

Supplementary data

Community Acquired Lung Respiratory Infections in HIV-Infected Patients: Microbial Aetiology and Outcome

Catia Cilloniz^{1, 2}, Antoni Torres^{1, 2}, Eva Polverino^{1, 2}, Albert Gabarrus^{1, 2}, Rosanel Amaro^{1, 2}, Encarnacion Moreno^{1, 2}, Santiago Villegas³, Mar Ortega⁴, Josep Mensa⁴, Maria Angeles Marcos⁵, Asuncion Moreno⁴ and Jose M. Miro⁴

¹Department of Pneumology, Institut del Tórax, Hospital Clinic, IDIBAPS, University of Barcelona, Barcelona, Spain

²Centro de Investigación Biomédica En Red-Enfermedades Respiratorias (CibeRes, CB06/06/0028)

³Departamento de Medicina Crítica y Cuidados Intensivos, Universidad CES, Medellin Colombia

⁴Infectious Disease Service, Hospital Clinic-IDIBAPS. University of Barcelona, Barcelona, Spain

⁵Department of Microbiology, Barcelona Centre for International Health Research (CRESIB, Hospital Clinic - University of Barcelona), Barcelona, Spain

Corresponding author:

Antoni Torres

Department of Pneumology; Hospital Clinic of Barcelona
Villarroel 170; Barcelona, Spain.

Email: atorres@clinic.ub.es

Website: www.idibapsrespiratoryresearch.org.

METHODS

Data Collection

The following data were collected at the time of hospital admission: age, gender, CD4+ cells/count, plasma HIV viral load, previous or current intravenous drug use, and current treatment of HIV infection, current smoking (>10 pack-years), alcohol habits (ingestion of an estimated amount of >80g alcohol per day for at least one year before presentation), comorbid illnesses, antimicrobial treatment prior to hospital admission, cotrimoxazol prophylaxis, highly active antiretroviral therapy (HAART), duration of symptoms before the diagnosis of pneumonia, clinical symptoms (fever, cough, pleuritic pain, dyspnea, mental confusion, and aspiration), physical examination, clinical sign (blood pressure, body temperature, respiratory rate, and heart rate), chest radiography pattern (number of lobes affected, pleural effusion, and atelectasis), blood analysis (hemoglobin level, white blood cells (WBC) count, platelet count, serum creatinine level, C-reactive protein (C-RP) level, and other biochemical parameters), pulmonary complications (empyema, acute respiratory distress syndrome (ARDS) criteria, pleural effusion, surgical pleural draining), clinical events (cardiac arrhythmias, septic shock, acute renal failure) and antimicrobial treatment at admission. Pneumonia severity index (PSI) and CURB-65 scores were determined in all patients. Patients were stratified into low, intermediate and high-risk classes as follows: PSI score: low risk = classes I-III, and high risk = class IV-V; CURB-65: low risk = classes 0-2 and high risk = classes 3-5.

Microbiological Evaluation

Tracheobronchial aspirates (TBAS) and bronchoalveolar lavage (BAL) samples were processed for quantitative culture by serial dilutions for bacterial pathogens; undiluted cultures for *Legionella* spp., fungi and mycobacteria were also carried out. Nasopharyngeal swabs and BAL specimens were processed for antigen detection by immunofluorescence assay (IFA) and for isolation of viruses in cell culture (influenza virus A, influenza virus B, human parainfluenza virus 1-3, adenovirus and respiratory syncytial virus). In addition two independent multiplex-nested RT-PCR assays able to detect from 1-10 copies of viral genomes were performed for the diagnostics of respiratory viruses. One RT-PCR assay detected influenza virus types A, B and C, respiratory syncytial virus A and B, and adenovirus. Another RT-PCR assay studied parainfluenza viruses 1, 2, 3 and 4, coronaviruses 229E and OC43, rhinoviruses and enteroviruses. All positive results were subsequently confirmed by a second independent assay.

