TO EVALUATE THE COMPLIANCE WITH ICS/NCCP GUIDELINES IN THE MANAGEMENT OF COMMUNITY ACQUIRED PNEUMONIA IN NORTH INDIAN TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Pneumonia is a common illness having significant morbidity and mortality. Irrational use of antibiotics in the treatment of pneumonia has led to antibiotic resistance, over prescribing and increased cost of treatment. Therefore, the present study was undertaken to evaluate the trends of antimicrobial prescription in community acquired pneumonia. **Aim:** To evaluate the deviation in the treatment of community acquired pneumonia given in the department of Chest and Tuberculosis, Rajindra Hospital, Patiala from the guidelines (Guidelines for Diagnosis and Management of Community Acquired Pneumonia in Adults: Joint ICS/NCCP Recommendations). **Materials and Methods:** All the antimicrobial containing prescriptions of community acquired pneumonia were monitored. Data from the prescriptions was entered into data entry forms. Patients of either sex, both in-patients and out-patients were included in the study. The prescriptions were analysed and any deviation in the treatment of community acquired pneumonia from the Indian pneumonia guidelines given by joint ICS-NCCP Committee was evaluated. **Results:** In present study there was 100% compliance with ICS/NCCP Guidelines with respect to all the investigations. There was no compliance with ICS/NCCP Guidelines with respect to CRB-65 score for risk stratification of patients but there was 100% compliance with guidelines with respect to clinical judgement. There was no compliance with ICS/NCCP Guidelines with respect to duration of treatment for out-patients but there was 72.3% compliance with guidelines with respect to duration of treatment for in-patients. There was 0% compliance with ICS/NCCP Guidelines with respect to antibiotic therapy in out- patients

without co-morbidities and 47.05% compliance in-patients without co-morbidities(i.e. 16 patients out of 34 in-patients without co-morbidities) but there was 100% compliance with guidelines with respect to antibiotic therapy in out-patients having associated co-morbidities and 76.9% compliance in in-patients having associated co-morbidities (i.e. 10 patients out of 13 in-patients with co-morbidities). According to the present study, overall percentage compliance calculated for the treatment of community acquired pneumonia given in the department of Chest and Tuberculosis, Rajindra Hospital, Patiala with ICS/NCCP Guidelines is 54.85%.

KEYWORDS: Community acquired pneumonia, antimicrobials, overprescribing, antibiotic resistance, ICS/NCCP Guidelines.

INTRODUCTION
Community acquired pneumonia (CAP) is pneumonia that has been acquired in a community in a patient who has not been hospitalized within 14 days prior to onset of symptoms or hospitalized less than 4 days prior to onset of symptoms.[1]

The mortality rate is less than 1% for persons with CAP who do not require hospitalization; however, the mortality rate averages from 12% to 14% among hospitalized patients with CAP. Among patients who are admitted to the intensive care unit (ICU), or who are bacteraemic, or who are admitted from a nursing home, the mortality rate averages from 30% to 40%. Therefore, it is crucial that physicians recognize and treat CAP appropriately.[2]

Constant exposure to contaminated air and frequent aspiration of nasopharyngeal flora make lung parenchyma susceptible to virulent micro-organisms. Most microorganisms reach lower respiratory tract as inhaled and contaminated micro-droplets. Complex interactions between virulence and quantum of aspirated or inhaled microorganisms, that arrive at lower respiratory tract, integrity of defence barriers and host immunity status, decide occurrence of pneumonia.[3,4]

The extensive list of potential etiologic agents in CAP includes bacteria, fungi, viruses and protozoa. Newly identified pathogens include hantaviruses, metapneumo viruses, the coronavirus responsible for severe acute respiratory syndrome (SARS) and community-acquired strains of methicillin-resistant Staphylococcus aureus (MRSA). Most cases of CAP, however, are caused by relatively few pathogens. Although Streptococcus pneumoniae is

most common, other organisms must also be considered in light of the patient's risk factors and severity of illness.[5]

The American Thoracic Society(ATS) emphasizes certain modifying factors that increase the risk of infection with drug-resistant and unusual pathogens. Risk factors for drug-resistant Streptococcus pneumonia (DRSP) include age greater than 65 years, beta-lactam therapy within the past 3 months, immunosuppression (either as the result of an illness or induced by treatment with corticosteroids), multiple medical comorbidities, alcoholism and exposure to a child in a day care center. Risk factors for enteric gram-negative organisms are as follows: recent antibiotic therapy, underlying cardiopulmonary disease, residence in a nursing home and multiple medical comorbidities.[6]

