ARHAI Scotland

Antimicrobial Resistance and Healthcare Associated Infection

NHS National Services Scotland

Standard Infection Control Precautions and Transmission Based Precautions Literature Review

Patient Placement, Isolation and Cohorting

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Key Information

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Document information

Description: This literature review examines the available professional literature on patient placement in the health and care setting.

Purpose: To inform the Standard Infection Control Precaution (SICPs) and Transmission Based Precautions (TBPs) sections on Patient Placement in the National Infection Prevention and Control Manual in order to facilitate the prevention and control of healthcare associated infections in NHSScotland health and care settings.

Target Audience: All health and care staff involved in the prevention and control of infection in Scotland.

Update/review schedule: Updated as new evidence emerges with changes made to recommendations as required.

Review will be formally updated every 3 years with next review in 2024

Cross reference: National Infection Prevention and Control Manual

SICPs Literature review: Hand Hygiene: Hand washing, hand rubbing and indications for hand hygiene.

Update level: Practice – The implications for practice are updated based on a review of the extant scientific literature on patient placement in an enhanced single room with a positive pressure ventilation lobby room.

Research – Further research required in alternative isolation options when space is limited and the effects on mental health in isolation.

Version history

This literature review will be updated in real time if any significant changes are found in the professional literature or from national guidance/policy.

Version	Date	Summary of changes
1.0	September 2018	Patient placement SICPs and TBPs review were amalgamated and updated using a double reviewer methodology. Term ‘isolation room/suite’ changed to ‘enhanced single room’ to align with Scottish guidance. Additional recommendation on protective isolation and the placement of patients receiving haemodialysis added.
2.0	October 2021	Updated after review of current literature. New research question included on patient placement in an enhanced single room with a positive pressure ventilation lobby room. Grading of recommendations updated to include new system based on HICPAC grading.

Approvals

Version	Date Approved	Name	Job Title	Division
1.0	September 2018	National Policies, Guidance and Outbreaks Steering Group		
2.0	October 2021	National Policies, Guidance and Outbreaks Steering Group		

Contents

1. Objectives

The aim is to review the extant scientific literature regarding the appropriate placement of patients (including isolation and cohorting) in health and care settings to form evidence based recommendations for practice.

The specific objectives of the review in terms of SICPs are to determine:

- What is the minimum standard space required per bed/patient?
- What is the minimum standard required for a single-bed room?
- What are the minimum standards required for multi-bed rooms?
- What are the minimum standards for the provision of hygiene/sanitation facilities in patient rooms?
- What is the current guidance on single-bed room provision in hospitals and in care homes?
- How should patients be assessed for infection risk upon admission/arrival at the care area?

The specific objectives of the review in terms of TBPs are to determine:

- Under which circumstances should a patient be placed in a single-bed room?
- What is an enhanced single room?
- Under which circumstances should a patient be placed in an enhanced single room (negative pressure)?
- Under which circumstances should a patient be placed in an enhanced single room (positive pressure)?
- Under which circumstances should a patient be placed in an enhanced single room with a positive pressure ventilation lobby room?
- Are there any legislative requirements relating to the use of an enhanced single room?
- What is a cohort area?

- Under which circumstances should a patient be placed in a cohort area?
- What is cohort nursing and under which circumstances should it be implemented?

N.B.

Recommendations relating to placement of alcohol-based hand rub products in the patient care environment and sink design and provision are outlined in the Hand Hygiene: Hand washing, hand rubbing and indications for hand hygiene.

2. Methodology

This targeted literature review was produced using a defined two-person systematic methodology as described in the National Infection Prevention and Control Manual: Development Process.

3. Discussion

3.1 Implications for practice: SICPs

What is the minimum standard space required per bed/patient?

