



Recovery from community acquired pneumonia: the view from the top of the iceberg

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Recovery from pneumonia is much more complicated than the paper in this issue of the *ERJ* suggests
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A very common question patients with pneumonia ask is, “When will I be better?” My usual response is a mixture of educated guess and anecdotal experience: “Probably not for 6–8 weeks at least – and it may be longer”, mentally reducing that time frame for younger patients and increasing it for the elderly. Given how fundamentally important this question is for our patients, the study in this issue of the journal by WOOTTON *et al.* [1] is particularly welcome. What I am not sure of is whether the study conducted has really answered the question.

WOOTTON *et al.* [1] used serial recording of the community-acquired pneumonia (CAP) symptom questionnaire (CAP-sym) [2] to estimate the average time to recovery of symptoms in 169 patients. The major conclusions of the study are that most patients will return to their pre-pneumonia baseline, with 97% of symptoms resolving within 10 days (mean 9.8 days, 95% CI 7.3–12.2 days). The CAP-sym measures 18 symptoms including coughing, chest pains, shortness of breath and fatigue [2].

How then do we reconcile an apparent resolution of symptoms in an average of 10 days with substantial evidence that survivors of CAP have significantly worse health outcomes over the subsequent months to years? [3–11]. Are the findings of WOOTTON *et al.* [1] generally representative of patients with CAP elsewhere? Is the “new” pathology driving the adverse outcomes truly unrelated to the speed and completeness of resolution of pneumonia, or are we not measuring resolution properly?

There are clues in other studies, many with disparate results. MARRIE *et al.* [12] studied 535 patients and found that at 6 weeks, 64% of patients still reported at least one CAP-related symptom. EL MOUSSAOUI *et al.* [13] studied 102 adults with mild-to-moderate pneumonia (pneumonia severity index grade I–III [14]) using a different symptom questionnaire to the CAP-sym and found that although respiratory symptoms typically resolved within 14 days, symptoms of well-being resolved much more slowly, taking up to 6 months. Furthermore the persistence of symptoms beyond 28 days was attributed to underlying comorbid conditions, not the pneumonia itself. METLAY *et al.* [15] studied 576 patients with CAP and found that over 50% of patients still reported fatigue at 90 days. BRUNS *et al.* [16] compared the resolution of radiological findings, clinical findings and patient symptoms. They found that by day 28, while radiology had resolved in 68% of patients and clinical signs had resolved in 89%, symptoms were completely resolved in only 42% of patients. Not surprisingly, it appears that patients who have more severe initial symptoms take longer to recover [17].

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Age is clearly a critical factor in the speed and completeness of recovery from CAP. EL SOLH *et al.* [18] studied 301 patients with CAP and a mean age of 74 years. They found that over one-third of patients had impaired physical function at discharge, with 11% still being impaired at 3 months. Premorbid cognitive decline and comorbidities were key predictors of impaired functional recovery. Radiological resolution is also greatly prolonged in older age groups, with 40% of patients aged 70 years or older having incomplete resolution at 6 weeks, and 15% at 12 weeks [19]. The presence of chronic obstructive pulmonary disease (COPD) in particular appears to be associated with longer recovery times from pneumonia [20], and smokers have a slower resolution of radiological changes than nonsmokers [21].

It is also possible that the infecting pathogen may play a role in determining the speed of recovery. BRANDENBURG *et al.* [22] found that in 158 patients with pneumococcal pneumonia, symptoms frequently persisted at 30 days, with more than 50% of patients still experiencing cough and dyspnoea and 48% still producing sputum at that time point. In contrast, the resolution of symptoms from CAP due to mycoplasma infection appears to be faster, although one in eight patients still has symptoms at 42 days [23].

How do we interpret the very significant range of results in these studies? Clearly fever resolves quite quickly, while it is unusual for cough and pleuritic pain to persist for longer than 2 weeks. Sputum production and dyspnoea (at rest or during activities of daily living) also usually resolve within 2 weeks. What is much more difficult to establish, but fundamentally much more important, is when patients truly return to their baseline health status and their former physical and cognitive function. It is likely that different findings in the studies described above are due to differences in the patients' age range and prior comorbid disease status, and in the wording and style of the questionnaire used. Differences in cultural and social acceptance of chronic symptoms may also be a factor [24–26].

While not established, it is reasonable to hypothesise that those who take longest to recover are those at greatest risk of long-term adverse health outcomes. Even small elevations of systemic inflammatory markers such as C-reactive protein have been associated with substantial increases in subsequent cardiac events [27, 28], and patients with the highest level of inflammatory markers at discharge from hospital with CAP have the worst 1-year outcomes [29]. The persistence of radiological infiltrates for months in some patients suggests a continued low-level inflammatory response. As has been established with exacerbations of COPD [30], some patients may not ever recover to their baseline function after an episode of CAP. Reduced physical activity is associated with higher cardiovascular disease risk [31], while increased physical activity has a systemic anti-inflammatory effect [32]. Any impairment of exercise function due to incomplete recovery from CAP, even if patients are not aware of it, may be critical.

To really answer the question of “When will I be better?”, we need much more detailed studies of CAP survivors using highly objective tools. This will certainly include actigraphy to track physical activity, serial neurocognitive assessment and some measure of systemic inflammatory response. Since some CAP survivors continue to have worse health outcomes than population controls for years afterwards, for some the truthful answer may be “Never”. However, being able to accurately determine a “healthy” recovery profile from an “unhealthy” one will be a significant leap forward in designing, testing and implementing interventions to improve the long-term health outcomes of patients who have had pneumonia.

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