!

ACT NOW

Enhance infection prevention and control

Use antibiotics when they are truly needed

Prescribe appropriately antibiotics

Control the source of infection when it is needed

What are healthcare-associated infections

What are healthcare-associated infections

Each year, hundreds of millions of patients around the world are affected by health care-associated infections (HCAIs). Although HCAI is the most frequent adverse event in health care, however its true global burden remains unknown because of the difficulty in gathering reliable data.
HCAIs can develop either as a direct result of healthcare intervention or from being in contact with a healthcare setting.
Every day, HCAIs result in prolonged hospital stays, long-term disability, increased resistance of microorganisms to antimicrobials, massive additional costs for health systems, high costs for patients and their family, and unnecessary deaths.

The application of appropriate infection prevention and control strategies by the HCWs can reduce the risk of HCAIs, as most of them are preventable.

HCWs behavior and healthcare associated infections

The behaviors of HCWs and their interactions with the health care system can influence the rate of HCAIs.

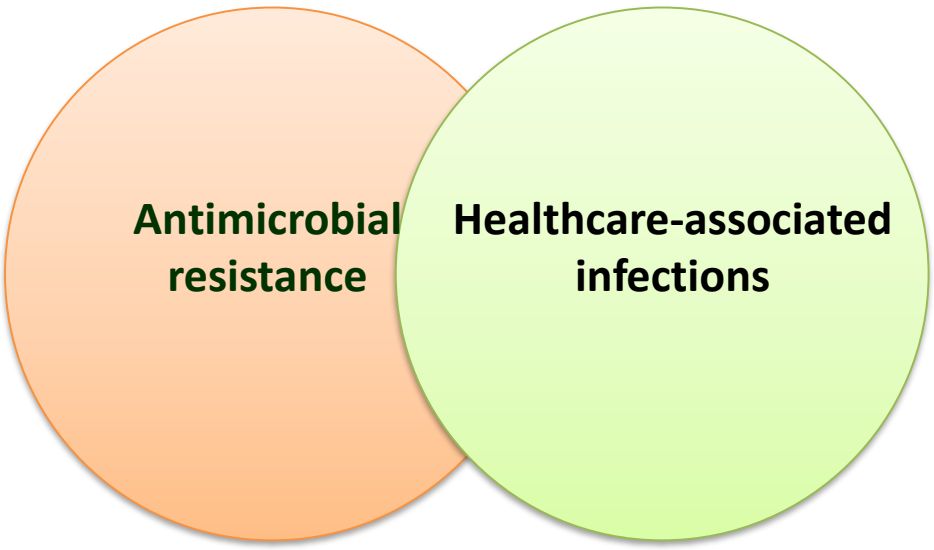
It is well shown that proper education and training of HCWs can increase compliance with and adoption of best practices (e.g., infection control, hand hygiene, attention to safety culture, and antibiotic stewardship) to prevent HAIs. Examples of best practices by a health care provider include careful insertion, maintenance, and prompt removal of catheters, as well as the careful use of antibiotics.

Poor infection control is the key driver of HCAIs.

Infection control is acknowledged universally as an essential basis towards patient safety and supports the reduction of HCAIs and their consequences.

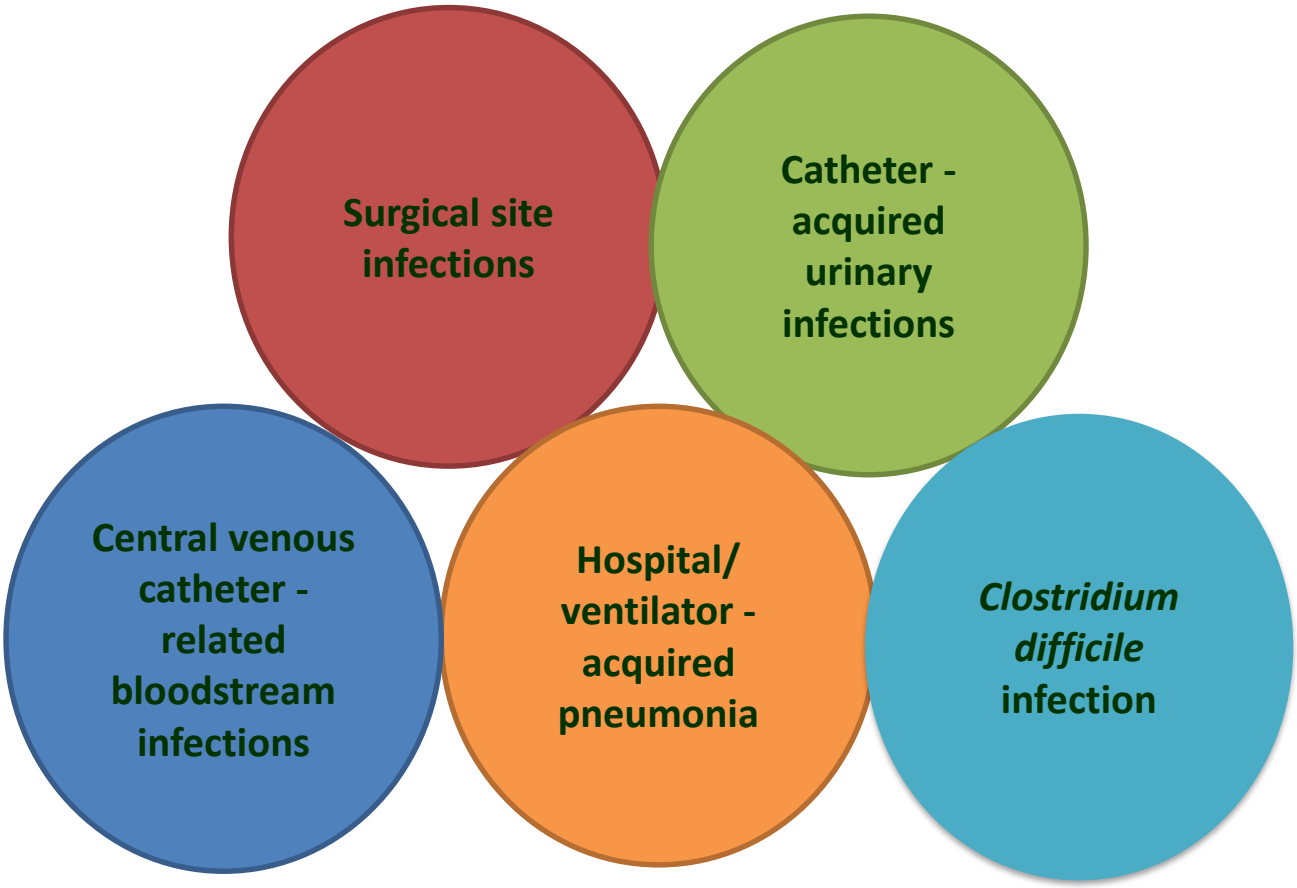
Healthcare-associated infections and antimicrobial resistance

There is sometimes a false impression that HCAIs are adequately controlled. However, with antimicrobial resistance increasing [Methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococci (VRE) and carbapenem-resistant Enterobacteriaceae (CRE)…] such infections are more than ever a public health threat. HCAIs show higher resistance rates to antibiotics than community-acquired infections.



Our goal is not to control infections after they happen but to prevent them before they happen!

