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Contents

Pertussis: laboratory diagnosis and infection control

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Introduction

Pertussis is a vaccine preventable disease that is potentially life threatening in infants. Since the early 1990s, a resurgence of disease with a change in the epidemiological pattern has been observed in highly immunised population [1]. Atypical presentations in adults and adolescents result in misdiagnosis and a growing reservoir transmitting the infection to vulnerable infants. In the absence of a completely efficacious vaccine, early diagnosis, isolation and treatment of cases and antibiotic prophylaxis of contacts are important for the control of pertussis.

Laboratory diagnosis

Laboratory diagnosis of pertussis has been far from satisfactory. Recovery of *Bordetella pertussis* from respiratory specimens remains the "gold standard" but the sensitivity is low. Direct fluorescent-antibody (DFA) testing provides rapid diagnosis but lacks sensitivity and specificity. Nucleic acid amplification methods such as polymerase chain reaction (PCR) give superior sensitivity to that of culture [2]. Serology mainly by enzyme-linked immunosorbent assay (ELISA) has been used for vaccine trial and diagnosis.

Culture of *B. pertussis*

Nasopharyngeal aspirates provide more materials for analysis and are preferable to nasopharyngeal swabs, whereas throat, sputum, or mouth specimens are not recommended. *B. pertussis* is extremely fastidious, immediate inoculation onto fresh medium is the best. If this is not feasible, transport medium should be used. Colonies usually appear after 3-4 days, and sometimes up to 7 days incubation. Identity is confirmed by biochemical tests and slide agglutination using specific antisera or PCR.

Higher sensitivity are associated with young age (higher in infants), less doses of pertussis vaccination received, early stage of disease and absence of antibiotic pre-treatment. Technical factors such as specimen collection, transport and culture condition also affect the yield. The overall sensitivity of culture is considered no more than 50%. However, culture is highly specific and provides isolates for susceptibility testing and molecular typing.

Direct fluorescent antibody (DFA) methods

DFA provides rapid, presumptive diagnosis by direct detection and identification of organisms [3]. The conventional method gives poor and highly variable sensitivity (18-78%) and specificity (7-44% false positives). DFA testing should be performed only as an adjunct to culture or PCR, and the results should be considered presumptive.

Detection of *B. pertussis* by PCR

PCR method has been shown to be rapid, sensitive, and specific. The best methodology is still under investigation and Insertion sequence IS481 offers greatest potential as target primer.

The turnaround time of PCR (3h - 2 days) is much better than culture (at least 3 to 7 days). Since viable organisms are not required, transport delays and antibiotics do not affect PCR. It remains positive longer than culture, provides better yield for vaccinated patients and late stage of the disease. PCR is also useful for identification and typing of isolates. It gives positive results for transiently colonising bacteria, dead bacteria and their degradation products. Problems of contamination, inhibitors, cross-reaction and clinical correlation

remain to be solved.

PCR is currently used for clinical diagnosis in conjunction with culture and serology, epidemiological investigation and vaccine trial. It is much more expensive and technically demanding than culture but would be a valuable tool for selected complex cases.

Serological methods
Serologic test is not routinely available and the cutoff level has not been well established. ELISA has increasingly been used for measuring antibodies to *Bordetella* antigens such as pertussis toxin (PT) and filamentous hemagglutinin (FHA). Antibodies development is usually late in illness and influenced by immunostatus. The diagnostic value of IgA and IgM is unclear, paired sera for IgG are usually required.

Serology is currently recommended for diagnosis in unvaccinated children, in symptomatic adolescents and adults, in epidemiological surveys and in vaccine trials. Variations in age, geographic area, prevalence of infection and history of vaccination hamper the diagnostic value of single serum serology. Nevertheless, it is potentially useful when age-specific reference ranges for different populations using different type of vaccine are established [4].

Infection control in hospital settings

Pertussis is highly contagious. Nosocomial spread has been well documented. Transmission occurs by contact with respiratory discharges and droplets. The incubation period is usually about 7-10 days (ranges from 4-21 days) and rarely as long as 42 days. Infectiousness is highest in the early catarrhal stage and up to 21 days after cough starts.

Management of pertussis in healthcare settings involve the followings: isolate and treat index patients, contact tracing and surveillance, offer prophylaxis for asymptomatic close contacts, evaluate and treat symptomatic contacts, furlough symptomatic health care workers during the first 5 days of therapy and ensure up-to-date immunisation for contacts age <7 years.

