

Study of outbreak of pneumonia in AL-Nasiriya city in 2015

Abbas F. Hlaihel

Thaer J. Hayal

AL-Hussein Teaching Hospital
Department of medicine- Medical College - Thi-Qar University

Abstract

A retrospective study of 92 patients admitted to AL-Hussein teaching hospital diagnosed with pneumonia in winter 2015 and 60 patients admitted in winter 2014 with pneumonia as control group. The age, sex and outcome [death or well] are recorded for each patients for both group, The presenting symptom for each patient in outbreak 2015 are recorded. Severity of pneumonia is assessed by CURB-65 and recorded for each patient, x-ray finding are recorded to patients in outbreak in2015 with result of sputum exam for gram stain and viral PCR in selected patients. Male to female ratio is 1:1 in outbreak of 2015 while it 0.6:1 in 2014 with significant difference between two groups and no sex difference in each group,The sex is not a risk factor for pneumonia except liogenella infection which more common in male. Severity of pneumonia is assessed by CURB-65 and result in 21 patients have score 3 and above [22%] and 10 have score 0 and 26 have score 1and 22[23%] patient have score 2.According to CURB-65 score ;36 patients no need to admission to hospital but other factor like co-morbid disease, for close up the compliance and response to treatment, and 22% have severe pneumonia need ICU admission and close monitoring.X-ray finding results in 40 patients show lobar consolidation, 22 patients showed bronchopneumonia pattern and 30 patients show diffuse interstitial infiltrate. Lobar opacity usually indicate bacterial infection while diffuse interstitial infiltrate usually nonbacterial mostly viral infection. Bronchopneumonia may indicate both bacteria and nonbacterial.Sputum for gram stain done for 22 cases only [two positive for S. pneumonia and the other are negative (no organism) and (throat and nasopharyngeal swap for REAL-PCR) of onther17 cases suspected to have influenza pneumonia [two are positive for flu A.]Debate continues over the need to perform a sputum examination with Gram staining in every patient with community-acquired pneumonia. An American Thoracic Society consensus panel has recommended that a sputum Gram stain and culture be obtained primarily if an organism that is resistant to the usual empirical treatment regimens is suspected]

Conclusion: diffuse infiltrate on x-ray, old age and co-morbid disease predict the mortality.sputum for gram stain and culture should be tested for every patient during outbreak to know most likely pathogen because the outbreak and modification of therapy in un respond or severe cases

Key words: Pneumonia, outbreak, winter season, CURB-65, x-ray, co-morbid disease, gram stain, bacteria, bronchopneumonia, sputum, lobar consolidation, diffuse infiltrate, mortality, ICU, CAP, confusion, influenza-asthma-traditional therapy ,novel virus ,PCR.

