

The second wave of COVID-19 in a tourist hotspot in Vietnam

Running head: Second wave of COVID-19 in Vietnam

Nong Minh Vuong MSc¹, Nguyen Thi Le Quyen MD², Doan Thu Tra PhD¹, Do Van Thanh PhD¹, Nguyen Quang Tuan PhD³, Dao Xuan Co PhD³, Nguyen Thi Huyen Trang MSc⁴, Do Duy Cuong PhD^{1‡}

¹Center for Tropical Diseases, Bach Mai Hospital, Hanoi, Vietnam

²Medical Services Administration, Vietnam Ministry of Health, Hanoi, Vietnam

³Bach Mai Hospital, Hanoi, Vietnam

⁴Department of Public Health, Thang Long University

‡Corresponding author

Cuong Do Duy, Ph.D., M.D.

Center for Tropical Diseases, Bach Mai Hospital

Address: No 78, Giai Phong Street, Dong Da District, Hanoi 100000, Vietnam

Email: doduy.cuong@bachmai.edu.vn

Highlights

The second wave of COVID-19 in Vietnam started in the largest tourist city in the country (Da Nang), initially with nosocomial transmission which spilled over and resulted in widespread community transmission. We discuss the challenges and strategies to prevent a further nationwide outbreak.

Keywords: SARS-CoV-2, second wave, nosocomial transmission, community transmission, Asia; travel; non-pharmaceutical interventions

By 8 September 2020, Vietnam reported a total of 1049 laboratory confirmation of SARS-CoV-2, with 35 deaths. After successfully containing the first wave¹ followed by 99 days without any further local cases, the second wave of COVID-19 started on July 25 in a major hospital in Da Nang – the biggest tourist city in the country with more than one million local citizens and about eight million tourists annually. During the period from July 25 to August 1, new incident cases increased by about 30% after only one week, the fastest growing rate since the beginning of the epidemic.

There was a total of 551 cases related to the outbreak in Da Nang, as reported by September 8th; 58.8% female, median age was 46 years, and 26.1% were aged ≥ 60 . About half of all SARS-CoV-2 cases were found in the hospital setting (49.4%), with Da Nang Hospital (DNH) as the epicenter of the outbreak (251 cases, 45.6%). Among cases detected in hospitals, there were

9.9% health-care workers (HCWs), 44.9% patients, 34.9% family caregivers, and 10.3% persons who had visited the hospital. There were 279 cases detected in the community, 175 were investigated as close contacts of positive cases (62.7%), and 104 cases did not identify the source of transmission (Table S1). A total of 15 major cities/provinces reported cases linked to the Da Nang outbreak, with most of cases detected in Da Nang (71.0%), followed by Quang Nam (16.9%), Hai Duong (2.9%), Hanoi (1.8%), and Ho Chi Minh City (1.5%). Our observations emphasize the potential threat of unrecognized rapid community spread even in successful outbreak-controlled countries such as Vietnam or New Zealand, and the importance of prevention of nosocomial infections in hospitals. Rigorous infection prevention control (IPC) measures should be continued in medical settings until a vaccine is rolled out.

Responses of Vietnam to the second wave of COVID-19

In Vietnam, a large nosocomial outbreak previously occurred in March at the biggest hospital in the North – Bach Mai Hospital (BMH). The successful experience from the BMH outbreak was a valuable lesson of how to prevent further community transmission from a nosocomial outbreak through mass testing of all suspected cases, lockdown, vigorous contact tracing, quarantine all the possibly contacts, and social distancing.² In Da Nang, one day after the first case was detected, three hospitals in a medical complex area with the center was DNH were put under lockdown. A total of 6,018 persons were considered as suspected cases and put in quarantine, including HCWs, non-clinical staff, patients, and family caregivers. An addition of 6,665 persons traced as direct contacts of positive cases were also quarantined and tested as reported on July 30. The laboratory capacity for RT-PCR of SARS-CoV-2 in Da Nang was increased to about 10,000 samples per day supported by BMH and the Ho Chi Minh City Pasteur Institute. In early August, mass testing was expanded to nearby residential areas of the hospital complex, and other high-risk areas in the community. From July 25th to September 2nd, an estimated 228,000 people were tested in Da Nang (about 25% of the total population). On 3rd September, the city planned to extend the testing for 71,424 low-risk households, one sample for each household. Social distancing was applied on July 28 for the whole city when all non-local citizen returned to their home province (Figure 1). Hundreds of experienced HCWs from Hanoi and Ho Chi Minh City were sent to Da Nang to support the control efforts, similarly to what China did for Wuhan.³ A temporary hospital for care and treatment for suspected cases and mild cases of COVID-19 was

