

Amoy Gardens investigation findings make public

The Secretary for Health, Welfare and Food, Dr Yeoh Eng-kiong, announced the findings of the investigation into the outbreak of severe acute respiratory syndrome at Amoy Gardens today (April 17).

Dr Yeoh said the findings showed that not one single factor could account for the outbreak in Block E of Amoy Gardens and that the outbreak was likely to be the result of a combination of factors, including:-

- * The presence of an index patient who caused the first batch of infections;
- * Person-to-person spread;
- * Transmission via the sewage system; and
- * Environmental contamination.

The report found it probable that the index patient suffering from chronic renal failure had infected a group of residents in Block E and subsequently other residents in the same block through the sewage system, person-to-person contact and the use of communal facilities such as lifts and staircases.

"Observations from some research studies report that some people with compromised immune systems can excrete copious amount of viruses," Dr Yeoh said.

"Laboratory studies have also shown that patients with the disease excrete corona virus in their stools and that the virus was able to survive much longer in faeces than on ordinary surfaces."

The report noted a swab sample taken from the toilet of an infected resident had shown positive in the test for the corona virus' genetic material.

A significant percentage of patients in Amoy Gardens were presented with diarrhea during their illness. They would have discharged large amount of virus into the soil stacks.

Transmission via contaminated sewage is compatible with on-site tests, the concentration of cases in Block E and reports about foul smell in the toilets in that

block.

In Amoy Gardens, eight vertical soil stacks of each block extend along the height of the building for each of the eight units. Each soil stack collects effluent from the water closets, the basins, the bathtubs and the floor drains of the toilets of all the units that it serves. Each of these sanitary fixtures is fitted with a U-shaped water trap to prevent foul smell and insects in the sewers from entering the toilets.

For the U-trap to function properly, it must be charged with water. However, it was found in the investigation that the U-traps of the floor drains were dried up in many cases because most households had the habit of cleaning the bathroom floor by mopping instead of flushing it with water. The U-shaped water traps of the water closets, the basins and the bathtubs did not have the same problem as these fixtures were frequently used.

In order to demonstrate this possible route of entry, a test was performed in the bathroom. By placing strips of paper at the floor drain, reflux of air from the soil stack was seen blowing the strips of paper through the floor drain. The effect was accentuated when the exhaust fan was switched on. Water vapour generated during a shower and the moist conditions of the bathroom could also have facilitated the formation of water droplets. This reflux of air could contain contaminated droplets of sewage present in the soil stack. The contaminated droplets could deposit virus on various surfaces, such as the floor mat, towels and other bathroom equipment. The chance of exposure was increased given that the bathrooms in the apartment units of Amoy Gardens were generally small in size (about 3.5 square metres.) Records from the management office confirmed that there were numerous complaints from residents on the emission of foul gas from the floor drains indicating the likelihood of the failure of the U-traps in these apartments.

The report also observed that the infection had spread among close contacts, e.g. family members, although this is a smaller contributory factor to the overall outbreak.

There are other theories which purport to explain the possible causes for this outbreak. The investigation team led by Secretary for Environment, Transport and Works, Dr Sarah Liao, did not find any leakage in the pipes when a tracer dye was used to test the soil stack.

However, by using a test with cool oil droplets generated by an atomizer, a crack in the sewer vent pipe at the fourth floor level was located. The vent pipe runs in parallel to the soil stack and is connected to the branch soil pipe from a bathroom on the fourth floor. It serves to equalize the air pressure between the main soil stack and the branch soil pipe.

In theory, any leakage or seepage in the sewerage system is important as it could allow droplets carrying contaminated sewage to be ejected into the lightwell. By using the oil droplets test, the aerodynamics of the lightwell demonstrated a "chimney effect".

The "puff" of droplets was shown to rise inside the lightwell, expanding laterally as it travelled up the height of the building in a matter of minutes under certain wind conditions.

However, for this theory to be substantiated, the amount of virus and the velocity of the emission of contaminated droplets from the sewer vent pipe have to be quantified. There is no evidence on both counts yet. .

Air samples, potable water samples and other environmental swabs were collected in Block E to identify the extent of contamination brought about by the infectious agent.

"Air and water samples showed no evidence of contamination. These laboratory test results together with the spatial and temporal distribution of cases in Amoy Garden and the epidemiological picture argue against airborne transmission or transmission through contaminated water," Dr Yeoh said.

He noted that investigation of similar nature always had a number of limitations, such as the paucity of epidemiological research on the disease, and the need to minimize inconvenience and distress to the affected residents.

The Government has carried out rigorous disinfection operation at Block E to clean up the building and its sewage system before the return of the residents after the isolation period, he said.

The Food and Environmental Hygiene Department (FEHD) and the building

management carried out thorough cleansing and disinfection of the common areas and individual flats of Block E between April 7 and 10. Disinfection of individual flats focused on sinks, bathtubs, washbasins, toilet bowls and floor drains in the toilet and kitchens. Subsequent test for E-Coli showed that the disinfection of the sewage system was effective.

For other blocks of Amoy Garden, FEHD has advised residents to disinfect their flats, in particular all the drainage outlets. Guidelines and disinfectants were provided to the residents.

Residents of Amoy Gardens were also advised to maintain the water seal at the U- traps of drainage outlets to ensure proper functioning.

The crack in the sewage vent pipe of Block E had been repaired before the residents returned. The Government has asked the management company of Amoy Gardens to carry out a comprehensive inspection of the drainage system of all blocks within the development.

The Government calls for everyone to raise their awareness on public health and personal hygiene. The Government has produced a guide and TV and radio APIs on disinfection of households including bathroom cleansing and how to ensure the proper functioning of the water seal in U-shaped water traps. Personal hygiene includes washing hands frequently and after going to the toilet; keep toilets clean and disinfected etc.

The Government has all along notified the building management of buildings where confirmed patients reside of the need to take disinfection measures. FEHD staff will inspect these buildings to ensure that the disinfection is done to the required standard.

The Government has also published a set of guidelines to draw the public's attention to the proper maintenance and repair of the drainage system and sanitary fittings.

The guidelines are available from the Buildings Department website and are being distributed to all management companies and owners' corporations in the next few days.

To improve the environmental hygiene in the vicinity, major

cleansing/disinfection operations were conducted in the Lower Ngau Tau Kok Estate, Telford Gardens and the surrounding areas by the building management with advice given by FEHD. The department also enhanced pest control measures in the area. Similar operations will also take place in other districts and pest control will be stepped up on a territory-wide basis.

The investigation was conducted by the Department of Health in collaboration with eight other government departments: the Electrical and Mechanical Services Department, Environmental Protection Department, Buildings Department, Food and Environmental Hygiene Department, Water Services Department, Drainage Services Department, Hong Kong Police Force and the Government Laboratory.

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