

Acute Respiratory Illness in HIV-Positive Patient
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. Shah RM, Kaji AV, Ostrum BJ, Friedman AC. Interpretation of chest radiographs in AIDS patients: usefulness of CD4 lymphocyte counts. <i>Radiographics</i> 1997; 17(1):47-58; discussion 59-61.	12	N/A	To determine usefulness of CD4 counts in the interpretation of chest radiographs (CXR).	Applying CD4 lymphocyte counts makes it possible for the working differential diagnosis of a radiographic pattern to be tailored to the clinical situation of a given patient.	4
2. Fishman JE, Saraf-Lavi E, Narita M, Hollender ES, Ramsinghani R, Ashkin D. Pulmonary tuberculosis in AIDS patients: transient chest radiographic worsening after initiation of antiretroviral therapy. <i>AJR</i> 2000; 174(1):43-49.	13	87	Retrospective review to evaluate the occurrence and nature of transient worsening of tuberculosis in AIDS patients after initiation of HAART.	Transient worsening occurred in 45% HIV+ and HAART vs 20% other two groups. Transient worsening may be a feature of improving immune function.	2
3. Haramati LB, Lee G, Singh A, Molina PL, White CS. Newly diagnosed pulmonary sarcoidosis in HIV-infected patients. <i>Radiology</i> 2001; 218(1):242-246.	13	10	To describe the radiologic and clinical findings of newly diagnosed sarcoidosis in HIV infected patients.	Radiologic features of sarcoidosis in HIV patients resemble the findings of sarcoidosis in non-HIV patients. In HIV infected patients receiving HAART, sarcoidosis may be a manifestation of disease related to restoration of the immune system.	4
4. Nalaboff KM, Rozenshtein A, Kaplan MH. Imaging of Mycobacterium avium-intracellulare infection in AIDS patients on highly active antiretroviral therapy: reversal syndrome. <i>AJR</i> 2000; 175(2):387-390.	14	6	To describe the radiological and clinical features of disseminated Mycobacterium avium-intracellulare in AIDS patients receiving HAART.	67% (4/6) developed lymphadenopathy in various regions. This was associated with fever and a rising CD4.	4
5. Afessa B, Green B. Bacterial pneumonia in hospitalized patients with HIV infection: the Pulmonary Complications, ICU Support, and Prognostic Factors of Hospitalized Patients with HIV (PIP) Study. <i>Chest</i> 2000; 117(4):1017-1022.	13	111	Prospective study to describe the microorganisms, CXR findings, clinical correlates, and outcomes of bacterial pneumonia in HIV-infected patients.	30% of bacterial pneumonias were bacterium. CD4 was lower among those with bacterial pneumonia vs those without bacterial pneumonia. In hospital mortality rate for bacterial pneumonia was 21%. CXR showed pleural effusion in 32% and multilobar consolidation in 41% of those with pneumococcal pneumonia.	1
6. Stringer JR, Beard CB, Miller RF, Wakefield AE. A new name (Pneumocystis jiroveci) for Pneumocystis from humans. <i>Emerg Infect Dis</i> 2002; 8(9):891-896.	12	N/A	To review new name (Pneumocystis jiroveci) for the organism that causes Pneumocystis carinii pneumonia (PCP).	DNA sequence variation exists among samples of Pneumocystis jiroveci. This feature allows re-examination of the relationships between host and pathogen.	4
7. Opravil M, Marincek B, Fuchs WA, et al. Shortcomings of chest radiography in detecting Pneumocystis carinii pneumonia. <i>J Acquir Immune Defic Syndr</i> 1994; 7(1):39-45.	10	93	Retrospective study to determine, in patients with PCP, the frequency of 1) normal CXR, and 2) correlation of CXR with illness severity.	<ul style="list-style-type: none"> Findings on chest roentgenograms were normal in 39%, whereas 36% showed interstitial and 25% acinar infiltrates. Severity of CXR abnormality correlated positively with the severity of the illness. 	1

