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EDITORIALS

The debated problem of community-acquired pneumonia diagnosis: many guidelines, any guideline?

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See linked articles by Snijders *et al*. on pg 400 and Christensen *et al*. on pg 454

The term community-acquired pneumonia (CAP) refers to a common lower respiratory infection diagnosed by a combination of some or all of the following: clinical signs and symptoms, an infiltrate seen on chest radiography, and abnormal laboratory values. It occurs outside of the hospital, or within 48 hours after hospital admission in a patient who has not been recently hospitalised and is not living in a long-term care facility. Pneumonia acquired in hospital or while living in an inpatient setting is referred to as "nosocomial pneumonia". The clinical symptoms and signs of CAP include cough (with or without sputum production), fever, chills, tachypnoea, tachycardia, pleuritic chest pain, dyspnoea, altered mental status, dehydration, and hemoptysis; clinical findings will include a temperature greater than 37.8°C, heart rate over 100/min, respiratory rate greater than 25/min, oxygen saturations in room air < 90%, rhonchi or focal rales on auscultation of the lungs, decreased breath sounds, and bronchophony.[1]

CAP is a major health problem worldwide and is associated with considerable morbidity, mortality and health care costs. However, although data are available from many prospective studies and national databases, it is difficult to determine the real clinical and economic impact of CAP for a number of reasons, the most common being that diagnostic certainty is usually only obtained in the hospital setting where (unlike the primary care setting) all diagnostic tools are readily available.

Therefore, to determine the burden of CAP affecting adults in North America and in Europe, two comprehensive literature reviews were conducted recently to examine the incidence, morbidity and mortality, aetiology, antibiotic resistance, and economic impact of the disease in these populations.[1,2] Both in the US and Europe, CAP is the most frequent cause of infection-related death. Its estimated incidence varies between countries and is dependent on age and gender, being higher in individuals aged ≥ 65 years and in men; therefore the incidence is expected to increase further as the average age of the population in the US and Europe increases. CAP is the fifth to ninth leading cause of death in developed countries, mainly among young children and elderly people, with mortality rates varying between 6.4% to 40% depending on the care setting (e.g. home, hospital, intensive care unit).[2] CAP accounts for more than $17 billion annually in the United States.[1] In Europe, pneumonia costs nearly €10.1 billion annually, with inpatient care accounting for €5.7 billion, outpatient care €0.5 billion, drugs €0.2 billion and the indirect cost of lost work days amounts to €3.6 billion.[2] CAP also has considerable effects on quality of life, with the time taken for patients to return to full activity ranging from 7 to 43 days.

Both in the US and Europe, *Streptococcus pneumoniae* continues to be the most frequently identified pathogen associated with CAP. Resistance to antibiotics is seen in all pathogens associated with CAP and is similar on both continents.[1,2] *Strep. pneumoniae* resistance to penicillin and macrolides is increasing, but whether this correlates with increased mortality is still uncertain.[3] Failure of first line antibiotic therapy is one of the causes of increasing treatment costs.[3]

The hospital admission rates for CAP vary between different studies, but on average are fairly low at about 25-30%.[1,2,4] Therefore, primary care clinicians have a key role in the diagnosis and management of these patients.[5] This key role has been absolutely reaffirmed by the study from Snijders *et al*.[6] published in this issue of the *PCRJ*. This interesting paper from the Netherlands is notable for the size of the study population (nearly 400,000) and the thoroughness of the research method. Between 2002 and 2009, the authors were able to study approximately 3,700 CAP episodes per year, of which 79% were managed solely in the primary care setting, showing clearly the contribution made by general practitioners (GPs) to the management of CAP.

The study from Snijders *et al*.[6] does have some limitations, the main one being (as declared by the authors) that the GP diagnosis of CAP was based on clinical symptoms and mostly not confirmed by the presence of infiltrate abnormalities on the chest x-ray or any laboratory findings. This highlights once again the ongoing debate regarding CAP diagnosis, and whether the GPs were seeing CAP or 'suspected CAP', a difference of not inconsiderable importance when trying to determine the real burden of the illness and the management strategies employed by national health services.

This debate is further highlighted by another study in this issue from Christensen *et al*.[7] Using a cross-sectional design, the authors investigated, at primary care level, the prevalence of presumed pneumonia in 2,698 patients with lower respiratory tract infection (LTRI) in two countries (Denmark and Spain) with different antibiotic prescribing rates. 47% of patients in Denmark were classified as having pneumonia, whereas in Spain this figure was 11%. In Spain, fever and a positive x-ray weighted significantly more in the diagnosis of pneumonia than in Denmark. Danish GPs, conversely, attached more importance to dyspnoea/polypnoea and CRP tests.

How accurate is an empiric diagnosis of CAP based on clinical assessment alone? A recent study of CAP diagnosis in 2,810 patients from 12 European countries shows that the majority of diagnoses of radiographic pneumonias were not suspected on clinical grounds by GPs.[8] In the primary care setting, and despite rigorous definitions of pneumonia which require the finding of a pulmonary infiltrate on a chest radiograph,[9] in patients with mild respiratory symptoms a chest radiograph will often not be ordered. This scenario is complicated further by the possibility that patients with bacterial "atypical" pneumonia can have a normal white cell count[10] (assuming a blood count is requested), few physical findings, and even negative chest x-rays in patients with dehydration or in the early stage of the disease.

