

How accurate is the clinical diagnosis of pneumonia?

■ EVIDENCE-BASED ANSWER

No element or combination of elements from the clinical history and physical examination are sufficiently sensitive or specific to confirm or exclude acute community-acquired pneumonia (CAP). A chest x-ray is recommended to make the diagnosis (Grade of Recommendation: **A**, based on well-designed cohort studies). No studies specifically demonstrate improved patient outcomes through use of chest x-ray in adults; however, accurate diagnosis is expected to reduce the number of unnecessary antibiotic prescriptions (Grade of Recommendation: **D**, based on expert opinion).

■ EVIDENCE SUMMARY

Metlay and colleagues¹ found only 4 high-quality, prospective cohort trials evaluating the sensitivity and specificity of the clinical history and physical examination in pneumonia. In each of the 4 studies, the reference standard for the diagnosis of pneumonia was a new infiltrate on chest radiograph. Subjects were community-dwelling adults with acute cough who were seen in ambulatory settings, and who had an average pneumonia prevalence of 7% (range, 3%–38%).¹ Although no study specifically addressed the interobserver reliability of the history and physical examination findings in pneumonia, other studies of chest findings typically found variable reproducibility. In a study by Spiteri and associates,² 24 physicians examined 24 patients with a variety of respiratory conditions: only 4 had pneumonia on chest x-ray. The most reliable findings (dullness to percussion and wheezing) had only fair agreement among examiners (kappa approximately 0.5).

Nine symptoms (cough, dyspnea, sputum production, subjective fever, chills, night sweats, myal-

gias, sore throat, and rhinorrhea) and 3 items in the past medical history (asthma, immunosuppression, and dementia) were associated with pneumonia. For most elements of history, both the positive and negative likelihood ratios (LR+, LR-) were in the indeterminate range of 0.5 to 2.0. No single feature was sufficient to either rule in or rule out the diagnosis.¹

Regarding the physical examination, tachypnea, tachycardia, and fever had LR+s between 1.5 and 2.4 in an ambulatory setting. In one study, the absence of any vital sign abnormalities reduced the likelihood of pneumonia substantially (LR- = 0.18), but did not rule out the diagnosis completely.¹ Egophony had an LR+ of 5.3. Other physical findings (rhonchi, crackles, decreased breath sounds, dullness to percussion, and bronchial breath sounds) yielded LR+s from 1.5 to 3.5, respectively. Most individual findings were insufficient to diagnose pneumonia. For example, if the

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What is a Clinical Inquiry?

Clinical Inquiries answer real questions that family physicians submit to the Family Practice Inquiries Network (FPIN), a national, not-for-profit consortium of family practice departments, residency programs, academic health sciences libraries, primary care practice-based research networks, and individuals with particular expertise.

Questions chosen for Clinical Inquiries are those considered most important, according to results of surveys mailed to family physicians across the U.S.

Answers are developed by a specific method:

- First, extensive literature searches are conducted by medical librarians.
- Clinicians then review the evidence and write the answers, which are then peer reviewed.
- Finally, a practicing family physician writes a commentary.

baseline prevalence of pneumonia was 5%, the presence of crackles raised the probability to 10% and their absence decreased the probability to 3%.

The sensitivity and specificity of clinical diagnosis varied with the prevalence of pneumonia. In a general practice setting, 20 of 402 patients with cough were diagnosed with pneumonia by chest x-ray.³ Physicians correctly diagnosed 7 patients clinically, and incorrectly diagnosed pneumonia in 22 additional patients.³ At a Veterans Administration hospital, a prospective cohort of 52 men with acute cough and change in sputum production underwent sequential blinded examination by 3 physicians. Rales and bronchial breath sounds were common, and chest x-ray confirmed pneumonia in 28 patients. Sensitivity of clinical diagnosis ranged from 47% to 69%, and specificity from 58% to 75%.⁴

Several researchers improved diagnostic accuracy by combining multiple elements from the history and physical examination. For example, according to Metlay and colleagues,¹ Heckerling et al calculated the probability of pneumonia if up to 5 predictors were present. However, if the prevalence of pneumonia in a primary care population is 5%, the presence of all 5 predictors raises the probability of pneumonia only to 53%.¹ The absence of 4 of the 5 findings (fever >37.8°C, heart rate >100 beats per minute, decreased breath sounds, crackles) reduces the risk of pneumonia to 1%, thus eliminating the need for radiography or antibiotics in most situations. If the patient also has asthma, the risk drops even further.

