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Original Article

Outbreak of Human Metapneumovirus Infection in a Psychiatric Hospital – Taipei, 2012

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Abstract

On April 10, 2012, Taipei City Health Department notified the Centers for Disease Control of a cluster of inpatients with fever and upper respiratory illness in two wards of a psychiatric hospital in Taipei. We aimed to investigate the causative agent and associated factors. We conducted a retrospective cohort study by reviewing medical records of all inpatients hospitalized in the two affected wards during April 2−17. A standardized case report form was used to collect patient demographics, medication, underlying diseases, history of cigarette smoking, attendance of group occupational therapy and clinical presentations. A case was defined as onset of cough, rhinorrhea, or sore throat three or more days after admission in a patient hospitalized between March 26 and April 25. Throat swab specimens tested by multiplex real-time RT-PCR/PCR. This outbreak extent included two wards where shared no common working staff but sessions of group occupational therapy. Twenty-four patients had conditions fulfilled the case definition. The most common symptoms were cough (n = 23; 96%), fever (n = 18; 75%), sore throat (n = 13, 54%), and rhinorrhea (n = 15; 63%). In multivariable analysis, factors associated with respiratory illnesses were diabetic mellitus (relative risk [RR], 2.6; 95% CI, 1.5−4.6), smoking (RR, 2.2; 95% CI, 1.3−4.6) and resident of ward A (RR, 2.3; 95% CI, 1.1−4.7). Six of 10 throat swab specimens from 10 case patients were positive for human metapneumovirus. Human metapneumovirus caused this upper respiratory illness outbreak. Diabetic mellitus and cigarette smoking are two associated factors. The group occupational therapy is speculated where disease transmission from one ward to the other happened.

Keyword: human metapneumovirus, psychiatric hospital

Introduction

On April 10, 2012, Taipei City Health Department notified the Centers of Disease Control (CDC) of a cluster of patients with fever and upper respiratory tract symptoms in a psychiatric hospital in Taipei. Seventeen psychiatric patients who were admitted to the two acute psychiatric wards experienced fever, cough, sore throat and rhinorrhea during April 2 and 11. The estimated attack rate was 26%. Two of the 17 patients developed pneumonia and were transferred to the medical ward in another hospital. All 17 patient received influenza A/B rapid testing; the results were all negative.

The initial infection control measures included strict hand hygiene and droplet and contact precaution among inpatients and health care providers in the two affected wards. However, the patients were not fully compliant because of their psychiatric illnesses. On April 9, the local health department recommended the hospital to take additional control measures which included case cohorting in isolation zones, increased frequency of environmental disinfection, cessation of new admissions to the two wards, suspension of group occupational therapy, and active surveillance for new cases. We characterized the outbreak and investigated the cause and associated factors.

Methods

A. Setting and study population

This psychiatric teaching hospital includes the acute and chronic psychiatric wards, work houses, an emergency room and a psychiatric intensive care unit. The two wards where the cluster occurred were both acute psychiatric wards located on the same floor. Patients were admitted to these wards for treatment of acute aggravated psychiatric conditions. Except for attending group sessions of occupational therapy, patients were not allowed to leave the ward during hospitalization. Patients whom physicians deemed suitable attended group sessions of occupational therapy twice daily; the activities included singing and making handicrafts.

B. Epidemiologic investigation

We conducted a retrospective cohort study in the two affected wards. On April 25, we reviewed medical records of all inpatients who had been hospitalized in the two wards after April 1. A standardized case report form was used to collect patient demographics; psychiatric diagnoses; medication in use; underlying diseases; history of cigarette smoking; dates of admission, isolation initiation, and discharge or bed transfer; attendance of group sessions of occupational therapy. Symptoms, signs, laboratory findings, and chest radiographic results among the patients with upper respiratory symptoms or fever that occurred were also recorded. A case was defined as onset of cough, rhinorrhea, or sore throat three or more days after admission in a patient who had been hospitalized between March 26 and April 25 in the two wards.

C. Laboratory investigation

Ten throat swab specimens obtained on April 11 from 10 case patients with fever were

tested for 19 respiratory viruses using multiplex PCR. Five serum specimens and one sputum specimen from case patients were collected and tested for *Mycoplasma pneumoniae* antibody using ELISA and *Mycoplasma pneumonia* using real-time PCR. All the specimens were sent to the CDC laboratories.

Eight multiplex real-time RT-PCR/PCR reactions were set up to detect 19 respiratory viruses, including human adenovirus, influenza A and B viruses, respiratory syncytial virus, coronaviruses (229E, OC43, NL63, HKU1), human metapneumovirus, parainfluenza type 1-4, human simplex virus type 1, human simplex virus type 2, varicella zoster virus, cytomegalovirus, human herpes virus type 6, bocavirus, parvovirus, enterovirus, rhinovirus. The primers and probes selected for each virus were described in previous studies.