The majority of recommendations in guidance documents are based largely on ergonomic requirements rather than infection control needs.[1-3] However, guidance produced in 2014 by Health Facilities Scotland providing information on Built Environment Infection Prevention and Control,[4] which is in agreement with the UK guidance produced in 2013 by Department of Health Estates and Facilities 'Infection Control in the Built Environment',[5] specifically recognise the important role of bed spacing in the prevention and control of infection. It states that 'the principle should be to maintain sufficient space for activities to take place and to avoid cross-contamination between adjacent bed spaces'. Furthermore, the guidance also mentions that issues surrounding the design and layout of rooms can contribute to the transmission of microorganisms.[4]

There is consensus on minimum bed spacing for adult in-patient facilities designed post 2010; bed spaces should not be less than 3.6m (width) x 3.7m (depth) since it is considered that most activities can be carried out within this space.[1-3] Spacing should allow clinical/care procedures

to be carried out from either side of the bed, with adequate circulation space to allow medical emergency teams and medical equipment to gain access to the patient.[3] This is applicable to in-patient rooms in most settings including critical care, day surgery and community facilities.[3]

The above is the gold standard for bed spacing. However, for older facilities, bed spacing should comply to the building note of the year in which the building was designed. For older facilities designed post 1995, the bed space should be a minimum of 2.7m x 2.9m and the preferred minimum bed centre is 2.9m.[6]

What is the minimum standard required for a single-bed room?

A single-bed room should contain a clinical wash-hand basin in a visible and convenient location.[3, 4, 7] Single-bed rooms should have en-suite sanitary facilities. Specifically, en-suite facilities should contain a shower, WC and a general wash-hand basin.[3, 4, 7] Single-bed rooms require a minimum total area of 23.5m^2.[3]

What is the minimum standard required for multi-bed rooms?

The acceptable maximum number of beds in a multi-bed room is four.[3] Four-bedded rooms require two clinical wash-hand basins for staff; one close to the entrance of the room, and another in an obvious and convenient position at the other end of the room to ensure minimum travel between patient and clinical wash-hand basin.[3-5] Multi-bed rooms must have en-suite sanitary facilities.[3, 5] Best practice is to provide an assisted shower room (with WC, shower and general wash-hand basin) and a separate semi-ambulant WC (with general wash-hand basin) both en-suite to the bedroom area.[3, 4] En-suite doors should not open directly onto adjacent bed areas.[3] Four-bed rooms require a minimum total area of 72.5m^2.[3]

What are the minimum standards for the provision of hygiene/sanitation facilities in patient rooms?

In general, all single-bed and multi-bed rooms should have en-suite facilities with a WC and shower.[3, 5] There should be clearly labelled, designated separate sanitary facilities for in-patients, clinical staff and visitors.[3] There should also be a sufficient number of wash-hand basins in all clinical areas and all en-suite facilities and toilet facilities should have a general wash-hand basin.[3-5]

What is current guidance on single-bed room provision in hospitals and in care homes?

It has been recommended that there is 100% single-bed room provision in new build hospitals and other healthcare facilities providing in-patient accommodation, unless there are clinical reasons to necessitate the availability of multi-bed rooms.[1-4, 7] These reasons should be clearly

identified and articulated in the appropriate Business Case and will be subject to Scottish Government agreement as part of the Business Case approval process.[2-4, 7]

In refurbishments, NHS boards should seek to maximise the number of single-bed rooms consistent with the recommendation for new builds.[1-4, 7] The minimum recommended single-bed room provision in refurbishments is 50%, but as close to 100% single-bed room provision as possible is expected.[1-4, 7]

In care home settings there will be other social considerations in the context of long term residential living accommodation on single-bed room provision.[8] It is recommended that there are a number of single-bed rooms available to manage residents with transmissible infections.

How should patients be assessed for infection risk upon admission/arrival at the care area?

Patients must be promptly assessed for infection risk on arrival at the care area (if possible, prior to accepting a patient from another care area) by performing a clinical risk assessment (CRA) and/or using a clinical scoring system.[9-17].

