Outbreak Management

IPC Standards,Response Framework & Role of Infection prevention and control specialists

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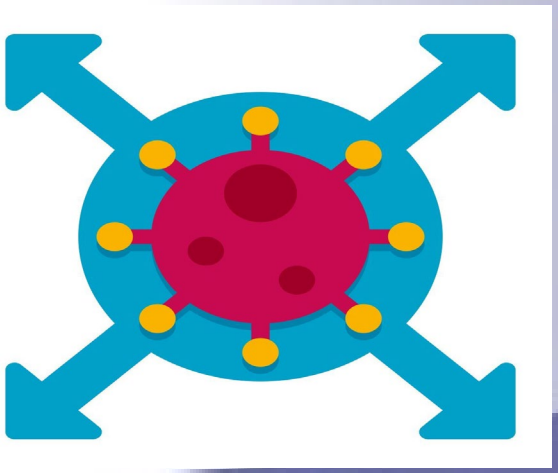
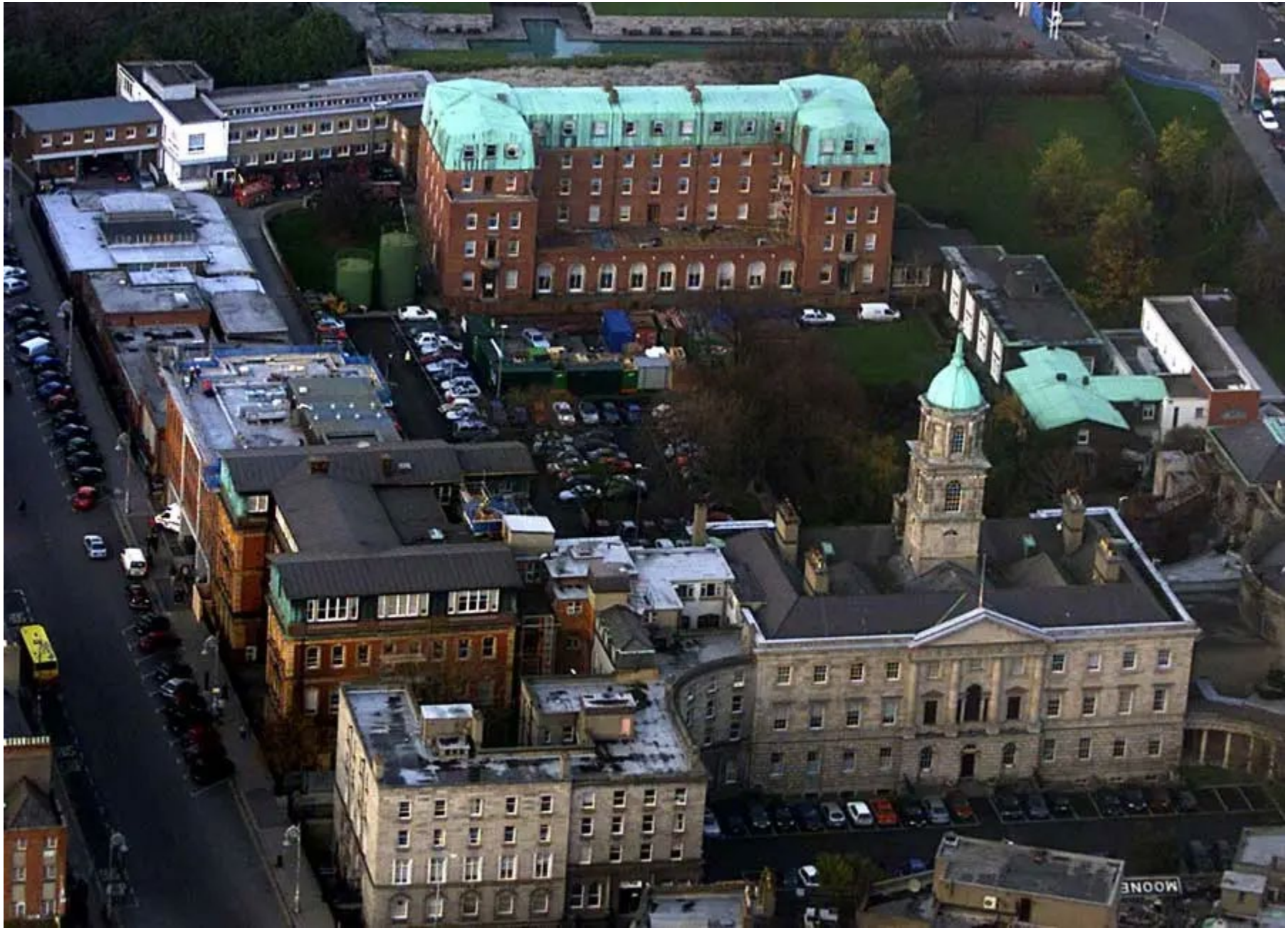
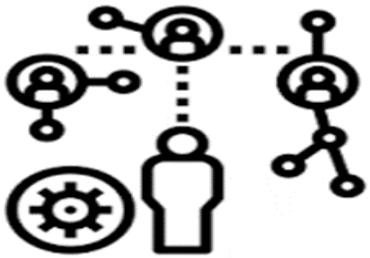




What is an outbreak?

