Short Report

Journal of Infection Prevention

Journal of Infection Prevention
2019, Vol. 20(6) 297–300

DOI: 10.1177/1757177419853342
jip.sagepub.com
SAGE

Introduction of Cobas Liat Influenza A/B for rapid point-of-care diagnosis of influenza infection in an acute trust

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Abstract

Background: We aimed to evaluate the impact of a new molecular point-of-care test (POCT), the Cobas Liat Influenza A/B for rapid diagnosis of influenza within 20 min, on the operational workflow of the Trust, accurate diagnosis and potential cost savings during the winter of 2017–2018.

Methods: A retrospective cohort study was conducted on all patients aged > 18 years tested for flu A/B by laboratory PCR in January 2017 and by POCT in January 2018.

Results: From 21 December 2017 to 30 April 2018, a total of 1375 POCTs were performed with a total of 479 (35%) influenza-positive cases. Results demonstrated that 1046 (76%) suspected cases did not require isolation or were able to be discharged from Emergency Department (ED), once other risks had been ruled out. We particularly looked into the differences between the month of January 2017 (before POCT) and the month of January 2018.

Discussion: Results demonstrate that influenza POCT had a positive impact on the Trust regarding prompt patient diagnosis and treatment, discharge decisions, improvement of patient bed management by avoiding unnecessary patient isolation and reducing bay closures, and significant reduction in length of stay in both positive and negative cases. Estimated cost savings were significant.

Keywords

Influenza, point of care, rapid, test

Date received: 15 November 2018; accepted: 14 April 2019

Background

During the winter of 2017–2018, the Trust experienced considerably high pressures in bed management due to influenza A and B. In 2016–2017, there were 97 influenza cases within the Trust and this number increased to 417 cases in 2017–2018.

Influenza is highly transmissible and outbreaks of influenza can lead to increased morbidity and mortality (World Health Organization, 2018). Rapid diagnosis, prompt medication and infection control procedures are absolutely essential (Jefferson et al., 2014; Public Health England, 2016). Anti-viral treatment is most effective if started promptly (Centers for Disease Control, 2017; Chaves et al., 2015).

The Trust is an acute 500-bed hospital on the outskirts of London with a high elderly care catchment. Respiratory results from the off-site laboratory multiplex polymerase chain reaction (PCR) typically take 1–2 days. A similar delay in diagnosis has been shown in a recent study in the UK, with an estimated median turnaround time of 1.2 days (Davis et al., 2017).

Inpatients being investigated for influenza need to remain under respiratory isolation while waiting for test results from the laboratory. Previously, this has resulted in a large number of suspected influenza patients, who later proved to be negative, requiring unnecessary isolation. The need for a rapid, accurate point-of-care test (POCT) was recognised.

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Table 1. Positive influenza A/B adult cases in January 2017 and 2018.

Year	n	Admitted cases (n (%))	Discharged from ED (n (%))	Single room isolation (n (%))	Bay isolation (n (%))	Oseltamivir (%)	Median LOS (days)
2017	35	32 (91.4)	3 (8.6)	16 (50)	16 (50)	62.5	13.1
2018	145	87 (60)	58 (40)	70 (80.5)	17 (19.5)	87.3	9.7

ED, Emergency Department; LOS, length of stay.

Table 2. Negative influenza A/B adult cases in January in 2017 and 2018.

Year	n	Admitted cases (n (%))	Discharged from ED (n (%))	Single room isolation* (n (%))	Closed bays* (n)	Median LOS (days)
2017	86	82 (95.3)	4 (4.7)	22 (26.8)	35	16.0
2018	231	189 (81.8)	42 (18.2)	0	0	10.2

*While waiting for laboratory result.
ED, Emergency Department; LOS, length of stay.

Aim

To determine the impact of the Cobas Liat Influenza A/B POCT on the accurate and timely diagnosis of influenza, operational workflow of the Trust and potential cost savings during the winter of 2017–2018.

Methods

The laboratory diagnosis for influenza was provided by a multiplex PCR using Roche Flow Solution, FTD Resp 21; apart from influenza A and B, the panel also includes parainfluenza, rhinovirus, coronavirus, respiratory syncytial virus (RSV), metapneumovirus, adenovirus, bocavirus, enterovirus, parechovirus and *Mycoplasma pneumoniae*.