Management of index cases
Index patients should be managed with droplet precautions until 5 days of appropriate antibiotic or 21 days after cough starts if effective antibiotic is not received.

Contact tracing
Significant contacts are defined by the Centers for Disease Control and Prevention (CDC) as contacts with a pertussis case without appropriate infection control precautions in the following settings: face-to-face contact, share confined space in close proximity for over 1 hour, or direct contact with respiratory, oral or nasal secretions. Those in waiting rooms of clinics or outpatient settings at the same time as a pertussis case are not considered close contacts [5]. However, individual assessment for the risk of infection and the specific condition of the exposure is required. The CDC definition is also used in Hong Kong [6]. CDC also recommends active surveillance in hospitals and institutions for 42 days after the onset of cough of the last case. UK guidelines defined close contacts as household contacts and contacts in institutions with overnight stay in the same room [7]. Vulnerable contacts are defined as unimmunised or partially immunised infants, children or immunocompromised persons, newborn infants of symptomatic mothers, presence of other chronic illness e.g. asthma, congenital heart disease.

Treatment and prophylaxis

The standard treatment of pertussis has been a full dose of erythromycin for 14 days. Evidence suggests that 7-day course is equally effective [8]. The use of azithromycin and clarithromycin to avoid the frequent gastrointestinal side effects of erythromycin is increasing. CDC recommends initiation of erythromycin (14 days course) within 3 weeks after cough onset or exposure, and up to 6 weeks for high-risk personnel regardless of age and vaccination status. The UK guidelines recommend erythromycin (7 days course) given within 21 days to treat the primary case, for prophylaxis of all close and vulnerable contacts except those aged less than 5 and have completed their primary immunisation. Minor discrepancies also exist locally, erythromycin for 14 days [5] and 7 days (Centre for Health protection, personal communication) for chemoprophylaxis are administered in the hospital and community settings respectively. Both authorities recommend 14 days erythromycin for treatment purposes.

Role of vaccine in outbreak control

Currently the role is minor since vaccine coverage is high among infants and preschool-aged children and the vaccines are not recommended for those over 7 years old. The vaccination course should be completed for cases or contacts aged less than 7 years who have not received the standard 4-dose series. Accelerated schedule for infants could be initiated by vaccination at 6 weeks of age with subsequent doses at 4-week intervals.

Conclusion

New diagnostic methods with improved sensitivity, specificity, rapidity, and cost-effectiveness are urgently required. PCR appears to have the greatest potential in this aspect. Recognition of persistent cough regardless of age or immunisation status as a presentation of pertussis allows earlier diagnosis. Provision of prompt isolation and treatment to cases and antimicrobial prophylaxis to close contacts are essential components to control the disease.

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Pertussis: clinical features and treatment

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Pertussis (Whooping cough) is an acute illness of the respiratory tract caused by *Bordetella pertussis* and, less frequently by *Bordetella parapertussis*. Pertussis affects all age groups, but is recognised primarily in children; it is most serious in young, unvaccinated infants and is a cause of mortality. *B. pertussis* is one of the major causes of cough illness. This year up to June, 21 cases were reported to the Department of Health, Hong Kong (http://www.info.gov.hk/dh/diseases/index.htm).

Year	Number of notification
1997	12
1998	3
1999	5
2000	11
2001	25
2002	23
2003	5
2004	10
2005	21 (up to Jun 2005)

Table 1: Notification rate of pertussis in Hong Kong

Clinical Features

Pertussis, or whopping cough, is a highly communicable infectious disease caused by the bacterium *Bordetella pertussis*. The clinical manifestations have considerable variation that depends on age, previous immunisation or infection, the presence of passively acquired antibody, and perhaps other factors such as the degree of exposure, host genetic and acquired factors, and the genotype of the organisms. It is characterised by spasms of 5 – 10 severe forceful coughing (paroxysms). The paroxysms are continuous without inspiration until the end and are often followed by the characteristic massive inspiratory effort (inspiratory whoop) and / or post-tussive vomiting (Figure 1).

