GP Handbook

Respiratory Diseases

(last update 20160812)

COMMON RESPIRATORY INFECTIONS

Runny Nose

- Cold virus first infects the nose and sinuses for 2-3 days, as the body fights back, mucus turns white or yellow; with overgrowth of normal flora, the mucus turns green. This means the colour of nasal discharge does not reflect the aetiology of runny nose with any accuracy.
- Cool mist vapourizer or steam generated from hot water may help alleviating runny nose.
- In most cases there is NO need to use antibiotics as the commonest causes of runny nose are viral infection and nasal allergy.

Respiratory Infection

- URTIs are those involving nasal airways to larynx.
- LRTIs affect trachea downwards.
- Accounting for 1/3 of sick-leave from work, and 3/5 of sick-leave from school
- Most URTI are VIRAL; antibiotics are not indicated.
- Combined URTI and LRTI include influenza, measles, whooping cough and laryngotracheobronchitis.

Common Cold vs Flu

	Common Cold	**Influenza**
Onset	Gradual	Sudden
Fever & chills	Rare	Common (>80%)
Cough	More productive	Usually dry
Sore throat	Common	Rare
Nasal symptoms	Common	Rare
Headaches & myalgia	Rare	Common
Tiredness	Rare	Common
Causes	Rhinoviruses Parainfluenza Influenza B Influenza C Corona virus RSV	Influenza A Influenza B

Management

- Rest, no greasy/fried food, high fluid intake + symptomatic medications
- Avoid multi-pharmacy (there are very few, if any, clinical situations in which a doctor needs to prescribe, in one single visit, more than 4 medications to a patient with URTI).

ANTIBIOTICS IN RESPIRATORY INFECTIONS

URTI

The term URTI includes non-specific infections, acute pharyngitis, acute sinusitis and acute otitis media. It is the most common diagnosis in all consultations in primary care. Among all URTIs, 80-90% of them are of viral causes. The most common causative agents are rhinovirus, respiratory syncytial virus, influenza virus, parainfluenza virus, adenovirus and coronavirus. Judging from clinical signs and symptoms, it may not be possible to differentiate whether the patient is suffering from bacterial or viral infection. This makes the proper use of antibiotics difficult.

In a survey conducted in Hong Kong, Dickinson et al revealed that among all consultations by family doctors, 25% of patients with URTI, 40% of patients with throat symptoms, and 80% of patients with tonsillitis were prescribed antibiotics.

In general, the doctors would be more likely to prescribe antibiotic if there is a request from the patient, if the patient is a smoker, of old age, having sinusitis, purulent sputum, purulent nasal discharge or imminent overseas travel.

Acute Otitis Media

Use of antibiotics can be deferred for 48 hours since 1/3 of all otitis media are viral and therefore self-limiting. Our recommendation is to prescribe a short course of antibiotics for children who are at risk for complications (eg when the child is in obvious, severe pain and the eardrum is red and bulging). Empirical coverage for *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella* species is recommended.

For children who need antibiotics, amoxycillin (Ospamox, 80mg/kg/d) or amoxycillin-clavulanate (Augmentin) is recommended. Clarithromycin (Klacid) and azithromycin (Zithromax) are useful for patients allergic to penicillin.

Oral antibiotics can often be given for 5-7 days in children over 6 years old. A full 10-day course, however, may be indicated for younger children and for those with complications. Avoid local treatment with antimicrobial eardrops (*Lisby-Sutch et al., 1990; "Clinical uncertainty clouds pharmacoeconomic assessment of otitis media therapy," 1995*).

Acute Rhinosinusitis

Green or yellow nasal discharge is NOT specific to bacterial infections and is NOT an indication for antibiotic treatment. Antibiotic treatment (eg Augmentin or Klacid) should be deferred unless there are severe symptoms, such as fever > 39 ^{o}C, maxillary pain and/or swelling, or cough with purulent rhinorrhea for more than 7-10 days. Local symptoms can be treated with intranasal decongestants together with oral antihistamines especially if allergic rhinitis is a possibility.

