

# How to Cope with Severe Acute Respiratory Syndrome (SARS)

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## General Background

The severe acute respiratory syndrome (SARS) epidemic is quite unprecedented in medical history. Its transmission has been led by the speed of the jumbo jet, swinging with the conveniences of worldwide travel. Also, never before has so much medical information been gathered in the short span of three months since it was brought out to media attention.

Since the issue of a global alert by the World Health Organization (WHO) on March 12, within two weeks scientists at the Centers for Disease Control and Prevention (CDC) and in Hong Kong had already announced that a new coronavirus had been isolated from patients with SARS.<sup>(1,2)</sup> All this and other information could be immediately accessed by the public through the electronic media, with the hard-copy journal publications becoming available much later - see for example the special issues on SARS published by the prestigious Harvard-based *The New England Journal of Medicine* (May 15 issue) and the top British medical journal *The Lancet* (May 17 issue). In the subsequent short time of one month or so, through the unprecedented collaborative efforts of CDC and WHO-linked laboratories in Europe, the entire genome of one of the new virus strains had already been sequenced and the presence of the virus could be identified positively in tissues of suspected SARS patients.<sup>(3,4)</sup> By the end of April, new diagnostic kits were already being finalized based on this sequence information and by early May, initial steps toward vaccine development had already begun.<sup>(5)</sup> Never before had the world collaborated together in such a massive scale bringing out and sharing unselfishly

such a wealth of information. This heightened activity pales the days of the AIDS epidemic, and some of us may still recall the scare of the early 80s, when AIDS was first made public in large cities like New York.

## Clinical-Pathological Course

From such observations it is now clear that SARS follows a peculiar clinical course. From one study of 138 cases in the Hong Kong outbreak,<sup>(6)</sup> the most common symptoms included fever (100% of the patients); chills, rigors, or both (73%); and myalgia (61%). Dry cough and headache were also reported in more than 50% of the patients. Other common laboratory findings were lymphopenia (70%), thrombocytopenia (45%), and elevated lactate dehydrogenase (71%) and creatine kinase levels (32%). Radiographic or CT scanning images of lung tissue consolidation typical of pneumonia or diffuse alveolar inflammation was typically seen in most patients that evolved to more serious course and has been used from the very beginning as a clinical-pathological sign for SARS. This coupled with the patients not responding to courses of antibiotics, have been used to describe the "atypical pneumonia" (antibiotic-resistant pneumonia), and now used as a synonym of SARS. About 23% of the patients were admitted to the intensive care unit. This same clinical profile was also noted in a smaller group of 10 patients from a Canadian study,<sup>(2)</sup> except that 100% of the patients had dry cough and 80% showed dyspnea, or difficulty in breathing.

Commonly held observations of SARS patients divided the clinical course of the infection into two

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*This paper is dedicated to all the front-line health professionals who have persevered courageously and unselfishly during the SARS crisis.*

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or three main stages, with each one corresponding roughly to one-week duration. During the first week, fever, myalgia, and other symptoms could be seen, with a portion of the patients evolving to more serious presentations of atypical pneumonia and respiratory distress during the second or third stage, requiring at that point much more aggressive interventions. A study on 75 Hong Kong SARS patients<sup>(7)</sup> describes the first week of illness as characterized by fever, myalgia, and other symptoms that generally improved after a few days. In the second week, when infectivity is greatest, patients frequently experienced recurrence of fever (85%), diarrhea (73%), and radiological worsening (80%). In 45% of the patients, improvements of initial lung lesions were associated with appearances of new radiological lesions at other sites. In this study, 20% of the patients progressed to a third phase, characterized by acute respiratory distress syndrome necessitating ventilator support. Because of this peculiar clinical evolution, many experts now believe that the more severe lung damages that follow in weeks 2 and 3 are mainly due to an autoimmune mechanism (that is, the host's own white blood cells attacking the lung tissues and not due to the viral replication alone).

#### **Lack Of Effective Treatment**

Treatment at this time remains largely controversial. Earlier protocols called for the use of antibiotics at the early phases of SARS symptoms, to rule out bacterial infections. Subsequently, when not responding, treatment is changed to the antiviral drug ribavirin and large doses of steroids, which has been used in large doses in Hong Kong.<sup>(6,8)</sup> This regimen is based on the activity shown by ribavirin against some respiratory infection viruses like syncytial and several forms of influenza viruses, but up to now there has been no evidence for any efficacy related to SARS.<sup>(9,10)</sup> Likewise, the use of steroids is also highly contested, with several important editorials in leading medical journals calling for moderation and for use only in the most severe cases, while in the same editorials, the use of ribavirin is contra-indicated.<sup>(9,10)</sup> More recent debates have linked the severe fibrotic or scarring lesions left behind in recovering patients to the use of this ribavirin/steroid combination.

