

Potential remedial measures for the epidemic outbreaks of novel coronavirus by control fire technique

by

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Abstract

A novel coronavirus, named 2019-nCoV, is responsible for current epidemic outbreaks in China and also other countries that cause acute pneumonia that was primarily linked to a seafood wholesale market in Wuhan, China. To control and prevent the existing epidemic outbreaks of coronavirus in China, a precise and easy disinfection/sterilization technique is important to disinfect/sterilize the mass-level peoples and their ambient environments (*e.g.* atmospheric air/aerosols). Among the disinfection techniques, control fire/flame (CF) could be applied. Large-size CF (LSCF) can be generated by using gas burner, gas cylinder that used in restaurant, coals, kerosene (petroleum), dried straws, dried woods) at entry and exit points of big gathering locations (*e.g.* hospital, airport, rail stations, seaports, apartments, streets/roads, etc. Additionally, small-size CF (SSCF) can be produced by using gas burner of kitchen, electric heater, kindle or waste papers at individual home and ward/room at hospital. Individual person can be soaked/immersed their hands and their belongings nearby CF for a moment, likely followed sterilization during quantification of the number of bacteria in experimental observation, that can rapidly sterilize the person perfectly. Correspondingly, the ambient air/aerosols moved towards CF due to water evaporation by fire that subsequently refresh all ambient air/aerosols by killing all viruses. Such CF could certainly reach the temperature higher than 56 degree C that could effectively disinfect/sterilize/kill the coronavirus. Therefore, CF could be effectively applied to control and prevent the epidemic outbreaks of coronavirus across China and worldwide.

Keywords: Coronavirus; Remedial measures; Disinfection/sterilization; Control fire/flame technique; Chemical technique

Introduction

In late December, Chinese authority reported that a cluster of patients with pneumonia of unknown cause was linked to a seafood wholesale market in Wuhan, China (Zhu et al. 2019; WHO, 2020). It has been reported that this cluster was associated with a novel coronavirus, named 2019-nCoV, which formed a clade within the subgenus *sarbecovirus*, *Orthocoronavirinae* subfamily (Zhu et al. 2019). This virus is the seventh member of the family of coronaviruses (Zhu et al. 2019), which is different from both severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) (Cui et al. 2019). Note that the severe acute respiratory syndrome coronavirus (SARS-CoV) outbreak in 2002 and the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in 2012 (de Wit et al. 2016). Other four viruses are 229E, OC43, NL63, and HKU1 which can typically cause common cold symptoms in immunocompetent individuals (Su et al. 2016).

Common symptoms of patients include a runny nose, cough, sore throat, possibly a headache and fever up to 39.4 °C (Zhu et al. 2019; Rothe et al. 2020; Holshue et al. 2020). The medical reports show that patients with a weakened immune system, mostly the young and the elderly, are at severe risk of the virus that causes a more acute respiratory tract illness, thereby causing death. Chinese and medical authorities confirmed that coronavirus are spreading from person to person that come in contact (Phan et al. 2020), thereby causing rapidly increasing the number of patients, not only in China, but also spreading in other countries that are typically linked with Wuhan (Zhu et al. 2019; Rothe et al. 2020; Holshue et al. 2020).

Chinese government has been implementing several strong initiatives to control and prevent the further epidemic outbreaks of coronavirus into mass-level peoples of other province

and cities. **Firstly**, all citizens, including foreigners did not allow to go outside with extreme necessities and asked to stay at home until epidemic outbreaks of coronavirus situations become stable. **Secondly**, all citizens regarding entering and exiting are quarantined for 14 days, which are strictly followed at all levels. **Thirdly**, each citizen is carefully checking their body temperature using device at all entry-exit levels (e.g. apartments or highway checking point or among provinces) to identify the patient to prevent the outbreaks. **Fourthly**, chemical disinfections at hospitals, airports, rail stations and other important mass gathering points are continuously conducting to control and prevent the epidemic outbreaks into other cities and countries. These primary initiatives are fruitful and effective still now to prevent spreading of epidemic outbreaks of coronavirus across China.

