Infection Management and Prevention Service

Meeting the challenge of emerging pathogens in children with cystic fibrosis

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Introduction

Emerging pathogens associated with deterioration in health present infection control challenges, particularly in the paediatric setting as children play, socialise and attend school. Their tendency to have close physical contact with carers and play mates increases the risk of transmission[1]. Children with Cystic Fibrosis (CF) are at particular risk of colonisation or infection with pathogens due to their lung physiology.

Background

Mycobacterium abscessus is a multidrug-resistant non-tuberculous mycobacterium found in water and soil. Infection with this emerging pathogen in people with CF is often associated with a decline in clinical condition. This organism can be difficult to treat, requiring long-term antibiotics. Recent studies have identified transmission of *M. abscessus* in the healthcare setting, despite conventional cross-infection prevention measures[2].

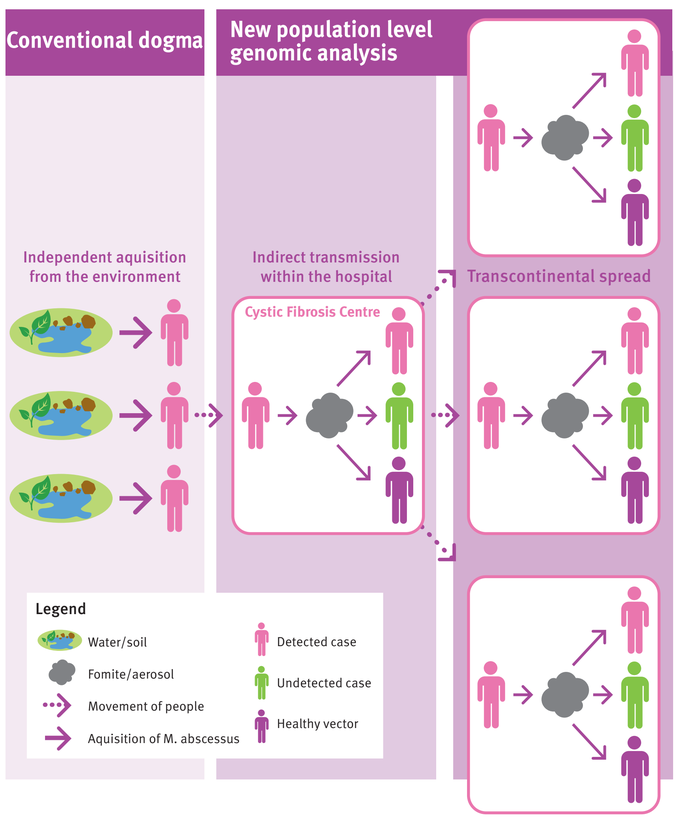

Figure 1 (above) illustrates the transmission of M. abscessus[3]

The problem

Although some literature has been published, there is no consensus on best practice to prevent transmission of *M. abscessus* in people with CF. Given the transmission risk and potential adverse outcomes, strategies were developed by Children's Health Queensland (CHQ) to protect all children with CF.

The solution

Some simple strategies required minimal negotiation, such as scheduling of outpatient clinics to avoid patient overlap and allowing post-clinic cleaning. Other measures were more complex. For example the use of the operating suite, medical imaging, and therapy rooms were complex because of the concurrent use by other "at risk" patients.

Existing transmission based precautions models such as contact and droplet precautions did not provide a good fit, therefore, the following new framework of precautions was customised for the CF patient cohort.

"Pink precautions" were divided into two levels:

1. **Pink precautions level one** comprised all children with CF
2. **Pink precautions level two** were specifically for those children with CF who also had infection or colonisation with the pathogens: *M. abscessus* or *Burkholeria cepacia*.

Pink precautions level 1:

- Door must be closed (imperative)
- Wear a surgical mask on entering the hospital and whenever outside their inpatient room, consultation room or treatment room such as the physiotherapy gym
- Respiratory hygiene stations were installed at hospital entrances with adult and child size masks provided to assist with this
- Staff to wear an apron for minimal patient/environment contact or a long sleeved gown for extensive patient/ environment contact
- Single room with own bathroom preferred. Do not room with other patients with CF, patients with: multi-resistant organisms; burns; respiratory disease; infections (chronic or acute) or oncology and immunodeficient patients
- Siblings living in the same household may room together with parental consent and following discussion with the CF team
- May visit entertainment, play, school and pet areas providing no other children with CF are present in the same room at the same time. Equipment and furniture used by the child must be cleaned with a disinfectant wipe after use
- Do not participate in hospital based planting and gardening activities
- All toys should be single patient use or cleaned and disinfected after use/after patient discharge
- Use sodium hypochlorite 1,000 ppm (bleach) to disinfect the patient environment on discharge.

Pink precautions level 2 – in addition to pink precautions level 1:

- Negative pressure single room preferred but not essential (due to higher rates of air exchange)
- Single room with own bathroom essential
- Not permitted to visit entertainment, play, school and pet areas
- May attend the gym if scheduled for the last session of the day. To be followed by disinfecting with sodium hypochlorite 1,000 ppm (bleach).

Implementation challenges

New terminology and restrictions on the children with CF posed a challenge. Extensive patient, family, carer and staff consultation and education was required. Patient and family information sheets, a procedure and fact sheet for staff, face to face education and ongoing troubleshooting have assisted.

Further questions and challenges

What disinfection is most suitable for environmental decontamination following CF patient discharge? (Consider staff and patient safety, ease of use, expense).

What level of air exchange is required in each room after each CF patient discharge to enhance patient safety?

Conclusion

Emerging pathogens present a challenge for healthcare providers. These challenges are likely to become increasing considerations in all patient groups, particularly with the evolution of resistant organisms, survival of high risk patient groups, increasing demand in the use of health service infrastructure, and globalisation.

Responding to risks such as emerging pathogens presents a challenge for infection prevention and control. Research and development of best practice models will assist in addressing these risks and enhancing patient safety and quality.

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