Patients who may present a particular cross-infection risk should be isolated on arrival and appropriate clinical samples and screening undertaken as per national protocols to establish the causative pathogen.[10, 12, 18] This includes but is not limited to patients who:

- have been previously positive for a multidrug resistant organisms (MDRO) such as meticillin-resistant Staphylococcus aureus (MRSA) or Carbapenemase- producing Enterobacteriaceae (CPE) ;[10-12, 18, 19] or
- have been hospitalised outside Scotland in the last 12 months (including those who received dialysis);[10, 12, 18] or
- have been a close contact of a person who has been colonised or infected with CPE in the last 12 months;[10, 12, 18] or
- have been in contact with a confirmed COVID-19 individual and are still within the 14-day self-isolation period.[20]

In addition to those:

- who have symptoms suspected of transmissible infections such as but not limited to, loose stools or diarrhoea[10], vomiting[16], fever,[16, 20, 21] or respiratory symptoms.[16, 20, 21]

The appropriate placement of patients within the acute healthcare setting should be determined by an assessment of the following aspects:

- The transmission of any potential healthcare associated infection when receiving healthcare in an NHSScotland facility.
- The risk factors posed by exposure to blood and body fluids by healthcare workers, patients, visitors and others.
- The route of transmission associated with symptoms or colonisation and potential spread of healthcare associated infection by blood and body fluids.
- Spatial considerations – including the availability of single-bed rooms and the current built environment within specific NHSScotland healthcare facilities.[9]

There is a hierarchy of patient placement decisions that should be undertaken for patients requiring care using Transmission Based Precautions, following risk assessment. A single-bed room (neutral pressure) is always required for patients on airborne precautions as a minimum, and is preferred for patients on contact and droplet precautions.[9, 22] This should include assessment of the route of transmission and potential spread of the infection alongside risk factors such as exposure to blood and body fluids.[9] For detailed information on optimal patient placement for specific infectious agents, see the National Infection Prevention and Control Manual Appendix 11.[22] More pathogen specific information and links to available guidance can be found in the NIPCM A-Z of Pathogens.[23]

3.2 Implications for practice: TBPs

Under which circumstances should a patient be placed in a single-bed room?

A Healthcare Improvement Scotland (HIS) evidence note, published in 2016, found that there was a lack of robust evidence to demonstrate the effectiveness of non-pressurised single-bed rooms for preventing or reducing HAI rates.[24] The available studies are mixed in their conclusions with some demonstrating a reduction in cross-transmission of HAI in single-bed rooms compared to open wards or multi-bed rooms, and others showing no difference.[25-28]

Although there is a lack of a robust evidence base in support of isolation as a separate strategy, there is no evidence to support the discontinuation of current isolation measures in the UK.[29] There is evidence that isolation in a single-bed room is effective in reducing transmission of infections spread by the contact or droplet routes, particularly when combined with other

infection prevention and control measures such as hand hygiene and PPE.[9, 25, 26, 29-35] In addition, single-bed room isolation has been shown to be effective for control of infections which can cause extensive environmental contamination (e.g. patients with *C. difficile* infection)[9, 36, 37] and infections with microorganisms which are resistant to antibiotics.[10]

Recently carbapenemase producing Enterobacteriaceae (CPE) and COVID-19 have become a major public health issue and guidance has been issued for NHS Scotland which recommends patients identified as high risk must be isolated in a single-bed room.[10, 20] Patients at high risk for MDROs are defined as those who: have been transferred from a hospital outside of Scotland; have been hospitalised outside of Scotland within the last 12 months (including those who received dialysis); have been a close contact of a person who has been colonised or infected with CPE in the last 12 months; have previously tested positive for MRSA or CPE at any body site.[10, 19] A CMO letter to reinforce this requirement has also been circulated.[12, 18] For current pathogen-specific guidance, see the A-Z Pathogens in the National Infection Prevention and Control Manual (NIPCM).[23]

When single-bed rooms are limited, patients who have conditions that facilitate the transmission of infectious material to other patients (e.g., draining wounds, stool incontinence, uncontained secretions) and those who are at increased risk of acquisition and adverse outcomes resulting from HAI (e.g., immunosuppression, open wounds, invasive devices, anticipated prolonged length of stay, total dependence on HCWs for activities of daily living) should be prioritised for placement in a single-bed room.[9] Single-bed room prioritisation should be reviewed daily.

The risk of seroconversion of hepatitis C virus (HCV) negative patients receiving haemodialysis in the same room as HCV positive patients has been highlighted in the literature.[38-40] There is weak evidence to suggest that patients with blood-borne viruses (BBV) receive haemodialysis in a single-bed room, using dedicated equipment.[39]

Patients should remain isolated in a single-bed room whilst considered infectious and until resolution of symptoms.[22] Viral shedding can persist in immunocompromised patients for prolonged periods of time and transmission to others may occur during that time; therefore, the duration of isolation may be prolonged.[9] Clinical and molecular tests to show the absence of microorganisms may be considered in the decision to discontinue isolation and can reduce isolation times.[41, 42] The clinical judgement and expertise of the staff involved in a patient's management and the Infection Prevention and Control Team (IPCT) or Health Protection Team (HPT) should be sought on decisions regarding isolation discontinuation.

