Management of Community-Acquired Pneumonia in the Home*

An American College of Chest Physicians Clinical Position Statement

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The number of patients with community-acquired pneumonia (CAP) who are being treated at home is increasing for a variety of reasons. These reasons include the increased availability and cost considerations of oral antibiotics that have been shown to be effective, as well as the consideration of patient and family preferences. However, there is still considerable variability in strategies for the management of patients with CAP. This American College of Chest Physicians position statement, which was cosponsored by the American Academy of Home Care Physicians, provides recommendations on the various aspects of home care for patients with this condition. Included are recommendations for evaluation and diagnosis in the home environment and the determination of the site of care, and an outline of an in-home management plan. The position statement also provides recommendations for issues related to patient and caregiver commitment to the plan, and for monitoring and follow-up. Recommendations are directed toward immunocompetent adult patients with CAP who are at home or in other unskilled residential facilities. These patients can include previously healthy individuals or chronically ill individuals who choose not to go to the hospital, or hospitalized patients who are completing a hospital discharge plan. The recommendations in this statement take into consideration the best course of action for the patient, as determined by incorporating the most recent evidence with clinician judgment and patient preferences. These recommendations also consider the available resources. Therefore, these recommendations may not apply to every patient, and interventions may need to be structured based on the individual. In addition to providing recommendations for the home care management of patients with CAP, we hope that this clinical policy statement will alert readers to the need for more scientific evidence related to the clinical and psychosocial issues associated with managing this condition.

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Key words: community-acquired pneumonia; home care; home treatment; pneumonia

Abbreviations: AAHCP = American Academy of Home Care Physicians; ACCP = American College of Chest Physicians; ATS = American Thoracic Society; BTS = British Thoracic Society; CAP = community-acquired pneumonia; HME = home medical equipment; IDSA = Infectious Diseases Society of America; PCP = primary care provider; PORT = Pneumonia Patient Outcomes Research Team

The American College of Chest Physicians (ACCP) finds it imperative to include individuals who are experts in their respective fields on policy development committees. The recommendations and publications that result from the meetings of these committees will have far-reaching significance that may affect multiple aspects of the practice of chest medicine throughout the world. Therefore, it is essential that the ACCP have full disclosure of outside interests from those individuals serving on policy development committees, including liaison representatives from outside organizations. Both real and potential conflicts of interest may actually affect impartial or objective decisions or may appear to.

Each chapter of this guideline was reviewed and approved by the ACCP Health and Science Policy Committee prior to submission, approval by the ACCP Board of Regents, and approval by the American Academy of Home Care Physicians (AAHCP). The guideline was then forwarded to other external organizations for endorsement.
In the ever-changing field of medicine, it is important and necessary to have access to up-to-date information. Clinical policies are developed to enhance the clinician’s ability to practice quality medicine and also to provide an opportunity for the busy clinician to receive the latest evidence on a particular topic. The information provided in this statement should be used in conjunction with clinical judgment. These recommendations may not apply to every individual patient; therefore, it is important for the physician to take into consideration the role of patient preferences and the availability of local resources.

The ACCP is sensitive to concerns that nationally and/or internationally developed position statements are not always applicable in local settings. Further, recommendations are just that; recommendations not dictates. In treating patients, individual circumstances, preferences, and resources do play a role in the course of treatment at every decision level. These recommendations are intended to guide healthcare decisions and may be adapted to be applicable at various levels.

The availability of effective oral antibiotics, patient preferences, and cost considerations have resulted in an increasing number of patients with community-acquired pneumonia (CAP) being treated in their homes. This option has been driven by studies identifying subsets of hospitalized patients with a low risk of mortality, patient preferences for outpatient care, and the possibility of reducing the costs of pneumonia care without impacting care quality and patient outcomes. These studies support in-home treatment for previously healthy individuals and chronically ill individuals who may or may not be home-bound but choose not to go into the hospital. Based on experiences among nursing home populations, there is concern that evaluation in an emergency department with admission to an acute care facility is a form of intervention that may be overused and may not always be in the best interests of the patient. Current guidelines for CAP focus on the decision to admit patients to the hospital and on the course of inpatient care. Home care involves less direct professional interaction and relies heavily on nurses aids, the patient, and informal caregivers. It is important, therefore, that the goals, requirements, and responsibilities of those involved in the in-home care of patients with CAP be clearly defined.