Common Cold

Antibiotics should NOT be given for common cold even in the presence of mucopurulent rhinitis.

Acute Laryngitis

Antibiotic treatment should be reserved for high-risk patients, patients with severe symptoms, or in the presence of an identifiable organism on Gram stain or culture.

If symptoms persist > 3 weeks, the condition is classified as chronic laryngitis, for which an underlying cause (eg polyps, cancer, TB and GERD) must be further investigated.

Acute Pharyngitis (Sore Throat)

Antibiotics are widely used (or abused) for treatment of sore throat, although <10% are bacterial in aetiology. Inflammed pharynges or enlarged or even exudative tonsils do not necessarily indicate a bacterial cause.

Two systematic reviews on a total of 19 trials failed to show any beneficial effect from antibiotics for the cure or symptomatic relief of the common cold, but the treatment groups reported more side effects. A local study by Dr K Choi confirmed the following points:

- The commonest bacteria isolated are Group A and Group G streptococcus.
- Penicillin V for 10 days remains the treatment of choice because of its proven efficacy, narrow-spectrum, safety and low cost.
- Erythromycin and tetracycline should not be used because of their high resistance rate.

Antibiotics should not be used with the specific intention to prevent development of rheumatic fever or acute glomerulonephritis. Antibiotics may reduce the risk of cross-infection in closed institutions but should not be used routinely for this purpose in the general community.

One important but often overlooked fact is that, even if the patient does indeed suffer from a bacterial infection, antibiotics may still not be needed. Rest, good hydration and symptomatic treatment may be all that is necessary for a complete and uneventful recovery.

Modified Centor Criteria

For diagnosis of streptococcal tonsillopharyngitis, a scoring system may be employed as follows:

One point is awarded for each of:

- ***Fever (> 38°C)***
- ***Absence of cough***
- ***Swollen, tender anterior cervical nodes***
- ***Tonsillar swelling or exudates***
- ***Age 3-14***

One point is deducted if:

- ***Age > 45***

According to the scoring system,

- 1 point or less: no further testing or antibiotics
- 2-3 points: throat swab culture - antibiotics only for positive cultures
- 4-5 points: empirical antibiotics +/- throat swab

Even at points 4-5, the risk of bacterial (streptococcal) infection is only about 50%.

Throat swab

In addition to traditional culture, rapid antigen detection tests (RADTs) are commercially available for identifying group A beta-haemolytic streptococci directly from throat swab. They have the

advantage over culture of producing results much faster. The results are highly specific for group A streptococci. Unfortunately the sensitivity of most RADTs ranges between 80% and 90%.

In daily practice however, getting throat swabs from patients is much easier said than done, considering the inevitable inconvenience and cost. Without objective microbiological data, most experienced physicians would recommend the following:

- 2-3 points: observation – antibiotics only if the patient deteriorates in 48 hours
- 4-5 points: empirical antibiotics – clinical review in 48 hours

Symptomatic treatment:
Paracetamol is effective in relieving the symptoms of fever, and sore throat in both adults and children. NSAIDs are not much more effective but cause more side effects. Aspirin is contraindicated in children under the age of 12 because of the risk of Reye's syndrome. The following may provide extra symptomatic relief:

- Lozenges: Pharynx, Dequadinium
- Gargle: Thymol gargle, Benzydamine (Difflam)
- Anti-inflammatory enzymes: Lysozyme, Papain, Flemyzme

Steroids
If symptoms are severe a short course of oral steroid (eg prednisolone 40-60mg/day x 3/7) may be considered. A Mayo Clinic study in 2003 found that a single 10 mg dose of dexamethasone provided safe, effective and inexpensive treatment for bacterial or viral pharyngitis (sore throat). Explain carefully to the patient that while steroid may offer excellent symptomatic relief, it does not treat the underlying cause of sore throat. Steroid therapy is contraindicated in patients with chronic hepatitis.

