

Improving healthcare services with POCT

How accelerated diagnoses at the point-of-care are enhancing patient care in a range of healthcare settings

Introduction

Traditionally, diagnostic testing in healthcare has been performed in laboratories requiring patient sampling, specimen transport, skilled staff, and complex analytical equipment. While not a new concept, point-of-care testing (POCT), also known as near-patient testing, is bringing testing and diagnosis closer to the patient.

Defined as medical testing carried out at or near the site of patient care, POCT provides instantly available results which facilitate efforts to diagnose and treat patients in the fastest and most efficient manner possible. Additionally, the short turnaround times provided by POCT allow direct discussion of results, reducing the number of consultations required and consequently, supporting improved patient outcomes and reducing overall healthcare costs.

The COVID-19 pandemic and the emergence of new, robust, and less error-prone point-of-care (POC) technologies has broadened the scope for the implementation of POCT. This is reflected in the NHS's Diagnostics Transformation Plan (2022-23) and has prompted a shift towards community diagnostics centres.¹ Recently, numerous POCT plans have been rolled out across the U.K., with healthcare services and patients already reaping the benefits in a wide range of locations such as paediatrics, mental health, as well as in the community.

Here, we explore several case studies detailing the beneficial effects POCT has had across various clinical settings, as discussed by invited expert speakers at the recent HORIBA CONNECT webinar – *'Enabling a Better Point-of-Care Diagnosis'*.²

Reducing risk for vulnerable patients

Since Cornwall's single acute hospital in Truro covers a large geographic area, patients may have to travel relatively long distances for medical attention at the Royal Cornwall Hospital. These big distances also affect the time it takes for patient samples to be delivered to the main laboratory for analysis. Consequently, the Royal Cornwall Hospitals NHS Trust (RCHT), in partnership with the Cornwall Foundation NHS Trust, have been exploring ways that help them better serve the community as explained by Lisa Vipond (Lead BMS Clinical Chemistry & POCT, RCHT).

The onset of the SARS-CoV-2 pandemic expedited plans to install five new Microsemi CRP point-of-care (POC) haematology analysers in acute and community settings across Cornwall (Figure 1). These analysers represent a compact, user-friendly device that delivers a laboratory-accurate, three-part differential full blood count combined with a C-reactive protein (CRP) to support the rapid near-patient distinction between bacterial and viral illnesses, as well as other acute applications. In turn, they have allowed non-laboratory personnel in Cornwall to rapidly diagnose a wide range of conditions locally in their community, rather than having patients visit the main hospital in Truro.

Figure 1: HORIBA's Microsemi CRP analyser in use in the community in Cornwall



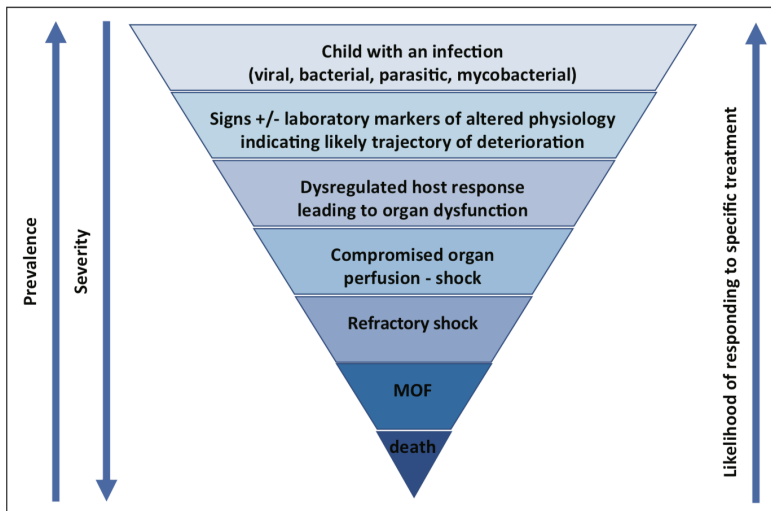
The acceleration of the RCHT's POCT plans necessitated rapid co-ordination, aided by HORIBA's expert team who ensured successful installation and staff training within just two days during 'lockdown'. Performing CRP tests in community settings prevents unnecessary trips to the main hospital and keeps vulnerable patients away from avoidable risk – a heightened priority in light of the COVID-19 pandemic. Furthermore, the rapidity of the results – delivered in just 4 minutes for FBC – means patients can receive immediate treatment, or be referred appropriately without delay.

The success of the initial roll-out led the Trust to install two additional Microsemi CRP POC haematology analysers across the county. As the pandemic has started to put less pressure on healthcare services, the analysers have continued to empower local GPs in clinical decision-making, reducing secondary care admissions for vulnerable patients and beneficially change the patient (and sample!) flow across Cornwall.