The incubation period is about 7-10 days (range 4 – 21 days) and rarely may be 42 days. The illness can be divided into 3 phases: Illness onset is insidious, with symptoms similar to those of a minor upper respiratory infection (i.e., catarrhal period). During the first 1-2 weeks of the illness, coryza with an intermittent non-productive cough is common. This period is followed by episodes of paroxysmal coughing which frequently last for several weeks (i.e., paroxysmal period). The disease peaks in severity after one or more weeks of paroxysmal coughing and gradually tapers off with an extensive convalescent period of 2 – 6 weeks that may last up to 3 months in some cases. Patients often experience significant sleep disturbance.

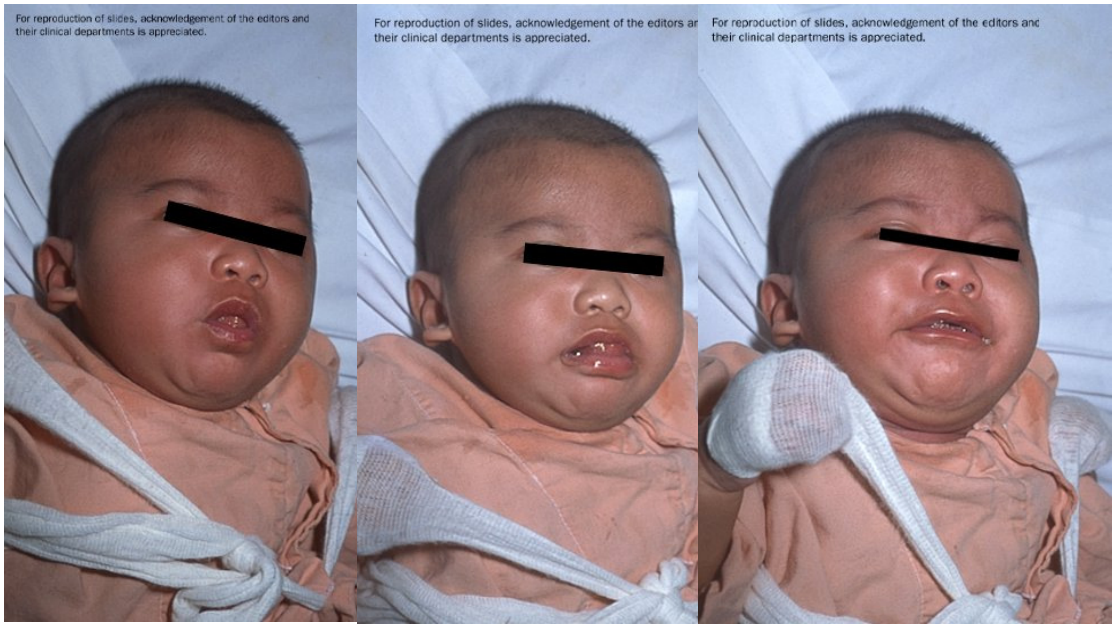

Figure 1: Serial pictures showing paroxysm of cough

Human are the only natural hosts of *B. pertussis*. Transmission is from person to person spread via aerosolised droplets produced from cough, sneeze or by direct contact with secretion from the respiratory tract of infected individuals. Pertussis is highly contagious with 80% attack rates among susceptible persons. Persons with pertussis are most infectious during the catarrhal stage and the first 2 weeks after cough onset. In several studies, older siblings (including adolescent) and adults may be an important source of pertussis in infants.

In classic disease, the clinical diagnosis should be made without difficulty. A history of contact with a known laboratory confirmed case would help make the diagnosis in a patient with mild or atypical illness. The presentation in infants less than 6 months old may be atypical, with absent of inspiratory whoop, also they may present as apnoea. The presence of leukocytosis with lymphocytosis in a child with a cough illness or the presence of apnoea in an infant provides further clues in diagnosis. A definitive diagnosis is made by positive culture from nasopharyngeal specimens.

Differential Diagnosis

Differential diagnosis of pertussis includes infections with other etiologic agents of cough illness, including *Mycoplasma pneumoniae*, *Chlamydia pneumoniae, Chlamydia trachomatis* (infants only), adenoviruses, and respiratory syncytial virus. Parapertussis caused by *Bordetella parapertussis* may also cause whooping cough. Two other Bordetella species – *B. bronchiseptica* and *B. holmesii* have occasionally been associated with pertussis-like cough illness.

