into the dental chair unit and, secondly, suck back of patient's saliva into the line due to lack of anti-retraction valves. Even a small amount of *Pseudomonas aeruginosa* in a municipal water system can contribute to the dental chair unit contamination problem because dental chair units provide a different environment with small bores, narrow lumens and periods of stagnant water. However, if the water is well maintained according to current hygiene guidelines, the prevalence of *Pseudomonas aeruginosa* in the public water supply is extremely low [6]. As *Pseudomonas aeruginosa* can be recovered from the oral cavity of ~4% of healthy individuals [7], it is therefore possible that some of these bacteria are aspirated into the dental chair unit waterlines through a defective check valve and are able to colonise in the waterlines. As the suction system hoses and pipe work are frequently wet, they provide an environment that is conducive to the growth and proliferation of biofilms which adhere to the inner surfaces of the lines. This biofilm protects the bacteria both from being washed away by the water flow and from many types of antimicrobial water treatment [8].

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STATEMENT OF INTEREST

None declared.

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Impact of poor dental health on pneumonia

To the Editors:

Pneumonia imposes a significant burden on a population, not only in terms of morbidity and mortality but also economically [1–3]. Direct costs generally increase from community-acquired pneumonia (CAP; US$25,218), healthcare-associated pneumonia (HCAP; US$27,647), hospital-acquired pneumonia (HAP; US$65,292) to ventilator-associated pneumonia (US$150,841) and reflect the level of care and length of hospitalisation [1]. The prevalence of elderly patients with pneumonia admitted to hospital is rising and it has been suggested that greater effort is required to vaccinate these individuals and identify other comorbid factors [4]. Even amongst employed patients with CAP, the majority of direct costs (59%) are attributable to a small proportion of individuals (10%) who require hospitalisation [2]. COLICE *et al.* [3] estimated that even amongst working individuals, the annual cost of CAP in the USA amounted to US$12.2 billion in 2004.

It was therefore with great interest that we read the study by ALMIRALL *et al.* [5], which attempted to identify new modifiable risk factors for CAP in a general population. Uniquely for a study of CAP, the authors chose to look at indices of dental health status and found that a visit to the dentist in the previous month was protective, while dental dysaesthesia or wearing a dental prosthesis were risk factors for CAP. These associations existed even though previously identified risk factors in larger populations of CAP, such as the use of acid-suppressing drugs, were not apparent [6].

There is an accumulating body of data that implicates dental plaque as a reservoir for pulmonary infection in critical care and institutionalised elderly patients [7], and that even instituting a programme of dental hygiene can reduce episodes of HCAP [8]. The study by ALMIRALL *et al.* [5] has important implications for healthcare resources, particularly in the UK where there have been numerous media reports detailing patients' difficulty in accessing dental care. THOMAS *et al.* [9] recently analysed data on all hospital admissions in England for dental abscess drainage and found a doubling of admissions between 1998–1999 and 2005–2006. Concurrently, the number of patients registered with a National Health Service (NHS) dentist has fallen by 6 million between 1994 and 2004; more than a fifth of patients in a recent survey had declined dental treatment because of cost [9]. Provision of NHS dentists compares poorly with other European countries and is unevenly distributed, such that a quarter of the population of England and Wales are supplied with <0.3 NHS dentists per

1,000 people [10]. Indeed, hospital admissions for drainage of dental abscesses showed the greatest increase in socially disadvantaged areas [11].

We would suggest that poor access to dental care, particularly in deprived areas of the UK where other risk factors for community acquired pneumonia coexist, is likely to increase the burden of pneumonia and place further pressure on limited healthcare resources. In addition, dental services within hospitals and long-term care institutions need to improve as they are woefully inadequate in their current form and provide little more than a service to extract loose or severely decayed teeth. Investment in General Dental Services in the UK amounts to <2% of the NHS budget, even in our own institution the funds for the entire Dental School is less than the Critical Care Unit. Oral health needs to be established as a priority not only in the community but also for hospital patients or institutionalised adults in much the same way as deep-vein thrombosis prophylaxis. Investment in promotion of oral hygiene is likely to prove an extremely cost-effective long-term measure.

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STATEMENT OF INTEREST

A statement of interest for M.A. Lewis can be found at www.erj.ersjournals.com/misc/statements.shtml

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Reproducibility of exhaled breath condensate markers

To the Editors:

The letter by Rosias *et al.* [1] highlights that individual biomarkers in exhaled breath condensate (EBC) require specific methods for optimal collection. Denominators need to be determined (such as time, total breath collection, protein, electrolytes, conductivity or other more stable markers) and, critically, researchers should consider collecting whole or global EBC, which may enhance reproducibility.

To determine the reproducibility of simple ions and more complex molecules, such as proteins and eicosanoids in different disease categories, we used the EcoScreen® (Erich Jaeger GmbH, Hochberg, Germany) to study the within-day variability of EBC biomarkers from 11 subjects with asbestosis, 14 with pulmonary fibrosis (PF) and 22 healthy normal subjects (tables 1 and 2).

Two EBC samples, obtained over exactly 10 min, were collected on the same day from each subject at 09:00 h and 13:00 h. The mean±SD EBC volumes collected at 09:00 h and 13:00 h were similar (1,831±498 *versus* 1,831±586 μL). The coefficient of variation (CV) for within-day EBC volume for all subjects was 14.8%. The mean CV for within-day EBC volume was increased at 23.0% in subjects with PF, possibly due to their more severe, restrictive lung function. Patients with PF had significantly reduced forced expiratory volume in one second (% predicted) and forced vital capacity (% pred) compared with normal subjects (73.2±17.7 *versus* 97.1±14.7 and 72.9±17.5 *versus* 98.7±13.1 at 09:00 h and 13:00 h, respectively; both $p<0.0001$, ANOVA and multiple comparison *post hoc* tests) and those with asbestosis (73.2±17.7 *versus* 83.2±14.2 ($p=0.14$) and 72.9±17.5 *versus* 85.3±16.8 ($p=0.09$), respectively).