Diagnostic Criteria

The aetiology was considered definite if one of the following criteria was met: 1) blood culture positive (in the absence of an apparent extra-pulmonary focus); 2) positive bacterial culture of pleural fluid or transthoracic needle aspiration samples; 3) elevated serum levels of IgM against *C. pneumoniae* ($\geq 1:64$), *C. burnetii* ($\geq 1:80$) and *M. pneumoniae* (any positive titre); 4) seroconversion (ie, a fourfold increase in IgG titres) for *C. pneumoniae*, *L. pneumophila*, *C. burnetii* and respiratory viruses (influenza viruses A and B, parainfluenza viruses 1-3, respiratory syncytial virus, adenovirus); 5) positive urinary antigen for *L. pneumophila* (Binax Now *L. pneumophila* urinary Antigen Test; Trinity Biotech, Bray, Ireland); 6) positive urinary antigen for *S. pneumoniae* (Binax

Now *S. pneumoniae* urinary Antigen Test; Emergo Europe, The Hague, The Netherlands); 7) bacterial growth in cultures of TBAS ($\geq 10^5$ cfu/mL), in protected specimen brush ($\geq 10^3$ cfu/mL), and BAL ($\geq 10^4$ cfu/mL); 8) detection of antigens by immunofluorescence assay (IFA) plus virus isolation or detection by reverse transcriptase polymerase chain reaction (RT-PCR) testing for respiratory virus (Influenza viruses A and B, parainfluenza virus 1 to 3, respiratory syncytial virus, rhinovirus, adenovirus).

Pneumocystis jiroveci infection was confirmed microscopically by BAL or induced sputum (IS) as part of routine diagnostic procedures.

The aetiology of pneumonia was classified as presumptive when a predominant microorganism was isolated from a purulent sample (leukocytes >25 per high power microscopic field and few epithelial cells <10 per high power microscopic field) and the findings of Gram staining were compatible. For the purpose of this study presumptive and definitive diagnostic were analyzed together.

Statistical Analysis

Receiver operating characteristic (ROC) curves were constructed to determine the best cut-points of the bacterial CAP and pneumocystic CAP in relation to C-reactive protein and LDH; the area under the curve (AUC), sensitivity, specificity, predictive positive value, predictive negative value, positive likelihood ratio, and negative likelihood ratio were calculated. Univariate and multivariate logistic regression analyses were performed to identify variables predictive of 30-day hospital mortality (dependent variable). The variables analyzed in the univariate analysis were: age (years), gender, smoking, alcohol consumption, previous antibiotic, influenza vaccination, pneumococcal vaccination, days of symptoms (≤ 5 vs. >5), HAART therapy, chronic

pulmonary disease, chronic cardiovascular disease, diabetes mellitus, neurological disease, chronic renal disease, chronic liver disease, pleuritic pain, fever, altered mental status, dyspnea, cough, septic shock, acute renal disease, serum creatinine (<1.5 vs. \geq 1.5 mg/dL), C-RP (<12 vs. \geq 12 mg/dL or <22 vs. \geq 22 mg/dL), WBC count (\leq 4,000 vs. $>$ 4,000 $\times 10^9$ cell/L), platelet count (<400 vs. \geq 400 $\times 10^9$ platelets/L), LDH (<598 vs. \geq 598 U/L), $\text{PaO}_2/\text{FiO}_2$ (<250 vs. \geq 250), multilobar affection, bacteremia, pleural effusion, mechanical ventilation, bacterial CAP, multidrug-resistant (MDR), CD4+ (<200 vs. \geq 200 cells/mm³), plasma HIV-RNA level (<200 vs. \geq 200 copies/mL), co-infection with HCV, co-infection with HBV, diagnosis of HIV infection (prior to hospital admission vs. during the episode of pneumonia) and appropriate antibiotic treatment. Univariate and two multivariate logistic regression models were also performed to predict patients with bacterial CAP and patients with pneumocystic CAP, respectively. The variables analyzed in the univariate analysis were those mentioned above except bacterial CAP, bacteremia and appropriate antibiotic treatment.

