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Weekly epidemiological monitoring of respiratory viruses is useful to select targeted viruses for routine molecular diagnosis for better resource management: a one-year study

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Background: Respiratory viral infections remains a prominent cause of death in the world. Seasonal variations and epidemics need to be identified and monitored to adapt continuously the panel of pathogens to be tested in clinical microbiology laboratories. Commercial multiplex panels are increasingly available but they are seldom used for routine because of economic limitations.

Material/methods: We compared results of (i) a weekly epidemiological overview covering 21 respiratory viruses, with (ii) those derived from a routine screening using monoplex real-time RT-PCR targeting 7 viruses. From 09/2015 to 09/2016, a total of 15,609 respiratory samples were collected from hospital-admitted adults and children, and analyzed with a 7-target monoplex real-time PCR (Influenza A and B, RSV, hMPV, Rhinovirus [RV], EV, IC). In parallel, each week 30 samples were randomly selected from the same ARI-patients (<5 years [n=15]; >5 years [n=15]) and pooled before extraction and testing using FTD Respiratory pathogens 21 kit (Fast-track Diagnostics) testing the same viruses and 4 CoV, 4 PIV, Bocavirus (BoV), EV, PEV, ADV, *M. pneumoniae*).

Results:

- **routine protocol:** In 4,378 of 15,609 patients (28%) a positive PCR was observed, 52,1% of which were in children. A single virus was found in 4,160 samples (95%),

whereas co-infections were mainly RV-VRS (n=47), RV-EV (n=43) and RV-MPV (n=22); RV accounted for 163/218 (74,8%) coinfections.

RV and EV were detected all along the year; RV are detected at lower rate (<20 per week) during W16-36. FluA was detected from W41-26. Flu B was detected W1-20. RSV was detected from W44-14 whereas hMPV was detected W37-18 (peak W48-12). Overall, the positivity rate for any respiratory virus tested in routine was 28%; among <5 year-old group, the detection rate for at least one pathogen was significantly higher (41% vs 20,8%).

- **Epidemiological monitoring**

The overall detection rate in pools was 92,7% (89/96); as expected, the positivity rate was higher in pediatric samples than in adult ones (100% vs 85,4%).

	Nb of positive pools >5 years	positive weeks	Nb of positive pools <5years	positive weeks
PIV1	3	37/39-40	7	37-46
PIV3	9	14-45	17	18-44
BoV	1	12	9	49-3/5/12/18/22
CoV	14	31-50/1-12	13	36-50/1-24
ADV	2	9-10	27	yearly
PEV	0	-	4	37/45-46/50
PIV2	0	-	3	36/40-41
PIV4	2	39-40	4	27-29/32

PIV3 and CoV accounted for high prevalence regardless the age, whereas ADV is important in young children; the latter was observed yearly while PIV3 and CoV were not detected during W46-W13 and W16-W30.

Conclusions:

The absence of positive samples for FluA, FluB, RSV and hMPV during a long period varying from 13-28 weeks depending on the virus show that routine testing should be adapted for a better management of resources to include PIV3, CoV, and ADV.