Now it is vital to take remedial measures for patients, doctors and nurses properly which has already been affected by epidemic outbreaks of coronavirus in Wuhan and other cities. Simultaneously, spreading of epidemic outbreaks of coronavirus into other major provinces and cities in China are gradually increasing. In such respects, disinfection at mass-level and individual person is comprehensively important to prevent and control the epidemic outbreaks of coronavirus across China and worldwide. Understanding a precise and easy disinfection/sterilization technique is vital to apply to disinfect/sterilize any individual person, mass peoples, roads/streets, air, hospitals, homes atmospheric air/aerosols and so on. Sterilization/disinfection for bacteria/viruses for individual human and its belongings along with hospital equipment is generally conducted by several pathways: **(1) Chemical technique:** Various chemicals, including hydrogen peroxide, ozone, alcohols, formaldehyde, ethylene oxide (ETO) gas, insecticides, herbicides, and so on, are mostly used as a disinfection at a hospital-level for washing hands, spraying on hard surface or soils and other surgical equipment purposes

(Block 2001; Sattar et al. 2002; Moore et al. 2000; Sagripanti et al. 1997; Mbithi et al. 1990; Kobayashi and Tsuzuki 1984; Bond et al. 1983; Rutala and Weber 2016). Note that it is also recommended some environmental hygiene with use of EPA-registered disinfectants that have microbiocidal (i.e., killing) activity against the pathogens (e.g. coronaviruses, bacteria). ETO is a colorless gas that is flammable and explosive. ETO can sterilize heat- or moisture-sensitive medical equipment without deleterious effects on the material used in the medical devices (Joslyn et al. 2001; Ernst and Doyle 1968). Acute exposure to ETO could cause central nervous system depression and irritation to skin, eyes, gastrointestinal or respiratory tracts system (Fisher, 1984; Jay et al. 1982; Salinas et al. 1981). (2) **Steam technique:** Steam sterilization as accomplished in an autoclave is to expose each item to direct steam contact at the required temperature [121°C (250°F) or 132°C (270°F)] and pressure for the specified time to kill all microorganisms (Agalloco et al. 1998; Adler et al. 1998). Surgical services equipment along with heat resistant items are generally used for this purposes. (3) **Plasma technique:** Direct exposure to the gaseous discharge (comprising an electric field and ions/electrons) or the N₂-O₂ flowing afterglow system (no *E*-field) can remove microorganisms at a hospital level (Moisan et al. 2014). (4) **UV-light technique:** UV light can disinfect the bacteria and virus, but that is limited to laboratory scale or specific surgical types or water treatment facilities (Anand 2013; Hijnen et al. 2006; Gerba et al. 2002; Shin et al. 2005). (5) **Fire/flame technique:** It is well-known that control fire/flame (CF) by any pathways (*e.g.* gas burner at a laboratory scale) is typically used for sterilization during any kind of biological-chemical analyses. During quantification of the number of bacteria in experimental observation, CF technique using gas burner is apparently used to disinfect/sterilize the hands and the ambient environments during the sampling and simultaneous measurement of other parameters, such as hydrogen peroxide (H₂O₂) and organic

peroxides (ROOH) during the photochemical and microbial observations (Mostofa, 2005; Mostofa et al. 2013).

In essence, apart from fire/flame technique, chemical processes are limited to disinfect/sterilize mass-level peoples and the ambient environments from current epidemic outbreaks of coronavirus across China. To control infection for mass-level peoples and their belongings (*e.g.* cloths, masks) during their transportation or daily works along with roads/streets, outside of houses and virus-contaminated atmospheric aerosols/air are typically difficult using chemical and other techniques.

In such current epidemic outbreaks of coronavirus in China, three key questions are needed to resolve. **Firstly**, how does control and prevent further infections that is now rapidly spreading in humans in mass-level and also at ambient environments? **Secondly**, how does disinfect/sterilize the coronavirus at mass-level in humans along with ambient environments? **Thirdly**, how do mass-level peoples come out from lockdown at home to control further spreading of coronavirus that is making panic and fears to mass-level peoples, thereby facing partially difficulty for local businesses? Control fire/flame (CF) technique can be useful for rapid remedial measures in such respects for mass-level peoples. CF can be derived from by using gas burner (small-size and laboratory based), gas cylinder that used in restaurant, kitchen's gas burner, electric heater, coals, kerosene (petroleum), dried straws, dried woods or waste papers or kindle. China Daily on 7 February reported that 56 °C temperature is sufficient to disinfect/sterilize/kill the coronavirus, therefore CF can be effectively used to control and prevent the epidemic outbreaks of coronavirus. The detailed procedures for mass-level disinfection disinfections are discussed as follows:

