# Mega city public health policy and Hospital management of COVID-19

## -Experience from Shanghai

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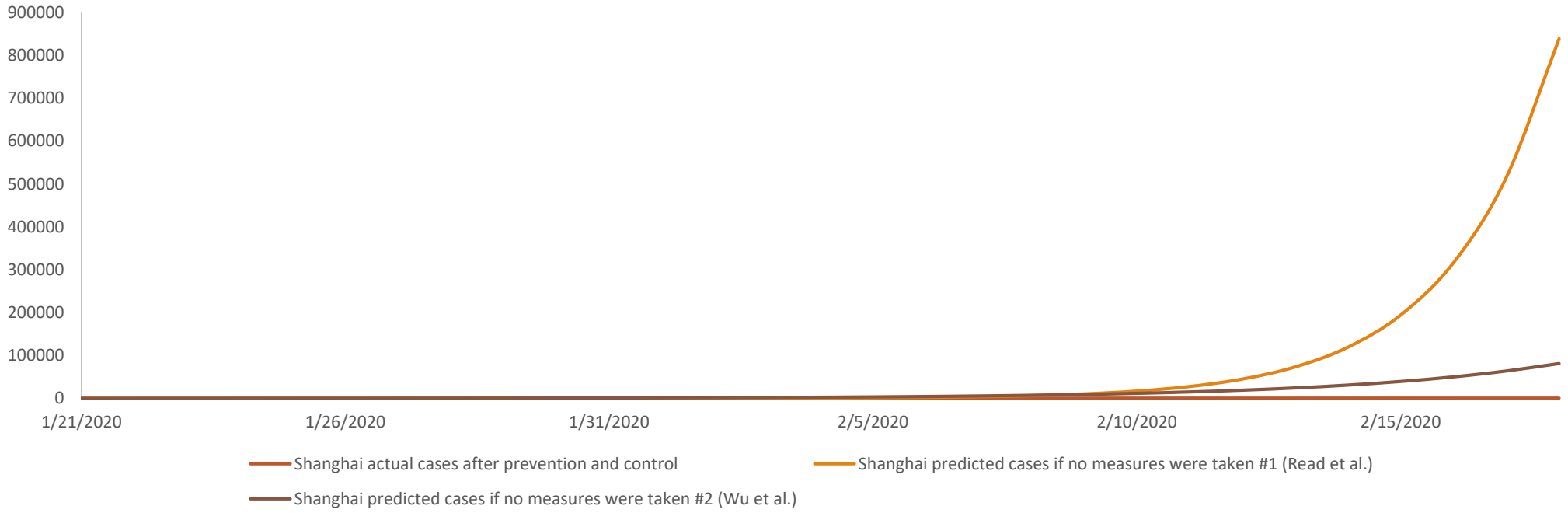
# The epidemic trend in Shanghai


Sources: HZ Lu, JW Ai, WH Zhanget al. medRxiv 2020.02.19.20025031;doi:https://doi.org/10.1101/2020.02.19.2002503

# The epidemics trend of Shanghai (actual vs. predicted)




- **The previous epidemics trend prediction of Shanghai by several studies if the transmission was not stopped.**
- **Shanghai has indeed managed to stopped the exponential growth in less than 2 weeks.**

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# Multiple measures taken by the Shanghai government in the early stage of the epidemics

**The population travelling to or leaving Shanghai has significantly decreased by approximately 50%.**

**All gathering activities and most of the recreational sites including restaurants, theatres and etc. were closed.**

**Shanghai extended the Spring Festival holidays to 17 days from Jan 24th until Feb 9$^{th}$ to minimize the possible infections from patients in their incubation period.**

**All citizens were encouraged to stay at home unless for necessary working , shopping, or medical treatment.**

# Multiple measures in medical and health control

- **Shanghai opened 110 designated fever clinics.**
- **ALL patients who met 1 epidemiology criteria+1 clinical relevant symptoms can go to these clinics.**
- **If the physicians thought the patient to meet the criteria of suspected COVID-19 infections, the patient would be admitted in to the quarantine ward and CDC staff would come for sampling and epidemiological question.**
- **If nucleic acid test turned our positive, all patients were enrolled into the designated hospital in Shanghai**

# A cohort study from Huashan Hospital, Shanghai

| | COVID-19 positive cases（N=20） | COVID-19 negative case（N=33） | P |
|---|---|---|---|
| **Age, median (Range)** | 37(26-66) | 39 (22-88) | 0.882 |
| **Sex** | | | |
| Male | 10 (50.0%) | 16 (48.5%) | |
| **Signs and symptoms (Range)** | | | |
| Fever | 16 (80.0%） | 17 (51.5%) | |
| Dry cough | 11 (55.0%) | 19 (57.6%) | |
| Diarrhea | 3 (15.0%) | 4 (12.1%) | |
| Fatigue | 2 (10.0%) | 2 (6.1%) | |
| Headache | 3 (15.0%) | 1 (3.0%) | |
| Vomiting | 1 (5.0%) | 0 (0.0%) | |
| Abdominal pain | 1 (5%) | 0 (0.0%) | |
| **Laboratory Findings (Range)** | | | |
| White blood cell count, $\times 10^9$/L | 4.21 (2.79-11.32) | 8.05 (5.41-11.91) | 0.001 |
| Neutrophil count, $\times 10^9$/L | 2.88 (0.99-7.95) | 5.25 (2.83-11.22) | 0.000 |
| Lymphocyte count, $\times 10^9$/L | 1.21 (0.30-3.32) | 1.58 (0.21-4.64) | 0.077 |

