

Faster testing in the emergency department

A report on point of care in practice

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Clinical chemistry is notoriously difficult to transfer out of the laboratory, but the emergency department at Newham University Hospital NHS Trust is leading the way in point-of-care testing and has improved patient waiting times in the process.

Lord Carter of Coles' *Report on the Review of NHS Pathology Services in England*,¹ published in 2006, confirmed the need to improve efficiency and provide better, more convenient and speedier diagnostic and monitoring services for patients. He highlighted the fact that point-of-care testing services – managed by local laboratories – have not been universally adopted.

The emergency department at Newham University Hospital NHS Trust is bucking the trend highlighted in the Carter report and is leading the way in point-of-care testing (POCT) by placing a clinical chemistry analyser in its own 'hot lab', fully supported by the trust's pathology department. This, in conjunction with other POCT technology, is helping the emergency medicine team at the hospital to attain and maintain 98% compliance with the four-hour emergency treatment standard.

Newham University Hospital NHS Trust is an acute hospital trust based in Plaistow, East London. In addition, some out-patient services are based at the Shrewsbury Health Centre (Forest Gate) and the Appleby Centre (Canning Town). Primarily serving a population of over 240,000 in Newham, it also provides services to the residents of Redbridge, Waltham Forest, Barking & Havering, City & Hackney and Tower Hamlets. The trust cares for one of the youngest, fastest growing and most diverse populations in the country. As a consequence of the rapid expansion of this busy borough, the hospital was experiencing increasing challenges in meeting and maintaining the

government's four-hour emergency treatment standard within its progressive emergency department. Between January and March 2008 alone, 30,986 patients attended the busy department.

Time and cost savings

In emergency medicine, where patients' lives frequently are under threat, the value of receiving faster clinical chemistry results through POCT is evident. This was first recognised by the Newham University Hospital NHS Trust five years ago and an instrument that could provide basic chemistry screening results for sodium, potassium, urea and glucose was installed. This helped to reduce patient waiting

times in the emergency department, but at significant financial cost. In addition to high running costs, the system could not deliver key add-on tests such as amylase and creatinine. This meant that it was still necessary to request these urgent (short turnaround time [STAT]) tests from the pathology laboratory, thereby incurring additional time costs.

"We recognised the need to find an alternative clinical chemistry POCT solution to enable us to maintain our four-hour standard cost-effectively," explained Dr Phil Moss, clinical lead consultant for emergency medicine. "In addition, having essential patient data immediately to hand gives my colleagues and me more thinking time, enabling us to make faster and better informed decisions on patient care pathways. This is undeniably far better for patient outcomes, while also reducing our turnaround times."

Chris Young, integrated governance manager (diagnostics and capacity), detailed the complexities involved in installing a POCT clinical chemistry analyser, which helps to explain why Newham is one of the first to do so: "Clinical chemistry is notoriously difficult to transfer out of the laboratory because of the

Point-of-care clinical chemistry testing in A&E without a doubt is enabling Newham to meet its four-hour waiting time targets



“In line with the government’s policy of providing services which are focused on the needs and wishes of patients, there is a growing trend towards point-of-care testing in pathology.

Point-of-care testing may be located elsewhere within the hospital setting – in accident and emergency departments, critical care wards or out-patient departments, for example... The Medicines and Healthcare products Regulatory Agency (MHRA) recommends that formal arrangements are made for the local laboratory to manage and regulate point-of-care testing, but to date such arrangements have not been universally adopted across England.”

complexity of the assays involved and the possibility of instrumentation failure due to a lack of proper competence training, maintenance and quality control procedures. In addition, if a system is to be operated by anyone other than a fully qualified biomedical scientist, then it must be exceptionally user friendly.”

The first steps towards installation of a new POCT clinical chemistry analyser were taken with the creation of a dedicated working party, which comprised key representatives from emergency medicine, pathology and point-of-care teams.

“In order to be able to have an effectively operating clinical chemistry POCT system, we recognised the importance of having the full support of our pathology department,” explained Natalie Firminger, emergency medicine business manager. “This support from

pathology was essential for the quality management of our POCT services, including training, maintenance, quality control and trouble-shooting.”

The POCT working party established a business case for the installation of a new POCT clinical chemistry analyser in the emergency department at Newham, based on the financial and time savings that it could deliver. It also clarified the essential specifications for the analyser, which had to be:

- easy to use
- a bench-top instrument
- able to test for sodium, potassium, urea, glucose, creatinine and amylase, with opportunity for future ‘add-ons’
- able to support onboard quality control
- able to conduct serum analyses
- fully compatible with existing hospital IT systems
- compatible with laboratory methods and reference ranges.

