Introduction of Rapid Molecular Testing of Respiratory Viruses at Acute Medical Admission during the winter season 2017-18

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Introduction

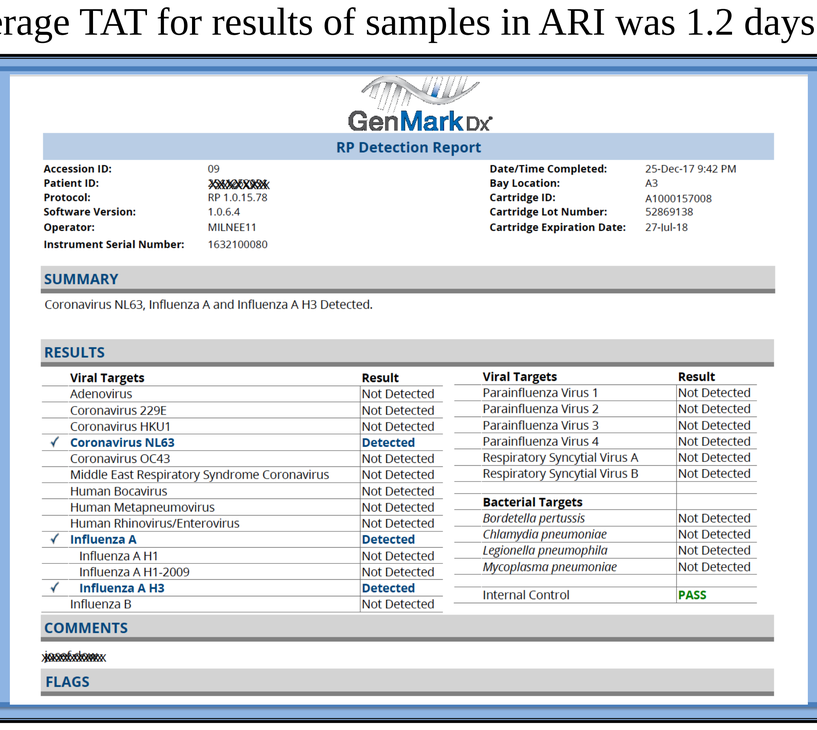
Respiratory Tract Infections cause significant clinical and economic burden to Aberdeen Royal Infirmary (ARI) patients and Trust.
Diagnosis based on clinical symptoms alone is extremely difficult and often inaccurate.
Conventional algorithm delays diagnosis and treatment and increases hospital costs.
Rapid diagnosis of respiratory viruses is critical for clinical management and infection control measures in healthcare settings. In addition, receiving early treatment is associated with better outcome.
From previous experience through the winter seasons, delay in diagnosis of respiratory tract infection has risk of transmission of infection to other patients and staff, chances of outbreaks and ward closure which is detrimental during the high pressure winter season.
Acute medical investigation and assessment unit (AMIA) is the main point of entry of patients with respiratory tract infection in ARI. Patient flow is subject to increase to a highest peak during winter putting a high pressure on the labs, wards and the hospital bed management.
There is a pressing demand to get a rapid diagnosis of respiratory tract infections.

Method

We conducted a pilot study for introducing a POC molecular testing pathway in AMIA. This type of virology molecular POCT has not been evaluated in the clinical wards in ARI before.
A rapid molecular POC system was introduced at AMIA on the 21st of December 2017.
The system used (GenMark e-Plex RP) is a rapid molecular PCR for detection of 24 targets of respiratory viruses and atypical bacterial respiratory pathogens providing result within 90 minutes (Figures 1, 2)
The e-Plex system allowed for on-demand, random-access flexibility, to help decisions on bed management, early discharge, promote patient flow infection control management.
Respiratory samples were double tested (ARI virology lab and AMIA POCT) during the study period

