SEGREGATION OF PAEDIATRIC PATIENTS WITH CYSTIC FIBROSIS AND OTHER CHRONIC RESPIRATORY CONDITIONS

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CHANGE RECORD			
Date	**Author**	**Change**	**Version No.**

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1. INTRODUCTION

Following the Scottish Governments National Delivery Plan, NHS Lanarkshire children's services provide a local Cystic Fibrosis service in partnership with its tertiary centre Royal Hospital for Children Glasgow (RHCG). This guideline has been developed to provide direction to staff in relation to the segregation of paediatric patients with either Complex Respiratory conditions or Cystic Fibrosis in a hospital setting within NHS Lanarkshire.

Cystic fibrosis is a life limiting condition which requires regular visits to clinic and, often, routine and/or emergency admissions to hospital for intensive physiotherapy and intravenous antibiotics.

While life expectancy has improved greatly over recent years, both preventing and delaying the acquisition of certain micro-organisms is expected to further improve overall outcome and therefore mortality for this group of children.

The Cystic Fibrosis Trust outlines recommendations in relation to segregation and infection control in cystic fibrosis; it is therefore felt reasonable that NHS Lanarkshire base its guideline on the same principles. This is in line with the West of Scotland cystic fibrosis and complex respiratory standards of care.

2. AIM, PURPOSE AND OUTCOMES

The aim is to ensure that when children with cystic fibrosis require to be admitted to hospital that optimum care is provided in a safe environment by

- Providing guidance to staff in relation to segregation of all chronic respiratory patients
- Promoting good practice on segregation and infection control
- Raising awareness and understanding of the significance of certain micro-organisms for high risk conditions
- Prevention of acquisition of, and cross infection of micro-organisms in the hospital setting

3. SCOPE

3.1 Who is the Guideline intended to Benefit or Affect?

Staff (multidisciplinary)

Patients in general (infection control)

Specific patient groups (paediatric CF and other respiratory)

3.2 Who are the Stakeholders?

Staff of various disciplines working with children in our wards and in the outpatient department. Patients and their families.

4. PRINCIPLE CONTENT

1.0 Inpatient Segregation Procedure (Including ward 19 attendance)

Due to the risks of cross-infection, we aim to manage respiratory infections in children with cystic fibrosis or chronic respiratory conditions at home whenever possible. When inpatient admission is necessary the respiratory team will aim to admit a maximum of two patients for routine treatment at any one time. The CF and complex respiratory teams must be informed of all CF and complex respiratory patients admitted acutely.

NHSL has dedicated paediatric wards that have isolation facilities that must be used for this high risk patient group. This guideline sets out the requirements for admission and in-patient care.

On arrival to ward 19 or on admission to ward 20, all cystic fibrosis and chronic respiratory patients must be nursed in source isolation until a reliable sputum sample or cough swab is collected and the results are known. Cough swabs will be done in advance of planned admissions whenever possible and samples which have been obtained within seven days may be used to identify segregation status.

Children with neurodisability have an increased incidence of carrying micro-organisms which are potentially harmful to CF patients and should therefore be swabbed and segregated as this protocol outlines.

Cystic fibrosis patients should be given a cubicle for the duration of their stay to prevent the acquisition of micro-organisms from other non CF patients with respiratory symptoms. Where this is not possible the following procedure should be adhered to.

2.0 Segregation Status

2.1 Patients colonised with *Mycobacterium abscessus* (M abs)

NOTE: M abs can prefix any other segregation status, segregate as M abs

Source isolation in a Ward 19 or 20 negative pressure cubicle throughout the hospital stay. Nursing care should be delivered by staff caring for no other cystic fibrosis or chronic respiratory patients therefore if any cystic fibrosis patients are being nursed in ward 19 or 20 patients colonised with *Mycobacterium abscessus* should be nursed in the other ward.

Because different genomovars (strains) exist, patients with *Mycobacterium abscessus* pose a risk to children with cystic fibrosis who do not carry the organism and also to those who do.

2.2 Patients colonised with *B.cepacia* (BC)

NOTE: BC can prefix any other segregation status, segregate as BC

Source isolation in a Ward 19 negative pressure cubicle throughout the hospital stay. Nursing care should be delivered by staff caring for no other cystic fibrosis or chronic respiratory patients.

Because several genomovars (strains) exist, patients with *B.cepacia* pose a risk to children with cystic fibrosis who do not carry the organism and also to those who do.