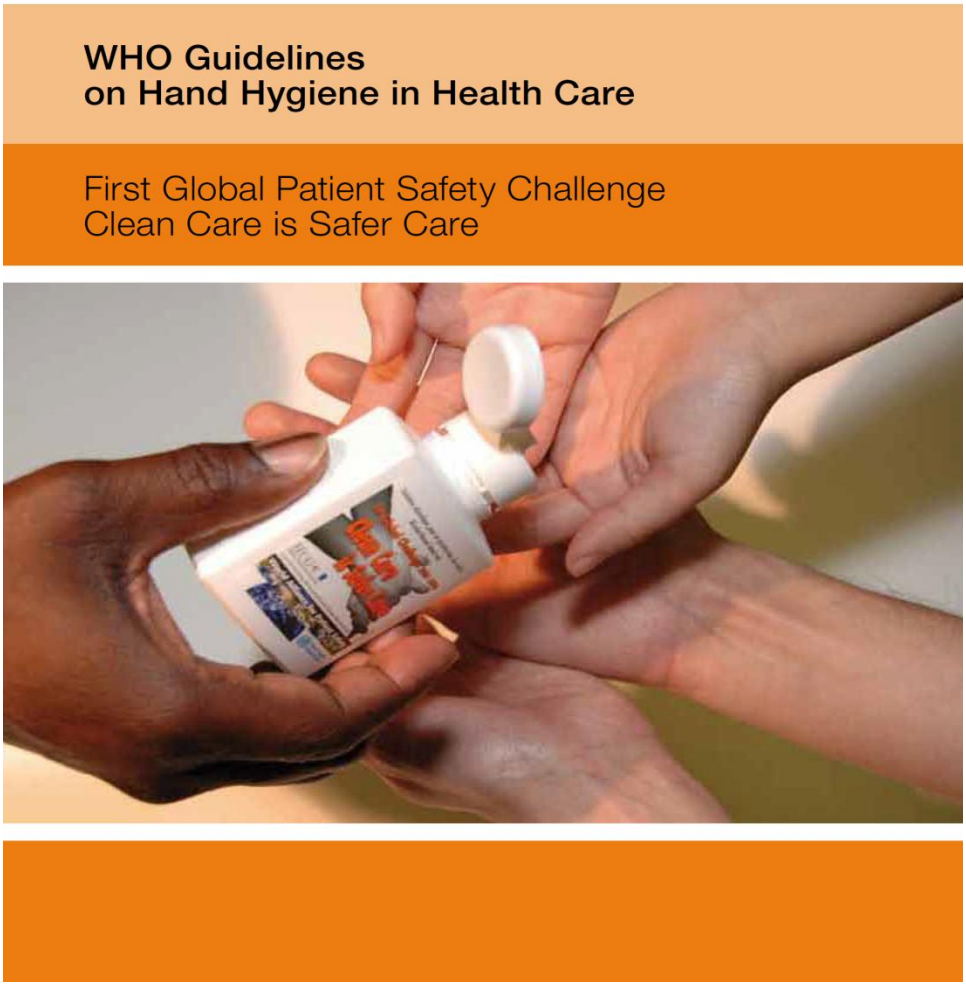
The most frequent types of infections include central line-associated bloodstream infections, surgical site infections, catheter-associated urinary tract infections, hospital or ventilator-associated pneumonia and *clostridium difficile* infection.




First of all
Clean your hands!
Global Alliance for
Infections in Surgery

Hand hygiene is a simple and effective solution to reduce both the spread of infection and multi-resistant germs, and to protect patients from HCAIs. Hand antisepsis reduces the transmission of health care-associated pathogens and the incidence of HCAI.

World Health Organization | Patient Safety
A World Alliance for Safer Health Care



Transmission of health care-associated pathogens from one patient to another patient via HCWs' hands

The hands of HCWs are commonly colonized with pathogens like methicillin resistant *S. aureus* (MRSA), vancomycin resistant *Enterococcus* (VRE), MDR-Gram Negative bacteria (GNBs), Candida spp. and *Clostridium difficile*, which can survive for as long as 150 h. Approximately 10^6 skin epithelial cells containing viable microorganisms are shed daily from the normal skin, which can contaminate the gowns, bed linen, bedside furniture, and other objects in the patient's immediate environment. Hand carriage of resistant pathogens has repeatedly been shown to be associated with HCAIs. The highest rates of hand contamination are reported from critical care areas, which also report most cases of cross-transmission. The hands may become contaminated by merely touching the patent's intact skin or inanimate objects in patients' rooms or during the "clean" procedures like recording blood pressure.

Effective hand hygiene is the single most effective action to reduce health care associated infections. Since Semmelweis' observation, there have been many studies to confirm the role that HCW hands play in transmission of pathogens in the health care setting. Various organizations, including the CDC and WHO, have published guidelines on appropriate hand hygiene practices for HCWs.

The five moments of hand hygiene outlined by WHO are: Before patient contact; before aseptic task; after bodily fluid exposure; after patient contact; and after contact with patient surroundings.

Clean your hands

Before touching a patient,
before clean/aseptic procedures,
after body fluid exposure/risk,
after touching a patient, and
after touching patient surroundings.

Many infection prevention and control measures, including hand hygiene, are simple, low-cost and effective, however they require staff accountability and behavioural change.

Surgical site infections

Surgical site infections (SSIs)

A surgical site infection (SSI) is an infection that occurs after surgery in the part of the body where the surgery took place. Surgical site infections can sometimes be superficial infections involving the skin only. Other surgical site infections are more serious and can involve tissues under the skin, organs, or implanted material.

The Centers for Disease Control and Prevention (CDC) has defined SSIs to standardize data collection for the National Nosocomial Infections Surveillance (NNIS) program.

SSIs are classified into incisional SSIs, which can be superficial or deep, and organ/space SSIs, which affect the rest of the body other than the body wall layers (see the image below). These classifications are defined as follows:

Superficial incisional SSI - Infection involves only skin and subcutaneous tissue of incision

Deep incisional SSI - Infection involves deep tissues, such as fascial and muscle layers; this also includes infection involving both superficial and deep incision sites and organ/space SSI draining through incision

Organ/space SSI - Infection involves any part of the anatomy in organs and spaces other than the incision, which was opened or manipulated during operation.

SSIs are the most common HCAIs among surgical patients. It is obviously important to improve patient safety by reducing the occurrence of SSIs. Preventing SSIs is a global priority. Bacteria are becoming increasingly resistant to antibiotics, making SSI prevention even more important nowadays.

SSIs are a major clinical problem in terms of morbidity, mortality, length of hospital stay, and overall direct and not-direct costs worldwide. Despite progress in prevention knowledge, SSIs remain one of the most common adverse events in hospitals. SSI prevention is complex and requires the integration of a range of measures before, during, and after surgery.

Prevention of surgical site infections
Recent guidelines

Both the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) have recently published guidelines for the prevention of SSIs. The 2016 WHO Global guidelines for the prevention of surgical site infection are evidence-based including systematic reviews presenting additional information in support of actions to improve practice.

CDC

Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017

WHO Global guidelines for the prevention of surgical site infection

The 2016 WHO Global guidelines for the prevention of surgical site infection are evidence-based including systematic reviews presenting additional information in support of actions to improve practice.

The guidelines include 13 recommendations for the pre-operative period, and 16 for preventing infections during and after surgery. They range from simple precautions such as ensuring that patients bathe or shower before surgery, appropriate way for surgical teams to clean their hands, guidance on when to use prophylactic antibiotics, which disinfectants to use before incision, and which sutures to use.

The proposed recommendations are as follows:

"Strong" – Expert panel was confident that benefits outweighed risks, considered to be adaptable for implementation in most (if not all) situations, and patients should receive intervention as course of action.

"Conditional" – Expert panel considered that benefits of intervention probably outweighed the risks; a more structured decision-making process should be undertaken, based on stakeholder consultation and involvement of patients and healthcare professionals.