built, following the concept of Fangcang Hospitals in China,⁴ in addition to two designated hospitals that were rapidly established and put under the directly direction of a special committee from the Ministry of Health (MoH).

The second wave occurred after more than 3 months of no detection of local cases in Vietnam, when the intra-country prevention measures had been eased, including the lifting of national social distancing in April, reopening of entertainment activities, and stimulation of domestic tourism. From July 1 to July 27, it was estimated that more than 1.5 million people returned from Da Nang to other provinces of Vietnam, of which about 41,000 people had visited DNH. The containment strategy varied between provinces, depending on the local laboratory capacity and ability to do contact tracing. Community measures similar to those in rural areas of China⁵ were employed for rural areas in Vietnam. Hanoi is the capital city with the largest number of contacts, hence mass testing mass testing was done for about 100,000 persons using the rapid antibody test, with strict quarantine and mobility restrictions. The control approach in Hanoi was almost similar to the contain strategy in South Korea.⁶ However, several studies indicated that the rapid tests had low sensitivity at early stage or for those with asymptomatic infections.^{7,8} False negative result might create a sense of false reassurance among both suspected cases and HCWs. This strategy quickly revealed its limitations when two cases who had negative test result based on the rapid test were soon found to be positive by RT-PCR, which resulted in mass re-testing for all the contacts and suspect cases with the RT-PCR methods in Hanoi.

Other provinces with lower number of tracing contacts, carried out less aggressive approach, but still followed the general principle of vigorous tracing, isolating, and testing if symptomatic. For example, Ho Chi Minh City, the biggest metropolitan city in South Vietnam received about 52,449 people returning from Da Nang. Consequently, Ho Chi Minh City conducted contacts tracing of all persons from Da Nang and stratified them into three groups. People with respiratory symptoms or those exposed to the three epicenter hospitals in Da Nang were placed in centralized quarantined and tested for SARS-CoV-2; other cases were isolated and monitored at home by local commune health staff.

In addition, a mobile application, named “Blue-zone” was developed and made freely available to all residents in Vietnam. By August 20, the application had exceeded 20 million downloads.

Current challenges and future directions

One of the biggest challenges of the outbreak in Da Nang was the high disease burden in the elderly with comorbidities as a consequence of the widespread of nosocomial transmission among patients at DNH. The proportion of severe or critical cases was above 10%, which was significantly higher than during the first wave where only five cases (1.2%) required ventilation or extracorporeal membrane oxygenation (ECMO). There were 35 deaths, mostly among patients aged ≥ 60 years, and those with serious underlying medical problems such as end-stage kidney diseases, diabetes, cardiovascular diseases, or cancer, in line with published data from the UK.⁹

The second challenge was the asynchronous capacity across provinces for quarantine, contact tracing and testing. Recent studies indicate a moderate level of local capacity to deal with the epidemic response, especially in rural areas and southern region.¹⁰ Mobilization of resources to localities with poor health system was critical for contact tracing and managing of more than 1.5 million people linked to the Da Nang outbreak.

Author contribution

N.M.V and D.D.C conceived the manuscript and wrote the first draft. All authors contributed to the final manuscript.

Funding

None.

Acknowledgements

None.

Conflicts of interest

The authors declare no conflict of interest.

References

1. Dinh L, Dinh P, Nguyen PDM, Nguyen DHN, Hoang T. Vietnam's response to COVID-19: prompt and proactive actions. *J Travel Med* 2020; **27**(3).
2. Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med* 2020.
3. Fisher D, Wilder-Smith A. The global community needs to swiftly ramp up the response to contain COVID-19. *Lancet* 2020; **395**(10230): 1109-10.
4. Chen S, Zhang Z, Yang J, et al. Fangcang shelter hospitals: a novel concept for responding to public health emergencies. *Lancet* 2020.