The POCT for influenza was delivered by two Roche Cobas Liat influenza/RSV analysers placed in the Emergency Department (ED) and the Acute Assessment Unit (AAU). This assay is a compact fully automated multiplex real-time reverse transcription (RT)-PCR which detects influenza virus A/B and RSV from nasopharyngeal swabs in 20 min. Testing was done on throat swabs as per hospital practice and was performed by trained nurses for patients fulfilling testing criteria. These consisted of flu-like symptoms or temperature of ⩾ 38° before or on presentation to ED and acute onset of at least one of the following respiratory symptoms: cough with or without sputum; hoarseness; nasal discharge or congestion; shortness of breath; sore throat; wheezing; or sneezing (Public Health England, 2016).

The laboratory verification on off-label throat swabs had showed 100% sensitivity for influenza A/B comparing it to the multiplex PCR. This was done by laboratory staff before the testing initiation at the point of care. Calibrations of the units, quality controls and training were the responsibility of the POCT coordinator.

A retrospective cohort study was conducted on all patients aged > 18 years tested for flu A/B by laboratory PCR in January 2017 and by POCT in January 2018.

Trust electronic patient records (EPR) allowed access to individual patient records for oseltamivir prescribing, bed allocation, length of stay (LOS) and other reasons for isolation.

Bay isolation of six beds refers to positive influenza cases and their contacts being cohorted in a bay or cohorting known influenza positive patients together in a bay following positive POCT results. Single room isolation refers to patients being nursed in a single occupancy room. LOS refers to the total number of continuous days each patient remained in the hospital for this admission.

Results

During the first two weeks, a number of samples (134 in total) were sent and tested in the laboratory after having a POCT. Of those, 36 positive POCTs were confirmed by laboratory PCR (sensitivity = 97%); four negative/invalid were positive by the laboratory PCR (negative predictive value [NPV] = 96%) and two positive POCTs were tested negative, probably due to low remaining viral load on the swab (positive predictive value [PPV] = 95%).

Overall, from December 2017 to May 2018, the Trust performed 1375 influenza POCTs. Of these, 479 were influenza positive (35%), with 213 influenza A and 266 influenza B. Early diagnosis helped the discharge from ED of 150 (31%) positive cases with no other health concerns, in contrast to the previous year where delayed influenza results often kept patients in for longer. All negative POCT admitted cases did not require respiratory isolation.

This season, 91% of influenza cases were diagnosed on admission to the Trust. Only 43 cases (9%) were hospital-acquired in comparison to 30% the previous year.

Tables 1 and 2 demonstrate a snapshot comparison of suspected influenza cases which were confirmed or not by laboratory PCR or POCT in January 2017 and January 2018, respectively.

Discussion

This study demonstrates that the use of POCT during the peak of the influenza season, although admissions rates were higher than rates seen in the previous six seasons (Public Health England, 2018), led to improvements in bed management and operational workflow and significant reductions in LOS.

The large increase in testing for influenza in 2018 versus 2017 reflects the high incidence experienced nationally (Public Health England, 2018) but also the availability of POCT as well, which appeared to have changed practice. The POCT significantly influenced decision-making in 2018 as in previous years confirmation of influenza diagnosis was never available while in ED. The decision was made only on clinical and other laboratory testing criteria. In January 2018, 27% of patients who had POCTs in ED were discharged.

Influenza POCTs contributed to faster ED discharges of positive and negative cases once other risks had been ruled out and especially in younger adults. Fast diagnosis with POCT prevented unnecessary isolation of suspected cases while waiting for results. Patients being tested in the ED remained in their cubicle while the test was carried out. Patients suspected of having influenza in bays on the wards stayed in the bay until the POCT result was ready. If the result was positive, the patient and contacts would be managed appropriately. During January 2017, the number of bays closed for suspected influenza cases while awaiting laboratory results, which were subsequently negative, resulted in blocked beds for 1–2 days as other patients in the bay were discharged but new patients could not be admitted into the bay. In contrast, there were no closed bays for suspected influenza cases during January 2018, which had a positive impact on bed flow. POCT enabled more side rooms to be used for positive influenza cases as the rooms were not being used by suspected cases. Avoiding unnecessary isolation for 1–2 days of the admitted negative POCT cases this month meant savings of £16,632–£33,264 considering use of personal protective equipment and staff time (cost of full isolation £88, Health Protection Scotland, 2011).

