

Review Article

COVID-2019: Experience of setting up quarantine center

Rashmi Datta

Consultant, Anaesthesiology, Base Hospital, Delhi Cantt, HQ Delhi Area, Delhi, India

Abstract

Indians stranded in countries reporting widespread transmission of COVID-19 in Jan to Mar 2020 were evacuated at short notice. Unclear and evolving evidence on COVID-19, risk of transmission of the disease from pre-symptomatic, asymptomatic and known cases of COVID-19 has put the spotlight back on the practice of quarantine. The article describes the processes, inter-sectoral coordination and methodology adopted for putting in place all measures for a successful evacuation and subsequent quarantine of the evacuees at the first Quarantine camp set up in India at Manesar, Gurugram near New Delhi by the Armed Forces. No health care worker or support staff contracted any infection with SARS-Cov-2 during the period of care and contact with those quarantined. The archaic practice of quarantine has yet again proven to be a robust and effective Public Health tool with great relevance in the ongoing Pandemic of COVID-19.

Keywords: COVID-19, quarantine camp, SARS-2 disinfection

The practice of isolating sick people goes back to biblical times when people affected with leprosy were segregated from society. The word “quarantine” itself originated in the 14th century

in Venice from the Italian quarantina, a period of 40 days, derived from quaranta, the Italian for “forty.” It referred to a period of 40 days, imposed upon ships when suspected of

carrying infectious or contagious disease in an effort to stave off the plague.^[1] Quarantine differs from isolation. The former is used to separate and restrict the movement of wellpersons who may have been exposed to a communicable disease to see whether they become ill. The latter is used to restrict the movement of ill persons and keep them separate from those who are healthy to help stop the spread of disease.^[2] The Division of Global Migration and Quarantine, a part of Center for Disease Control and Prevention has listed cholera, diphtheria, infectious tuberculosis, plague, smallpox, yellow fever, viral hemorrhagic fevers (such as Marburg, Ebola, and Congo-Crimean), and severe acute respiratory syndromes as quarantinable diseases.^[1,3,4]

Initial reports of the World Health Organization (WHO) highlighted 198 cases of pneumonia of unknown etiology from Wuhan City, Hubei Province of China on 31 Dec 2019.^[5] Viral metagenomics carried out on three bronchoalveolar-lavage specimens identified a new strain of beta-coronavirus on 7 Jan 2020. It was named SARS-CoV2 as there was a close genetic correlation to the corona virus causing the severe acute respiratory syndrome (SARS) epidemic of 2002-2003 which was named SARS-CoV by the International Committee on Taxonomy of Viruses. SARS-CoV-2 is a similar, enveloped, single-stranded RNA virus, 50–200 nm in diameter and transmitted mainly via respiratory droplets, fomites, and probably by fecal-oral route, predominantly from adults with respiratory tract infection. The basic reproductive ratio (R-naught; R0) for SARS-CoV-2 is currently estimated to be 2–3.5 indicating its extremely contagious nature.^[6,7] The disease spreads rapidly and on 30 Jan 2020, WHO declared it as a Public Health Emergency of International Concern (PHEIC) when cases were reported from five WHO regions.^[8] On 11 Feb 2020, WHO announced the name of the disease caused by the SARS-CoV2 virus as CoVid-19 which is an acronym for coronavirus disease of 2019.^[9] The clinical features range from mild in the form of fever, headache, myalgia, sore throat to breathlessness and hemoptysis.