RESULTS

Table 1. Characteristics of HIV cases stratified by CD4+ cell count

| Variables | <200 | ≥200 | p-value |
|--|----------------------------|----------------------------|------------------|
| | CD4+ cells/mm ³ | CD4+ cells/mm ³ | |
| | (n = 128) | (n = 203) | |
| Demographic | | | |
| Age (years), mean ± SD | 41.7 ± 9.1 | 42.4 ± 9.7 | 0.49 |
| Sex (male), n (%) | 97 (75.8) | 146 (71.9) | 0.44 |
| Current smoking, n (%) | 69 (53.9) | 151 (75.1) | <0.001 |
| Current alcohol abuse, n (%) | 28 (21.9) | 59 (29.5) | 0.13 |
| Prior antibiotic treatment, n (%) | 30 (23.4) | 29 (14.3) | 0.034 |
| Influenza vaccine, n (%) | 5 (4.6) | 15 (8.9) | 0.18 |
| Pneumococcal vaccine, n (%) | 3 (2.8) | 14 (8.4) | 0.059 |
| Days of symptoms, median (IQR) | 7.0 (4.0-8.0) | 5.0 (3.0-7.0) | 0.031 |
| HAART therapy, n (%) | 40 (31.3) | 130 (64.0) | <0.001 |
| Cotrimoxazole prophylaxis n (%) | 47 (36.7) | 87 (42.9) | 0.27 |
| Co-infection with HCV, n (%) | 34 (26.6) | 106 (52.2) | <0.001 |
| Co-infection with HBV, n (%) | 13 (10.2) | 18 (8.9) | 0.70 |
| Diagnosis of HIV infection during the episode of pneumonia, n (%) | 42 (32.8) | 15 (7.4) | <0.001 |
| Comorbidity, n (%) | | | |
| Chronic respiratory disease, n (%) | 29 (22.7) | 68 (33.5) | 0.035 |
| Chronic cardiovascular disease, n (%) | 6 (4.7) | 3 (1.5) | 0.082 |
| Diabetes mellitus, n (%) | 0 (0) | 14 (7.0) | 0.002 |
| Neurological disease, n (%) | 26 (20.3) | 63 (31.3) | 0.028 |
| Chronic renal disease, (%) | 4 (3.1) | 12 (5.9) | 0.25 |
| Chronic liver disease, n (%) | 26 (20.3) | 82 (40.4) | <0.001 |
| Laboratory findings | | | |
| Creatinine (mg/dL), median (IQR) | 0.9 (0.8-1.1) | 1.0 (0.8-1.2) | 0.28 |
| Creatinine ≥1.5 mg/dL, n (%) | 19 (14.8) | 35 (17.4) | 0.54 |
| C-reactive protein level (mg/dL), median (IQR) | 8.1 (3.3-17.0) | 13.4 (6.8-23.3) | <0.001 |