# Use of chest CT, SARS-CoV-2 RT-PCR and multi-plex PCR (or rapid influenza antigen or flu RT-PCR tests ) in Huashan Hospital Shanghai

| | Diagnostic methods | Laboratory-confirmed cases（n=20） | Laboratory-confirmed non-COVID (n=33) |
|---|---|---|---|
| **2019-nCoV identification** | Suspected chest CT signs | 20/20 | 20/33 |
| | First time SARS-CoV-2 PCR positive | 14/20 | 0/33 |
| | Second time SARS-CoV-2 PCR positive | 3/6 | 0/33 |
| | mNGS positive for SARS-CoV-2 | 20/20 | 0/33 |
| **Other respiratory infection pathogens** | Direct antigen Flu A+B test positive | 0/20 | 0/33 |
| | Multiplex PCR positive for other pathogens | 5/20 | 7/20 |
| | mNGS positive for other pathogens | 11/20 | 23/33 |

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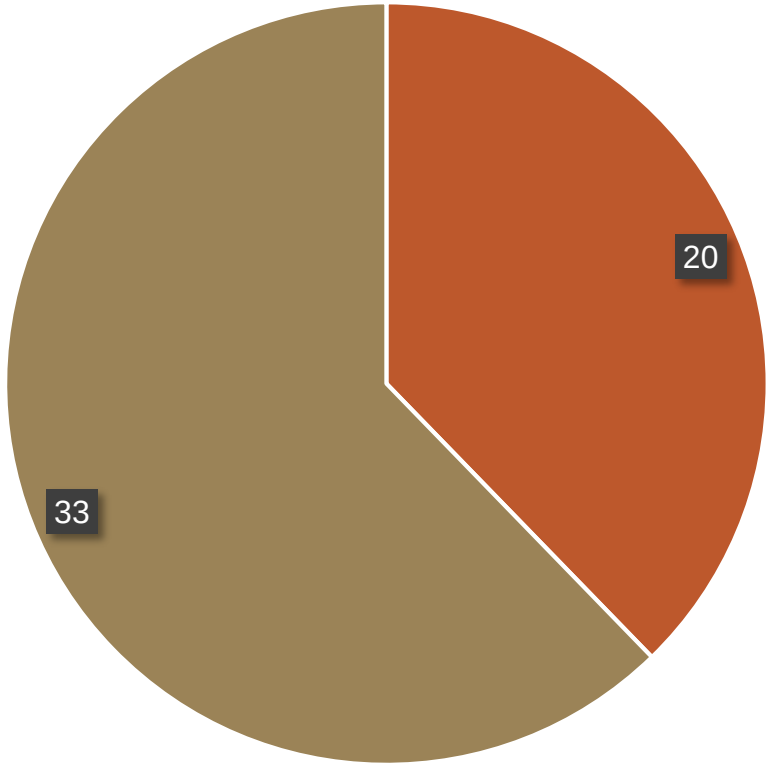
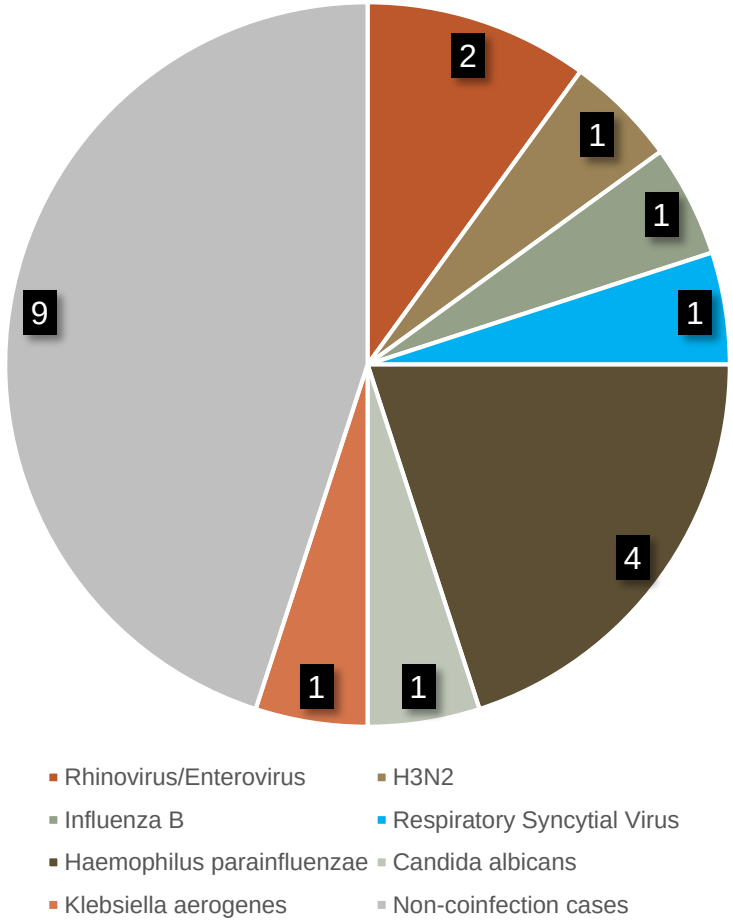
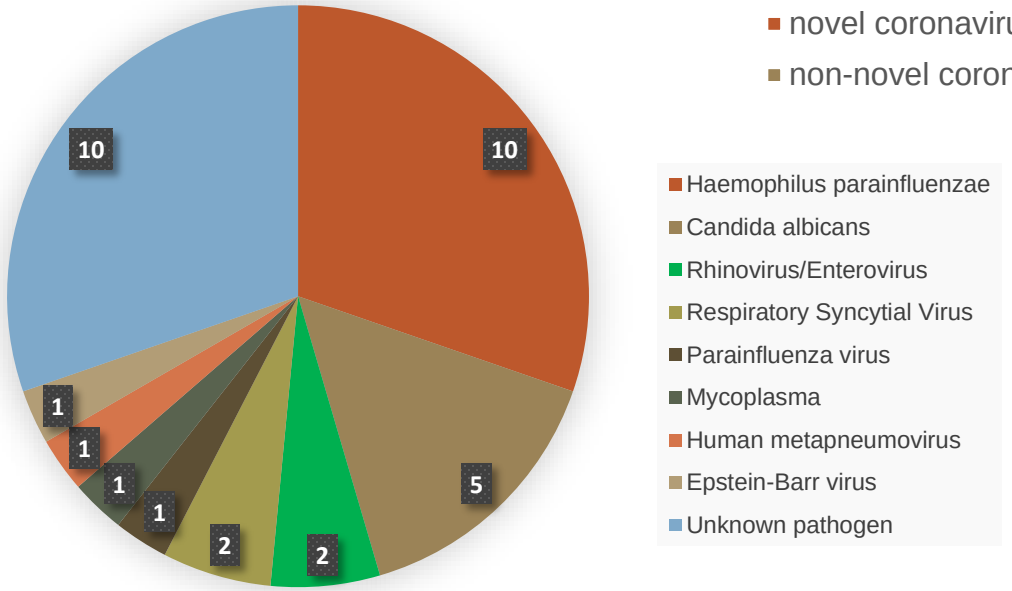
# Co-infections in the COVID-19 patients