دراسة وبائية ذات الرئة في مدينة الناصرية في شتاء ٢٠١٥

عباس فاضل حليحل ثائر جبار حيال

مستشفى الحسين التعليمي

كلية الطب - جامعة ذي قار

الخلاصة

دراسة شملت ٩٢ مريض من المرضى الذين يتم إدخالهم إلى مستشفى الحسين التعليمي في مدينة الناصرية بتشخيص الالتهاب الرئوي في فصل الشتاء عام ٢٠١٥، وايضا ٦٠ مريضا في فصل الشتاء لعام ٢٠١٤ مع الالتهاب الرئوي. يتم تسجيل العمر والجنس والنتيجة [الموت أو جيد] لكل المرضى على حد سواء مجموعة. وتسجل الأعراض لكل مريض. تسجل الأعراض لكل مريض في بداية ٢٠١٥ ويتم تقييم شدة الالتهاب الرئوي من خلال CURB-65 المسجلة لكل مريض. يتم تسجيل نتائج الأشعة السينية للمرضى في وبائية ٢٠١٥. مع نتائج اختبار البلغم بصبغة غرام و PCR للفيروسات للمرضى المختارين. وجد إن نسبة الذكور إلى الإناث هي ١:١ في عام ٢٠١٥ بينما كانت ١:٠,6 في عام ٢٠١٤ مع وجود فارق كبير بين المجموعتين ولا يوجد فرق بين الجنسين في كل مجموعة. إن الجنس ليس عامل خطورة لا إصابة بالالتهاب الرئوي لا يوجد فرق كبير في التوزيع العمري في كلا المجموعتين ولكن هناك زيادة في خطر الالتهاب الرئوي مع تقدم السن في كل مجموعة [٤٨٪] الذين تتراوح أعمارهم ستون عاما فاكثرا في عام ٢٠١٤ و ٣٣٪ في عام ٢٠١٥. يحدث الالتهاب الرئوي في ٢٠ من كل ١٠٠٠ من الأشخاص الأكبر ٦٠ عاما من العمر في المملكة المتحدة. ضيق التنفس هو عرض من أعراض ذات الرئة ينظر في ٦٠ مريضا في عام ٢٠١٥ [٦٤٪] وأقل السعال في ٢٥ مريضا [٢٦٪] والارتباك في الوعي في أربعة من المرضى وكذلك الحمى في ثلاثة مرضى [٣٪]. يتم تقييم شدة الالتهاب الرئوي باستخدام CURB-65، مما ينتج عنه ٢١ مريضا بدرجة ٣ فما فوق [٢٢٪] و ١٠ بدرجة صفر و ٢٦ ويسجل ١ و 23 [22 and 23]٪ المريض بدرجة ٢. أظهرت نتائج الأشعة السينية إن ٤٠ مريض لديه التهاب رئوي فصوي وإن ٢٢ مريض لديهم التهاب قصبي رئوي و ٣٠ مريضا التهاب رئوي انتشاري. إن الالتهاب الرئوي الفصوي يشير عادة إلى الالتهاب الرئوي البكتيري بينما الالتهاب الرئوي القصبي يشير إلى كل من البكتيري واللابكتيري فيما يشير الالتهاب الانتشاري إلى ألالتهاب الفيروسي. إن فحص البلغم لصبغة غرام اجري ل ٢٢ مريض فقط وكان موجب لأربع فقط فيما أرسل الإفرازات الأنفية البلعومية لفحص الحامض النووي ل ١٧ مريض فقط كان هناك شك في إصابتهم بذات الرئة الفيروسية وكانت النتيجة موجبة لاثنتان فقط. توصي الجمعية الأمريكية لإمراض الصدر بفحص البلغم والإفرازات الصدرية للبكتريا والفيروسات وتحاليل أخرى لمعرفة الكائن المسبب في حالة ذات الرئة الشديدة أو في حالة عدم الاستجابة للعلاج. إن عدد المتوفين في وبائية ذات الرئة عام ٢٠١٥ بلغ اثنا عشر مريضا أكثرهم يعاني أمراض أخرى كالتهاب القصبات "٧ مرضى" كما إن أغلبهم اظهر في الأشعة السينية التهاب انتشاري نسيجي "٨ مرضى" الاستنتاج الذي وصل له البحث ان الالتهاب الانتشاري من خلال الأشعة السينية ووجود أمراض أخرى يزيد من معدل الوفاة. كما يوصي البحث بارسال تحاليل كاملة لمعرفة السبب في الحالات الشديدة او المستعصية وزيادة عدد الأسرة في وحدة العناية التنفسية.

Introduction

Pneumonia is an infection of the lung parenchyma. It is categorized as either community-acquired pneumonia (CAP) or health care-associated pneumonia (HCAP), with subcategories of HCAP including hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP). Like other respiratory tract illnesses, pneumonia is most common in the winter because of the seasonal increase in viral infections and the close contact of persons [10].

The incidence rates are highest at the extremes of age. Although the overall annual figure in the United States is 12 cases per 1000 persons, the figure is 12–18 per 1000 among children <4 years of age and 20 per 1000 among persons >60 years of age. [1] The mortality rate of adults managed at home is very low (< 1%); hospital death rates are typically between 5 and 10% and may be as high as 50% in severe illness [12]. Pneumonia is increasingly prevalent in patients with specific co