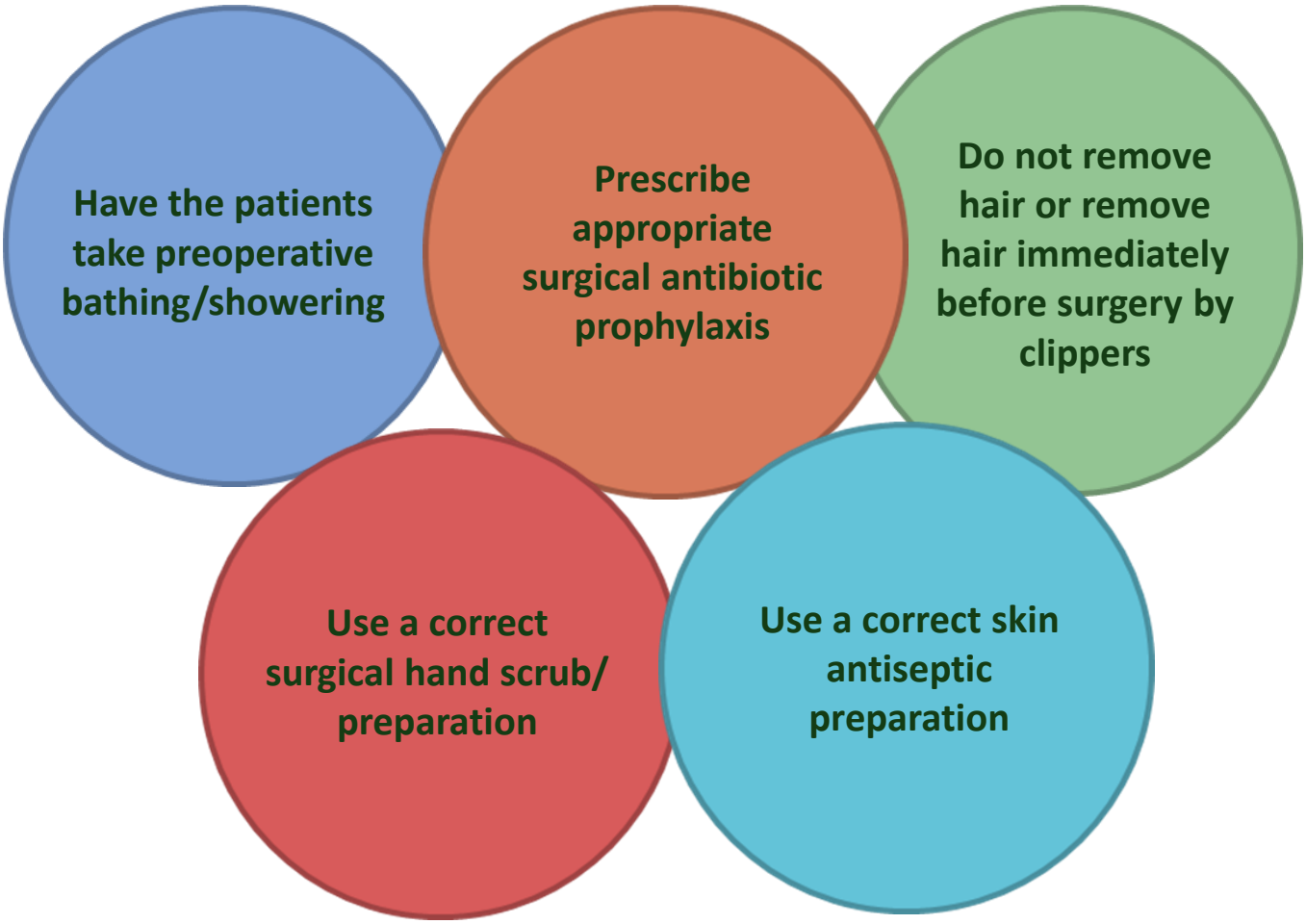
WHO Global guidelines for the prevention of surgical site infection

https://www.who.int/gpsc/ssi-prevention-guidelines/en/

Surgical care bundles

Numerous clinical interventions with varying levels of supporting evidence have been implemented to reduce SSIs among surgical patients. A recent approach to improving patient outcomes is the use of care bundles. Care bundles were first introduced by the Institute for Healthcare Improvement (IHI) in 2001 to improve clinical outcomes in the critical care population. The concept of a care bundle was developed from evidence documenting that a structured approach to performing 3–5 evidence-based collective interventions could lead to an improved patient outcome. While specific interventions may vary between bundles, it is the bundle approach that ensures consistent implementation of all measures that is claimed to be successful. Surgical care bundles have been developed to reduce SSIs after the success of care bundles in reducing catheter-related bloodstream infections and ventilator-associated pneumonia.

A proposal for a bundle for the prevention of surgical site infections



Antibiotic prophylaxis

Systemic antibiotic prophylaxis (AP) is one of the most important component of a perioperative infection prevention strategy. The use of AP contributes considerably to the total amount of antibiotics used in hospitals and may be associated with increases in antibiotic resistance and healthcare costs.

Although AP plays a pivotal role in reducing the rate of surgical site infections, other factors such as attention to basic infection-control strategies may have a strong impact on surgical site infections rates.

Perioperative surgical AP should be recommended for operative procedures that have a high rate of postoperative wound infection or when foreign material is implanted.

Prophylactic antibiotic agents should be nontoxic and inexpensive and have in vitro activity against the common organisms that cause postoperative wound infection after a specific surgical procedure.

Therapeutic concentrations of antibiotics should be present in the tissue throughout the all period that the wound is open.

Principles of appropriate antibiotic prophylaxis

1. Antibiotic agents alone are unable to prevent surgical site infections. Strategies to prevent surgical site infections should always include attention to:

- **IPC strategies including correct and compliant hand hygiene practices**
- **Meticulous surgical techniques and minimization of tissue trauma**
- **Hospital and operating room environments**
- **Instrument sterilization processes**
- **Peri-operative optimization of patient risk factors**
- **Peri-operative temperature, fluid, and oxygenation management**
- **Targeted glycemic control**
- **Appropriate management of surgical wounds**

2. Antibiotic prophylaxis should be administered for operative procedures that have a high rate of post-operative surgical site infection, or when foreign materials are implanted.

3. Antibiotic agents given as prophylaxis should be effective against the aerobic and anaerobic pathogens most likely to contaminate the surgical site—i.e., gram-positive skin commensals or normal flora colonizing the incised mucosae.

4. Antibiotic prophylaxis should be administered within 120 minutes before the incision. Administration of the first dose of antibiotic agents beginning within 30 to 60 minutes before surgical incision, however, is recommended for most antibiotic agents (e.g., cefazolin), to ensure adequate serum and tissue concentrations during the period of potential contamination. Obese patients ≥120 kg require higher doses of antibiotic agents.

5. A single dose generally is sufficient. Additional antibiotic doses should be administered intra-operatively for procedures >2–4 hours (typically where duration exceeds two half-lives of the antibiotic) or with associated significant blood loss (>1.5 L).

6. There is no evidence to support the use of post-operative antibiotic prophylaxis.

7. Each institution is encouraged to develop guidelines for proper surgical prophylaxis.

Catheter-acquired urinary infections

Catheter-acquired urinary infections

Urinary tract infections (UTIs) are the most common HCAIs. Most UTIs are attributable to use of an indwelling urethral catheter. Catheter-acquired urinary infections (CA-UTIs) have received significantly less attention than other hospital–acquired infections, such as surgical site infections, hospital-acquired/ventilator-associated pneumonia, and bacteremia probably because CA-UTIs present apparent lower morbidity and mortality compared with the other infections, as well as limited financial impact. However, because they are common, their cumulative impact is large.

The indwelling urethral catheter is an essential tool for many hospitalized patients. It is placed for a number of reasons, including output monitoring of unstable patients, voiding management for patients with urethral obstruction, and perioperative use for selected surgical procedures. However it may carry predictable and unavoidable risk of UTI perturbing host defense mechanisms and providing easier access of uropathogens to the bladder. Fortunately, most CA-UTIs are asymptomatic and do not require antimicrobial treatment.

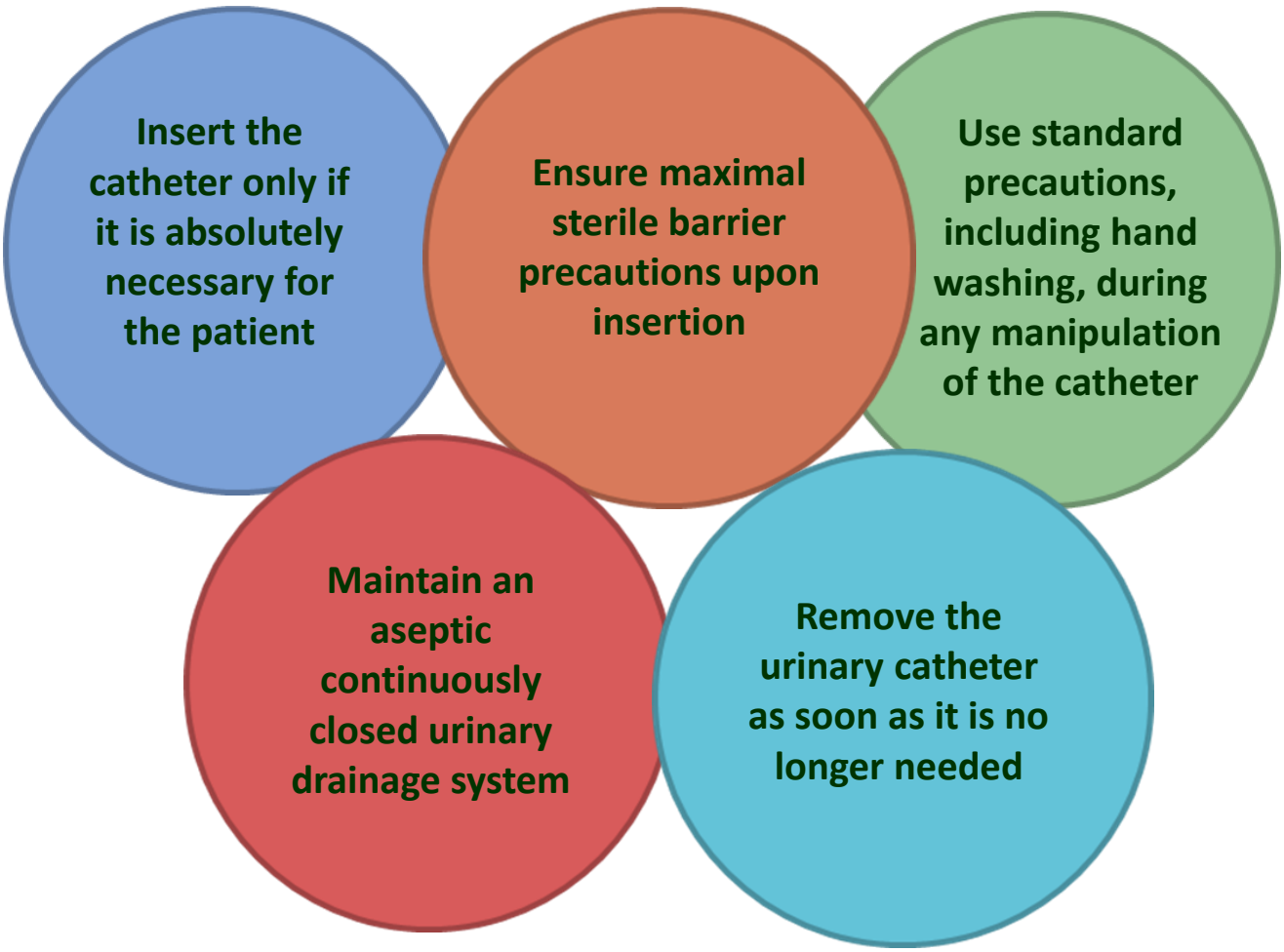
CA-UTI may be extraluminal or intraluminal. Extraluminal infection occurs via entry of bacteria into the bladder along the biofilm that forms around the catheter in the urethra.