NCP Cases with co-infection status




Non NCP cases

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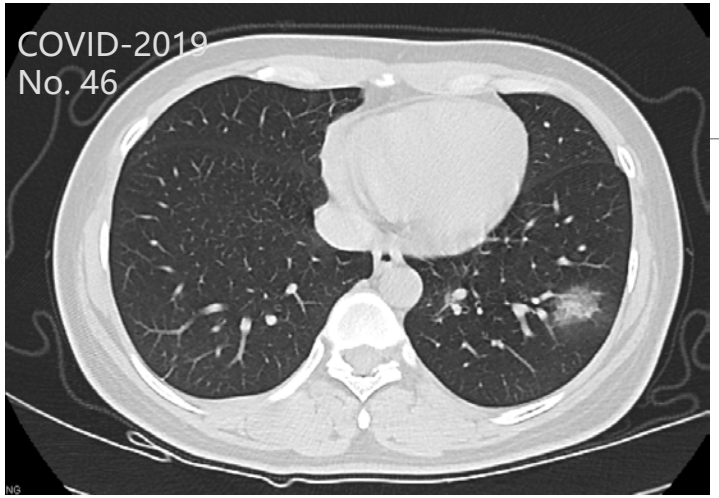
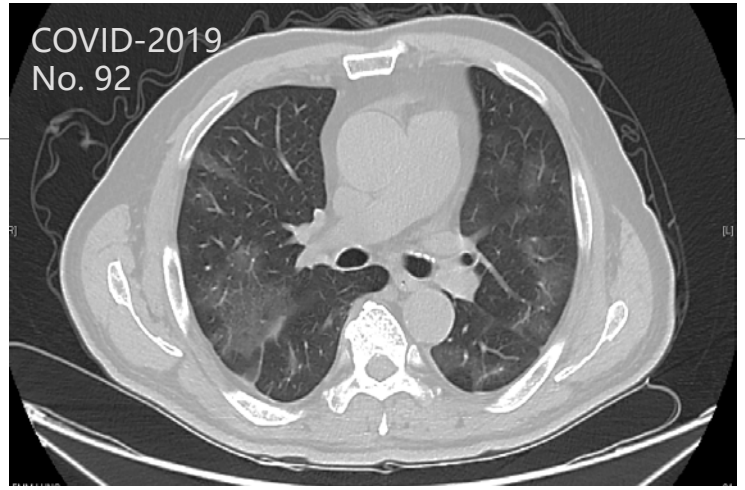
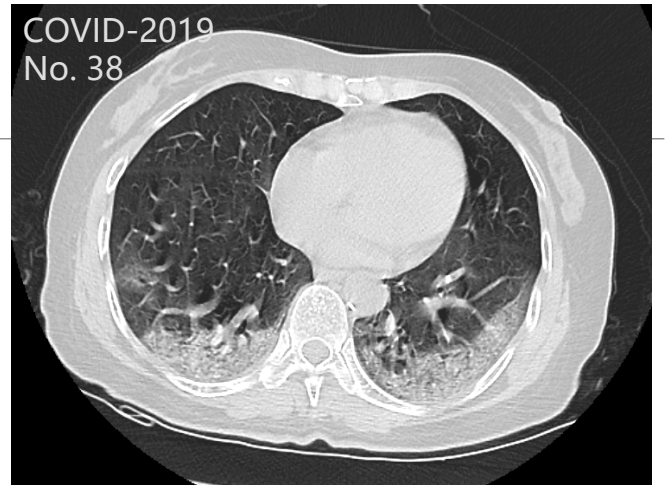
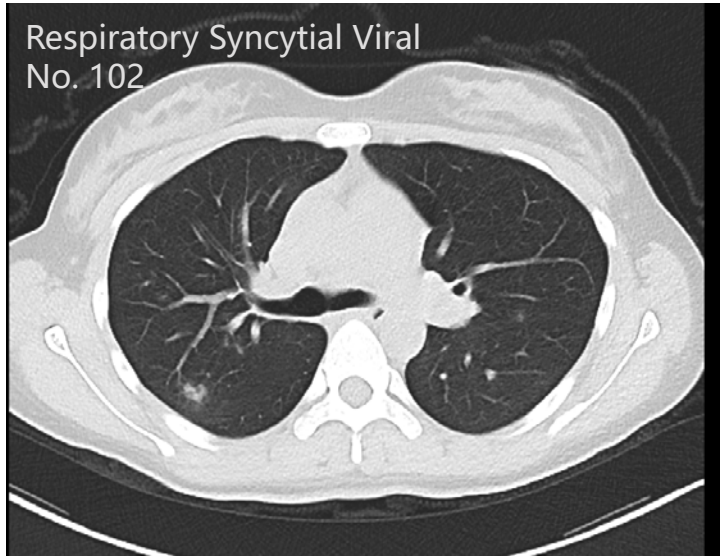
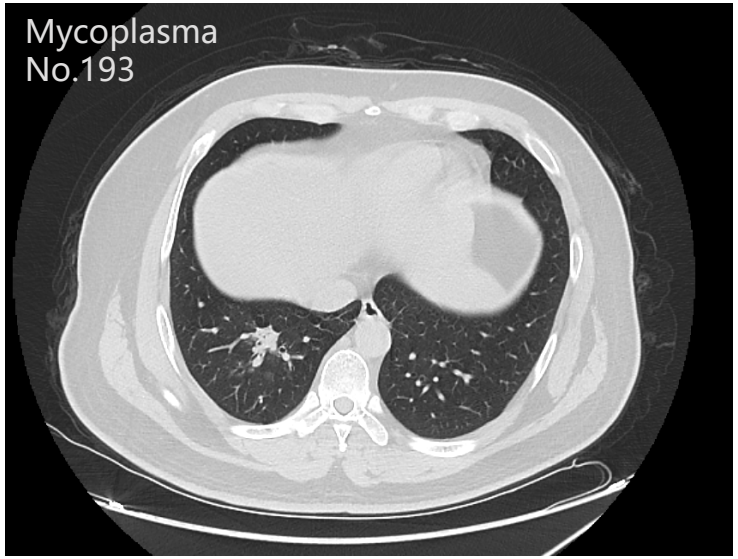
# Chest CT alone could not precisely diagnose COVID-2019 due to sometimes similar radiological presentations.