| Variables | <200 | | p-value | |
|---|----------------------------|----------------------|------------------|--|
| | CD4+ cells/mm ³ | | | |
| | (n = 128) | (n = 203) | | |
| C-reactive protein level ≥22 mg/dL, n (%) | 19 (16.1) | 50 (27.6) | 0.021 | |
| C-reactive protein level ≥12 mg/dL, n (%) | 44 (37.3) | 103 (56.9) | 0.001 | |
| WBC count (x10 ⁹ cell/L), median (IQR) | 6,500 (4,100-9,700) | 9,635 (6,250-13,450) | <0.001 | |
| WBC count >4,000 x 10 ⁹ cell/L, n (%) | 98 (76.6) | 179 (89.5) | 0.002 | |
| Platelet count (x10 ⁹ platelets/L), median (IQR) | 225.5 (153.0-344.5) | 204.0 (127.0-279.0) | 0.10 | |
| Platelet count ≥400 x10 ⁹ platelets/L, n (%) | 8 (8.7) | 8 (6.6) | 0.57 | |
| LDH (U/L), median (IQR) | 547.0 (350.0-853.0) | 360.0 (322.0-477.0) | <0.001 | |
| LDH, ≥598 U/L, n (%) | 77 (60.2) | 64 (31.5) | <0.001 | |
| Sat O ₂ (%), median (IQR) | 93.1 (88.8-96.0) | 94.0 (90.0-97.0) | 0.19 | |
| Sat O ₂ <92 %, n (%) | 23 (40.4) | 27 (34.2) | 0.46 | |
| PaO ₂ /FIO ₂ , median (IQR) | 288.6 (242.9-366.7) | 295.2 (238.1-357.1) | 0.86 | |
| PaO ₂ /FIO ₂ <250, n (%) | 24 (30.8) | 35 (29.2) | 0.81 | |
| Etiology, n (%) | | | | |
| Unknown etiology | 33 (25.8) | 71 (35.0) | 0.079 | |
| <i>Streptococcus pneumoniae</i> | 25 (19.5) | 75 (36.9) | 0.001 | |
| <i>Pneumocystis jirovecii</i> | 35 (27.3) | 7 (3.4) | <0.001 | |
| Mixed etiology* | 17 (13.3) | 21 (10.3) | 0.41 | |
| Respiratory viruses [#] | 4 (3.1) | 14 (6.9) | 0.14 | |
| <i>Haemophilus influenzae</i> | 3 (2.3) | 4 (2.0) | >0.99 | |
| <i>Staphylococcus aureus</i> | 3 (2.3) | 1 (0.5) | 0.30 | |
| <i>Pseudomonas aeruginosa</i> | 3 (2.3) | 3 (1.5) | 0.68 | |
| <i>Legionella pneumophila</i> | 0 (0) | 3 (1.5) | 0.29 | |
| <i>Escherichia coli</i> | 0 (0) | 1 (0.5) | >0.99 | |
| <i>Klebsiella pneumoniae</i> | 0 (0) | 1 (0.5) | >0.99 | |
| <i>Mycoplasma pneumoniae</i> | 1 (0.8) | 0 (0) | 0.39 | |
| Others ^{\$} | 4 (3.1) | 2 (1.0) | 0.21 | |
| PSI IV-V, n (%) | | | | |
| Multilobar infiltrates, n (%) | 29 (22.8) | 57 (28.5) | 0.26 | |
| | 69 (53.9) | 64 (31.5) | <0.001 | |

| Variables | <200 | ≥200 | p-value |
|--|----------------------------|----------------------------|--------------|
| | CD4+ cells/mm ³ | CD4+ cells/mm ³ | |
| | (n = 128) | (n = 203) | |
| Bacteremia, n (%) | 17 (13.3) | 33 (16.3) | 0.45 |
| ICU admission, n (%) | 26 (20.3) | 37 (18.2) | 0.64 |
| Mechanical ventilation, n (%) | 15 (12.3) | 34 (17.3) | 0.23 |
| Length of hospital stay (days), median (IQR) | 10.0 (5.0-17.0) | 6.0 (4.0-11.0) | 0.001 |
| 30-day hospital mortality, n (%) | 11 (8.6) | 11 (5.4) | 0.26 |

Percentages calculated on non-missing data. Abbreviations: HAART = highly active antiretroviral therapy; IQR = interquartile range; LDH = lactate dehydrogenase; PaO₂/FIO₂ = ratio between arterial pressure of oxygen and fraction of inspired oxygen; PSI = pneumonia severity index; Sat O₂ = oxygen saturation; SD = standard deviation; WBC = white blood cells. [#] Mixed etiology: *Streptococcus pneumoniae* plus influenza A virus; *Haemophilus influenzae* plus influenza virus A; *Streptococcus pneumoniae* plus adenovirus; *Streptococcus pneumoniae* plus rhinovirus; *Legionella pneumophila* plus rhinovirus; *Streptococcus pneumoniae* plus *Pseudomonas aeruginosa*. * Respiratory viruses: Influenza virus A, Influenza virus B, Rhinovirus; Adenovirus; Respiratory syncytial virus; Parainfluenza virus 2; Parainfluenza virus 3. [§] Other microorganism (*E. faecalis*, *S. sanguis*, *S. constellatus*, *Fusobacterium*, *S. pyogenes*).