Two or more linked cases of the same infection/colonisation with the same organism OR observed numbers of new cases exceeding the expected number (surveillance is key to identifying, especially if colonization/infection is asymptomatic). A single case of an unusual or rare infection may also represent an outbreak.

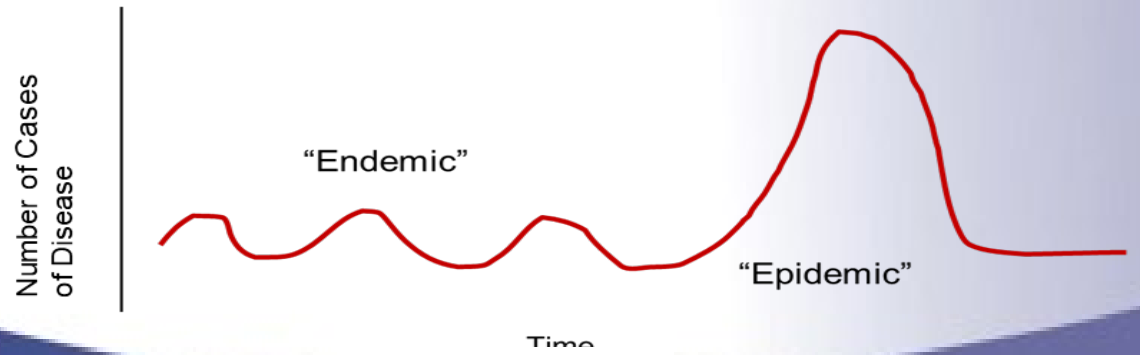


Endemic: Constant presence of a disease or infectious agent in a population within a geographic area such as malaria

Hyper endemic: Persistent high levels of disease occurrence

Epidemic: An increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area

Pandemic: An epidemic that has spread over several countries or continents, usually affecting large numbers of people. The worldwide spread of a new disease.



Why identify outbreaks?

Reduce illness and complications

Inform future prevention strategies

Evaluate existing prevention strategies

Address public concern

How do we identify outbreaks?

Surveillance

The continuous collection, analysis, and interpretation of health data to support planning, implementation, and evaluation of public health practice.

- Passive surveillance: Relies on routine data reporting (e.g. notifiable diseases); can be delayed and less efficient.
- Active surveillance: Proactive data collection (e.g. flu monitoring via sentinel GP networks, screening of hospital inpatients).
- Aggregate data: General information (e.g. age range, location)
- Case-based data: Detailed clinical information (e.g. symptoms, presentation)

Notifiable Diseases and their respective causative pathogens

specified to be Infectious Diseases under Infectious Diseases (Amendment) Regulations 2022 (S.I. No. 258 of 2022) May 2022