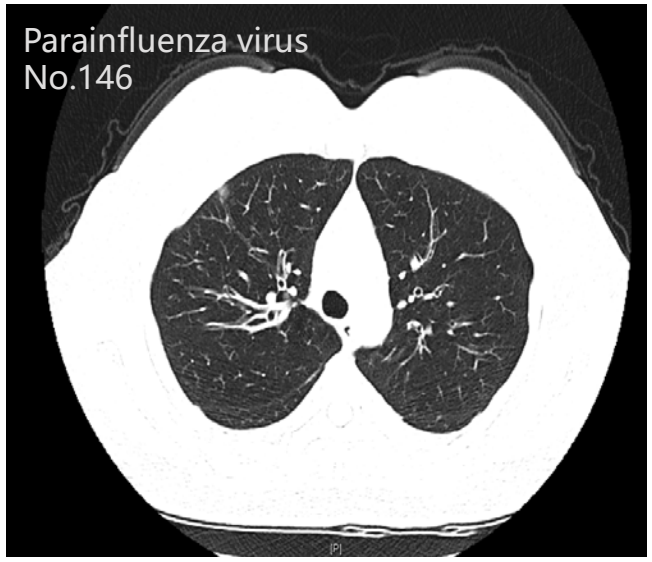
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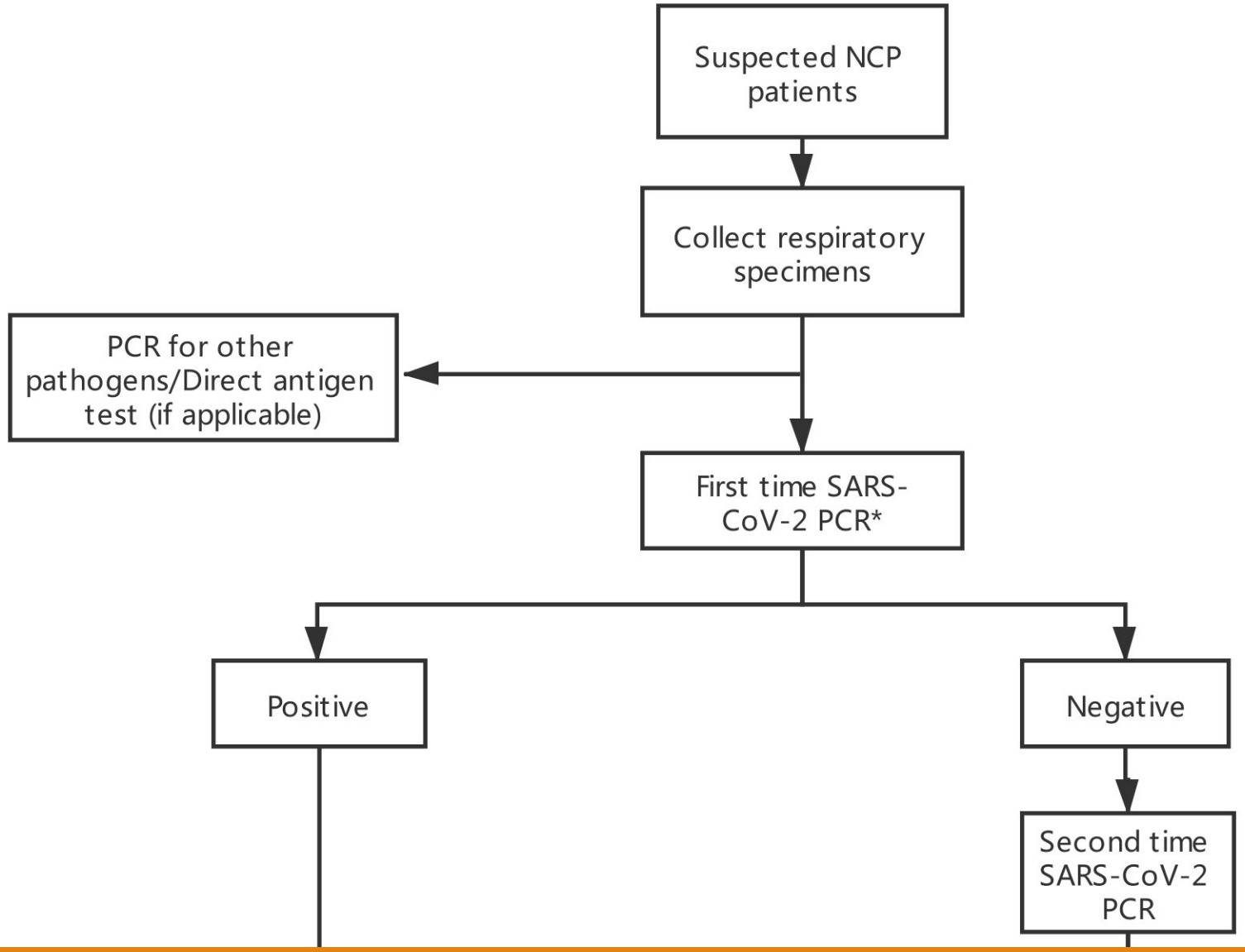
# Recommended diagnostic flow diagram (1).