CAP is a significant issue. The disease affects an estimated 2 to 3 million individuals in the United States each year, resulting in about 10 million physician visits, 500,000 hospitalizations, and 45,000 deaths. Pneumonia is the most common cause of death from infectious disease and the sixth most common cause of death overall. The direct costs of treating CAP have been estimated at about $8.5 billion dollars annually in the United States, with approximately 95% of the costs resulting from inpatient care. The impact on indirect costs may be substantial. In a study of 944 outpatients with CAP, 89% of nonemployed and 96% of employed surviving patients had returned to usual activities after 30 days, but 76% still had one or more persisting pneumonia-related symptoms. For inpatients, the comparable numbers were 57%, 82%, and 86%, respectively. The incidence of pneumonia appears to be highest in the oldest and youngest age groups.

There is considerable variability in the manner in which CAP is managed. Differences in practice patterns among primary care providers (PCPs) appear to be related to individual practice styles. Factors that are central to these differences include the ability to evaluate the patient prior to treatment, the diagnostic capacities available in the home, the capability of the caregiver and patient to manage the illness, the ease with which the PCP can monitor the patient at home, and concerns about medical liability. Broad differences in hospital admission rates among PCPs, which appear to be based primarily on nonclinical criteria, present an opportunity for clinicians and policy makers to develop explicit guidelines to help normalize practice patterns.

The general goals of home care are to provide the same level of quality, and to achieve the same level of recovery and functional status as would be possible at any other site of care. The objectives of this article are to address the requirements for successfully managing patients with CAP in the home environment. It is intended for the use of primary care and emergency physicians who are likely to make the principal diagnosis and who are responsible for the management of patients during the course of CAP. Home care agencies, medical groups, managed care

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†For a complete list of the members of the American College of Chest Physicians’ Home Care Network Working Group, see Appendix 1.

This position statement is cosponsored by the American Academy of Home Care Physicians, and the recommendations in this document have been endorsed by the American Thoracic Society, the American Association of Respiratory Care, and the American Geriatrics Society.

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organizations, and home medical equipment (HME) suppliers who wish to develop care algorithms or clinical management plans for CAP should also find these principles useful.

The following topics will be addressed:

- Initial patient evaluation and diagnosis in the home environment;
- Determination of the site of care;
- Elements of an in-home management plan;
- Patient and caregiver commitment to the care plan;
- Goals for nurses providing interim home care; and
- Monitoring, assessment of the risk of recurrence, preventive measures, and closure.

This clinical position statement was developed by a working group of the ACCP Home Care Network, which includes representatives of the American Thoracic Society (ATS) and the American Association of Respiratory Care. It is based on a review of the guideline literature and on a consensus panel meeting of the AAHCP Community-Acquired Pneumonia Working Group (see Appendix 2 for a list of participants), which was held on October 20, 2000, in Coolfont, WV. The AAHCP panel review process included reviews of guidelines from the ATS (1993),\(^\text{17}\) the Infectious Diseases Society of America (IDSA) [2000],\(^\text{14}\) the Canadian Infectious Diseases Society and the Canadian Thoracic Society (2000),\(^\text{15}\) the Centers for Disease Control and Prevention (2000),\(^\text{16}\) the European Respiratory Society (1998),\(^\text{18}\) and the British Thoracic Society (BTS) [1993].\(^\text{19}\) The AAHCP recommendations were reconsidered by the ACCP working group and were updated with a MEDLINE search of the literature from October 2000 to July 2003. This review included the 2001 update of the ATS recommendations\(^\text{24}\) and the 2003 update of the IDSA recommendations.\(^\text{25}\)

The working group concluded that the current literature did not provide the scientific evidence to support a clinical practice guideline as defined by the ACCP (i.e., a statement that is based on scientific evidence, that explicitly documents the process used to develop the statement, and that grades the strength of the evidence used in making clinical recommendations). Because the issue of appropriate resources for the home treatment of CAP is of immediate importance, the working group proceeded to develop this clinical position statement. None of the current guidelines that address the management of patients with CAP specifically focuses on practice recommendations for the home care patient, but the recommendations in this position statement are compatible with each of these existing guidelines.

**Target Population**

These practice recommendations are intended to support the care delivered to immunocompetent adults with CAP who are living at home or in unskilled residential facilities. The patient populations that are appropriate for these guidelines include previously healthy individuals and chronically ill individuals who may or may not be home-bound but choose not to go into the hospital. These recommendations may also be helpful in hospital discharge planning for patients hospitalized with CAP. These recommendations are not intended to be applied to pediatric patients, patients with HIV or other forms of immune compromise, or to patients living in skilled nursing facilities.