Acute Bronchitis

Most cases are self-limiting, and viral in aetiology. Antibiotics should only be used in the elderly, patients with signs and symptoms of pneumonia. Routine chest x-ray should be performed in patients with acute cough illness lasting more than 2 weeks, especially in poor risk patients, to rule out pneumonia, pneumonitis, cancer and TB.

Exacerbation of COAD

Patients with acute exacerbation without increase in purulent sputum do not need antibiotics unless there is clinical or radiological (eg consolidation on a CXR) evidence of pneumonia. The antibiotics of choice are Augmentin, Klacid, Zithromax and Zinnat (cefuroxime).

Community Acquired Pneumonia (CAP)

In Hong Kong, *Streptococcus pneumoniae* is the single most common pathogen in CAP. Empirical treatment for CAP should therefore be based on local data of drug-resistant *Strep pneumoniae* (DRSP) and the increasing prevalence of atypical pathogens (eg *Chlamydia pneumoniae*, *Mycoplasma pneumoniae* and Legionella species). The following are extracted from the local guidelines IMPACT (Interhospital Multidisciplinary Programme on Antimicrobial ChemoTherapy):

Out-patient
- PO amoxicillin-clavulanate (Augmentin) +/- macrolide*
- PO ampicillin-sulbactam (Unasyn) +/- macrolide*
- PO amoxicillin + macrolide*

In-patient

- IV or PO amoxicillin-clavulanate +/- macrolide*, or
- IV or PO ampicillin-sulbactam +/- macrolide*, or
- IV cefotaxime +/- macrolide*, or
- IV ceftriaxone +/- macrolide*

** clarithromycin (Klacid), or azithromycin (Zithromax)*

Pseudomonas risk

- IV piperacillin, meropenem, ceftazidime, aztreonam or amikacin

Fluoroquinolone is not recommended as the first line therapy for CAP in Hong Kong. The resistance of this class of drug is rapidly emerging among the *Streptococcus pneumonia* in this locality. Moreover, tuberculosis is prevalent in Hong Kong. Excessive use of fluoroquinolone may lead to delay in diagnosis of tuberculosis and increased fluoroquinolone resistance against *Mycobacterium tuberculosis*.

COUGH

Cough is a reflex response to mechanical, chemical, or inflammatory irritation of the tracheobronchial tree mediated by sensory neurons in the airways reflexly through neurons in the brainstem. Cough serves as a physiologic function to clear airways of obstructive or irritating material or to warn of noxious substances in inspired air.

Productive Cough

In some pathologic states (eg asthma, and a variety of inflammatory conditions), excessive and/or abnormal airway secretions may be produced. The cough reflex serves to maintain airway patency by clearing these secretions. Clearing of pathologic tracheobronchial secretions is essential to patient management and may be enhanced by chest physiotherapy. Suppression of productive cough may therefore worsening the situation by promoting pooling of secretions, airway obstruction, secondary infection, and hypoxemia.

Persistent Cough

Many common respiratory conditions in which cough is prominent (eg viral URTIs) are self-limited (lasting a few days). Cough may be an expression of airway reactivity or asthma. The cough that is associated with these conditions may be satisfactorily managed with fluids and increased ambient humidity. When cough is persistent, it is usually secondary to infection, allergy (including asthma), environmental irritants (eg cigarette smoke, dust particles) or, occasionally, a foreign body. Therapy should be directed at the underlying condition for lasting benefit.

Anti-tussive Agents

Most cough suppressant preparations are mixtures of dextromethorphan or codeine/pholcodeine with antihistamines, decongestants, expectorants, and/or antipyretics. Some nonprescription preparations substitute diphenhydramine or eucalyptus oil in place of codeine or dextromethorphan. In addition, many of these cough products are elixirs, which may contain up to 25% alcohol by volume.