■ RECOMMENDATIONS FROM OTHERS

The Infectious Diseases Society of North America states that a chest x-ray is necessary for accurate diagnosis. In otherwise healthy adults with acute cough illness, antibiotic therapy is indicated only for pneumonia. A normal chest x-ray obviates the need for antibiotics.^{5,6}

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■ CLINICAL COMMENTARY

The immediate question for clinicians is “Can you treat pneumonia based on clinical findings alone?” Apparently, the answer is “no” unless the radiograph would be unacceptably difficult to obtain (eg, certain nursing home or homebound patients). Can the patient have pneumonia even if the chest radiograph is negative? Subtle early pneumonias sometimes blossom on chest film after a day or two. The diagnosis of pneumonia can be just as much a subjective “call” for the radiologist as “a few crackles” can be for the clinician, so the bottom line is: If you suspect pneumonia, order a chest film.

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Who should have colposcopy?

■ EVIDENCE-BASED ANSWER

Colposcopy is the preferred test in the work-up of patients with abnormal cervical cytology:

TABLE

Recommendations for colposcopy, American Society for Colposcopy and Cervical Pathology⁷

Cytology result	Recommendation for colposcopy	Strength of recommendation
ASC-US	Preferred for positive high-risk HPV DNA	A
	Acceptable for any patient with ASC-US	A
	Also acceptable: intensive cytology follow-up alone	A
	Preferred for any immunosuppressed patient	B
ASC-H	Preferred for all patients	A
AGC or AIS	Preferred for all patients (include endocervical curettage)	A
	Preferred for those older than 35 years, or having atypical endometrial cells, or unexplained vaginal bleeding (include endometrial biopsy)	
LSIL	Preferred for all patients	A
HSIL	Preferred for all patients (include endocervical curettage)	A

- Low-grade squamous intraepithelial lesion (LSIL): mild dysplasia
- High-grade squamous intraepithelial lesion (HSIL): moderate to severe dysplasia.
- Atypical squamous cells of undetermined significance (ASC-US) with high-risk human papillomavirus (HPV) DNA
- Atypical squamous cells, cannot rule out HSIL (ASC-H)
- Atypical glandular cells (AGC)
- Adenocarcinoma in situ (AIS)

Colposcopy is also recommended for patients with symptoms suggestive of cervical cancer (abnormal appearance of the cervix, persistent and undiagnosed vaginal discharge or bleeding) regardless of cytology results, and in the follow-up of patients previously treated for cervical dysplasia (Grade of Recommendation: **B**). Colposcopy is not recommended for routine cervical cancer screening.

■ EVIDENCE SUMMARY

The primary role of colposcopy is to identify cervical lesions, allowing directed biopsies to identify invasive cancer or its precursors. Although colposcopy has been studied as a primary screening technique, issues of cost, accessibility, invasiveness, and low specificity severely limit its usefulness in this role.¹ Using histology as the gold standard, the sensitivity of colposcopy for cervical abnormalities is high (96%; 95% confidence interval [CI], 95%–97%), but the specificity is much lower (48%; 95% CI, 47%–49%).² This low specificity means that more than half of women with no cervical pathology will have an abnormal colposcopy result. The corresponding positive and negative likelihood ratios are 2 and 0.1, respectively. Consequently, a normal colposcopy result can effectively rule out cervical pathology, thus supporting its role as a diagnostic rather than a screening tool.

While most lesions are found by abnormal cytology, the sensitivity of the Papanicolaou smear ranges from 30% to 89%.³ Therefore, colposcopy is also indicated for patients with symptoms suggestive of cervical dysplasia or cancer (abnormal appearance of the cervix, or persistent and undiagnosed vaginal discharge or bleeding), even in the setting of normal cytology.⁴

Colposcopy is also indicated for follow-up after treatment of cervical dysplasia. One study⁵ identified 3 risk factors for recurrence of dysplasia after a loop electrocautery excision procedure (LEEP): residual disease at either the endocervical or ectocervical margins, and involvement of endocervical glands. The presence of these risk factors predicted a recurrence rate of almost 70%.⁵ Because 8% of the recurrences were missed on cytology, the authors recommended colposcopy 6 months after LEEP for patients with these risk factors.

■ RECOMMENDATIONS FROM OTHERS

The place of colposcopy in the work-up of patients with abnormal cytology is well supported. With the recent revision of the Bethesda System by the National Cancer Institute,⁶ the American Society for Colposcopy and Cervical Pathology (ASCCP) held a consensus conference to review the literature and provide evidence-based guidelines for management of abnormal cervical cytology.⁷ Its recommendations on colposcopy are summarized in the **Table**.