**Approach to Patient Care and Practice Standards**

CAP may be diagnosed in patients in different settings, and the premorbid status and care objectives may vary by patient. The sites of diagnosis include the following: (1) the home/residence; (2) the office/clinic; and (3) an emergency department. The goals of diagnosis are the same at each site, but the availability of diagnostic tests and the level of comfort with a working diagnostic assumption may vary.

Once a diagnosis is made, the patient’s premorbid state will be a major factor in determining appropriate management. The management plan must account for each patient’s mobility (i.e., homebound or ambulatory), preexisting state, and individual overall treatment goals. Treatment goals may range from full care, with the expectation of a return to normal function, to palliative care for end-of-life patients. The recognition of differences and similarities by patient type and site of diagnosis shapes the management requirements for each.

**Initial Patient Evaluation and Diagnosis in the Home Environment**

Regardless of the site of the evaluation, the diagnosis should be based on a clinical history and

<table>
<thead>
<tr>
<th>Evaluation Procedure</th>
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<tbody>
<tr>
<td>History and physical examination</td>
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<tr>
<td>Chest radiograph*</td>
</tr>
<tr>
<td>Oxygen saturation or arterial blood gas</td>
</tr>
<tr>
<td>CBC*</td>
</tr>
<tr>
<td>Chemistry panel*</td>
</tr>
<tr>
<td>Blood cultures*</td>
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<tr>
<td>Risk stratification</td>
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</table>

*Consider in selected patients.
physical examination findings that are consistent with CAP (Table 1). This diagnosis should be suspected in patients with the classic symptoms and signs of new-onset cough, sputum production or shortness of breath in the context of fever and altered breath sounds or crackles, and should be suspected in special populations of patients who may not be able to mount an appropriate response to infection (eg, elderly or immunocompromised patients).14

The initial assessment will also determine the course of a further workup. While no single pattern of simple signs and symptoms define pneumonia, the diagnosis is often apparent from the clinical presentation.26 Home-bound patients who are otherwise healthy and exhibit no risk factors for a poor outcome may not require a chest radiograph to confirm the diagnosis.15,17,26 For most patients, however, if CAP is suspected and the patient’s overall treatment goals are compatible with full treatment and a goal of complete recovery, a chest radiograph should be performed to confirm the diagnosis, assess severity, exclude other possible etiologies, and establish a baseline for confirming disease resolution. In the emergency department, a chest radiograph should always be obtained to confirm the diagnosis. This requirement also applies to the office/clinic in most situations. In the home setting, a portable chest radiograph is desirable, but the diagnosis will commonly be made in homebound patients without a confirmatory chest radiograph. An evaluation of gas exchange by oximetry or arterial blood gas is required regardless of the site of the evaluation (ie, including the home setting). Additional tests that should be considered as a guide to management include a chemistry panel evaluation, hemoglobin/hematocrit determination, and blood cultures. Any or all of these tests may not be indicated if the patient is in an end-of-life, palliative care program. In such situations, the decision to treat with antibiotics should be carefully reviewed.

An assessment of the risk for poor treatment outcomes is central to the initial evaluation. Prediction rules such as those developed by the Pneumonia Patient Outcomes Research Team (PORT) and the BTS are a reasonable approach to identifying low-risk patients with CAP.2,26,27 This information should be considered in the initial and ongoing assessments of the risks associated with home care and the scope of in-home support for patients who are not admitted to the hospital.

In all instances, a qualified provider (ie, a physician, nurse practitioner, or physician assistant) should perform the initial evaluation in person. There are no outcome studies to support the initial telephone management for new cases of patients with CAP who remain at home. Although the patient may be well-known to the PCP, telephone contact between the physician (or another qualified provider) and the patient or caregiver alone is not sufficient. While a nurse from a home health agency who is visiting the patient may be able to carry out this evaluation, make a diagnosis, complete risk stratification, and suggest a management plan in direct consultation with a qualified provider during the evaluation, it remains the responsibility of the qualified provider to determine whether the nursing assessment is adequate before proceeding with a diagnostic and management plan. If the PCP or another qualified provider does not personally perform the initial evaluation, the provider must see the patient within 24 h of presentation. Finally, a qualified provider must personally evaluate the patient at the closure of the acute infection and more frequently as individual circumstances dictate.

**Determination of Site of Care**

The decision to admit a patient to the hospital or to treat a patient at home is a clinical decision that is based on the severity of illness, the capacity of the system (including the patient and caregiver) to manage the patient in their home, and the patient’s wishes. The decision is always made in the context of overall patient management goals and the patient’s personal desires (Table 2).