The over-the-counter availability of numerous cough and cold preparations promotes the perception that such medications are safe and efficacious. Although codeine and dextromethorphan are efficacious for cough suppression in adults, similar efficacy has not been demonstrated in children, and these medications may be potentially harmful. Decongestant (sympathomimetic) components of these mixtures administered to children have been associated with irritability, restlessness, lethargy, hallucination, hypertension, and dystonic reactions. A great variability in the enterohepatic circulation of these drugs is noted in adults, which affects drug response, especially with repeated dosing. The relatively immature hepatic enzyme systems in young children may enhance the risk of adverse effects of such medications, especially in infants. Unfortunately, the dosing guidelines for these agents are based on extrapolation from adult data without consideration of their potentially unique metabolism and disposition in children.

Codeine
(Vickolax - codeine phosphate 7.5 mg, papaverine 5 mg, chlorpheniramine 2 mg)
(Codolax – codeine phosphate 15 mg, papaverine 5 mg, chlorpheniramine 2 mg)
(Codoplex - codeine phosphate 15 mg, papaverine 6 mg, dipheniramine 2 mg, terpin hydrate 60 mg,

caffeine 10mg)

In adults, codeine (methylmorphine) and dextromethorphan have been shown to suppress cough mainly through central nervous system mechanisms. A linear relationship has been shown to exist between a dosage range of 7.5-60 mg/d and a decrease in the frequency of cough. Complete suppression of cough was not achieved in these trials, even at the highest daily dose of codeine.

Pharmacokinetic studies of codeine therapy in children are lacking. The published dosage recommendation for codeine in children is 1 mg/kg/d in 4 divided doses, not to exceed 60 mg/d, although no well-controlled studies have documented the safety and efficacy of this dosage.

The principal manifestations of codeine toxicity are respiratory depression and obtundation. In children, antitussive dosages of 3-5 mg/kg/d have produced somnolence, ataxia, miosis, vomiting, rash, facial swelling, and pruritis. Reports of adverse reactions to codeine are based on single dose ingestions; the repetitive administration of codeine for therapeutic purposes may be associated with adverse symptoms at doses lower than a single dose of 5 mg/kg.

Dihydrocodeine (Codaewon tablet – dihydrocodeine bitartrate 5 mg, guaifenesin 50 mg, methylephedrine 17.5 mg, chlorpheniramine 1.5 mg) is a semi-synthetic opioid with chemical structure, effects and side effects similar to those of codeine. Depending on individual metabolism, dihydrocodeine is about 2-3 times the potency of codeine. Its duration of action (6 hours) is longer than that of codeine (4 hours).

Dextromethorphan

The addictive potential of codeine encouraged the marketing of dextromethorphan in a variety of cough and cold preparations. Although dextromethorphan is chemically derived from opiates, it has no analgesic or addictive properties. According to some studies, the cough suppression potency of dextromethorphan in adults is nearly equal to that of codeine. The drug, like codeine, acts on the central nervous system to elevate the threshold for coughing. Dosages of equal antitussive potency to codeine produce comparable levels of central nervous system depression in adults.

Pharmacokinetic studies of dextromethorphan therapy in children are lacking. The recommended dosage in children is similar to that for codeine (ie 1 mg/kg/d in 4 divided doses).

Others

Papaverine is an opiate used primarily in the treatment of visceral spasm and vasospasm. While it is found in the opium poppy, papaverine differs in both structure and pharmacological action from the other opiates.

Terpin hydrate is prepared from oil of turpentine. It was a popular cough medicine from the late 1800s until the mid 1990s. Then the FDA banned it in on the grounds that it had not been proven effective. As an expectorant, terpin hydrate was supposed to loosen mucus and relieve coughs. It is contraindicated in gastritis and duodenal ulcer.

