

New Hematology Automation Solution Helps Middlemore Hospital Hematology Laboratory Improve Productivity and Accuracy

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Overview of the Hematology Laboratory

Middlemore Hospital laboratory receives samples almost exclusively from its in-patients and a very limited number from the community. The hematology laboratory processes about 380,000 tests per year or 190,000 CBCs per year. On a daily basis, the laboratory processes about 600 CBC per day but this figure can reach as high as 800, with an annual increase of about 6%.

The laboratory operates 24 hours a day, 7 days a week using three shifts of staff.

Prior to April 2008 the laboratory was using two Beckman Coulter Gen S systems with slide makers and one stainer. Under that system, 43% of the samples required technical validation, 35% required microscopic review and 18% required manual differentials.

In Search of the Right Solution

Like all expanding laboratories, we were keen to explore other hematology solutions that can help us to be more cost-effective, and reduce turnaround time for physicians, without compromising on the quality of the test results.

So between 2007 and 2008, a team from the laboratory visited a number of sites in the North Island of New Zealand to see what other hematology solutions were available.

Based on what we saw, we found the solution for our hematology laboratory- two Sysmex Hematology

AlphaN Transportation Systems and an automated image analysis system, CellaVision® Diffmaster 96 (CellaVision AB, Lund, Sweden; hereinafter called CellaVision® DM96). The systems were ordered from Roche New Zealand and implementation began.

The Sysmex Hematology AlphaN Transportation System consists of an Automated Hematology Analyser (XE-5000) and an Automated Hematology Slide Preparation Unit SP-1000i (Sysmex Corporation, Kobe, Japan). Computer middleware, IT3000, enables logical connection between the analysers and the laboratory information system (Delphic LIS, Sysmex New Zealand).



Middlemore Hospital is one of the three hospitals in the Auckland region of New Zealand. Auckland has a population of about 1.4 million and Middlemore Hospital serves 800,000 people from the south of Auckland. Auckland has a very diverse population and the hospital sees many patients from the Pacific Islands, Asian, European and the indigenous Maori populations. The hospital is situated in quite a low socio-economic area, and this has a significant impact on the health of the population.

Remarkable Results

Since implementation of the new system in April 2008, the impact on the laboratory workflow has been a significant one. We have seen a great improvement in the workflow in terms of efficiency and productivity.

The XE-5000 is arguably the most advanced and complete hematology analyzer available today. With a throughput of 150 blood samples per hour, it is about 30% faster than the previous cell counters our laboratory had and has allowed us (the laboratory) to absorb the increasing workload with ease.

Another important outcome is the minimization of the time spent on manual technical validation by the laboratory personnel. Manual technical validation was reduced from 43% to 32% with the effective use of patient information and CBC algorithms to release normal (negative) results automatically after analysis.

With the new system, 26% of CBC's requiring blood film examination is performed with the CellaVision® DM96. < 3% of the total CBC's has to be examined manually with a microscope. Manual examination may be required

for several reasons; poorly prepared manual blood films (blood films are prepared manually if sample volumes are insufficient for automated preparation), the need to examine the tail of the blood film for platelet clumps, or to scan for abnormal cells or parasites such as malaria and microfilaria etc.

The CellaVision® DM96 automatically performs cell location and pre-classification and stores the slide as digital cell images for review by laboratory technicians or scientists. When required, the laboratory technician or scientist re-classifies the white cells; adds comment on the red cell or platelet morphology or the white cell population directly on the instrument. The result is then saved and transmitted to the LIS.

The CellaVision® DM96 has changed the way a peripheral blood examination is traditionally done. The CellaVision® DM96 remote review software transfers patients' digital cell images and results from the CellaVision® DM96 to a remote monitor in the microscopy area. All the analysis can be opened and accessed from this monitor.



Sysmex XE-AlphaN



CellaVision® DM 96



"The impact is especially noticeable in the turnaround time for the samples, which is the key performance indicator for our laboratory. Prior to implementation, the laboratory had much difficulty in meeting the target of reporting 98% of CBC results within 60 minutes. But after implementation, the laboratory has been able to achieve its target consistently."

John Peters, Charge Scientist, Hematology Laboratory



Scientist working at one of the remote review stations in the microscopy area

The laboratory has set up three remote review stations in the microscopy area. Each station has one 19" flat screen monitor to view the patient's digital cell images and results and two 17" flat screen monitors to view the current and previous CBC results in the LIS. The laboratory has future plans to set up a remote station at the hematologist/ registrar office.

The CellaVision® DM96 has definitely helped the laboratory to speed up routine microscopy work. The time to review blood films has reduced by enough to make a huge difference with the sample numbers that we are processing now.

The time saving is estimated to be between 45 seconds to two minutes per film, depending on the experience of the technician or scientist. The reduction in the time required to screen each film has allowed more efficient use of the experienced microscopists' time.

Not only has the laboratory improve its turnaround time for CBC, it has also been able maintain its high standard in CBC reporting. The CellaVision® DM96 provides the laboratory with a reliable shortcut to accurate and standardized cell differential.

The best outcome for us is the improvement in ergonomic conditions with the CellaVision® DM96. Working in the microscopy area is less stressful now and

we are experiencing less fatigue in the neck, wrists, and eyes. In fact, there have been no reported problems of physical injury related to excessive microscope use since the introduction of the CellaVision® DM96, according to Sandra Duggan, the laboratory Safety Officer.

A Valuable Teaching Tool

A further major benefit of the CellaVision® DM96 is the CellaVision® Competency Software, an on-board educational and competency testing software.

The CellaVision® DM96 has become a great teaching tool for both students and new staff members. The educational capability of the CellaVision® DM96 has extended beyond the laboratory to our affiliated tertiary teaching institution that runs degree courses for laboratory scientists.

The CellaVision® DM96 has a database that contains a comprehensive library of blood cells which can be used for teaching purposes; the laboratory can also add its own slides to the collection. It keeps a record of all cell classifications to the individual cell level. Supervisors can thus audit the work of students or new staff and identify areas for improvement. In this way errors in cell recognition can be corrected immediately.

Moving Forward

There is no doubt of the capability of Sysmex's hematology solution and its impact on the routine hematology workflow.

Our future plans will include a full Sysmex Hematology Systemization (HST-N) automation line and an additional XE-5000 analyser to further streamline our workflow.

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