

SARS in Health Care Settings: A Newly Emerging Old Infection



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Recently, we noted the coming back of SARS in some nearby countries causing a number of casualties. The spread of this virus has a wide spectrum, including the health care facilities.

Background

Viruses have long been recognized as a source of nosocomial infections, including coronaviruses, influenza, mumps, measles, respiratory syncytial virus, varicella, rubella, adenoviruses, and noroviruses. Both humans and the physical environment in healthcare facilities play a role

in the spread of these viruses and the illnesses they cause (Sepkowitz, 1996; Sattar, 2004). The need for a comprehensive understanding of the routes by which viruses can spread in healthcare environments and the measures needed to prevent transmission has taken on particular urgency since the advent of severe acute respiratory syndrome (SARS).

First emerging in 2003, the outbreak of this previously unknown atypical viral pneumonia became emblematic of infectious disease in the age of global travel, spreading from person to person, through cities, between countries, and across continents with the movements of human beings. When it was realized that an outbreak had begun, the race was on to find the etiologic agent. The finish line was first crossed by two groups almost simultaneously, identifying the causative agent of SARS as a novel member of the coronavirus family (Drosten *et al.*, 2003; Ksiazek *et al.*, 2003; Rota *et al.*, 2003). The virus was not only unknown up to that point, but unrelated to any of the currently known human or animal coronaviruses. This new virus, SARS coronavirus (SARS-CoV), spread through 26 countries, with over 8000 cases and 700 deaths before the chain of natural transmission was broken in late 2003 (WHO, 2004).

SARS spread in Health Care Facilities

One of the striking features of the SARS outbreak was its spread in healthcare facilities, resulting in transmission to patients, visitors, and healthcare workers (HCWs) (McDonald *et al.*, 2004). The impact on HCWs in outbreak settings was significant; physicians (Chen *et al.*, 2004), medical students (Wong *et al.*, 2004), nurses (Loeb *et al.*, 2004), and emergency room personnel (Chen *et al.*, 2004) became infected with SARS in the course of patient care, accounting for approximately 20% of cases by the time the outbreak was contained (Chan-Yeung, 2004; Lau *et al.*, 2004).

The spread of SARS in healthcare facilities focused attention on the role of surfaces and other fomites in spread-

ing nosocomial viral infection. SARS-CoV nucleic acids have been identified on surfaces in hospitals where SARS outbreaks took place, illustrating that SARS-CoV may be deposited on hospital surfaces, which may then serve as a reservoir for subsequent transmission (Chen *et al.*, 2004; Dowell *et al.*, 2004; Booth *et al.*, 2005). These studies only examined nucleic acids, and could not make any conclusions about the presence of infectious SARS-CoV. However, previous research has shown that other enveloped viruses can survive on surfaces. Non-SARS coronaviruses, which have been previously recognized as a source of nosocomial infections (Gagneur *et al.*, 2002), can survive on surfaces for up to 6 hours (Sizun, Yu, and Talbot, 2000). Results of laboratory experiments with SARS on surfaces have found that SARS-CoV survives up to 9 days in the presence of 10% FCS and up to 6 days without FCS (Rabenau *et al.*, 2005). The possible survival of SARS-CoV on surfaces and objects has important infection control implications. Viral contamination of inanimate objects has been suggested as the vehicle for outbreaks of nosocomial viral infection (Roger *et al.*, 2000).

SARS and People

Controlled studies have shown that when people come in contact with inanimate surfaces, they can both deposit viruses on these surfaces and acquire viruses from them (Rheinbaben *et al.*, 2000; Rusin, Gerba, and Maxwell, 2002), and viruses on hands can be transferred to the face during hand-to-face contact (Rusin, Gerba, and Maxwell, 2002). Once deposited on surfaces, some pathogenic viruses can remain viable for hours to days, even on porous materials such as gowns and lab coats (Brady, Evans, and Cuartas, 1990; Bean *et al.*, 1982; Mbithi, Springthorpe, and Sattar, 1991; Sattar, Lloyd-Evans and Springthorpe, 1986). Given that surfaces are a possible source for acquisition of SARS-CoV in the healthcare environment, and that the few available studies suggest possible long-term survival, more data are needed on the survival characteristics of this virus in healthcare environments, and the effect of environmental variables such as temperature and humidity on viral survival rates. Generating such data is complicated by the fact that SARS-CoV causes a possibly fatal droplet- and aerosol-transmitted disease, and can be handled only by trained personnel under biosafety level 3 conditions, restricting it to a few specialized laboratories. Even restricted to high containment laboratories, such research carries risks. There have been cases of laboratory-acquired SARS that occurred after the chain of natural

transmission had been broken (Lim *et al.*, 2004), posing a risk of reintroducing SARS into human populations. For a pathogen with these characteristics, the use of a surrogate virus for studying patterns of survival and transmission on surfaces is desirable. Studies using other members of the *Coronaviridae* may be able to provide insight into the survival, persistence, and transmission risks of SARS-CoV and other nosocomial coronaviruses on surfaces in the healthcare environment.

Transmission of SARS in Large Housing Projects

Surfaces and fomites may not be the only vehicles of nosocomial coronavirus transmission. An outbreak of SARS in a large apartment complex in Hong Kong suggested a role for contaminated water droplets and aerosols in the transmission of SARS. It was found that SARS-CoV shed in the feces of an infected individual visiting an apartment in one of the buildings of the complex may have spread via viral aerosols that entered the bathrooms of other apartments through faulty toilet plumbing and floor drains, transmitting SARS to other occupants of the building (McKinney *et al.*, 2006). During outbreaks, it is possible that water becomes contaminated with SARS-CoV shed by infected individuals and that this water is subsequently aerosolized to serve as a vehicle of transmission.