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8. Greenberg SD, Frager D, Suster B, Walker S, Stavropoulos C, Rothpearl A. Active pulmonary tuberculosis in patients with AIDS: spectrum of radiographic findings (including a normal appearance). <i>Radiology</i> 1994; 193(1):115-119.	10	133	Retrospective studies to assess the accuracy of CXR in detecting active tuberculosis in AIDS patients.	On CXR 36% had a primary tuberculosis pattern, 28% had a post-primary pattern, 19% had a normal CXR, 13% had atypical infiltrates, and 3% had a military pattern. CXR did not suggest active tuberculosis in 43 (32%) of AIDS patients with active pulmonary tuberculosis.	2
9. McGuinness G, Scholes JV, Garay SM, Leitman BS, McCauley DI, Naidich DP. Cytomegalovirus pneumonitis: spectrum of parenchymal CT findings with pathologic correlation in 21 AIDS patients. <i>Radiology</i> 1994; 192(2):451-459.	10	21	Retrospective study to characterize the CT features of cytomegalovirus pneumonia in AIDS patients.	Cytomegalovirus pneumonitis should be suspected in patients with either extrathoracic cytomegalovirus or documented Kaposi sarcoma, especially when radiographic or CT evidence of pulmonary nodules or masses exists.	3
10. Gruden JF, Huang L, Turner J, et al. High-resolution CT in the evaluation of clinically suspected <i>Pneumocystis carinii</i> pneumonia in AIDS patients with normal, equivocal, or nonspecific radiographic findings. <i>AJR</i> 1997; 169(4):967-975.	10	51	Prospective study to assess the diagnostic accuracy of high resolution CT (HRCT) for the presence or absence of PCP and to evaluate the role of HRCT in patients with normal, equivocal or non-specific CXR findings.	HRCT had sensitivity of 100% (6/6), specificity of 89% (5 false positives) accuracy of 90% for identification of PCP vs no PCP. HRCT may allow exclusion of PCP in patients with findings that are normal, equivocal, or nonspecific on CXR.	3
11. Castaner E, Gallardo X, Mata JM, Esteba L. Radiologic approach to the diagnosis of infectious pulmonary diseases in patients infected with the human immunodeficiency virus. <i>Eur J Radiol</i> 2004; 51(2):114-129.	12	N/A	Review radiologic approach to the diagnosis of infectious pulmonary diseases in HIV patients.	CT has improved radiologic diagnosis. Greatest value of CT is in excluding lung disease when the radiographic findings are equivocal and in confirming the presence of clinically suspected disease when the radiograph is normal.	4
12. Knollmann FD, Grunewald T, Neitzert J, et al. Thoracic computed tomography of patients infected with the human immunodeficiency virus: relevance for the course of disease. <i>J Thorac Imaging</i> 1999; 14(3):185-193.	9	154	Retrospective review. To correlate chest CT findings in HIV-infected patients with their clinical course, CXR, CD4, and histologic and microbiologic findings.	Confluent infiltrates and masses indicated advanced disease with a poor median survival of 115 and 174 days, respectively. CD4 counts were associated with CT findings and final diagnosis. Accuracy of CT for specific diagnoses was: normal 79%, Kaposi sarcoma 88%, PCP 76%, mycobacterial infection 90%.	1
13. Aderaye G, Bruchfeld J, Assefa G, et al. The relationship between disease pattern and disease burden by chest radiography, M. tuberculosis Load, and HIV status in patients with pulmonary tuberculosis in Addis Ababa. <i>Infection</i> 2004; 32(6):333-338.	13	168	To evaluate impact of HIV infection on CXR pattern and extent of disease in patients with pulmonary tuberculosis.	HIV+ patients had lower colony count of M. tuberculosis than HIV negative patients.	2