It is considered good practice to keep the doors to non-pressurised single-bed rooms closed, as this provides physical separation of patients in isolation from other patients.[43] One observational

study found that keeping patient doors closed was associated with lower rates of hospital-acquired diarrhoea in paediatric wards.[44] Therefore, the door to the isolation room should remain closed, and should only be opened when entering/leaving; however, Department of Health guidance recognises that in some cases this may not be possible and therefore individual risk assessments should be undertaken for each patient.[9, 43]

What is an enhanced single room?

Also known as an isolation room,[4, 45] an enhanced single room has the same provision as a single-bed room (en-suite) with the addition of in-built ventilation systems designed either to prevent infectious airborne particles from leaving the room (negative pressure) or to prevent potentially infectious airborne particles from entering the room (positive pressure).[4, 46] Where a patient presents an infection risk to others, a 'negative pressure' enhanced single-bed room is used (source isolation).[46]

An enhanced single room is different from an isolation suite which has an additional positive pressure ventilation lobby (PPVL). For specific information regarding isolation suites, please see 'Under which circumstances should a patient be placed in an enhanced single room with a positive pressure ventilation lobby room?'.

Enhanced single rooms with reversible airflow provisions to allow for switching between protective isolation (positive air pressure) and source isolation (negative air pressure) are not recommended because of the risk of cross contamination in the event of the setting being incorrect.[45, 46] For more detailed information on the requirements for an enhanced single-bed room, see SHPN 04 In-patient Accommodation: Options for Choice (Supplement 1 Isolation Facilities in Acute Care Settings).[46]

Under which circumstances should a patient be placed in an enhanced single room (negative pressure)?

There is consensus on the role of suitable ventilation in the prevention of infectious agents disseminated by the airborne (aerosol) route. One systematic review in which 40 original studies were evaluated by a team of experts in the field of engineering and microbiology, demonstrated strong evidence of an association between the spread of airborne infectious diseases such as chickenpox and measles and the direction of airflow and supported the use of negative pressure enhanced single rooms for the control of specific infectious agents.[47] For the purposes of infection prevention and control, an enhanced single room with negative pressure is the preferred choice for patients known or suspected to have infections spread by the airborne (aerosol) route.[9, 22]

Where the enhanced single room is a negative pressure room (i.e. to prevent escape of airborne microorganisms from the room), or a positive pressure room (i.e. protective isolation to prevent airborne microorganisms from entering the room), then the door should remain closed to help maintain the correct pressure differential.[48, 49] There is evidence that door opening can disrupt the containment effectiveness of negative pressure rooms, allowing the dispersal of airborne particles into adjacent areas.[49, 50] Therefore, it is recommended that door-opening is kept to a minimum, and doors should remain closed when not in use.

Under what circumstances should a patient be placed in an enhanced single room (positive pressure)?

The CDC suggests that in general immunocompromised patients can be cared for in the same environment as other patients.[9] However, there are specific patient groups for whom isolation in an enhanced single room with positive pressure may provide protection from infection including:

- Any patient whose blood neutrophil count falls below, or is expected to fall below 0.5 $x10^9/L$[48, 51]
- Patients receiving haematopoietic stem cell transplant,[52] particularly allogeneic transplants[53]
- Patients with extensive burns[54]

Providing HEPA filtered air into the positive pressure room is also recommended.[9, 52]

Under which circumstances should a patient be placed in an enhanced single room with a positive pressure ventilation lobby room?

An enhanced single room with en-suite facilities and ventilated lobby, also known as isolation suite,[46] has the same provision as an enhanced single room but with a lobby having positive pressure ventilation (PPVL).[4] The isolation suite can be used for both source and protective isolation by preventing air entering the corridor or escaping from the room and should therefore be considered for immunocompromised patients who are known or suspected to be infected with a microorganism spread by the airborne (aerosol) route whilst the patient is considered infectious.[9, 46, 49] The lobby (anteroom) also provides an area for healthcare workers to prepare before entering/exiting the room.