Disease	Causative Pathogen
Acute anterior poliomyelitis	Polio virus
Ano-genital warts	Human papilloma virus
Anthrax	*Bacillus anthracis*
***Bacillus cereus* food-borne infection/intoxication**	*Bacillus cereus*
Bacterial meningitis (not otherwise specified)	
Botulism	*Clostridium botulinum*
Brucellosis	*Brucella* spp.
***Campylobacter* infection**	*Campylobacter* spp.
Carbapenemase producing *Enterobacteriaceae*, infection or colonisation	Carbapenemase producing *Enterobacteriaceae*, infection or colonisation
Chancroid	*Haemophilus ducreyi*
Chickenpox – hospitalised cases	Varicella-zoster virus
Chikungunya disease	Chikungunya virus
***Chlamydia trachomatis* infection (genital)**	*Chlamydia trachomatis*
Cholera	*Vibrio cholerae*
***Clostridium difficile* infection**	*Clostridium difficile*
***Clostridium perfringens* (type A) food-borne disease**	*Clostridium perfringens*
COVID-19	SARS-CoV-2
Creutzfeldt Jakob disease	
variant Creutzfeldt Jakob disease	
Cryptosporidiosis	*Cryptosporidium parvum, hominis*
Cytomegalovirus infection (congenital)	Cytomegalovirus
Dengue fever	Dengue virus
Diphtheria	*Corynebacterium diphtheriae or ulcerans* (toxin producing)
Echinococcosis	*Echinococcus* spp.
Enterococcal bacteraemia	*Enterococcus* spp. (blood)
***Escherichia coli* infection (invasive)**	*Escherichia coli* (blood, CSF)
Giardiasis	*Giardia lamblia*
Gonorrhoea	*Neisseria gonorrhoeae*
Granuloma inguinale	*Klebsiella granulomatis*
***Haemophilus influenzae* disease (invasive)**	*Haemophilus influenzae* (blood, CSF or other normally sterile site)
Hepatitis A (acute) infection	Hepatitis A virus
Hepatitis B (acute and chronic) infection	Hepatitis B virus
Hepatitis C infection	Hepatitis C virus
Hepatitis E infection	Hepatitis E virus
Herpes simplex (genital)	Herpes simplex virus
Herpes simplex (neonatal)	Herpes simplex virus
Human immunodeficiency virus infection	Human immunodeficiency virus
Human Monkeypox infection	Monkeypox virus of the orthopoxvirus genus
Influenza	Influenza A and B virus
***Klebsiella pneumoniae* infection (invasive)**	*Klebsiella pneumoniae* (blood or CSF)
Legionellosis	*Legionella* spp.
Leprosy	*Mycobacterium leprae*
Leptospirosis	*Leptospira* spp.
Listeriosis	*Listeria monocytogenes*
Lyme disease (neuroborreliosis)	*Borrelia burgdorferi*
Lymphogranuloma venereum	*Chlamydia trachomatis*
Malaria	*Plasmodium falciparum, vivax, knowlesi, ovale, malariae*
***mcr*-positive *Enterobacteriaceae* infection or colonisation**	*mcr*-positive *Enterobacteriaceae* infection or colonisation

Disease	Causative Pathogen
Measles	Measles virus
Meningococcal disease	*Neisseria meningitidis*
Mumps	Mumps virus
Non-specific urethritis	
Novel or Rare Antimicrobial-resistant Organism (NRAO)	
Norovirus infection	Norovirus
Paratyphoid	*Salmonella* Paratyphi
Pertussis	*Bordetella pertussis*
Plague	*Yersinia pestis*
***Pseudomonas aeruginosa* infection (invasive)**	*Pseudomonas aeruginosa* (blood or CSF)
Q Fever	*Coxiella burnetii*
Rabies	Rabies virus
Respiratory syncytial virus infection	Respiratory syncytial virus
Rotavirus infection	Rotavirus
Rubella	Rubella virus
Salmonellosis	*Salmonella* spp. other than S. Typhi and S. Paratyphi
Severe Acute Respiratory Syndrome (SARS)	SARS-associated coronavirus
Shigellosis	*Shigella* spp.
Smallpox	Variola virus
Staphylococcal food poisoning	Enterotoxigenic *Staphylococcus aureus*
***Staphylococcus aureus* bacteraemia**	*Staphylococcus aureus* (blood)
***Streptococcus* group A infection (invasive)**	*Streptococcus pyogenes* (blood, CSF or other normally sterile site)
Streptococcus group B infection (invasive)	*Streptococcus agalactiae* (blood, CSF or other normally sterile site)
***Streptococcus pneumoniae* infection (invasive)**	*Streptococcus pneumoniae* (blood, CSF or other normally sterile site)
Syphilis	*Treponema pallidum*
Tetanus	*Clostridium tetani*
Toxoplasmosis	*Toxoplasma gondii*
Trichinosis	*Trichinella* spp.
Trichomoniasis	*Trichomonas vaginalis*
Tuberculosis	*Mycobacterium tuberculosis* complex
Tularemia	*Francisella tularensis*
Typhoid	*Salmonella* Typhi
Typhus	*Rickettsia prowazekii*
Verotoxigenic *Escherichia coli* infection	Verotoxin producing *Escherichia coli*
Viral encephalitis	
Viral haemorrhagic fevers	
Viral meningitis	
West Nile fever	West Nile virus
Yellow fever	Yellow fever virus
Yersiniosis	*Yersinia enterocolitica, Yersinia pseudotuberculosis*
Zika virus infection	Zika virus

Please refer to the case definitions for the above diseases. The up-to-date list of diseases and case definitions are available on the HPSC website at www.hpsc.ie/notifiablediseases