Address for correspondence: Dr. Rashmi Datta,
HQ Delhi Area, Delhi Cantt, Delhi -110 010, India.
E-mail: drrashmidatta@gmail.com

Access this article online	
Quick Response Code:	Website: www.joacp.org
	DOI: 10.4103/joacp.JOACP_315_20

Indian Scenario

The first case of COVID-19 in India was reported on 30 Jan 2020 in Kerala, which rose to three cases by 3 Feb; all were students who had returned from Wuhan, China.^[10] The concept of “super-spreaders” emerged in Mar 2020, when 27 cases could be traced back to a Sikh preacher who on returning from Italy and Germany attended a Sikh festival in Anandpur Sahib. Over 40,000 people in 20 villages in Punjab were quarantined on 27 Mar to contain the spread.^[11] On 31 Mar, a Tablighi Jamaat congregation event that took place in Delhi in early March emerged as a new virus hotspot after numerous cases across the country were traced back to the event.^[12] On 12 Mar 2020, a 76-year-old man who had returned from Saudi Arabia became the first victim of the virus in the country.^[13] As of 20 May 2020, case-fatality in India at 3.09%, against the global 6.63%.^[14]

Response

The National Crisis Management Committee (NCCM) headed by the Cabinet Secretary, of the Government of India (GoI) is the apex authority overseeing the command, control and coordination of the crisis management group (CMG) of various wings under the Ministries of Health, Home, Civil Aviation and Defense in the fight against CoVid-19.^[15]

Initial measures taken by GoI were thermal screening of all passengers arriving from China and Hong Kong which was started on 18 Jan 2020 at seven Indian airports and later expanded to 20 airports by the end of Jan. By end Feb 2020, screening was extended to passengers from Thailand, Singapore, Japan, South Korea, Nepal, Vietnam, Indonesia, and Malaysia. This was deemed inadequate as asymptomatic, infectious persons were still slipping through at airports. In addition, no comprehensive nationwide surveillance system was in place and the infrastructure was inadequate. Public awareness was also minimal.^[16]

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Datta R. COVID-2019: Experience of setting up quarantine center. J Anaesthesiol Clin Pharmacol 2020;36:S14-8.

Submitted: 04-Jun-2020 Accepted: 16-Jun-2020 Published: 31-Jul-2020

On 27 Jan 2020, directions were issued by the NCMC to the administrative heads of Armed Forces and Armed Forces Medical Services (AFMS) to facilitate the evacuation of approximately 300 evacuees from Wuhan and surrounding regions of China who were arriving on 30 Jan 2020. The tasks outlined had to be completed within 72 h and included identification of a suitable quarantine facility, far from the densely populated areas of the capital but within distance from a tertiary care hospital.^[1,2,17] Manesar, a place 40 km from Delhi was identified. The students were potential carriers with possibility of becoming symptomatic and needing treatment. Emergent standard operating procedures were made for exit screening, entry screening, quarantine procedures, sample collection methodology and testing site, daily medical examination, isolation protocols and treatment protocols (in case any evacuee developed symptoms suggestive of COVID-19), biomedical waste (BMW) management, use of personal protective equipment (PPE) by evacuees, healthcare workers, housekeeping and administrative staff, etc.^[18,19] Inputs of experts from NCDC, Emergency Medical Relief division of Ministry of Health and Family Welfare (MoHFW), and the Indian Council of Medical Research (ICMR) were taken along with WHO guidelines. Training of the health care workers (HCWs) was conducted under the aegis of medical authorities in Delhi and NCDC on various aspects of the disease including doffing and donning of PPE, use of masks, disposal of all categories of PPE, sample collection, transport, and other infection prevention measures. In view of the short time of 72 h multiple nonmedical teams were created for implementation and organization of the administrative arrangements for the housing, feeding, and security of the evacuees.

A medical team detailed by the MoHFW from a Govt Hospital in Delhi accompanied the flight. They undertook the exit screening at Wuhan along with the mandatory exit screening by Chinese authorities in the form of self-declaration of symptoms, contact history with CoVid-19 patients, and screening for fever with a hand-held, noncontact thermal scanner. Those found symptomatic were not allowed to board the flight. Written consent of the evacuees to undergo compulsory quarantine on arrival in India was taken prior to boarding. Entry screening of the evacuees and crew was done on arrival at Indira Gandhi International Airport, New Delhi on similar lines by the Airport Authority of India and AFMS medical team.^[19] Sub cohorts of 20–25 each were created at the airport itself and on reaching the quarantine facility, housed in same barracks.