The U.S. Preventive Services Task Force's 1996 recommendations found insufficient evidence to recommend either for or against the use of colposcopy as a screening tool for cervical cancer. Based on high cost and low specificity, it recommends against screening colposcopy.⁸

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■ CLINICAL COMMENTARY

The evaluation of abnormal Pap smear results is a common problem for providers of women's health care. Questions as to which women should

be referred for colposcopy occur most commonly when the Pap smear shows ASC-US, AGC, or abnormal clinical findings. The recent evidence-based guidelines from the ASCCP provide clearer guidance as to who needs colposcopy, especially when Pap smear results are minimally abnormal.

Evaluation of LSIL confirmed by colposcopy and biopsy is another area causing confusion. It is reasonable for these patients to be followed with regular Pap smears for up to 2 years, as the smears of many women will return to normal without any treatment. I usually do not recommend they return for colposcopy unless the Pap smear result worsens or does not normalize after 2 years.

Patients, as well as providers, have many questions regarding HPV testing. Recently, the ALTS trial has shown that HPV testing in patients with ASC-US can be useful in determining which patients need colposcopy.⁹

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What is the best treatment for bronchiolitis?

■ EVIDENCE-BASED ANSWER

Nebulized epinephrine decreases oxygen requirements, respiratory rate, wheezing, and retractions and may lower hospitalization rates and length of stay (Grade of Recommendation: **A**, based on consistent randomized controlled trials [RCTs] and systematic reviews). At best, other beta-2 agonists provide modest short-term improvement in mild to moderate bronchiolitis (Grade of Recommendation: **A**, consistent RCTs and systematic reviews), and may be indicated in patients with preexisting asthma. Discontinue bronchodilators if patients do not respond quickly, because the bronchodilators may cause respiratory deterioration (Grade of Recommendation: **D**, expert opinion). Supplemental oxygen for low oxygen saturation and suctioning may improve respiratory status (Grade of Recommendation: **D**, expert opinion). Chest physiotherapy (Grade of Recommendation: **D**, expert opinion), cool mist (Grade of Recommendation: **D**, expert opinion), and aerosolized saline (Grade of Recommendation: **A**, based on RCTs) are not recommended. Steroids, routine antibiotics, ribavirin, and pooled immunoglobulins play no role in previously

healthy children (Grade of Recommendation: **A**, systematic review, RCT and meta-analysis). See the **Table** for a summary of therapeutic interventions for bronchiolitis.

■ EVIDENCE SUMMARY

Most trials of bronchiolitis treatment suffer from 2 constraints: possible inclusion of patients with asthma and inconsistent outcome measures. Five trials of nebulized epinephrine, involving 225 children, have been published in the last decade. All have shown clinical improvement in measures such as respiratory rate, wheezing, retractions, hospital admission rates, and length of stay.¹

Data from other clinical trials, meta-analyses, and a comprehensive Cochrane systematic review do not support the routine use of selective beta-2 agonists. Studies with unselected patients noted some benefit, which may reflect the inclusion of asthmatic children, or the effects of suctioning in combination with inhalational therapy. Large proportions of patients admitted to hospital with bronchiolitis receive bronchodilators, and many physicians continue to advocate their use.² The cost of routine bronchodilators for children with bronchiolitis may be as high as \$37.5 million per year.²

One systematic review and 8 RCTs found conflicting evidence on the effects of corticosteroids.³

TABLE

Therapeutic interventions for bronchiolitis

Intervention	Usefulness	Grade of recommendation	Notes
Nebulized epinephrine	Beneficial	A	Should be discontinued promptly in the absence of response
Beta-2 agonists	Not beneficial	A	May be useful in patients with pre-existing asthma
Corticosteroids	Not beneficial	A	Not shown to impact clinical score or length of hospital stay
Supplemental oxygen, suctioning	Beneficial	D	Initiate at 91% and wean at 94%

Steroid therapy, given as inhalations, intravenously, orally, or intramuscularly, does not have a consistent effect on clinical status or on length of stay.⁴

A 1997 systematic review showed that ribavirin had no significant effect on mortality or the risk of respiratory deterioration in children admitted to hospital with respiratory syncytial virus (RSV) bronchiolitis.³ In fact, cohort studies and randomized trials have shown that ribavirin use is associated with an increase in the number of days of mechanical ventilation, intensive care unit stay, and hospitalizations.⁴

Passive immunotherapy with pooled immunoglobulins remains controversial and is undergoing intense study.⁴ Three RCTs failed to show any effect on length of hospital stay, and subsequent studies of an RSV-specific humanized monoclonal antibody (palivizumab) have not shown improvements in outcome.