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14. Gelman M, King MA, Neal DE, Pacht ER, Clanton TL, Diaz PT. Focal air trapping in patients with HIV infection: CT evaluation and correlation with pulmonary function test results. <i>AJR</i> 1999; 172(4):1033-1038.	10	59	To correlate inspiratory and expiratory CT findings in HIV-infected patients and controls and to correlate the findings with pulmonary function tests.	63% of HIV infected patients had air trapping which was severe in 6%. This correlated with abnormal pulmonary function including decreased forced expiratory volume in 1 sec (FEV1), and diffusion capacity (D(LCO)). Severe air trapping occurred in patients with low CD4.	2
15. Balestra DJ, Hennigan SH, Ross GS. Clinical prediction of Pneumocystis pneumonia. <i>Arch Intern Med</i> 1992; 152(3):623-624.	13	279 (31 with PCP)	Analyze data to determine predictive value of elements of the history, physical exam, and clinical tests for predicting presence of PCP.	Dyspnea is most sensitive symptom. CXR had high positive (84%) and NPV (94%), and moderate sensitivity (68%) for PCP.	2
16. Fujii T, Nakamura T, Iwamoto A. Pneumocystis pneumonia in patients with HIV infection: clinical manifestations, laboratory findings, and radiological features. <i>J Infect Chemother</i> 2007; 13(1):1-7.	13	32	To describe the clinical and radiographic features of acute respiratory illness due to pneumocystis infection in patients with HIV.	Fever, cough, and dyspnea were the most common presenting symptoms. The most common radiographic presentations were ground glass opacities sparing the lung periphery (41%), ground glass with a mosaic pattern of attenuation (29%), homogenous ground glass, and ground glass with consolidation (21%), with cysts (21%), with linear opacities (18%), with nodules (9%), or with cavities (6%).	3
17. Bigby TD, Margolskee D, Curtis JL, et al. The usefulness of induced sputum in the diagnosis of Pneumocystis carinii pneumonia in patients with the acquired immunodeficiency syndrome. <i>Am Rev Respir Dis</i> 1986; 133(4):515-518.	10	32 (25 with PCP)	To examine the diagnostic sensitivity of induced sputum in diagnosis of PCP in patients with AIDS.	Induced sputum's detected 14/25 (56%) patients with PCP, thereby decreasing the need for bronchoscopy.	3
18. Huang L, Stansell J, Osmond D, et al. Performance of an algorithm to detect Pneumocystis carinii pneumonia in symptomatic HIV-infected persons. Pulmonary Complications of HIV Infection Study Group. <i>Chest</i> 1999; 115(4):1025-1032.	10	306	Prospective studies to determine whether CXR followed by diffusing capacity of the lung for carbon monoxide (D(LCO)) is an effective algorithm for detecting PCP in symptomatic HIV-infected patients.	An algorithm combining a CXR followed by a D(LCO) measurement was effective and detected abnormalities that led to a diagnosis of PCP in 78 of 80 evaluable episodes (97.5%).	1
19. Hidalgo A, Falco V, Mauleon S, et al. Accuracy of high-resolution CT in distinguishing between Pneumocystis carinii pneumonia and non- Pneumocystis carinii pneumonia in AIDS patients. <i>Eur Radiol</i> 2003; 13(5):1179-1184.	10	30	To evaluate the utility of HRCT in differentiating PCP from non-PCP in AIDS patients at high risk for PCP.	HRCT is a reliable method for differentiating PCP from other infectious processes in HIV positive patients.	3

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20. Barron TF, Birnbaum NS, Shane LB, Goldsmith SJ, Rosen MJ. Pneumocystis carinii pneumonia studied by gallium-67 scanning. <i>Radiology</i> 1985; 154(3):791-793.	10	34	To evaluate reliability and validity of Ga-67 lung scans for diagnosis of PCP in AIDS patients.	Ga-67 had a sensitivity and specificity of 94% and 74%, respectively. Recommended in the diagnosis of PCP in AIDS patients with respiratory symptoms when CXR is normal or equivocal.	3
21. Leach RM, Davidson AC, O'Doherty MJ, Nayagam M, Tang A, Bateman NT. Non-invasive management of fever and breathlessness in HIV positive patients. <i>Eur Respir J</i> 1991; 4(1):19-25.	9	72 (36 with PCP)	Prospective study to determine usefulness of non-invasive tests (including CXR) in HIV+ patients with fever and dyspnea.	DTPA lung scan and induced sputum, in combination, detected all cases of PCP.	3
22. Hartman TE, Primack SL, Muller NL, Staples CA. Diagnosis of thoracic complications in AIDS: accuracy of CT. <i>AJR</i> 1994; 162(3):547-553.	10	122	To assess accuracy of CT in diagnosis of thoracic complications of AIDS and determine whether more invasive diagnostic procedures can be avoided.	Certain findings on chest CT scans allow confident diagnoses of specific complications in patients with AIDS.	1
23. Abdel-Dayem HM, Bag R, DiFabrizio L, et al. Evaluation of sequential thallium and gallium scans of the chest in AIDS patients. <i>J Nucl Med</i> 1996; 37(10):1662-1667.	10	181	Retrospective evaluation of sequential thallium-gallium scintigraphy in differentiating intrathoracic Kaposi sarcoma from malignant lymphoma and opportunistic infections.	A thallium-positive, gallium-negative pattern in AIDS patients has a high specificity for the diagnosis of Kaposi sarcoma, but the sensitivity dropped from 89% to 37% in the presence of opportunistic infections.	2
24. Jasmer RM, Edinburgh KJ, Thompson A, et al. Clinical and radiographic predictors of the etiology of pulmonary nodules in HIV-infected patients. <i>Chest</i> 2000; 117(4):1023-1030.	13	87	Retrospective analysis to determine the clinical and radiological predictors for the etiology of lung nodules on chest CT of HIV infected patients.	In HIV patients having pulmonary nodules on chest CT scan, opportunistic infections are the most common cause. Specific clinical and radiographic features can suggest particular opportunistic infections.	2
25. Nyamande K, Laloo UG, Vawda F. Comparison of plain chest radiography and high-resolution computed tomography in human immunodeficiency virus infected patients with community-acquired pneumonia: a Sub-Saharan Africa study. <i>Br J Radiol</i> 2006.	9	49	To determine the proportion of patients with missed lesions on CXR compared with HRCT in HIV patients community-acquired pneumonia (CAP).	In 82% of patients, at least one key thoracic abnormality was visualized on HRCT but not on CXR. Mediastinal lymphadenopathy, ground glass opacification, pleural effusions, and pericardial effusions were among the lesions most commonly missed.	3
26. Leutner CC, Gieseke J, Lutterbey G, et al. MR imaging of pneumonia in immunocompromised patients: comparison with helical CT. <i>AJR</i> 2000; 175(2):391-397.	9	16	To compare T2-weighted turbo spin-echo MRI and CT in characterizing pneumonia in immunocompromised patients.	T2-weighted turbo spin-echo imaging is able to depict characteristic features of pneumonia and shows excellent results compared with CT. This MRI technique offers advantages in patients with pneumonia because of its higher sensitivity for necrotizing pneumonia.	3