Results

A total of 673 samples were tested by POCT at AMIA during the period of 21st Dec 2017- end of April 2018.
Positive Flu A were 164 samples (24%), Flu B 75 samples (11%) and 312 samples were negative (46%).
During the same period 941 samples were sent to ARI virology lab for respiratory testing. Of which 185 samples were positive for Flu A (20%), 101 samples were positive for Flu B (11%) and 585 sample were negative (62%).
The average TAT for results of samples in ARI was 1.2 days



GenMark Dx

RP Detection Report

Accession ID:	09	**Date/Time Completed:**	25-Dec-17 9:42 PM
Patient ID:	XXXXXXXX	**Bay Location:**	A3
Protocol:	RP 1.0.15.78	**Cartridge ID:**	A1000157008
Software Version:	1.0.6.4	**Cartridge Lot Number:**	52869138
Operator:	MILNEE11	**Cartridge Expiration Date:**	27-Jul-18
Instrument Serial Number:	1632100080		

SUMMARY

Coronavirus NL63, Influenza A and Influenza A H3 Detected.

RESULTS

	Viral Targets	Result
	Adenovirus	Not Detected
	Coronavirus 229E	Not Detected
	Coronavirus HKU1	Not Detected
✓	**Coronavirus NL63**	**Detected**
	Coronavirus OC43	Not Detected
	Middle East Respiratory Syndrome Coronavirus	Not Detected
	Human Bocavirus	Not Detected
	Human Metapneumovirus	Not Detected
	Human Rhinovirus/Enterovirus	Not Detected
✓	**Influenza A**	**Detected**
	Influenza A H1	Not Detected
	Influenza A H1-2009	Not Detected
✓	**Influenza A H3**	**Detected**
	Influenza B	Not Detected

Viral Targets	Result
Parainfluenza Virus 1	Not Detected
Parainfluenza Virus 2	Not Detected
Parainfluenza Virus 3	Not Detected
Parainfluenza Virus 4	Not Detected
Respiratory Syncytial Virus A	Not Detected
Respiratory Syncytial Virus B	Not Detected
Bacterial Targets	
Bordetella pertussis	Not Detected
Chlamydia pneumoniae	Not Detected
Legionella pneumophila	Not Detected
Mycoplasma pneumoniae	Not Detected
Internal Control	PASS

COMMENTS

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FLAGS

Figure 1: Report of e-Plex POC system showing the 24 targets tested, internal control pass and positive results.

Results

Figure 2: Setting of the POC system in AMIA including the e-Plex system with a printer next to it, the vortex racks and instruction card.

There was an excellent correlation between the ePlex RP and the Standard-of-Care method
166 samples had matching results for ePlex RP and the Standard-of-Care method
ePlex results were reported **30.5 hours earlier** than the Standard-of Care method
Time-to-result varied based on when the sample was received

Subgroup analysis of 45 consecutive cases of positive Flu A had shown the following:
Patient group included 29 female (64%) and 16 males (36%)
Age range was between 22 and 91 years old, with an average of 65 years
Duration of symptoms ranged between 6 hours and 4 weeks, and 11 patients had symptoms for more than 5 days.
POC results were available for 38 patients.
Oseltamivir was prescribed for 41 patients
The timing between POC result and oseltamivir prescription was an average of 2h03 min,
There was an average of 56 minute of oseltamivir prescription to administration time
Antibiotics were prescribed in 27 cases and were stopped in 6 cases (22 %) following Flu A positive POC result was provided.

Discussion

The use of on-site POCT in AMIA allowed an opportunity to identify and deal with circulating flu earlier, raising awareness and isolating early (many of the patients were elderly with comorbid and presented relatively non-specifically with delirium and exacerbations of existing respiratory conditions, but also febrile).

Samples tested in ARI standard of care method had an average high TAT that was significantly reduced by the rapid provision of results on site by the POCT. This helped patient flow and control of respiratory outbreaks.

The use of POC at the hospital point of entry helped early decision making, and supported patient placement.

There was a 22% reduction of unnecessary antibiotic use for patients with Flu A.

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