The ventilation should be +10 Pascals in the lobby with respect to the corridor; patients' room should have 10 air changes per hour and be neutral in pressure to that of the corridor; the

en-suite having at least 10 air changes per hour and a negative pressure to that of the patient's room.[4, 45, 46]

If an isolation suite is not available, the CDC recommends that the patient should be placed in an enhanced single room (negative pressure) using portable, industrial-grade HEPA filters in the room to minimise the number of airborne microorganisms, including fungal spores, that may pose an infection risk to immunocompromised patients. [9]

Are there any legislative requirements relating to the use of an enhanced single room?

As part of local COSHH assessments a log book should be completed for each enhanced single room.[46] These log books should be located in close proximity to the room e.g. the lobby or anteroom. The following information should be recorded for each enhanced single-bed room:

- a schematic layout of the enhanced single room and ventilation system serving it;
- information on the ventilation design parameters;
- a record of the actual ventilation performance at initial validation ("Acceptance testing");
- records of the annual validations;
- records of the lobby pressure, taken by ward staff from gauges and monitoring devices provided;
- records of any routine service and maintenance activities;
- records of any repairs or modifications;
- a method statement for disinfecting the system.[46]

What is a cohort area?

A cohort area is a bay/ward in which a group of patients (cohort) with the same infection are placed together. Cohorts are created based on clinical diagnosis, microbiological confirmation when available, epidemiology, and mode of transmission of the infectious agent.[9, 55]

Under which circumstances should a patient be placed in a cohort area?

Cohorting forms part of a hierarchy of patient placement decisions for patients requiring care using Transmission Based Precautions. This approach is particularly used when there are increased numbers of cases with the same pathogen/strain and/or if single-bed rooms are in short supply.[4, 9, 15, 21, 25, 29, 35, 36, 56, 57] Any patient who has a co-infection with more than one

pathogen must not be cohorted. [20, 21, 58] Wherever possible, cases with similar symptoms of a suspected infection still awaiting laboratory conformation should not be cohorted together.[20, 21, 58] In addition, the European Geriatric Medicine Society (EuGMS) recommend that in Long-Term care facilities (LTCF) distinction should also be made between residents who are able to understand/tolerate their isolation (e.g. cognitively intact residents) and those more likely to suffer negatively from isolation (e.g. residents with dementia and depressed mood or who walk with purpose) who may be better cared for in a cohort area.[59]

It is difficult to elucidate the evidence to support the effectiveness of cohorting as it is mainly used during outbreaks, the findings suggest that it is effective when combined with other infection prevention and control measures such as hand hygiene, appropriate PPE and environmental decontamination.[9, 25, 29, 32, 36, 60-62] However, some studies have suggested that transmission between patients may occur during cohorting, particularly in the absence of accurate or prompt testing, microbiological typing or where some patients are convalescing/recovering and others still have active symptoms e.g. CDI.[63-67] The maximum distance for cross transmission from droplets has not been fully determined, although a distance of approximately 1 metre (3 feet) around the infected individual has frequently been reported in the literature as the highest area of risk.[68] Therefore, it is important to ensure that there is adequate separation between inpatients and treatment chairs and it is recommended that this is at least 2 metres or more. Inpatients across all care pathways must continue to physically distance by 2 metres at all times from other patients, visitors and staff when not receiving direct care. Curtains may also be used as a further means of separation.[9]

What is 'cohort nursing', and under which circumstances should it be implemented?

Cohort nursing (staff cohorting) is defined as the use of a dedicated team of healthcare staff to care for patients infected with a single infectious agent.[4, 9, 21] Evidence suggests that this approach may be beneficial when control methods have been unsuccessful and/or an outbreak is continuing.[9, 69-71] There is some evidence to suggest that cohort nursing is an effective intervention to further minimise the risk of cross contamination and should be implemented if there are adequate resources to do so.[5, 9, 21, 36, 57, 59, 60, 72-74]

3.3 Implications for research

Limited robust literature was identified by this review regarding the appropriate placement of patients, although there is acknowledgement within guidance that adequate bed spacing, provision of single-bed rooms and provision of separate sanitary facilities for staff and visitors are important factors in infection control.[4] Furthermore, terminology in the published literature is varied and confusing, the term ‘isolation’ is used to mean both physical separation and other infection control measures such as use of PPE. In addition, the term ‘isolation room’ is used to mean simply single-bed room with or without pressure whereas ‘isolation suite’ is used to mean an enhanced single room with a positive pressure ventilation lobby (PPVL).