Guaifenesin is an expectorant. It is frequently combined with dextromethorphan (Robitussin-DM - per 5 ml: dextromethorphan 10 mg, guaifenesin 100mg). It is also effective in treating the thickened bronchial mucosa characteristic of asthma.

You Didn't Ask, But…

- Unexplained, persistent cough for more than 2 weeks is either pulmonary TB or lung cancer until proven otherwise (ie CXR indicated).
- Cough suppressants are for dry cough, whereas expectorants (eg MES) are for productive cough.

- Tablets and capsules are for adults, whereas syrup is for children.
- Half-tablets can be flexibly used in combination with other cough/cold medications.
- Since most patients cannot tell the difference between "post-nasal drip" and "phlegm", a lot of mucolytics are prescribed to the wrong patients.

Cough Variant Asthma

Aka Reactive Airways Dysfunction Syndrome (RADS), Hyper-responsive Airways Disease, Bronchial Hyper-responsiveness…etc.

Throat "itchiness", chest tightness, mild dyspnoea associated with severe, explosive "chains" of coughing, and nocturnal cough – this asthma-like syndrome represents hyperactivity, or hyper-irritability of airways; do not confuse this with bronchitis or COAD.

A lot of these patients complained of a post-nasal drip syndrome:

- Some "phlegm" sticking in the throat, especially during sleep or in the morning.
- The throat is so itchy that irritative, sleep disturbing cough is inevitable.
- The "phlegm" is actually nasal secretion dripping down from the back of the nose. It tends to get swallowed in daytime, but collected around the throat during sleep because of gravity.
- With significant post-nasal drip blocking the nasal passage the patient tends to breathe orally. Without the humidifying, warming and filtering effect of the nose, cold, dry and dirty air bombards our throat all through the night, thus causing throat dryness and grittiness in the morning.
- The throat symptoms are worsened by the fact that during sleep the throat is in a dependent position, and tends to be more oedematous upon irritation.

Mucolytics are therefore ineffective in treating this kind of "phlegm". Cough suppressant may help alleviating some symptoms, but rigorous treatment for the nasal secretions is mandatory. Antihistamines, nasal decongestants and even intranasal steroids may be used.

Treatment strategy

- First goal – good sleep (a hypnotic may be needed)
- Treat symptomatically until the cough does not disturb patient's normal daily living.
- Medications must include oral or even inhalational bronchodilators (avoid giving bronchodilators at bedtime – they may impair sleep).
- Patients may need oral or inhalational steroids, or leukotriene receptor antagonist like Zafirlukast (Accolate), Montelukast (Singulair).
- Reduce the dosages as symptoms improve.
- Aim at gradual control of symptoms in 1-2 weeks.
- Sustained remission often depends on environmental factors.
- Antihistamines, nasal decongestants and intranasal steroids may be required.
- A sedating, long-acting antihistamine is useful as a night drug.

PNEUMONOCOCCAL DISEASE

Pneumococcal disease is caused by *Streptococcus pneumoniae*, a bacterium that has more than 90 serotypes. Most serotypes cause disease, but only a few produce the majority of invasive pneumococcal disease. The disease is spread from person to person by droplets in the air. The pneumococci bacteria are common inhabitants of the human respiratory tract. They may be isolated from the nasopharnyx of 5%-70% of normal, healthy adults.

Pneumococcal pneumonia tends to affect humans when they are either very young or very old. According to WHO, pneumococcal disease is the world's number 1 vaccine-preventable cause of death among infants and children younger than 5 years of age.

Non-Invasive Pneumococcal Diseases

These occur outside the major organs or the blood. *S pneumoniae* can spread from the nasopharynx (nose and throat) to the upper and lower respiratory tract and can cause:

- Otitis media - *S pneumoniae* is among the top two isolates found therein.
- Non-bacteraemic pneumonia - infection of the lower respiratory tract without detectable spread of organisms to the blood stream.

