Bacha Khan Medical Complex / Gajju Khan Medical College **Medical Teaching Institute, Swabi**		
Infection Prevention & Control Policy Manual		
IPC/POL/GKMC/BKMC-MTI/Vol-1		
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1.0 PURPOSE

The purpose of this policy is to ensure that infection prevention & control protocols to be followed in true letter & spirit in BKMC/GKMC-MTI Swabi, and constituent THQ Hospitals.

2.0 SCOPE

This policy applies to GKMC/BKMC-MTI & Both constituent THQ Hospitals.

3.0 WHAT IS AN INFECTION CONTROL PROGRAMME?

The important components of the infection control programme are:

4.1 Basic measures for infection control, i.e. standard and additional precautions;
4.2 Education and training of health care workers;
4.3 Protection of health care workers, e.g. immunization;
4.4 Identification of hazards and minimizing risks; including proper triage for infectious patients and placing them in isolations.
4.5 Routine practices essential to infection control such as;

4.1.1 Aseptic techniques,
4.1.2 Use of single use devices,
4.1.3 Reprocessing of instruments and equipment,
4.1.4 Antibiotic usage,
4.1.5 Management of blood/body fluid exposure,
4.1.6 Handling and use of blood and blood products,
4.1.7 Sound management of medical waste,
4.1.8 Effective work practices and procedures, such as,

4.1.1.1 Environmental management practices including management of hospital/clinical waste,
4.1.1.2 Support services (e.g., food, linen),
4.1.1.3 Use of therapeutic devices;
4.1.1.4 Surveillance;
4.1.1.5 Incident reporting and monitoring;
4.1.1.6 Outbreak investigation;
4.1.1.7 Infection control in specific situations;
4.1.1.8 Research.

4.0 In addition to implementing basic measures for infection control, health care facilities should prioritize their infection control needs and design their programmes accordingly. Adherence to infection prevention and control (IPC) practices in hospitals in Pakistan can offset the pressure from emergence of multi-drug resistant bacteria. The IPC practices in Western experience have delivered savings in most healthcare streams and decreased morbidity and mortality from infections. However, the tools necessary in its dispensation need developing:

As is usually the case in self-perpetuating cycles, there is no obvious point of entry to disrupt this cycle; a practical is to intervene at all levels in a campaign.
A campaign can be taken on three levels:

4.1 A set of guidelines suitable to local needs;
4.2 Training the trainers on infection control; and
4.3 Setting up an E-learning module on infection control for doctors and nurses.

Although the core principles of IPC remain the same for everywhere, it is important to remember that much of the experience from the developed countries cannot apply to the conditions in developing countries.
The current work aims at proposing brief guidance and affordable practical strategy suitable to our conditions. These proposals should not be expected to tally with international standards but that does not automatically render them sub-standard. The contents are considered to be best possible practice based on scientific evidence, expert opinion, personal experience, reason and knowledge of the conditions in hospitals of Pakistan.
Disclaimer: Since this guidance is designed to serve the principles of affordability and feasibility, and not to correspond exactly with international standards, any medical legal liability arising from their practice is not supposed to be borne by the authors or promoters of this guidance.
As with all other functions of a health care facility, the ultimate responsibility for prevention and control of infection rests with the health administrator.
The hospital administrator/head of hospital should:
Establish an infection control committee which will in turn appoint an infection control team; and provide adequate resources for effective functioning of the infection control programme.

6.0 INFECTION CONTROL COMMITTEE:

6.1 An infection control committee provides a forum for multidisciplinary input and cooperation, and information sharing. This committee should include wide representation from relevant departments: e.g. management, physicians, other health care workers, clinical microbiology, pharmacy, sterilizing service, maintenance/engineering, administration, housekeeping and training services.

6.2 The committee must have a reporting relationship directly to either administration or the medical staff to promote programme visibility and effectiveness.

6.3 In an emergency (such as an outbreak), this committee must be able to meet promptly. It has the following tasks:

6.3.1 To review and approve a yearly programme of activity for surveillance and prevention;

6.3.2 To review epidemiological surveillance data and identify areas for intervention;

6.3.3 To assess and promote improved practice at all levels of the health facility;

6.3.4 To ensure appropriate staff training in infection control and safety management, provision of safety materials such as personal protective equipment and products; and

6.3.5 Training of health workers.

6.4 The infection control programme will be effective so long as it is comprehensive and includes surveillance and prevention activities, as well as staff training. There must also be effective support at national and regional levels.

6.5 The infection control committee is responsible for the development of policies for the prevention and control of infection and to oversee the implementation of the infection control programme. It should:

6.5.1 Elect one member of the committee as the chairperson (who should have direct access to the head of the hospital administration);

6.5.2 Appoint an infection control practitioner (health care worker trained in the principles and practices of infection control, e.g. a physician, microbiologist or registered nurse) as secretary.

6.5.3 Met regularly (ideally monthly but not less than three times a year).

6.5.4 Develop its own infection control manual/s; and

6.5.5 Monitor and evaluate the performance of the infection control programme.

7.0 INFECTION CONTROL TEAM:

7.1 The infection control team is responsible for the day-to-day activities of the infection control programme. Health care establishments must have access to specialists in infection control, epidemiology, and Infectious disease, including physicians and infection control practitioners. In some countries, these professionals are specialized teams working for a hospital or a group of health care establishments; they may be administratively part of another unit (e.g. a microbiology laboratory, medical or nursing administration, public health services).
The optimal structure will vary with the type, needs, and resources of the facility**.**

7.2 These teams or individuals have a scientific and technical support role, e.g. surveillance and research, developing and accessing policies and practical supervision, evaluation of material and products, the overseeing of sterilization and disinfection, ensuring the sound management of medical waste and the implementation of training programmes. They should also support and participate in research and assessment programmes at the national and international levels.

7.3 **THE INFECTION CONTROL TEAM SHOULD:**

7.3.1 Consist of at least an infection control practitioner who should be trained for the purpose;

7.3.2 Carry out the surveillance programme;

7.3.3 Develop and disseminate infection control policies;

7.3.4 Monitor and manage critical incidents;

7.3.5 Coordinate and conduct training activities.

7.3.6 The team should meet at least weekly. In case of an outbreak meetings should be held daily.

7.3.7 The team should be responsible for day to day functions of IC i.e. developing and accessing policies, surveillance, audit, overseeing of sterilization and disinfection, ensuring safe management of clinical waste and implementation of training programs.

7.3.8 ICT should prepare a yearly work plan, which should be approved by the ICC and administration.

7.3.9 The team should develop an infection prevention manual containing instructions and practices for patient care. The manual should be approved by the ICC and should be made readily available for HCWs.

7.3.10 The team should assess training needs of the staff and organize regular training programs.

7.3.11 The team should audit antimicrobial usage and infection control procedures.

7.3.12 The team should develop standard (bundles) for management of proper insertion and maintenance of medical devices.

7.3.13 ICT should ensure proper vaccination of the healthcare workers where required.

An official Infection Control Committee and Infection control team to be notified.

8.0 HEALTHCARE SERVICE AREAS AND PRACTICES COVERED:

Several service areas and practices in hospitals will benefit in their routines from this guidance.