Quarantine

Screening and medical surveillance were done on entry into the quarantine camp on individual forms.^[19,20] Details of

subsequent daily medical examination were also entered into the same. If any symptoms or signs suspicious of CoVid-19 were presented or detected, the individual was labeled as “suspected case.” A detailed case sheet was prepared and he/she was immediately transferred to the isolation facility at the referral hospital with a referral form,^[19] a copy of which was submitted within 24 h to the nodal officer, AFMS HQ and Integrated Disease Surveillance Program (IDSP). All cases were investigated and clinically managed as per MOHFW guidelines.^[20]

The challenges faced were that this was the first time, a camp was being set up in recent times for a disease for which available information was minimal at that time. Apart from the general principles of quarantine, special care was needed for disinfection and BMW management. Quarantine was a source of stress for both the detainees and the staff from fears of infection and long isolation, frustration, boredom, inadequate information and supplies, financial loss, and stigma.^[6,8]

An extensive review of literature regarding disinfection for SARS-CoV2 revealed scanty information. In view of the similarities between SARS-CoV, it was presumed that fomites and aerosol transmission would be the major source of spread. Oro-fecal route was also considered. Various human corona viruses (CoV) have been reported to persist on fomites at room temperatures for up to 9 days.^[6,21] A behavioral observation study from the University of New South Wales described that face is touched on an average 23 times an hour, followed by skin (56%), mouth (36%), and nose and eyes (31%).^[22] The viral load of CoV on fomites is not known but transmissibility of CoV was extrapolated from that of influenza A virus and parainfluenza virus 3 where 31.5% and 1.5%, respectively, of the viral load could be transferred to the hands following a 5-s contact.^[23] Hence, environmental surface cleaning was stressed upon.

The effect of various hospital-level disinfectants and different temperatures had been extensively studied for SARS-CoV.^[23-25] A minimal reduction factor (Log_{10}) of 3 was taken as an estimate of effectiveness. Temperatures of $>60^{\circ}\text{C}$ with or without presence of proteins were shown to cause $>5.0\text{Log}_{10}$ reduction in viral loads. Based on this, steam generators were employed in dining areas and those living areas where disinfectants could not be used. Linen was boiled before washing and then sun-dried for 2 h. WHO recommended the use of surface cleaning with water and detergent and application of commonly used hospital disinfectants such as sodium hypochlorite. This is usually used as a 0.05% concentration but various studies on CoV recommend a 0.1% (1:50 dilution) solution for 1 min. Glutaraldehyde (0.5%) demonstrated a viral load reduction

of $>4.8\text{Log}_{10}$ but it was not used as exposure is known to lead to asthma and difficulty breathing, dermatitis, nasal irritation, sneezing, wheezing, burning eyes, and conjunctivitis. These mimic the early symptoms of CoVid-19 and may confuse the issue. Moreover, it needs a 30 min contact time.^[25]

Wet mopping of the impermeable living area floors was done with 0.1% sodium hypochlorite solution. Aerosol disinfection is needed to penetrate all crevices and folds in larger areas. The aerosol droplet size of the aerosol generator commonly used in the operation theaters generates droplets with volume median diameter (VMD) of 150–200 μm . Sodium hypochlorite solution clogs these generators and is only effective with knapsack sprayers which generate spray droplets of VMD >400 .^[26] Formaldehyde is a known carcinogenic and was not considered even though it has demonstrated a $>3.8\text{Log}_{10}$ reduction in the viral load. For generating aerosol of VMD of 150–200 μm , electrolytically generated hypochlorous acid, also referred to as “electrochemically activated (ECA) water” was used. It is a mixture of stable hypochlorous acid and oxidants like hydroxyl anion, peroxide anion, oxonium ion. It is US Food and Drug Administration (US FDA) approved (FCN 1811, dated-October 13, 2017) and considered 70 times more active than hypochlorite being more than 99.999% effective in eliminating coronavirus OC43, which is similar to CoVid-19.^[27,28] It was generated by an on-site generator, SteriGen® as the compound loses its efficacy rapidly. Windows and doors were kept open whenever feasible to allow perflation 30 min after the fogging. 70% ethanol for 30 s showed a reduction of 3 Log_{10} and 100% ethanol for 30 s showed a reduction of $>5\text{Log}_{10}$. These, however, could only be used for small surfaces, at best. Sterillium® (45% 2-propanol, 30% 1-propanol) demonstrated a $>2.8\text{Log}_{10}$ reduction after 30 s and it was advised as hand-disinfectants as were $>70\%$ alcohol-based hand rubs.^[24,25] Toilets were sprayed with 0.1% sodium hypochlorite and ECA. Buckets of the solution were placed for use by the detainees post-evacuation to help in the elimination of any viral via the fecal route. Few places soakage pits were in use for which lime and 0.5% cresol were used.^[29] For disinfection of mobile toilet sludge and septic tanks, 0.2% sodium hypochlorite solution was kept for a contact time of 30 min.

