

Challenge

A state-of-the-art hospital laboratory

The laboratory at Montreal's Jewish General Hospital integrates advances in Roche technology to improve access to tests and expand diagnostic capabilities

Dr. Elizabeth MacNamara, Director of the Department of Diagnostic Medicine, arrived at the Jewish General Hospital in Montreal in 1994 with the goal of making the lab an efficient and innovative contributor to patient care. In the process, she developed a winning partnership with Roche, a diagnostics company that, like her, recognizes laboratories as the lifeblood of the hospital.

Dr. MacNamara has few illusions about the status of her specialty. In most hospitals, the laboratory is seen as equivalent to the cafeteria: physicians order what they want and pick up results when they're ready. Today, senior administration at the Jewish General Hospital (JGH) recognizes the laboratory as vital to the quality of care the hospital provides and its potential for progress. However, it took Dr. MacNamara 10 years explaining and demonstrating the value of a high-efficiency lab to gain that recognition.

When Dr. MacNamara arrived at the JGH, the lab was suffering from terrible neglect. Functional structures had not been changed in 30 years and laboratory technologists were stuck in rigid and unnecessary practices that were disconnected from patient care.

The program part 1: Gaining trust

Dr. MacNamara is distinct as a director of a lab in that she also works as an internist on the ward. That helps her forge close links with clinical personnel. "The change came about when the doctors and nurses realized that I was not so much on their or the laboratory's side, but on the side of the patient. Every single decision I've made over the last 20 years has been based on what's good for the patient. Not what's good for

the nurse or the doctor, but 'what would you want if the patient was your mother?' Everyone can understand the need for change when it's put in those terms."

One of Dr. MacNamara's first changes was to open the JGH Test Centre in the evenings so that patients didn't have to miss a day's work to come for tests, and move from appointment-based to drop-in service. At the JGH, these changes reduced cost, greatly improved speed of testing and improved satisfaction among both staff and patients.

The program part 2: A technology partner

The laboratory Dr. MacNamara stepped into in 1994 contained equipment and instruments from every era, no two from the same company. It had 18 sub-sections in different rooms and technologists were attached to a particular sub-section with little to no mobility between them. Dr. MacNamara tackled the equipment challenge first. She had seen highly efficient American laboratories and set out to find one supplier that could handle most of the biochemistry tests the JGH lab performed. She sent companies her requirements and requested that they submit a plan to handle these, detailing everything from staff requirements to the cost of

analyzers, reagents, support, computer interfaces and training.

Boehringer Manheim (which was bought within a year by Roche) had the most convincing plan and Dr. MacNamara was able to persuade the JGH administration to make the investment, which resulted in large savings within three years.

"The lab I entered in 1994 had a multitude of large and small machines that were not optimized and were often divided to work along historical and political lines," says Dr. MacNamara. "Each machine required a dedicated technologist, which resulted in high staff costs and often long waits for results.

Roche Diagnostics were among the first to use analyzers that could do tests in a random way, develop assays that had previously only been done manually, and amalgamate many sections of the laboratory on a single analyzer. Mr. Ian Parfremment, President and General Manager at Roche Diagnostics, regards random access analyzers as the first in a series of significant advances over the past 30 years. "Random access meant that you could keep feeding samples into the analyzer rather than wait until you had a batch that would be processed through the analyzer together. In the beginning this still entailed one machine per type of test, but at least it could run continuously."

The next significant breakthrough, according to Mr. Parfremment, was the ability to link together analyzers used for clinical chemistry tests such as albumin and glucose, and analyzers for highly sensitive immunoassays used to measure such tests as hormones and tumour markers. "That allowed us to consolidate serum sampling testing onto a single automated platform," says Mr. Parfremment.

Further efficiencies came from automating pre-analytics: the steps that lab technologists had to take before putting the sample on the analyzer. "Around 2001," states Mr. Parfremment, "we launched a platform that automated this whole process. The sample would come into the laboratory in its native state and be placed onto the pre-analytical unit that would label it,

de-cap it, centrifuge it, aliquot it and automatically transfer it onto the analyzer."

Results

The number of analyzers that could be joined together went from two to three to four and onward. "Today," says Dr. MacNamara, "the most recent evolution in Roche's automated lab, which we acquired last year, can do about 80% of all routine tests that come into the lab. Because of that, and because I fully avail of the machine's capability, our lab and technologists can do twice the amount of work per technologist of any other equivalent laboratory in Quebec."