Testing for robustness

Following a tender process run by the hospital’s procurement department and governed by EU procurement rules, eight clinical chemistry companies initially expressed an interest – with three companies ultimately installing their systems temporarily at the trust for intensive technical trials.

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The analysers were first assessed for a week, by biomedical scientists within the pathology laboratory, for robustness and accuracy, before two of the systems went on to be trialled for a further week *in situ* in the emergency department itself. “It was essential that the trials were extremely rigorous given the nature of the environment that the analyser was to work in; emergency departments of course require absolute reliability for 24/7 operation,” continued Natalie Firminger. “In the trials, we were not only assessing the reliability of the instrumentation but also that of the supplying companies and their personnel. Excellence in customer support and problem-solving is crucial for our department to ensure that we have near 100% up time.”

In addition to the technical assessments undertaken by pathology laboratory personnel and clinicians in the emergency department, financial assessments were also made by the trust’s finance department. Phill Montgomery, procurement manager, clarified: “We looked at the whole-life costs of the instruments concerned, as well as their capacity for future upgrades. Every tender that we undertake is based on the delivery of value for money for the trust, not only financially but also based on what is ultimately delivered. In this case, we required an extremely easy-to-use, reliable and accurate clinical chemistry system for our busy emergency department to ensure we meet our patient waiting targets, now and in the future.”

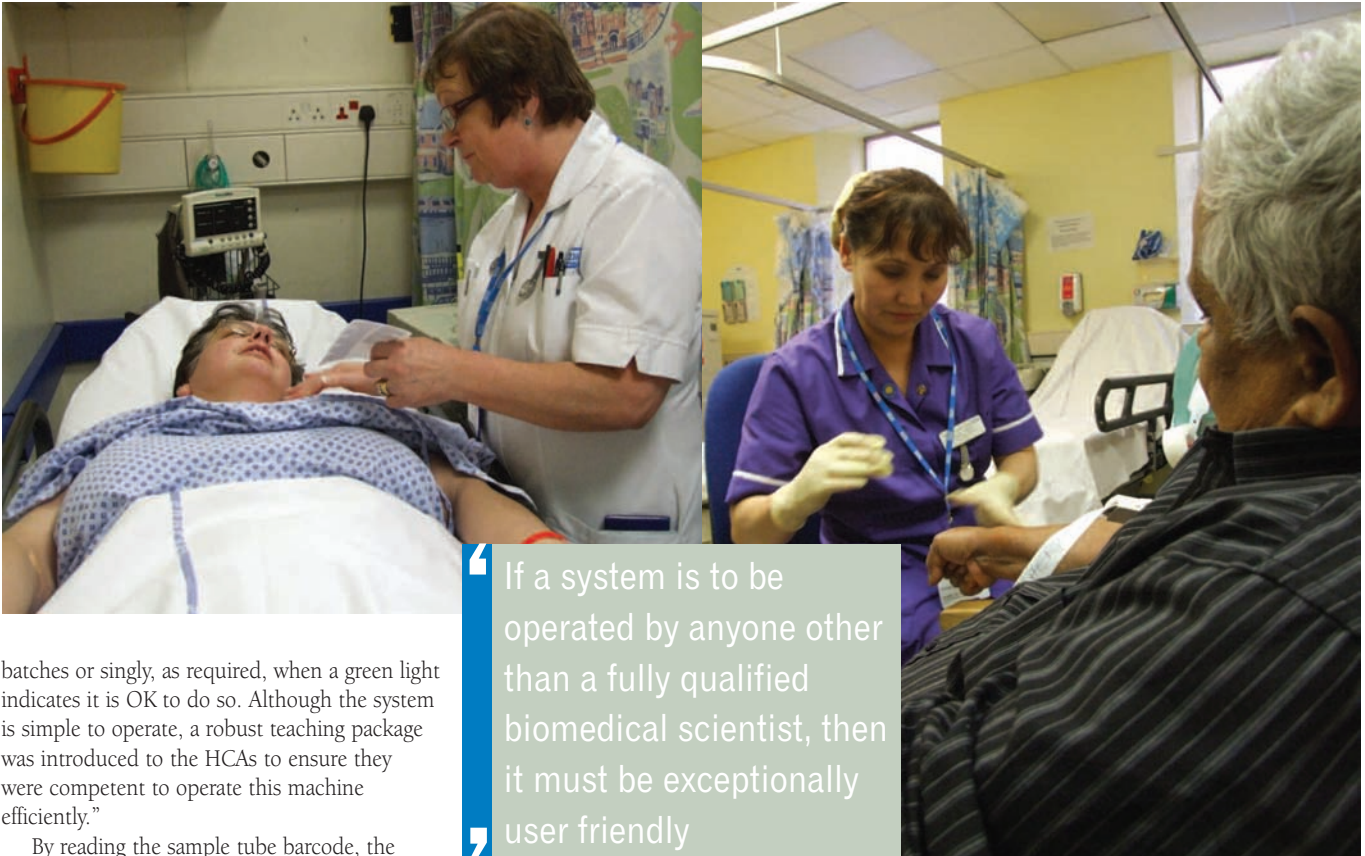
Following this rigorous review process, the ABX Pentra 400 clinical chemistry analyser from Horiba ABX emerged as the POC analyser of choice, meeting all of the trust’s specifications. The analyser is compact and user friendly, with all operations controlled on the single screen, allowing real-time viewing of system, reagent and sample status. The integrated work and validation station also provides Delta checking and automatic validation, as well as full traceability and online help.