Wet waste and dry waste/refuse were collected separately by the housekeeping staff. For this, segregation at source (in barracks, cookhouse, and other areas) was ensured by placing green and blue waste-bins for wet and dry wastes, respectively, as per Bio-Medical Waste Management and Handling Rules, 2016. Buckets with yellow non-urethane, biodegradable bags with 0.2% sodium hypochlorite were placed at strategic points so that all masks were soaked. This had the additional advantage of preventing masks from scattering around the area. PPEs were sprayed with ECA before doffing and

then placed in yellow bags. For final disposal, the BMW was transported to a Common Biomedical Waste Treatment Facility (CBMWTF) under the aegis of the referral hospital.

Stress among the detainees and also the HCW was addressed by free communication with the families. In addition, provision for non-contact games, availability of social media, changing food menu were seen to.^[1,2,6]

Conclusion

Modern quarantine represents a wide range of scalable interventions to separate/restrict movements of individuals exposed to dangerous contagions. These strategies are important to suppress the spread of epidemics. Ethical implementation is resource and labor intensive. Comprehensive preparedness planning requires public participation and clear and effective communication at all levels. Strategic plans must be exercised to expose and rectify gaps and pitfalls to ensure our readiness at all times.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Barbisch D, Koenig KL, Shih FY. Is there a case for quarantine? Perspectives from SARS to Ebola. *Disaster Med Public Health Prep* 2015;9:547-53.
2. Giubilini A, Douglas T, Maslen H, Savulescu J. Quarantine, isolation and the duty of easy rescue in public health. *Version 2. Dev World Bioeth* 2018;18:182-9.
3. Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, *et al*. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: A scoping review. *Infect Dis Poverty* 2020;9:29.
4. Yang Y, Peng F, Wang R, Guan K, Jiang T, Xu G, *et al*. The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. *J Autoimmun* 2020;109:102434.
5. WHO. Novel Coronavirus (2019-nCoV); Situation Report-1: 21 Jan 2020.
6. Perrella A, Carannante N, Berretta M, Rinaldi M, Maturò N, Rinaldi L. Novel Coronavirus 2019 (Sars-CoV2): A global emergency that needs new approaches? *Eur Rev Med Pharmacol Sci* 2020;24:2162-4.
7. Meo SA, Alhowikan AM, Al-Khlaiwi T, Meo IM, Halepoto DM, Iqbal M, *et al*. Novel coronavirus 2019-nCoV: Prevalence, biological and clinical characteristics comparison with SARS-CoV and MERS-CoV. *Eur Rev Med Pharmacol Sci* 2020;24:2012-9.
8. WHO. Novel Coronavirus (2019-nCoV); Situation Report-11: 31 Jan 2020.
9. WHO. Novel Coronavirus (2019-nCoV); Situation Report-22: 11 Feb 2020.