2.3 Patients colonised with *P.aeruginosa* and Multiresistant organisms - excluding *B.cepacia* or *M. abscessus* (CC ; CCMR / CCMROther / CI /CI MR/ CI MROther)

Chronic Colonisation (CC)
Children who are chronically colonised with *P.aeruginosa* (i.e. have not had any "clear" period of more than 6 months between positive cultures in the last 12 months).

Colonisation with multi-resistant strains of *P.aeruginosa* (CIMR /CCMR)
Children with multi-resistant strains of *P.aeruginosa*.

Intermittent / New Colonisation with *P.aeruginosa* (CI)
Children whose sputum has recently cultured positive for *P.aeruginosa* and in whom eradication is being attempted.

Returning colonisation with P. Aeruginosa (CI*)
Children who have recently been considered "clear" of P. aeruginosa but have again cultured positive within a short period of time. Each case will be considered individually.

Colonisation with *P. aeruginosa* and Multiresistant Organisms other than *B.cepacia* or *M.abscessus* (CIMROther/CC MROther)
Children who, as well as having positive cultures for *P.aeruginosa*, also have other multi-resistant organisms e.g. *Stenotrophomonas maltophilia*, Methicillin-resistant *Staphylococcus aureus.*

All children with a segregation status of **CC, CI, CIMROther** or **CCMROther** must be in source isolation throughout their stay in a ward 20 cubicle.

2.4 All Other Patients (N / NI / NMROther / NIMROther)

Children who have never had *P.aeruginosa*, *B.cepacia* or *M.*abscessus

and

Children who are considered to be "clear" of *P.aeruginosa*

and

those who have not acquired a multiresistant organism **(N /NI)**

Will initially be admitted to a ward 20 cubicle for source isolation until a sputum culture result is known. Should this result be negative for *P.aeruginosa, B.cepacia, M.abscessus* and multiresistant organisms, the patient may then be nursed in the open ward in a bay containing no other respiratory patients (including asthma and viral illnesses).

Patients who have had a multi-resistant organism in their sputum within the past six months with less than three negative specimens **(NMROther / NIMROther)** will be required to spend the duration of their hospital stay in source isolation.

3.0 Infection control measures

3.1 Source isolation for cystic fibrosis and chronic respiratory patients

NHS Lanarkshire's Infection Prevention and Control Manual should be adhered to in relation to standard infection control precautions (SICP's) and to source isolation with the following qualifications:

- Visitors should be permitted if they do not have Cystic Fibrosis
- Visitors should not go on to visit other people with cystic fibrosis within the hospital without seeking advice from staff and ensuring that correct infection control measures are taken to ensure that cystic fibrosis and chronic respiratory patients are protected.
- Permission may be granted for children with chronic respiratory conditions or cystic fibrosis who are inpatients to leave the hospital in the company of a responsible adult.

3.2 Hand hygiene

Hand hygiene is the single most important action to be taken by staff to reduce the spread of infection. All members of staff must perform hand hygiene as per Infection Prevention and Control manual SICP's. Plain liquid soap and water or alcohol gel will be sufficient in most instances providing good hand hygiene technique is used. Prior to use of any equipment, patients will perform hand hygiene. Facilities for hand hygiene should be clean and readily available for staff, parents, visitors and patients.

3.3 Equipment

Medical devices and equipment used for cystic fibrosis and chronic respiratory patients should be either disposable or dedicated to one patient during their stay in hospital and appropriately cleaned between patients. At no time should equipment be shared between cystic fibrosis or complex respiratory patients without prior decontamination.

Manufacturer instructions should be followed when cleaning, disinfecting and sterilising equipment. Guidance in relation to cleaning of equipment can be found in section of the Infection Prevention and Control Manual, chapter 1, SICP's.

Note: For M abs patients
M abs patients will be provided with single patient use equipment. Any equipment which cannot be single use, which is used on, or in the cubicle of, a patient with an M abs status must be thoroughly cleaned with a chloride based detergent such as Actichlor plus 1000ppm. Thereafter equipment should not come into contact with any other respiratory patient for at least 2 hours.

3.4 Nebulisers

Nebuliser apparatus will be for single patient use only and will be rinsed out after use with sterile water (large bottles of sterile water should be labelled with date & time of opening and discarded within 24 hours). Once rinsed, all pieces should be stored dry. For further guidance please refer to the nebuliser management procedure for NHSL.