8.1 Single most important measure:

8.1.1 Hand Hygiene.

8.1.2 Method of Hand hygiene.

8.1.3 Guidance for HCWs.

8.1.4 Provision.

8.1.5 Issues for local teams to address.

8.1.6 Balancing between Infection Risk and Human Touch.

8.2 Building and Environment

8.2.1 Cleaning Hospital Environment

8.2.2 Care of spillages

8.2.3 Waste Disposal

8.3 People

8.3.1 Overcrowded Wards

8.3.2 Patient-Attendants

8.3.3 Hospital Visiting

8.3.4 Isolation policy

8.3.5 Staff Protection

8.3.6 Needle-stick injuries.

8.4 Clean Work

8.4.1 Decontamination.

8.4.2 Endoscopes.

8.4.3 Operation theatres.

8.5 Healthcare-Associated Infections (HAI)

8.5.1 Catheter-care.

8.5.2 Surgical site infections.

8.5.3 Outbreaks.

8.5.4 Critical Care.

8.5.5 Screening, Surveillance, Reporting and Audit.

8.6 Respiratory pathogens like

8.6.1 Tuberculosis

8.6.2 Influenza

8.6.3 COVID-19

8.7 Important Peripherals

8.7.1 Laundry, Kitchen, Eating Areas

8.7.2 Hospital Water Management

8.7.3 Hospital Air Management

8.8 Infection Control Strategy: Administration and Responsibility

8.8.1 Professionalism

8.8.2 Surveillance and data broadcasting

8.8.3 Awareness and training

8.8.4 Advocacy, Public demands, Political lobbying

8.8.5 Funds and budgeting

8.8.6 Infrastructure and planning

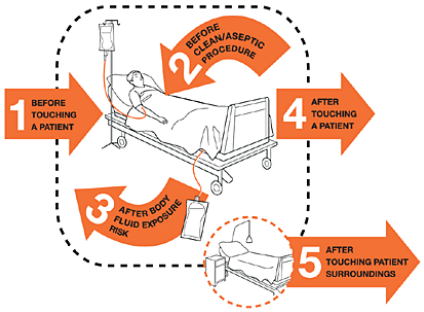
8.1 **The single most important measure:**

8.1.1 **Hand Hygiene**

Hands are a major site of bacterial colonization, even more so after patient contact. Investment in this area is expected to make equal or more savings to healthcare.

WHO identifies 5 moments in the working of a healthcare worker (HCW) providing opportunities for securing hand hygiene:

8.1.1.1 **Before** patient contact.
8.1.1.2 **After** patient contact.
8.1.1.3 **After** contact with patient surroundings**.**
8.1.1.4 **After** body fluid exposure risk.
8.1.1.5 **Before** aseptic procedure



WHO

8.1.2 **METHODS OF HYGIENE:**

8.1.2.1 Alcohol based hand sanitizer/Gel.
8.1.2.2 Soap and water.

8.1.3 **Guidance for HCWs:**

8.1.3.1 Apply alcohol gel to all parts of clean hands, to rub for few seconds until it is dried:

8.1.3.2 BEFORE contact with a patient (to protect patients)

8.1.3.3 AFTER contact with a patient, except the one with diarrhoea (to protect HCWs)

8.1.3.4 Wash hands thoroughly with soap and water AFTER contact with patient with diarrhoea

8.1.4 **Provision.**

All clinical areas need to be supplied with lockable, wall-fixed hand gel dispensers, including in outpatient departments, suitably installed for HCWs.

8.1.5 **Issues for local teams to address:**

8.1.5.1 Used bottles not regularly replaced.

8.1.5.2 Bottles being stolen.

8.1.5.3 Alcohol abuse, and intoxication.

8.1.5.4 Gel splashed into eyes (choose Curved-nose dispensers)

8.1.5.5 Safety of children.

8.1.5.6 Skin allergy to gel.

8.1.6 **Balancing between Infection Risk and Human Touch.**

Colleagues: between shaking hands, hug or just smile – please choose 'just smile'. Hand-shakes in hospital environment are not completely without risk of cross-infection.

8.2 **BUILDING AND ENVIRONMENT: -**

8.2.1 **Cleaning of Hospital Environment: -**

A process of environmental cleaning in a hospital actually starts with a purpose-built structure for a hospital with design input from infection control experts. Obviously this will only be possible for future buildings. The current guidance aims only at presenting bare-minimum actions to keep the environment clean and to reduce the risk of spreading infection to patients, visitors and HCWs.

Soft carpeting in clinical areas must be removed and replaced with water resistant, non-slip and easily cleaned floors.

8.2.1.1 **Routine Cleaning: -**

Aims at reducing the level of contamination but does not destroy all organisms.

8.2.1.1.1 Low risk areas i.e. ward corridors and visitor's walk-ins: Wipe floors with detergent/soap water.

8.2.1.1.2 Medium to high risk area, like theatres: wipe floors using a combined detergent/chlorine.

8.2.1.1.3 Damp-mop floors daily.

8.2.1.1.4 Spray clean all vinyl floors daily

8.2.1.1.5 Vacuum sweep carpeted areas weekly or more frequently.

8.2.1.2 **Issues for local teams to address: duties of cleaners: -**

8.2.1.2.1 Dispose of waste bags and replace with new bags.

8.2.1.2.2 Clean all wash basins, sinks, baths, showers, toilets, urinals, mirrors and splash backs as necessary.

8.2.1.2.3 Clean door glass and door handles daily.

8.2.1.2.4 Replenish soap, paper towels and toilet tissue.

8.2.1.2.5 Clean and dry all cleaning equipment.

8.2.1.2.6 Clean area of discharged patients.

8.2.1.2.7 Periodical change curtains, shower curtains and shampoo carpets.

8.2.1.2.8 Replenish hand gel bottles.

8.2.1.2.9 Management of spillages.

8.2.1.3 **Equipment of cleaning floor: -**

8.2.1.3.1 **NOT acceptable:**

8.2.1.3.1.1 One floor mop-head used for all surfaces and large areas.

8.2.1.3.1.2 One floor mop-head carried around with one bucket for dips.

8.2.1.3.1.3 Floor mop-heads not washed much before they get dirty.

8.2.1.3.1.4 Floor mop-heads not dried after washed

8.2.1.3.2 **Recommended:**

Multiple mop-heads supplied for daily use

Dip; Use for a smaller area; Squeeze into a separate bucket.

(This function can only be possible with a trolley to carry two buckets, one with a mop-squeezer and other for dipping, and with paper towel and a bag for waste.)

8.2.1.4 **Extraordinary Cleaning: -**

Room or ward fumigation is no more a recommended practice

8.2.1.5 **Transfer/Discharge Clean: -**

There is an opportunity to clean the bed space on discharge or transfer of a patient.

8.2.1.6 **Terminal Clean: -**

Terminal cleaning of an isolation (Private) room is undertaken when a patient is moved out of isolation.

The environment and equipment need to be decontaminated, preferably using a combined detergent/chlorine releasing agent 1,000ppm. Curtains need to be washed in cases of gastroenteritis.

8.2.1.7 **Deep Clean: -**

Deep cleans of wards or bays is undertaken when an outbreak has closed

Every surface is cleaned.

During a deep clean all areas within the defined environment and all equipment must be decontaminated using a combined detergent/chlorine releasing agent 1,000ppm.

8.2.1.8 **All Washing: -**

Routine wall washing is not required except when:

• There was a case of infectious diarrhea;

• Walls visibly dirty

8.2.2 **Care of Spillages.**

All spillages, blood, vomits, fecal matter, urine, material from broken bottles of clinical specimens, etc are potentially hazardous and must be dealt with immediately. Dried spillage can be equally hazardous, thus must be treated in the same way.

8.2.2.1 The person must wear disposable gloves and apron

8.2.2.2 The surface is to be flooded with 10,000ppm chlorine releasing agent, mopped and dried thoroughly.

8.2.2.3 Urine and vomit must be soaked up with absorbent disposable paper towels which should be disposed of into clinical waste and the area then cleaned with 10,000ppm chlorine releasing agent, mopped and dried.

