Performance of the Twist Biosciences versus the Biofire Respiratory Panel

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Introduction

Respiratory tract infections (RTI) are a common cause of infection in children with a range of manifestations that can vary from mild to severe symptoms. In the OUH NHS FT Microbiology Department, the BioFire FilmArray respiratory 2.1 (RP2.1) panel which requires nasopharyngeal swabs (NPA) is the current gold standard for RTI detection. The RP2.1 panel is a cartridge-based nested PCR assay detecting 19 respiratory viruses but does not provide genomic information. Twist Biosciences have developed a respiratory virus panel (RVR) detecting 29 human respiratory viruses using >40K probes to enrich viral sequences prior to sequencing.

Aims

Comparison of the results of NPA and saliva samples tested both on the Biofire RP2.1 and Twist RVR panels, utilising both simulated and real clinical samples from paediatric patients who were admitted to the OUH NHS FT between January 2021-July 2022 with respiratory symptoms.

Methods

Thirty paired NPA and saliva children's samples were tested on the RP2.1 panel. Eleven of these paired patient samples were then tested on the RVR panel. To evaluate the RVR panel, three synthetic controls containing InfluenzaH3N2, Human Rhinovirus89 and SARS-CoV-2,Gene expression universal human RNA and negative NPA from patients' samples wer also tested.
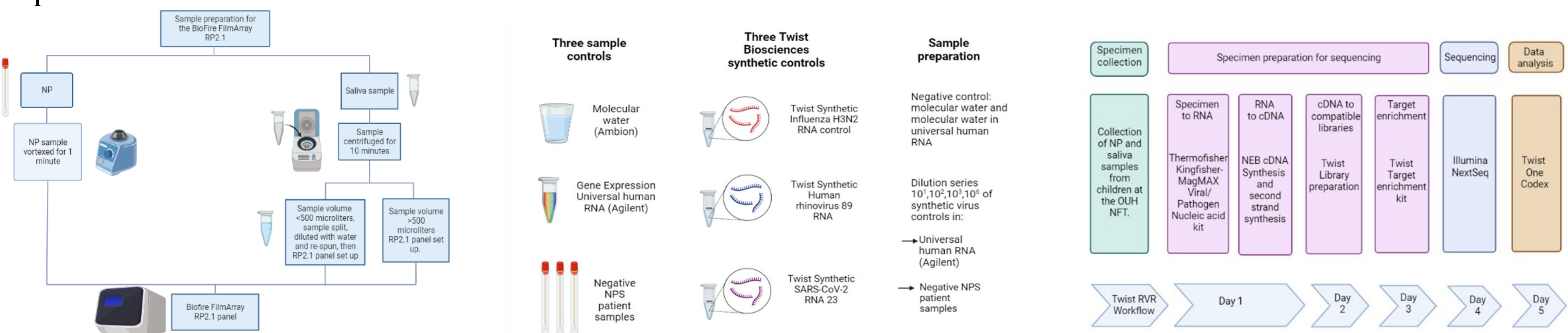

Figure 1, RP2.1 and RVR panel sample workflow

Results

The results from the RP2.1. panel showed a 76% concordance of results between NPA and saliva samples.
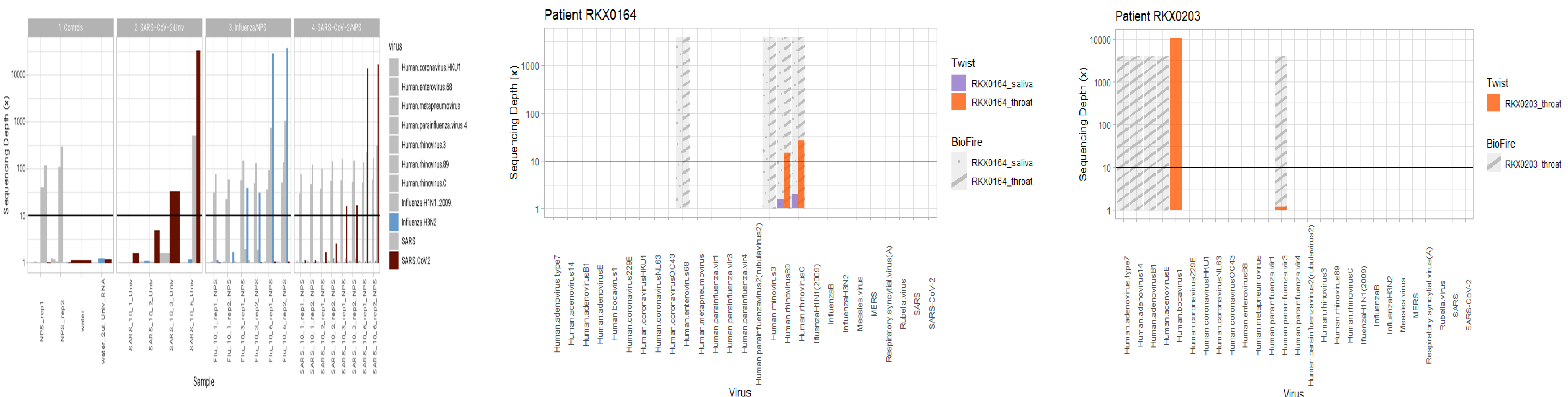

Figure 2, Results of the sequencing depth for the simulated and clinical patient samples.

For simulated experiments, genome coverage >90% was achieved at inputs >10^3 virus copies/mL for all viruses, and thresholds for detection were met at inputs >10^6 virus copies/mL. Issues with specificity were observed, with clear cross-reactivity between similar viruses.For 21 clinical samples (*n=11* patients), results generated using the RVR panel were strictly concordant with those generated by BioFire RP2.1 in 8/21 (38%) cases.

Discussion and Conclusion

The findings from this evaluation lend support to the use of saliva as an alternative sample on both the RP2.1 and the RVR panel. The use of the RVR panel on patient samples highlighted its major advantage over the RP2.1 panel in its capacity to distinguish between Rhinovirus and Enterovirus infections, as well as the detection of Human Bocavirus in a patient sample which is not currently detected by the RP2.1 panel.

References

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