3.5 Environmental cleaning

The hospital environment may harbour potentially pathogenic organisms, therefore adherence to our local Infection Prevention and Control Manual and nursing and domestic cleaning schedules is essential in all clinical areas. A "terminal clean" should be carried out on all cubicles on the discharge of cystic fibrosis patients from that cubicle.

For Ward 19 outpatients and outpatient departments please see also section 10.3

4.0 Nursing Allocation/ Ward Rounds/ AHP

When more than one cystic fibrosis or chronic respiratory patient is present within inpatient services, careful consideration of nursing allocation, sequence of ward round, physiotherapy visits etc is essential to minimise risk of cross infection.

5.0 Visits to other departments in the hospital

Arrangements must be in place to ensure that segregated patients do not mix in the waiting area of other departments. Cystic fibrosis and complex respiratory inpatients should not be sent for non urgent investigations such as X-ray on a Wednesday or Thursday morning when respiratory patients attending outpatients and cystic fibrosis patients attending annual review investigations may be using these facilities. **Please see also sections 10.1 and 10.3.**
Cystic fibrosis and complex respiratory patients should not frequent areas such as the canteen or shop.

6.0 Theatre

The named surgical consultant is responsible for informing the following professionals on the admission of any cystic fibrosis patients for theatre.

- The paediatrician on duty (for discussion regarding antibiotic cover and segregation)
- The anaesthetist, who must ensure patients are placed appropriately on theatre lists and will not mix in admission and recovery areas
- The secretary responsible for distributing theatre lists, who will put a CF flag next to patients names to ensure recovery staff are aware of need for segregation.

Consideration as above must also be given to patients with a complex respiratory diagnosis.

7.0 Physiotherapy

When carrying out airway clearance use of plastic aprons and gloves is essential regardless of segregation status. Airway clearance should be carried out either in a well ventilated single room

(negative pressure cubicle where appropriate) or for patients in the open ward at their own bed area away from other cystic fibrosis and chronic respiratory patients. Expectorated sputum will be collected in covered containers.

Only one patient may attend the physiotherapy gym at any given time and careful consideration must be given to the order in which children attend. The gym equipment must be cleaned after use as per Infection Prevention and Control Manual SICP's. Patients with a segregation status of M.Abs or BC may not attend the physiotherapy gym.

8.0 Respiratory Function Laboratory (RFL)

Respiratory function tests must be carried out in a well-ventilated area, which is cleaned daily. Schedules for use will be arranged to avoid cystic fibrosis and chronic respiratory patients who are segregated from being together in the waiting area.
Patients should carry out hand hygiene prior to using equipment.
Cleaning of these machines must be in strict adherence with manufacturer's instruction and our local Infection Prevention and Control Manual SICP's .

Note: For M abs patients
M abs patients will be provided with single patient use respiratory function equipment.

9.0 Transport

Patients may require transport either to home, school or other setting. This must be coordinated by ward staff to ensure that segregated patients do not share the same transport.

10.0 Procedure for outpatient CF care

10.1 Clinics and annual review appointments

All cystic fibrosis clinics will adhere to the following microbiological surveillance, infection control and segregation principles as outlined by the CF trust and in line with our local Infection Prevention and Control Policies. Children at all clinics will ideally go straight to their individual clinic rooms from out patient reception in order to reduce any risk of cross infection.

Patients within N, NI, NMR Other and NIMR Other segregation categories will be seen at an appropriate clinic and be given an appropriate time slot, with sufficient time between appointments to avoid any cross infection between each other or patients in other categories.

Children carrying *P.aeruginosa* will be seen at a separate clinic or at the end of existing clinics with sufficient time between appointments to avoid any cross infection between each other or patients in other categories.

Children within the CI group will be seen in different time slots to those in the CIMR Other or CCMR Other groups with sufficient time between appointments to avoid cross infection.

Those in the CCMR, BC or M.Abs categories will be seen individually at clinics either on different days or at the end of existing clinics with sufficient time between appointments to avoid any cross infection between each other or patients in other categories.

The multi-disciplinary team must ensure patients do not mix in other areas of the out-patient department / hospital such as lung function or x-ray. Cleaning of consulting rooms and equipment between patients will be carried out as per Infection Prevention and Control Manual by all members of the team.

