**8. Physiotherapy**

### An investigation into microbial contamination of non-invasive ventilation (NIV) devices used in adults with cystic fibrosis (CF)

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**Background:** Data for potential cross-infection risk of non-invasive ventilation (NIV) use is limited. Our previous practice involved internal ethylene oxide (ETO) sterilisation of NIV devices after use by CF adults with internal airway infection e.g., *Burkholderia cepacia* complex (BCC) or if outlet bacterial/viral filter use not feasible (if integral humidifier used). Changes in Trust sterilisation protocol necessitated practice review.

**Objective:** To investigate levels of microbial contamination of patient environment and NIV devices.

**Method:** Settle plates were placed and air sampling performed during airway clearance in 2 patients, 1 *Pseudomonas aeruginosa* (PaA) and 1 BCC infected. 7 NIV devices (VPAP III and III/V IV ST, BiPAP Harmony S/T) used by PaA or BCC infected patients were swabbed in a controlled environment at 7 internal/external sites, 5 devices pre- and 2 post-ETO sterilisation.

**Results:** Environmental flora (>300 colonies) were cultured from 2 air sample plates; settle plates had minimal growth (<11 colonies). Most swabs had no/minimal growth (0–4 colonies). Exceptions: inlet filter housing of 1 device (pre-ETO); inlet filter of another (post-ETO) which both grew >8 colonies of environmental flora. No common CF pathogens were isolated.

**Conclusion:** This small study shows no evidence of significant NIV device contamination, even without ETO sterilisation. Our centre has now ceased practice of ETO sterilisation but uses separate devices for BCC infected patients. We now always: use single patient use circuits with bacterial/viral filters (and separate single use humidifiers); replace inlet filters and continue to surface clean devices between patients.

### Effectiveness of universal tubing at generating positive expiratory pressure in children: a pilot study

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**Background:** The physiological and clinical effects of Positive Expiratory Pressure (PEP) have been well documented and are widely used for the therapeutic treatment of respiratory conditions. The pressure delivered using Bubble PEP with tubing of a small diameter has been suggested to be greater than the recommended levels. (Mestriner et al. 2009). The aim the pilot was to determine the effects of hospital suction tubing, with variable diameter, to deliver therapeutic pressures in the treatment of Cystic Fibrosis (CF) children using Bubble PEP. We hypothesised that the tubing would deliver pressures higher than the recommended levels to recruit collateral ventilation.

**Methods:** This experimental in vivo study focused on CF children (N = 15) who use Bubble PEP as part of their routine chest clearance. Bubble PEP was set up using 1 litre bottles of water at a water level of 10cms. Using Pennine healthcare 5mm diameter non conductive link tubing, cut to a total length of 80cms. The diameter of the tubing design varies between 5–10 mm. A ‘Y’ connector attached the Druck DPI 700(IS) manometer.

**Conclusion:** With the hospital-based bubble PEP set-up we found that 14 out of the 15 (93%) children achieved peak pressures within the recommended therapeutic range of 10–25 cms of water pressure. All of the children achieved the minimum therapeutic pressures, however, one child exceeded these in all three attempts (see poster table). The average pressure generated by the children was 21 cms of water pressure. The link tubing delivered appropriate therapeutic pressure in children with CF who routinely use Bubble PEP. Future research may include widening the patient group to other respiratory conditions.

### When should lung function test be performed to evaluate the effects of an airway clearance therapy session in children and adults with cystic fibrosis?

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**Objectives:** Promoting airway clearance using chest physiotherapy remains a mainstay of treatment for patients with CF. The aim of the respiratory physiotherapy in patients with cystic fibrosis is to mobilize and to evacuate the major quantity of secretions to maintain or to improve the pulmonary function in order to slow down the progression of the disease and to have a better quality of life.

Spirometry is often the tool to evaluate the effects of airway clearance techniques. The aim of the study is to clarify at what time point after a treatment session spirometry should be performed in order to obtain a reliable result and to find out whether there are inter and intra-individual differences.

**Methods:** 24 patients with CF (16 adults and 8 children) with mean lung function FVC 70±30% and FEV1 61±30% of predicted were included. Each patient performed a spirometry before; immediately, 30 min, 1, 2 and 3 hrs after their physiotherapy session. All the patients were measure twice to identify intra-individual variation.

**Conclusions:** FEV1 and FVC in adults was statistically significant improved 30 min after physiotherapy (p < 0.0003 and p < 0.02). FEV1 and FVC in children were not statistically significant but tendency was better immediately after the session. The intra-individual variation for adults and children was not significant.

There was a tendency showing that performing the spirometry immediately after the session might be optimal in children and after 30 minutes in adults (statistically significant). Adults have a worse disease status with morphological changes, and a copious amount of sputum that may change the expectant time to perform spirometry.

### The tolerability of hypertonic saline in patients with cystic fibrosis

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Hypertonic saline is commonly used as a mucolytic agent in patients with cystic fibrosis (CF). Evidence shows small short term improvements in lung function and a reduction in the frequency of pulmonary exacerbations. Published studies have used conventional jet nebulisers, but in current practice high output nebulisers such as the e-flow and I-neb are more commonly used. There is little data regarding the use of these nebulisers with hypertonic saline.

**Aim:** to review current practice of administering hypertonic saline in the UK and to ascertain any tolerability issues.

**Method:** A questionnaire was e-mailed to 36 adult and paediatric tertiary CF centres in the UK. Questions related to the current use of hypertonic saline, types of nebulisers used and tolerability issues.

**Results:** The response rate was 53%. 95% of centres used hypertonic saline as a mucolytic agent, median number of patients per centre was 10 (1–100). All adult and 72% of paediatric centres used a bronchodilator pre dose. 88% of adult and 64% of paediatric centres measured lung function at 1st dose. Issues with tolerability were reported by 89% of centres. These included excess coughing, nausea, wheeze, sore throat and regular stopping during the nebulisation period. Nebulisers included the e-flow, I-neb, Pariboy and side stream, with many centres using several of these. 58% of centres felt that the choice of nebuliser affected tolerability. This was due to the higher output from the e-flow and I-neb.

**Conclusion:** High output nebulisers are beneficial as nebulisation time is reduced and efficacy may be improved but this needs to be balanced with tolerability issues. Further research is needed in this area.