Uses	**Quantity of chlorine required for disinfection (mg/L = ppm*)**	**How to prepare the required chlorine solution for disinfection**
		Bleach (ml) : Water(ml)
Blood spillage	10,000	100:1000
Single use laboratory bottles	2,500	25:1000
Ward / environmental disinfection	1,000	10:1000
Disinfection of instruments (after soap and water washing)	500	5:1000
Infant feeding bottles and teats/ Food preparation areas and catering equipment	125	1.25:1000

Drinking water treatment	0.5-1	0.01:1000
1. *Undiluted commercial hypochlorite (bleach) solution contains approximately 100 000 ppm available chlorine ***2.*** Chlorine-releasing agents should not be diluted in hot water, nor mixed with acids nor inappropriate cleaning solutions		

8.2.3 **Waste Disposal: -**

Developed world have a sophisticated system of waste segregation based on even more waste types. We do not afford such systems of segregation but we can have a practical affordable system mainly focusing at segregation of domestic waste, which makes the bulk, from the rest.

Types of hospital waste

8.2.3.1 Domestic + Offensive Domestic

8.2.3.2 Infectious

8.2.3.3 Sharps

8.2.3.4 Anatomical waste (recognisable body parts)

More importantly, any collection and segregation system needs to be backed by apt waste disposal. Healthcare centers attract extremely bad press and reputation when found to have disposed clinical waste irresponsibly.

Although waste management is mainly an infection control issue, it is also a health and safety and aesthetic issue. It is best left to Estates and Management departments to address this issue.

8.3 **PEOPLE: -**

8.3.1 **OVER-CROWDED WARDS: -**

Obviously, over-crowding is unavoidable especially in the public sector health facilities**.** Hospital bed shortages and high occupancy rate is a universal problem. In our setting, the rate at some places can escalate to an unacceptable >100%, resulting in practices considered as taboo for discussion. For example, the practice of double occupancy of beds has prevailed in some centers across the country but no one is prepared to debate this for solutions.

Apart from breaching dignity and privacy of patients and risking their safety, ward overcrowding quite obviously cause infection control to crumble. This document aims at facilitating discussion on the subject focusing on comparisons of various practices based on risk assessment, offering some solutions, which should not be construed as an approval of such practices.

8.3.1.1 **Increased ward Occupancy:**

The practice of putting extra beds, in a bay on temporary basis, resulting in no, or very little, space between the beds exposes the patients to definite risk of cross infection.

8.3.1.2 **Patients admitted to their own bed in the open**

In some places, patients are admitted in hospital but there is no bed available. A patient thus admitted may remain in their own bed, brought from home, outside the hospital building for part or whole of their hospital stay. This situation poses an enormous challenge for medical and nursing staff but surprisingly may not be such a big issue for cross infection. Following measure can be considered to improve the situation on cross-infection.

8.3.1.2.1 Immunocompromised patients may not be admitted to these unruly environmental conditions

8.3.1.2.2 A system of place allocation rather than leaving to patients or their families to randomly choose a place may improve the situation.

8.3.1.2.3 Crowding should be avoided

8.3.1.2.4 Patients with communicable infections should be segregated from the rest

8.3.1.2.5 As a policy no extra beds or admissions should be allowed and personal beds are prohibited in the hospital premises.

8.3.2 **PATIENT-ATTENDANTS: -**

Families and friends in our culture usually prefer to be constantly around their patients admitted to a hospital. Despite this practice causing problems, including risk of cross-infections, it is usually allowed in order to fill the gap from lack of continuous nursing care.

By way of turning a problem into an opportunity, where possible, patients' attendants are deputed to meaningfully participate in healthcare and support specific needs of their own patient in a safe, clean and comforting environment. It may be taken as a practical solution for chronic shortages of nursing staff.

Any such practice must be reviewed and audited at appropriate intervals. The following measures and precautions (and possibly more, with discussions in the local teams) can be considered.

8.3.2.1 The person invited to look after their patients should be free of ongoing infections. A quick survey of the individual can provide a reassurance.
No cough; No temperature; No open wound; No skin rash; No diarrhea.

8.3.2.2 The person with some educational or technical background is more suited to this role.

8.3.2.3 Emphasis on not approaching neighboring patients or their immediate surrounding.

8.3.3 VISITING HOSPITAL BY PATIENTS' FAMILY AND FRIENDS: -

The risk of Health Care Acquired Infections (HCAI) from those family and friend visiting their patient should be balanced against the importance of psychological wellbeing of all by providing access. However, there are measures which can prevent cross-infection from or to visitors.

8.3.3.1 The visitors are cautioned against visiting if carrying an infection of their own, signified by, Cough, Temperature or Diarrhea.

8.3.3.2 They should use alcohol hand gel on entering and leaving the hospital.

8.3.3.3 They should not have a physical contact with other patients or their immediate surroundings.

8.3.3.4 Further restriction of visiting is imposed in cases of ongoing outbreaks or difficult infections in the ward. (as is the case with COVID-19 related clinical areas)

8.3.3.5 Visiting hours need to be displayed and implemented for smooth running of routine clinical activities.

8.3.3.6 Ward Matron/ Sister or ward manager is responsible for ensuring policy implementation on their respective ward(s).

8.3.4 ISOLATION POLICY: -

Application of standard patient isolation policy demands enormous resources. In our country, separate rooms where available are mostly used for privacy and comfort, thus as a source of income for hospitals, rather than for reasons of infection control. This practice is difficult to change but at least a preference for allocation of a private room can be given to patients needing isolation.

There are two types of isolation:

Source isolation of a patient who poses a serious infection risk to others.

Protective isolation of an immunocompromised patient needing to be protected from infection from others.

8.3.4.1 Source Isolation: -

Strongly suspected or proven cases of the following infections should be considered for isolation where possible (Should be further discussed locally):

8.3.4.1.1 Pulmonary Tuberculosis (smear-positive)

8.3.4.1.2 Multidrug-resistant tuberculosis

8.3.4.1.3 COVID-19 infection

8.3.4.1.4 Diarrhea or Dysentery of any cause (isolation preferable also for aesthetic reasons)

8.3.4.1.5 *Clostridium difficile*-associated diarrhea

8.3.4.1.6 Typhoid or paratyphoid fever

8.3.4.1.7 Chickenpox

8.3.4.1.8 Insect infestation (fleas, lice, scabies)

8.3.4.1.9 Measles

8.3.4.1.10 Flu virus infection

Isolation of cases with MRSA, Group A Streptococcus, multi-drug resistant Gram negative bacteria or VRE is also important wherever possible, but the priority should be given to the above more infectious conditions.

8.3.4.2 Priority in allocation can be based on these broad principles:

8.3.4.2.1 Gravity of disease

8.3.4.2.2 Infectiousness of pathogen

8.3.4.2.3 Vulnerability of surrounding patients

8.3.4.2.4 Route of infection e.g., measles spread through airborne route needing isolation; but HIV or Hepatitis viruses are not infectious except though blood exposure, which as such does not need isolation of the source.

8.3.4.2.5 Inevitability of spread: e.g., Noro virus infection is difficult to contain when other patients have already been exposed.

8.3.4.2.6 Isolation is going to be beneficial: isolation of a case of Measles is good only if exposure to it in the community stands a rare chance.

8.3.4.2.7 In situation with outbreaks of infection of known cause, cohorting of patients in defined bays or wards can be considered.

8.3.4.2 **Protective isolation.**

The patients who cannot handle any infection owing to their deranged immune system need protective isolation:

8.3.4.2.1 Immunocompromised patients.

8.3.4.2.2 Patients on immunosuppressive therapy.

8.3.4.2.3 Patients with neutropenia owing to chemotherapy for cancers. The main risk to this group of patients is from air-borne mold infections.

8.3.4.2.4 Normally, isolation is carried out in rooms with continuous positive air pressure, secured by maintaining pressure differentials in the air supply systems and by filtration efficiencies.

