Automated Molecular: The Next Steps for Liverpool Clinical Laboratories Virology

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Introduction:
Liverpool Clinical Laboratories (LCL), part of Liverpool University Hospitals NHS Foundation Trust, implemented an automated molecular solution (Roche cobas p612 + 8800) in Virology in April 2023 (Figure 1). The intention of a Rapid Improvement Event (RIE) is to optimize the molecular virology workflow to realise anticipated automation benefits by delivering timely results using staff resources more efficiently.

Problem:
To improve efficiency of axess Sexual Health Team workflow processes from Sample Receipt through result verification ensuring 24 turn-around-time (TAT) requirements are met.

In scope:
Virology workflow from specimen receipt through result verification using cobas p612 + cobas 8800 platform (molecular assays: axess Chlamydia trachomatis & Neisseria gonorrhoea CT GC assay).

Out of scope:
Non molecular testing areas
Courier workflow prior to delivery at Specimen Receipt

Processes for RIE:
LEAN methodology principles:
Value, Value stream, Flow, Pull, Perfection (Figure’s 2,5,6&7).
The Kano Model:
Published in 1984 by Dr Noriaki Kano, a model to understand a customer’s needs & improve customer satisfaction (Figure 2).
The 5 why’s:
Developed by Sakichi Toyoda in the 1930s. An effective way of identifying the root cause of a problem (Figure 3).

Results:
After a successful RIE, we were able to impressively reduce the footsteps required from sample to result by 53% (Figure 8). We have reduced our non-value added (NVA shown in red) processes down by 13, while increasing our value-added (VA shown in green) steps by 2.5%. Since implementation of the automated molecular platforms the TAT of our CT GC has greatly reduced, even more so since week 26 which was the RIE week as shown in figure 9. Furthermore, since using the automated molecular solution the RLHU (Royal Liverpool University Hospital) GUM patients have received their results quicker than previous methods. Figure 10 shows patients had waited up to 6 days (shown in red) compared to now, getting their results the same day (shown in green).

RIE improvement themes:
- People
Desire to enhance team member engagement. A survey has been distributed to understand baseline satisfaction.
- Quality
24 TAT performance goal for axess Sexual Health team is not realised in all testing scenarios. Impact of non-conformity test performance by assay to be measured.
- Cost
Manual process steps in the workflow impact TAT. Understand waste in our current state process to redesign a more efficient process.
- Growth
Cobas p612 + 8800 instruments are not operating at full capacity. However, the current workflow process would not support an increased workload. Optimising efficiency is a must.

Conclusion:
The RIE for Virology demonstrated great teamwork, increased confidence of staff e.g., public speaking and allowed the team to embrace new ways of working. The whole team appreciated the opportunity to take part in the RIE, thoroughly enjoyed the experience and are hugely impressed with the outcomes.

Some take away messages for future events include having more IT support and to consider the impact on staff in the laboratory who were not actively part of the event e.g., better communication.

The next steps for Virology are to include the LEAN methodology in other areas and ultimately increase the TAT for other assays.
- Molecular automation can increase TAT, increase flexibility of multiplex assay testing, minimises contamination & operator error and opens cost-saving opportunities.
- Quality
Virology are now looking at what other assays we can run on the Roche cobas p612 & 8800 to move away from our manual in-house methods.

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Sources:
- 1 Hata, Nobuhiko; Seraku, Fumio Takahashi; Tsuji Shinichi (April 1984). "Value, Value stream, Flow, Pull, Perfection (Figure’s 2,5,6&7)."