Improving patient management in ED

In a paediatric emergency department (ED) to co-ordinate patient flow effectively, it is essential to determine which patients have minor injuries and illnesses and which patients need emergency attention. Sepsis represents a potentially life-threatening condition that necessitates rapid intervention. Moreover, any delay to the diagnosis and treatment of sepsis represents a huge clinical risk (Figure 2).

Figure 2. Sepsis progression in children



Sepsis is particularly dangerous for children because their symptoms can be more difficult to detect. For example, Dr Sylvester Gomes outlined a case where a 3-month-old patient was brought in to the Guy's & St Thomas's Hospital Paediatric ED. The patient's behaviour was atypical and they had elevated temperature, however, all other basic observations were within normal range. POC CRP analysis using the Microsemi CRP quickly determined that the white blood cell count (WBC), neutrophil count, and CRP were extremely high, indicating sepsis.

The ability to diagnose the patient within minutes allowed the ED to make rapid, potentially life-saving decisions about patient treatment. In a counter scenario, a 7-year-old patient was referred by his GP to the ED with suspected appendicitis. In this case, POC testing using the Microsemi CRP allowed doctors to quickly rule out appendicitis and discharge the patient safely with the appropriate treatment and a follow-up GP appointment.

There is considerable pressure in EDs to deliver high level healthcare and maintain patient flow through the department while managing a busy and often, overcrowded environment. Because POCT enables more rapid clinical decision making in the process of diagnosis, it represents an approach that assists operational decision making and resource utilisation – ultimately, improving patient care.

Streamlining prescriptions

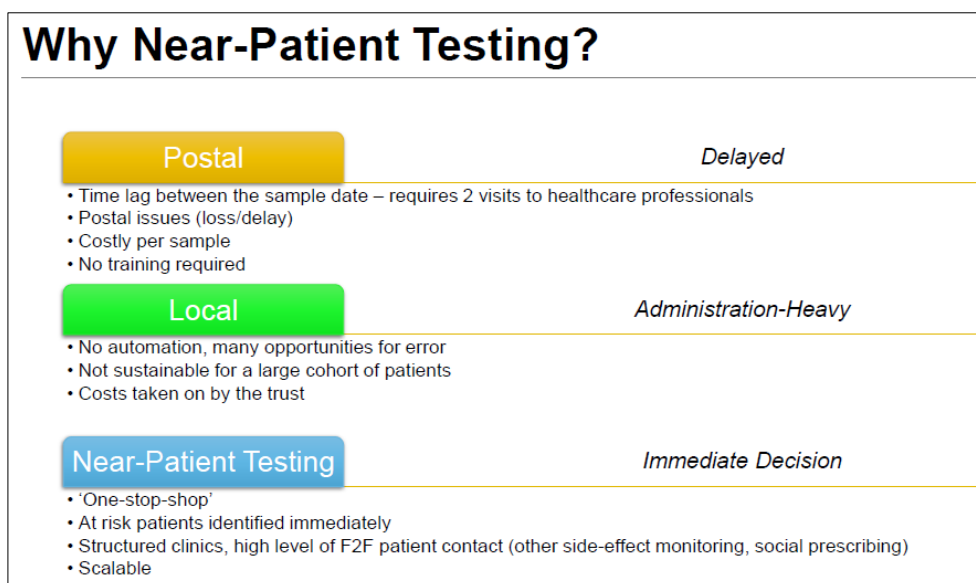
Clozapine is a highly effective antipsychotic medication for treatment-resistant schizophrenia. However, it is considered a high-risk medication due to the small but significant possibility of developing a life-threatening blood disorder known as agranulocytosis. While this resulted in clozapine losing its license temporarily in the 1970s, it is now licensed as a valid treatment for schizophrenia when a strict full blood count (FBC) monitoring protocol is followed.

Initially, the monitoring program involves weekly testing, gradually reducing to fortnightly and eventually monthly blood tests. The testing is based on the neutrophil count and WBC which determines whether the medication can be dispensed. In cases where the neutrophil count and WBC are too low, the patient is removed from the medication and asked to come in for daily monitoring to ensure signs of agranulocytosis are reversed.

The requirement for frequent blood monitoring and the associated logistics and administrative burden is seen as a major barrier to prescribing clozapine. In fact, a number of studies have suggested that clozapine is under-utilised or used too late in the patient’s treatment pathway.³

In a typical scenario, bloods are drawn from the patient and posted to a central haematology laboratory. This creates a time lag between patient sampling and results, and necessitates two patient consultations; once to have their blood taken and subsequently to pick up the prescription. There is also opportunity for postal delays which can prolong patient treatment. Additionally, when samples are taken and analysed by different local hospital laboratories, there is often a deviation in the computer systems used. Consequently, time intensive manual administration is required to transfer the results between systems, opening up opportunity for error.