E. Stastical analysis.

Chi-square test and Student *t* test were used to analyze categorical and continuous variables, respectively. Variables with *p*-value <0.05 in bivariate analysis were entered into a multivariable logistic regression to calculate the risk ratio (RR) and 95% confidence interval (95% CI) of variables. All *p*-values were 2-tailed. Analyses were performed using Epi Info™ software.

Results

Between April 1 and April 9, 77 patients had been admitted to the two wards and 73 (95%) medical records were available. Of 73 patients, 34 (47%) were male. The age ranged from 18 to 72 years (mean, 42; standard deviation [SD], 13). Twenty-four (33%) were habitual smokers. Twenty-seven (37%) had chronic diseases including 10 (14%) diabetes

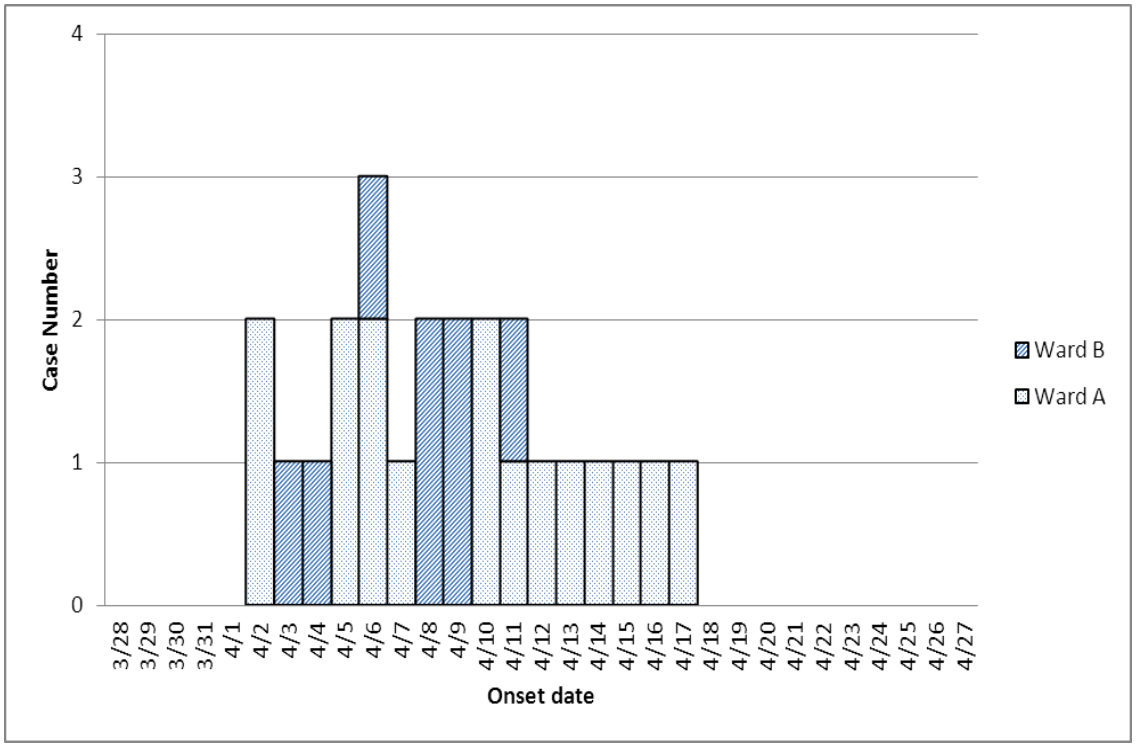

Figure. Epidemic curve of cases occurred among psychiatric patients in the two wards

mellitus, 8 (11%) hypertension, 3 (4%) hyperlipidemia, 3 (4%) hypothyroidism, 3 (4%) cancer, 3 (4%) chronic hepatitis, 1 (1%) diabetes insipidus, 1 (1%) parkinsonism, 1 (1%) valvular heart disease, 1 (1%) psoriasis, 1 (1%) gastric ulcer and 1 (1%) iron-deficiency anemia. Twenty-four patients met the case definition. Figure shows the epidemic curve. Attack rates for ward A and B were 47% and 21%, respectively.

Symptoms of the 24 patients included: cough (n = 23; 96%), fever (n = 18; 75%), sore throat (n = 13, 54%), and rhinorrhea (n = 15; 63%), muscle aches (n = 1; 4%), and headache (n = 1; 4%). The duration of cough, sore throat and rhinorrhea ranged from 3 to 17 days (median, 9 days). The duration of fever ranged from 1 to 10 days (median, 3 days). Table summarized the attack rates by patient characteristics and underlying medical diseases.