8.3.4.2.5 However, still-air rooms can be used when the door is mostly kept closed and the windows are sealed, and the weather conditions allow that to happen.

8.3.4.2.6 Alternatively, patients can be supplied with masks (FFP3, or at least surgical masks where cost is an issue) in condition where quality of air supply cannot be controlled.

8.3.5 **PROTECTION OF HCWS: -**

Prevention of occupational exposure to infectious diseases primarily is a responsibility of the healthcare workers themselves. It can be carried out by two main methods:

Vaccination:

Protection by good clinical practice.

8.3.5.1 Vaccinations recommended:

BCG	**Any time**	**No need to repeat**
MMR (Measles, Mumps and Rubella)	Two doses a month apart	
DPT (Diphtheria, Pertussis, Tetanus)	One dose	Booster in 5 years
Hepatitis B virus Ag	Three doses: now; at 1 month; at 6 month	Booster after 5 year, if good antibody level
Typhoid	One dose of *Vi* antigen vaccine	To be repeated at three yearly intervals
Hepatitis E	Two doses: now; at 1 month	
Varicella	Two doses: now; at 1 month	HCW without a history of chickenpox
COVID-19	Two doses or a single shot depending on the type used	
Influenza vaccine	Yearly	
Meningococcal vaccine against groups A, C, Y and W135 strains	One dose	

8.3.5.2 Protection by good clinical practice: -

8.3.5.2.1 Avoid direct contact with blood and other body fluids; when inevitable, use Personal Protective Equipment (PPE).

8.3.5.2.2 Using PPE is an expensive policy to operate, plus using disposable material can add to waste and to costs. A rational use as per approved guidelines for different scenarios should be followed.

8.3.5.2.3 In our conditions, the practices must be calibrated against supplies, affordability and feasibility and with real infection risks.

8.3.5.2.4 Staff are at risk of acquiring infections at work through:

8.3.5.2.4.1 Droplet (TB, Flu).

8.3.5.2.4.2 Airborne (Measles, Varicella).

8.3.5.2.4.3 Contact or fomites (MRSA, *C. diff*; MDR- gram-negative bacteria).

8.3.5.2.4.4 Food-related infection (preventable by avoiding taking food in risk-related areas, with unwashed hands).

8.3.5.2.5 PPE contains mainly three components: mask, gloves and apron.

8.3.5.2.5.1 Masks: -

8.3.5.2.5.1.1 It has been shown that keeping at a distance from a patient with flu or RT viruses, particularly when they are coughing, and briefly covering mouth and nose during their coughing or sneezing may offer a significant protection from acquiring infection.

8.3.5.2.5.1.2 Wearing surgical masks by the staff on general wards are recommended especially during the COVID-19 pandemic.

8.3.5.2.5.1.3 An N 95 mask should be worn with performing aerosol generating procedures.

8.3.5.2.5.1.4 Whenever feasible, wearing surgical masks may sufficiently reduce the risk of infection.

8.3.5.2.5.1.5 Use appropriate mask, goggles and face visors where available in cases where risk of infection through contact with the mucous membranes (eyes) from splashing of blood or body fluids is considered as high.

8.3.5.2.5.2 **Gloves: -**

8.3.5.2.5.2.1 Gloves provide additional protection to hands from exposure to body fluid and from sharp injuries.

8.3.5.2.5.2.2 Intact healthy skin provides an efficient barrier to acquiring infections.

8.3.5.2.5.2.3 Gloves to be worn where risk of exposure to blood and other body fluid is high, e.g., venipuncture.

8.3.5.2.5.2.4 Gloves to be worn where risk of exposure to blood and other body fluid is high, e.g., venipuncture.

8.3.5.2.5.2.5 Routine use of gloves in general clinical areas should be discouraged.

8.3.5.2.5.2.6 Hand hygiene, mostly with hand gel remains the main tools in infection control.

8.3.5.2.5.3 Apron: -

Disposable plastic aprons (single use) are perhaps more important in preventing spread of infection between patients as clothes of healthcare worker when soiled pose a real risk of spread of infection

8.3.5.2.6 **Cough / Sneeze Etiquettes: -**

Campaign: '**Catch It, Bin It, Kill It'**, involves the following:

8.3.5.2.6.1 Always carry tissues.
8.3.5.2.6.2 Use clean tissues to cover your mouth and nose when you cough and sneeze.
8.3.5.2.6.3 Bin the tissues after one use.
8.3.5.2.6.4 Wash your hands with soap and hot water or apply an alcohol-based hand gel.
8.3.5.2.6.5 Do not handshake with others before step 4.

8.3.6 Needle-stick Injury: -

8.3.6.1 Prevention.

8.3.6.1.1 **Use of PPE** can efficiently decrease risk but is expensive.
8.3.6.1.2 **Vaccination,** particularly hepatitis B vaccination as it is available, effective and against very infectious virus.

8.3.6.2 Exposure: -

An exposure to blood and body fluids should be followed by a risk assessment by a senior member of medical staff based on three factors:

8.3.6.2.1 Amount of blood exposed to
8.3.6.2.2 Type of injury
8.3.6.2.3 Risk assessment of donor

8.3.6.2.1 **Risk by amount of blood exposure per device: -**:

8.3.6.2.1.1 **Critical**: IV catheter.
8.3.6.2.1.2 **Serious**: IM injection (hollow needle).
8.3.6.2.1.3 **Medium**: Acupuncture; Blood Splashes; Surgical Devices, Dental Equipment.
8.3.6.2.1.4 **Low**: No patient contact; Bodily Fluids; Heparin, Insulin, Tinzeparin Subcutaneous Injection.

8.3.6.2.2 **Risk by type of injury: -**

8.3.6.2.2.1 Scratch
8.3.6.2.2.2 Superficial
8.3.6.2.2.3 Deep

Transmission rarely occurs from mucous membrane exposure to blood; and no report of transmission from exposure of intact skin to blood.

8.3.6.2.3 **Donor risk factors: -**

Plus, urgent serological testing of donor's blood for BBV.

8.3.6.2.4 **Post-Exposure Procedures: -**

8.3.6.2.4.1 Exposure management
8.3.6.2.4.2 Blood testing
8.3.6.2.4.3 Post-exposure measures

8.3.6.2.4.1 Exposure management: -

8.3.6.2.4.1.1 Skin, wound or non-intact skin should be washed with soap and water, but without scrubbing. Antiseptics should not be used.
8.3.6.2.4.1.2 Free bleeding of puncture wounds should be encouraged gently.
8.3.6.2.4.1.3 Exposed mucus membranes, including eye, should be irrigated copiously with water.

8.3.6.2.4.2 Blood Testing of the recipient: -

Screening is required only when:

8.3.6.2.4.2.1 The donor patient is known to have BB virus infection.
8.3.6.2.4.2.2 Have had known risks for BBV.
8.3.6.2.4.2.3 Likely circumstances, e.g., high local prevalence of a particular infection.
8.3.6.2.4.2.4 The recipient of needle-stick needs reassurance

	HBV	HCV	HIV*
Baseline blood	Test for anti-HBs Non-immune: give accelerated course + consider HBIG based on risk-assessment Serum stored for future reference		
1-2 Months	Test for anti-HBs for immunity	PCR if available	HIV Ab/Ag
3 Months	If anti-HBs negative, test for HBsAg: if Pos, PCR to confirm, if available	ELISA	HIV Ab/Ag
6 Months	If HBsAg negative, repeat test for HBsAg to finalize	ELISA	HIV Ab/Ag
			*Advise use protective practices during this period if risk is high

8.3.6.2.4.3 Post-exposure Prophylaxis: -

8.3.6.2.4.3.1 HIV infection: -

8.3.6.2.4.3.1.1 PEP should not be offered following exposures to low risk materials (e.g. urine, vomit, saliva, faces) unless they are visibly bloodstained.

