

Pilot Study for Introduction of Point of Care Rapid Molecular Testing of Respiratory Viruses at a Remote District General Hospital during the winter season 2017-18

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Introduction

Doctor Gray's Hospital (DGH) is a 185-bed district general hospital located in Elgin, 65 miles to the north of Aberdeen. Respiratory samples from DGH are transferred to Aberdeen Royal Infirmary (ARI) by courier system with long transport time, and respiratory testing is performed by in house PCR at ARI virology department. Service is available 6 days a week (Mon-Sat). Incoming respiratory samples are batched with a cut off time of 09:30 AM. Any samples received after that are delayed until the next day's run, experiencing a delay of a further 24 hours. Turnaround time (TAT) can vary between 8 hrs - 48 hrs from sample arrival in the lab. The in-house test covers 15 pathogenic targets. There is a clinical need to reduce the TAT and to extend the pathogen coverage to a wider number of targets.

Method

We conducted a pilot study of introducing a respiratory point of care system (POC) at DGH acute medical admission ward during the busy winter season 2017-18.

The system used (GenMark e-Plex RP) is a rapid molecular PCR for detection of respiratory viruses (20 viruses) in addition to atypical bacterial pathogens (4 Bacterial targets). Results are available within 90 minutes. (Figure 1)

The system requires minimal skills, and training was provided to medical and nursing staff at acute medical admission, however, the system was set to serve all the wards of the hospital.

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 and DGH POCT) during the study period

Results

A total of 114 samples were tested by POCT at DGH during the period of 21st Dec 2017-end of March 2018.

The maximum number of samples were in February (44 samples). Positive Flu A were 24 samples (21%), Flu B 17 samples (15%) and 61 samples were negative (54%).

The main reason for testing was mainly suspected flu or Upper Respiratory Tract Infection (URTI) Figure 2.

During the same period 330 samples were sent to ARI lab for respiratory testing. Of which 66 samples were positive for Flu A (20%), 30 samples were positive for Flu B (9%), one positive mycoplasma pneumonia and 192 sample were negative (58%).

The average TAT for results of samples in ARI was 2.1 days, with 23 samples took 4-5 days TAT.

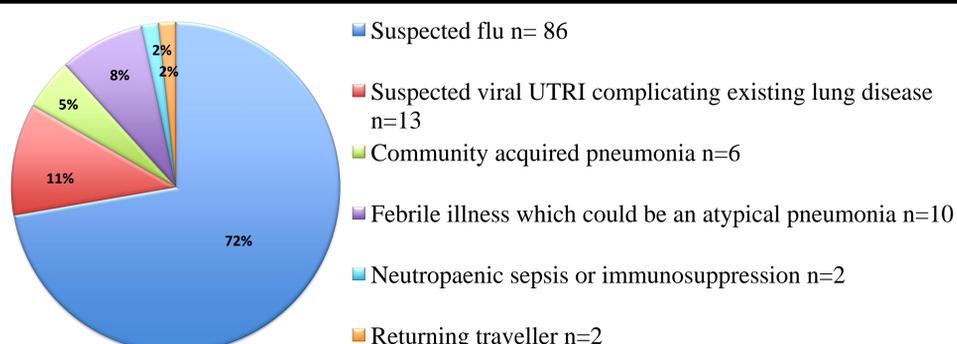


Figure 2: Clinical indications for testing

Results



Viral Targets	Result	Viral Targets	Result
Adenovirus	Not Detected	Parainfluenza Virus 1	Not Detected
Coronavirus 229E	Not Detected	Parainfluenza Virus 2	Not Detected
Coronavirus HKU1	Not Detected	Parainfluenza Virus 3	Not Detected
✓ Coronavirus NL63	Detected	Parainfluenza Virus 4	Not Detected
Coronavirus OC43	Not Detected	Respiratory Syncytial Virus A	Not Detected
Middle East Respiratory Syndrome Coronavirus	Not Detected	Respiratory Syncytial Virus B	Not Detected
Human Bocavirus	Not Detected		
Human Metapneumovirus	Not Detected	Bacterial Targets	
Human Rhinovirus/Enterovirus	Not Detected	Bordetella pertussis	Not Detected
✓ Influenza A	Detected	Chlamydia pneumoniae	Not Detected
Influenza A H1	Not Detected	Legionella pneumophila	Not Detected
Influenza A H1-2009	Not Detected	Mycoplasma pneumoniae	Not Detected
✓ Influenza A H3	Detected	Internal Control	PASS
Influenza B	Not Detected		

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

Data for infection control precautions were available for 67 patients, of which 7 patients in open wards were moved to isolation following the POCT result, 28 patients continued isolation precautions, and 8 patients did not require the precautions in place.

The use of ePlex RP Panel decreased the time to result by **2 days**

	Collection to Receipt in Lab	Collection to Standard of Care Result	Collection to ePlex RP Panel Result	Time Savings with ePlex RP Panel
Weekdays	20 hours 33 min	52 hours 1 min	2 hours 25 min	49 hours 35 min
Weekends	30 hours 47 min	55 hours 43 min	9 hours 18 min	46 hours 25 min
Overall	25 hours 12 min	53 hours 42 min	5 hours 33 min	48 hours 9 min

Discussion

The use of on-site POCT in DGH 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 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.

By enabling on-site testing with ePlex RP, patients results were received 2 days earlier than with standard of care testing

Atypical infection does not appear to be a major problem in the local community at DGH during the winter season, only one case was found positive with mycoplasma of 330 cases.

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