Transmission by Contaminated Water

In addition, sinks, water baths, and whirlpools have been identified as foci for the spread of nosocomial infections (Squier, Yu, and Stout, 2000). These locations are likely to have standing water for extended periods. If they become contaminated with SARS-CoV from infected patients or the hands of healthcare workers caring for infected patients, virus may survive and remain infectious in water (Wang *et al.*, 2005). Data on the survival of SARS in both contaminated and potable waters can help in quantifying and assessing the risk involved in this potential route of nosocomial spread. Although contaminated water droplets and aerosols are thought to have played a part in the transmission of community-acquired SARS, droplets and aerosols from the respiratory secretions of infected patients were a more common route of spread in healthcare environments. Several studies were done to determine how to protect HCWs from such transmission.

Personal Protective Equipment

Epidemiologic studies of the spread of SARS in healthcare

environments established a crucial role for personal protective equipment (PPE) and SARS, including gowns, masks, and gloves, in preventing the spread of SARS to healthcare workers (Chen *et al.*, 2004; Dwosh *et al.*, 2003; Lau *et al.*, 2004; Loeb *et al.*, 2004; Seto *et al.*, 2003). Although PPE certainly plays an important role in protecting healthcare workers from SARS and other more common respiratory pathogens (Gamage *et al.*, 2002), PPE is itself a kind of surface, and viruses can survive on the types of materials PPE is made from (Bean *et al.*, 1982; Brady, Evans, and Cuartas 1990; Lai, Cheng, and Lim, 2005). Thus, items of PPE themselves may play a role in the transmission of disease if they become contaminated with infectious viruses. This exposure route has been recognized by the Centers for Disease Control and Prevention (CDC), which has a protocol outlining the proper sequence of removal of PPE items to minimize the risk of contamination to the wearer during removal (CDC, 2005). However, there is no empirical evidence proving that this protocol does or does not prevent the spread of viruses from contaminated PPE to the wearer during removal. The risk of viral transmission from contaminated PPE is also difficult to assess because data are lacking on how coronaviruses and other nosocomial viruses survive on the materials used to make PPE. Therefore, the possibility that PPE itself may be an environmental surface that contributes to the spread of viruses such as SARS-CoV remains a research question in need of being addressed. Like the role of healthcare surfaces and reservoirs for coronavirus, this is another research question that might be addressed with the use of surrogate viruses to model survival and transmission dynamics.



Summary

Evidence from laboratory studies, environmental surveys, and epidemiologic studies suggests that environmental surfaces, including protective equipment worn by healthcare workers, may serve as vehicles for transmission of SARS6 CoV in the healthcare environment. However, there are significant gaps in our knowledge both of how viruses may spread to healthcare workers in the course of using PPE, and how coronaviruses themselves survive on inanimate surfaces and objects, including PPE items, found in healthcare environments.

In Lebanon, are we getting ready for SARS? Do the consequences of the “Rabih El Arabi” have protected us? No tourists this year!

Infos

Le Frotox: Un Nouveau Remède Miracle Contre les Rides

Le Frotox débarque dans les cabinets de chirurgie esthétique. Grâce à des aiguilles glacées, le nerf du front est paralysé sans figer les muscles. Une intervention qui n’est pas sans risques.

Un nouveau moyen d’effacer les signes du temps arrive sur le marché. Fini le Botox, place au Frotox ! Pour le moment, le Frotox est utilisé uniquement pour les rides du front. Grâce à trois petites aiguilles glacées à -80°, il aide à lutter contre les rides disgracieuses. Cette technique permet de congeler le nerf, qui met plusieurs mois à se ré-

chauffer sans paralyser les muscles. Cela évite l’effet figé tant reproché au Botox.

Toutefois, le Frotox comporte également des effets indésirables. Des migraines, des rougeurs ou des hématomes ont été signalées. Malgré l’obtention du marquage CE en Europe, d’autres effets secondaires pourraient suivre, vu la nouveauté de cette technique. D’ailleurs, selon certains scientifiques, le Frotox comporterait un risque d’inertie définitive du nerf. De quoi faire réfléchir avant d’investir dans des séances à 400 euros les 15 minutes, deux à trois fois par an.

Congratulations to the 3rd and 4th winners of Pril dinner!

One of the leading Henkel brands, Pril the number 1 dishwashing liquid in Germany, launched lately a dishwashing game on its Facebook page “Pril Lebanon”. The object of the game is to clean as many dirty elements within a sixty seconds time period with your favorite Pril dishwashing variant. The faster you are the highest score you get and you win a gourmet dinner at your place for up to 20 people!



Ms. Adelle Bitar was the third winner in Pril Dishwashing competition followed by the fourth winner Mr. Tony Tannous. The winners enjoyed a dinner for 20 people at their house catered by Fleur De Lys, the refined catering company. They invited their family and friends to spend a great time and enjoy a delicious food prepared by a professional team with a fancy decoration.



The competition is still online on Pril Lebanon facebook page. A winner is announced every week and our team is always ready to prepare the gourmet dinner for him at his place. Stay tuned with Pril, play the dishwashing game and win!

Pril is the solution for dishwashing problems. Pril, your best choice for your dishes!



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