#### **High Mortality Rates And Public Health Concerns**

Epidemiological studies on 1425 SARS cases in Hong Kong (reported up to 4/28) show that the mean fatality rate for SARS could be divided into two groups. For patients younger than 60 years old, the fatality was 6.8% and for those 60 years and older patients, an astonishing 55% fatality was reported.<sup>(11)</sup> This high fatality rate is supported by statistics elsewhere which show fatalities in the range between 7-14% registered at different times since the infection and mortality rates began to be documented on a daily basis.

It is now believed that the SARS virus may have arisen as a mutation of a virus formerly unknown in humans.<sup>(12)</sup> Sequences of viral SARS genomes extracted from patients from different geographical locations now reveal that distinct genetic signatures are emerging in each geographical region indicating that the RNA virus responsible for SARS is quickly mutating, at a speed that is mind-boggling, with one single patient capable of showing one, two, or more variants.<sup>(13)</sup> This fact will greatly challenge the finding of proper vaccines down the road.

#### **Health Professionals Are The Highest Risk Group**

SARS is also highly unusual in the large percentage of health professionals affected. In Hanoi, for example, with the exception of the first index patient that gave rise to the local outbreak, every other subsequent death was either those of doctors or nurses.<sup>(14)</sup> This included the now posthumously famous Dr. Carlo Urbani, a WHO Infectious Diseases specialist, among the first to diagnose SARS and who died on March 29, 18 days after starting to show symptoms. Note that the index patient in Hong Kong who died on March 4, 11 days after symptoms appeared, was a 64-year-old doctor who had treated patients with pneumonia in the Guangdong Province weeks earlier. In Hong Kong, almost 25% of the overall outbreak cases came from health professionals while in Taiwan, at the time of this writing, the numbers approach 30%.

These high incidences of infection among health professionals reflect the need for close contact through saliva and nasal droplets for the transmission

of SARS. But even more importantly, it is an alarming reminder that all medical interventions must at this time be considered high risk. In a much publicized Lancet article,<sup>(15)</sup> Professors Brian Tomlinson and Clive Cockram of The Prince of Wales Hospital of Hong Kong, the first Hospital outside of China to host SARS cases, and the medical site for the first documented outbreak of SARS in early March, emphasize that "Procedures causing high risk to medical personnel include nasopharyngeal aspiration, bronchoscopy, endotracheal intubation, airway suction, cardiopulmonary resuscitation, and non-

invasive ventilation procedures. Cleaning the patient and the bedding after faecal incontinence also appears to be a high-risk procedure." These are warnings that must be taken to heart, and the recent outbreak among the medical professionals in Taiwan can probably be traced back to the practice of one or more such interventions at the bedside.

The anxiety generated among medical personnel is unprecedented, as reflected also by a highly circulated letter advising prevention against SARS written by Dr. Justin Wu, another physician at the Prince of Wales Hospital, Hong Kong (read the gray box).

*This letter was widely circulated through the Internet. Note the meticulous details on hygiene described by Dr. Wu, reflecting the state of anxiety and concern that must have been rampant through the medical staff at the Prince of Wales Hospital, the site of the first SARS cases outside China. Some of the tips are highly relevant to our current crisis state in Taiwan.*

Subject: Preventing infection from SARS

From: Dr. Justin Wu, Physician in Ward 8A, Prince of Wales Hospital, Hong Kong

Date: Mon, 31 Mar 2003 09:52:08 +0800

Dear all,

Hundreds of staff works with me. They are all facing the same risk of infection. It is really sad that, over last 2-week's ordeal, 8% of our staff have been infected despite the following precautions. That is probably due to forgetfulness: rubbing eyes or nose after touching the mask, etc. So you can imagine how contagious this virus is. Preventive measures are mostly just remembering to think before acting, taking time to clean up, staying clean, and doing things properly.