Note: For M abs patients
M abs patients will be provided with single patient use equipment, this should be used where possible. Any rooms or equipment which is not single use, used by patients with an M abs status must be thoroughly cleaned with a chloride based detergent such as Actichlor plus 1000ppm. Thereafter rooms and equipment should not come into contact with any other cystic fibrosis patient for at least 2 hours.

10.2 Screening and surveillance

- Sputum or cough swabs should be cultured at every clinic attendance and on day one of every IV antibiotic course
- Sputum or cough swabs and viral throat swabs should be obtained whenever the patient is unwell, and at attendance for annual review
- Induced sputum will be taken and cultured annually
- Antibiotic sensitivities should be reported and monitored
- After every clinic visit, the cystic fibrosis team will inform parents of the most recent sputum sample / cough swab result and their child's current segregation group. This will be sent with a copy of the clinic letter
- Multi-resistant strains are sent to a reference laboratory (PHE, Colindale) which is approved by the Cystic Fibrosis Trust
- Isolates of *P.aeruginosa, B.cepacia or M.abscessus* will be typed to identify possible cross-infection at an early stage
- Rates of acquisition of *P.aeruginosa , B.cepacia*, multi-resistant organisms and *M.abscessus* in children attending the cystic fibrosis clinic will be continually monitored and annually reviewed

10.3 Open Access and Ward 19 investigations

The cystic fibrosis team must ensure patients are given appropriate appointment dates and times to prevent cross infection. All members of the multi-disiplinary team are responsible for ensuring cystic fibrosis patients are appropriately segregated in cubicles while attending Ward 19. Cleaning of consulting rooms and equipment must be carried out as per Infection Prevention and Control Manual by all members of the team.

Note: For M abs patients
M abs patients will be provided with single patient use equipment, this should be used where possible. Any rooms or equipment which is not single use, used by patients with an M abs status must be thoroughly cleaned with a chloride based detergent such as Actichlor plus 1000ppm. Thereafter rooms and equipment should not come into contact with any other cystic fibrosis patient for at least 2 hours.

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CLASSIFICATION OF SEGREGATION STATUS

CODE	DEFINITION
1) **"N"**	**N**o *Pseudomonas aeruginosa* ever isolated from sputum
2) **"NI"**	**N**o *Pseudomonas aeruginosa* in current sputum cultures and clear of *Pseudomonas aeruginosa* for more than 6 months. Has had **I**ntermittent isolates in past
3) **"N MROther**	As (1) but has had a **M**ulti**R**esistant Organism **Other** than *Pseudomonas aeruginosa*, *Burkholderia cepacia* or *Mycobacterium Abscessus* present in sputum within the past 6 months
4) **"NI MROther**	As (2) but has had **M**ulti**R**esistant Organism **Other** than *Pseudomonas aeruginosa* or *Burkholderia cepacia* present in sputum within the past 6 months
5) **"CI"**	**C**urrently has had *Pseudomonas aeruginosa* in sputum in past 6 months but cannot yet be classed as chronically colonised. Eradication of the organism is being attempted. May have had *Pseudomonas aeruginosa* present **I**ntermittently in the past.
6) "**CI*"**	Children who have recently been considered "clear" of P. aeruginosa but have again cultured positive within a short period of time. Treat as CI.
7) **"CIMR**"	**C**urrently has had a **M**ulti**R**esistant strain of *Pseudomonas aeruginosa* in sputum in past 6 months but cannot yet be classed as chronically colonised. Eradication of the organism is being attempted. May have had *Pseudomonas aeruginosa* **I**ntermittently present in the past.
8) **"CC"**	**C**urrently has had *Pseudomonas aeruginosa* in sputum in the past 6 months, with 3 or more isolates in the past year. **C**hronically colonised.
9) **"CCMR"**	**C**urrently and **C**hronically colonised with a **M**ulti**R**esistant strain of *Pseudomonas aeruginosa.*
10) **"CI MROther"**	**C**urrently has had *Pseudomonas aeruginosa* in sputum **I**ntermittently in past 6 months but cannot yet be classed as chronically colonised. Also has had a **M**ulti**R**esistant organism, **Other** than *Burkholderia cepacia* or *Micobacterium Abscessus*, present in sputum within the past 6 months.
11) **"CC MROther"**	**C**urrently and **C**hronically colonised with *Pseudomonas aeruginosa* and also has had a **M**ulti**R**esistant organism, **Other** than *Burkholderia cepacia*, or *Mycobacterium Abscessus* present in sputum within the past 6 months.
12) **"BC"**	Colonised with ***B**urkholderia **C**epacia* **NOTE: BC can prefix any other segregation status, segregate as BC**
13) **"M abs"**	Colonised with ***M**ycobacterium **abs**cessus* **NOTE: M abs can prefix any other segregation status, segregate as M abs**

