Comparison of turnaround time and time to oseltamivir discontinuation between two respiratory viral panel testing methodologies

Respiratory infections contribute to many Emergency Department visits and hospitalizations, resulting in a high healthcare burden (Neuzil et al., 2003; Schull et al., 2005). Rapid detection of respiratory pathogens in patients presenting with symptoms of an upper respiratory tract infection is crucial for timely determination of optimal antimicrobial management, avoidance of unnecessary evaluations and implementation of transmission-reducing infection control practices. Rapid viral testing can also result in cost savings to the healthcare system through reduction in Emergency Department boarding time and decreased duration of empiric antiviral therapy (Schull et al., 2005). With increased emphasis on antimicrobial stewardship in hospitals to facilitate improved clinical and economic outcomes with antimicrobial therapy, the implementation of rapid diagnostics for laboratory identification of pathogens is of great interest (Bauer et al., 2014).

Multiplex PCR is a highly sensitive molecular method for accurate detection of respiratory pathogens and provides a more rapid turnaround time (TAT) compared with other respiratory viral testing methodologies. Our microbiology laboratory switched from the Luminex xTAG respiratory viral panel (RVP) (http://www.luminexcorp.com), which detects 12 respiratory viruses with an assay time of 8.5 h, performed two to three times per week to the Biofire Diagnostics FilmArray respiratory panel (RP) (http://filmarray.com), which detects 17 respiratory viral and three bacterial targets with an assay time of 1.2 h, performed 24 h a day/7 days per week. We compared the TAT between the two RVPs performed at different frequencies and determined the time to discontinuation of empiric oseltamivir among patients testing negative for influenza. All adult patients with an RVP test result reported between 1 December 2011 and 28 February 2012 performed on Luminex xTAG RVP (two to three times per week) and 1 December 2012 and 28 February 2013 performed on FilmArray RP (24 h a day/7 days per week) were evaluated for mean TAT.

The mean TAT for the Luminex xTAG RVP (two to three times per week) between 1 December 2011 and 28 February 2012 (n=230 assays) was 46.4 h compared with a mean TAT of 3.1 h (P<0.001) for FilmArray RP (24 h a day/7 days per week) between 1 December 2012 and 28 February 2013 (n=872 assays) (Fig. 1). The mean time to discontinuation of empiric oseltamivir amongst patients with an RVP negative for influenza was 4 and 2 days for the Luminex xTAG RVP (n=42) and FilmArray RP (n=75) groups, respectively (P<0.001). The reduction in mean time to discontinuation of empiric oseltamivir resulted in cost savings of ~US$34.16 per patient (using a wholesale acquisition cost for oseltamivir of US$8.54 per dose), which during the 2012–2013 peak influenza season would be an overall cost saving of US$2527.84. The amount of oseltamivir utilized after we began using the FilmArray RP (24 h a day/7 days per week) would cost US$9564.80 (if all 112 influenza-positive patients received the standard 75 mg every 12 h dose for a duration of 5 days), in addition to US$2527.84 for those that would have received empiric therapy for a duration of 2 days prior to discontinuation following a negative influenza result, totalling US$12009.64 in expenditure on oseltamivir during this time period. The cost savings in switching methodologies and increasing the frequency of assay performance were not evaluated; however, with 642 more assays run with the FilmArray RP in the subsequent influenza season and keeping in mind the additional cost associated with running the Luminex xTAG RVP (increased laboratory technician handling time and extra cost of the materials needed to perform the assay), the anticipated cost savings would be in favour of the FilmArray RP.

Consistent with previous literature, we found the use of the FilmArray RP to be associated with a significantly shorter mean TAT compared with the Luminex xTAG-RVP (3.1 versus 46.4 h) (Babady et al., 2012; Popowitch et al., 2013; Rand et al., 2005). With increased emphasis on antimicrobial stewardship in hospitals to facilitate improved clinical and economic outcomes with antimicrobial therapy, the implementation of rapid diagnostics for laboratory identification of pathogens is of great interest (Bauer et al., 2014).
et al., 2011; Xu et al., 2013). We also found that the duration of empiric oseltamivir amongst patients found to be influenza-negative was also significantly reduced with the improved TAT of the FilmArray RP and increased frequency of specimen processing. The results of this analysis showcase the benefits of rapid diagnostic testing with a shortened TAT on the optimization of antimicrobial therapy and utilization of healthcare resources by facilitating timely de-escalation of empiric antiviral therapy.

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