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Monitoring the SARS-CoV-2 Activity when Public Health Policies are Changing: Daily Antigen Rapid Testing Surveillance (DARTS) System

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Background

With the changing community testing policies and cease of mandatory reporting, **PCR-confirmed case count no longer representatively reflects SARS-CoV-2 activity for disease surveillance**. [1,2] We explored the feasibility of using self-performed rapid antigen tests (RAT) to establish a large-scale community surveillance initiative, **Daily Antigen Rapid Testing Surveillance (DARTS) System**.

Objective

To explore the feasibility of using self-performed RATs to **inform the community surveillance** of SARS-CoV-2 activity when public health policies are changing.

Methods

A representative cohort of 10000+ participants was enrolled and being divided into 7 sub-cohorts to achieve a rolling testing schedule with 1400+ individuals on a daily basis. Participants performed the **RAT regularly irrespective of symptom or exposure history**. RAT results and photos were reported on the same day of testing through an online platform. Daily point prevalence was disseminated on a real-time dashboard to inform the situational awareness. (https://covid19.sph.hku.hk/dashboard).

Results

Since its launch in March 2022, the system has tracked the changing trajectory of different phases of the Omicron pandemic, including the **rapidly decreasing BA.2 wave** from an initial high daily prevalence of 12.7% in early March to a non-zero baseline (0.1-0.3%) over May; and **alerted the subsequent BA.5 wave** over December (1.1-5.7%) and **XBB wave** (peaked with 7.7%) in May 2023, reflecting the changing activity of infections by these Omicron variants in the community.

Conclusion

Our experience from the DARTS system suggested a participatory surveillance system using **regular RAT testing is feasible and useful for timely and stably reflecting the epidemic trajectory** and helps to give a representative picture towards endemicity. The use of RAT also helps to **avoid the bias** in epidemic trend arisen from changing policies and testing capacity, and has empowered the general public to self-perform rapid test in home settings.

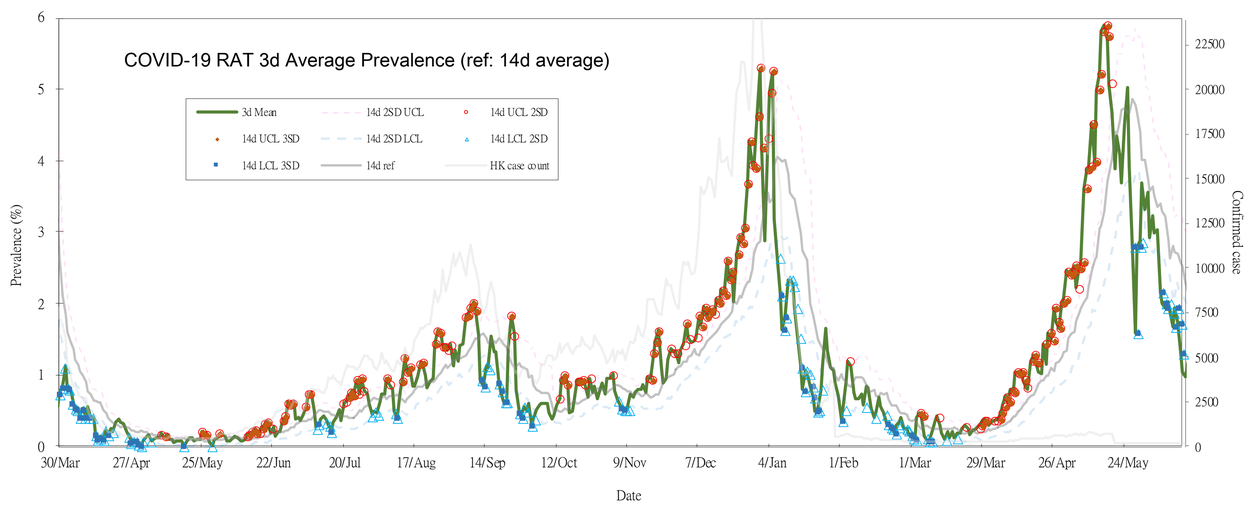

Figure 2. Signal detection using a 3-day moving average and a 14-day moving reference baseline