Table 2. Characteristics of HIV cases stratified by the plasma HIV-RNA viral load level

| Variables | <200 HIV-RNA | ≥200 HIV-RNA | p-value |
|-----------------------------------|-----------------------|------------------------|------------------|
| | copies/mL (n = 99) | copies/mL (n = 232) | |
| Demographic | | | |
| Age (years), mean ± SD | 46.3 ± 10.6 | 40.3 ± 8.4 | <0.001 |
| Sex (male), n (%) | 70 (70.7) | 173 (74.6) | 0.47 |
| Current smoking, n (%) | 67 (68.4) | 153 (66.2) | 0.71 |
| Current alcohol abuse, n (%) | 23 (23.2) | 64 (27.9) | 0.37 |
| Prior antibiotic treatment, n (%) | 11 (11.1) | 48 (20.7) | 0.037 |
| Influenza vaccine, n (%) | 9 (11.4) | 11 (6.5) | 0.092 |
| Pneumococcal vaccine, n (%) | 9 (11.4) | 8 (4.1) | 0.023 |
| Days of symptoms, median (IQR) | 5.0 (3.0-7.0) | 6.0 (4.0-7.0) | 0.034 |

| Variables | <200 HIV-RNA | ≥200 HIV-RNA | p-value |
|--|----------------------|----------------------|------------------|
| | copies/mL | copies/mL | |
| | (n = 99) | (n = 232) | |
| HAART therapy, n (%) | 99 (100) | 82 (35.3) | <0.001 |
| Cotrimozaxole prophylaxis, n (%) | 50 (50.5) | 84 (36.2) | 0.015 |
| HCV Co-infection, n (%) | 55 (55.6) | 85 (36.6) | 0.001 |
| HBV Co-infection, n (%) | 10 (10.1) | 21 (9.1) | 0.76 |
| Diagnosis of HIV infection during the episode of pneumonia, n (%) | 3 (3.0) | 54 (23.3) | <0.001 |
| Comorbidity, n (%) | | | |
| Chronic respiratory disease | 32 (32.3) | 65 (28.0) | 0.43 |
| Chronic cardiovascular disease | 5 (5.1) | 4 (1.7) | 0.090 |
| Diabetes mellitus | 9 (9.1) | 5 (2.2) | 0.005 |
| Neurological disease | 28 (28.3) | 61 (26.5) | 0.74 |
| Chronic renal disease | 11 (11.1) | 5 (2.2) | 0.001 |
| Chronic liver disease | 43 (43.4) | 65 (28.0) | 0.006 |
| Laboratory findings | | | |
| Creatinine (mg/dL), median (IQR) | 1.0 (0.8-1.3) | 0.9 (0.8-1.2) | 0.33 |
| Creatinine ≥1.5 mg/dL, n (%) | 19 (19.4) | 35 (15.2) | 0.34 |
| C-reactive protein level (mg/dL), median (IQR) | 13.9 (7.2-22.4) | 10.0 (4.5-20.2) | 0.021 |
| C-reactive protein level ≥22 mg/dL, n (%) | 25 (26.0) | 44 (21.7) | 0.40 |
| C-reactive protein level ≥12 mg/dL, n (%) | 58 (60.4) | 89 (43.8) | 0.007 |
| WBC count ($\times 10^9$ cell/L), median (IQR) | 9,190 (6,200-13,270) | 7,830 (4,800-11,400) | 0.034 |
| WBC count $>4,000 \times 10^9$ cell/L, n (%) | 89 (89.9) | 188 (82.1) | 0.073 |
| Platelet count ($\times 10^9$ platelets/L), median (IQR) | 201.5 (135.5-273.5) | 213.0 (148.0-310.0) | 0.34 |
| Platelet count $\geq 400 \times 10^9$ platelets/L, n (%) | 6 (7.5) | 10 (7.5) | >0.99 |
| LDH (U/L), median (IQR) | 350.0 (322.0-470.0) | 437.0 (341.5-676.5) | 0.002 |
| LDH, ≥ 598 U/L, n (%) | 19 (19.2) | 76 (32.8) | 0.012 |
| Sat O ₂ (%), median (IQR) | 91.0 (89.1-96.0) | 94.0 (90.0-96.2) | 0.32 |
| Sat O ₂ <92 %, n (%) | 16 (51.6) | 34 (32.4) | 0.051 |
| PaO ₂ /FIO ₂ , median (IQR) | 283.3 (228.6-357.1) | 295.2 (242.9-364.3) | 0.49 |