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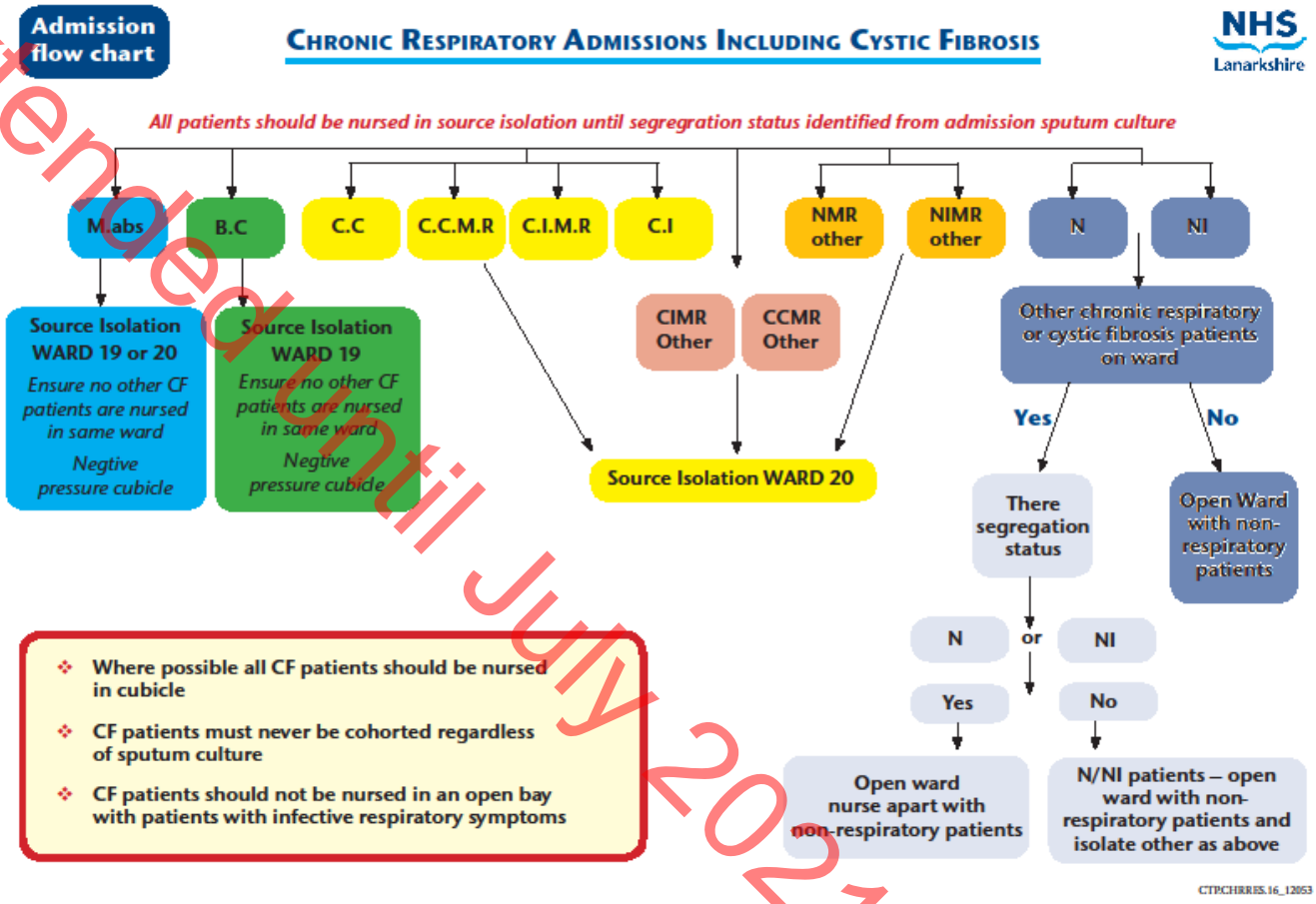

5. ROLES AND RESPONSIBILITIES

Managers have a responsibility to ensure this guideline is communicated to their team.