Month	Reproductive number
March 2022	0.66 (0.63, 0.70)
April	0.74 (0.64, 0.82)
May	0.96 (0.82, 1.09)
June	1.23 (1.13, 1.33)
July	1.06 (1.01, 1.11)
August	1.10 (1.06, 1.14)
September	0.91 (0.85, 0.97)
October	1.05 (1.00, 1.09)
November	1.08 (1.04, 1.12)
December	1.13 (1.10, 1.16)

Month	Reproductive number
January 2023	0.77 (0.70, 0.84)
February	0.81 (0.71, 0.90)
March	1.04 (0.95, 1.12)
April	1.19 (1.15, 1.23)
May	1.05 (1.01, 1.08)
June	0.87 (0.82, 0.92)
July	0.95 (0.87, 1.02)
August	1.09 (0.89, 1.27)

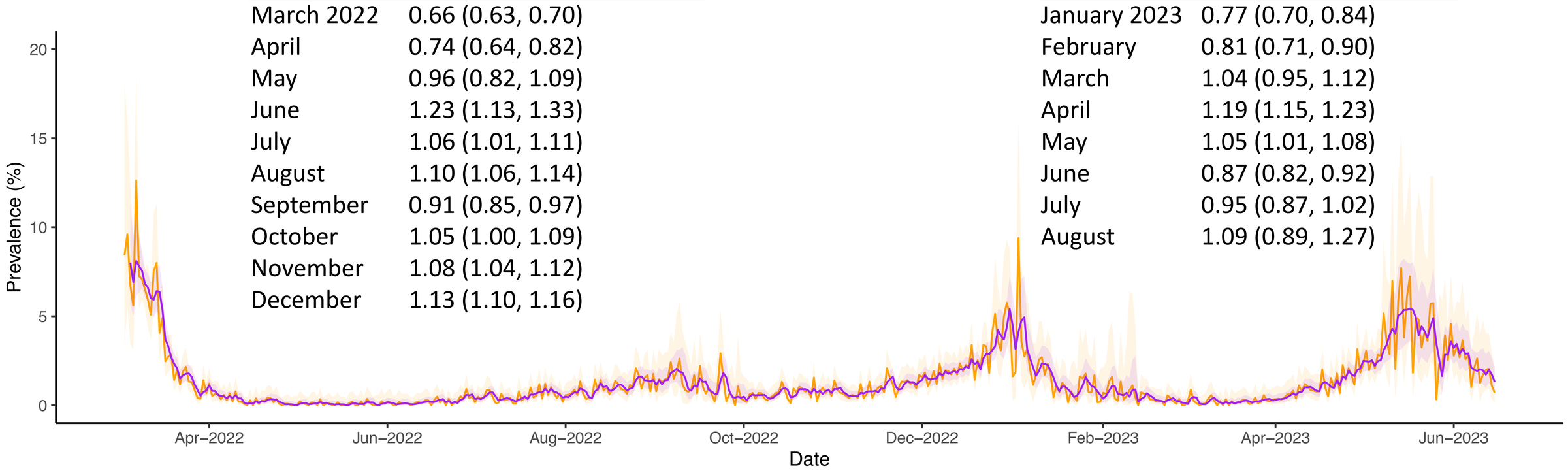

Figure 1. Daily point prevalence (orange) and its 3-day rolling average (purple)

References

[1] Tancredi S, Anker D, Rosella L, Chiolero A. Elimination of covid-19: beware of surveillance bias BMJ 2021; 374 :n2126 doi:10.1136/bmj.n2126

[2] Greene DN, Jackson ML, Hillyard DR, Delgado JC, Schmidt RL. Decreasing median age of COVID-19 cases in the United States-Changing epidemiology or changing surveillance? PLoS One. 2020 Oct 15;15(10):e0240783. doi: 10.1371/journal.pone.0240783.

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