CAP can vary from indolent to fulminant in presentation and from mild to fatal in severity. The various signs and symptoms that depend on the progression and severity of the infection include both constitutional findings and manifestations limited to the lung and associated structures. The patient is frequently febrile with tachycardia or may have a history of chills and/or sweats. Cough may be either non-productive or productive of mucoid, purulent or blood-tinged sputum. Depending on severity, the patient may be able to speak in full sentences or may be very short of breath. If the pleura is involved, the patient may experience pleuritic chest pain.[5]

The presentation of pneumonia can vary from a mild, self limiting illness to a severe, life threatening illness with significant mortality. Thus the most important decision facing the physician once a diagnosis of pneumonia is confirmed is the site of care. This decision affects both patient outcomes and healthcare costs.[7,8]

Several predictive models and scoring systems have been developed and validated to help develop uniform, guidelines based protocols.[9] CURB 65 is a simpler scoring system which is easier to remember and apply.[10]

CURB65 uses five variables which include confusion, urea more than 20mg/dl, respiratory rate more than 30/min, blood pressure (systolic blood pressure less than 90 mm/hg or diastolic blood pressure less than 60 mm/hg) and age more than 65 years. Each parameter is assigned one point to get a severity score. The recommendations on the basis of CURB65 scoring are outpatient treatment for patients with a score of 0-1, hospital admission for a

score of 2 and consideration for admission to ICU with a score of 3 or more. CRB 65 can be used when urea levels are not available. CRB65 has the benefit of using only clinical parameters and has been found to have discriminatory value similar to CURB65.[11]

The first step in treatment of CAP following severity assessment and decision regarding site of care, is initiation of treatment with appropriate antibiotics as bacteria are the most common pathogen. Early initiation of antibiotics is seen to abbreviate the illness and lead to a decrease in both complications and mortality. This is usually empirical as the organism is not isolated in a large proportion of patients at the onset.[9]

Severe cases of CAP require immediate institution of therapy, which must be adjusted after confirming microbiological etiology. Switch from intravenous antibiotics to oral treatment is recommended in case of observed improvement in symptoms, improved respiratory rate and oxygen saturations, patient being afebrile for >24 hours, hemodynamic stability, reduction in white blood cell count (if elevated earlier) and absence of nausea/ vomiting.[9]

All appropriate spectrum antibiotics are equally effective. The main purpose is to target streptococcus pneumonia. Beta-lactams and macrolides are most commonly used antibiotics. Combination therapy is recommended for severe pneumonia only.[12]

Pneumonia is a common illness having significant morbidity and mortality. Irrational use of antibiotics in the treatment of pneumonia has led to antibiotic resistance, over prescribing and increased cost of treatment. Therefore, the present study was undertaken to evaluate the trends of antimicrobial prescription and compliance with ICS/NCCP Guidelines in the management of community acquired pneumonia.

MATERIALS AND METHODS

Study Design

This prospective, open and observational study was conducted for the duration of one year starting from the date of approval of protocol of study and the approximate sample size calculated for the study was 80.The patients of community acquired pneumonia attending the department of Chest and Tuberculosis, Rajindra Hospital, Patiala were included. The patients fulfilling the inclusion criteria and having none of the exclusion criteria were enrolled in the study after obtaining written informed consent.

Inclusion Criteria

All patients with radiological or clinical evidence of community acquired pneumonia.

Exclusion Criteria

1. Patients <18 years of age
2. Immunosuppressed (HIV positive or concurrent chemotherapy or immunosuppressant therapy)
3. Cystic fibrosis
4. Bronchiectasis
5. Suspected or confirmed tuberculosis
6. Aspiration or hospital-acquired Pneumonia
7. Discharged from hospital within the previous 14 days
8. Transferred from another hospital (unless transferred within 4 hours of presentation at original institution)
9. Patients unwilling or unable to comply with study proceedings

Study Sequence

All the patients were informed about the study in layman language and written informed consent was taken. The patients of community acquired pneumonia coming to the department of Chest and Tuberculosis, Rajindra Hospital, Patiala were included in the study. All the antimicrobial containing prescriptions of community acquired pneumonia were monitored. Data from the prescriptions was entered into data entry forms. Patients of either sex, both in-patients and out-patients were included in the study. The prescriptions were analysed and any deviation in the treatment of community acquired pneumonia from the Indian pneumonia guidelines given by joint ICS-NCCP Committee was evaluated. The research was conducted after obtaining approval from Institutional Ethics Committee.

Statistical Analysis

Descriptive statistics had been applied for the analysis of data. Data was expressed in proportion and percentage form and represented in the form of tables, charts and bar diagrams.