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27. Fishman JE, Sagar M. Thoracic lymphadenopathy in HIV patients: spectrum of disease and differential diagnosis. <i>AIDS Patient Care STDS</i> 1999; 13(11):645-649.	13	45	To evaluate the etiology of intrathoracic lymphadenopathy (LAD) on CT in HIV infected patients.	78% of infections were mycobacterial. 39% of tumors were lymphoma which was most common. When the diagnosis was infection, mean CD4 was 62 vs 314 for tumor ($p<0.05$). CT and clinical findings may help direct the differential diagnosis of LAD in AIDS patients.	3
28. Jasmer RM, Gotway MB, Creasman JM, Webb WR, Edinburgh KJ, Huang L. Clinical and radiographic predictors of the etiology of computed tomography-diagnosed intrathoracic lymphadenopathy in HIV-infected patients. <i>J Acquir Immune Defic Syndr</i> 2002; 31(3):291-298.	13	318	To evaluate which clinical and imaging features are useful in predicting specific diagnostic etiology for intrathoracic lymphadenopathy on chest CT in HIV infected patients.	28% (31/110) had mycobacterial infection, 24% (26/110) had bacterial pneumonia, and 19% (21/110) had lymphoma. Cough and necrotic lymph nodes were predictive of mycobacterial infection. Intrathoracic lymphadenopathy is a frequent chest CT finding in HIV-infected patients.	2
29. Pastores SM, Naidich DP, Aranda CP, McGuinness G, Rom WN. Intrathoracic adenopathy associated with pulmonary tuberculosis in patients with human immunodeficiency virus infection. <i>Chest</i> 1993; 103(5):1433-1437.	13	25	Retrospective study to describe the role of computed tomography (CT) in the diagnosis of mediastinal tuberculosis lymphadenitis in HIV infected patients.	Low-density mediastinal and/or hilar lymph nodes on CT is sufficiently characteristic for tuberculosis to warrant empiric antituberculosis therapy pending results of cultures.	3
30. Busi Rizzi E, Schinina V, Palmieri F, Girardi E, Bibbolino C. Radiological patterns in HIV-associated pulmonary tuberculosis: comparison between HAART-treated and non-HAART-treated patients. <i>Clin Radiol</i> 2003; 58(6):469-473.	13	209	To determine if treatment with HAART affects the frequencies of typical radiographic appearances of tuberculosis in HIV infected patients.	82% of patients on HAART displayed a post-primary pattern of radiographic appearance (defined as upper lobe consolidation with or without cavitation; bronchogenic spread, without adenopathy) as opposed to a primary pattern (adenopathy, pleural effusion, middle or lower lobe consolidation, or interstitial changes). In contrast, 44% of patients not on HAART developed a post-primary pattern.	2
31. Morris DG, Jasmer RM, Huang L, Gotway MB, Nishimura S, King TE, Jr. Sarcoidosis following HIV infection: evidence for CD4+ lymphocyte dependence. <i>Chest</i> 2003; 124(3):929-935.	13	23	Retrospective review to determine the typical CD4+ count of HIV patients presenting with new onset sarcoidosis.	In a review of 23 HIV patients with granulomatous disease (selected by pathology reports), all 8 patients with HIV and new onset sarcoidosis had a CD4+ lymphocyte count <200. In 75% of the 16 HIV patients with etiologies other than sarcoidosis, the CD4+ count was >200.	3