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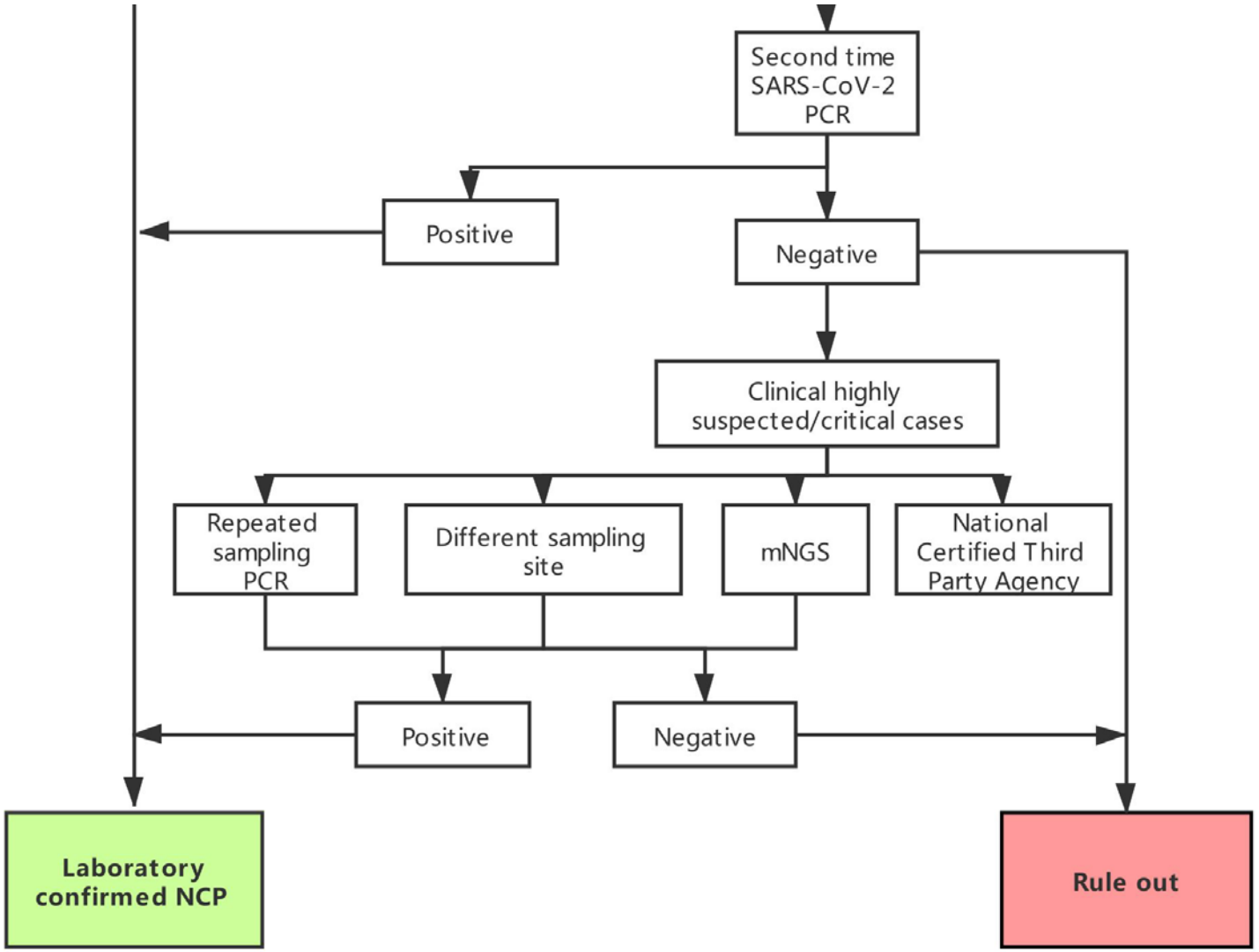
# Recommended diagnostic flow diagram (2).