The evidence supporting the use of supplemental oxygen and suctioning of respiratory secretions is limited to expert opinion.⁵

■ RECOMMENDATIONS FROM OTHERS

Most pediatric infectious diseases specialists surveyed in Europe recommend bronchodilators. However, bronchodilators are seldom used to treat bronchiolitis in the United Kingdom.² The present consensus from the American Academy of Pediatrics⁶ states that ribavirin should be considered in infants with underlying congenital heart disease, lung disease, or immunosuppression, or for infants requiring mechanical ventilation.

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■ CLINICAL COMMENTARY

Wheezing children are usually hospitalized when they have hypoxemia, lethargy, and fatigue associated with tachypnea and decreased oral intake. Because of the difficulty in differentiating between "bronchiolitis" and a first episode of "asthma," many wheezing children will continue to receive bronchodilators. Discontinuing bron-

chodilators seems prudent if oxygenation and respiratory rate do not improve after 6 hours. Supportive care with fluids, oxygen, and suctioning of secretions is usually all that is required in even moderately sick patients. As in other situations involving sick children, the temptation to intervene is overwhelming, hence the many ineffective treatments available. RSV is by far the most common viral pathogen causing bronchiolitis; effective immunization for RSV would probably markedly decrease hospitalizations from bronchiolitis.

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Does surgery for carpal tunnel syndrome improve outcomes?

- Photocopy for your patients "What is carpal tunnel syndrome?" on page 73.

■ EVIDENCE-BASED ANSWER

Good evidence supports the use of surgery for carpal tunnel syndrome over nonsurgical therapies such as

wrist splints, nonsteroidal anti-inflammatory drugs (NSAIDs), physical therapy, occupational therapy, local steroid injections, work modification, and oral vitamin B₆ (Grade of Recommendation: **A**, based on extrapolation from a systematic review of 1 randomized controlled trial [RCT], 1 additional recent RCT, and 2 cohort studies). Surgery is likely worth the extra costs when conservative therapy (up to 3 months) fails to improve symptoms and return of function, because delayed surgery is as successful as surgery performed shortly after diagnosis. Closed endoscopic release and open release surgery are equally effective therapies for controlling symptoms (Grade of Recommendation: **C**, based on extrapolation from a systematic review of RCTs). However, whether endoscopic release results in more rapid regain of function and return to work is unclear.

■ EVIDENCE SUMMARY

A recent Cochrane review based on only 1 RCT of 22 patients published in 1964 concluded that surgical treatment of carpal tunnel syndrome appears to be more effective than wrist splinting.¹ A well-designed RCT of 176 patients published since that Cochrane review stated that with regard to overall improvement of symptoms and function status, surgical treatment of carpal tunnel syndrome was more effective than wrist splinting 18 months post-treatment.² The investigators found that surgery resulted in worse short-term outcomes at 1 month follow-up (29% vs 42% success), but by 3 months the improvement in all outcomes was greater in the surgery group (80% vs 54% success). The number needed to treat (NNT) over 18 months was only 2 patients in the treatment-received (per protocol) analysis (92% vs 37% success) and 7 in the intention-to-treat analysis (90% vs 75% success). Patients in the conservative treatment group who underwent surgery after splinting had failed had a higher success rate after 18 months follow-up than patients who did not have surgery (94% vs 62% success rate; NNT = 3).

One cohort study of 90 patients concluded that with respect to symptom control and return to

function, open release surgery was as effective as local steroid injection at 1 month follow-up.³ However, at 4 to 6 months after the operation, surgery patients were found to have significantly improved symptom and function scores, with continued improvement compared with patients who received the steroid injection. One other cohort study of 429 patients found that surgery (open or closed endoscopic) was more effective with respect to symptom relief and functional status than various nonsurgical therapies (NSAIDs, splints, physical or occupational therapy, local steroid injections, work modification, or vitamin B₆) at 30 months follow-up.⁴ In both cohort studies, the patients' pre-treatment symptom and functioning scores were worse in the surgery group than in the nonsurgical group. The investigators in the first study³ did not report controlling for these scores. In the second study,⁴ the authors controlled for functional status scores, but not for symptom severity.