| Variables | <200 HIV-RNA | ≥200 HIV-RNA | p-value |
|---|----------------|----------------|------------------|
| | copies/mL | copies/mL | |
| | (n = 99) | (n = 232) | |
| PaO ₂ /FIO ₂ <250, n (%) | 20 (37.0) | 39 (27.1) | 0.17 |
| Etiology, n (%) | | | |
| Unknown etiology | 34 (34.3) | 70 (30.2) | 0.45 |
| <i>Streptococcus pneumoniae</i> | 38 (38.4) | 62 (26.7) | 0.034 |
| <i>Pneumocystis jirovecii</i> | 2 (2.0) | 40 (17.2) | <0.001 |
| Mixed etiology* | 8 (8.1) | 30 (12.9) | 0.21 |
| Respiratory viruses [#] | 8 (8.1) | 10 (4.3) | 0.17 |
| <i>Haemophilus influenzae</i> | 2 (2.0) | 5 (2.2) | >0.99 |
| <i>Pseudomonas aeruginosa</i> | 2 (2.0) | 2 (0.9) | 0.59 |
| <i>Staphylococcus aureus</i> | 3 (3.0) | 3 (1.3) | 0.37 |
| <i>Legionella pneumophila</i> | 0 (0) | 3 (1.3) | 0.56 |
| <i>Escherichia coli</i> | 0 (0) | 1 (0.4) | >0.99 |
| <i>Klebsiella pneumoniae</i> | 1 (1.0) | 0 (0) | 0.30 |
| <i>Mycoplasma pneumoniae</i> | 0 (0) | 1 (1.4) | >0.99 |
| Others ^{\$} | 1 (1.0) | 5 (2.2) | 0.67 |
| PSI IV-V, n (%) | 31 (31.6) | 55 (24.0) | 0.15 |
| Multilobar infiltrates, n (%) | 32 (32.3) | 101 (43.5) | 0.057 |
| Bacteremia, n (%) | 15 (15.2) | 35 (15.2) | >0.99 |
| ICU admission, n (%) | 14 (14.1) | 49 (21.1) | 0.14 |
| Mechanical ventilation, n (%) | 18 (18.2) | 31 (14.1) | 0.35 |
| Length of hospital stay (days), median (IQR) | 7.0 (4.0-12.0) | 7.0 (4.0-14.0) | 0.76 |
| 30-day hospital mortality, n (%) | 6 (6.1) | 16 (6.9) | 0.78 |

Percentages calculated on non-missing data. Abbreviations: HAART = highly active antiretroviral therapy; IQR = interquartile range; LDH = lactate dehydrogenase; PaO₂/FIO₂ = ratio between arterial pressure of oxygen and fraction of inspired oxygen; PSI = pneumonia severity index; Sat O₂ = oxygen saturation; SD = standard deviation; WBC = white blood cells. * Mixed etiology: *Streptococcus pneumoniae* plus influenza A virus; *Haemophilus influenzae* plus influenza virus A; *Streptococcus pneumoniae* plus adenovirus; *Streptococcus pneumoniae* plus rhinovirus; *Legionella pneumophila* plus rhinovirus; *Streptococcus pneumoniae* plus *Pseudomonas aeruginosa*. [#] Respiratory viruses: Influenza virus A, Influenza virus B,

