

The hospital management of community-acquired pneumonia

Recommendations of the British Thoracic Society

Prepared on behalf of the Council of The British Thoracic Society by:

B. D. W. HARRISON, MB, FRCP,* B. M. FARR, MD, MSc
C. K. CONNOLLY, MB, FRCP, J. T. MACFARLANE, BM, MRCP(UK),
J. B. SELKON, MB, FRCPath, C. L. R. BARTLETT, MB, FFCM

The Research Committee of the British Thoracic Society has recently published the results of a multicentre study of 453 patients admitted to hospital with community-acquired pneumonia [1]. Pneumonia remains an important cause of morbidity with an incidence of 4.7 per 1,000 population aged 15-79 years [2]. Up to 20 per cent of patients may need hospital admission [2]. Despite modern antibiotic availability, pneumonia is still an important cause of mortality and this is not just in the elderly. In patients under 65 years of age, pneumonia accounts for as many deaths as all other infectious diseases combined [3], and in patients in the 5-49 year age group, pneumonia accounts for between three and four times as many deaths as asthma [4]. Most patients admitted to hospital with pneumonia are looked after by general physicians, and pneumonia admissions increase during the winter months. The British Thoracic Society has produced the following recommendations that are based on the results of their new study [1] and on three other recent hospital-based British studies [5-7]. The recommendations do not apply to pneumonia acquired in hospital, nor to pneumonia in immunocompromised patients.

Recommendations

1. Only a few types of pathogen account for most cases of community-acquired pneumonia. The commonest by far is *Streptococcus pneumoniae*, followed by *Mycoplasma pneumoniae* (in epidemics every three to five years) and influenza virus. These three account for over half the cases. Other organisms, including *Haemophilus influenzae*, *Staphylococcus aureus*, and *Legionella pneumophila* are less common. Gram negative bacteria are rarely the primary pathogen. Microbial aetiology is not established in around one third of infections, but there is evidence to suggest that a large proportion of these are in fact pneumococcal. Antibiotic treatment active against the most likely organisms should be started on diagnosis.

Address for correspondence: Dr B. D. W. Harrison, Department of Respiratory Medicine, West Norwich Hospital, Bowthorpe Road, Norwich, Norfolk NR2 3TU.

Where practicable, specimens for microbiological culture should be obtained before treatment. Remembering that about one third of patients produce no sputum in the acute phase of pneumonia, antibiotic treatment should not be delayed in such patients until sputum is obtained, nor should it be delayed until the next 'drug round.'

2. Since *S. pneumoniae* remains the commonest cause of community-acquired pneumonia, the antibiotic chosen should always be active against this organism.

3. During outbreaks of mycoplasma infection, or at other times when mycoplasma pneumonia is suspected, initial therapy should also cover *M. pneumoniae*. During outbreaks this organism is a common cause of hospital admission and can prove fatal.

4. The combination of Influenza A virus and *S. aureus* infection is often lethal. During influenza epidemics, or in very sick patients, or at other times when staphylococcal pneumonia is suspected (eg cavitating pneumonia) an anti-staphylococcal antibiotic should be given in addition to antibiotics active against the other more common organisms.

5. *L. pneumophila*, though uncommon, can cause severe community-acquired pneumonia especially in localised outbreaks, and is difficult to diagnose early. In seriously ill patients antibiotics active against this organism should be started early.

6. Oxygen therapy adequate to maintain a PaO₂ above 8 kPa (60 mmHg) and careful attention to fluid balance, correcting any dehydration but avoiding volume overload, are essential in seriously ill patients.

7. *Predicting the outcome of pneumonia.* There are several useful pointers to a severe infection with a poor prognosis. Death is much commoner in patients over 60 years old, but the risk is increased at any age in patients with any of the features listed in Table 1.

8. *Microbiological investigations.* Sputum Gram stain to identify pneumococci and staphylococci, sputum and blood culture and routine acute and convalescent serology are valuable diagnostic tests. Sputum, urine and blood examination for pneumococcal antigen, and serum for mycoplasma specific IgM, are also valuable tests, and diagnostic results can be quickly available.