Few population-based studies of CAP treated in the primary care setting have been undertaken. In a meta-analysis of the prognosis and outcomes of CAP, only six of the 127 studies included in the review were carried out in ambulatory cohorts with radiographic confirmation, and one of the conclusions was that future investigations should focus greater attention on studying ambulatory patients.[11] Despite the fact that primary care plays an important role in the management of CAP, as confirmed by Snijders *et al*.,[6] the potentially low diagnostic yield (20% of cases) at this level is surprising; this may be explained by the lack of availability of chest radiography so that many patients are referred to the hospital emergency department, as well as the tendency of patients to seek care directly from the hospital emergency service.[11]

Since 1993, a considerable number of guidelines for the management of CAP have been available in developed countries.[5,9,12-15] However, with one or two key exceptions,[5,12] these seem to be notable for their lack of relevance and friendliness to primary care. The guideline process, which first began in the US and Canada, has been implemented over time in numerous countries throughout the world, and now each geographic region or country has developed locally specific recommendations. The result is a lack of homogeneity between guidelines (e.g. are x-rays mandatory or not?) and actual contradictions (should we reserve the definition of CAP only to those LRTIs confirmed by chest x-ray, and have a diagnosis of 'suspcted CAP' for those diagnosed on clinical features alone?). It is also interesting to note that guidelines from different regions often interpret the same evidence base differently even though the bacteriology of CAP varies little from one region to another.[4]

However, the question remains: is it necessary to review the global consensus on CAP to improve our approach in order to reduce the comprehensive burden of the disease? Snijders and colleagues[6] have confirmed that GPs play a crucial role in the management of this condition. Christensen *et al*.[7] have confirmed different diagnostic approaches in different countries. In the interim, it is good practice to maximise the numbers of patients having vaccination against flu virus and pneumococcal pneumonia.

Conflicts of interest The authors declare that they have no conflicts of interest in relation to this article.

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Correct inhalation technique is critical in achieving good asthma control

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See linked article by Levy *et al*. on pg 406

The prevalence of asthma has been reported to range from 1 to 18% of the population in different countries.[1] This means that several hundred million patients with asthma rely on the efficacy of their inhalers to achieve asthma control. Undeniably, inhaled therapy remains the cornerstone of treatment for patients with asthma, and the main inhalation devices used are pressurised metered dose inhalers (pMDIs) and dry powder inhalers (DPIs).[2] Yet there are more than 200 different drug-inhaler combinations available in any medical formulary, and this causes immense confusion amongst prescribers, healthcare professionals and patients.

Published evidence shows that, when used correctly, there is little difference in clinical efficacy between different inhaler types.[3] However, several studies have reported that a high proportion of patients cannot use their inhalers (either pMDIs or DPIs) well enough to benefit from the treatment.[4,5] These numbers are even more depressing considering that between 40 to 85% of healthcare professionals, who should readily be able to teach patients how to use their inhalers correctly, do not seem to be able to perform that task properly – and doctors are the worst amongst all healthcare professionals.[6-8]

It has clearly been shown that failure to use inhalers correctly may result in poor asthma control,[8] increased cost,[9] and a greater risk to the patient from exposure to less well-tolerated alternative treatments. In a large cross-sectional study involving over 1600 asthma outpatients, the finding of just one critical error in inhalation technique, irrespective of the inhalation device (DPI or pMDI), was associated with increased emergency room visits, hospitalisation and oral medication prescription.[10]

In this issue of the *PCRJ*, Levy and co-workers[11] retrospectively evaluated pMDIs usage in a large cohort (nearly 4000) of UK primary care patients with asthma, and correlated patients' inhaler technique with the level of asthma control. Patients at British Thoracic Society (BTS) treatment steps 1, 2 and 3 had their asthma status reviewed through the Improving the Management of Patients Asthma and COPD Treatment (IMPACT) service, where specialist nurse advisors undertake asthma reviews in primary care according to protocols based on the UK BTS/SIGN National Asthma Guidelines.[12] Interestingly, part of the review involved evaluating pMDI inhaler technique objectively by using the Vitalograph Aerosol Inhalation Monitor,[13] a training device aimed at assessing three crucial steps needed for correct pMDI usage: slow inhalation flow (below 50 L/min); synchronisation between inhaler actuation and inhalation; and a 5 second breath-hold pause following inhalation.

The authors observed that patients who displayed significant errors when using pMDIs had higher risks of poor asthma control and more bursts of systemic corticosteroid prescriptions than those who operated pMDIs correctly.[11] Of note, patients who were using pMDIs in conjunction with spacers, or were using breath-actuated inhalers, had better asthma control than those using pMDIs alone. Synchronisation – i.e. achieving the correct inhalation flow following actuation – was the main step in the inhalation technique which most patients failed.

These findings should be interpreted in the context of the retrospective observational nature of the study. We do not know whether other reasons for poor disease control (e.g. co-morbidities, different treatment plans, different drug dosages) were more frequent in patients who misused their pMDI than those who used it correctly. In addition, the UK is rather atypical with respect to device prescription compared to the rest of Europe, where DPIs are the favoured inhalation device. In this current study, only 9% and 14% of patients, respectively, used their DPI as reliever, or maintenance, therapy. The investigators did not attempt to assess inhalation technique in the patients prescribed a DPI, nor did they relate DPI technique to asthma control. Certainly there is evidence to show that patients using DPIs may experience more critical errors than those using pMDIs.[10] Despite these limitations, the results of the study by Levy *et al*. are important: they confirm the relationship between inhaler misuse and poor asthma control, and reinforce the notion of the importance of patients training for efficient inhalation drug delivery.[11]

Patients' ability to handle inhalers correctly is a crucial issue for the choice of the most appropriate inhaler device for a given patient. Adherence to therapy is likely to be influenced by patients' attitudes and their experience in using the device, and if the patient feels that