**Preventive measures:**

1. Wash your hands frequently. Don't touch your eyes, nose or mouth before washing hands. After you wash, don't touch faucet handles or paper towel levers with hands; use paper towels to touch things, and then toss them. Or use your elbows.
2. Minimize touching things: e.g., push the button in the lift using your key or elbows, to avoid any direct contact with your bare hand.
3. If you can tolerate latex gloves, wear them. But remember not to touch your eyes or mouth with the glove. Outsides of gloves become contaminated. When you remove gloves, wash up immediately.
4. Wear a well-fitted mask (N95 or 3 ply surgical) in all public places: lifts, escalators, bus, MTR, trains, airplanes, offices, restaurants and shopping malls. Don't go to cinemas.
5. If you wear a mask, don't touch its outside. Masks work well: they trap a lot of droplets, so they quickly become contaminated on the outside. Throw them out safely. Then wash up immediately.
6. Always use handkerchiefs and tissues when you cough or sneeze. Keep them handy. Frown at people who thoughtlessly sneeze or cough without protecting others. Warn them verbally.
7. The air and all surfaces within a distance of 5 feet from an infected person are highly infectious because of droplets, especially when that person sneezes and coughs.
8. Clean your door handles, light switches, doorjamb, furniture and floor with diluted (1 in 100) bleaching detergent. Dettol is NOT useful.
9. Do not lie down on the floor, or allow children to crawl or play on the floor. Floors are nearly impossible to keep clean from contaminants.
10. Wash your clothes immediately after going home from public exposures. You have been using clothing to protect you all day long. Now it is contaminated. Remember your elbows?

Please forward this message to your friends and relatives. Ask them to distribute them further.

Take care of yourselves and those around you.

Dr. Justin Wu

WHO also published on May 16 a further update on the resistance of the SARS coronavirus to environmental factors.<sup>(16)</sup> Thus the virus may survive up to 2 days as nasal droplets and up to 4 days as fecal matter, an alarmingly high resistance that is probably linked to the unusually high infectivity seen with this virus.

### **What Can Be Done Among Current Uncertainties**

With so many changes and uncertainties surrounding SARS, there is wide public concern, almost bordering on panic. The handling of SARS through the health care system is being examined daily with a microscope by the media. According to WHO, the current epidemic should subside on its own in a few more months when proper isolation of the infections can be firmly instituted, as already seen in places like Hong Kong, Singapore, Hanoi, and Toronto.<sup>(17)</sup> Already, all governmental and private agencies of health are collaborating together in a way that is unprecedented on the island, and through learning from some of the early mistakes made in containment and hospital management, we shall soon have seen the worst of this epidemic. However, how to survive the next few weeks without contracting SARS appears to be the concern of every person out on the street.

This is the time however for poise, for calm reflection on what each one of us can do to help prevent SARS and when inoculated with the virus, what we can do to combat the infection. The high incidence of infection among health professionals should alert us to do more on our own to educate ourselves on every aspect of SARS and to promote our own health rather than relying merely on health professionals for advice. For the first time, the health professionals are seen almost as helpless as victims as the rest of the population. For, not only is current conventional medicine ineffective against simple viruses like the upper respiratory infection viruses, but the very nature of the health-related workplaces all health professionals at a great risk. Unlike in the past, the Hospitals in our health care system are no longer seen as secure places to go. Today, sadly, they are viewed as the source of infection for the many who have contracted SARS while attending to other health problems.

At a time when none of the drugs used by conventional medicine has been proven to be effective, or is free from controversy, we suggest the opening of minds by physicians and patients alike to other alternative or traditional remedies that have been known to regulate or boost up immunity. This is particularly true in the midst of so many daily changes in information and guidelines of treatment, so much so that one must retain some minimal common sense and allow it to prevail through such turbulent times. And common sense calls for the necessity to prevent the infection in the first place. Or, when failed, to properly manage the infection at its early stage (1st stage), during which a turn-around of health may mean the difference between complete recovery versus the progressive deterioration ending with artificial ventilator support or other aggressive drug interventions, with complex side effects. Recall that during the early stage of infection in most clinics or hospitals, only antibiotics, if any, are administered to rule out bacterial infections, and virtually no treatment is instituted until the patient deteriorates rapidly to the point where acute upper respiratory distress calls for large doses of steroids or antiviral. This strikes us as a golden opportunity missed out since if any medication should work, it is during this early stage that it should be used.