It is reasonable that hospitalization should be the general rule for most patients who are at extremely high risk of poor outcome and the initial clinical assessment risk stratification using protocols based on PORT,14 BTS,14,27 or similar criteria are useful for identifying such patients. Nonetheless, patient wishes to remain in the home may override a risk assessment that is suggestive of a poor outcome if the treatment goals are clearly understood and the elements of care needed to meet these goals are available in the home.

**Table 2—Site of Care**

<table>
<thead>
<tr>
<th>Assessment of risk factors on initial evaluation</th>
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<tbody>
<tr>
<td>Consistent with patient’s informed wishes (written advanced directives should be confirmed at the time of diagnosis of CAP with the patient or surrogate)</td>
</tr>
<tr>
<td>Care contract, preferably formal, in place</td>
</tr>
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</table>
poor prognosis. Other risk factors suggestive of a poor outcome include alcoholism, COPD, serious comorbid disease, aspiration, confusion, living alone, cardiovascular instability, prior hospitalization for pneumonia within the last year, uremia, or malnutrition. Physical findings suggesting increased risk include a respiratory rate of \( \geq 30 \) breaths/min, hypotension, temperature \( \geq 101^\circ\text{F} \) (38.2°C), evidence of extrapulmonary infection, and confusion or decreased consciousness. These may be helpful as a starting point and for ongoing management decisions regarding the need for hospitalization.

Experience has taught that risk stratification schemes for determining the site of treatment, such as that developed by PORT (Fig 1), are helpful for organizing the approach to risk assessment but should not be viewed as an algorithm for hospital admission. The ultimate decision remains a clinical process. Indeed, if a system such as the one developed in the PORT program were the basis for hospitalization, men \( \geq 71 \) years of age would always be admitted. Most of the risk-assessment systems were developed to be used in hospital emergency departments and have not been studied in in-home

![Figure 1](https://example.com/fig1.png)

**Figure 1.** Application of the PORT severity index to determine the initial site of treatment. Step 1 identifies patients in risk class I on the basis of age \( \leq 50 \) years, and the absence of all comorbid conditions and vital sign abnormalities listed in step 2. For all patients who are not classified as being in risk class I, the laboratory data listed in step 2 should be collected to calculate a pneumonia severity score. Risk class and recommended site of care based on the pneumonia severity score are listed in the final table. The 30-day mortality data are based on two independent cohorts of 40,326 patients. The figure was adapted from Metlay and Fine, with permission.
or office practice settings. Furthermore, some studies have shown that risk-stratification protocols do not adequately predict a patient’s outcomes especially when adverse social factors such as homelessness and substance abuse exist.

Decisions regarding in-home care vs admission of the patient with CAP to an acute care facility should ultimately be a joint decision between the attending PCP and the patient, or with the family/caregiver according to an advance directive. When a patient is unable to participate in the decision to treat in-home or in-hospital, their wishes regarding decisions concerning the possible admission to an acute care facility are best expressed through an advance directive. On admission to a house call practice, discussions outlining general parameters (including advance directive) for considering transfer to an acute care facility should be a standard component of the initial evaluation, and should be updated with each major change in clinical status or annually. Current documentation should be maintained in the medical record. Unfortunately, advance directives are not always available, nor readily obtained, and the decision regarding hospital admission is often left to the PCP in consultation with the patient or the family at the time of crisis. In the absence of an advance directive or directions from the patient or family/caregiver, the decision regarding in-home care vs admission to the hospital should be based on the patient’s clinical condition, comorbid diseases, prognosis, anticipated effectiveness of the proposed interventions, and/or the capacity of the family/caregiver to provide the necessary care and support to the patient.

Generally, patients in whom CAP has been initially diagnosed in the home have been transferred to the emergency department for acute care admission based on the following justifications:

- The patient is clinically unstable and the patient’s or the family’s goals indicate that aggressive medical or surgical interventions should be urgently initiated.
- Critical diagnostic tests are not available in the home.
- A required or necessary therapy is not available in the home, or the frequency of dosing and the intensity of monitoring of the therapy are beyond the capacity of the caregiver.
- Comfort measures cannot be assured in the home.
- Specific infection control measures are not available in the home.