Intraluminal infection occurs due to urinary stasis because of drainage failure, or due to contamination of the urine collection bag with subsequent ascending infection. Extraluminal is more common than intraluminal infection.

The two most important strategies to prevent CA-UTI are not to use a urinary catheter and, if a catheter is necessary, to minimize the duration of use. Catheters should be inserted only when there are valid indications and removed as soon as they are no longer indicated.

Systemic antimicrobial prophylaxis should not be routinely used in patients with short-term or long-term catheterization, including patients who undergo surgical procedures, to reduce CA-bacteriuria or CA-UTI because of concern about selection of antimicrobial resistance.

A proposal for a bundle for the prevention of catheter-associated urinary tract infections



Hospital-acquired pneumonia and ventilator-associated pneumonia

Hospital-acquired pneumonia and ventilator-associated pneumonia

Nosocomial pneumonia including hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) are the second most frequent nosocomial infections and the first in terms of morbidity, mortality, and costs. In recent years two different sets of guidelines for the management of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) were published: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America (IDSA) and the American Thoracic Society (ATS) and (2017) Guidelines of the European Respiratory Society (ERS), European Society of Intensive Care Medicine (ESICM), European Society of Clinical Microbiology and Infectious Diseases (ESCMID) and Asociación Latinoamericana del Tórax (ALAT). Nosocomial pneumonia are generally classified into hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP).

Hospital-acquired pneumonia (HAP) is defined as pneumonia occurring at least 48 hours after hospital admission, excluding any infection incubating at the time of admission.

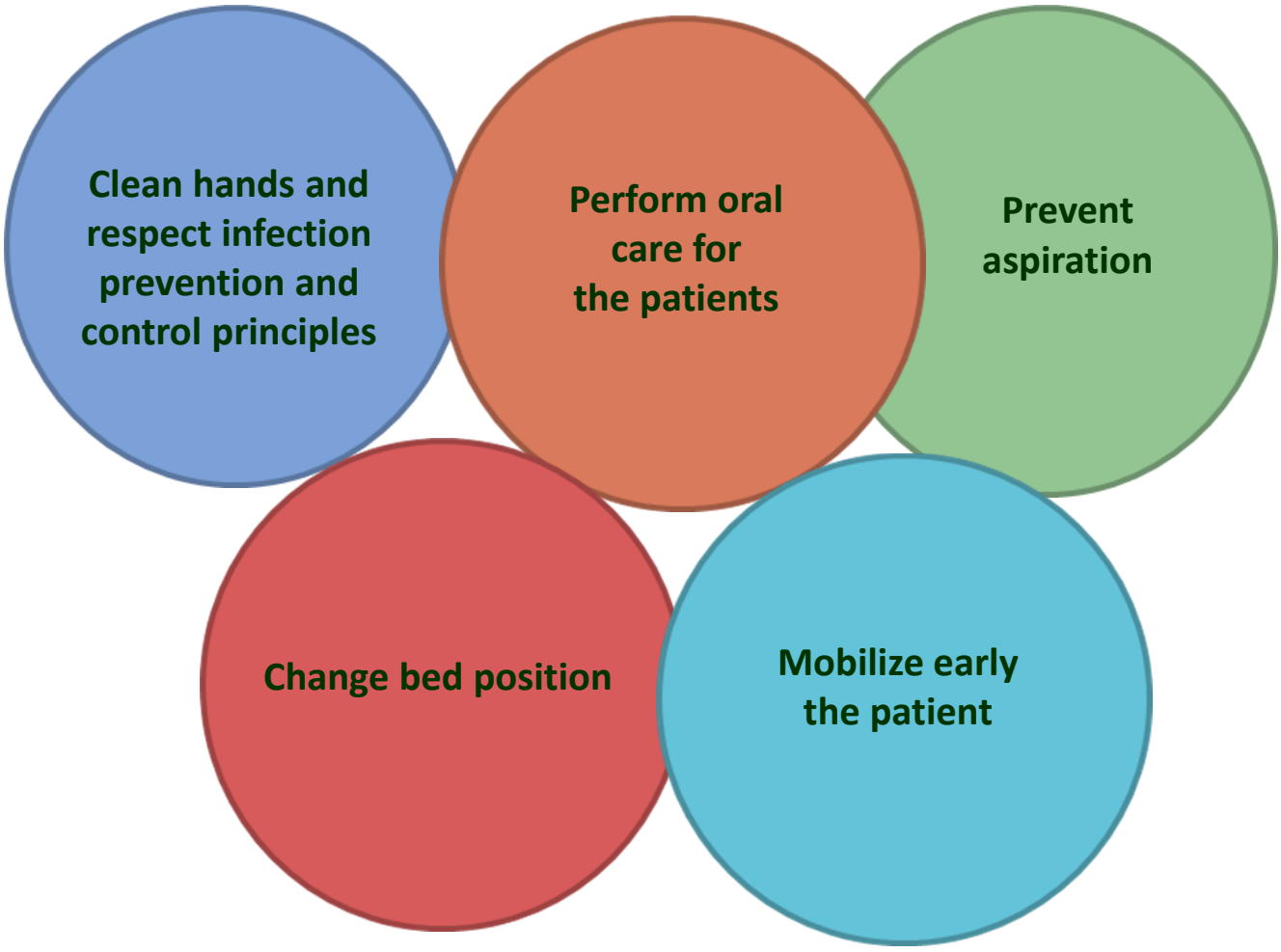
Ventilator-associated pneumonia (VAP) is defined as a pneumonia occurring in patients under mechanical ventilation for at least 48 hours. It is a frequent issue in intensive care units, with a great impact on morbidity, mortality and cost of care. Treating VAP is a difficult task, as initial antibiotics have to be appropriate and prompt.

The term healthcare-associated pneumonia (HCAP) was included in the previous guidelines to identify patients coming from community settings at risk for multidrug-resistant (MDR) bacteria. HCAP referred to pneumonia acquired in healthcare facilities including nursing homes, hemodialysis centers and outpatient clinics or acquired in patients with previous hospitalization within the past 90 days. However HCAP was not included in recent guidelines because there is increasing evidence that aetiology in HCAP patients is similar to that of community-acquired pneumonia and that many patients with HCAP are not at high risk for MDR bacteria.