In a major outbreak of infectious agents, sufficient isolation rooms are not always available and especially not when there is a need of negative pressure ventilation in the room. For this reason, the use of an isolation priority tool is suggested in the literature.[75, 76] Moreover, multiple alternative options were rapidly developed during the recent COVID-19 pandemic to help decrease the cross-infection risk of nosocomial infections.[77-79] Further research is required to validate these alternative isolation options.

There is some evidence to suggest placing patients in isolation can be harmful towards their mental health, although more research is needed. Depression and anxiety has been seen to be significantly higher amongst patients isolated with multi-drug resistant infections.[80] Contact precautions are often used when a patient is isolated and this has been seen to worsen neuropsychiatric symptoms, particularly in those suffering dementia or other complex conditions, depression or sensory impairment.[21, 80] Further research is required to ascertain the impact on mental health when a patient is placed into a single-room and if contact precautions are an independent factor. It may be important to consider mental status and psychological factors when placing patients into single-rooms.

Further research is required to ascertain: the impact of single-bed room provision on infection control across NHSScotland inpatient facilities; the effectiveness of both source and protective isolation for the prevention of HAI; the effectiveness of both patient and staff cohorting for the prevention of HAI; the mode of transmission of pathogens; any potential risks of transmission associated with cohorting; validated alternative isolation options in the case of limited single-rooms or cohort space available; the effects on mental health in isolation.

4. Recommendations

This review makes the following recommendations based on an assessment of the extant scientific literature on patient placement in the health and care setting.

4.1 Recommendations for standard infection control precautions (SICPs)

What is the minimum standard space required per bed/patient?

The minimum bed space in both single and multi-bed rooms of adult in-patient facilities designed or refurbished post 2010 is a minimum of 3.6m (width) x 3.7m (depth). This is considered gold standard for bed spacing in all healthcare settings.

As a minimum, for older facilities, bed spacing should comply to the building note of the year in which the building was designed.

Spacing should allow clinical/care procedures to be carried out from either side of the bed, with adequate circulation space to allow medical emergency teams and medical equipment to gain access to the patient.

(Mandatory)

What is the minimum standard required for a single-bed room?

A single-bed room is a room with space for one patient and should contain a clinical wash-hand basin in a visible and convenient location.

Single-bed rooms should also have en-suite sanitary facilities comprising of a shower, WC and a general wash-hand basin.

Single-bed rooms require a total area of 23.5m2.

(Mandatory)

What are the minimum standards required for multi-bed rooms?

The acceptable maximum number of beds in a multi-bed room is four.

Four-bed rooms require a total area of 72.5m2.

Four-bed rooms require two clinical wash-hand basins for staff; one close to the entrance of the room, and another in an obvious and convenient position at the other end of the room to ensure minimum travel between patient and clinical wash-hand basin.

Multi-bed rooms must have en-suite sanitary facilities. Ideally, an assisted shower room (with WC, shower and general wash-hand basin) and a separate semi-ambulant WC (with general wash-hand basin) both en-suite.

En-suite doors should not open directly onto adjacent bed areas.

(Mandatory)

What are the minimum standards for the provision of hygiene/sanitation facilities in patient rooms?

All single-bed and multi-bed rooms should have en-suite facilities with a WC and shower.

There should be clearly labelled separate, designated sanitary facilities for in-patients, clinical staff and visitors on wards in convenient locations.

(Mandatory)

There should be a sufficient number of wash-hand basins in all clinical areas and all en-suite facilities and toilet facilities should have a general wash-hand basin.

(Mandatory)

What is the current guidance on single-bed room provision in hospitals and in care homes?