Comfort care may occasionally demand extraordinary measures. The control of symptoms associated with widely fluctuating fevers and chills may require an intensity of nursing care that is not within the capacity of most family caregivers. Certain infection control procedures may require special forms of quarantine, such as negative-pressure ventilation for isolating a patient with active tuberculosis. In most instances, the need for specialized interventions, technological support, and/or monitoring of various procedures/therapies also warrants admission to an acute care facility. Examples include the need for ventilator support, central venous pressure monitoring, and high flow-rate oxygen. While these services are not typically supplied in the home, they can be, and home care may be appropriate based on an individual patient’s circumstance. It is the responsibility of the qualified provider making the diagnosis and the patient and/or caregiver to determine whether this is the most appropriate course given the patient’s wishes and circumstances. Patients and caregivers should always be informed of the relative risks, benefits, and costs associated with inpatient treatment vs home treatment of CAP, and should accept the responsibilities involved before making the decision to treat at home.

Elements of In-Home Treatment Plan

The diagnosing physician/provider is responsible for ensuring that all elements of the treatment plan are available before initiating in-home treatment (Table 3). The provider needs to know that the patient is in a safe and secure environment with a capable caregiver onsite, and that HME and other resources required by the treatment plan are available (eg, home O₂, nebulizers, physical therapy, and respiratory therapy).

Antibiotic choice and route of administration are central to an appropriate in-home treatment plan. The oral route is recommended if the patient can tolerate it, and if the availability and activity of the

Table 3—Elements of the In-Home Treatment Plan*

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADL/H11005</td>
<td>ADL = activities of daily living</td>
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<tr>
<td>Support services</td>
<td></td>
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<tr>
<td>Professional follow-up</td>
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<tr>
<td>Energy conservation</td>
<td></td>
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<tr>
<td>Nutritional support</td>
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<tr>
<td>Maintenance of functional capacity (ADL/Instrumental ADL)</td>
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<tr>
<td>Hydration</td>
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<tr>
<td>Oxygenation</td>
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<td>Smoking cessation</td>
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<tr>
<td>Ventilation</td>
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<tr>
<td>Treatment of ancillary symptoms (eg, cough and pain)</td>
<td></td>
</tr>
<tr>
<td>Treatment of coexisting illnesses (eg, diabetes and chronic ventilatory insufficiency)</td>
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<tr>
<td>Caregiver education (ie, monitoring and treatment responsibilities)</td>
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</table>
agent are adequate. With the advent of effective oral antibiotics and home infusion, hospitalization is no longer required simply to administer antibiotics. Most common bacterial illnesses among long-term care facility residents have been shown to respond promptly to broad-spectrum oral antibiotic therapy, and, therefore, should be equally effective in the home. The capacity to provide parenteral therapies in the home is a Medicare-covered service and has become quite common in most communities, although currently Medicare does not cover the cost of the parenteral medication itself. Moreover, some drugs may be administered via the IM route. For example, select third-generation cephalosporins agents such as ceftriaxone, when administered IM, demonstrate similar efficacy to the IV route of injection. In addition, several antibiotics, such as quinolones, have been developed that achieve systemic concentrations via oral administration that are comparable to the parenteral route of administration. Such advances should mitigate the necessity for admission to an acute care facility for mild-to-moderate uncomplicated infections.

Although treatment is facilitated if the etiologic agent is known (pathogen-directed treatment for CAP is provided in Table 14 of the IDSA guidelines), most outpatient treatment is empiric. The recommendations of the ATS and IDSA are for empiric treatment, and a sputum Gram stain and recommendations of the ATS and IDSA are for empiric treatment, and a sputum Gram stain and acid-fast stain. Furoxime, cefpodoxime, or cefprozil (as of June 1999 were classified as intermediately resistant or resistant to penicillin) in patients of age greater than 65 years, in patients with significant comorbidities or those who have had recent antibiotic treatment are at increased risk for infection with problematic organisms. The risk of drug-resistant Streptococcus pneumoniae must always be assessed in each patient. Streptococcus pneumoniae is the most common identifiable agent causing CAP. It is among the leading causes of disease and mortality in patients with comorbid conditions and the elderly. The resistance of S. pneumoniae to penicillin and other antimicrobial drugs has been increasing. It has been estimated that 25 to 35% of S. pneumoniae isolates taken from infected individuals in the United States as of June 1999 were classified as intermediate resistant or resistant to penicillin. In elderly patients with reduced functional status, multiple comorbidities, and structural lung disease, polymicrobial infections, Gram-negative rods, and Pseudomonas aeruginosa are likely to be more common. The ATS has developed an approach to this assessment (Table 5) that may be useful.