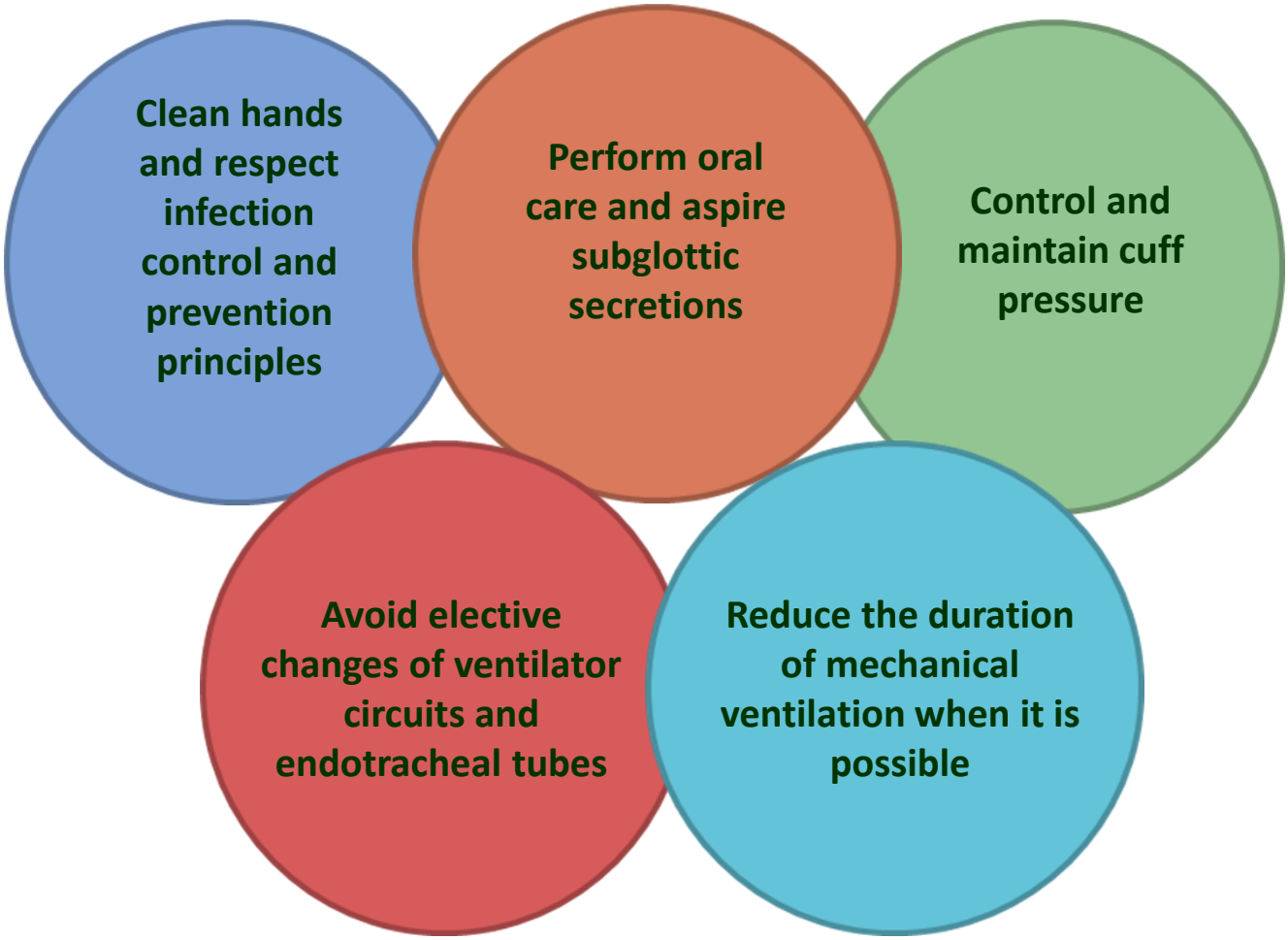
The pathogenesis of nosocomial pneumonia is multifactorial. The concomitant illnesses of hospitalized patients is a risk for nosocomial infections. In hospitalized patients alterations in immune function make patients more susceptible to invasive infections that would not occur in healthy individuals.

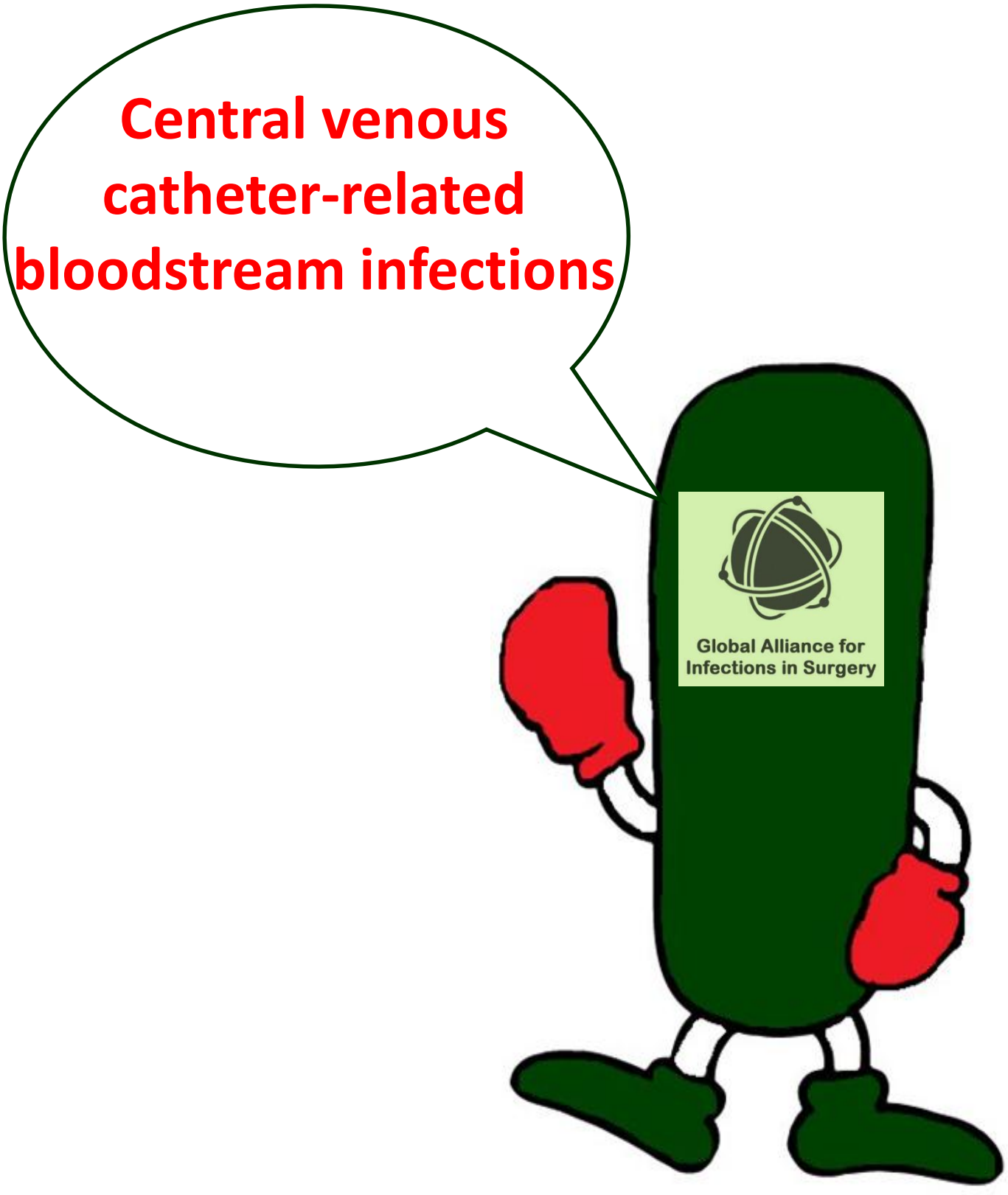
Many hospitalized patients are in poor nutritional status, increasing their risk of infection. Severe illness and hemodynamic compromise are associated with increased rates of nosocomial pneumonia. Aspiration of oropharyngeal secretions may play a significant role in the development of nosocomial pneumonia. In hospitalized patients the combination of alterated immune function, impaired mucocilliary clearance of the respiratory tract and oropharynx colonization by enteric Gram-negative pathogens make aspiration an important contributor to pneumonia. Moreover supine positioning contributes greatly to the aspiration risk. Risk factors are also prolonged hospital length of stay, cigarette smoking, increasing age, uremia, prior antibiotic exposure, alcohol consumption, endotracheal intubation, coma, major surgery, malnutrition, multiple organ-system failure, and neutropenia. Importantly, the use of stress ulcer prophylaxis, such as proton pump inhibitors commonly used in critically ill patients, is associated with risk of nosocomial pneumonia. Finally, foreign bodies, such as endotracheal and nasogastric tubes, may provide a source for further colonization allowing migration of pathogens to the lower respiratory.

