CORRESPONDENCE

Bacterial colonization as a potential source of nosocomial respiratory infections in spirometers

To the Editor:

We read with interest the article by BURGOS *et al.* [1], which is a welcome addition to the literature on the potential problems of cross-infection of patients from respiratory testing equipment. Although few water-sealed spirometers are now used in the UK, the data provide valuable information on the potential types of microorganisms encountered during testing in patients without clinically apparent respiratory infection. We have two comments on this study.

Firstly, the method of sampling from both devices may not provide the true picture of contamination. It is likely that, by sampling from discrete areas using swabs, colonies of organisms may have been missed completely. An alternative method may be to wash the entire area under investigation with a broth solution and then to culture samples of this broth accordingly [2]. This may well have provided a better picture of overall contamination of the tubing and spirometer bell. In our study [2], we recovered 82% of organisms from the spirometer tubing, whereas in the study by BURGOS *et al.* [1] only 13% of organisms were recovered from the pneumotachograph system.

Secondly, BURGOS *et al.* [1] suggest that bacterial and antiviral filters may be a solution to preventing contamination of respiratory equipment, and readers may be lulled into thinking that this simple solution will solve cross-contamination problems. However, several studies have shown that, in practice, the filters currently available are not as efficient as expected. Although KIRK *et al.* [3] stated that the Pall Pf305 filter had a bacterial efficiency of 99.9%, this has subsequently been demonstrated to be incorrect both by ourselves [4] and by CLAYTON *et al.* [5] for the Pall and other filters. A more accurate figure is 66% efficiency [4]. The differences may be explained by the experimental methods used, in particular the assumptions made in calculating filter efficiency and in the flow rates at which testing took place. There are few studies that have used flow

rates comparable to the peak flow rates encountered in routine lung function testing. Much of the early bench testing used flow rates of 50–100 L·min⁻¹, which clearly do not reflect the conditions during actual measurements of peak expiratory flow (PEF) or forced vital capacity (FVC).

Would the authors be willing, therefore, to indicate how effective bacterial filters are in protecting respiratory equipment from contamination and patients from possible cross-infection? In the light of our experience, we are cautious about the value of using filters routinely until a filter is produced for which convincing evidence of efficacy is provided.

References

1. Burgos F, Torres A, Gonzalez J, Puig de la Bellacasa J, Rodriguez-Roisin R, Roca J. Bacterial colonization as a potential source of nosocomial respiratory infections in two types of spirometer. *Eur Respir J* 1996; 9: 2612–2617.
2. Leeming JP, Kendrick AH, Pryce-Roberts D, Smith D, Smith EC. Use of filters for the control of cross-infection during pulmonary function testing. *J Hosp Infect* 1993; 23: 245–246.
3. Kirk YL, Kendall K, Ashworth HA, Hunter PR. Laboratory evaluation of a filter for the control of cross-infection during pulmonary function testing. *J Hosp Infect* 1992; 20: 193–198.
4. Leeming JP, Pryce-Roberts D, Kendrick AH, Smith EC. The efficiency of filters used in respiratory function apparatus. *J Hosp Infect* 1995; 31: 205–210.
5. Clayton N, Collins TA, Egan J, Isalska BS, Stanbridge TN, Woodcock A. Evaluation of effectiveness of four bacterial filters during pulmonary function testing. *Thorax* 1995; 50 (Suppl. 2): A65.

A.H. Kendrick*, E.C. Smith, J.P. Leeming⁺**

*Respiratory Dept, Bristol Royal Infirmary, **University Dept of Medicine, and ⁺Bristol Public Health Laboratory, Bristol, UK.

REPLY

From the authors:

Thank you for your letter and your interesting comments regarding our study. Our investigation was mainly designed to examine the potential risk of spirometers in the transmission of respiratory infections, and we could not find any relationship in a series of patients undergoing spirometry.

In relation to the sampling method, we took sam-

ples of three and four different parts of the equipment (water-sealed and pneumotachograph, respectively). Samples were taken daily before and after routine pulmonary function testing throughout a 5 day period [1]. The decision to sample specific parts of the equipment was taken in relation to the frequency of water condensation and the potential bacterial contamination. It is clear that your suggested method [2] provides a better picture of the contamination, but it is difficult to perform in sequential studies. With regard to the difference between the 13% colonization in our recovered samples

versus the 82% to which you refer [2], this could be explained by the difference between wedge-bellows spirometers that condense water inside the tubes, compared to our pneumotachograph system, that is heated to avoid such condensation. On the other hand, in our water-sealed spirometer, microorganisms were isolated at a similar rate (90%) compared to the study of LEEMING *et al.* [2].

In your letter, you mention that we suggested that bacterial and antiviral filters may prevent contamination. In fact this was not the suggestion of our discussion, and we apologize if this was not made clear. We tried to explain in the discussion that some authors have suggested that the use of filters could prevent bacterial contamination. We agree with KENDRICK and co-workers that the utility of these filters to protect patients from possible cross-contamination has not been clearly demonstrated. We believe that rather than using filters it is desirable to implement more efficient daily hygiene measures for the maintenance of equipment.

References

1. Burgos F, Torres A, Gonzalez J, Puig de la Bellacasa J, Rodriguez-Roisin R, Roca J. Bacterial colonization as a potential source of nosocomial respiratory infections in two types of spirometer. *Eur Respir J* 1996; 9: 2612–2617.
2. Leeming JP, Kendrick AH, Pryce-Roberts D, Smith D, Smith EC. Use of filters for the control of cross-infection during pulmonary function testing. *J Hosp Infect* 1993; 23: 245–246.

F. Burgos, A. Torres, J. Gonzalez, J. Puig de la Bellacasa, R. Rodriguez-Roisin, J. Roca.

Servei de Pneumologia i Al·lèrgia Respiratoria Hospital Clínic, Dep. de Medicina, Universitat de Barcelona, Spain.