Roles and governance structures

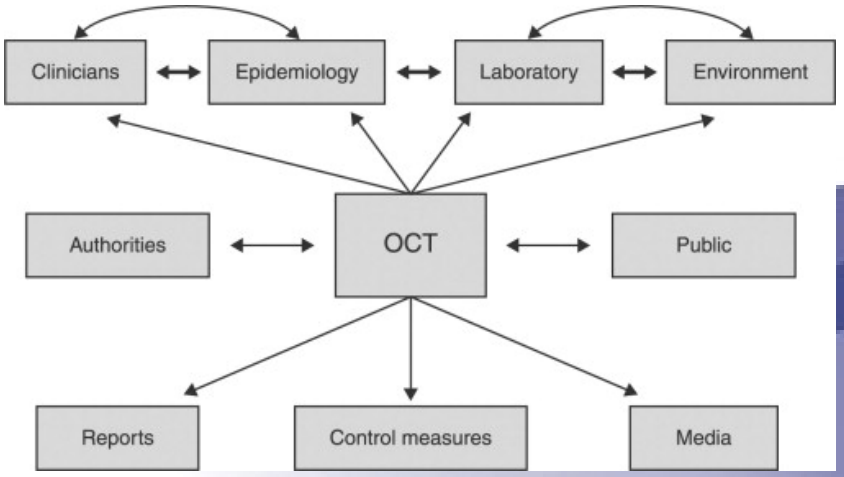
If an outbreak is suspected/confirmed an outbreak control team (OCT) should be convened by the Executive Management Team on advice of the IPCT (for a hospital outbreak)

Relevant members of staff should be informed and included in the OCT. In the case of a significant outbreak the Outbreak Control Committee will meet regularly to monitor the outbreak and direct management as required.

Outbreak Management Process

Outbreak control committee

- Senior management
- IPC nurse/midwife
- Consultant microbiologist/antimicrobial pharmacist/Infectious Diseases – e.g. if o/break of resistant organism may need to change empiric antimicrobial guidelines
- Ward manager
- Bed management
- Laboratory
- Pharmacy
- Household/general services
- Occupational health
- Senior nursing representative
- Medical representative



Roles & Governance Structure

- Outbreak Lead (Clinical Director)
- IPC Team & Microbiology
- Midwifery +/- Neonatal Leads
- Hospital Executive Oversight

Outbreak control committee

- Technical services e.g. if Pseudomonas outbreak associated with water supply/sinks
- Public Health need to be informed of all outbreaks
- Press officer if likely media interest
- Environmental Health Officer – for sample collection
- Catering
- Additional expertise e.g. if associated with a particular piece of equipment may need to contact manufacturer – bypass machines.

Key roles

- Declare an outbreak
- Advise on appropriate control and prevention measures
- Additional case finding
- Coordinate investigation – root cause analysis if unclear source (examine events of timeline to determine cause of problem e.g. if outbreak from contaminated Total Parenteral Nutrition / infusion pumps issues with equipment etc.). Review IPC measures and compliance e.g. hand hygiene
- Ensure adequate resources
- Communication

Aims

- Identify source and spread
- Analyze contributing factors
- Implement control measures
- Prevent recurrence

Identification of sources

- Likely sources based on pathogen and mode of transmission e.g. Legionella associated with a water source
- May need to delineate patient journeys and look for commonalities
- Common exposures – other patients/environment/products
- Common procedures e.g. surgery/line insertions/dialysis and personnel involved/location/process (skin prep etc.) Review documentation of procedures/care bundles.
- Contaminated environment may contribute - ?affected patients accommodated in same area
- Personnel e.g. MRSA carriage – patients cared for by the same team/HCWs
- Contaminated products e.g. shaving foam – ?single or multi use products. Can be contaminated at production/during storage/during use. Review storage and use conditions e.g. temperature of storage.

Case definitions

Clinical criteria

The clinical criteria give the general outline of the disease

Laboratory criteria

Laboratory methods that are used to confirm a case. Samples not always available

Epidemiological criteria

An epidemiological link, during the incubation period

- Human to human transmission
- Animal to human transmission
- Exposure to a common source
- Exposure to contaminated food/drinking water
- Environmental exposure
- Laboratory exposure

Case classification

A possible case: clinical criteria without epidemiological or laboratory evidence of the disease in question - some false positive cases may be included.

A probable case: clinical criteria and an epidemiological link as described in the case definition.

A confirmed case: laboratory confirmed and may fulfil the clinical criteria or not. The definition of a confirmed case is highly specific and less sensitive; therefore most of the collected cases will be true.

Assess patients

- Symptoms/onset – develop a case definition: a set of criteria to determine whether or not an individual has the disease of interest. Usually includes lab and clinical parameters, may be definite, probable, possible
- Relationship of cases in time and place, were patients admitted with symptoms, have they developed since admission. Have patients been transferred **from/to** other wards – are they symptomatic? Is there an obvious index case (first to develop symptoms). Is there an association with specific teams/HCWs?
- Other potential causes e.g. non-infectious.
- Case finding: any other cases on ward (staff or patients)?need to screen other patients/staff. May need to consider weekly screening if ongoing issues. Consider screening household under particular circumstances. Environmental screening if suspected as source e.g. sink traps in Pseudomonas o/break.