A proposal for a bundle for the prevention of hospital-acquired pneumonia



A proposal for a bundle for the prevention of ventilator-associated pneumonia




Central venous catheter-related bloodstream infections
Global Alliance for Infections in Surgery

Central-venous catheter-related bloodstream infections

About half of nosocomial bloodstream infections occur in intensive care units, and the majority of them are associated with intravascular device. Central venous catheter-related bloodstream infections (CRBSIs) are an important cause of healthcare-associated infections.

Central venous catheters (CVCs) are integral to the modern clinical practices and are inserted in critically-ill patients for the administration of fluids, blood products, medication, nutritional solutions, and for hemodynamic monitoring. They are the main source of bacteremia in hospitalized patients and therefore should be used only if they are really necessary.

Risk factors for CRBSI include patient-, catheter-, and operator-related factors. Several factors have been proposed to participate in the pathogenesis of CRBSI.

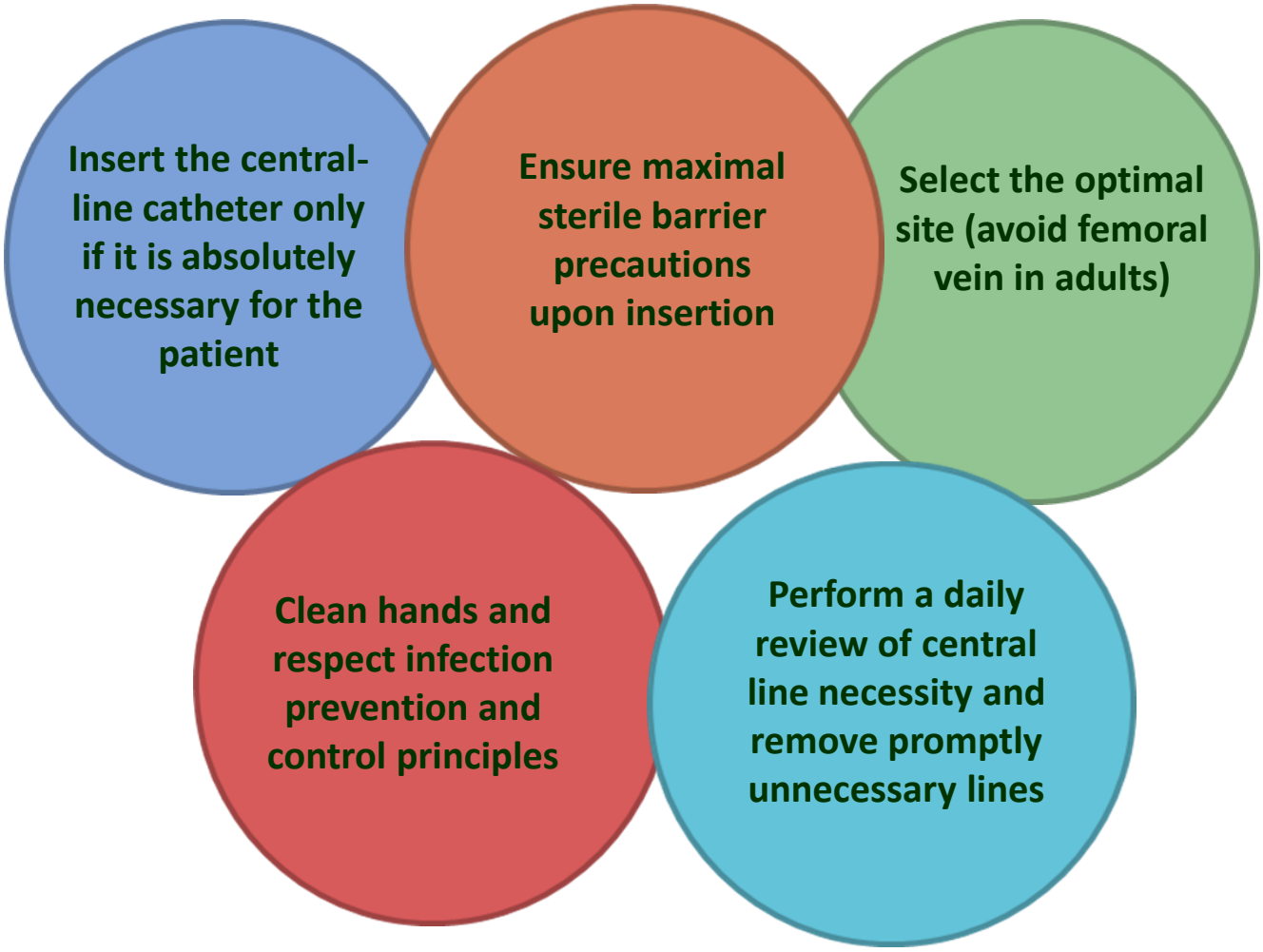
Hospitalized patients with neutropenia are at high risk. However other host risk factors also include immune deficiencies in general, chronic illness, and malnutrition.

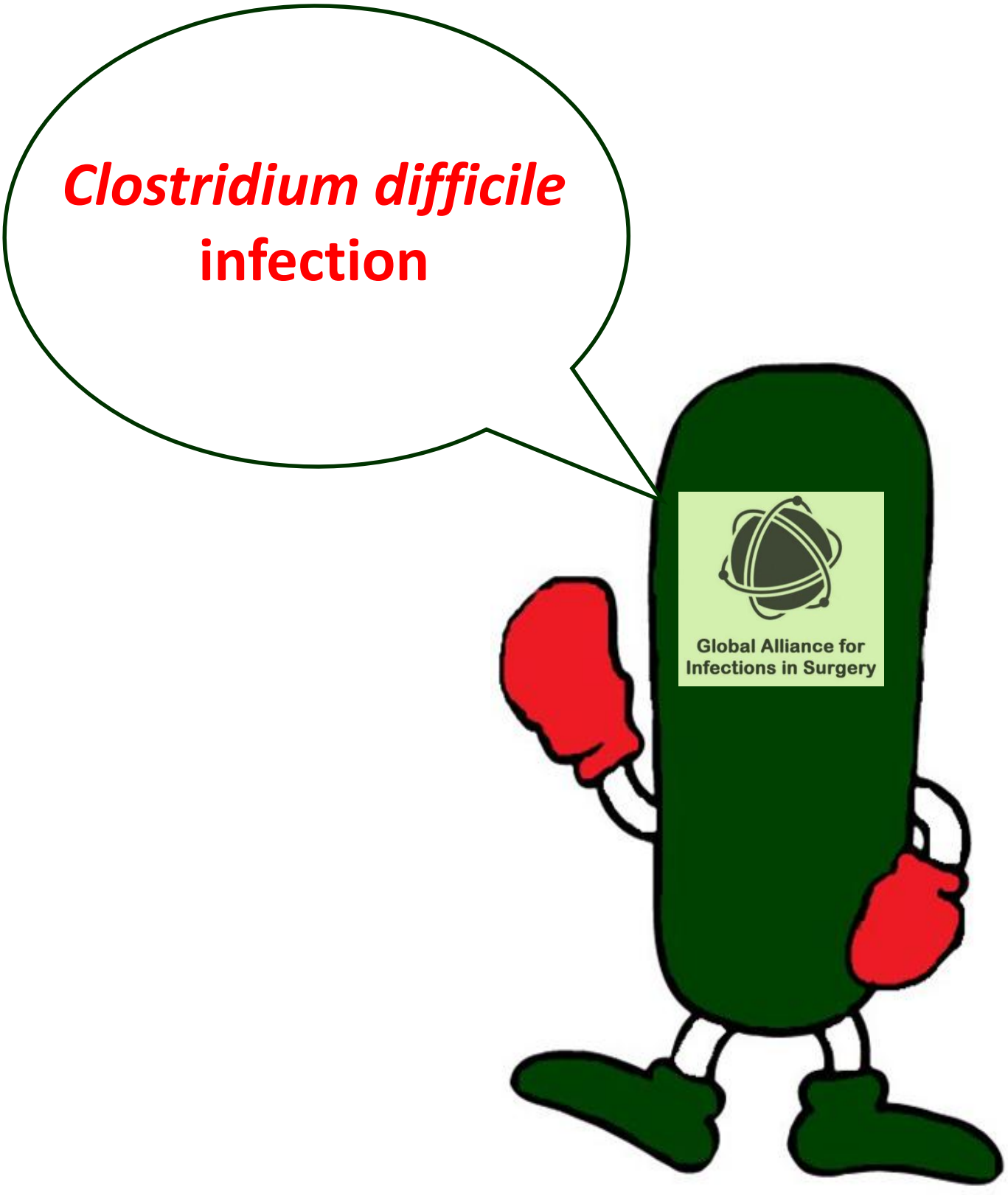
The catheter itself can be involved in 4 different pathogenic pathways: colonization of the catheter by microorganisms from the patient's skin and occasionally the hands of healthcare workers, intraluminal or hub contamination, secondary seeding from a bloodstream infection, and, rarely, administration of contaminated infusate or additives.