morbid conditions, including smoking, chronic obstructive pulmonary disease), diabetes mellitus, malignancy, heart failure, neurologic diseases, narcotic and alcohol use, and chronic liver disease [11]. Even with intensive laboratory investigation, the specific microbiologic cause can be established with certainty only in approximately 50% of patients with pneumonia. The probable predominant organism varies with the host's epidemiologic factors, the severity of illness, and which laboratory approach is used to establish the diagnosis. S. pneumoniae still account for 30% to 60% of all community-acquired pneumonias for which an etiology can be determined. The second most common bacterial cause of community-acquired pneumonia is H. influenzae, which accounts for about 10% of cases; M. catarrhalis is being recognized increasingly as a cause of community-acquired pneumonia. Staphylococci and gram-negative bacilli are much less common but more serious causes of community-acquired respiratory infections. In a study of patients with a mean age of 41

years, for example, *M. pneumoniae* accounted for 22.8% of community-acquired pneumonias, and *C. pneumoniae* for 10.7%; in addition, influenza A accounted for 2.7%. Respiratory tract viruses, including respiratory syncytial virus, adenoviruses, and influenza or parainfluenza viruses, can also cause community-acquired pneumonias in persons of all ages[5]. Primary influenza viral pneumonia is uncommon during epidemics but has accounted for up to 20% of pneumonias during pandemics and has been the principal manifestation of patients with H5N1,H1N1 illness. It occurs predominantly in persons with underlying pulmonary and cardiac disorders, pregnancy, or immunodeficiency states, although up to 40% of reported cases no recognized underlying disease.[11] .in the last years the discovery of novel viruses , including such SARS corona virus and Middle East respiratory syndrome corona virus [MERS-Co V] that has caused severe respiratory illness in healthy adult[1]. Although the pattern of infiltration can rarely establish a specific microbiologic etiology, chest films are most useful for providing essential information on the distribution and extent of involvement, as well as potential pneumonic complications. 'Lobar pneumonia' is a radiological and pathological term referring to homogeneous consolidation of one or more lung lobes, often with associated pleural inflammation [2]. bronchopneumonia refers to more patchy alveolar consolidation associated with bronchial and bronchiolar inflammation often affecting both lower lobes.[3] Diffuse interstitial and alveolar infiltrates should suggest viral infections (cytomegalovirus, influenza virus, or RSV), *L. pneumophila*, or enteric gram-negative pneumonia, particularly in neutropenia patients. These diffuse pulmonary infiltrations can be indistinguishable from other causes of adult respiratory distress syndrome[5].

Patients and methods

This is retrospective study of ninety- two patients diagnosed with pneumonia admitted to AL-Hussein teaching hospital in AL-Nassiryhia city from first January 2015 to first April 2015. The age , sex and outcome (died or well) are recorded for each patient. The age reference written as mention below

1=<20 years, 2=20-29,3=30-39 ,4=40-49,5=50-59,6=60-69,7=70-79,8=>=80

The presenting symptoms are also recorded for each patient. Severity of pneumonia is assessed by CURB-65

and recorded for each patient [grade 0, 1,2,3,4 and 5]. The CURB-65 criteria include five variables: confusion (C); urea >7 mmol/L (U); respiratory rate 30/min (R); blood pressure, systolic 90 mmHg or diastolic 60 mmHg or less (B); and age 65 years and above (65) [10]. Chest x-ray findings are also recorded for each patient, Sputum exam for Gram's stain is done only for 22 patient and the result are recorded, Real-time PCR for influenza virus done for 19 patient suspected to have influenza pneumonia and the results are recorded. Co-morbid diseases are recorded for each patient if its present or not [nil] and mention each co-morbid disease. Type of treatment either it traditional antibiotic or changed are recorded for each patient. The age ,sex and the outcome are recorded for a sixty patients admitted to AL-Hussein teaching hospital with pneumonia for the same period in 2014 for compare.

Results and discussion

In this study: A number of cases of pneumonia in winter season 2015 that admitted to hospital is 92 while a number of patients with pneumonia for the same period in 2014 is 60 with nearly equal number of general population suggestive outbreak of pneumonia in 2015. A male number is 47 [51%] and female number is 45 [49%] with ratio near to 1:1 with no sex difference in outbreak of pneumonia in winter 2015 while male number is 26 [40%] and female is 36 [60%] with ratio is 0.6 :1in cases of winter 2014 with significant difference [p value less than 0.05] between them ,but no sex difference in outbreak of 2015 as seen in figure 1. The gender is not risk factor for pneumonia except in legionella infection where it more common in male gender [3].