Point-of-care testing in action

Through training and new standard operating procedures, the trust has worked hard towards reskilling its workforce to operate the new analyser. The clinical chemistry analyser is now operated on a routine basis by healthcare assistants (HCA) in the emergency department. All patients admitted to the emergency department are triaged prior to seeing a clinician, and have their data and test orders entered on the hospital electronic patient record (EPR) system, and blood taken by HCA staff for testing on the POCT analyser in the adjacent ‘hot lab’.

“The simplicity of the system and its accompanying protocols is crucial because it is operated outside the laboratory,” confirmed Visha Patel, the biomedical scientist responsible for POCT for this project. “Blood sample tubes are barcode-labelled and centrifuged prior to being placed directly on the analyser, either in





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batches or singly, as required, when a green light indicates it is OK to do so. Although the system is simple to operate, a robust teaching package was introduced to the HCAs to ensure they were competent to operate this machine efficiently.”

By reading the sample tube barcode, the analyser knows exactly which tests are required as it is interfaced directly with the hospital EPR system and the pathology laboratory information system (LIMS). All patients will have STAT sodium, potassium, urea, creatinine and glucose analysed, and those admitted with abdominal pain will also have amylase as a key indicator test.

In addition to printing out results with laboratory compatible reference ranges, which are provided as part of the full package of patient information for the clinician to review immediately during assessment, the analyser automatically validates and transfers all results to the LIMS, flagging those that are out of range.

Biomedical scientists in the pathology laboratory review all results directly on the LIMS for final validation and governance purposes, and will re-run any flagged samples. Once analysis is completed on the POCT analyser, sample tubes are simply removed, placed into bags and sent via an air-tube system directly to the laboratory. Owing to the use of barcode labels and IT integration, no paperwork is

required to accompany them, as the laboratory can identify them simply by swiping them on arrival.

“The POCT analyser has also helped us to streamline our laboratory procedures, as the IT link has removed the need for any keying in of information,” said David Hutcheon, pathology business manager. “Having POCT clinical chemistry is without doubt enabling us to meet our four-hour waiting time targets, as it front loads the information available to my colleagues and me, enabling us to make clinical decisions far earlier,” continued Phil Moss. “Having amylase and creatinine results immediately to hand is proving particularly useful. Furthermore, haemolysed samples are also identified much earlier, meaning that we can make prompt decisions based on the full knowledge of the state of the sample.”

The trust has noted significant financial changes too. “Since the installation of the analyser, we have been able to demonstrate a 50% reduction in monthly running costs for our POCT clinical chemistry,” confirmed Natalie Firmin. “The ABX Pentra 400 has certainly met all of our requirements for ease of use, time and cost savings.”

Next steps

Now that the ABX Pentra 400 has been operating successfully for 12 months, the clinical chemistry point-of-care working party will review thoroughly the results and outcomes of using the new analyser in the emergency department. It will also look to see how else

it can help, such as through add-on tests for C-reactive protein (CRP), liver function tests (LFTs) and possibly calcium and magnesium. The clinical chemistry analyser can run up to 55 parameters at any one time, so there is ample capacity, now and in the future.

It is clearly apparent that Newham University Hospital NHS Trust is indeed bucking POCT trends, as Chris Young discovered recently: “My colleagues and I attended the World Leaders in Medical Innovations conference in 2008. We overheard clinicians from other hospitals saying that clinical chemistry POCT was exactly what they needed to be able to meet emergency department waiting time targets and ensure the best possible patient care. We were very pleased to be able to share the very positive outcomes that we have achieved at Newham.”

Reference

- 1 Department of Health. *Report of the Review of NHS Pathology Services in England*. London: Department of Health, 2006.

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