Formula for the calculation of Percentage of Compliance of the present study with ICS/NCCP Guidelines is:

$$\text{Percentage Compliance} = \frac{\text{Mean Deviation}}{\text{Mean}} \times 100$$

RESULTS

Data from the prescriptions was entered into data entry forms. Patients of either sex, both in-patients and out-patients were included in the study. The prescriptions were analysed to evaluate the trends of antimicrobial prescription and compliance with ICS/NCCP Guidelines in the management of community acquired pneumonia.

Table-I Percentage Of Compliance With Ics/Nccp Guidelines With Respect To Investigations

Investigations	%age compliance
X-ray	100
Blood culture	100
Sputum culture	100
Gram stain	100

As shown in the table, in present study there was 100% compliance with ICS/NCCP Guidelines with respect to all the investigations as x-ray was done in all the 80 patients and blood culture, sputum culture and gram stain was done in all the 47 hospitalised patients which was in accordance with ICS/NCCP Guidelines.

Table-Ii Percentage Of Compliance With Ics/Nccp Guidelines With Respect To Risk Stratification

Risk stratification criteria	% age compliance
CRB-65 score	0
Clinical judgement	100

As shown in the table, there was no compliance with ICS/NCCP Guidelines with respect to CRB-65 score for risk stratification of patients but there was 100% compliance with guidelines with respect to clinical judgement as clinical judgement was used in all the patients for assessment of severity and site of care and CRB-65 score for risk stratification was not used in any of the patients and according to guidelines both clinical judgement and CRB-65 score should be used to assess severity and site of care for each patient.

Table-Iii Percentage Of Compliance With Ics/Nccp Guidelines With Respect To Duration Of Therapy

Duration of therapy	%age compliance
5 days for out-patients	0
7 days for in-patients	72.3

 This table shows that there was no compliance with ICS/NCCP Guidelines with respect to duration of treatment for out-patients as according to ICS/NCCP Guidelines out-patients should be given antibiotic therapy for 5 days but in present study all the out-patients were treated for more than 5 days but there was 72.3% (i.e. 34 patients out of 47 in-patients) compliance with guidelines with respect to duration of treatment for in-patients as according to ICS/NCCP Guidelines in-patients should be given antibiotic therapy for 7 days but in present study out of 47 in-patients only 34 in-patients were treated in accordance with guidelines and remaining 13 in-patients were given treatment for more than 7 days which was not in compliance with guidelines.

Table-Iv Percentage Of Compliance With Ics/Nccp Guidelines With Respect To Antibiotic Therapy In Out-Patient Setting

Patient population	%age compliance
Without co-morbidities	0
With co-morbidities	100

As shown in the table, in present study there was 0% compliance with ICS/NCCP Guidelines with respect to antibiotic therapy in patients without co-morbidities who were treated in out-patient setting but there was 100% compliance with guidelines with respect to antibiotic therapy in patients having associated co-morbidities treated in out-patient setting as according to ICS/NCCP Guidelines out-patients without co-morbidities should be treated with monotherapy either with macrolides or beta-lactams and out-patients with co-morbidities should be treated with combination of beta-lactam and macrolide but in present study all out-patients irrespective of the presence or absence of associated co-morbidities were treated with combination of beta-lactam and macrolide.

CALCULATION OF PERCENTAGE COMPLIANCE OF TREATMENT OF COMMUNITY ACQUIRED PNEUMONIA WITH ICS/NCCPGUIDELINES

$$= \frac{\text{Mean Deviation}}{\text{Mean}} \times 100$$

$$\text{MEAN} = \frac{100 + 100 + 100 + 100 + 0 + 100 + 0 + 72.3 + 0 + 100 + 47.05 + 76.9}{12} = 66.35$$

MEAN DEVIATION

Parameters	Individual Parameter (x)	Mean ($\bar{x}$)	$|x-\bar{x}|$
1	100	66.35	33.65
2	100	66.35	33.65
3	100	66.35	33.65
4	100	66.35	33.65
5	0	66.35	66.35
6	100	66.35	33.65
7	0	66.35	66.35
8	72.3	66.35	5.95
9	0	66.35	66.35
10	100	66.35	33.65
11	47.05	66.35	19.3
12	76.9	66.35	10.55

$$\text{MAD} = \frac{\sum |x - \bar{x}|}{n} = 436.75/12 = 36.39$$

PERCENTAGE OF COMPLIANCE OF PRESENT STUDY WITH ICS/NCCP GUIDELINES IS

Percentage Compliance $= \dfrac{\text{Mean Deviation}}{\text{Mean}} \times 100$

$$= \frac{36.39}{66.35} \times 100 = 54.85\%$$

DISCUSSION

Pneumonia refers to a syndrome caused by acute infection, usually bacteria, characterized by clinical and/or radiographic signs of consolidation of a part or parts of one or both lungs. True incidence of community acquired pneumonia (CAP) is exactly not known.[13]