5. Liu X, Zhang D, Sun T, Li X, Zhang H. Containing COVID-19 in rural and remote areas: experiences from China. *J Travel Med* 2020; **27**(3).
6. Oh J, Lee JK, Schwarz D, Ratcliffe HL, Markuns JF, Hirschhorn LR. National Response to COVID-19 in the Republic of Korea and Lessons Learned for Other Countries. *Health systems and reform* 2020; **6**(1): e1753464.
7. Lisboa Bastos M, Tavaziva G, Abidi SK, et al. Diagnostic accuracy of serological tests for covid-19: systematic review and meta-analysis. *BMJ* 2020; **370**: m2516-m.
8. La Marca A, Capuzzo M, Paglia T, Roli L, Trenti T, Nelson SM. Testing for SARS-CoV-2 (COVID-19): a systematic review and clinical guide to molecular and serological in-vitro diagnostic assays. *Reprod Biomed Online* 2020: S1472-6483(20)30318-7.
9. Docherty AB, Harrison EM, Green CA, et al. Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: prospective observational cohort study. *BMJ* 2020; **369**: m1985.
10. Tran BX, Hoang MT, Pham HQ, et al. The operational readiness capacities of the grassroots health system in responses to epidemics: Implications for COVID-19 control in Vietnam. *J Glob Health* 2020; **10**(1): 011006-.

Figure legend

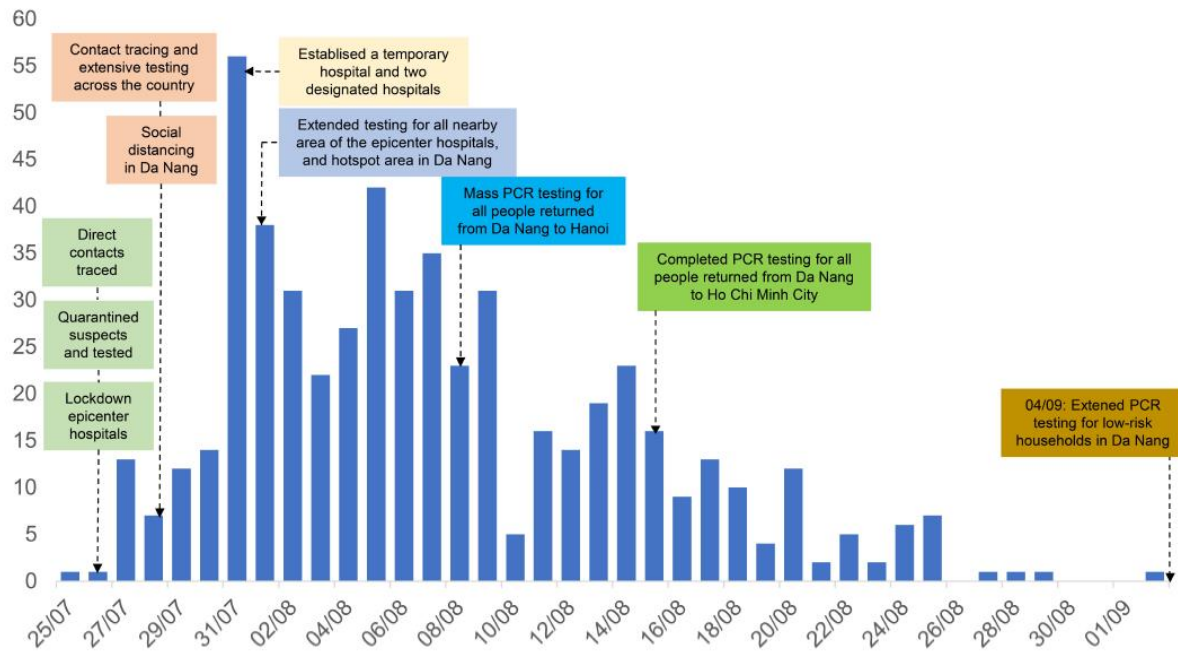


Figure 1. Timeline of COVID-19 outbreak at Da Nang from July 25 to September 08, 2020

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