8.3.6.2.4.3.1.2 PEP is most likely to be effective when initiated as soon as possible (within hours, and certainly within 48-72 hours of exposure).

8.3.6.2.4.3.1.3 The following regime is now recommended for PEP starter packs in the UK. Local discussion need to take place for local use:

8.3.6.2.4.3.1.4 One Truvada Tablet (300mg tenofovir and 200mg emtricitabine FTC)) once a day. Plus

8.3.6.2.4.3.1.5 Two Kaletra film-coated tablets (200mg lopinavir and 50mg ritonavir) twice a day.

8.3.6.2.4.3.2 HBV Infection: -

8.3.6.2.4.3.2.1 If hepatitis B surface antibody (anti-HBs) present (>100mIU/ml): give booster of HB vaccine.

8.3.6.2.4.3.2.2 Anti-HBs level < 10 mIU/ml (known or tested): a booster dose of HB vaccine, plus hepatitis B immunoglobulin (HBIG).

8.4 CLEAN WORK: -

8.4.1 Decontamination.

Definitions: -

CONTAMINATION The soiling or pollution of inanimate objects, e.g., a surgical device, or living material e.g., skin, with harmful, potentially infectious or unwanted material, needing removing.

Contamination can be dealt with a number of ways (categories of decontamination) depending on the level of cleanliness required by the intended procedure.

8.4.1.1 **CLEANING:** The process that physically reduces the level of contamination (organic matter, dirt, grease) but does not destroy all organisms.

8.4.1.2 **DISINFECTION:** The partial removal or destruction of organisms, apart from **spores,** bringing them to a safe level

8.4.1.3 **STERILISATION:** The process used to render an object free from all organisms including spores

8.4.1.4 **DECONTAMINATION:** A combination of above used to render a re-usable item safe for further use on patients.

8.4.1.4.1 **Categories of Decontamination: -**

It depends upon the procedure planned: High; medium; or low risk.

8.4.1.4.1.1 HIGH RISK: Items that come into contact with or penetrate skin/mucous membranes or enter a sterile body area, need: Sterilization: Autoclave; Ethylene Oxide.

8.4.1.4.1.2 MEDIUM RISK: Items that have contact with mucous membranes Disinfection / Sterilization; Autoclave; Heat disinfection; Chemical disinfection.

8.4.1.4.1.3 LOW RISK Items used on intact skin. Clean Wash with detergent, hot water/universal sanitizing wipes

8.4.1.4.2 **Practical points: -**

8.4.1.4.2.1 Items after use on patients known to have BBV infection must always be treated as high-risk.

8.4.1.4.2.2 Soiled objects are much more difficult to decontaminate. The equipment and laundry do not have to be let soiled, e.g., laundry thrown on a dirty floor with people walking over it, on the assumption that they are going to be decontaminated anyway.

8.4.1.4.2.3 A decontaminated device but still carrying dirt or grease is not safe to use.

8.4.1.4.2.4 Failure in decontamination is more likely to be due to mishandling of objects after decontamination rather than failure of the process itself.

8.4.1.4.2.5 Reliance placed on antibiotic prophylaxis when not sure about the decontamination processes is not a good policy: Antibiotics do not kill BBV viruses, not even all bacteria.

8.4.2 Cleaning of Endoscopes: -

8.4.2.1 There are definite risks of transmission of infection through endoscope. The reports from the Western Countries show a very low rate of cross-infections owing to maintenance of standards of decontamination and relatively low rate of infections in the community.

8.4.2.2 In our situation the risk of transmission of BBV could alarmingly high owing to baseline rate of these infection in the community.

8.4.2.3 Spread of Multi-drug resistant bacteria between patients, expected to be far more likely with substandard practices, may pose equally important risk to health.

8.4.2.4 This policy is a general guide explaining principles only. Detailed policy must be supplied by the manufacturers of the device or from CDC or PHE websites.

8.4.2.5 **There are two steps to cleaning endoscopes: -**

8.4.2.5.1 Manual Cleaning: The physical removal of infectious agents (but not necessarily their destruction) and the organic material which can shield them from disinfectants, e.g. a neutral detergent or enzymatic cleaner in warm water.

8.4.2.5.2 Washer-Disinfector machine capable of disinfection and rinsing to a reproducible standard

8.4.2.6 **Cleaning can be done through two approaches: -**

8.4.2.6.1 Disinfection: The process of reduction in viable infectious agents to a safe level, e.g., by using chlorine dioxide or Peracetic Acid.

8.4.2.6.2 Decontamination: The process of cleaning combined with disinfection or sterilization that makes medical devices safe for reuse.

8.4.2.6.3 Where possible Endoscope Storage Cabinet, a specially designed cabinet to store endoscopes in a clean and dry environment, using HEPA (High Efficiency Particulate Air) filtration, need to be used.

8.4.2.6.4 The devices can be damaged by repeated cleaning, thus need periodic inspection for damage.

8.4.2.6.5 A logbook for the usage of endoscope on named patient can help tracing outbreak of infections including BBV infections.

8.4.3 OPERATION THEATRES: -

Carpets are not allowed anywhere in the theatre complex

8.4.3.1 Dress code:

8.4.3.1.1 Wrist watches and jewelry of any kind are a hazard in theatres and an infection control risk, and should be disallowed.

8.4.3.1.2 Theatre Staff must wear scrub suits with sleeves above the elbows to prevent them from getting wet.

8.4.3.1.3 Dedicated personalized closed toe non-slip footwear to be used by the theatre staff.

8.4.3.1.4 Wearing theatre clothes outside theatre is prohibited.

8.4.3.2 Mask and Hat:

8.4.3.2.1 All members of the scrub team should wear a mask, but the wearing of masks by other personnel is at the discretion of the surgeon.

8.4.3.2.2 Masks should not be carried around as dangling around the neck, or placed in a pocket or here and there. A mask is either worn properly or removed to laundry basket.

8.4.3.2.3 Hats need to be worn by the staff inside the operating theatre.

8.4.3.3 Infected cases in theatre lists:

8.4.3.3.1 Perform a risk assessment.

8.4.3.3.2 Do it last on the list in elective surgeries.

8.4.3.3.3 Preferably recover patient in theatre.

8.4.3.3.4 Special disinfection of the surfaces, including operation table, following surgery.

8.4.3.3.5 Sterilization of all the equipment as per standard practice.

8.4.3.4 Theatre Discipline:

8.4.3.4.1 It is surgeon's prerogative to disallow anyone to enter the theatre.

8.4.3.4.2 Minimize number of people are allowed in operating theatre; risk of infection increases with number of personnel present during the operation.

8.4.3.4.3 Restrict traffic and frequent door opening.

8.4.3.4.4 Separate waste bins for Domestic, Clinical and Anatomical types of waste.

8.4.3.4.5 Laundry basket for used linen; no throwing on the floor.

8.4.3.4.6 Eating in theatre disallowed.

8.4.3.5 Air management solution:

Air in the theatre is a significant source of infection.

Advice on setting up appropriate air pressure in various parts of the theatre complex is beyond the scope of this guidance. In an ideal situation, the following factors need attention:

8.4.3.5.1 **Supply of clean filtered air at:**

8.4.3.5.1.1 derisible pressure.

8.4.3.5.1.2 flow rate, resulting in a particular number of air changes per hour.

8.4.3.5.1.3 direction for flow from clean to relatively less clean areas.
8.4.3.5.1.4 temperature and humidity of air

However, it has to be appreciated that owing to resource deprivation, such sophisticated air flow systems may not be available everywhere in the country.