Invasive Pneumococcal Diseases (IPD)

These tend to be more serious and occur inside a major organ, or in the blood, including:

- Bacteremia and septicaemia
- Meningitis
- Bacteraemic pneumonia - infection of one or both lungs, with pneumococcus in the bloodstream.

IPD is age dependent, with children aged under 2 fall into the highest risk group. The incidence of IPD in Hong Kong was comparatively lower than that overseas. The annual incidence of IPD in the US and the UK were in the range of 70 - 90 per 100,000 before the introduction of PCV. In Hong Kong, with the introduction of PCV into the Childhood Immunisation Programme since September 2009, the annual incidence rate of IPD in children aged under 2 has dropped from 11.39 per 100,000 population in 2008 to 1.89 per 100,000 population in 2012. IPD in Hong Kong has a seasonal trend with more cases observed in winter months.

Pneumococcal Pneumonia

This is the most common disease caused by pneumococcal infection. It can occur in combination with bacteraemia and meningitis. Isolated pneumococcal pneumonia is not considered invasive disease but it can be severe. The incubation period is 1-3 days. Symptoms include abrupt onset of fever, chills or rigors, chest pain, cough, shortness of breath, tachypnoea and tachycardia. The fatality rate is 5%-7% and may be much higher in the elderly.

Pneumococcal bacteremia occurs in about 25-30% of patients with pneumococcal pneumonia. Bacteraemia is the most common clinical presentation among children < 2 years, accounting for 70%

of invasive disease in this group.

Pneumococcal Vaccines

Pneumococcal polysaccharide vaccine (PPSV23)
The first pneumococcal vaccine, licensed in 1977, was a polysaccharide vaccine covering 14 different types of pneumococcal bacteria. In 1983, a 23-valent polysaccharide was licensed (PPSV23), replacing the 14-valent vaccine.

Pneumococcal conjugate vaccine (PCV13)
In 2000, the first pneumococcal conjugate vaccine (PCV) was licensed in the US. This vaccine contained seven serotypes (4, 6B, 9V, 14, 18C, 19F, and 23F) of *Streptococcus pneumoniae* and became known as PCV7 (Prevnar). In February 2010, a new 13-valent product was licensed — PCV13 (Prevnar 13) — which added 6 new serotypes (1, 3, 5, 6A, 7F, and 19A), accounting for the majority of IPD in the US.

Recommendation as of July 2015
All infants - a primary 3-shot series of PCV13, at ages 2, 4, and 6 months with a booster at 12 to 15 months.

Group (A) persons 65 years old or above
Group (B) persons with age between 2 and 64 years, and with one or more of the following:

- history of invasive pneumococcal disease
- immunocompromised states
- chronic medical conditions
- CSF leaks
- cochlear implants

Group A - Either one PCV13 or one 23vPPV. For those with additional high risk conditions, one-time revaccination may be considered 5 years later.

Group B, never vaccinated - One PCV13 followed by one 23vPPV at least 2/12 later.

Group B, had 23vPPV - One PCV13 at least one year later.

Group B, had PCV13 - One 23vPPV at least 2/12 later.

There is no medical reason to withhold pneumococcal vaccination from a healthy adult who requests it, although we do not routinely recommend it for people who do not meet any one of the above criteria.

SEVERE ACUTE RESPIRATORY SYNDROME

Case Definition

Criteria for reporting to HA SARS Registry

1. Radiographic evidence of infiltrates consistent with pneumonia, and
2. Fever of 38C or higher, or history of such any time in the past 2 days, and
3. At least 2 of the following:
    - Chills any time in the past 2 days
    - Cough (new or increased) or breathing difficulty
    - General malaise or myalgia
    - Known history of exposure

A case should be excluded if an alternative diagnosis can fully explain their illness.