CRBSIs can be reduced by a range of interventions including closed infusion systems, aseptic technique during insertion and management of the central venous line, early removal of central venous lines and appropriate site selection.

Different measures have been implemented to reduce the risk for CRBSI, including use of maximal barrier, precautions during catheter insertion, effective cutaneous anti-sepsis, and preventive strategies based on inhibiting micro-organisms originating from the skin or catheter hub from adhering to the catheter. Simultaneous application of multiple recommended best practices to manage CVCs has been associated with significant declines in the rates of CRBSI. Education, and training of health care workers, and adherence to standardized protocols for insertion and maintenance of intravascular catheters significantly reduced the incidence of catheter-related infections and represent the most important preventive measures.

A proposal for a bundle for the prevention of central venous catheter-related bloodstream infections




Clostridium difficile
infection
Global Alliance for
Infections in Surgery

Clostridium diffile infection

In the last two decades, the dramatic increase in incidence and severity of *Clostridium difficile* infection (CDI) in many countries worldwide, has made CDI a global public health challenge. CDI may be a particular concern in surgical patients, as surgery may predispose patients to CDI and surgery itself needs to treat severe cases of CDI. Optimization of CDI management in the peri-operative setting, has become increasingly necessary to decrease the cost, morbidity and mortality that may result from CDI.
***C. difficile* is an anaerobic, spore forming Gram-positive bacillus, which may form part of the normal intestinal microbiota in healthy newborns but which is rarely present in the gut of healthy adults. The organism is spread via the oral-fecal route and in hospitalized patients may be acquired through the ingestion of spores or vegetative bacteria spread to patients by healthcare personnel or from the environment. Since CDI is a toxin mediated infection, toxins negative *C. difficile* strains are non-pathogenic.**
Risk factors for CDI may be divided into three general categories: host factors (immune status, co-morbidities), exposure to *C. difficile* spores (hospitalizations, community sources, long-term care facilities) and factors that disrupt normal colonic microbiome (antibiotics, other medications, surgery). Risk factors have included, age more than 65 years, comorbidity or underlying conditions, inflammatory bowel diseases, immunodeficiency (including human immunodeficiency virus infection), malnutrition, and low serum albumin level. Patients with inflammatory bowel disease are at increased risk of developing CDI, they may have worse outcomes, including higher rates of colectomy, and they experience higher rates of recurrence.
It is well known that antibiotics play a central role in the pathogenesis of CDI, presumably by disruption of the normal gut flora, thereby providing a perfect setting for *C. difficile* to proliferate and produce toxin. Although nearly all antibiotics have been associated with CDI, clindamycin, third-generation cephalosporins, penicillins and fluoroquinolones have traditionally been considered at greatest risk. A controversial risk factor is related to the exposure to gastric acid-suppressive medications, such as histamine-2 blockers and proton pump inhibitors (PPIs). Recent studies have suggested the association between use of stomach acid–suppressive medications, primarily PPIs, and CDI.

The spectrum of symptomatic CDI ranges from mild diarrhoea to severe disease or fulminant colitis and as many as 30% of patients may develop recurrent CDI. Diarrhea is the hallmark symptom, however, patients may not present with initial symptoms of diarrhea due to colonic dysmotility either from previous underlying conditions or possibly from the disease process itself. Diarrhea may in fact be absent. This is especially important in surgical patients who may have a concomitant ileus. Therefore it is important to have a high index of suspicion. Diarrhea usually may be accompanied by abdominal pain and cramps and if prolonged may result in altered electrolyte balance and dehydration.

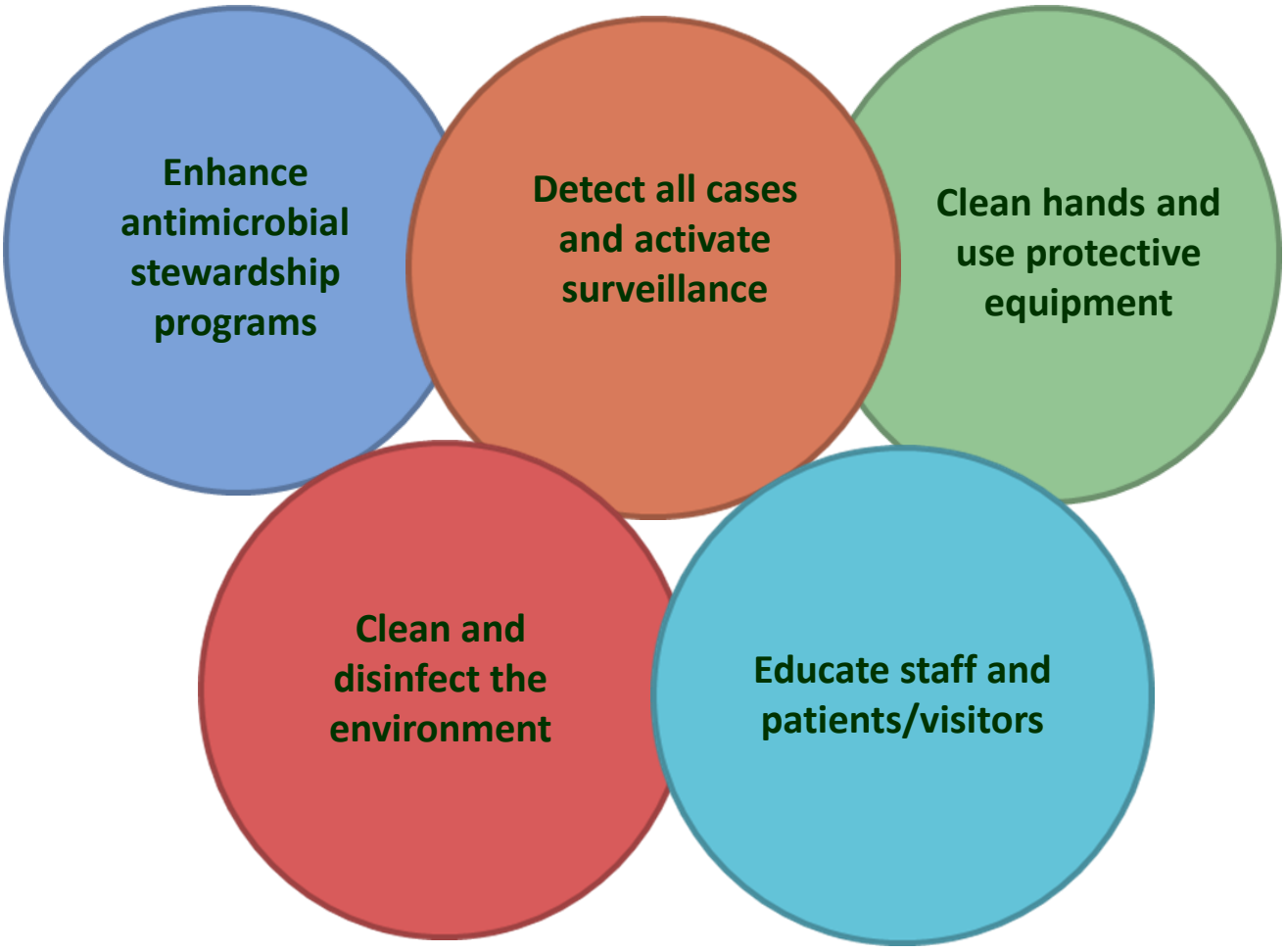
Severe forms of the disease are associated with increased abdominal cramping and pain and signs of systemic inflammation, such as fever, leukocytosis, and hypoalbuminemia. Diarrhoea may be absent in some patients with CDI. Sometimes, it may signal the progression of the infection to its fulminant form. The progression to fulminant *C. difficile* colitis is quite infrequent (1%–3% of all CDI); however, mortality in this group of patients remains high due to the development of toxic megacolon and colonic perforation, peritonitis and septic shock, and subsequent organ dysfunction.