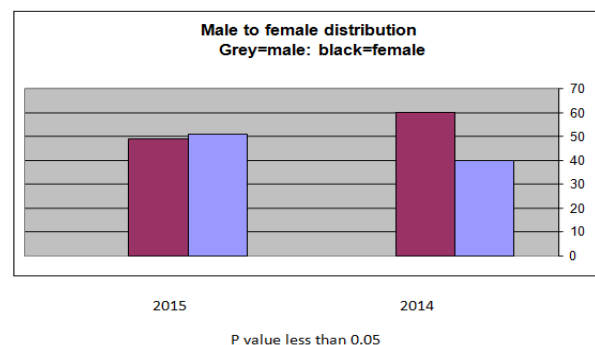


Fig.1: Sex distribution in outbreak of 2015 and pneumonic patient in 2014

In this study; one third of cases [33%] of pneumonia in winter 2015 are aged 60 and above and only 4% is young less than 20, while in cases of winter 2014, nearly half [48%] are aged 60 and above. No significant age difference between two group [p value more than 0.05]. As seen in Fig 2 .

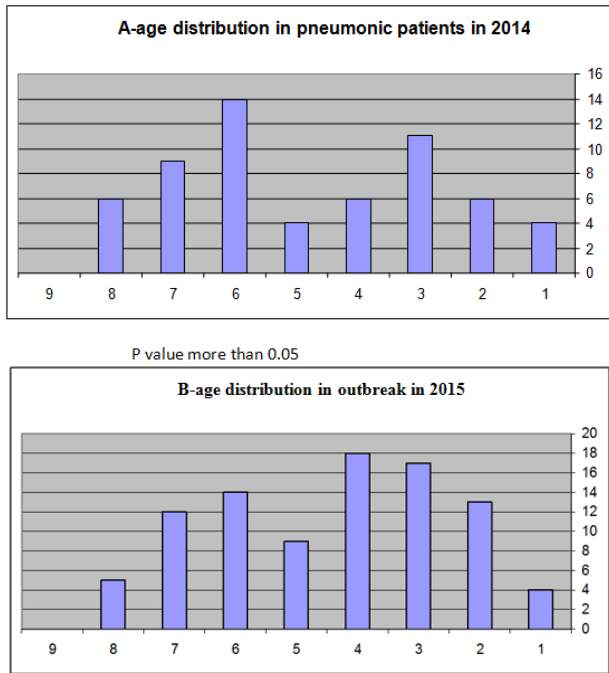


Fig. 2: A-age distribution 2014 and B-age distribution in 2015

The incidence rates are highest at the extremes of age. Although the overall annual figure in the United States is 12 cases per 1000 persons, the figure is 12–18 per 1000 among children <4 years of age and 20 per 1000 among persons >60 years of age.[1] Mortality in outbreak of winter 2015 is [12 patient (13%)] while it is 6%[4patient] in 2014 with significant difference. In UK The mortality rate of adults managed at home is very low (< 1%); hospital death rates are typically between 5 and 10% and may be as high as 50% in severe illness[12].Sixty patients present with shortness of breath, twenty five present with cough and in few the fever or confusion is presenting symptom specially elderly .Classic signs and symptoms of pneumonia include cough, sputum production, chest pain, fever, chills, hypoxia, and dyspnea[8] The clinical presentation may not be so obvious in the elderly, who may initially display new-onset or worsening confusion and few other manifestations. Severely ill patients who

have septic shock secondary to CAP are hypotensive and may have evidence of organ failure [10] .

