

Notes from the Field

Key Points of the Program for Disinfection Technology in Special Places During the Coronavirus Disease-2019 (COVID-19) Outbreak

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Since January 2020, the coronavirus disease 2019 (COVID-19) epidemic has been prevalent throughout China. Disinfection, as an effective measure to cut off routes of transmission, is crucial in addressing epidemics of infectious diseases. To further guide prevention and control of COVID-19 and on-site disinfection nationwide, the *Program for Disinfection Technology in Special Places* (first edition) has been developed on January 28. The second and third edition has been revised and formulated on February 6 and 21, 2020. This program was created by using current trends of the epidemic situation and the combined characteristics of COVID-19 and its transmission mode and by referring to the *General principle on disinfection for infectious focus* (GB 19193-2015), *Hygienic requirements of disinfectant for infectious focus* (GB 27953-2011), and other standards. This program was released by the General Office of the National Health Commission on January 28, 2020 and was released again after revision on February 6 and 21.

The program guidelines are suitable for the disinfection of special places in which patients and infected persons live such as homes, isolation wards of medical institutions, and transferred tools storage areas. The program also includes guidelines on application scope and differences for concurrent and terminal disinfections and methods for infectious focus. Furthermore, it points out that disinfection should be performed in a timely manner in place where patients live such as sick houses, medical institutions, and transferred tools storage areas. In addition, specific disinfection methods of commonly contaminated objects are reintroduced in detail including indoor air, contaminants, feces and sewage, ground walls, surfaces of objects, clothes, beddings and other textiles, hands, skin and mucous membranes, tableware (drinkware), transported and transferred tools, domestic waste of patients, medical waste, treatment of corpse, etc. At the same time, evaluation methods and judgment criteria of the on-site disinfection effects are provided. The

natural bacteria or indicator microorganisms can be selected for effect evaluation, and the evaluation should be performed by relevant professionals with the qualifications of inspection and detection.

Selecting a disinfection method is particularly important when disinfecting in a special place. The program offers a basic principle of selection: medical institutions should choose disposable medical supplies. For non-disposable medical supplies, pressure steam sterilization should be preferred. For non-heat-resistant objects, chemical disinfectants or low-temperature sterilization equipment for disinfection or sterilization can be selected. For the surface of environmental objects, chlorine-containing disinfectants, chlorine dioxide, and other disinfectants should be selected to wipe, spray, or soak for disinfection. For hands and skin, selection of effective disinfectant is recommended such as iodophor, chlorine-containing disinfectants and hydrogen peroxide disinfectants, or quick-drying hand disinfectant for wiping disinfection. Regarding the disinfection of indoor air, disinfectants, such as peroxyacetic acid, chlorine dioxide, hydrogen peroxide, can be selected for spray disinfection. Meanwhile, the specific disinfection methods of 13 common contaminated objects are listed in detail (Table 1) (1–3). During disinfection, on-site contamination conditions should be understood. If there are obvious contaminants, contaminants should be disinfected first. After removal, disinfection measures can be taken according to the characteristics of the objects. The disinfection products used shall meet the management requirements of relevant national health departments.

Objects and places contaminated by patients should undergo concurrent disinfection. If people are present, spray disinfection is not recommended. Ventilation measures, including natural and mechanical ventilation, can be adopted in isolated places to maintain circulation of indoor air. Non-negative pressure isolation wards should be well ventilated, ventilation, including natural and mechanical

TABLE 1. Disinfection methods for commonly contaminated objects in the epidemic focus.