Diagnosis of CAP is a challenge to the evaluating physician as this condition closely mimics the common cold or flu. Appropriate medical history and physical examination are an important part of making pneumonia diagnosis.[14,15]

The present prospective, open and observational was conducted for the duration of one year to study the trend of use of antimicrobials in community acquired pneumonia.80 prescriptions were analysed and data from the prescriptions was entered into data entry forms. Till present

date no study has been conducted in the Indian scenario to evaluate the compliance with standard guidelines in the management of community acquired pneumonia.

The mean age of cases was 53.83 years and 61.25% of the patients were males (i.e. 49 patients out of 80 patients) and 38.75% were females (i.e. 31 patients out of 80 patients).

Associated co-morbidities were present in 33.75% of patients (i.e. 27 patients out of 80 patients). Out of 27 patients with co-morbidities 14 patients were out-patients and 13 were in-patients. The two commonest co-morbid illnesses were chronic heart disease (CHD) present in 11 patients out of 27 patients with co-morbidities and chronic obstructive pulmonary disease (COPD) present in 9 patients out of 27 patients.

Diagnosis of Community acquired Pneumonia

In the present study x-ray was done in all 80 patients whether out-patients or in-patients. According to ICS/NCCP Guidelines wherever feasible, a chest radiograph should be obtained in all patients suspected of having CAP. In the absence of availability of chest radiograph, patients may be treated on the basis of clinical suspicion. Chest radiograph should be repeated if the patient is not improving and also for all those patients who have persistence or worsening of symptoms/physical signs or those in whom an underlying malignancy needs to be excluded. It is not routinely necessary to repeat a chest radiograph in patients who have improved clinically.[16] Percentage of compliance with ICS/NCCP Guidelines with respect to x-ray for diagnosis of community acquired pneumonia was 100%.

Duration of Treatment

In the present study blood culture, sputum culture and gram stain was done in all the 47 in-patients. According to ICS/NCCP Guidelines, blood cultures should be obtained in all hospitalised patients with CAP and an initial sputum gram's stain and culture (or an invasive respiratory sample as appropriate) should be obtained in all hospitalised patients with CAP.

Therefore, Percentage of compliance with ICS/NCCP Guidelines with respect to blood culture, sputum culture and gram stain for diagnosis of community acquired pneumonia was 100%.

In the present study 67 patients received antibiotic therapy for 7-days which included all the out-patients (33 patients) and 34 in-patients out of 47 in-patients whereas 13 patients who were all in-patients received antibiotic therapy for 14-days.

According to ICS/NCCP Guidelines out-patients should be treated for five days and in-patients for seven days.[16]

Percentage of compliance with ICS/NCCP Guidelines with respect to duration of therapy was 0% for out-patients as all the 33 out-patients were given antibiotic therapy for more than 5 days and 72.3% for in-patients as only 34 in-patients out of 47 in-patients were given antibiotic therapy for 7 days which was in accordance with guidelines whereas remaining 13 in-patients were given antibiotic therapy for 14 days which was not in compliance with guidelines.

Antibiotic therapy in out-patient setting
In the present study out-patients were treated with combination therapy (beta-lactam plus macrolide) irrespective of presence or absence of co-morbidities and none of the patient without co-morbidity was treated with monotherapy. All the patients were given oral therapy.

According to ICS/NCCP Guidelines therapy in out-patient setting should be targeted towards coverage of the most common organisms, namely Streptococcus pneumonia. Out-patients should be stratified as those with or without comorbidities. Recommended antibiotics are oral macrolides (e.g. azithromycin) or oral beta-lactams(e.g., amoxicillin 500-1000 mg thrice daily) for out-patients without comorbidities. For out-patients with comorbidities oral combination therapy is recommended (beta-lactams plus macrolides).[16]

Percentage of compliance with ICS/NCCP Guidelines with respect to antibiotic therapy in out-patient setting was 0% for out-patients without co-morbidities as 19 patients out of 33 out-patients who were without any associated co-morbidity were also treated with combination of beta-lactam and macrolide which was not in accordance with guidelines as these patients should have been treated with either beta-lactams or macrolides i.e. monotherapy instead of combination therapy and 100% for out-patients with co-morbidities as 14 patients out of 33 out-patients with associated co-morbidities were treated with combination of beta-lactam and macrolide which was in compliance with guidelines.