Complications

Complications such as otitis media and pneumonia are common among infants. Complications related to apnoea include hypoxia, seizures and hypoxic encephalopathy. Other complications related to pressure effects of severe paroxysmal coughing includes subconjunctival haemorrhage, rib fracture, pneumothorax, atelectasis, subdural

haemorrhage, hernias and rectal prolapse. Hospitalisation is commonly required in infants for the treatment of infants with pertussis.

Infants younger than 6 months of age and other patients with severe disease commonly require hospitalisation for supportive care to manage apnoea, hypoxia, feeding difficulties and other complications.

Treatment

The first choice for antimicrobial treatment is erythromycin estolate, which will ameliorate the symptoms if given early during the course of the illness and will eliminate the organisms from the nasopharynx within a few days, thereby shortening the period of contagiousness. The dose for children is 40-50 mg/kg per day, orally, in 4 divided doses; maximum 2 g/day for 14 days. Recently studies showed that giving 7 days of erythromycin estolate treatment was as efficacious as 14 days treatment[3]. The newer macrolides, azithromycin dihydrate (10-12 mg/kg per day, orally, in a single dose; maximum 600 mg/day) for 5 days or clarithromycin (15-20 mg/kg per day, orally, in 2 divided doses, maximum 1g/day) for 7 days, can also be expected to be effective. Although rare, the use of erythromycin in young infants is associated with infantile hypertrophic pyloric stenosis, education to the parents concerning this potential risk is important.

Corticosteroid and β2-adrenergic stimulant may be effective in reducing paroxysms of coughing but further evaluation is required before their use can be recommended. Therapeutic use of pertussis-specific immunoglobulin is currently under investigation.

Supportive care to the infected individual includes avoidance of factors that trigger cough, maintenance of nutrition and hydration. In the hospital, gentle suction to remove respiratory secretions and humidified oxygen may be needed. In severely affected babies, intensive care facilities and assisted ventilation may be required.

In additional to the standard precaution, droplet precautions are recommended for 5 days after initiation of effective therapy or until 3 weeks after the onset of paroxysms if appropriate antimicrobial therapy is not given.

The prognosis in pertussis is related to the patient's age. In older children and adults, the prognosis is good. Infants are more likely that older children or adults to have severe diseases, to suffer from complications, to require hospitalisation or to die.

Chemoprophylaxis for Contacts

Erythromycin in the index case shortens communicability of the *Bordetella* organisms and thus limits the spread of the disease. During the first few days of treatment, contact with susceptible persons should be avoided. Health care personnel taking care of the patients should maintain strict droplets precaution. Close contacts of the index case should be given chemoprophylaxis in the form of erythromycin for 14 days and active immunisation should be administered to children younger than 7 years old who have not completed their immunisation series for pertussis. The use of erythromycin prophylactically in exposed adults is recommended. In the hospital setting, such use often involves many people and considerable expense. Given the fact that drug compliance in adults is often poor and the considerable side effects of erythromycin, it has been suggested by some that erythromycin should not be routinely used for prophylaxis, but only for treatment at the first sign of

respiratory illness in those exposed. Alternatively, azithromycin may be used prophylactically, as it is tolerated better in adults.

Vaccination

Whole cell pertussis vaccine became available in the 1940s and the rate of pertussis was reduced dramatically in countries in which universal immunisation of infants and children were implemented. Concerns about a relationship between pertussis vaccination and temporally associated serious adverse events led to a sharp decline in vaccination rates in Japan and several European countries during the 1970s. This concern, along with well-documented high rates of unpleasant local and systemic reactions, led to the development of new acellular vaccines. These vaccines cause reaction less frequently and are presently in use in many countries throughout the world.

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A fatal case of non-typhoidal Salmonella aortitis and literature review

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Non-typhoidal salmonellae are widely spread in nature and are commonly associated with animals (e.g. chickens and turtles). In humans, non-typhoidal *Salmonella* infections are most often associated with contaminated food products. The incidence of reported infections due to non-typhoidal *Salmonella* has increased dramatically since the 1980s. It can be manifested as gastroenteritis, bacteremia, extra-intestinal localised infections or asymptomatic chronic carrier state. The most serious extra-intestinal localised infections include endovascular lesions, osteomyelitis and meningitis. Endovascular infection can be in forms of infected aortic aneurysm or infective endocarditis and could result in high mortality. We reported a fatal case of mycotic aneurysm involving thoracic aorta in a patient with *Salmonella enteritidis* bacteremia.