In hospital, blood for culture should be obtained in all patients as soon as possible and before the first dose of antibiotic(s); as should sputum if it is available. Other specimens should be obtained as soon as practicable. Apart from the specimens for culture, the other investigations are probably not required routinely in the patient who is not very ill and who responds appropriately to therapy. They may, however, be invaluable in patients who are very sick, or who deteriorate or fail to respond to treatment. It is therefore important to obtain all specimens and, if they are not to be tested immediately, to store them in case they are needed later.

In the very sick patient more invasive investigations, eg transtracheal puncture, fiberoptic bronchoscopy or percutaneous lung puncture, should be considered to obtain lower respiratory tract specimens for microbiology. These investigations require specialist expertise. Which technique is used depends on the local availability of the necessary skills.

Overall, the value of good liaison between the clinical and microbiological laboratory staff cannot be exaggerated.

9. Therapy

(a) *Antibiotics.* In the moderately ill patient, amoxycillin orally, ampicillin orally or by injection, or benzylpenicillin by injection should be started immediately to cover *S. pneumoniae*. Benzylpenicillin by injection is most appropriate where specific therapy against the pneumococcus is required. In patients allergic to penicillin, erythromycin should be given orally or by injection. Where mycoplasma infection is suspected, erythromycin by mouth or by injection or oral tetracycline should be added. When staphylococcal pneumonia is suspected injected flucloxacillin should be included.

Seriously ill patients identified by one or more of the features listed in Table 1 require intravenous therapy with a combination of high dose penicillin or ampicillin, erythromycin and flucloxacillin. This combination will cover all the organisms mentioned above and also *L. pneumophila*. In the rare patients where Gram negative organisms are suspected, an aminoglycoside (eg gentamicin or netilmicin) or a broad spectrum cephalosporin (cefuroxime or ceftazidime) should be added. With this rare exception cephalosporins and cotrimoxazole are not indicated in the initial treatment of community-acquired pneumonia.

(b) *Intensive care and intermittent positive pressure ventilation (IPPV).* Seriously ill patients identified by the presence of one or more of the features listed in Table 1 should be admitted to hospital and when in hospital should be observed carefully and frequently. They should be looked

after by a medical team aware of the current epidemiology of infectious agents* with the necessary expertise to handle such patients, and with access to an intensive therapy unit (ITU). Transfer to the ITU should be considered early for a sick patient, or for a patient whose condition is deteriorating despite treatment. At this stage antibiotic therapy should be reviewed and should certainly cover all the organisms listed above. Further invasive investigations should be considered if the microbiological diagnosis remains in doubt. IPPV should be considered early. Confusion, progressive tiredness and inadequate cough suggest the need for ventilatory support. Progressive hypoxia and persistent hypoxia below 8 kPa (60 mmHg) in a previously fit person, despite an inspired oxygen concentration of 60 per cent by face mask, are indications for IPPV. IPPV and intensive care may need to be continued for several weeks; around two thirds of such patients recover completely.

10. *Hospital course and follow-up.* Most patients admitted to hospital with community-acquired pneumonia spend between one and two weeks as an inpatient. Six weeks following admission almost 80 per cent of survivors are fit for normal activities. The chest radiograph at the point of discharge from hospital may well not have returned to normal, and a chest radiograph at this time may therefore not be necessary in a patient whose condition is improving or giving no cause for concern. During the convalescent period radiographic clearing lags considerably behind clinical recovery, and in patients over 30 years old may not be seen until more than six weeks after the onset. Decisions about the need for bronchoscopy where carcinoma is suspected must therefore be made before complete radiographic resolution can be expected.

Table 1. Features associated with increased mortality in community-acquired pneumonia.

Patient over 60 years old

Signs on admission

High respiratory rate (> 30 per minute)†
 Low diastolic blood pressure (< 60 mmHg)†
 Confusion

Investigations during admission

Raised blood urea (> 7 mmol/l)†
 Low arterial oxygen tension (< 8 kPa (60 mmHg)) on admission
 Very low or very high white cell count (< 4 or > 30 × 10⁹ per litre) on admission
 Low serum albumin (< 35 g/l)

†The risk of death was increased 21-fold in patients with any two of these three features[1]

*The *Communicable Disease Report* is a weekly bulletin providing up to date information on prevalent infectious agents and their antibiotic resistance and will be sent to physicians who write to the Editor, P.H.L.S., Communicable Disease Surveillance Centre, 61 Colindale Avenue, London NW9 5EQ.