8.4.3.5.2 **The main objectives of air flow system:**

8.4.3.5.2.1 Keep down the bacterial count suspended in air.
8.4.3.5.2.2 Control the atmospheric temperature.

8.4.3.5.3 **The main sources of bacteria suspended in air are:**

8.4.3.5.3.1 Number of personnel in the environment shedding bacteria from their skin and from talking, coughing.
8.4.3.5.3.2 Duration of activity in the area.
8.4.3.5.3.3 Air drafts caused by stirring up by fans etc.
8.4.3.5.3.4 Theatre waste not contained, and left over unattended for prolonged time

8.4.3.5.4 **SOLUTION:**

Following recommendations can be made in situations where ideal facilities are not available:

8.4.3.5.4.1 Number of personnel and traffic in the theatre must be reduced to minimum.
8.4.3.5.4.2 Horizontal surfaces and floors are regularly mopped using a freshly prepared solution of 1000 ppm of available chlorine.
8.4.3.5.4.3 At the end of each list.
8.4.3.5.4.4 In between long sessions, the theatre is rested for several hours for particles suspended in the air to settle on the surfaces.
8.4.3.5.4.5 Another wet mop is given to the surfaces before start of next list.
8.4.3.5.4.6 The theatres should be made as still-air, with all the source of draft eliminated. Air-conditioning is only carried out in such a way as to prevent air draft.
8.4.3.5.4.7 Prompt and contained disposal of theatre waste will keep the bacterial contamination down.

8.4.3.6 Cleaning and maintenance: -

8.4.3.6.1 **Fumigation.**

- Fumigation of theatres is NOT recommended as it presents a serious risk of cancers to those exposed to formalin fumes.

8.4.3.6.2 **Horizontal surfaces.**

8.4.3.6.2.1 Should be cleaned at the end of each list and at the start of next, using a freshly prepared solution of 1000 ppm of available chlorine.

8.4.3.6.2.2 Any spillage of blood or body fluid should be disinfected (see the page 'Spillage' in the guidance)

8.4.3.6.3 **Wall washing** is NOT recommended routinely, except:

8.4.3.6.3.1 For routine annual theatre maintenance.

8.4.3.6.3.2 Following any major maintenance work.

8.4.3.6.3.3 Any obvious dirt or grease on the walls.

8.4.3.6.4 **Routine Microbiological Surveillance of theatre** is NOT recommended, except**:**

8.4.3.6.4.1 After major construction work.

8.4.3.6.4.2 On commissioning of the theatre.

8.4.3.6.4.3 For investigation of an outbreak of infection.

8.4.3.6.4.4 In ultra-clean theatres

8.5 Healthcare-Associated Infections (HAI): -

HCAIs are those infections which are not present or incubating prior to the medical care or treatment, but result from medical care or treatment in hospital. As an important source of infection, use of vascular cannula and catheter is discussed here; other HAI would be discussed in the section, 'Critical Care'.

8.5.1 Catheter-care

8.5.1.1 Peripheral IV Cannula

Myth: I/V route is superior to oral route even when oral alternatives are available and absorption is not an issue. Be it psychologically gratifying, I/V route is not without serious risks.

8.5.1.1.1 A clear indication of clinical need is required

8.5.1.1.2 Phlebitis risk:

8.5.1.1.2.1 Use of hand veins poses a lower risk of infection than of the veins on the wrist or upper arm.

8.5.1.1.2.2 Upper limb veins have a lower risk than lower limbs veins.

8.5.1.1.2.3 Select most distal site for initial cannulation.

8.5.1.1.2.4 Avoid using a limb with pre-existing medical conditions:

8.5.1.1.2.5 Side affected with stroke.

8.5.1.1.2.6 Hemodialysis fistula.

8.5.1.1.2.7 Lymphedema.

8.5.1.1.2.8 A fractured limb.

8.5.1.1.2.9 A side of previous mastectomy.

8.5.1.1.2.10 Limb with bruised, painful, broken or infected skin.

8.5.1.2 Methods

8.5.1.2.1 Record date of insertion; usually they should be removed or replaced after staying in for 7-10 days.

8.5.1.2.2 Preferable to use the non-dominant arm, away from joints.

8.5.1.2.3 Wash the site with soap and water and dry.

8.5.1.2.4 Decontaminate hands with soap and water/ alcohol hand gel before procedure.

8.5.1.2.5 A surgical scrub is not required.

8.5.1.2.6 Wear gloves (can be non-sterile) to protect you and patient.

8.5.1.2.7 Scrub skin for at least 20-30 seconds with wipe impregnated with 2% Chlorhexidine Gluconate in 70% Isopropyl alcohol or Povidone Iodine, and allow to air dry for 30 seconds.

8.5.1.2.8 Do not re-palpate the peripheral insertion site after disinfection.

8.5.1.2.9 Apply a sterile, semi-permeable transparent dressing if available.

8.5.1.2.10 Dispose sharps in sharps bins.

8.5.1.3 Nurses: inspect insertion site 3 times per day for signs of infection

8.5.1.3.1 Suspect infection if redness, irritation, swelling or pain near IV site.

8.5.1.3.2 Replace loose, damp or soiled dressing, promoting infection.

8.5.1.3.3 Remove cannula if signs of infection.

8.5.1.4 With any sign of infection, removing the cannula may suffice; antibiotic therapy is NOT indicated unless patient septic.

8.5.1.5 Where venous access is limited, and there is a further need for peripheral IV cannula, it can remain in-situ unless signs of infection.

8.5.1.6 Intravascular Catheters:

Central venous catheters (CVCs) are widely used in hospitals:

8.5.1.6.1 In patients in intensive care units (ICUs)

8.5.1.6.2 For monitoring.

8.5.1.6.3 For drug delivery.

8.5.1.6.4 For haemodialysis

CVCs increase the risk of blood stream infections and non-bactermic infections, which increase mortality, morbidity and costs. The risks of infections can be reduced significantly by taking measures at the time of catheter insertion and during catheter maintenance.

8.5.1.7 At the time of Insertion:

8.5.1.7.1 Use a chlorhexidine/silver sulfadiazine or minocycline/rifampin - impregnated CVC has not largely improved the rate of catheter infections.

8.5.1.7.2 Antibiotic prophylaxis is NOT recommended for insertion of catheters.

8.5.1.7.3 Hand hygiene, gloves and gown.

8.5.1.7.4 Skin antisepsis: 2% chlorhexidine gluconate in 70% isopropyl alcohol.

8.5.1.7.5 Maximal sterile precautions including full barrier drapes.

8.5.1.7.6 Avoid the femoral route

8.5.1.8 CVC Maintenance:

Colonisation of catheters with Coagulase Negative Staphylococcus or with other organisms originating from skin does not pose acute clinical problem but is mainly responsible for chronic infections ending up removal of catheters and other clinical problems. Use of antibiotic prophylaxis to prevent colonisation is not warranted and is wasteful.

Locking the catheters with solutions of appropriate antibiotics, particularly after a positive blood culture, can help keeping the catheter clean for longer period, even salvage infected catheters. The solutions usually employed are vancomycin or gentamycin at 10 mg per ml. The line is locked and rested for several hours to days after instillation of solution into it.

8.5.1.9 Other measures to keep the catheter clean:

8.5.1.9.1 Aseptic access technique.

8.5.1.9.2 Daily site review.

8.5.1.9.3 Chlorhexidine-impregnated sponge dressings, if available, have been shown to reduce catheter-associated infection.

8.5.1.9.4 Cleansing of port with Chlorhexidine.

8.5.1.9.5 Replacement of wet soiled or dislodged central line dressing.

8.5.1.9.6 Remove a CVC at earliest opportunity.

8.5.1.9.7 Remove a CVC at the first sign of infection.

8.5.2 Surgical site infections:

It is defined by the presence of redness, pain, heat or swelling at the site of the surgical incision or by the drainage of pus from the wound or the presence of pus under or around wound as an abscess. These may lead to wound dehiscence. In more significant case, signs

of systemic sepsis, including fever, indicates systemic involvement and potentially of distant tissues and organs.