Suspected case

A case is reported as suspected SARS when:

- *based on clinical judgement, it is highly likely to be a case of SARS, but*
- *at the time of reporting, does NOT completely meet the case definition for SARS and*
- *there is absence of close contact with a SARS case or exposure to a known source of outbreak.*

Epidemiology

- Causative agent: a new coronavirus never seen before in human, confirmed by the results of 13 laboratories from 10 countries including Hong Kong.
- Origin: Guangdong Province, China. The earliest known cases were identified in mid-November, 2002.
- Evidence to date indicates old age and chronic diseases are the main mortality risk factors for SARS. Smokers and children seem to be less likely infected.
- SARS appears to spread most commonly by close person-to-person contact involving exposure to infectious droplets, and possibly by direct contact with infected body fluids.
- The SARS virus apparently can survive on common surfaces at room temperature for hours or even days, which could explain how people can get infected without face-to-face contact with a sick person. One study showed the virus survived for at least 24 hours on a plastic surface at room temperature. Another found the microbe remained viable for as long as 4 days in human waste.
- In another set of studies, scientists in Japan examined how well the virus weathered extreme temperatures. The virus died at 98.6 degrees Fahrenheit and above, started to deteriorate at 40 degrees but seemed to remain viable indefinitely when temperatures dropped to 32 degrees. Scientists in Beijing produced similar results.

Laboratory Tests

Positive test results indicate that SARS patients are, or recently were, infected with the SARS virus. A negative SARS virus test does not rule out SARS, if the clinical features and exposure history is compatible with SARS.

Antibody tests

ELISA detects antibodies in the serum of SARS patients reliably as from day 21 after the onset of

clinical symptoms and signs. Immunofluorescence assays detect antibodies in serum of SARS patients after about 10 days of onset of symptoms.

- **Positive antibody test** results indicate a previous infection with SARS coronavirus. Seroconversion from negative to positive or a four-fold rise in antibody titre from acute to convalescent serum indicates recent infection.
- **Negative antibody test** results after 21 days from onset of illness seems to indicate that no infection with SARS coronavirus took place.

Molecular tests

PCR can detect genetic material of the SARS virus in various specimens (blood, stool, respiratory secretions or body tissues). A ready-to-use PCR test kit has been developed. PCR tests are very specific but not sensitive enough.

SARS coronavirus PCR can be negative for the following reasons:

- The patient is not infected with the SARS coronavirus; the illness is due to another infectious agent (virus, bacterium, fungus) or a non-infectious cause.
- The test results are incorrect ("false-negative"). Current tests need to be further developed to improve sensitivity.
- Specimens were not collected at a time when the virus or its genetic material was present. The virus and its genetic material may be present for a brief period only, depending on the type of specimen tested.

Cell culture

Growing the virus is the only means to show the existence of a live virus.

Radiological Tests

In the early stage of the disease, a peripheral / pleural-based opacity may be the only abnormality. This may range from ground-glass to consolidation in appearance. A particular area to review is the paraspinal region behind the heart. This is frequently where lung lesions are detected on HRCT in suspected SARS patients with normal radiographs. In the more advanced cases, there is widespread opacification which may be ground-glass or consolidative affecting large areas. This tends to affect the lower zones first and is not uncommonly bilateral. Calcification, cavitation, pleural effusion or lymphadenopathy is NOT features of this disease.

When to Refer?

In Hong Kong, doctors are advised to refer patients with the following conditions to a public hospital for further management:-

Patients without contact history

Fever > 38°C and new onset of pulmonary infiltrate (clinical and/or x-ray) and either shortness of breath or cough and no symptomatic response to standard therapy including a beta-lactam (penicillin & cephalosporin groups) and coverage for atypical pneumonia (a fluoroquinolone, tetracycline, or a macrolide) after 2 days of therapy in terms of fever and general well-being.

Patients with contact history

Fever > 38°C and new onset of pulmonary infiltrate (clinical & / x-ray) and either shortness of breath or cough and positive contact history (pneumonia) in the previous 2 weeks.