The tag line for the cobas® 8000 modular analyzer is *Intelligent LabPower*. The power can best be described in throughput per square metre: The chemistry analyzer has the same

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footprint as previous Roche analyzers but can process 2.5 times the workload. "The intelligence", Mr. Parfremment explains, "is in the way the samples move around the analyzers. The instrument ensures that tests are performed in the right order, and that if a certain test is busy, the sample moves on to another location on the analyzer to get other tests done first. It's a machine with a highly intelligent sample workflow."

Dr. MacNamara has incorporated each of these advances into the JGH lab and has been able to bring all but highly specialized manual tests into the same space and drastically reduce staffing requirements. With fewer machines to watch over, technologists have been encouraged to develop their skills in informatics, management, health and safety and point-of-care coordination. A number of technologists and PhDs were freed up by these efficiencies to create what has become one of the best genomics labs in



Quebec. Over time, Dr. MacNamara was able to cut the salary budget in the laboratory by about a third, while still moving a number of technologists into exciting areas that further enhanced the lab and the hospital's capabilities.

Potential for expansion

Dr. MacNamara has proven a uniquely rigorous user of the new technology, extracting the most benefit possible from each advance that Roche delivers. She feels that the real secret is to use the equipment the way it's meant to be used, which, she says, is rare: "All sorts of historical and territorial reasons can stand in the way.

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That makes her an ideal partner in Mr. Parfremont's opinion: "Roche is committed to innovation and spends 18% of global turnover on R&D, but at a certain point, we need labs with knowledge and experience like the JGH to be the first to deploy that innovation to its greatest benefit. We

have a track record of introducing cutting edge approaches with the JGH, knowing that they have a high level of expertise in the laboratory that will enable the new approach to succeed. If there are limitations or impediments, we can work together in an iterative process to actually get to the end point we're both looking for."

"Over the years, Roche and my lab have developed a strong partnership based on mutual trust and respect. I'm a demanding customer and always one of the first to spot a problem," Dr. MacNamara acknowledges, "but I will also work with them to help fix it."

With the cobas® 8000 modular analyzer, two functionalities in particular benefitted from experience gained at the JGH. The system has the ability to use primary tubes, which are the tubes into which the blood sample is taken directly from the patient. Previously, the sample would be decanted from the primary tube into a secondary tube before being placed in the analyzer, thus ensuring there were no clots that could interfere with the analyzer. The instrument can detect and reject samples that contain clots, thus eliminating the need for a secondary tube. Dr. MacNamara's was the first lab in Canada to use primary tubes, an attractive advance as it saves on plastics, cuts down on the number of samples required from the patient, and further reduces the need for manual handling. However, it requires a significant change in workflow and habits. "We worked with the JGH to overcome the questions and challenges raised with the use of primary tubes and came up with an approach that we believe is highly reproducible and beneficial for laboratories countrywide," says Mr. Parfremont.

Roche also worked with Dr. MacNamara to understand questions and concerns around integrating serology testing onto the cobas® 8000 modular analyzer. "Tests for HIV and hepatitis are performed on stand-alone analyzers, often in Microbiology departments," explains Mr. Parfremont. "The ability to run the tests in the core lab increases efficiency and assures access to testing 24/7 — which is especially important to hospitals with maternity wards — but there were issues that needed to be addressed to make the transition possible. The very open communi-

cation with the JGH equipped us with a dossier of information we can provide to other hospitals considering this sort of move.”

Dr. MacNamara has great respect for technological partnerships that go beyond acquiring a piece of equipment at the best price. “Implementing new tools in health care is a lengthy and difficult process with important impacts on staff and workflow,” she says, “both within the lab and across the hospital.” Ultimately it affects the quality of patient care and patient outcomes.

Efficiencies gained in the laboratory have enabled the JGH to focus staff efforts on other aspects of their roles and invest in the development of new diagnostic capabilities, first in genomics and more recently moving into the establishment of a proteomics lab to serve the needs of personalized health care. Personalized healthcare is also a key focus of Roche globally with their Diagnostics and Pharmaceutical divisions working together. “By producing highly specific diagnostic information we can help clinicians ensure the right drug is prescribed to the right patient at the right time and the all-round benefits of this are huge” says

Mr. Parfremont. “This is another key area of cooperation with the JGH.”

Mutual trust opens new opportunities for collaboration. Roche recognizes the lab's strengths in information technology, its highly skilled and adaptable workforce and its positive relation-

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ship with clinicians and hospital administration and trusts that it will come up with the resources required to test new technology. “Roche gets someone who really wants to work with them,” says Dr. MacNamara; “and we get the best technology for our patients.” ■