Case Report

An eighty-four-year-old man, who was a chronic smoker and enjoyed good past health, presented to our medical ward for chest pain radiated to back for ten days. He also complained of cough with blood-streaked sputum and hoarseness of voice for the same period. He reported no symptom of diarrhoea or constipation. On admission, the patient was febrile with temperature up to 38 degree Celsius. Blood pressure was 181/90. Physical examination showed normal peripheral pulses, with no clinical sign of aortic regurgitation. Chest X-ray showed widened mediastinum. Urgent CT scan of thorax was performed, showing type B aortic dissection of size of 3.6 cm x 1.9 cm between aortic arch and descending aorta with periaortic haematoma of 4.2 cm x 9.6 cm compressing on oesophagus. Abdominal aorta was normal. Blood test showed neutrophilia of 27.3 x 10^9/L, haemoglobulin level was 11.5 g/dL. Renal and liver function tests were normal. Spot sugar level was 17 mmol/L. Blood culture taken on admission showed presence of Gram-negative bacilli, which was later identified to be *Salmonella* Enteritidis.

The patient was admitted to CCU for monitoring and blood pressure control. He was given intravenous ceftriaxone for control of sepsis. Echocardiogram was performed and no valvular regurgitation or vegetation was found. Cardio-thoracic surgery team was consulted and medical therapy was suggested. The patient remained haemodynamically stable and free of chest pain. Haemoglobulin level was static. However, he developed sudden onset of massive haematemesis one week after admission requiring active resuscitation and intubation. Urgent upper endoscopy showed haematoma at mid-oesophagus level. The patient, however, showed no sign of neurological recovery after resuscitation and pupils were fixed and nonreactive. He finally succumbed two days later.

Discussion

Mycotic aneurysms are localised abnormal dilatations of the arterial walls that develop secondary to an infective process causing destruction of the vessel wall. The most common site of *Salmonella* mycotic aneurysm is the abdominal aorta. These aneurysms often remain undiagnosed, resulting in recurrent bacteraemia. Eventually they rapidly expand and rupture and result in high rates of fatality. There are more than two thousand serotypes of non-typhoidal salmonellae but certain serotypes are more likely to cause systemic infections. A study in Canada found that the most commonly isolated serotypes from cases with *Salmonella* aortitis were *S.* Typhimurium (serogroup B) and *S.* Enteritidis (serogroup D1). (1)

Studies by Chiu et al. in Taiwan reported the order of prevalence to be *S.* Typhimurium*, S.* Choleraesuis (serogroup C1) and *S.* Schwarzengrund (2, 3).

Most patients with *Salmonella* aortitis have pre-existing atherosclerotic disease at the site of infected aneurysm. Studies conducted in Western countries found that around 10% of bacteraemic adults aged 65 years or above developed endovascular infection. (4,5) A Taiwanese study published in 1996 found that 35% of bacteraemic adults aged above 65 years had aortitis. (6) In a recent study evaluating risk factors for endovascular infection in patients with non-typhoidal salmonellosis, it was found that old age is an independent and the most important risk factor for both primary bacteremia and endovascular infection. (7) In another report of ten cases of aortitis due to *Salmonella*, nine patients had significant risk factors for atherosclerosis including hypertension, diabetes mellitus and ischaemic heart disease. (1) All these evidence may reflect the tendency of salmonellae to cause endothelial infection in the presence of atherosclerosis. Our patient was also an elderly man who was a chronic smoker and was diagnosed to have diabetes mellitus after admission. These risk factors for atherosclerosis predisposed him to endovascular infection with *Salmonella* bacteraemia.

Traditionally, patients with immunodeficiency were thought to be susceptible to *Salmonella* endovascular infection. High rate of *Salmonella* bacteremia was reported in patients with HIV infection and systemic lupus erythematosus. However, aortitis rarely occurs in these immunocompromised patients, because they are younger and without the above risk factors. A study in Taiwan found that immunodeficiency and systemic lupus erythematosus contributed to the development of primary bacteremia but not endovascular infection. (7)

Fever, back pain and abdominal pain are common clinical presentation associated with infection of thoracic and abdominal aorta. Patients typically present with a subacute course with mean duration of symptoms for one month. Recurrent or continuous bacteraemia is often, although not invariably, found. Various imaging techniques are useful for diagnosis of mycotic aneurysm. Both CT scan with contrast and MRI provide excellent visualisation of the thoracic and abdominal aorta and their relationship with the surrounding structures. An adjacent collection of blood, fluid or adjacent vertebral osteomyelitis on CT scan may further suggest infective aortitis.