Prompt and precise diagnosis is an important aspect of effective management of CDI. Early identification of CDI allows early treatment and can potentially improve outcomes. Rapid isolation of infected patients is important in controlling the transmission of *C. difficile*.

This is particularly important in reducing environmental contamination as spores can survive for months in the environment, despite regular use of environmental cleaning agents. Contact (enteric) precautions patients with CDI should be maintained until the resolution of diarrhea, which is demonstrated by passage of formed stool for at least 48 hours. Patients with known or suspected CDI should ideally be placed in a private room with en-suite hand washing and toilet facilities. If a private room is not available, as often occurs, known CDI patients may be cohort nursed in the same area though the theoretical risk of transfection with different strains exists.

Hand hygiene with soap and water and the use of contact precautions along with good cleaning and disinfection of the environment and patient equipment, should be used by all health-care workers contacting any patient with known or suspected CDI. Hand hygiene is a cornerstone of prevention of nosocomial infections, including *C. difficile*. Alcohol-based hand sanitizers are highly effective against non–spore-forming organisms, but they may not kill *C. difficile* spores or remove *C. difficile* from the hands. The most effective way to remove them from hands is through hand washing with soap and water.

A proposal for a bundle for the prevention of *Clostridium difficile* infection



Behavior changes to reduce healthcare-associated infections

Behavior changes to reduce healthcare-associated infections

Despite clear evidence and guidelines to direct HCAIs prevention strategies, compliance is uniformly poor and major difficulties arise when introducing evidence and clinical guidelines into routine daily practice.
High rates of inappropriate infection and control (IPC) practices in surgery continue to be reported in the literature. Due to cognitive dissonance (recognising that an action is necessary but not implementing it), changing behaviour is extremely challenging.

In hospitals, cultural, contextual, and behavioral determinants influence clinical practice. Improving behavior in IPC practices remains a challenge. Understanding how to implement healthcare workers' behavior is fundamental to develop effective reduction in HCAIs.
There are generally three primary levels of influence related to behavior modification and infection control in healthcare facilities:

1) Intrapersonal factors;
2) Interpersonal factors;
3) Institutional factors.

Including these three levels of influence in IPC interventions may be a key in preventing HAIs.

On an individual level, healthcare workers should have the necessary knowledge, skills, and abilities to implement effective infection control practices. Increasing the knowledge may influence their perceptions and motivate them to change behavior.

Education and training represent an important component for accurate implementation of recommendations.

Education of all health professionals in preventing HCAIs should begin at undergraduate level and be consolidated with further training throughout the postgraduate years.

Hospitals are responsible for educating clinical staff about infection prevention and control programs. Active education techniques, such as academic detailing, consensus building sessions and educational workshops, should be implemented in each hospital worldwide according to its own resources.

However, increasing knowledge alone may not be sufficient for effective infection control and may be insufficient to effect sustained change especially considering the multi-factorial nature of the problem of HCAIs.

Peer-to-peer role modeling, and champions on an interpersonal level have been shown to positively influence implementation of infection control practices.

Many practitioners use educational materials or didactic continuing medical education sessions to keep up-to-date. However, these strategies might not be very effective in changing practice, unless education is interactive and continuous, and includes discussion of evidence, local consensus, feedback on performance (by peers), making personal and group learning plans, etc. Identifying a local opinion leader to serve as a champion may be important because the "champion" may integrate best clinical practices and drive the colleagues in changing behaviors, working on a day to day basis, and promoting a culture in which infection prevention and control is of high importance.

Surgeons with satisfactory knowledge in surgical infections may provide feedback to the prescribers, integrate the best practices among surgeons and implement change within their own sphere of influence interacting directly with IPC team.

Follow locally-developed antibiotic guidelines and clinical pathways	Enhance infection prevention and control	Control the source of infection
Prescribe antibiotics only when they are truly required	Prescribe appropriate antibiotics(s) with adequate dosages	Reassess treatment when culture results are available
Use the shortest duration of antibiotics based on evidence	Educate staff	Support surveillance of antimicrobial resistance and monitoring of antibiotic consumption

Be a champion!

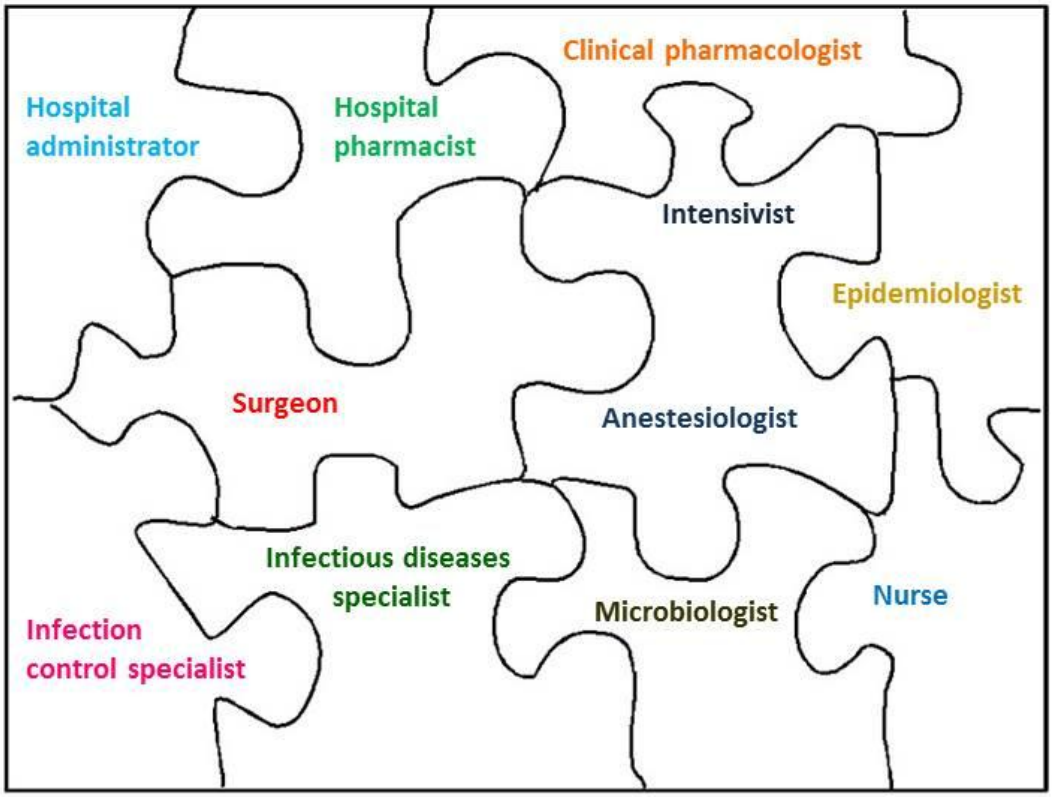
Organizational obstacles may influence infection prevention and control implementation. Many different hospital disciplines are typically involved in IPC, making collaboration, coordination, communication, teamwork and efficient care logistics essential. IPC teams have been shown to be both clinically effective improving patients outcome, and cost-effective providing important cost savings in terms of fewer HAIs, reduced length of hospital stay, less antimicrobial resistance and decreased costs of treatment for infections.

Raising awareness of IPC to stakeholders is a crucial factor in changing behaviors. Probably clinicians are more likely to comply with guidelines when they have been involved in developing the recommendations. One way to engage health professionals in guideline development and implementation is to translate practice recommendations into a protocol or pathway that specifies and coordinates responsibilities and timing for particular actions among a multidisciplinary team. There is now a substantial body of evidence that effective team-work in health care contributes to improved quality of care.

Leading international organizations, such as the WHO, acknowledge that collaborative practice is essential for achieving a concerted approach to providing care that is appropriate to meet the needs of patients, thus optimizing individual health outcomes and overall service delivery of health care.

The use of such approaches reinforces the concept that each one brings with them their particular expertise and is responsible for their respective contributions to patient care. In this context the direct involvement of surgeons may be crucial.

Interdisciplinary approach to infections in surgery



Enhance infection prevention and control

Use antibiotics appropriately

Prescribe antibiotics when they are truly needed

Control the source of infection when it is needed

Together we can impact millions of people!

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