In multivariable analysis, factors associated with respiratory illnesses were diabetes mellitus (RR, 2.6; 95% CI, 1.5-4.6), smoking (RR, 2.2; 95% CI, 1.3-4.6) and being a resident of ward A (RR, 2.3; 95% CI, 1.1-4.7) (Table).

Of the 10 throat swabs for multiplex real-time RT-PCR/PCR, 6 were positive for human metapneumovirus (hMPV). Throat swabs and sputum specimen were all negative for *Mycoplasma pneumoniae* using PCR. Five serum specimens were all negative for *M. pneumoniae* IgM, and one of the five was positive for *M. pneumoniae* IgG.

There was no significant difference of time from symptom onset to isolation initiation between case patients in two different wards (ward A versus ward B, 1.3 versus 2.7 days, p=0.20). Nevertheless, compared with cases occurring before April 9, cases occurring after April 9 had shorter duration from symptom onset to isolation (0.33 versus 3.8 days, p<0.001). No additional case was identified after April 17, and the wards resumed their usual practice on April 27.

Table. Attack rates of patients with different characteristics and chronic medical conditions

	Attack rate (%)	Risk ratio (95% confidence interval)
Ward		
A	16/34 (47)	2.3 (1.1, 4.7)
B	8/39 (21)	
Sex		
Male	14/34 (41)	1.6 (0.8, 3.1)
Female	10/39 (26)	
Age		
≧60 years	1/8 (13)	0.4 (0.1, 2.3)
<60 years	23/65 (35)	
Smoking		
Current smoker	13/24 (54)	2.2 (1.3, 4.6)
Non-smoker	11/49 (22)	
Use of zapine drugs		
Yes	6/13 (46)	1.5 (0.8, 3.1)
No	18/60 (30)	
Group occupational therapy*		
Yes	17/40 (43)	2.0 (1.0, 4.2)
No	7/33 (21)	
Hypertension		
Yes	3/8 (38)	1.6 (0.4, 3.0)
No	21/65 (32)	
Diabetic mellitus		
Yes	7/10 (70)	2.6 (1.5, 4.6)
No	17/63 (27)	

*Participating more than once group occupational therapy between April 1 and April 9

Discussion

We described an outbreak of hMPV infection in a psychiatric hospital. The first case occurred on April 2, and the ward started droplet and contact precaution. However, cases continued occurring Starting from April 9, extensive control measures were initiated, which included strict hand hygiene, case cohorting in isolation zones until 3 days after symptom resolution, wearing surgical masks, gowns and gloves by staff members in the isolation zone, stopping admission of new patients to the two wards, and suspension of group occupational therapy.

Human metapneumovirus is a single-stranded RNA virus belonging to the family Paramyxoviridae [1]. The virus circulates predominantly in late winter and early spring months in temperate areas. The mode of transmission is likely direct contact with infected secretions through fomites or large-particle aerosols [2-3]. The precise incubation period is not known, although the literature suggests an incubation period of about three to six days. Clinical infections can cause upper respiratory illness including cough, rhinorrhea, fever [5], and can cause lower respiratory tract infections including pneumonia and respiratory failure in young children or immunocompromised patients [6-12]. Human metapneumovirus could cause only minor symptoms among healthy adults [3, 13].

Human metapneumovirus can potentially cause nosocomial infection and outbreak [2,14-17]. This outbreak extent included two wards where shared no common working staff except a head nurse. The head nurse had no upper respiratory symptom. In addition, the only activity shared by the patients in the two separated wards was group occupational therapy. Therefore, the group occupational therapy is speculated to be where disease transmission from one ward to the other took place. The diagnosis and control measures may have been delayed due to the acute psychiatric conditions which rendered the patients unable to report their symptoms precisely. On the other hand, the infection control measure may have been compromised due to the non-compliance of the patients. Prior studies reported risk factors for severe hMPV disease were female sex, prematurity and infected by genotype-B virus among hospitalized children. In this outbreak, we found that smoking and diabetes mellitus were both the risk factors for symptomatic hMPV infection among adult patients. Time from symptom onset to isolation initiation was significantly shorter after April 9. This indicated that the awareness of staff members was raised after April 9 while the outbreak was notified and extended control measures were taken. Moreover, the multiple control measures which included case cohorting in isolation zones, increased frequency of environmental disinfection, cessation of new admissions to the two wards, suspension of group occupational therapy, and active surveillance for new cases were implemented after April 9. Those were all crucial for controlling this outbreak.