A lack of response to treatment with macrolides and fluoroquinolones has been reported. Some authorities prefer to reserve the use of fluoroquinolones for older patients, patients who are allergic or intolerant to macrolides, patients who have recently received macrolide treatment, patients with comorbidities, patients with documented infections with highly resistant pneumococci, or patients with a lack of response to treatment with another agent. There have been reports in the literature describing the lack of response to outpatient therapy with azithromycin and clarithromycin as the primary treatment for CAP.

While there are minor differences in specific recommendations, the IDSA and ATS recommendations generally agree that a patient who is at high risk either because of complicated comorbidities or extensive prior antibiotic use may be a candidate for treatment with either a β-lactam/macrolide combination or a combination therapy with another agent. Double therapy with either a β-lactam/macrolide combination or a β-lactam/ antimicrobococal fluoroquinolone should be considered in patients who would normally be considered for ICU admission but have chosen to remain in the home.

Table 4—Initial Treatment of CAP in Low-Risk Patients

| Macrolide (erythromycin, clarithromycin, or azithromycin). | Clarithromycin and azithromycin are recommended if Haemophilus influenzae is suspected. |
| Doxycycline. | Fluoroquinolone (levofloxacin, moxifloxacin, gatifloxacin, or other agent with enhanced activity against S pneumoniae). |
Table 5—Modifying Factors That Increase the Risk of Infection With Specific Pathogens

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>Modifying Factors</th>
</tr>
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<tbody>
<tr>
<td>Penicillin-resistant and drug-resistant pneumococci</td>
<td>Age &gt; 65 yr&lt;br&gt;β-Lactam therapy within the past 3 mo&lt;br&gt;Alcoholism&lt;br&gt;Immunosuppressive illness (including therapy with corticosteroids)&lt;br&gt;Multiple medical comorbidities&lt;br&gt;Exposure to a child in a day care center</td>
</tr>
<tr>
<td>Enteric Gram-negative organisms</td>
<td>Residence in a nursing home&lt;br&gt;Underlying cardiopulmonary disease&lt;br&gt;Multiple medical comorbidities&lt;br&gt;Recent antibiotic therapy</td>
</tr>
<tr>
<td><em>P. aeruginosa</em></td>
<td>Structural lung disease (bronchiectasis)&lt;br&gt;Corticosteroid therapy (10 mg prednisone per day)&lt;br&gt;Broad-spectrum antibiotic therapy for 7 d in the past month&lt;br&gt;Malnutrition</td>
</tr>
</tbody>
</table>

Hospital guidelines. This is a reasonable starting point, especially for patients who might be candidates for in-hospital care. These guidelines are listed in Table 6.

The timing of the administration of the first dose is a significant issue. Mortality rates are increased for hospitalized patients receiving their first doses of IV antibiotics > 8 h past presentation. The Joint Commission on Accreditation of Healthcare Organizations uses the standard of no later that 8 h after presentation for hospitalized patients to receive their first dose of antibiotics, and the Centers for Medicare and Medicaid Services (formerly, the Healthcare Financing Administration) recommends the administration of IV antibiotics within 4 h. These recommendations apply to the patient with CAP who is treated at home. The diagnosing physician should consider the patient’s condition and treatment goals in determining the timing of the first dose (i.e., 4 vs 8 h), but in no circumstance should the first dose be delayed beyond 8 h.

Finally, hydration, oxygenation, nutrition, treatment of ancillary symptoms (e.g., pain, cough, and shortness of breath) and coexisting illness, preservation of functional status, and caregiver adequacy should be evaluated and addressed in the treatment plan. In the absence of studies suggesting alternative approaches, the timelines for hydration and oxygenation should be consistent with those for antibiotic administration (i.e., 4 to 8 h, depending on the patient’s condition and treatment goals). If the treatments can be provided in a timely fashion, these factors generally do not require hospitalization of the patient.

Hospitalization is not without hazard. Inpatient care puts patients at risk for deconditioning, pressure ulcers, bacterial colonization with highly virulent or drug-resistant organisms, and translocation trauma. These consequences of acute CAP must be aggressively addressed regardless of the site of treatment. Several studies have shown that residents of long-term care facilities with severe functional dependence experience a very high risk of mortality, regardless of the setting of care, and have questioned the benefit of hospitalization to clinical outcome. Nevertheless, home treatment may be limited due to the lack of availability of home care services. The expenses incurred through transfer to the emergency department and admission to the hospital add to the direct costs to the patient and to the societal costs of care, and are often unnecessary.