Our data show a reduction in LOS for positive POCT patients of 3.4 days and for negative POCT patients of 5.8 days. This is due to discharges and antiviral treatment being delayed in 2017 due to diagnostic delays or uncertainty. In one month alone, this reduction equates to a potential cost savings of £88,740 and £328,860 respectively, considering that the average cost of a medical patient's day is estimated at £300 by the Trust. Even if the cost of POCT in January 2018, which was £10,904, is deducted, these potential cost reductions are still significant.

Oseltamivir use for positive influenza cases was high in 2018 and this was due to earlier diagnosis with POCT enabling a prompt start of antiviral treatment, compared to the previous year where late diagnosis often rendered treatment with oseltamivir futile. It is believed that POCT also enabled rational antimicrobial treatment when indicated.

Laboratory respiratory multiplex PCR was still used for the ITU, paediatric and maternity cases and, in particular, severely ill or immunocompromised inpatients to look for other viruses. POCT did not impact management of RSV infection as it is not Trust policy to isolate these patients in the adult wards. There were no additional laboratory PCRs performed in those with a known POCT result except for the initial verification period. The respiratory laboratory PCR activity was kept on the same level in 2018 (n = 848) as the year before (n = 805) despite the high number of POCTs performed; this is explained by the much higher flu prevalence (four times higher than the previous year).

It was noted that since the introduction of POCT the Infection Prevention and Control Team have experienced less calls regarding postponing the transfer of suspected flu patients for inhouse investigations such as scans or X-rays; therefore, it is concluded that POCTs also potentially reduced delays in other medical diagnosis.

The Trust considers that patient experience may have improved due to faster diagnosis, prompt discharge where appropriate, the prevention of unnecessary isolation and lessened interruption to patient investigations. Incidence of transmissions during the hospital stay was remarkably low showing that flu POCT facilitated good Infection Control practice.

Early initiation, including preparation, communication and collaboration between clinical and laboratory staff, was essential for running this new service.

Automatic upload onto the laboratory system and the Trust EPR proved to be a big challenge; therefore, multiple documentation was needed in EPR, paper forms, emails and log books. Work is still ongoing for the IT interface.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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References

Centers for Disease Control and Prevention. (2017) *Prompt use of antivirals is key this influenza season*. Atlanta, GA: CDC. Available at: https://www.cdc.gov/features/influenza-antivirals/index.html (accessed 9 November 2018).

Chaves SS, Pérez A, Miller L, Bennett NM, Bandyopadhyay A, Farley MM, Fowler B, Hancock EB, Kirley PD, Lynfield R, Ryan P, Morin C, Schaffner W, Sharangpani R, Lindegren ML, Tengelsen L, Thomas A, Hill MB, Bradley KK, Oni O, Meek J, Zansky S, Widdowson MA and Finelli L. (2015) Impact of prompt influenza antiviral treatment on extended care needs after influenza hospitalization among community-dwelling older adults. *Clinical Infectious Diseases* 61(12): 1807–1814.

Davis S, Allen AJ, O'Leary R, Power M, Price DA, Simpson AJ, Tunbridge A, Vale L, Whiteside M, Evans C and Raza M. (2017) Diagnostic accuracy and cost analysis of the Alere™ i Influenza A&B near-patient test using throat swabs. *Journal of Hospital Infection* 97(3): 301–309.

Health Protection Scotland. (2011) NHS Scotland MRSA Screening Pathfinder Programme Final Report Volume 2: An assessment of the economics, implementation and modelling of universal MRSA screening. Available at: https://www.hps.scot.nhs.uk/resourcedocument.aspx?id=2493 (accessed 9 November 2018).

Jefferson T, Jones M, Doshi P and Spencer EA. (2014) Oseltamivir for influenza in adults and children: systematic review of clinical study reports and summary of regulatory comments. *British Medical Journal* 348: g2545.

Public Health England. (2016) *Infection control precautions to minimise transmission of acute respiratory tract infections in healthcare settings*. V2. London: Public Health England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/585584/RTI_infection_control_guidance.pdf (accessed 1 November 2018).

Public Health England. (2018) *Surveillance of influenza and other respiratory viruses in the UK: Winter 2017 to 2018*. London: Public Health England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/710483/Surveillance_of_influenza_and_other_respiratory_viruses_in_the_UK_2017_to_2018.pdf (accessed 24 October 2018).

World Health Organization. (2018) *Influenza (Seasonal)*. Geneva: WHO. Available at: https://www.gov.uk/government/collections/seasonal-influenza-guidance-data-and-analysis (accessed 24 October 2018).