Antibiotic therapy in in-patient setting
In in-patient setting 9 patients were treated with two-drug combination therapy (1 patient with amoxicillin-azithromycin, 5 patients with azithromycin-cefotaxime, 3 patients with azithromycin-ceftriaxone) and 38 patients were treated with three drug combination therapy

(18 patients with azithromycin-co-amoxiclav, 20 patients with ceftriaxone-piperacillin-tazobactam). 46 patients out of 47 in-patients were given parenteral therapy.

In in-patient setting out of 47 patients, 34 patients are without any associated co-morbidities and 13 patients were with associated co-morbidities.

According to ICS/NCCP guidelines the recommended regimen is combination of a beta-lactam plus a macrolide (preferred betalactams include cefotaxime, ceftriaxone and amoxicillin-clavulanic acid). Route of administration (oral or parenteral) should be decided based upon the clinical condition of the patient and the treating physician's judgement regarding tolerance and efficacy of the chosen antibiotics. Switch to oral from intravenous therapy is safe after clinical improvement in moderate to severe CAP.[16]

Percentage of compliance with ICS/NCCP Guidelines with respect to antibiotic therapy in in-patient setting was 47.05% for in-patients without associated co-morbidities and 76.9% for in-patients with associated co-morbidities as only 16 in-patients out of 34 in-patients without associated co-morbidities and 10 in-patients out of 13 in-patients with associated co-morbidities were given antibiotic combinations which are recommended by ICS/NCCP Guidelines (i.e. combination of a beta lactum plus a macrolide and preferred beta-lactams include cefotaxime, ceftriaxone and amoxicillin-clavulanic acid).

Overall compliance

According to the present study, overall percentage compliance calculated for the treatment of community acquired pneumonia given in the department of Chest and Tuberculosis, Rajindra Hospital, Patiala with ICS/NCCP Guidelines is 54.85%.

The results were similar to 2009/2010 Adult Community Acquired Pneumonia Audit conducted by British Thoracic Society from 1 December 2009 and 31 January 2010. According to British Thoracic Society Community Acquired Pneumonia Audit antibiotics were given in accordance with local CAP guidelines in only 54% of cases.[17]

Therefore, the results of present study conducted in the department of Chest and Tuberculosis, Rajindra Hospital, Patiala to study the trends and prescription auditing of antimicrobials in community acquired pneumonia were similar to British Thoracic Society Community Acquired Pneumonia Audit.

CONCLUSION

In the present study it was observed that community acquired pneumonia was most common in the age group of 42-60 years and the disease was more prevalent in males as compared to females. In the present study 58.75% were in-patients (i.e.47 patients out of 80 patients) and 41.25% were out-patients (i.e.33 patients out of 80 patients). Study showed that 83.75% of the patients received the treatment for 7 days and 16.25% of the patients received the treatment for 14 days.

Percentage of compliance with ICS/NCCP Guidelines with respect to investigations was 100% as x-ray was done in all the 80 patients and blood culture, sputum culture and gram stain was done in all the 47 hospitalised patients which was in accordance with ICS/NCCP Guidelines.

Percentage of compliance with ICS/NCCP Guidelines with respect to risk stratification was 100% for clinical judgement and 0% for CRB-65 score.
Percentage of compliance with ICS/NCCP Guidelines with respect to duration of therapy was 0% for out-patients and 72.3% for in-patients.

Percentage of compliance with ICS/NCCP Guidelines with respect to antibiotic therapy in out-patient setting was 0% for out-patients without co-morbidities and 100% for out-patients with co-morbidities.

Percentage of compliance with ICS/NCCP Guidelines with respect to antibiotic therapy in in-patient setting was 47.05% for in-patients without co-morbidities (i.e. 16 patients out of 34 in-patients without co-morbidities) and 76.9% for in-patients with co-morbidities (i.e. 10 patients out of 13 in-patients with co-morbidities). According to the present study, overall percentage compliance of the treatment of community acquired pneumonia given in the department of Chest and Tuberculosis, Rajindra Hospital, Patiala with ICS/NCCP Guidelines is 54.85%.

Further studies involving large number of prescriptions of community acquired pneumonia are required to find the compliance of treatment with guidelines in order to avoid antibiotic resistance and misuse.

This study gives an interesting perspective on how patients are currently managed for community acquired pneumonia in the department of Chest and Tuberculosis, Rajindra hospital, Patiala.

There are clearly some areas where there could be improvement which would both be of benefit to patients and to the cost of providing their care in hospital.

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