### **The Use of Foods And Other Natural Regimens To Regulate Immunity**

One rationale is that the initial week (or 1st stage) of infection is when we must restore the immunity in the body and we must buy time for the body to combat the virus spread. Using specific immunity boosters (like thymosin peptides), as rumored to being done to the top governmental circles in Beijing, is again an artificial or one-sided way of bringing up immunity. This one-sided approach hits the body very specifically through a narrow immune pathway or branch, the so-called T-cell branch - again lacking the "roundness" that the body itself is able to accomplish on its own. One must also recall that, as said, there is a good chance that the advanced SARS pathology (into the 2nd and 3rd week of infection) may be due largely or in part to autoimmune factors as several clinical pathologists are suggesting, and if proven right, this would cast even greater doubt as to the efficacy of specific

immune boosting agents which might lead to imbalance in the immunological circuitry.

There are many foodstuffs that work as "adaptogens", regulating the body so that a stronger immunity can be restored. These foods, long known to our ancient forefathers, helps re-set our homeostat so that the body can readjust to various stressful situations such as a developing SARS infection. Central to this school of thinking is the view that the body will readjust itself to challenges (whether viral or some other) provided that it has all the proper nutrients required as tools. Thus, a good adaptogen does not necessarily raise immunity or any particular reaction in the body; it simply re-adjusts the body to its natural needs by supplying some key ingredients required in body reactions.

Our group is currently working on the role of trace elements in regulating immunity, and we have come across a whole range of different trace elements that are normally lacking in foods but that are critically needed as catalysts or co-factors for a number of body enzymes. When given in severe upper respiratory infections, they appear to produce strong anti-viral immunity plus a decongestion effect that helps alleviate the patient of the acute respiratory distress. We have found that such elements, especially elements of the transition and rare earth series, when extracted in the right soluble configuration, by using natural organic acids which chelate them, they are among the most potent adaptogens known in nature.

Many other foods are equally effective in regulating immunity and must be considered as well. These include not only bee products, especially Propolis, natural polyphenols and flavonoids, and many fungal products like Cordyceps, Ganoderma, and agarics, rich in complex beta-glucans and mannans known to activate T-cell, natural killer (NK) cell and macrophage activities required to mount a proper anti-viral defense, but also included are many different kinds of herbal extracts known to Traditional Chinese Medicine (TCM), all of which have been shown to effective adaptogens. Some not only display anti-viral activity but also are notable decongestants of the lungs. Cordyceps are known for example to induce bronchio-alveolar muscle relaxation and have been used successfully in severe cases of bronchio-alveolitis.<sup>(18)</sup> Many other herbal

teas are also notable for similar decongestant effects and should be considered as well. It is no coincidence that most Hong Kong and China hospitals these days are working in conjunction with TCM experts in combating the early stages of SARS. We favor the use of such complex or wholesome foods much more than the use of synthetic compounds (steroids in large doses, ribavirin) currently used for alleviating SARS symptoms because of their lack of side effects.

One particular natural food should also be mentioned: garlic. Garlic is rich in the allicin family of compounds as well as in organic germanium, and has been found to have broad anti-viral activity,<sup>(19)</sup> with an effectiveness shown to exceed anti-viral drugs like ribavirin when tested against RNA viruses as well as against typical enteroviruses.<sup>(20)</sup> We recommend at least one large garlic clove each day, and if this is not available then to take garlic extracts or oil.

Past experience with bacterial probiotics also suggests its use in the prevention of respiratory viral infections that also affect the gastro-intestinal tract,<sup>(21,22,23)</sup> as appears to be the case with SARS, although this must be directly tested. The general strategy is to populate the intestinal tract with benevolent bacteria that are known to exert positive effects on the overall body immunity and metabolism, which in turn may limit viral infection locally or systemically. Many different kinds of probiotics products can be used, including yogurt, but the latter has been shown to be slower in its effect compared to probiotics supplements.

Finally, everyone should be encouraged to perform physical exercises, even if under confinement or isolation. In particular, any exercise that produces stretch and torsion of the body length should be considered more effective in stimulating circulatory and lymphatic flow and should complement aerobic workouts.

In summary, it is hoped that by re-setting of the body's homeostat and producing a decongestion of the lungs that may alleviate the acute respiratory distress symptoms, the patient may more likely recover without progressing to the more severe stages of the infection. These alternative measures must be considered at a time when none of the current methods reported to date has been shown to be effective or risk-free against SARS.

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