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Surveillance of acute respiratory infections in hospitalized patients: evaluation of an automated multiplex PCR assay

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Background: Acute respiratory infections (ARI) are a relevant cause of morbidity and mortality worldwide. Etiological agents include viruses, bacteria and fungi, with high incidences of co-infections. Multiplex assays allow for the simultaneous detection of a wide panel of respiratory pathogens and identification of main circulating subtypes. In this study, performance of a multiplex assay for rapid diagnosis of ARI and analysis of epidemiological data, has been evaluated in hospitalized adult and pediatric patients

Material/methods: Between January 2014 and August 2016, 918 cases of suspected ARI (400 in pediatric subjects and 518 in adults) have been investigated by using the Film Array Respiratory Panel (Biomerieux) on different respiratory specimens (bronchoalveolar lavage, nasal and nasopharyngeal swab). This assay detects 18 targets, including viruses, *Bordetella pertussis*, *Mycoplasma pneumoniae* and *Chlamydophila pneumoniae*.

Results: Among the pediatric patients, 130 (32.5%) resulted negative, 210 (52.5%) positive to a single target, 52 (13%) to 2 and eight (2%) to 3; the detected agents included Enterovirus/Rinovirus (RV/EV) 24.7% (99/400), Respiratory Syncytial virus (RSV) 18.2% (73/400), Influenza virus B (Flu B) 9.5% (38/400), Coronavirus (CoV) 9.2% (37/400), Adenovirus (AdV) 6.5% (26/400), Influenza virus A (Flu A) 4.5% (18/400), Metapneumovirus (MPV) 4.5% (18/400), Parainfluenza viruses (PIV) 4.5% (18/400), *Bordetella pertussis* 2.5% (10/400), and*Mycoplasma pneumoniae* 0.2% (1/400). Among the adult patients, 302 (58.3%) resulted negative, 188 (36.3%) positive to a single target, 23 (4.4%) to 2, three (0.6%) to 3, two (0.4%) to 4; the detected agents included FluA 13.1% (68/518), RV/EV 9.3% (48/518), RSV 9.1% (47/518), CoV 5.4% (28/518), PIV 4.4% (23/518), FluB 3.5% (18/518), MPV 2.3% (12/518), AdV 1% (5/518), and *M. pneumoniae* 0.4% (2/518). Overall, 73 specimens were positive to FluA in 2014/2015, including Flu A/H1N1pdm 2009 54.8% (40/73), FluA/H3N2 32.9% (24/73), FluB 9.6% (7/73), not-typed FluA 2.7% (2/73); 69 in 2015/2016, including FluB 71% (49/69), Flu A/H1N1pdm 2009 21,7% (15/69), not-typed FluA 7.2% (5/69).Influenza viruses, RSV, PIV and CoV were mainly detected in the first months of the year, whereas RV/EV, MPV, and AdV throughout the whole year. Positivity rates and coinfections were higher in pediatric versus adult patients (67.5% vs 41.7% and 22.2% vs 13%, respectively).

Conclusions: Film Array Respiratory Panel is a valid method for investigating molecular epidemiology of viruses and atypical respiratory pathogens. Clinical evaluation may be useful to understand the relative role of different pathogens in co-infections.