Patient and Caregiver Commitment to the Care Plan

Inherent in the decision-making process regarding site of care is the idea of a cooperative agreement between the clinician and the patient/caregiver if care is to be given at home. This agreement promotes the understanding of the care the patient will receive at home, and of the expectations and responsibilities of all participants. One approach, a “patient care contract,” is signed by the home care provider and the patient/caregiver, and is placed in the medical record (see Table 7 for an example). The patient care contract is not a legal contract but represents an educational document that helps to ensure an understanding of the risks and benefits of the treatment plan. If a patient care contract cannot be agreed to or is violated, transfer to an acute care facility would be necessary.

Elements of the treatment contract will vary from patient to patient. A formal contract may not be inappropriate for an otherwise young healthy individual with straightforward CAP, whereas every element of the contract may be important for the caregiver of a home-bound patient with complicated significant comorbidities.

Table 6—Appropriate Time Lines for the Principal Elements of In-Home Management of CAP

<table>
<thead>
<tr>
<th>Time Line</th>
<th>Description</th>
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<tbody>
<tr>
<td>4–8 h</td>
<td>The first dose of antibiotic should be administered within 4–8 h of presentation. Oxygenation should be optimized within 4–8 h of presentation. If hydration is necessary, it should be initiated within 4–8 h of presentation.</td>
</tr>
</tbody>
</table>

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Responsibilities for HME

If HME is required (eg, home O₂), it is the responsibility of the qualified provider making the diagnosis or his/her designee to ensure that the equipment is delivered within the timelines of these requirements, that it is in good operating order, and that the patient and/or caregiver are educated in its proper use and maintenance.

Monitoring and Goals for Nurses Providing Interim Home Care

Following the initial evaluation and institution of the care plan, a qualified provider should assess the high risk patient within 24 h to confirm the implementation of all aspects of the treatment plan, including HME, and to determine if the patient is responding (Table 8). Previously discussed severity stratification systems can be used as a guide to determine high risk for continuing treatment at home. Other factors such as patient compliance and caregiver support, if unreliable, may also place the patient in the high-risk category. Patients who fail to respond may have an incorrect diagnosis, ineffective medications or adverse side effects, poor compliance, or undiagnosed complications. The initial follow-up assessment may be later than 24 h in patients who are not considered to be at high risk.

At every visit, patients should be observed and assessed with respect to the status of the following conditions (based on the Pneumonia Care Plan of the Visiting Nurse Association of Greater Philadelphia):

1. Vital signs
   - Temperature
   - Pulse
   - Respiratory rate
   - BP

2. Cardiopulmonary signs and symptoms
   - Chest pain
   - Shortness of breath
   - Cough
   - Heart and breath sounds
   - Edema
   - Oxygen use
   - Oximetry
   - Weight

3. Mental status
4. Nutrition and hydration status and compliance with diet including appetite, nausea/vomiting, and constipation
5. Urinary frequency and output
6. Skin integrity and turgor
7. Lower extremity pain, pulses, color, and swelling
8. Mobility and use of assistive devices
9. Psychosocial status and coping ability
10. Medication compliance
11. Status of problem list indicating the problem, and the date and time that the problem was both identified and resolved, or the goal revised

Table 7—Elements of a Contract for Participation in Home Care*

<table>
<thead>
<tr>
<th>Role Agreement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient/caregiver agrees to</td>
<td>Learn to provide the care required including use of medications, appropriate diet and nutrition, and recommended pulmonary therapy. Take medications and other treatments (eg, oxygen or nebulization) as indicated by the provider. Follow recommendations to improve gas exchange including coughing, deep breathing, and proper positioning. Notify the provider of fever above ((\text{F}^\circ)), increased difficulty breathing, worsening of cough or sputum, or other symptoms as indicated by the provider. Participate with the patient/caregiver in the planning and provision of care. Make and keep appointments as recommended by the provider.</td>
</tr>
<tr>
<td>Provider agrees to</td>
<td>Provide appropriate treatments, instruction, assessment, and evaluation to the patient/caregiver. Respond to the patient in a timely fashion. Agree to transfer the patient to an acute care facility if recommended by the provider.</td>
</tr>
</tbody>
</table>

*The purpose of this contract is to promote understanding of the care the patient (specify name) is to receive at home, and to identify the responsibilities of both the patient/caregiver and the provider in ensuring that the patient’s needs are met.

