Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/mjafi

Original Article

Outbreak control of community acquired pneumonia in a large military training institution

Col Vani Suryam [a], Col V.K. Bhatti [b], Flt Lt Aniket Kulkarni [c], Air Cmde A. Mahen [d], Maj Gen Velu Nair, AVSM, VSM**[e,*]

[a] Associate Professor, Dept of Community Medicine, Armed Forces Medical College, Pune 411040, India
[b] Colonel (Health), HQ Northern Command, C/O 56 APO, India
[c] MO, SMC, 10 Wing Air Force, C/O 99 APO, India
[d] Dy PMO, HQ Western Air Command, C/O 56 APO, India
[e] Senior Consultant (Med), O/O DGAFMS, Ministry of Defence, M Block, New Delhi 110001, India

ARTICLE INFO

Article history:
Received 18 July 2014
Accepted 30 September 2014
Available online 22 November 2014

Keywords:
Outbreak
Pneumonia
Chemoprophylaxis

ABSTRACT

Background: Between 09 Jan 2011 to 25 Mar 2011 an outbreak of respiratory illness was reported from a Military Training institution. 52 cases of respiratory tract infection were admitted from this institution. All the cases were trainees between 18 and 21 years of age. Aggressive control measures were instituted along with the investigation of the outbreak to determine the nature of the disease and the causative organism.

Methods: The investigation of the outbreak was initiated on 08 Mar 2011 when a sudden rise in number of hospital admissions due to respiratory illness was noticed. Epidemiological information was collected from the cases. Routine blood investigations, sputum examination and chest radiograph of suspected cases were done.

Results: Total of 52 cases of respiratory illness were reported during the period of outbreak giving an attack rate of 25.8 per 1000. Out of these 52 cases 23 (44.2%) were radiologically confirmed. Streptococcus pneumoniae was grown in 8 (25.85) out of 31 sputum samples. The outbreak was controlled by administration of 'supervised mass chemoprophylaxis' of all susceptible individuals in the institution with Tablet Azithromycin orally. Last suspected case was admitted to the military hospital on 25 Mar 2011.

Conclusion: The study highlights the importance of Streptococcus pneumoniae as a causative organism for outbreaks of community acquired pneumonia (CAP) in large residential training institutions and reiterates the need for formulating a policy for continuous surveillance. It also highlights the importance of the novel method of using chemoprophylaxis for control of an ongoing outbreak of CAP.

* *Corresponding author.*
E-mail address: nairvelu2000@yahoo.com (V. Nair).
http://dx.doi.org/10.1016/j.mjafi.2014.09.015

Introduction

Community acquired pneumonia (CAP) is known to have high rate of mortality despite development of better antibiotics.[1] Closed living conditions, environmental challenges and harsh physical training among military trainees increase their risk of acquiring respiratory infections. Major pathogens causing these infections are Group A streptococcus, adenovirus, influenza A, Streptococcus pneumonia, rhinovirus, Bordetella pertusis, Mycoplasma pneumonia and atypical agents.[2] A study done in Turkey has also found that 62.8% of cases of CAP are due to Streptococcus pneumoniae, 13.8% due to Mycoplasma pneumoniae and 10% due to respiratory syncytial virus.[3] Outbreaks of pneumococcal disease have been reported from various military institutes all over the world.[4,5] The aim of the article is to describe the investigation and control of an outbreak of pneumonia that occurred in a large military training institute in winter of 2011 and to give recommendations based on the experience gained during the outbreak control. This military institute trains approximately 2000 trainees at any point of time. There were 2015 trainees aged between 18 and 21 years in the institute during the period of investigation. In January 2011 fresh trainees were joining the institution in first term and other trainees from second to sixth terms were reporting back at the end of term break. Between 06 January 2011 to 08 March 2011, 18 cases of respiratory illness varying between pneumonia/bronchitis/upper respiratory tract infections were admitted to different hospitals for treatment.

Materials and methods

The diagnosis of pneumonia/bronchitis in these cases was established based on clinical presentation, lab reports and chest radiograph findings. An increase in the number of cases of pneumonia/bronchitis being admitted to the hospital compared to last two years was noticed and an investigation into the cause of this apparent outbreak was initiated on 08 March 2011.

Case definition: A case definition was developed as any trainee present in the training institution from 01 January 2011 onwards and presenting with fever with cough whether productive or non productive was defined as a 'probable case' of pneumonia for the purpose of investigation. All cases fitting the probable case definition were treated as cases of pneumonia for the purpose of investigation of the outbreak. 'Confirmed case' was defined as any probable case with chest radiograph PA view showing lobar consolidation.

Epidemiological case sheet and line listing of cases: An epidemiological case sheet was developed and information recorded from all affected cases admitted; domains included personal particulars, date of onset, presenting complaints, date of reporting, date of admission, history of contact with a known case, history of any collective activities, clinical details, lab investigation reports. All probable and confirmed cases were line listed and analysed in time/place/person. In addition following actions were taken to identify the possible source of infection:

(a) Interview and clinical examination of cases of pneumonia at the training establishment including both admitted cases at the hospital and those which had reported back after sick leave.
(b) Collection of sputum samples from the affected trainees for microbiological examination.
(c) Throat swabs were collected from a random sample of healthy trainees.
(d) Visit to living accommodations, class rooms and training areas to assess environmental factors.
(e) Interaction with administrative authorities
(f) Interview of all civilian support staff interacting with trainees who had taken sick leave from January to March 2011

Surveillance: As the investigation progressed, cases continued to be reported on a daily basis. Daily medical inspection of trainees from all terms and subunits was done by medical officer and any trainee suffering from respiratory symptoms like cough with or without sputum, chest pain, breathing difficulty, other symptoms like fever, body aches and weakness was segregated and admitted to the hospital.

Blood culture and sputum culture was carried out for all cases reported after 10 March 2011. Samples were tested for IgM for Mycoplasma pneumoniae at microbiology referral laboratory at local medical college. In addition 54 samples (throat swabs) were collected from healthy trainees to look for carrier rate of Streptococcus pneumoniae and Mycoplasma pneumoniae. These were also sent to National Institute of Virology (NIV) Pune for a viral screen.

Results

Total of 52 cases of respiratory illness were reported from the training Institution between 06 January 2011 to 25 March 2011 giving the attack rate of 25.8 per 1000 for the respiratory illness. The common symptoms for hospitalization were running nose, sore throat, cough and fever. Out of these 52 cases of respiratory illness, 23 (44.2%) were confirmed radiologically (lobar consolidation in one or more lobes on radiograph chest PA view) (Table 1). There was no fatality.

Out of the 31 sputum samples collected from the affected trainees, 8 (25.8%) showed growth of Streptococcus pneumonia. None tested positive for IgM for Mycoplasma. Sputum samples were collected for cases in the later part of the outbreak only, hence these samples could not be collected for all 52 cases. None of the blood cultures of the hospitalized cases showed any positive results.

In addition, out of 54 throat swabs that were randomly collected from healthy trainees only 2 (3.7%) samples showed a growth of Streptococcus pneumoniae, 2 (3.7%) were positive for Mycoplasma pneumoniae and 2 (3.7%) were positive for parainfluenza virus. No sample was positive for Influenza A H1N1.

The training institution has 15 subunits to which the trainees are distributed in various terms from first to sixth term. The subunit wise breakdown of cases is given in Table 2 and term wise breakdown of cases is given in Table 3.