Salmonella aortitis could be difficult to treat with a high fatality rate. Complications could result from post-operative condition (e.g. graft dehiscence, deep vein thrombosis, etc), bleeding or rupture from aneurysm, or other septic foci related to *Salmonella* bacteremia. (1) The cause of death of our patient was likely due to aortoesophageal fistula from the mycotic aneurysm. Several factors appear to be able to improve survival in the management of *Salmonella* aortitis. Firstly, early diagnosis with high clinical suspicion and appropriate investigation is important. Clinical clues for endovascular infection include patients older than 55 years old, with the presence of vascular abnormality as well as high grade bacteremia (i.e. more than 50% of 3 or more sets of blood culture positive for *Salmonella*). Secondly, bactericidal antibiotic therapy such as fluoroquinolones or third-generation cephalosporins should be administrated as soon as possible and should be continued for at least 6 weeks. However, in view of the emergence of fluoroquinolone resistant *Salmonella* in Southeast Asia, third-generation cephalosporins should be chosen as initial treatment for life-threatening condition in our locality before sensitivity result of the isolate is available. Thirdly, early surgical intervention has greatly improved the survival. The mortality rate was 96% for patients treated only medically and 38% for patient treated with combined surgical and medical therapy in a report involving ten cases. (1) In a recently published paper reporting five cases of non-typhoidal *Salmonella* endovascular infection in New Zealand, all patients

survived after treated both surgically and medically with ciprofloxacin for at least six weeks. (8) Finally, long-term suppressive therapy with antibacterial agent may be able to improve survival in patients who have undergone surgical intervention, but no randomised controlled trial has been performed regarding this aspect.

In Hong Kong, food poisoning and enteric fever are notifiable diseases. A laboratory-based surveillance programme has been started since 1974 by Department of Health. The number of food poisoning due to non-typhoidal salmonellae has shown an increasing trend in recent years, especially in the summer months. According to the data from the Salmonella Surveillance Programme (SSP), the top three *Salmonella* serotypes isolated in the year 2000 were *S.* Enteritidis*, S.* Typhimurium and *S.* Derby, (9) which were quite compatible with the most common serotypes isolated from *Salmonella* aortitis in overseas data. Currently, no surveillance data on *Salmonella* aortitis is available in our locality. However, only a minority of human isolations of *Salmonella* were from patients older than 65 years old. Children under five years accounted for around forty percent of the isolations in the same year.

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Journal review

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Falsey AR, Hennessey PA, Formica MA, et al. Respiratory syncytial virus infection in elderly and high-risk adults. N Engl J Med. 2005; 352: 1749-59.

Respiratory syncytial virus (RSV) is a major cause of lower respiratory tract infections in young children. However, its medical importance and disease burden in elderly and at-risk adults have not been well studied previously. In this study published in the *New England Journal of Medicine*, investigators from Rochester, New York conducted a community-based surveillance study which spanned over a period of four consecutive winters (1999–2003). They identified RSV infections in two prospective cohorts (608 healthy individuals 65 years old or older; 540 high-risk individuals 21 years old or older with chronic cardiopulmonary disease) and a cohort of 1388 hospitalised patients 65 years old or older with acute cardiopulmonary conditions.

Out of a total of 2514 respiratory illnesses, RSV infection accounted for 244: 46, 56 and 142 in the healthy cohort, the high-risk group, and the hospitalised patients, respectively. By comparison, influenza A virus infection accounted for 24, 20, and 154 illnesses, respectively. On an annual basis, RSV infections developed in 3% to 7% of the healthy elderly and 4% to 10% of the high-risk adults. In these cohorts, majority of patients with RSV and influenza A infections were symptomatic (89% and 91%, respectively), and visits to physicians' offices were more frequent for influenza A than for RSV. In the hospitalised cohort, RSV infection was similar to influenza A infection in terms of length of stay, development of pneumonia, use of intensive care, and mortality. Discharge diagnosis codes for these patients showed RSV to be the underlying cause in 11% of hospitalisations for pneumonia, 11% for chronic obstructive pulmonary disease, 5% for congestive heart failure, and 7% for asthma.