Summary

- A limited range of pathogens cause the majority of community-acquired pneumonia.
- Antibiotic therapy should be started immediately at diagnosis.
- Always cover *S. pneumoniae* (the commonest cause).
- Cover *M. pneumoniae* during outbreaks.
- Cover *S. aureus* when there is an influenza epidemic, in seriously ill patients, and at other times when staphylococcal pneumonia is suspected.
- Cover Legionella in seriously ill patients.
- Oxygen therapy adequate to maintain a PaO₂ at or above 8 kPa (60 mmHg), and careful attention to fluid balance, are essential in seriously ill patients.
- Death is much commoner in patients over 60 years old, but the risk is increased at any age in patients with any of the features listed in Table 1.
- Such high risk patients should always be admitted to hospital and carefully monitored, ideally by an expert thoracic medical team with access to an ITU. Intensive care and IPPV should be considered early for a patient with progressive hypoxia or serious confusion.

- The following are particularly useful microbiological tests:

Sputum and blood culture
Sputum Gram stain
Sputum, urine and blood for pneumococcal antigen
Serum for mycoplasma specific IgM
Acute and convalescent serology.

References

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Book review

Dementia. Edited by Brice Pitt. Churchill Livingstone, Edinburgh, 1987. 346pp. £40.00.

This book adds to the growing number of volumes on dementia, a tribute to the work and burgeoning of interest in this intractable, but common and devastating disorder of the elderly. Many books on dementia, and particularly those on Alzheimer's disease, are directed at specific audiences and this new book falls into that category, being a volume in a series entitled, 'Medicine in old age.'

The book consists of 19 chapters by different authors, most of them individuals rather than research groups, in which the main features of dementia, and particularly Alzheimer's disease, are described. The chapters are relatively uniform and the references adequate, although some rather well known contributions to recent ideas are omitted. Most chapters are fairly complete while others, particularly that on the neurochemistry of the disease, are little more than summaries of the available information. Throughout the book there is a tendency to ignore the fact that the disease is a disease of the brain with all that that implies in terms of symptomatology and, thus, of disability. There is much of interest in relation to the neuropathology, psychology and other clinical features, but descriptions of the neurology of the disease seem to be limited to a short paragraph headed 'Other physical problems'. Here we learn that, 'The patient may be incontinent', surely a problem that deserves more emphasis! There is a whole chapter on how to care for the carers of those affected and another on psychogeriatric and social services for the demented but nothing on how to deal with the sheer physical exhaustion faced by the

families and nurses of demented patients other than a brief, inadequate account placed, somewhat curiously, in the chapter on psychological management.

Several chapters form an uneasy truce between research and clinical practice. Sentences such as, 'The pulse sequence employed in spin-warp imaging allows a variety of data to be collected' hardly inspire confidence in the reader that he is going to gain much useful information in the management of his patients, nor that much useful scientific information will follow. It would have been better had the Editor considered separating the more academic, research information into one section, and the clinically relevant aspects of diagnosis and management into another part. As it is, the informed reader will be irritated by reiteration of information that is readily available elsewhere, particularly in peer review journals, and the reader picking up the book because it contributes to a series which might be expected to provide practical advice, will find himself lost in a morass of obscure sentences and abbreviations, while searching hopefully for information of practical value.

Nowhere in the book is there any solid account of the approach to an individual patient. How many should be investigated and by what means? Is age important in deciding this problem? When should social services be invited to help? What are the features which suggest that family breakdown is about to occur? Many of the contributors to this volume must have considered these problems and it is a pity they were not allowed to address them in their chapters. This volume seems to fall into that class of book in which the work of others is endlessly reiterated; an approach, in the case of dementia, that has reached saturation point.

MICHAEL SWASH