HKUMed WHO Collaborating Centre for Infectious Disease Epidemiology and Control updates on the Universal Community Testing Programme (UCTP) and vaccine procurement

港大醫學院世衞傳染病流行病學及控制合作中心
簡布有關「普及社區檢測計劃」及疫苗採購事宜的最新概況
If a person is infected by SARS-CoV-2:
1) Viral RNAs are **detectable** by RT-PCR on **3-21 days since infection**
2) The person is **infectious** on **4-13 days since infection**
3) The person is likely to develop symptoms on **5-6 days after infection** (i.e. the **mean incubation period**)

An approximate estimation of PCR positives detected by UCTP

\[ n_{pos} = \frac{n_{daily\ confirmed} \times t_{duration\ detection} \times p_{avg\ PCR\ sensitivity}}{p_{reporting} \times N_{population}} \times n_{test} \]

\[ = \frac{10 \times 19 \times 0.65}{0.25 \times 745 \times 10^4} \times 12.8 \times 10^4 = 8.5 (3.8 - 16.4) \]

\[ n_{daily\ confirmed} \]: the number of daily confirmed cases (i.e. assuming 10 local cases daily)

\[ t_{duration\ detection} \]: the detectable duration (i.e. 19 days, assuming it’s detectable on Day 3-21)

\[ p_{avg\ PCR\ sensitivity} \]: the average RT-PCR sensitivity (i.e. 0.65 on Day 3-21)

\[ p_{reporting} \]: the case reporting rate (i.e. assuming 1 of 4 cases is reported to CHP)

\[ N_{population} \]: the total population of Hong Kong

\[ n_{test} \]: the number of tests performed
An approximate estimation of the total number of PCR positives

\[ n_{\text{total pos}} = \frac{n_{\text{daily confirmed}} \times t_{\text{duration detection}} \times p_{\text{avg PCR sensitivity}}}{p_{\text{reporting}} \times N_{\text{population}}} \times N_{\text{population}} \]

\[ = \frac{10 \times 19 \times 0.65}{0.25} = 494 \ (451 - 540) \]
An approximate estimation of the total number of infectious individuals among PCR positives

\[ n_{\text{total infectious}} | \text{pos} = \frac{n_{\text{daily confirmed}} \times t_{\text{infectious duration}} \times p_{\text{avg PCR sensitivity}}}{p_{\text{reporting}} \times N_{\text{population}}} \times N_{\text{population}} \]

\[ = \frac{10 \times 10 \times 0.7}{0.25} = 280 \ (248 - 315) \]

An approximate estimation of the total number of infectious individuals

\[ n_{\text{total infectious}} = \frac{n_{\text{daily confirmed}} \times t_{\text{infectious duration}}}{p_{\text{reporting}} \times N_{\text{population}}} \times N_{\text{population}} \]

\[ = \frac{10 \times 10}{0.25} = 400 \ (362 - 442) \]
About 35% of infectious individuals generates secondary infections.

The total number of infectious individuals: 400 (362-442)
The total number of infectious individuals who generates secondary infections: 140 (127-155)

Adam D et al, In press, 2020