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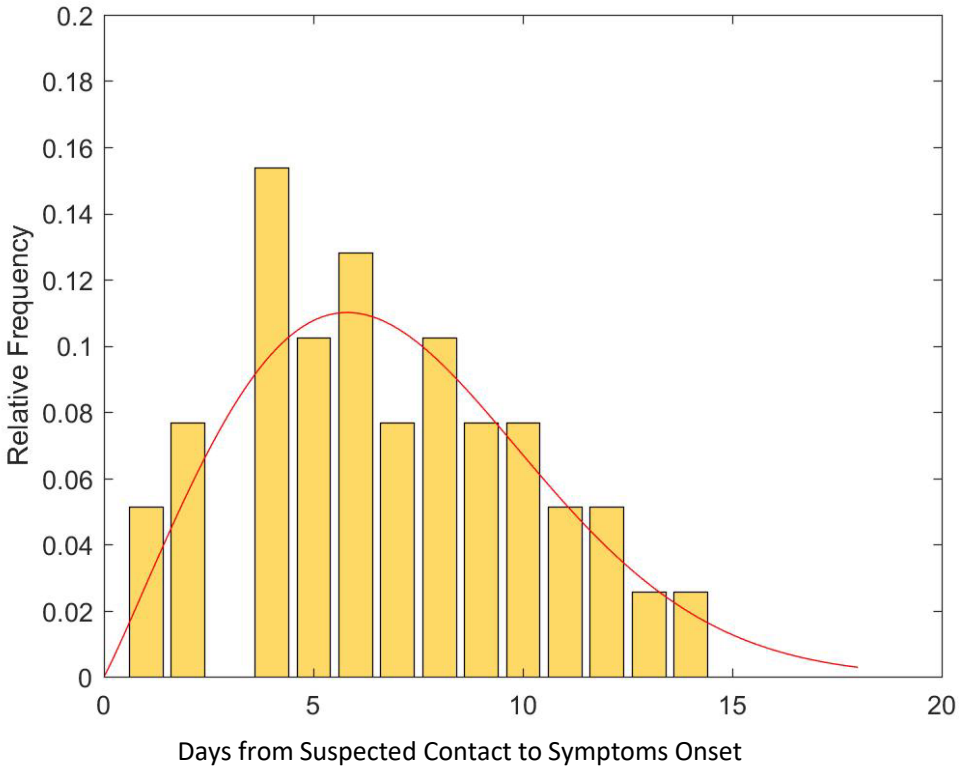
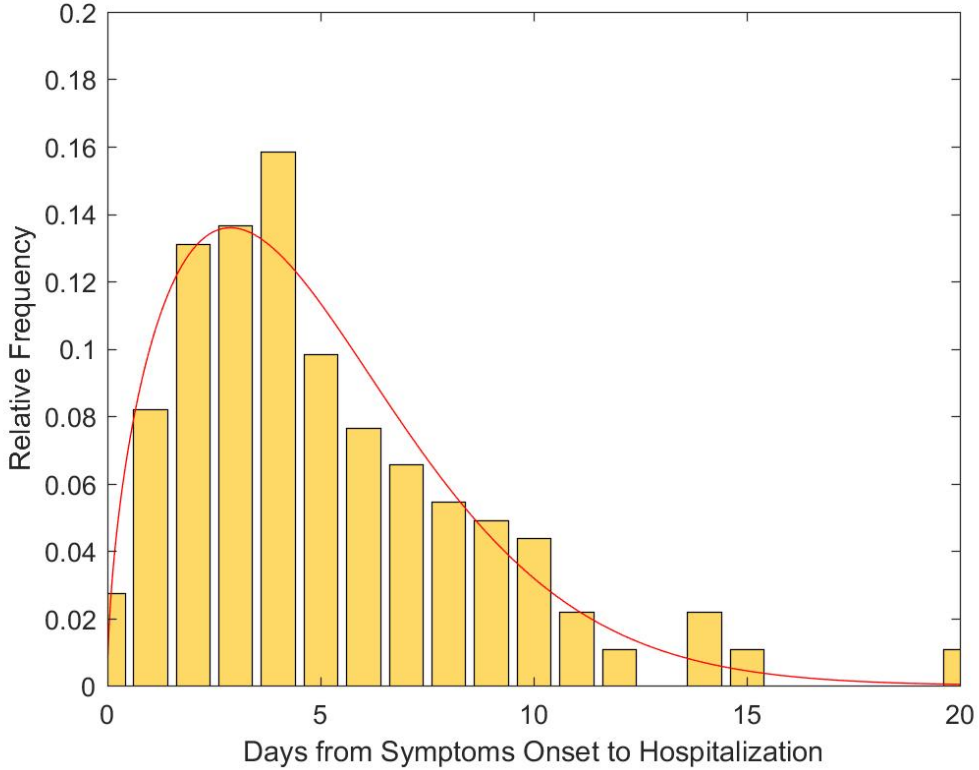
# Timely diagnosis would lead to timely admission of the patients to prevent further local transmission




**The mean incubation period is 6.4 days (95% CI 5.3 to 7.6)， and the mean onset-admission interval was 5.5 days (95% CI, 5.1 to 5.9, SD 3.5) in Shanghai.**

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# KEY POINTS of medical and health control in Shanghai and China

**All suspected patients should be tested at least twice by CDC**

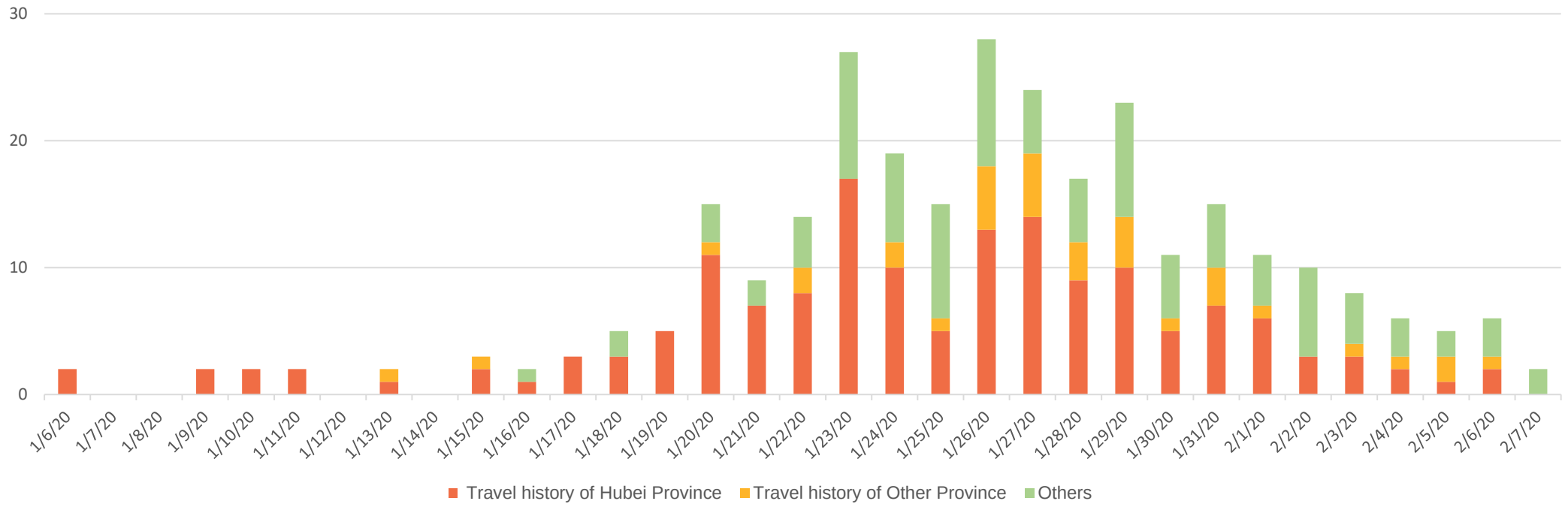
**All nucleic tests and treatment are free**