Points to note: RSV has now been clearly established as a medically important pathogen among elderly and high-risk adult patients in the community, accounting for a substantial disease burden during the winter among outpatients and those requiring hospitalisation for acute cardiorespiratory conditions. Although RSV and influenza A illness rates were comparable, the rates for influenza A were probably reduced by vaccination programmes. Development of a RSV vaccine may hold much promise for the future, although it is likely to be a difficult task because infections occur repeatedly throughout life.

Oxman MN, Levin MJ, Johnson GR, et al. A vaccine to prevent herpes zoster and postherpetic neuralgia in older adults. N Engl J Med. 2005; 352: 2271-84.

Older individuals tend to have increased incidence of reactivation of herpes zoster as a result of waning of cell-mediated immunity associated with aging. Whether administration of a live attenuated varicella-zoster virus (VZV) vaccine to older adults might boost their immunity against VZV and prevent the development of zoster is currently not known. In order to answer this important clinical question, researchers from the Shingles Prevention Study in San Diego, US conducted a prospective, multicentre, randomised, controlled trial from November 1998 through September 2001, which was partially supported by industry, and the results were published in the *New England Journal of Medicine.*

During the study period, a total of 38,546 immunocompetent subjects 60 years or older were randomised to receive a single dose of VZV vaccine or placebo; follow-up continued through April 2004, with a mean duration of 3.1 years. As compared with control subjects, vaccine recipients showed significant reductions in incidence (5.4 vs. 11.1 episodes per 1000

person-years, respectively), duration, and severity of herpes zoster, as well as overall burden of illness and incidence of postherpetic neuralgia (0.46 vs. 1.38 episodes per 1000 person-years). Side effects during the first 42 days post vaccination were more common in vaccine recipients than in controls (58% vs. 34%), most of which were minor injection site reactions. Among the 957 participants who developed herpes zoster during the observation period, PCR testing detected wild-type VZV DNA in 894, in none of the patients were vaccine-type VZV DNA detected.

Points to note: Given the morbidity associated with herpes zoster, the VZV vaccine's ability to reduce disease incidence by more that 50 percent and postherpetic neuralgia incidence by 66.5 percent strongly suggests that it could be of major potential benefit for older adults. As noted in the editorial, vaccination would likely be quite cost-effective. One word of caution though: the VZV vaccine employed in this trial was about 14-fold more potent than the preparation currently licensed for use in children, so this formulation will require formal FDA approval before it could be used for the purpose in the general adult population.

Wernitz MH, Swidsinski S, Weist K, et al. Effectiveness of a hospital-wide selective screening programme for methicillin-resistant *Staphylococcus aureus* (MRSA) carriers at hospital admission to prevent hospital-acquired MRSA infections. Clin Microbiol Infect. 2005; 11: 457-65.
Wernitz MH, Keck S, Swidsinski S, et al. Cost analysis of a hospital-wide selective screening programme for methicillin-resistant *Staphylococcus aureus* (MRSA) carriers in the context of diagnosis related groups (DRG) payment. Clin Microbiol Infect. 2005; 11: 466-71.

Internationally published guidelines to reduce transmission of methicillin-resistant *Staphylococcus aureus* (MRSA) continue to recommend isolating patients known to carry the organism as well as screening those at risk. A group of researchers from Germany recently assessed the effectiveness and the cost of screening potential MRSA carriers upon admission to hospital. At a Berlin hospital, swabs were taken from the throat and nares, skin lesions, and any other suspicious sites from individuals who had a known history of MRSA carriage, who were referred from foreign hospitals or institutions where MRSA was endemic, or who had two or more other risk factors for MRSA carriage or infection.

Between the period from May 2001 till November 2002, 539 patients at high risk for MRSA carriage (1.5% of all admissions) were screened and isolated until test results were received; 111 (20.6%) were eventually found to be positive for MRSA. MRSA-positive patients were immediately placed in private rooms under strict barrier precautions. During the 19-month screening period, it was found that a total of 38 inpatients developed hospital-acquired MRSA infections. The incidence of hospital-acquired MRSA infections was 48 percent lower — and that of MRSA bloodstream infections, 65 percent lower — than the numbers predicted, as compared with the incidence during a 19-month retrospective control period in 1999–2001.