10. Reid, David (30 January 2020). India confirms its first coronavirus case. CNBC.
11. 40,000 Indians quarantined after 'super spreader' ignores government advice. The Telegraph 2020 Mar 28.
12. India event sparks massive search for Covid-19 cases. BBC News. 2020 Mar 31.
13. India's first coronavirus death is confirmed in Karnataka. Hindustan Times 2020 Mar 12.
14. Hu Y, Sun J, Dai Z, Deng H, Li X, Huang Q, *et al*. Prevalence and severity of corona virus disease 2019 (COVID-19): A systematic review and meta-analysis. *J Clin Virol* 2020;127:104371.
15. Mishra, Mihir (12 March 2020). Covid-19: Seven ministries to set up quarantine facilities. The Economic Times. Available from: <https://economictimes.indiatimes.com/news/politics-and-nation/covid-19-seven-ministries-to-set-up-quarantine-facilities/articleshow/74586054.cms>. [Last retrieved on 2020 Mar 12].
16. Wikipedia contributors. COVID-19 pandemic in India. Wikipedia, The Free Encyclopedia 2020 May 31. 04:18 UTC. Available from: https://en.wikipedia.org/w/index.php?title=COVID-19_pandemic_in_India&oldid=959901373. [Last accessed on 2020 Jun 02].
17. Rosenberger LH, Riccio LM, Campbell KT, Politano AD, Sawyer RG. Quarantine, isolation, and cohorting: From Cholera to Klebsiella. *Surg Infect (Larchmt)* 2012;13:69-73.
18. Govt of India, Min of Health and Family Welfare. Guidance Document for POEs, States and UTs for Surveillance of 2019-nCoV. Self Reporting form; For travellers arriving from 2019-nCoV affected countries. Available from: <https://www.mohfw.gov.in/pdf/Guidance%20document%20-%202019-nCoV.pdf>. [Last accessed on 2020 Jun 04].
19. Govt of India, Min of Health and Family Welfare. Guidance Document for POEs, States and UTs for Surveillance of 2019-nCoV. Suspect Case Referral Form: For any passenger developing symptom as per case definition of 2019-nCoV. Available from: <https://www.mohfw.gov.in/pdf/Guidance%20document%20-%202019-nCoV.pdf>. [Last accessed on 2020 Jul 08].
20. Govt of India, Min of Health and Family Welfare. Guidance Document for POEs, States and UTs For Surveillance Of 2019-nCoV. Format A for surveillance of passenger for 2019-nCoV. Available from: <https://www.mohfw.gov.in/pdf/Guidance%20document%20-%202019-nCoV.pdf>. [Last accessed on 2020 Jun 04].
21. Lou J, Tian SJ, Niu SM, Kang XQ, Lian HX, Zhang LX, *et al*. Coronavirus disease 2019: A bibliometric analysis and review. *Eur Rev Med Pharmacol Sci* 2020;24:3411-21.
22. Kwok YL, Gralton J, McLaws ML. Face touching: A frequent habit that has implications for hand hygiene. *Am J Infect Control* 2015;43:112-4.
23. Chan KH, Peiris JS, Lam SY, Poon LL, Yuen KY, Seto WH. The effects of temperature and relative humidity on the viability of the SARS coronavirus. *Adv Virol* 2011;2011:734690.
24. Rabenau HF, Cinatl J, Morgenstern B, Bauer G, Preiser W, Doerr HW. Stability and inactivation of SARS coronavirus. *Med Microbiol Immunol* 2005;194:1-6.
25. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *J Hosp Infect* 2020;104:246-51.
26. Mount GA. A critical review of ultralow-volume aerosols of insecticide applied with vehicle-mounted generators for adult mosquito control. *J Am Mosq Control Assoc* 1998;14:305-34.
27. U.S. Environmental Protection Agency. Alternative Disinfectants and Oxidants Guidance Manual. Washington, DC, USA: US-EPA; 1999.
28. Prütz, W. Interactions of hypochlorous acid with pyrimidine nucleotides, and secondary reactions of chlorinated pyrimidines with GSH, NADH, and other substrates. *Arch Biochem Biophys* 1998;349:183-91.
29. Patel P, Sanghvi S, Malik K, Khachemoune A. Back to the basics: Diluted bleach for COVID-19. *J Am Acad Dermatol* 2020;83:279-80.