**All diagnosed patients should be admitted to designated hospital**

**All close contacts of the diagnosed patients were traced and quarantined for 14 days, and all close contacts of the diagnosed patients received SARS-CoV-2 RT-PCR tests**

# Early control of the local transmission is the key to stop the diseases spreading

**Shanghai's data showed effective control of the local cases (green bars)**

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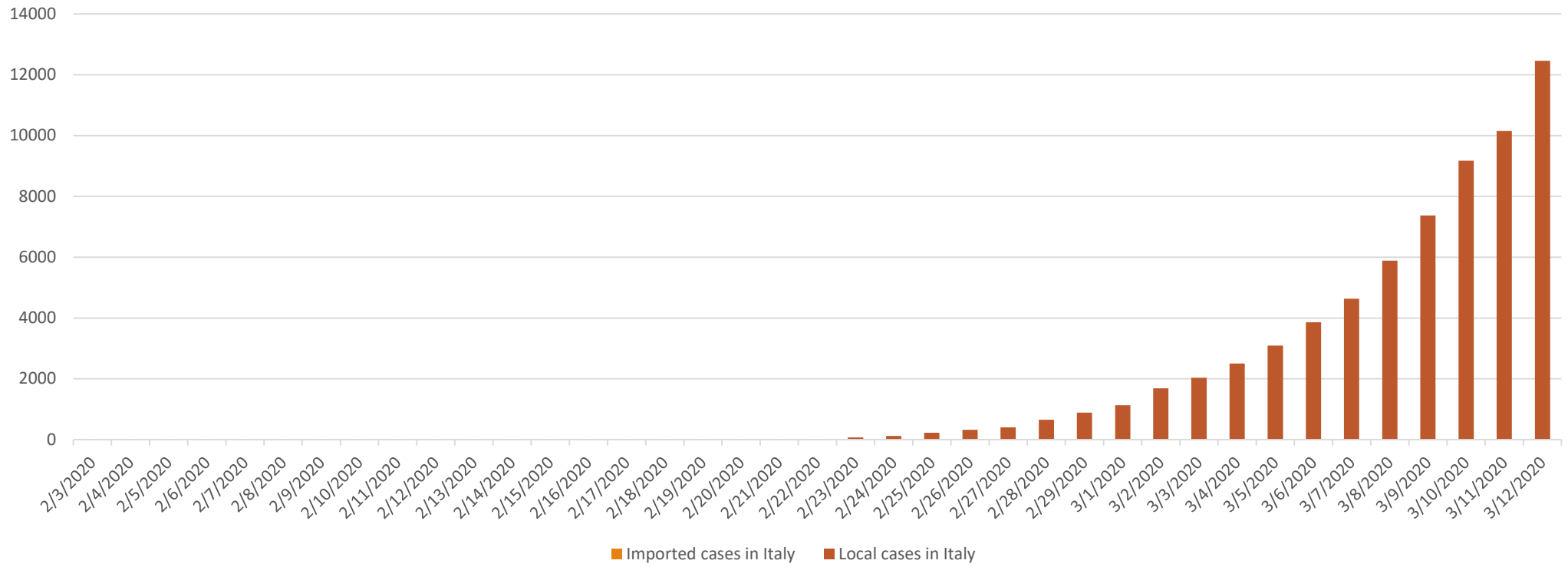
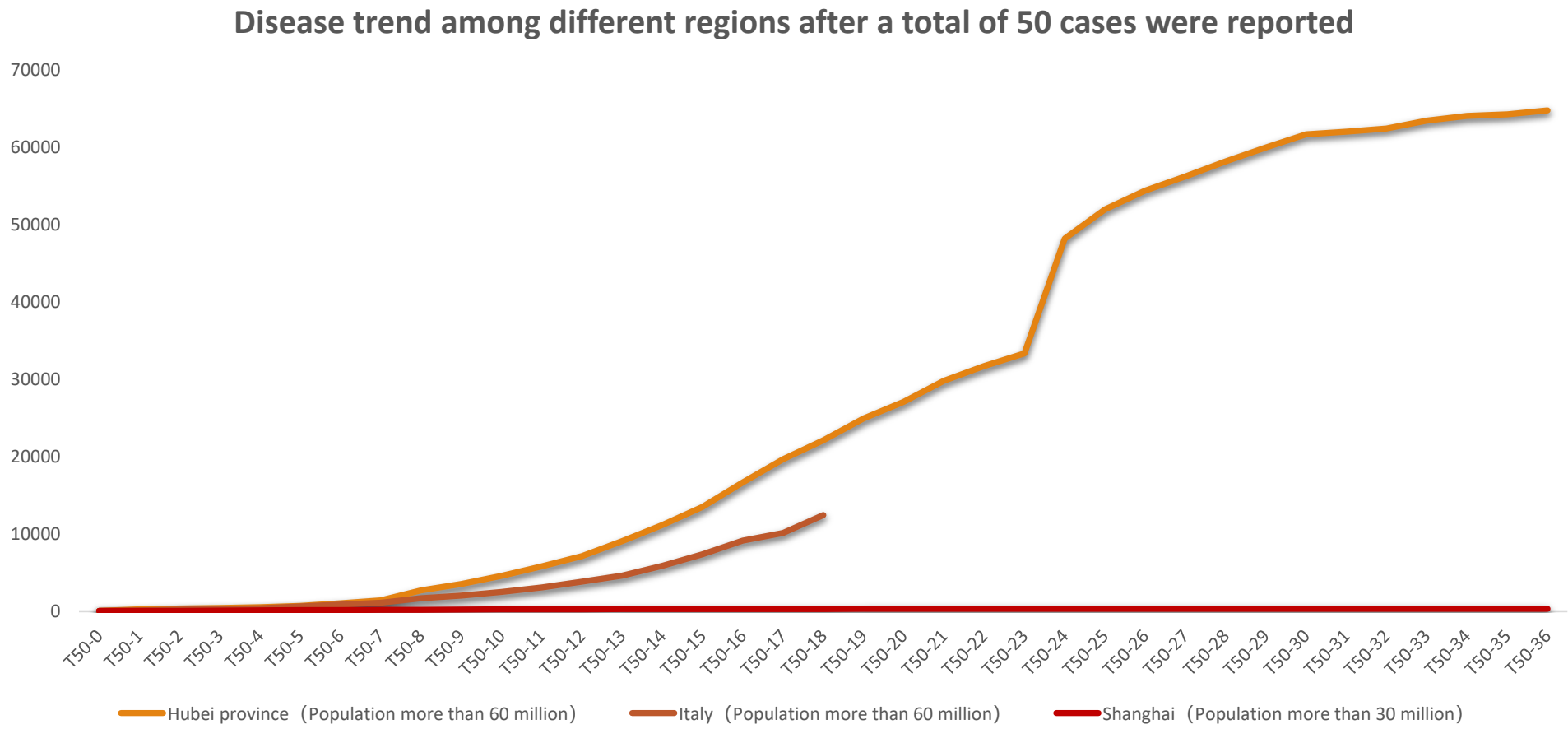
# Early control of the local transmission is the key to stop the diseases spreading