8.5.2.1 Pre-operative Measures:

8.5.2.1.1 Antimicrobial prophylaxis within 1 hour prior to incision where indicated (No prophylaxis for routine clean non-prosthetic uncomplicated surgery).

8.5.2.1.2 Nasal screening and decolonization in carriers of *Staphylococcus aureus* undergoing elective significant procedures e.g., prosthetic surgery or cardiothoracic surgery.

8.5.2.1.3 Screen and treat infections before surgery if possible.

8.5.2.1.4 Bath / shower on the day of surgery or the night before using soap is recommended. Alternatively, Chlorhexidine bath / body wash on the day of surgery can be used.

8.5.2.1.5 If needed, remove hair by clipping or depilatory agents instead of sharp razor.

8.5.2.1.6 Skin preparation with appropriate antiseptic agents.
(Consider using topical Gentian Violet; its antibacterial affect is maintained with the stain)

8.5.2.1.7 Maintain normothermia early postoperative.

8.5.2.1.8 Keep operating room doors closed during surgery.

8.5.2.1.9 If on prophylaxis, repeat antibiotic dose at the 3 hr interval in procedures with duration >3hrs.

8.5.2.1.10 If on prophylaxis, top up doses of antibiotics on significant blood transfusion.

8.5.2.1.11 Wound should be covered with dressing at the end of the operation.

8.5.2.1.12 Do NOT use wound irrigation, intracavity lavage or antimicrobial agents before wound closure to reduce the risk of surgical site infection.

8.5.2.1.13 Use an aseptic non-touch technique for changing or removing surgical wound dressings.

8.5.2.1.14 Advise patients that they may shower safely 48 hours after surgery.

8.5.2.2 Surveillance

Surgical wound infection surveillance with feedback to surgeons (see page on ‘Surveillance’)

8.5.3 Outbreaks Definition.

8.5.3.1 An incident in which two or more individual have similar infections occurring in a frame of time / place, indicating association. Or

8.5.3.2 A situation where the observed number of cases in a defined community exceeds the expected number.

8.5.3.3 Significant Incident

An occurrence of a single case of an infection with potentially extremely serious consequences, such as a highly transmissible infection or one associated with high mortality or morbidity rates.

8.5.3.4 Major Outbreak

8.5.3.4.1 A large number of cases of related infection, for instance and usually, food poisoning.

8.5.3.4.2 Even one case of a highly significant infection, *e.g*., diphtheria.

8.5.3.4.3 **Major Outbreaks Recognition.**

Occurrence of a major outbreak may not be obvious; ward nurses and medical staff and microbiologists are well placed to identify an outbreak.

8.5.3.4.4 Control

This is a very intricate process involving several key players in the hospital, and needing a lot of resources. The list of action includes identification of organisms involved, diagnosis, patient isolation, decanting of patients, cohorting, closing and cleaning of wards. Hospitals that cannot afford such measures are continuously hit by outbreaks adding to pressure on resources, and to morbidity and mortality.

The institutions ideally place with full facilities allowing application of standard policies of procedures for control of outbreaks are obligated to adapt those policies. Here we are only proposing some practical tips which can be adapted to reduce the risk of outbreaks and to curtail them.

8.5.3.4.5 **Two main objectives can be identified:**

8.5.3.4.5.1 Prevent outbreak.

8.5.3.4.5.2 Curtail outbreak

8.5.3.4.6 Methods

8.5.3.4.6.1 Admission of symptomatic patients.

Admission of symptomatic patients in the bays in general wards is obviously going to introduce the infective agent in the ward. The doctor admitting the patient must give it a thought how, for example, Salmonella from the patient admitted with severe gastroenteritis can be prevented from spreading to the neighbouring patients. Following measures can be considered, depending upon availability

8.5.3.4.6.1.1 Admission to isolation room: Ideal

8.5.3.4.6.1.2 Admission to separate bay (Co-horting): This requires prior microbiological diagnosis of the individual patients, which is going to be difficult. This guidance does not recommend this practice; however, in pressing conditions, this may be a temporary fix with the following qualifications:

8.5.3.4.6.1.2.1 Bed space is increased.

8.5.3.4.6.1.2.2 Nursing staff strictly adhere to hand hygiene practice.

8.5.3.4.6.1.2.3 Under appropriate conditions, patient' attendants may be instructed / trained to provide basic nursing to their patient.

8.5.3.4.6.1.2.4 Continuous attending of the ward by the cleaners.

8.5.3.4.6.1.2.5 Early microbiological diagnosis based on which further segregation of the affected patients.

8.5.3.4.7 **Management of Affected Ward**

8.5.3.4.7.1 All patients admitted in a clinical area affected by an on-going outbreak are to be considered as infectious.

8.5.3.4.7.2 An attempt can be made to segregate infected patients into a separate bay. If the remaining patients / bay remain OK for the next 48 hours, they can be considered as free from infection involved in the outbreak.

8.5.3.4.7.3 Patients from infected ward are NOT for transfer to other wards until /unless:

8.5.3.4.7.3.1 The outbreak has ended.

8.5.3.4.7.3.2 The patient has been asymptomatic for 48 hours after the last exposure to infection.

8.5.3.4.7.3.3 There is an isolation room at the destination ward reserved for such patient.

8.5.3.4.7.3.4 The patient is ready to be discharged to home.

8.5.3.4.7.3.4.1 Surgical or diagnostic procedures on these patients should:

8.5.3.4.7.3.4.2 Normally be postponed or Carried out after risk assessment.

8.5.3.4.7.3.4.3 When carried out, the fixtures in the area should be decontaminated (See the page on 'Decontamination')

8.5.3.4.7.3.5 Special effort should be made to prevent spread of infection to the visitors, other patient and the staff by hand hygiene practices (see page on 'hand hygiene'). Hand gel is NOT sufficient to clean contaminated hands; hand washing with water and soap is essential.

8.5.4 Critical Care (CC)

Infection control in CC compares with hand hygiene in the extent and impact of the challenge and the impact of interventions. Numerous issues are involved: ventilator-associated pneumonia; hospital-acquired pneumonia; catheter-related bloodstream infections; surgical site infections; and catheter-associated urinary tract infections. The challenge is compounded by the resistant bacteria involved in each of these types of infections. Following factors play key role in spread of infection:

If we cannot reduce the impact of infection by over 60% promised by standard infection control techniques in the West, any reduction achieved by careful application of simple strategies is worth trying. This guidance outlines a strategy to achieve humble objectives. The message is to use several maneuvers together, if not all; and to observe infection control regulations by ALL the members of team – only a few observing them is not sufficient to achieve the target.

8.5.4.1 Predisposing factors:

8.5.4.1.1 More unwell patients, colonized with resistant bacteria, with compromised immune system.

8.5.4.1.2 Healthcare workers, stretched, over-worked.

8.5.4.1.3 Lack of resource, facilities and equipment.

8.5.4.1.4 More intense and invasive interventions employed

8.5.4.2 Mode of Transmission:

8.5.4.2.1 Direct contact.

8.5.4.2.2 Aerosolized droplets.

8.5.4.2.3 Air-borne pathogens.

8.5.4.2.4 Vehicle-based inoculation.

8.5.4.2.5 Endogenous spread

8.5.4.3 Standard Precautions:

8.5.4.3.1 Ensure Hand hygiene.

8.5.4.3.2 Hand washing is as good as the microbial quality of the water used. In case of doubt, use hand gel after hand washing.