Case Finding

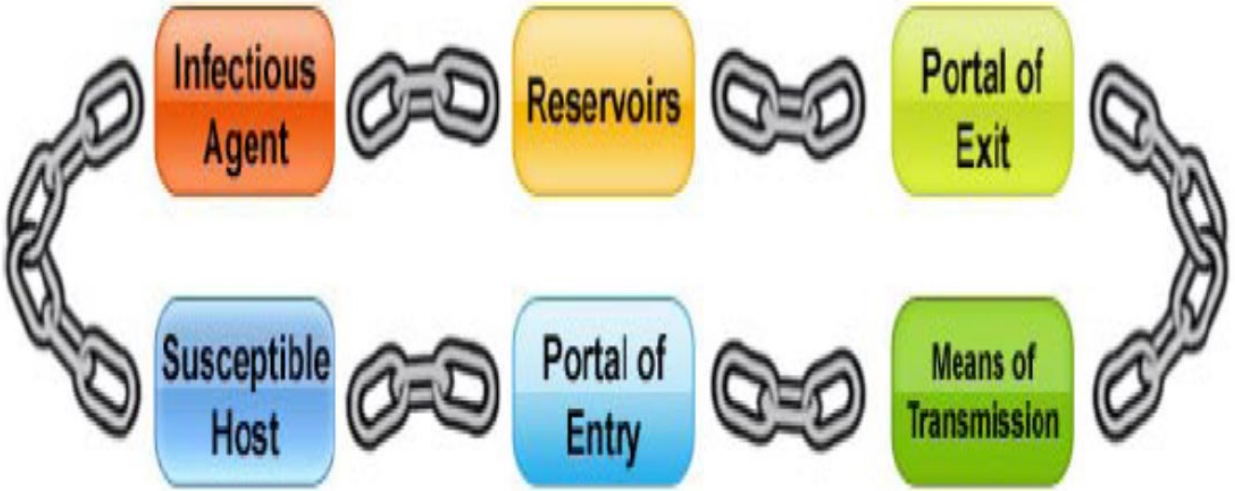
Helps to:

- Establish the onset (which helps identify source)
- Define the extent of the outbreak - minor or major
- Identify cases requiring healthcare input
- Identify where control measures are needed
- Monitor effectiveness of control measures
- Determine when the outbreak can be declared over

Sources for case finding

- Clinical
- Laboratory testing
- Screening/testing of contacts of cases
- Review of historical laboratory results e.g. ask scientists to look into numbers of new MRSA identifications
- GPs/household/hospitals/occupational health/media appeals

The Chain of infection



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Immediate control measures

They will vary depending on the agent, the mode of transmission etc.

Isolate or cohort symptomatic patients. Ideally isolate in case of alternative diagnosis.

- Control the source of the pathogen

~Remove the source of contamination, e.g., discard contaminated food

- Remove persons from exposure

~Keep people from being exposed to mosquito bites to prevent encephalitis

Type of transmission suspected	Suggested action
Contact- Cross-transmission (transmission between individuals)	Patient isolation and barrier precautions determined by infectious agent(s)
Contact- Hand transmission	Improvements in hand hygiene (e.g., washing, disinfection, glove use)
Airborne agent	Patient isolation with appropriate ventilation
Waterborne agent	Checking of water supply and all liquid containers Use of disposable devices
Foodborne agent	Elimination of the at-risk food

Additional Control measures

•Treatment of cases
•Identification of contacts if appropriate +/- prophylaxis – medication/vaccination
•Isolation of contacts
•Close rooms/ward to admissions and transfers in or out – dependent on number of cases, severity of illness, likelihood of transmission e.g. norovirus – highly contagious
•Service restriction
•Cleaning/decontamination
•Staff cohorting/restriction/redeployment
•Visitor restriction

- Communication to all necessary parties
- Review need for dedicated equipment for patient care, minimal stock in patient rooms.

Confirm diagnosis

Appropriate samples for testing, are specific swabs etc. needed

Exclude other potential causes of symptoms.

Communication

- Senior management – effect on service provision, ward/bed closures, elective procedures, outpatient care including cancer care
- Bed management – beds/wards closed, isolation rooms required
- Household/general services – review cleaning practices, additional cleaning, training, appropriate disinfectants etc. ?staff vaccination (may be a company and therefore not under remit of hospital Occupational Health – measles), infrastructural changes if need for additional isolation facilities.