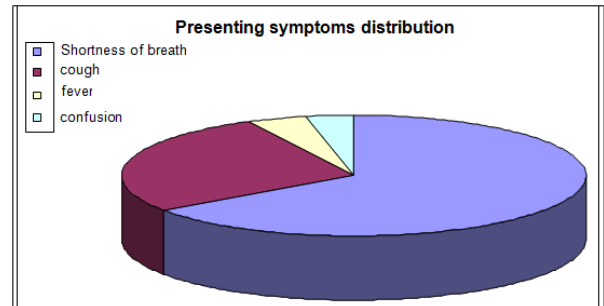


Fig. 3: distribution of presenting symptom in outbreak 2015

Most patients admitted had score 1 [26] (34%) and score 2 [22] (28%).Ten percent of patients] have score 0 of[CURB-65] severity score and admitted to hospital for close monitoring of treatment. Twenty- one patients [23%] have score 3 and above and need ICU care, twelve of them died [57%],this mean that one quarter of patients need care in ICU. Lobar pneumonia seen in X-ray in 40 patients [43%] , diffuse infiltrate in 30 patients [32%] and bronchopneumonia in 22 patients as seen below. Lobar opacity suggests bacterial infections specially if the chest x-ray reveals lobar or segmental consolidation, abscess formation, or significant pleural effusion, Bronchopneumonia is suggest both bacterial and nonbacterial. Diffuse interstitial and alveolar infiltrates should suggest viral infections (cytomegalovirus, influenza virus, or RSV), L. pneumophila, or enteric gram-negative pneumonia, particularly in neutropenic patients These diffuse pulmonary infiltrations can be indistinguishable from other causes of adult respiratory distress syndrome

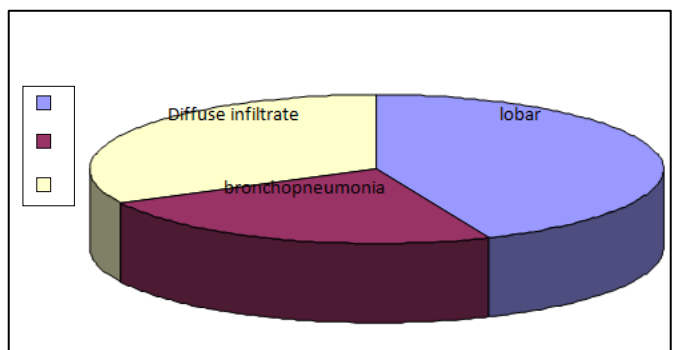


Fig. 4: distribution of x-ray finding in pneumonic patients 2015

Co-morbid disease are seen in 49 patients [53%] most of them[13 patients] had respiratory diseases [COPD and asthma] , DM in 13 , CKD in 5 and stroke in 3 while no medical problem in 43 patients [47].the death rate is 10 % [5 patients] in those with co-morbid disease Older patients and those with co-morbid disease are risk to have pneumonia and have poor outcome or response to treatment [9].

In this study: sputum of twenty two patients [24%]are sent to gram stain , only four are positive for gram positive diplococci and other show no organism. An American Thoracic Society has recommended that a sputum Gram stain and culture be obtained primarily if an organism that is resistant to the usual empirical treatment regimens is suspected[8] A full range of microbiological tests should be performed on patients with severe CAP ,In patients who do not respond to initial therapy, microbiological investigations may lead to the appropriate modification of therapy. Microbiology also provides useful epidemiological information[6].Result of Real-PCR for influenza virus in suspected influenza pneumonia or severe pneumonia or pneumonia of diffuse infiltrate[17 cases] are negative except two cases [positive flue A] with well outcome. The PCR not available in the hospital and results come from health ministry and only for influenza. Most commonly, the laboratory diagnosis for influenza pneumonia is established with rapid viral tests that detect viral nucleoprotein or neuraminidase by means of immunologic or enzymatic techniques that are highly sensitive and 60–90% as specific as tissue culture. Viral nucleic acids can also be detected in clinical samples by reverse transcriptase polymerase chain reaction. The type of the infecting influenza virus (A or B) may be determined by either immunofluorescence or HI techniques, and the hem agglutinin subtype of influenza A virus (H1, H2, or H3) may be identified by HI[5]

Physicians should also be vigilant for clues of pneumonia related to agents of bioterrorism These clues can include outbreaks of severe illness and pneumonia in multiple, otherwise healthy individuals or the isolation of unusual organisms in patients with pneumonic illness. The microorganisms most likely to be associated with severe pneumonia during bioterrorism-related inhalation exposure include *B. anthracis*, *Francisella tularensis* and *Y. pestis*. Inhalational anthrax always indicates a bioterrorism threat, whereas pneumonic plague or tularemia may or may not be associated with bioterrorism[4].