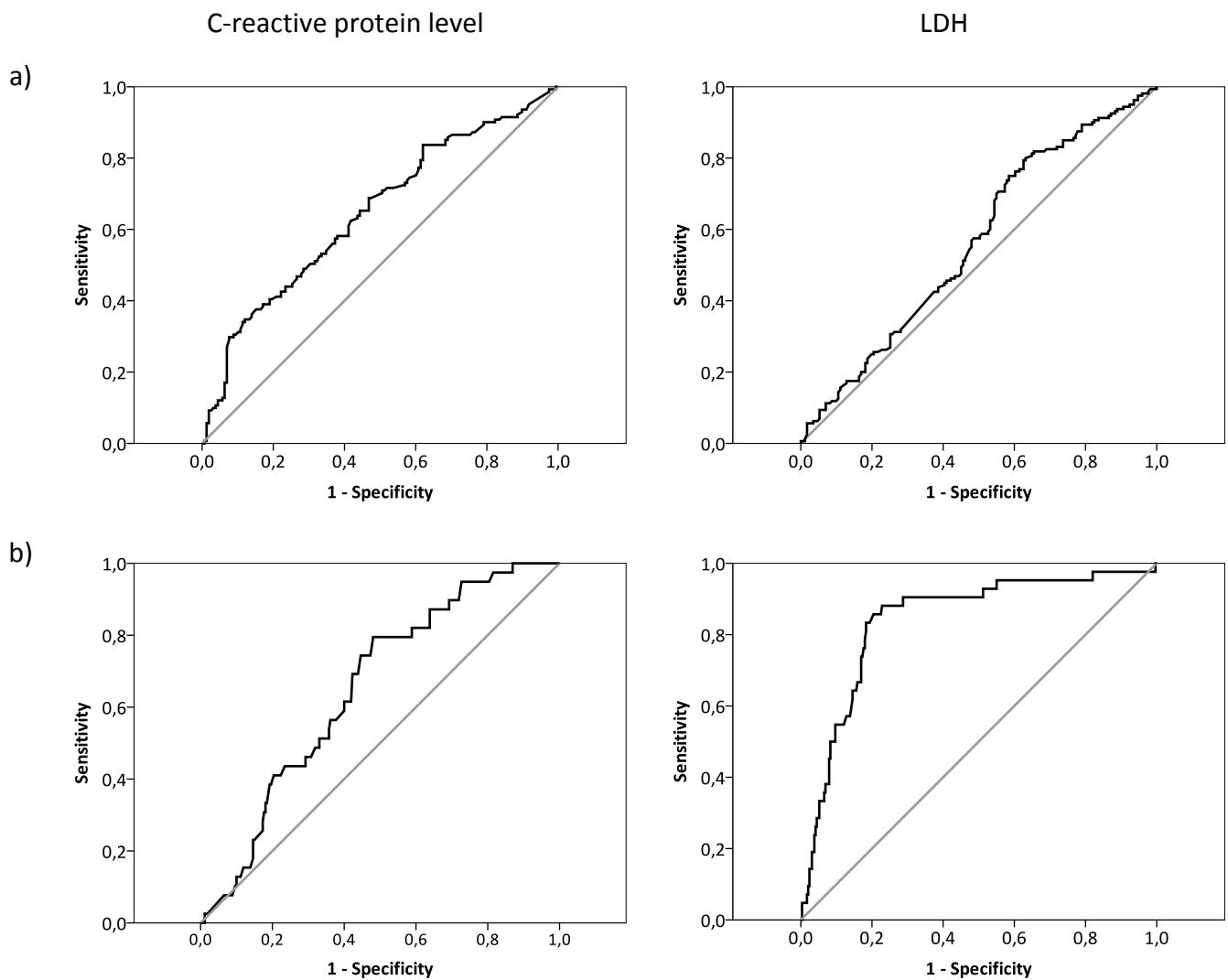
Rhinovirus; Adenovirus; Respiratory syncytial virus; Parainfluenza virus 2; Parainfluenza virus 3. [§] Other microorganism (*E. faecalis*, *S. sanguis*, *S. constellatus*, *Fusobacterium*, *S. pyogenes*).