Communication

- Laboratory – vigilance, increased testing may be required, screening. ?adequate lab reagents/test kits/ analyzers /staff/IT.

- Need to involve nursing staff/laboratory in the case of increased testing. May need to involve external/reference laboratory – consider turnaround times, testing kits, sampling kits, increased courier requirements etc.
- Ward staff – hand hygiene, screening requirements, training and education e.g. measles recognition, new guidelines.

Communication

•Occupational health – need for testing/screening ?need for additional resources/physical/staff/IT. Need for vaccination programme or catch up programme e.g. MMR
•Procurement – PPE supplies
•Pharmacy – need for prophylaxis to be available e.g. Tamiflu or need for vaccines – storage etc.
•Patients – involvement in an outbreak, notices/signage, ?need to restrict visiting, ?cancellation of elective procedures, ?effect on outpatient services.

Communication

•Visitors – NB if restrictions apply/PPE requirements/hand hygiene etc.
•Alert to all staff – symptoms/Occ. Health, know their vaccine status if relevant e.g. MMR, scope of problem
•External – public health, HSE, micro/IPC colleagues (other hospitals or community if patients discharged/transferred to residential care)
•Media

Communication Framework

- Internal leadership briefings
- Public health authority notification
- Transparent patient/family communication, with documentation of same
- Daily situational updates if needed

Adequate Resources

- PPE
- Staff
- Cleaning
- Medications
- Vaccines
- Laboratory
- Security e.g. for visiting
- Communication

Ongoing control measures

- Regular meetings of outbreak committee
- Daily review of cases
- Evaluate effectiveness of control measures: cases cease to occur or return to endemic level, or continue
- ?Need to involve reference laboratory – typing of isolates to determine relatedness/transmission routes
- Address deficiencies in system – infrastructure, training and education, guidelines and policies.

Outbreak Over

- Declare over – usually after 2 incubation periods have passed with no new cases– communicate to all

- Prepare a report:

  -Contributing factors

  -What worked well

  -Lessons for next time

- Implement recommendations

Recovery and Post-Outbreak Review

- Debrief & lessons learned
- Policy revision & retraining
- Strengthen preparedness plan

Role of an Infection Prevention &Control specialists

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- Leads early detection of infection outbreaks (e.g., unusual clusters)
- Monitors effectiveness of interventions to limit spread
- Implements and enforces infection control measures
- Coordinates with clinical teams, microbiology, and management
- Collects, analyzes, and interprets outbreak data
- Conducts risk assessments and outbreak investigations
- Confirms outbreaks and ensures reporting to public health authorities
- Identifies source, transmission mode, and at-risk groups

Role of an Infection Prevention &Control specialists

A key part of their role is **implementing control measures quickly and effectively**. This may involve:

- Reinforcing strict hand hygiene and PPE Use
- Ensuring environmental cleaning and disinfection standards are intensified
- Advising on ward closures or visitor restrictions if necessary
- Isolating or cohorting affected patients

Role of an Infection Prevention &Control specialists Cont…

The IPC specialist also provides **education and guidance to staff**. During an outbreak, clear communication is critical—they ensure all staff understand updated protocols, including correct use of PPE, hand hygiene practices, and transmission-based precautions.

Role of an Infection Prevention &Control specialists Cont…

Promote patient and staff safety

Investigate and manage infection outbreaks

Conduct audits and ensure compliance

Educate staff on hygiene and safety practices

Develop and implement infection control policies

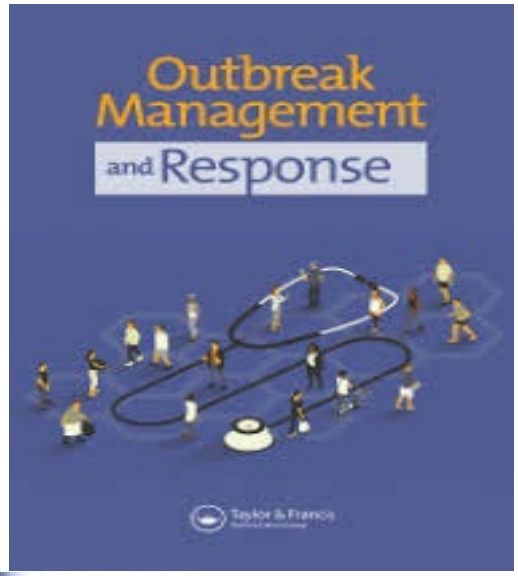
Monitor and prevent healthcare-associated infections

Role of IPC Specialist (Post-Outbreak):

- Leads outbreak review and analysis
- Updates policies and staff training
- Identifies gaps (e.g., hand hygiene, environment)
- Prevents future outbreaks

