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Sir—Ann Falsey and Edward Walsh (published online April 8)1 describe the fears that surround severe acute respiratory syndrome (SARS). In the past few weeks, our outpatient department in Germany has received numerous calls from worried doctors of companies doing business in Asia. These calls have increased since the claim was made that within 2 years every citizen of Hong Kong will be infected with SARS. A German newspaper 2 fitted an exponential curve to the cumulative number of probable SARS cases (as reported by WHO3), forecasting a progressively steeper increase in case numbers. Such predictions can have enormous economic repercussions, so they should be scientifically tenable; we do not believe they are.

To illustrate why, we have fitted curves to the cumulative cases reported from Hong Kong between Feb 21 and April 5, 2003. Microsoft Excel calculates an $R^2$ of 0·98 for an exponential curve, indicating an excellent fit (figure, A). Using the function of the curve, we can predict a total of 71 583 cases 60 days later. The exponential curve matches the dynamics of an epidemic in a closed population with a high basic reproductive number $R_0$, which corresponds to the average number of new cases that one infectious case is expected to produce. Under such conditions, almost everyone will become infected during the epidemic.4 However, a linear curve can be fitted to the same data, yielding an equally impressive $R^2$ of 0.96, but predicting only 2410 cases 60 days later. Moreover, $R^2$ statistics are invalid with cumulative data because the assumption that observations are independent is violated.

Making predictions early in an outbreak by fitting simple curves is dubious for another reason—doing so ignores interventions to decrease contact rate and transmission probability. If successful, such efforts reduce $R_0$ and thereby case numbers.5 An emerging herd immunity would also reduce $R_0$. This effect might only be temporary, however, since antibody levels diminish rapidly in other coronavirus infections.5

Part B of the figure shows an alternative way of presenting the data, which we think is more informative. That there has not been a great increase in the average number of new cases per day in the past weeks becomes immediately apparent. Furthermore, the outbreak in a housing estate in late March is not followed by a pronounced peak of secondary cases 2–7 days later, as would be expected if $R_0$ was generally high. These data are compatible with the hypothesis of uncommon but effective modes of transmission, in combination with an overall $R_0$ that is not exceptionally high. Given the possibility of waning immunity, the data are also consistent with an emerging endemic situation in which a part of the population will be affected seasonally.4,5

Attempts to model the dynamics of an epidemic early on can lead to untenable conclusions, especially when based on worst-case scenarios such as a persistently high $R_0$. Although we wholeheartedly support the policy to publish case numbers, a format that can be easier understood by lay people.
Atypical presentations of SARS

Sir—Singapore reported its first imported cases of SARS on March 13, 2003. By March 17, 21 secondary cases had been identified at Tan Tock Seng Hospital, which was then designated the national SARS hospital in an attempt to contain the epidemic. At the National University Hospital, we developed screening protocols similar to those reported previously in individuals with SARS, and could alert doctors in affected areas to atypical presentations of SARS. Other laboratory variables were not helpful in our cases.

Early in the epidemic, a single non-isolated case of SARS led to dozens of secondary and tertiary cases, many fatal. The contagious nature of the disease justifies early isolation of individuals with low grade fever, chest radiograph abnormalities, or respiratory symptoms alone. In the first 3 weeks of adopting this policy, we had admitted 275 individuals who did not meet WHO criteria to our isolation wards, where full respiratory and contact isolation is provided in single rooms. 49 patients and 17 staff have since been referred to the SARS hospital. At the time of writing, six more typical probable cases have been transferred, without having caused any secondary infections.

Unfortunately, nosocomial transmission did result from two of our atypical cases, since they spent up to 12 h in open ward areas before full isolation precautions were taken. Two doctors, three nurses, three visitors, and two other patients have been infected by them, and a further 100 individuals who came into contact with these two cases remain under surveillance.

Atypical presentations of SARS are a threat to patients, staff, and visitors. The WHO case definition is a useful epidemiological device. However, it is no substitute for daily, thorough clinical, laboratory, and radiological assessment of patients with symptoms of this emerging disease. Doctors cannot afford rigid adherence to epidemiological criteria when caring for individual patients.

William Ho. 1 All patients meeting WHO criteria 1 for probable or suspect SARS were transferred to Tan Tock Seng hospital. However, four individuals admitted to our hospital with atypical presentations of disease were later diagnosed with SARS. Their clinical and epidemiological features (table) emphasize some of the difficulties in identifying SARS without a reliable diagnostic test.

Individuals are defined, according to WHO, as having had contact with SARS if they have cared for, lived with, or had direct contact with respiratory secretions and body fluids of a person with the disease. Three of our four patients became infected simply by visiting affected wards of other hospitals; only children or dangerously ill patients can now be visited in hospital.

Our patients might not have had the characteristic fever (≥38°C) associated with SARS 1 admission because of chronic comorbidities, raising questions about the sensitivity of temperature monitoring as a screening tool. All our patients became febrile with clinical and radiological deterioration, and eventually met the criteria for transfer.

Our four patients had lypemophenia and raised serum concentrations of lactate dehydrogenase. These non-specific abnormalities have been previously reported in individuals with SARS, and could alert doctors in affected areas to atypical presentations of SARS. Other laboratory variables were not helpful in our cases.

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