One recent systematic review of 14 RCTs comparing types of surgical therapies for carpal tunnel syndrome concluded that none of the alternative surgical procedures, including closed endoscopic release, appeared to give better symptom relief than open release; and that the evidence is conflicting as to whether endoscopic release results in earlier return to work or improved level of function.⁵

■ RECOMMENDATIONS FROM OTHERS

The American Society of Plastic and Reconstructive Surgeons recommends surgical release in the following situations⁶: (1) failed or incomplete conservative therapy; (2) motor weakness or thenar atrophy; (3) lumbrical pattern symptoms (occur when the metacarpophalangeal joints are held at 90 degrees, eg, driving, letter writing, holding a magazine, pinching, using a small tool); (4) severe pattern on electrical studies (not defined); (5) space-occupying lesions requiring excision; (6) acute carpal tunnel syndrome with symptoms lasting longer than 6 to 8 hours; and (7) progressive or severe symptoms lasting longer than 12 months. The Society did not recommend one surgical procedure over another.

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■ CLINICAL COMMENTARY

In my practice, many patients have carpal tunnel syndrome and we regularly struggle with the question of whether and when to suggest surgical consultation. This review will make that struggle easier. With at least 33% of cases responding to splinting alone, an initial trial of conservative treatment seems appropriate for most patients. However, early surgical referral when a conservative approach has failed can now be easily justified, given the 90% or better success rate with surgery. The authors also include guidelines from the American Society of Plastic and Reconstructive Surgeons, which may be helpful in selecting which patients should go directly to surgical release.

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From the Office of DR.

■ WHAT IS CARPAL TUNNEL SYNDROME?

Carpal tunnel syndrome is felt as pain, tingling, a burning sensation, or loss of sensation that occurs throughout all or part of the hand. These symptoms may be worse at night and can wake you from sleep. You may feel the pain in just the hand, or it may travel up the arm.

■ HOW IT'S DIAGNOSED

Carpal tunnel syndrome can be challenging to diagnose.

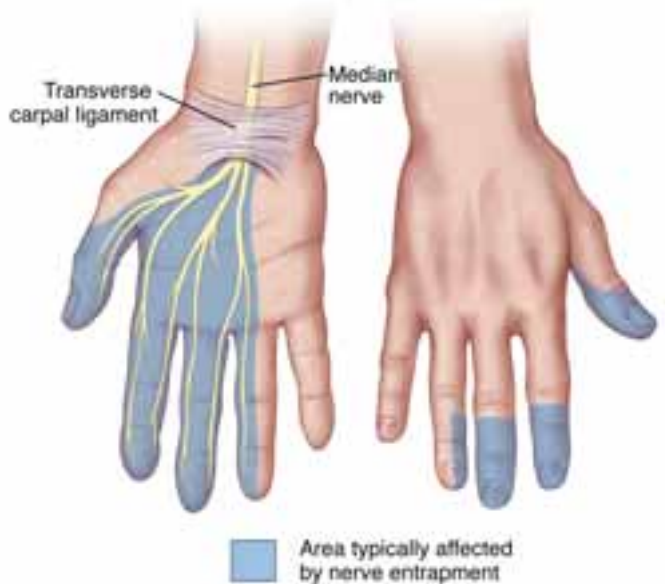
Your doctor will ask you to describe your symptoms and may ask you to perform specific motions with your hand or wrist to see how they affect your symptoms.

Your doctor may arrange for a nerve conduction study—a test to determine how well the nerves in your hand are working. The test can detect if the pressure on the nerve is enough to affect how well it works.

■ HOW IT'S TREATED

Your doctor may ask you to wear wrist splints at night or during work, and may advise you to reduce those activities that make the problem worse. Steroid injections into the carpal tunnel may also help.

If such conservative treatment does not help, your doctor may talk to you about a simple surgical procedure to relieve pressure on the nerve. The surgeon cuts the ligament over the carpal tunnel, which releases the pressure on the nerve. This surgery works well to relieve the symptoms of carpal tunnel syndrome.



In carpal tunnel syndrome, the median nerve that goes to the thumb and first three fingers is compressed or pinched at the wrist by the transverse carpal ligament.



A pinched median nerve can also cause muscle weakness. For instance, you might have weakness in the thumb muscles when you press your thumb against the little finger.

The carpal “tunnel” is the space in which nerves, tendons, and blood vessels pass through the bones of the wrist. Anything that narrows the tunnel, such as swelling of tendons, can compress the nerve and cause carpal tunnel syndrome.

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