Why Outbreak Management Matters

- neonates, post-partum mothers, elderly, immunocompromised are at risk
- Close contact increases transmission risk
- Rapid spread can impact whole unit
- Regulatory & reputational implications

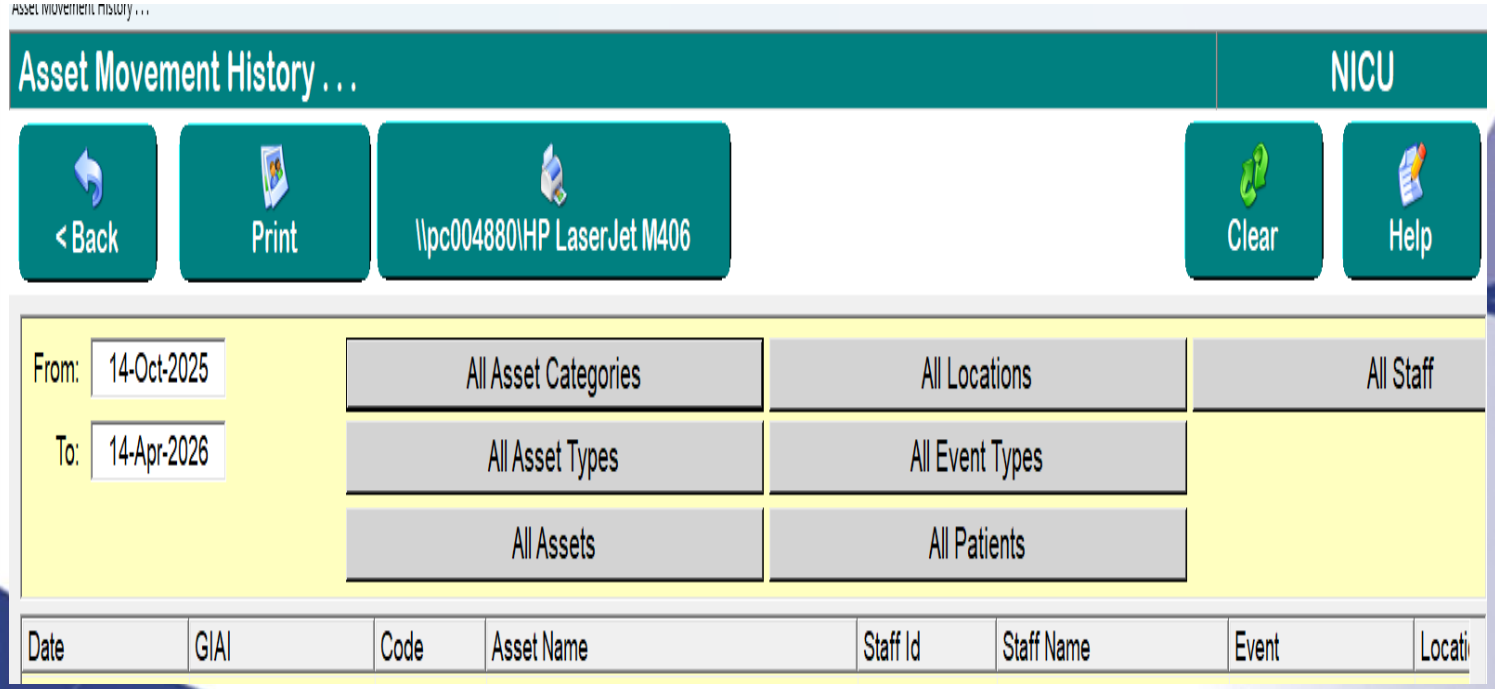


Core IPC Standards for Hospital Settings

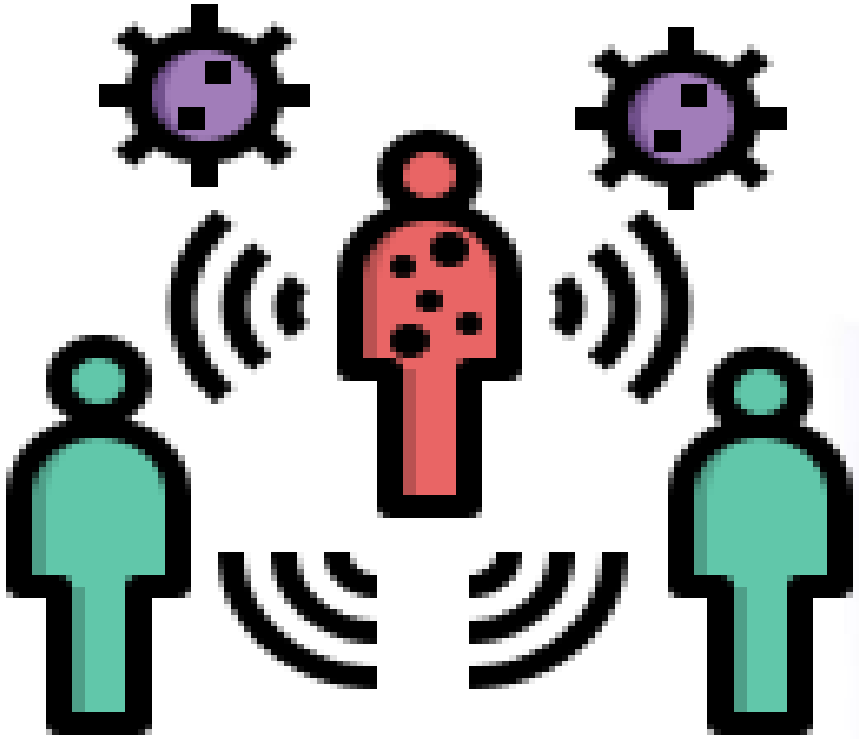
- Hand Hygiene – WHO 5 Moments
- Standard & Transmission-Based Precautions
- Staff competency & ongoing training