Table 3. Radiological features by microorganism

| Microorganisms in total population (n=331) | Alveolar | Interstitial | Mixed | | Pleural | |
|---|----------------------|---------------------|---------------------|------------------------|--------------------|----------------------|
| | Opacities (n=225) | Opacities (n=64) | Opacities (n=12) | Multilobar (n= 133) | effusion (n=35) | Cavitations (n=6) |
| | | | | | | |
| Unknown etiology | 72 (32.0) | 28 (29.8) | 4 (33.3) | 30 (22.6) | 9 (25.7) | 1 (16.7) |
| <i>Streptococcus pneumoniae</i> | 96 (42.7) | 0 (0) | 4 (33.3) | 31 (23.3) | 13 (37.1) | 0 (0) |
| <i>Pneumocystis jirovecii</i> | 4 (0.9) | 39 (41.5) | 1 (8.3) | 36 (27.1) | 2 (5.7) | 0 (0) |
| Mixed etiology* | 28 (12.4) | 9 (9.6) | 1 (8.3) | 16 (12.0) | 4 (11.0) | 0 (0) |
| Respiratory viruses [#] | 4 (1.8) | 13 (13.8) | 1 (8.3) | 5 (3.8) | 0 (0) | 0(0) |
| <i>Haemophilus influenzae</i> | 5(2.2) | 1 (1.1) | 1 (8.3) | 2 (1.5) | 0 (0) | 0(0) |
| <i>Staphylococcus aureus</i> | 4 (1.8) | 2 (2.1) | 0 (0) | 5 (3.8) | 3 (8.6) | 3 (50.0) |
| <i>Pseudomonas aeruginosa</i> | 3 (1.3) | 1 (1.1) | 0(0) | 3 (2.3) | 0 (0) | 0 (0) |
| <i>Legionella pneumophila</i> | 3 (1.3) | 0 (0) | 0(0) | 1 (0.8) | 1 (2.9) | 0 (0) |
| <i>Escherichia coli</i> | 1 (0.4) | 0 (0) | 0(0) | 1 (0.8) | 0 (0) | 0 (0) |
| <i>Klebsiella pneumoniae</i> | 1 (0.4) | 0 (0) | 0 (0) | 0 (0) | 1 (2.9) | 0 (0) |
| <i>Mycoplasma pneumoniae</i> | 1 (0.4) | 0 (0) | 0 (0) | 1 (0.8) | 0 (0) | 0 (0) |
| Others [§] | 5 (2.2) | 1 (1.1) | 0 (0) | 2 (1.5) | 2 (33.3) | 2 (33.3) |

Data are expressed as n (%). * Mixed etiology: *Streptococcus pneumoniae* plus influenza A virus; *Haemophilus influenzae* plus influenza virus A; *Streptococcus pneumoniae* plus adenovirus; *Streptococcus pneumoniae* plus rhinovirus; *Legionella pneumophila* plus rhinovirus; *Streptococcus pneumoniae* plus *Pseudomonas aeruginosa*. [#] Respiratory viruses: Influenza virus A, Influenza virus B, Rhinovirus; Adenovirus; Respiratory syncytial virus; Parainfluenza virus 2; Parainfluenza virus 3. [§] Other microorganism (*E. faecalis*, *S. sanguis*, *S. constellatus*, *Fusobacterium*, *S. pyogenes*).

Figure 1. Receiver operating characteristic curves for C-reactive protein level and LDH as predictors of bacterial CAP (a) and PCP (b) in the HIV population



Abbreviations: CAP = community-acquired pneumonia; LDH = lactate dehydrogenase; PCP = *P. Jirovecii* pneumonia.