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Virus pathogens suggest an autumn return

A S M Abdullah

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WILL THE SARS EPIDEMIC RECUR?

Host and environment are key factors

A Lee

On 5 July 2003, the WHO removed Taiwan from its list of areas with recent local transmission of SARS meaning that all known chains of person to person transmission of the severe acute respiratory syndrome (SARS) virus have now been broken. However, the WHO executive director for communicable diseases advised that public health should not let down its guard, as more cases could still surface somewhere in the world. It is therefore an important public health issue whether the SARS epidemics will recur.

If you had a crystal ball to view the future, this question would be answered. We would make some prediction based on the epidemiological triangle (fig 1) recognising the three main factors—agent, environment, and host in the pathogenesis of disease. If we can control any two of the main factors, we would prevent the occurrence of a communicable diseases.

Coronavirus has been identified in playing an aetiological part of SARS. A lot of work has been done to understand the genome of the virus that would lead to development of vaccine and treatment, but time is needed for such development. To prevent the recurrence of epidemics we should look at the host and environmental factors.

The agent must be capable of infecting the host for infection to develop. This depends on whether the environment is favourable for its survival and transmission, and also the susceptibility of the host. The susceptibility of the host depends on its ability to fight off the infection, which can be a disease specific defence mechanism such as vaccine, or non-specific defence mechanism. The ability of non-defence mechanism to fight off infectious disease will depend on the host’s general health status, nutritional status, age, coexisting chronic illness, etc. If you have a population that is healthy, fit, and well nourished, the chance of infection would be low.

Epidemics are an increase in the frequency of occurrence of a disease in a population above its baseline level for a specified period of time. To calculate this, estimate the basic reproductive number that is defined as the expected number of new infectious hosts that one infectious host will produce during the period of infectiousness in a population that is susceptible. It depends on number of contacts per unit time, transmission probability, and duration of infectiousness. Apart from infectivity of the agent and host suscepti-

Virus pathogens suggest an autumn return

A S M Abdullah

SARS is one of the deadly new emerging infectious diseases identified in the 21st century. Since its emergence in November 2002, SARS has created public panic and raised many issues among healthcare workers and policy makers around the world. Although
healthcare communities together with public 
vigilance around the world seem to have 
halted the SARS outbreak, at least for the 
time being, the question remains to be answered 
whether the infection will reappear? I 
believe if SARS follows the pattern of other 
respiratory viruses, it is probable that it will 
reappear next autumn during the influenza season. I have the following explanations in 
support of my opinion. 
The causative agent of SARS is a novel 
coronavirus—a virus of the corona family. 
About one third of all common colds are caused 
by viruses from the same family and these show 
a winter and spring seasonality.1 The emergence 
of SARS outbreak in China and Hong Kong 
during the influenza season (December–March) 
suggests that possible common environmental 
and hygiene factors may influence transmission. Some 
human pathogens such as influenza, measles, 
and rotavirus follow a cyclical pattern, waxing in 
colder and drier months and waning when 
weather turns warmer,2 which may also be the 
case for the SARS virus. While the importance of 
effective quarantine and preventive measures 
cannot be ignored, the decline in the SARS 
prevalence with increasingly warmer weather 
supports that seasonality may be a contributing 
factor. This may explain the limited spread of the 
SARS virus in the rural areas of Guangdong, 
which has only basic medical facilities and lower 
public preparedness. For instance, environmen-
tal temperature may influence the trends of 
SARS outbreak. Outbreaks of respiratory syncy-
tial virus infections were associated with higher 
environmental temperature, lower relative 
humidity, and higher maximum day to day 
temperature variations.3 During the Amoy gar-
den outbreak in Hong Kong, external tempera-
ture ranged between 18–22°C, which has been 
proposed as permissive temperature enabling 
transmission of the SARS coronavirus. It is 
unconvincing that Vietnam and Guangzhou 
controlled SARS by better medical facilities and 
hygienic standard. Anecdotal reports suggest 
that the changes in temperature might have 
limited the outbreak of SARS in Vietnam and 
Guangzhou earlier than Hong Kong. The wider 
use of heaters in Toronto and air conditioning in 
Hong Kong and Singapore, usually to keep the 
room temperature within 18–22°C, might have 
contributed to the long lasting outbreak in these 
developed cities. It would be useful to examine 
the relationship between temperature change 
and the occurrence of SARS in the future. 
Consistent with other infectious diseases,2 
changes in atmospheric conditions, the preva-
ience of virulence of the pathogen and the 
behaviour of the host could also contribute to 
the recurrence of SARS. It is possible that the 
virus is being slowly transmitted among 
people who remain asymptomatic or the virus 
is surviving in the environment and will reappear 
when favourable conditions return. Although 
the source of the coronavirus remains to be 
confirmed, civet cats and other wild animals 
sold in food markets in southern China are 
believed to be the source. If confirmed the 
animals will be a reservoir in ready contact with 
humans that could initiate a second SARS 
epidemic. 

Finally, whether or not SARS reappears, 
lessons learned from the recent outbreak such 
as greater vigilance about health and hygiene 
and the open sharing of medical information 
should be a norm in future. In the absence 
of any effective vaccine or treatment, the 
only way to combat SARS is to limit its spread. 
We should also be aware that if SARS does 
return in autumn its epidemiology could be 
different. In the recent outbreak, most of the 
SARS cases with the exception of Amoy Garden 
outbreak in Hong Kong were confined to the 
healthcare workers indicating limited commu-
nity spread. Given the high case fatality rate, 
if the rate of transmission should increase in 
the community the consequences could be 
devastating.

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