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32. Guihot A, Couderc LJ, Agbalika F, et al. Pulmonary manifestations of multicentric Castleman's disease in HIV infection: a clinical, biological and radiological study. <i>Eur Respir J</i> 2005; 26(1):118-125.	13	12	Retrospective study to report clinical presentations, radiologic appearances, and bronchoalveolar lavage findings in patients with respiratory illness due to HIV-associated multicentric Castleman's disease.	The most common clinical findings were dyspnea, peripheral lymphadenopathy, hepatosplenomegaly, fever, cough, and crackles. Reticular interstitial (in 7) and nodular intestinal patterns (7) were common on CXR and CT, as were mediastinal lymphadenopathy (9), and bilateral pleural effusions (3). Bronchoalveolar lavage (BAL) showed hypercellularity and/or lymphocytosis.	3
33. Shelburne SA, Visnegarwala F, Darcourt J, et al. Incidence and risk factors for immune reconstitution inflammatory syndrome during highly active antiretroviral therapy. <i>Aids</i> 2005; 19(4):399-406.	13	180	Retrospective review to determine risk factors for immune reconstitution syndrome in patients with HIV on highly active antiretroviral therapy (HAART) in opportunistic infection with mycobacterium tuberculosis, mycobacterium avium complex, and cryptococcus.	31.7% of patients studied developed immune reconstitution syndrome. These patients were more likely than those not developing the syndrome to have begun HAART near the time of diagnosis of opportunistic infection, to have had a more rapid fall in HIV RNA after initiation, and to have been naive to HAART.	2
34. French MA, Price P, Stone SF. Immune restoration disease after antiretroviral therapy. <i>Aids</i> 2004; 18(12):1615-1627.	12	N/A	To review immune restoration disease (IRD) after antiretroviral therapy.	Among infectious etiologies for immune reconstitution syndrome, mycobacteria, cryptococci, herpesvirus, hepatitis B and C, and JC virus are common. Pathophysiology of IRD appears to be specific to the etiologic agent.	4
35. Rajeswaran G, Becker JL, Michailidis C, Pozniak AL, Padley SP. The radiology of IRIS (immune reconstitution inflammatory syndrome) in patients with mycobacterial tuberculosis and HIV co-infection: Appearances in 11 patients. <i>Clin Radiol</i> 2006; 61(10):833-843.	13	11	Retrospective review to investigate the radiographic findings in cases of immune reconstitution inflammatory syndrome occurring in patients with HIV and mycobacterium tuberculosis co-infection.	Axillary lymphadenopathy was observed in 40% and mediastinal lymphadenopathy in 36%. Central low attenuation of adenopathy was seen in most (88%) of cases. Diffuse parenchymal nodules were seen in 55%. Unilateral pleural effusions were observed in 2 cases. Abdominal abscesses and lymphadenopathy were also observed.	3
36. Gruden JF, Huang L, Webb WR, Gamsu G, Hopewell PC, Sides DM. AIDS-related Kaposi sarcoma of the lung: radiographic findings and staging system with bronchoscopic correlation. <i>Radiology</i> 1995; 195(2):545-552.	13	76	Retrospective review to determine CXR findings of intrathoracic Kaposi sarcoma in AIDS patients with bronchoscopically proven disease.	Statistically significant relationship between extent of tracheobronchial disease and radiographic stage ($p=.01$). Correlation between tracheobronchial and parenchymal disease.	2

Evidence Table Key

Study Type Key

Numbers 1-7 are for studies of therapies while numbers 8-15 are used to describe studies of diagnostics.

1. Randomized Controlled Trial — Treatment
2. Controlled Trial
3. Observation Study
 - a. Cohort
 - b. Cross-sectional
 - c. Case-control
4. Clinical Series
5. Case reviews
6. Anecdotes
7. Reviews

8. Randomized Controlled Trial — Diagnostic
9. Comparative Assessment
10. Clinical Assessment
11. Quantitative Review
12. Qualitative Review
13. Descriptive Study
14. Case Report
15. Other (Described in text)

Strength of Evidence Key

- Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.
- Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.
- Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.
- Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.