Employees have a responsibility to ensure they are familiar with corporate guidelines and procedures.

6. RESOURCE IMPLICATIONS

For the purpose of implementation of this guideline, Education/training/awareness – will be promoted by Paediatric CF team.

7. COMMUNICATION PLAN

CF Team will promote.

8. QUALITY IMPROVEMENT – Monitoring and Review

Reviewing and continuously improving.

9. EQUALITY AND DIVERSITY IMPACT ASSESSMENT

This meets NHS Lanarkshire's EDIA. A completed copy has been sent to hina.sheikh@lanarkshire.scot.nhs.uk ✓ (tick box)

10. Summary or Frequently Asked Questions (FAQs)

Please ensure you send a summary of your guideline or a frequently asked questions with your completed guideline

Nil yet

11. REFERENCES

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12. APPENDIX: Microorganisms

Staphylococcus aureus* (*S.aureus*) and *Haemophilus influenza (H.influenza)

- Are commonly found in the upper respiratory tract, throat and skin
- Usually colonisation with *Staphylococcus aureus* occurs in the first days and weeks of life
- May be transmitted via direct contact and via respiratory secretions not just from other children with cystic fibrosis
- May cause acute exacerbations of respiratory disease in cystic fibrosis
- Can be minimised by use of oral prophylactic antibiotics
- *Haemophilus influenzae* commonly colonises the respiratory tract in patients with cystic fibrosis and other patient groups

Conclusion: Patients who do NOT carry *Staphylococcus aureus* or *Haemophilus influenza* are at risk from those who do, but do not pose a significant risk to each other.

Pseudomonas aeruginosa (P.aeruginosa)

- May be anywhere in the home and hospital environment, particularly around sinks and other moist environments.
- May be transmitted between patients with cystic fibrosis and chronic respiratory conditions.
- Is associated with deterioration in respiratory function.
- Once acquired, repeated exposure is not documented to be associated with further deterioration in respiratory function. However, acquisition of a strain, which is resistant to many of the antibiotics normally used to control this organism, may limit options for antibiotic treatment.
- Frequently requires treatment with intravenous antibiotics.
- May cause disease in other patient groups, e.g. those with burns and the immunocompromised
- If present in wounds, should not pose a cross-infection risk if the wound is covered.

Conclusion: Patients who carry *Pseudomonas aeruginosa* pose a risk to those who do not carry it, and pose a significant risk to each other if a multi-resistant strain is carried.

Burkholderia cepacia (B.cepacia)

- Is naturally found in soil around plant roots, rivers and lake sediments.
- Is transmitted between patients with cystic fibrosis, mainly through contact or contact with respiratory secretions.
- Is associated with deterioration in respiratory function. In up to one third of cases, deterioration may occur acutely due to pneumonia (“cepacia syndrome”). Such cases have been associated with the acquisition of a particular strain of *B. cepacia*.
- Should be viewed as a group of related species - it is possible to be infected serially with more than one species - raising concerns about additive respiratory damage.
- Requires intravenous antibiotics for treatment
- Rarely causes disease in patient groups other than those with cystic fibrosis
- If present anywhere in the respiratory tract in a patient who does not have CF, that patient must be nursed in source isolation on a different ward to CF patients.

Conclusion: Because several genomovars (species) exist, patients with *B.cepacia* pose a risk to children with cystic fibrosis who do not carry the organism and also those who do.

Mycobacterium abscessus (M.abscessus)

- The mode of transmission of *Mycobacterium abscessus* is yet to be confirmed. Similarly, it is unknown how long is survives on objects and in the environment. This subject is topical and research is ongoing.
- It is associated with accelerated, progressive, deterioration in respiratory function and is currently a contraindication to lung transplantation.
- It is possible to be infected serially with more than one strain - raising concerns about additive respiratory damage.
- It is a resistant micro-organism; intravenous antibiotic treatment regimes are intensive and outcomes for eradication are poor.
- It rarely causes disease in patient groups other than those with cystic fibrosis.
- If present anywhere in the respiratory tract in a patient who does not have CF, that patient must be nursed in source isolation on a different ward to CF patients.

Conclusion: Because different genomovars (species) exist, patients with *Mycobacterium abscessus* pose a risk to children with cystic fibrosis who do not carry the organism and also those who do.