Figure 3: Considerations for the value of using POCT



Recognising the value of near-patient testing (Figure 3) and to improve its model for clozapine dispensing and patient monitoring, Cumbria, Northumberland, Tyne and Wear Mental NHS Foundation Trust (CNTW), in partnership with Britannia Pharmaceuticals, installed HORIBA’s Yumizen H500 point-of-care haematology analysers at a number of its mental health clinics.

By delivering a full blood count with 5-part WBC differential from just 20µL of whole blood within two minutes at the CNTW clinics, the Yumizen H500 gives healthcare professionals and patients results almost instantly. Not only does this relieve a lot of vulnerable patient stress, but it allows clozapine to be dispensed

in just one appointment, without compromising patient safety. In fact, POC blood analysis may be safer than traditional means of analysis. Since agranulocytosis can deteriorate quickly, any delay to results can represent a clinical risk.

An additional benefit is the scalability and efficiency of POC blood analysis using the Yumizen H500. By removing the need for a second consultation and streamlining the administration process, CNTW are now able to monitor three times the number of patients compared to 2017 before the Trust first started working with HORIBA.

Quality, competence, and safety in POCT

While there are many advantages to POCT, challenges to the rollout of plans and management of the services still exist, making effective governance essential. Therefore, quality, competence, and safety are integral to implementing a successful POCT plan as discussed by Tony Cambridge (Lead Healthcare Scientist – Pathology Management) in HORIBA's webinar. Broadly speaking, this means that a POC service is delivered within a robust, well designed quality system, and that healthcare professionals are competent to deliver a safe clinical service.

The definition of quality POCT encompasses several ideas and provokes questions healthcare services should ask when implementing and monitoring new POCT services, including:

- **Quality of results:** are POCT results good and consistent enough to provide a safe and effective clinical service?
- **Quality of care:** does POCT facilitate an improvement to the quality of care provided compared to the previous system?
- **Robust service:** are multiple POC devices needed to ensure continuity of service (e.g. in case of downtime related to consumable management, or breakdowns)?
- Is POCT **cost-efficient** and **clinically effective**?

Measuring quality can be achieved through quality indicators, that form the basis of a regular report. Quality indicators can include factors such as non-conformances, clinical incidences, and audit findings. These serve to highlight areas for improvement, such as a need for further training or a requirement for device maintenance. For example, by quantifying waste as a quality indicator, a health service can identify where more or less resource allocation (such as reagent packs) are required. In another example, activity indicators can be used to recognise where additional equipment is required.

Secondly, ensuring competence not only refers to making sure that staff are competent to run POCT, but also to conduct any troubleshooting, interpret results, and potentially change analyser consumables. Sufficient training, competency assessment, and the availability of standard operating procedures (SOPs), quick guides, and learning materials represent strategies to ensure competency at POCT sites. Additionally, competence must be assessed, observed, and officially documented with defined re-assessment periods.

Finally, the delivery of a safe service is ensured by establishing both quality and competency. However, it is important to note that continuing to uphold quality competency, and safety in POCT is contingent on the independent review of service provision and striving for a culture of continued improvement.

Summary

The market for POCT has rapidly expanded over the past decade, and shows no signs of slowing down, as also highlighted by the UK Government's current drive to open community diagnostic centres across the country.

With healthcare services already seeing the benefits of POCT for some conditions, such as those outlined above, and new technologies emerging, the scope for POCT is only going to continue to grow. Reflecting on these experiences and implementing lessons learned into future plans will help ensure that POCT fully meets its potential of providing better healthcare.

Discover the full case studies presented and more about how POCT is helping to accelerate diagnoses and improve patient care in a variety of healthcare settings by watching the full HORIBA CONNECT webinar - [Enabling a Better Point-of-Care Diagnosis](#) - [here](#).

References

1. UK Government (2021). *40 community diagnostic centres launching across England*. <https://www.gov.uk/government/news/40-community-diagnostic-centres-launching-across-england>
2. HORIBA UK (2022). *Enabling a Better Point-of-Care Diagnosis*. <https://www.horiba.com/gbr/medical/support/webinars/horiba-connect-webinar-series-enabling-a-better-point-of-care-diagnosis/>
3. Kelly, D. L., Freudenreich, O., Sayer, M. A. & Love, R. C. (2018). *Addressing Barriers to Clozapine Underutilization: A National Effort*. *Psychiatr. Serv.* 69, 224–227.