There should be 100% single-bed room provision in all new build hospitals and other healthcare facilities providing in-patient accommodation, unless there are clinical reasons to necessitate the availability of multi-bed rooms.

The minimum single-bed room provision in refurbishments is 50%, but as close to 100% single-bed room provision as possible is expected.

In care home settings there will be other social considerations in the context of long term residential living accommodation on single-bed room provision. It is recommended that there are a number of single-bed rooms available to manage residents with transmissible infections.

(Mandatory)

How should patients be assessed for infection risk upon admission/arrival at the care area?

Patients must be promptly assessed for infection risk on arrival at the care area (if possible, prior to accepting a patient from another care area) and should be continuously reviewed throughout their stay.

Patients who may present a particular cross-infection risk should be isolated on arrival and appropriate clinical samples and screening undertaken as per national protocols to establish the causative pathogen. This includes but is not limited to patients who:

- Have been previously positive for a multidrug resistant organism (MDRO) such as meticillin-resistant Staphylococcus aureus (MRSA) or Carbapenemase- producing Enterobacteriaceae (CPE); or
- Have been hospitalised outside of Scotland in the last 12 months (including those who received dialysis); or
- Have been a close contact of a person who has been colonised or infected with CPE in the last 12 months; or
- Have been in contact with a confirmed COVID-19 individual and are still within the self-isolation period.

(Mandatory)

In addition to those:

- Who have symptoms suspected of transmissible infections such as loose stools or diarrhoea, vomiting, fever or respiratory symptoms.

(Category B)

Patient placement decisions should be based on risk assessment which should consider the route of transmission alongside patient factors and symptoms that increase the risk of cross transmission.

A single-bed room should be considered as a minimum for patients on airborne precautions, and is preferred for patients on droplet and contact precautions.

(Category B)

4.2 Recommendations for transmission based precautions (TBPs)

Under which circumstances should a patient be placed in a single-bed room?

Patients who are known or suspected to be infected with a microorganism spread by the contact or droplet route should be cared for in single-bed rooms when available.

(Category B)

Hospitals should have systems in place to be able to rapidly identify:

- patients who have been transferred from a hospital outside of Scotland;
- patients who have been hospitalised outside of Scotland within the last 12 months;
- patients who have been a close contact of a person who has been colonised or infected with CPE in the last 12 months;
- patients who have previously been positive for CPE (carbapenemase producing enterobacteriaceae) or meticillin-resistant Staphylococcus aureus (MRSA) at any body site;
- patients who are within the COVID-19 self-isolation period.

These patients should be prioritised and risk-assessed for placement in a single-bed room.

(Mandatory)

Patients that are at increased risk of transmission, are likely to contaminate the environment, do not maintain appropriate hygiene, or are at increased risk of acquiring infection or developing

adverse outcome following infection should be prioritised for placement in a single-bed room. Single-bed room prioritisation should be reviewed daily.

(Category B)

Where possible, patients who are receiving haemodialysis and are known or suspected to be positive for a blood-borne virus (BBV) should be managed in a single-bed room using dedicated equipment.

(Category C)

Patients should remain isolated in a single-bed room whilst they remain symptomatic and/or are considered infectious. The clinical judgement and expertise of the staff involved in the patient's management and the Infection Prevention and Control Team (IPCT) or Health Protection Team (HPT) should be sought on decisions regarding duration of transmission based precautions. Clinical and molecular tests to show the absence of microorganisms may be considered in making these decisions.

(Category B)

The door of a single-bed room should remain closed when it is occupied by a patient with a known or suspected infection unless the risk assessment determines that the door should remain open for observational purposes. Risk assessments should be reviewed regularly.

(Category B)

What is an enhanced single room?

An enhanced single room, often referred to as an isolation room, is a single-bed room (en-suite) with in-built ventilation systems designed to prevent egress (negative pressure) or ingress (positive pressure) of potentially infectious air.

(Mandatory)

Enhanced single rooms with reversible airflow provisions to allow for switching between source isolation (negative air pressure) and protective isolation (positive air pressure) are not recommended.

(Mandatory)

Under which circumstances should a patient be placed in an enhanced single room (negative pressure)?

An enhanced single room (negative pressure) should be used to accommodate a patient known or suspected to be infected with a microorganism spread by the airborne (aerosol) route whilst the patient is considered infectious.