Mortality more seen in diffuse infiltrate 8 of died [66%] while less in bronchopneumonia 1 patient [8%] and cough is major symptom in 7 patients [51%]

Table 1: presenting symptom and x-ray finding between died and well outcome patients.

| Presenting symptom | Died | Well | x-ray finding | death | Well outcome |
|--------------------|------|------|-----------------|-------|--------------|
| SOB | 3 | 57 | lobar | 3 | 37 |
| Cough | 7 | 18 | bronchopneumoni | 1 | 21 |
| Confusion | 2 | 2 | diffuse | 8 | 22 |

In this study ;eight dead are had diffuse interstitial infiltrate on chest x-ray [66%] The presence of extensive radiographic abnormalities, especially bilateral pleural effusions, is associated with higher risk of mortality. fifty percent of patients present with confusion are died [two of four patients] while only[3] present with shortness of breath are died from[60] present with shortness of breath] In this study: 49[53%] patients with co-morbid develop pneumonia, five of them is died [10%] mostly CKD [2 patient] with significant difference p value less than 0.05[strong correlation between co-morbidity and pneumonia risk and mortality][7] other probable causes of Increased mortality in 2015 are

- 1-increase number of cases in 2015 [92 cases]
- 2-increase number of cases of severe pneumonia [21patients (22%) of total patients] with limitation of beds in ICU.
- 3-no microbiological diagnosis except in 6 cases[4 streptococcal pneumonia and two influenza A with no change in traditional therapy .

Conclusion

1-diffuse infiltrate on x-ray, old age and co-morbid disease predict the mortality.

2-sputum for gram stain and culture should be tested for every patient during outbreak to know most likely pathogen cause the outbreak and modification of therapy in un respond or severe cases.

3- Rapid viral antigen test and real- PCR[for influenza ,RSV, adenovirus, novel corona COV-ME and parainflunza] should done for suspected cases of viral pneumonia, severe pneumonia or those with diffuse interstitial infiltrate on chest x-ray

Recommendations

1-sputum for gram stain and culture should be tested for every patient during outbreak to know most likely pathogen because the outbreak and modification of therapy in un respond or severe cases

2-Rapid viral antigen test and real- PCR[for influenza ,RSV, adenovirus, novel corona COV-ME and parainflunza] should be done for suspected cases of viral pneumonia, severe pneumonia or those with diffuse interstitial infiltrate on chest x-ray

3-increase beds in ICU and special place of care to reduce mortality and proper management

4-Health education to prevent spread of influenza and other respiratory infection

5-vaccination is main therapy to prevent pneumonia include influenza and pneumococcal before winter outbreak to all people especially those with co-morbid disease or immune comprised

References

- 1-Ali MohZaki: isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia: New England journal f medicine2012 october:367:1814-20
- 2-Brown PD, Lerner SA{1998}: Community-acquired pneumonia. Lancet 352:1295, 1998
- 3-Fine MJ: A prediction rule to identify low-risk patients with community-acquired pneumonia. N Engl J Med 336:243, 1997 [PMID: 89950868
- 4-Falguera M, Martín M, Ruiz-González A: Community-acquired pneumonia as the initial manifestation of serious underlying diseases. Am J Med 2005; 118:378-383
- 5-File TM Jr: Community-acquired pneumonia. Lancet 362:1991:2012
- 6-Halm EA, Teirstein AS: Management of community-acquired pneumonia. N Engl J Med 347:2039, 2002
- 7-Lim WS:{2003}: Defining community acquired pneumonia severity on presentation to hospital: An international derivation and validation study. Thorax 58:377 [PMID: 12728155
- 8-Mandell LA et al:{2007}: Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia. Clinic Infect Disease 44(Suppl 2):S27

- 9-Michael M. Lederman.. :{2011}:infection of lower respiratory tract infection: infection diseases: Cecil essentials of medicine ,7th edition 2011
- 10-Lionel A. Mandell and Richard Wunderink ..Pneumonia; respiratory disease; Harrison's principle of internal medicine 18th edition 2012.
- 11-overview of pneumonia;{2012}: respiratory disease ;Cecil text book of medicine 24th edition.
- 12-P .T .Reid, and T.A .Innes .{2014}:Pneumonia; respiratory disease; Davidson practice of medicine 22th edition