**Italy's data showed epidemics mainly due to local transmission**



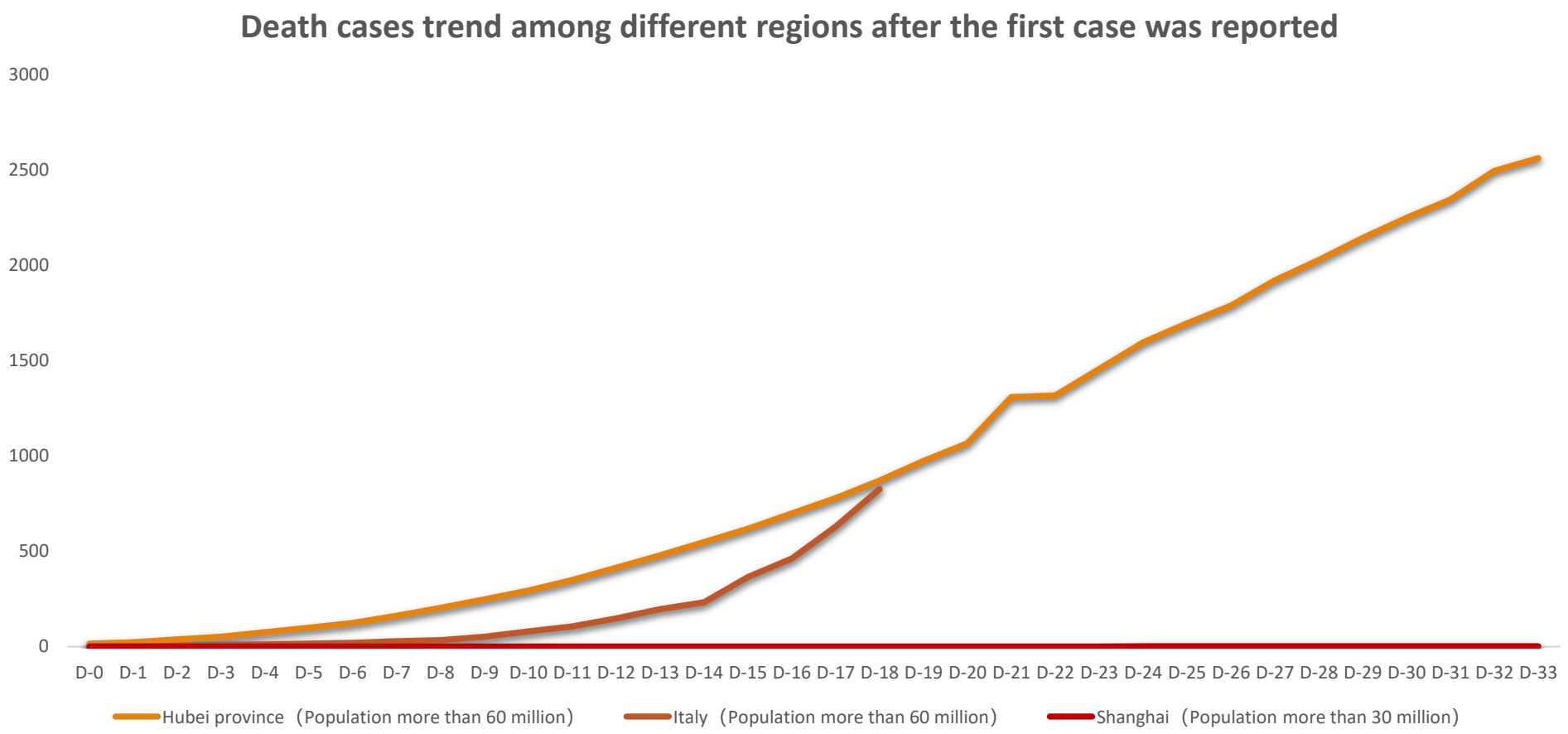

Sources: Huashan Hospital

# Failure to control local transmission could lead to spikes in total cases




Sources: Huashan Hospital

# Death cases could sharply increase if epidemics control failed and cause medical resources shortage




Sources: Huashan Hospital

# Some supporting reasons for Shanghai management

**If not controlled at the early stage, medical resources (especially ICU resources) might in the end face severe shortage,  and causing sharp rising of mortality rate ( the percentage of severe cases of COVID-19 is around 10-20%)**

**In Wuhan city without effective control in the early stage, there are 5000 critically ill patients right now. On the contrary, only 5 critically ill patients in Shanghai today.**

# However ……

**If the pandemics failed to be controlled globally, how will we cope with COVID-19?**

**Management similar to that of seasonal flu? Vaccine?**

**How to balance between epidemics control to avoid medical (ICU especially) resources shortage and social vitality?**

**In the end, each country and every state should adapt to its own suitable methods**

# Thank you!