Table 8—Monitoring In-Home Treatment of CAP

<table>
<thead>
<tr>
<th>The frequency of follow-up visits to the home or patient visits to the clinic/office should be a written component of the initial plan and should be revised as needed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of episode assessment includes consideration of return to baseline functional state and a follow up chest radiograph at 6 to 8 weeks.</td>
</tr>
<tr>
<td>A house call practice should establish a process for the ongoing review and analysis of cases in which patients are transferred to an acute care facility or to an emergency department, even when the patient returns home without hospital admission.</td>
</tr>
</tbody>
</table>
In addition, the patient should achieve the following goals, and the timing of their achievement should be documented:

1. Understand pneumonia (eg, causes, preventive measures, and clinical implications);
2. Recognize worsening signs and symptoms and occurrence of complications, and have a written plan for response;
3. Make and keep medical appointments;
4. Adapt lifestyle to maintain adequate hydration, decrease or control symptoms, and comply with coughing and deep-breathing exercises;
5. Monitor temperature and sputum production;
6. Understand and comply with medication regimen and diet;
7. Understand use and cleaning of respiratory equipment (eg, mini-nebulizer);
8. Follow care plan to maintain vital signs, respiratory status, and oximetry measurements within provider established parameters;
9. Follow activity prescription, including physical therapy evaluation, if needed, to avoid, for example, deconditioning and skin breakdown; and
10. Smoke-free environment

**Assessment of Risk of Recurrence, Preventive Measures, and Closure**

A qualified provider should confirm the resolution of the pneumonia by chest radiograph a minimum of 8 weeks following the diagnosis. Functional status and risk of recurrence should be evaluated. If the patient has had recurrent bouts of pneumonia, a more extensive evaluation may be necessary. Preventive measures should be incorporated into the long-term plan for the patient including smoking cessation, annual influenza vaccination, an initial pneumococcal vaccination, and revaccination with pneumococcal vaccine every 5 to 7 years if appropriate.51

**Table 9—Transfer From In-Home Care**

If the management goals cannot be achieved in the home care setting or the treatment plan is failing, then transfer of the patient to an acute care facility should be considered.

When a transfer decision is made, the rationale for referral to the emergency department or for hospitalization should be documented in a progress note in the patient’s medical record.

CAP who is being treated at home or in an unskilled residential facility are summarized below. Future research should be focused on evidence for appropriate assessment and in-home treatment, such as diagnostic tests, home care interventions, and the exploration of the efficacy of telephone triage in selected groups of patients who are at low risk and are well-known to the provider. Finally, the approach to the in-home management of CAP that has been outlined herein, and others, should be studied to assess their impact on patient outcomes (especially in the elderly) and to ensure that in-home management can achieve the same level of quality and patient outcomes as at any other treatment site for appropriate patient subsets.

**Recommendations for the Home Treatment of Patients With CAP**

**Initial Patient Evaluation and Diagnosis in the Home Environment**

1. A qualified provider includes a physician, nurse practitioner, or physician assistant.
2. The initial evaluation should be performed in person by a qualified provider or by a visiting home nurse who is in contact with a qualified provider at the time of the evaluation. In this case, the qualified provider must evaluate the patient within 24 h of the initial diagnosis. Telephone triage alone is not acceptable.
3. If a qualified provider does not meet with the patient at the time of the initial evaluation, the provider must see the patient sometime between presentation and closure.

**Transfer From In-Home Care**

The approach to treating CAP must include plans for the orderly transfer of patients from home to inpatient care either at the initial evaluation of patients in the home or in cases of failure to respond to an in-home treatment plan (Table 9). Such transfers should be coordinated with the receiving facility and should include the timely transfer of the patient and all pertinent clinical information.

**Summary**

Recommendations for the evaluation of care provided to the immunocompetent adult patient with
• The first dose of antibiotic should be administered within 8 h of presentation.
• Oxygenation should be optimized within 8 h of presentation.
• Hydration should be initiated within 8 h of presentation.

6. If a patient care contract cannot be agreed to or is violated, transfer to an acute care facility should occur.

Management of CAP at Home
7. The patient should be treated with antibiotics based using the empiric therapy guidelines of the ATS and IDSA.

Monitoring and Goals for Nurses Providing Interim Home Care
8. Repeat assessment should be performed within 24 h for the high-risk patient.
9. If a provider chooses not to refer a patient to a home care agency, the standards for interim care must still be met.

Closure
10. There should be a closure visit for each patient during which the risk of recurrence is evaluated, preventive measures are discussed, and functional status is assessed.
11. A chest radiograph should be obtained to confirm the resolution of the illness a minimum of 8 weeks following diagnosis.

APPENDIX 1

Members of the ACCP Home Care Network Working Group

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APPENDIX 2

Participants in the Consensus Panel Meeting of the American Academy of Home Care Physicians Community-Acquired Pneumonia Working Group

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