(1) Mass-level disinfection at entry/exit points on a hospital and inside hospital: CF can be conducted in front of a hospital using gas cylinder. Now the question is: how to apply CF to disinfect/sterilize by individual person? There are two options in such cases: **Firstly**, large-size CF (LSCF) using gas cylinder can be operated at the front gate of a hospital whereas each person entering or exiting can be disinfected their hands, masks, cloths and belongings by soaking/immersing nearby LSCF. Every person own-self can move at all directions to get touch in contact in his/her all sides nearby LSCF to disinfection his all body sides along with cloths and belongings. **Secondly**, small-size control fire (SSCF: e.g. using a kindle or gas burner or electric heater) can be easily used at each ward/room in hospital to keep their hands, masks, cloths and other small belongings over SSCF or by soaking/immersing for a moment, likely to be similar to sterilization during quantification of the number of bacteria in experimental observation. Our head and mouth along with other body parts can be partly disinfected by touching the palms of our two hands that then soaked/immersed into SSCF. These processes can disinfect all kind of coronaviruses or bacteria as a whole. Other important steps could be summarized as follows:

- ✓ SSCF using gas burner or kindle or electric heater at each ward in hospital and at home can be operated and thus will be disinfected spontaneously the room's air/aerosols.
- ✓ SSCF can be operated at each ward room of a hospital
- ✓ Doctors and nurses can be disinfected using SSCF as accordingly
- ✓ SSCF can be used to disinfect all small devices for temperature and other measurements purposes

(2) Mass-level disinfection on streets/roads and their checking points: CF using gas cylinder, electric heater or by other processes (e.g. dried straws, dried woods) can be operated at each

road/street/road-checking point to disinfect/sterilize the respective road/street along with atmospheric air/aerosols as well as individual person and their belongings over SSCF or nearby LSCF similarly as described before. In such cases, LSCF can be conducted continuously for several days at individual places at a distance in a street/road, particularly in Wuhan to disinfect/sterilize all the roads/streets. Additionally, infected air/atmospheric aerosols will be disinfected simultaneously. When LSCF is operated constantly, the ambient air near LSCF will be disinfected and go upward directions due to water evaporation, thereby surrounding more infected air will be followed towards LSCF. Thus a cycling of ambient air constantly occurred to LSCF due to water evaporation of atmospheric air caused by firing. Such cycling of atmospheric air/aerosols can completely disinfect the surrounding ambient atmospheric air/aerosols as a whole. Simultaneously, persons on such roads/streets can be disinfected when they are walking nearby CF that they can be soaking/immersing their hands, masks and other belongings over the CF to disinfect/sterilize simultaneously as mentioned before. Similar processes can be applied for mass-level disinfection on subway or bus stations, seaports, airports, rail stations, apartments and so on.

(3) Individual-level disinfection on home using their kitchen's gas burner: SSCF can be operated at home by using kitchen's gas burner or a kindle or electric heater. After coming back from outside at home, each person can be soaking/immersing their hands, masks and other belongings over SSCF to disinfect/sterilize simultaneously.

Note that fire is one of the five key elements (metal, wood, water, fire and soil/earth) of the Earth system that can not only remove darkness, but also provide fearless/braveness of a person along with edible cooked human foods with destroying all kinds of pathogens, including viruses and bacteria. For safety and choosing a proper place for operating LSCF on entry-exit

points in roads/streets, airports, seaports, bus stations, etc; it is recommended to arrange a high-level meeting, including experts from different fields, such as engineers of roads and highway, engineers of subway, architectures of building construction, hospital doctors regarding virology and others, fire extinguisher, police officer, army officer regarding fire extinguisher and so on. Therefore, CF could be useful indicator to take remedial measures to reduce the epidemic outbreaks resulted from coronavirus across China. Lastly, it is exclusively optimistic to full-scale victory by taking urgent remedial measures by applying the CF technique by any pathways to combat the epidemic outbreaks of the coronavirus across China and worldwide.

Conclusions

- SSCF and LSCF could be used to control further mass-level spreading and also simultaneously to disinfect/sterilize the current infected mass-level peoples and their belongings along with ambient atmospheric air/aerosols at home, hospital, airports, rail stations and so on
- In Wuhan, it is needed to disinfect in many individual levels, which includes streets/roads, apartments, airports and atmospheric air/aerosols by using LSCF.
- Fight unanimously for saving humans from coronavirus using control fire.

For LSCF at any levels, it could be carefully operated to avoid any further occurrence of firing.

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