Droplet and contact precaution should be taken immediately for patients with fever or respiratory tract illness in residential or health care facilities in companion with environmental disinfection and strict hand hygiene [3]. If the patients were not able to follow the instructions,

he or she should be cared in a single isolation room. If a cluster of fever with upper respiratory tract illness occurred, isolation for each patient or case cohorting, environmental disinfection and suspension of group activities should be employed without delay.

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References

1. van den Hoogen BG, de Jong JC, Groen J, et al. A newly discovered human pneumovirus isolated from young children with respiratory tract disease. Nat Med 2001 Jun;7(6):719-24.
2. Te Wierik MJ, Nguyen DT, Beersma MF, et al. An outbreak of severe respiratory tract infection caused by human metapneumovirus in a residential care facility for elderly in Utrecht, the Netherlands, January to March 2010. Euro Surveill 2012 Mar 29;17(13).
3. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 7th ed., Vol. 2: Natasha Andjelkovic.
4. Peiris JS, Tang WH, Chan KH, et al. Children with respiratory disease associated with metapneumovirus in Hong Kong. Emerg Infect Dis 2003 Jun;9(6):628-33.
5. Bosis S, Esposito S, Niesters HG et al. Impact of human metapneumovirus in childhood: comparison with respiratory syncytial virus and influenza viruses. J Med Virol 2005 Jan;75(1):101-4.
6. Schildgen V, van den Hoogen B, Fouchier R, et al. Human Metapneumovirus: lessons learned over the first decade. Clin Microbiol Rev 2011 Oct;24(4):734-54.
7. Pelletier G, Déry P, Abed Y, et al. Respiratory tract reinfections by the new human metapneumovirus in an immunocompromised child. Emerg Infect Dis. 2002 Sep;8(9):976-8.
8. Renaud C, Campbell AP. Changing epidemiology of respiratory viral infections in hematopoietic cell transplant recipients and solid organ transplant recipients. Curr Opin Infect Dis 2011;24(4):333-43.
9. Bastien N, Ward D, Van Caeseele P, et al. Human metapneumovirus infection in the Canadian population. J Clin Microbiol 2003 Oct;41(10):4642-6.
10. Falsey AR, Erdman D, Anderson LJ, et al. Human metapneumovirus infections in young and elderly adults. J Infect Dis 2003 Mar 1;187(5):785-90.
11. Englund JA, Boeckh M, Kuypers J, et al. Brief communication: fatal human metapneumovirus infection in stem-cell transplant recipients. Ann Intern Med 2006 Mar 7;144(5):344-9.
12. Larcher C, Geltner C, Fischer H, et al. Human metapneumovirus infection in lung transplant recipients: clinical presentation and epidemiology 2005 Nov;24(11):1891-901.
13. Osterhaus A, Fouchier R. Human metapneumovirus in the community. Lancet 2003 Mar

15;361(9361):890-1.
14. Liao RS, Appelgate DM, Pelz RK. An outbreak of severe respiratory tract infection due to human metapneumovirus in a long-term care facility for the elderly in Oregon. J Clin Virol 2012 Feb;53(2):171-3.
15. Osbourn M, McPhie KA, Ratnamohan VM, et al. Outbreak of human metapneumovirus infection in a residential aged care facility. Commun Dis Intell 2009 Mar;33(1):38-40.
16. Honda H, Iwahashi J, Kashiwagi T, et al. Outbreak of human metapneumovirus infection in elderly inpatients in Japan. J Am Geriatr Soc 2006 Jan;54(1):177-80.
17. Boivin G, De Serres G, Hamelin ME, et al. An outbreak of severe respiratory tract infection due to human metapneumovirus in a long-term care facility. Clin Infect Dis 2007 May 1;44(9):1152-8.

Outbreak Investigation Express

The Investigation Report of First Confirmed Case of Hantavirus Hemorrhagic Fever in Taiwan, 2012

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Abstract

A hospital reported on June 27, 2012, that a 63-year-old male pig farmer who resided in Alian District of Kaohsiung City had probably been bitten on toes by mouse at workplace in mid-May, and sought medical advice after developed fever, vomiting, ostealgia, muscular soreness, back pain, and shortness of breath since June 18. His symptoms were not relieved and on June 22, he went to consult the doctor again. After examination, he was found sinus bradycardia and thrombocytopenia and admitted to the hospital. On June 27, he was reported as a case of Hantavirus hemorrhagic fever by the hospital, and was confirmed by Centers for Disease Control, Taiwan on July 11, becoming the first local acquired case of Hantavirus hemorrhagic fever for the last two years. After notification, the health authorities had launched into rodent control and public health education.

Keywords: Hantavirus, Hantavirus hemorrhagic fever, rodent

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