(Category B)

The door of an enhanced single room must remain closed when a patient is managed within it and door opening should be kept to a minimum.

(Category B)

Under which circumstances should a patient be placed in an enhanced single room (positive pressure)?

An enhanced single room (positive pressure), ideally with a HEPA filtered air supply should be considered for patients at an increased risk of infection e.g. severely immunocompromised.

(Category B)

Under which circumstances should a patient be placed in an enhanced single room with a positive pressure ventilation lobby room?

An enhanced single room with a positive pressure ventilation lobby room, often referred to as an isolation suite, should be used when source and protective isolation are needed. The isolation suite should be considered for immunocompromised patients who are known or suspected to be infected with a microorganism spread by the airborne (aerosol) route whilst the patient is considered infectious.

(Mandatory)

If an isolation suite is not available, the patient should be placed in an enhanced single room (negative pressure) and use portable, industrial-grade HEPA filters in the room to minimise the number of airborne microorganisms, including fungal spores, that may pose an infection risk to immunocompromised patients.

(Category B)

Are there any legislative requirements relating to the use of an enhanced single room?

As part of local COSHH assessments a log book should be completed for each enhanced single-bed room. These log books should be located in close proximity to the room e.g. the lobby or anteroom. The following information should be recorded for each enhanced single-bed room:

- a schematic layout of the enhanced single room and ventilation system serving it;
- information on the ventilation design parameters;
- a record of the actual ventilation performance at initial validation ("Acceptance testing");
- records of the annual validations;
- records of the lobby pressure, taken by ward staff from gauges and monitoring devices provided;
- records of any routine service and maintenance activities;
- records of any repairs or modifications;
- a method statement for disinfecting the system.

(Mandatory)

What is a cohort area?

A cohort area is a bay/ward in which a group of patients (cohort) with the same infection are placed together. Cohorts are created based on clinical diagnosis, microbiological confirmation when available, epidemiology, and mode of transmission of the infectious agent.

(Category B)

Under which circumstances should a patient be placed in a cohort area?

Patient cohorting may be appropriate when single-bed rooms are not available and there is more than one patient with the same confirmed infection. Wherever possible, cases with similar symptoms of a suspected infection still awaiting laboratory conformation should not be cohorted together.

(Mandatory)

Patient cohorting should be combined with other infection prevention and control measures e.g. hand hygiene, PPE and environmental decontamination.

(Category A)

Patients should be separated by at least 2 metres from each other in a cohort area; and bed curtains can be drawn as an additional physical barrier.

(Category B)

What is cohort nursing, and under which circumstances should it be implemented?

Cohort nursing (staff cohorting) is defined as the use of a dedicated team of healthcare staff to care for patients infected with a single infectious agent.

(Mandatory)

Cohort nursing may be implemented to minimise the risk of contamination between groups of symptomatic and non-symptomatic patients if there is adequate staff resource available to do so.

(Category A)

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Appendices

Appendix 1: Grades of recommendation

Grade	Descriptor	Levels of evidence
Mandatory	'Recommendations' that are directives from government policy, regulations or legislation	N/A
Category A	Based on high to moderate quality evidence	SIGN level 1++, 1+, 2++, 2+, AGREE strongly recommend
Category B	Based on low to moderate quality of evidence which suggest net clinical benefits over harm	SIGN level 2+, 3, 4, AGREE recommend
Category C	Expert opinion, these may be formed by the NIPC groups when there is no robust professional or scientific literature available to inform guidance.	SIGN level 4, or opinion of NIPC group
No recommendation	Insufficient evidence to recommend one way or another	N/A

Appendix 2: Search strategy

EMBASE and MEDLINE search 2000 to current

1. exp Patient Isolation/
2. exp Hospitals, Isolation/
3. cohorting.mp.
4. exp Patients' Rooms/
5. side room.mp.
6. single room.mp.
7. 1 or 2 or 3 or 4 or 5 or 6
8. decontamina*.mp.
9. exp Disinfection/
10. exp Disinfectants/
11. exp Detergents/
12. exp Decontamination/
13. 8 or 9 or 10 or 11 or 12
14. 7 and 13

Limit 14 to English language