8.5.4.3.3 Observe Sneeze/ Cough etiquettes.

8.5.4.3.4 Quick and contained Waste Disposal.

8.5.4.3.5 Exclude a significantly unwell healthcare worker from working in CC.

8.5.4.3.6 Ensure visible cleanliness of the environment.

8.5.4.3.7 Remove carpets and soft furniture from the premises; replaces non-cleanable surfaces with glazed surfaces.

8.5.4.3.8 **DO NOT RECYLCE INTUBATION TUBES, CATHETERS AND RELATED DEVICES.**

8.5.4.3.9 Keep bed space as large as possible.

8.5.4.3.10 Give priority to staffing CC.

8.5.4.4 Spread of Infection and Specific Measures:

8.5.4.4.1 Spread from contact.

Following pathogens mainly spread by contact: MRSA and Staph. aureus; VRE; C diff; Group A streptococcus; Norovirus; Scabies. In CC, Hospital-acquired pneumonia (HAP), catheter-associated blood-stream infection and surgical-site infection infections usually result from spread through contact although other routes may also be involved.

Spread from contact can be reduced with use of gloves and gown for all patient interactions.

8.5.4.4.1.1 If these gadgets are not available, strict adherence to hand hygiene will continue to help.

8.5.4.4.1.2 Chlorhexidine gluconate should be used for daily bathing of the patients (specific treatment is required for Scabies)

8.5.4.5 Hospital-acquired pneumonia (HAP)

8.5.4.5.1 Pneumonia occurring typically 48 hr after hospital admission in a non-intubated patient. It is mostly due to microorganisms transmitted via HCWs' hands.

8.5.4.6 Catheter-associated urinary tract infections

8.5.4.6.1 Maintenance of free urine flow.

8.5.4.6.2 Use of aseptic techniques.

8.5.4.6.3 Securing of catheter on body.

8.5.4.6.4 Closed sterile drainage of urine.

8.5.4.6.5 Meticulous Hand Hygiene

8.5.4.7 *Surgical site infections* (See page on Surgical-Site infections)

8.5.4.8 *Catheter-related bloodstream infections* (See page on Care of Catheter)

8.5.4.9 Spread by droplet route.

Following conditions spread by droplet route: Pertussis; Mumps; Rubella; Neisseria meningitis; Diphtheria; Influenza.

8.5.4.9.1 Spread by droplet can be reduced by Isolation of patients if possible (See page on 'Isolation')

8.5.4.9.1.1 If isolation facility is not available, such patients wear a mask if tolerated and considered important after risk -assessment.

8.5.4.9.1.1.1 If facemasks are not available or intolerable, using paper hankies, especially during coughing and sneezing, might offer some level of protection.

8.5.4.9.2 The healthcare workers in contact with a patient on droplet precautions should use a facemask

8.5.4.10 Airborne Infections

Following conditions are mainly airborne: RSV; Measles; Varicella; Varicella-zoster; Pulmonary Tuberculosis.

8.5.4.10.1 Control of airborne infection requires a negative pressure room.

8.5.4.10.2 If not available, at least a still-air room should be afforded.

8.5.4.10.3 If isolation room not available at all, wearing of masks by the patient on droplet precautions admitted on unit all may become mandatory.

8.5.4.10.4 A risk assessment should be done before admitting such patient on the main unit, e.g., open tuberculosis, and on the vulnerability of other patients to infections, e.g., immunocompromised patients.

8.5.4.11 Endogenous Spread

Critical illness converts the normal carrier state of *E. coli* into carriage of abnormal bacteria, including Klebsiella, Enterobacter and Pseudomonas, and Staphylococcus aureus, including MRSA. Owing to abnormal gut motility and iatrogenic gastric neutrality, these flora ascend along the gut and, facilitated by NG / NJ tubes, pass onto the respiratory tract helped by endotracheal tubes. Hence ventilator-associated pneumonia (VAP) ensues. It is obvious that hand hygiene fails to eradicate carriage of potential pathogens in throat and gut detected by surveillance samples on admission.

8.5.4.12 Ventilator-associated pneumonia (VAP)

Pneumonia occurring typically 48 hr after hospital admission and endotracheal intubation and/or mechanical ventilation that was not present before intubation. . It is mainly due to microorganisms transmitted via HCWs' hands or acquired endogenously from abnormal gut flora.

Following measures can help to prevent VAP:

8.5.4.12.1 **DO NOT RECYLCE INTUBATION TUBES**

8.5.4.12.2 Oral care with chlorhexidine solution

8.5.4.12.3 Nebulization with Colomycin or taurolidine citrate (the later may not be available in Pakistan, but is worth making available)

8.5.4.12.4 Use of Oral Gut Decontamination for prevention of VAP is debated

8.5.4.12.5 Oral intubation preferred

8.5.4.12.6 Head of patient's bed raised between 30-45 degree if possible

8.5.4.12.7 Scheduled drainage from ventilator circuits

8.5.4.12.8 Continuous subglottic suctioning

8.5.4.12.9 Avoid gastric distention

8.5.4.12.10 Wean ASAP

8.5.4.13 Outbreak of infections in CC

Usual organisms involved are: MRSA; VRE; C. difficile; aerobic Gram Neg Bacilli (AGNB), including E. coli, Klebsiella etc; Pseudomonas spp.; Acinetobacter Spp. These organisms are mainly acquired through contact and from contaminated equipment environment and infected water resource.

8.5.4.13.1 Microbial surveillance of patient in CC constitutes cultures of the oropharynx and the anus on admission and twice weekly.

8.5.4.13.2 Surveillance cultures of the oropharynx during ICU stay showing positive growth reveal an impending outbreak long before the actual outbreak

8.5.4.13.3 When facilities available, knowledge of the carrier state using surveillance is an effective strategy for early identification of impending outbreak.

8.5.4.14 Measures

Control of outbreak in CC is very intricate process, involving several pieces of strategies and actions needing help from experts. A bare-minimum layout of the interventions is given here:

8.5.4.14.1 Hand hygiene

8.5.4.14.2 Personal protective equipment, when available

8.5.4.14.3 Isolation of infected / colonized patients, when possible

8.5.4.14.4 Patient segregation, if isolation not possible

8.5.4.14.5 Care of patient equipment; Particularly, High-risk items including invasive devices in contact with mucous membrane or a break in the skin or those introduced into a sterile body area. These items require sterilisation, or at least high-level disinfection. THERE IS NO OPTION OF USING THESE EQUIPMENTS BETWEEN PATIENTS WITHOUT DECONTMAINATION. Disposable items should be discarded after use.

8.5.4.14.6 Patient management, with appropriate antibiotics when needed, elevation of head-side of bed, cautionary use of PPI, wound-care, catheter care etc.

8.5.4.14.7 Antibiotics

8.5.4.14.7.1 Only use when clinically necessary. Infection must be treated but NOT colonization

8.5.4.14.7.2 Use narrow spectrum antibiotics when possible

8.5.4.14.7.3 Use in short courses

8.5.4.14.7.4 Changing antibiotic in the policy sometime has been shown to terminate an outbreak; however, this is a complicated issue, needing expert help.

8.5.4.14.8 Environmental control

8.5.4.14.8.1 Water Supply (See page on ‘Water Management’)

8.5.4.14.8.2 Air Supply (See page on ‘Air Management’)

8.5.4.14.8.3 Visitors to CC (see page on ‘Hospital Visiting’)

8.5.5 Screening, Surveillance, Reporting and Audit

Quarterly and need based screening, surveillance and reporting will be the mandate of the Infection Control Team, they will follow the NHSN protocol and the report will be presented to the Hospital Infection Control committee.

The institution will be enrolled with the GLASS reporting system

The data will also be uploaded on the hospital website.

For any Queries feel free to contact the infection control team.