- Environmental cleaning & sterilization
- PPE compliance & auditing

Example of a Quality improvement initiative after outbreak management

1.Use of technology for tracking and tracing patient equipment's.



A story of an Outbreak



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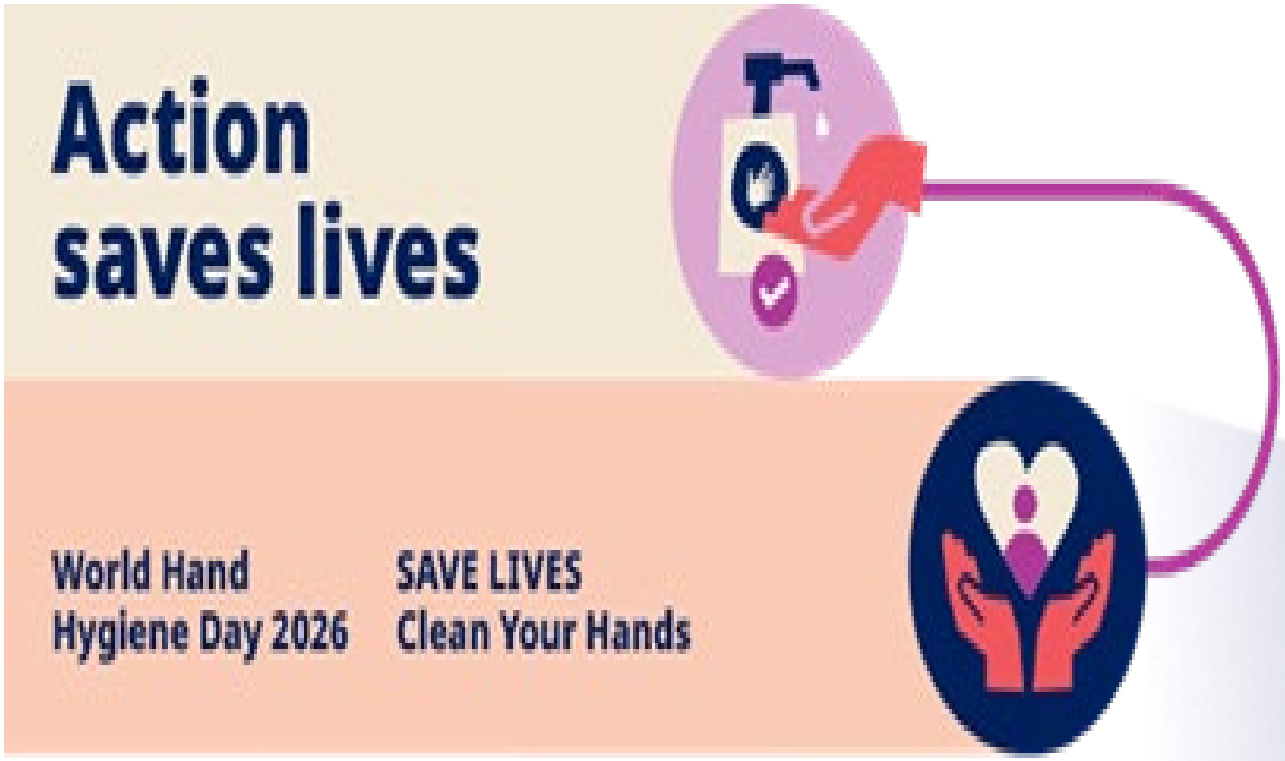
Action
saves lives
World Hand
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SAVE LIVES
Clean Your Hands


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