In an industry-supported cost analysis of the same trial, the researchers calculated a loss in excess of 5700 Euros per hospital-acquired MRSA case. The screening programme, by preventing an estimated 35.2 cases over 19 months, saved treatment costs of about 127,000 Euros per year. Given the extra costs for screening and isolation of nearly 17,000 Euros per year, this translated to a net saving of about 110,000 Euros as a result of the screening programme. A sensitivity analysis further demonstrated that the screening programme would be cost-effective for institutions with MRSA rate among incoming patients between 0.03 and 13.7 percent.

Points to note: An obvious potential limitation of this study and cause for criticism is the use of a retrospective control group. Nonetheless, these data are the best available for estimating the impact of MRSA screening. Although the routine use of such active surveillance for MRSA remains controversial in the U.S. and in other parts of the world where MRSA is endemic in hospitals, these studies served to demonstrate that a relatively simple screening programme could potentially reduce hospital-acquired MRSA infections and save money. Pending further investigations, it may be justifiable for hospitals with low to moderate MRSA incidence to consider instituting similar MRSA screening programmes in the mean time.

Meetings	
20-21 Oct 2005 Paris, France	**Managing Infective Therapies** Contact: Fax: +33 1 40 61 34 05 E-mail: euroconf-ip@pasteur.fr
10-11 Nov 2005 London, United Kingdom	1st International Conference of the Journal of Travel Medicine and Infectious Diseases Organised by Elsevier in association with Travel Medicine and Infectious Disease Contact: Sophie Peters, Travel Medicine Conference Secretariat, Elsevier The Boulevard, Langford Lane, Kidlington Oxford OX5 1GB, UK Tel: +44 (0) 1865 843643 Fax: +44 (0) 1865 843958 Email: s.peters@elsevier.com Web: http://www.travelmedicine.elsevier.com/
19-20 Nov 2005 Hilton New York Hotel & Towers New York United States	**The 18th Annual Infectious Diseases in Children Symposium** Contact: Registration Manager INFECTIOUS DISEASES IN CHILDREN 6900 Grove Road Thorofare, NJ 08086-9447 Tel: 1-877-307-5225 Fax: 856-251-0278 Email: meetingregistration@slackinc.com Web: https://www.slackinc.com/meetings/IDC/ny/register.htm
7-10 Mar 2006 Waterfront Hotel Lahug, Cebu City Philippines	**3rd Asian Congress of Pediatric Infectious Diseases and 13th Pediatric Infectious Diseases Society of the Philippines Annual Convention** “Pediatric Infections in the 21st Century: Meet the Challenges” Contact: Pediatric Infectious Disease Society of the Philippines (PIDSP) Unit 4 Metro Square Townhomes #35 Scout Tuazon corner Scout de Guia Sts., Quezon City Tel (632) 526-9167; (632) 374-1855 Fax (632) 404-2397; (632) 412-6998 E-mail: aspid@uplink.com.ph Web: http://www.asianpids.org
11 Mar 2006 Eaton Hotel Hong Kong	10th Annual Scientific Meeting of the Hong Kong Society for Infectious Diseases Contact: CMPMedica Pacific Ltd Tel (852) 2559 5888 Fax (852) 2559 6910

19-22 Mar 2006 Atlanta Marriott Marquis Atlanta, Georgia	**International Conference on Emerging Infectious Diseases** Contact: American Society for Microbiology Phone: 202-942-9330 Fax: 202-942-9340 E-mail: iceid@asmusa.org
2-6 Apr 2006 Alice Spring Australia	**5th International Symposium on Pneumococci and Pneumococcal Disease (ISPPD5)** **C**ontact: ISPPD5 Conference Managers GPO Box 128 Sydney, NSW, 2001 Australia Phone: +61 2 9265 0700 Fax: +61 2 9267 5443 E-mail: isppd5@tourist.com.au Web: http://www.isppd5.com
1-4 Apr 2006 Nice France	16th European Congress of Clinical Microbiology and Infectious Diseases Contact: 16th ECCMID 2006 c/o AKM Congress Service P. O. Box CH-4005 Basel Switzerland Phone: +41 61 686 7711 Fax: +41 61 686 7788 E-mail: info@akm.ch Web: www.escmid.org/eccmid2006