| Object | Disinfection method |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indoor air | peroxyacetic acid, chlorine dioxide, hydrogen peroxide, etc. ultra-low volume spray |
| Contaminants (blood, secretions, etc. from patient) | Water absorbent material carrying disinfectant (5,000–10,000 mg/L chlorine-containing disinfectant) for 30 min, or disinfectant dry wipes achieving high level of disinfection |
| Container for contaminants | Soaking with 5,000 mg/L chlorine-containing disinfectant for 30 min and then cleaning |
| Feces and sewage | Separate septic tank: adding chlorine-containing disinfectant and 10 mg/L the total residual chlorine after 1.5 h. Excreta in container: soaking with 20,000 mg/L chlorine-containing disinfectant for 2 hours when the ratio of fecal to disinfectant is 1:2. Massive dilution of excreta in container: disinfecting with 70%–80% dry bleaching powder for 2 h when the ratio of fecal to disinfectant is 20:1 |
| Ground wall | Wiping and spraying with 1,000 mg/L chlorine-containing disinfectant or 500 mg/L Chlorine dioxide disinfectant for no less than 30 min, the range of spray volume from 100 mL/m ² to 300 mL/m ² |
| Surface of objects | Spraying, wiping, or soaking with 1,000 mg/L chlorine-containing disinfectant or 500 mg/L chlorine dioxide disinfectant for 30 min and then wiping with clean water |
| Clothing, bedding and other textiles | Circulating vapor or boiling for 30 min, soaking with 500 mg/L chlorine-containing disinfectant for 30 min, and then washing |
| Hand | Rubbing with quick-drying hand disinfectants containing alcohol or alcohol compound (first choice), wiping with 75% ethanol, rubbing with quaternary ammonium salt hand disinfectant, or soaking or wiping hands with 0.05% chlorine-containing or 3% hydrogen peroxide hand disinfectant, or wiping with 0.5% polyvidone iodine |
| Skin | Wiping with 0.5% polyvidone iodine or 3% hydrogen peroxide disinfectant for 3–5 min |
| Mucous membrane | Flushing saline or 0.05% polyvidone iodine |
| Tableware | Soaking with 500 mg/L chlorine-containing disinfectant for 30 min 500 mg/L or boiling |
| Transported and transferred tools | Spraying with 1,000 mg/L chlorine-containing disinfectant or 500 mg/L chlorine dioxide disinfectant for 30 min and then wiping with clean water |
| Domestic waste of patients | Treating as medical wastes |
| Medical wastes | Treating as medical wastes |
| Corpse | Filling the wound with 3,000–5,000 mg/L chlorine-containing disinfectant or cotton ball or gauze soaked with 0.5 % peroxyacetic acid, wrapping the corpse with double sheet soaked the disinfectant, and then putting it in the double corpse bags |

ventilation, can be adopted, and circulating air disinfection machine can also be used for air disinfection. The source of infection should be terminally disinfected after leaving the relevant places to ensure the absence of pathogens in disinfected places and related objects. Large-area disinfection of outdoor environments including air is not necessary. There is no need for terminal disinfection in place with no obvious contaminants where patients and infected persons might have briefly visited.

On-site disinfection work should be conducted by relevant units in a timely manner under the guidance of the local disease prevention and control agencies, or the local disease prevention and control agencies should be responsible for disinfection. Concurrent and terminal disinfections of medical institutions should be performed by specially-assigned persons, and disease prevention and control agencies should provide technical guidance. Non-professionals should receive professional training from local disease prevention and control agencies before disinfecting, adopt correct

disinfection methods, and adhere to high standards of personal protection.

The introduction of this program provides technical support to effectively address the epidemic and the performance of scientific and precise disinfections by providing specific methods for on-site disinfection. Thus, the program has important public health significance for effectively safeguarding the physical health and life safety of the people.

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References

1. General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China, Standardization Administration of the People's Republic of China. GB 19193-2015 General principle on disinfection for infectious focus. Beijing: Standards Press of China, 2016. <http://c.gb688.cn/bzgk/gb/showGb?type=online>

- [&hcno=1FEE405AE7AA6A3EAA7DE54CDF58EC26](#). (In Chinese).
2. General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China, Standardization Administration of the People's Republic of China. GB 27953-2011 Hygienic requirements of disinfectant for infectious focus. Beijing: Standards Press of China, 2012. <http://c.gb688.cn/bzgk/gb/showGb?type=online&hcno=1CFE8901A0667472C5C7C60850CFF3B6>. (In Chinese).
3. General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China, Standardization Administration of the People's Republic of China. GB 15982-2012 Hygienic standard for disinfection in hospitals. Beijing: Standards Press of China, 2012. <http://c.gb688.cn/bzgk/gb/showGb?type=online&hcno=4DA7977F7EFBF4B3181E3EE674DC82C8>. (In Chinese).