Total Laboratory Automation Integrates Health System

A little more than a year ago North Shore-Long Island Jewish Health System opened North Shore-Long Island Jewish Health System Laboratories, containing state-of-the-art automated core laboratory equipment. Based in Lake Success, NY, the laboratory consolidates and standardizes all laboratory testing for the 13-hospital health system on Long Island, NY.

As part of the total system integration, all hospital laboratories now share the same procedures, policies, computers, and laboratory information system (LIS) database, according to Bernard E. Statland, MD, PhD, medical director of the laboratory. Strategically located to all hospitals within the system, the 30,000-sq-ft core laboratory provides services for test procedures that are not time sensitive. All time-sensitive tests can be completed in each hospital’s on-site rapid-response laboratories. The core laboratory handles two thirds of the hospital system’s test volume.

Within the core laboratory is the clinical laboratory automation system (CLAS, Roche-Boehringer Mannheim-Hitachi, Indianapolis), which can process up to 3,500 tests per day, 7 days a week. By the end of 1999, the core laboratory expects to complete more than 200,000 tests per month, or more than 2 million tests per year.

The core laboratory includes a monorail with sections for coagulation, hematology, and chemistry, with an outside area containing special hematology (eg, hemoglobin electrophoresis), serology, immunology, and special chemistry. Samples arrive by courier around the clock and are prepared for analysis by the CLAS through bar coding, then put in the sample sorter. The hematology and general chemistry instruments are on line, and an immunochemistry analyzer will be added in the near future.

Total laboratory automation results in improved patient care, says Statland. Improved turnaround allows physicians to make medical decisions right away. In addition, the decrease in labor means staff can do more specialized work. Other reasons for total laboratory automation include fewer manual steps, fewer clerical errors, lower costs owing to decreased labor, standardization, increased quality, ensured predictability, and increased work volume without increasing staff.

A highly specialized team of pathologists and laboratory managers studied the project for 1 year before selecting an automated system. Headed by Robert Stallone, administrative director of the laboratory, the team visited central laboratories in the United States, Canada, and Japan; in Japan more than 75 fully automated systems have been installed since 1979.

“We considered what type of automation we would need based on our test volume at the time,” Stallone says. The network hospitals were generating approximately 4 million tests a year, and planned to send at least 2.5 million to the core laboratory. “We were looking for a cost-effective and efficient way to deliver laboratory services that could be installed in a short time frame.” The system was built in 5 months and operational within 7 months.

Since its inception in March 1998, the system has experienced no operational or hardware problems, Stallone says. He cites four factors critical in selecting an automated laboratory system: adequate test volume, a proven track record, successful interface with the LIS, and cost-effectiveness.

The laboratory may expand into the commercial marketplace. “Our goal is to do more outside work,” says Statland. “The larger the volume, the lower the cost per test.” Nearly 85% of the laboratory’s business is hospital work; the remainder is outreach for nursing homes, physicians’ offices, clinics, and managed care groups.

The health system comprises 13 tertiary and community hospitals, more than 90 ambulatory sites, 13 community-based multiphysician practices, and two extended care/rehabilitation facilities.

Total laboratory automation system at North Shore—Long Island Jewish Health System Core Laboratory, Lake Success, NY, was designed by Karlsberger Laboratory and Technology Group, New York.
Noninvasive Test for Blood Glucose on the Horizon

People with diabetes are accustomed to drawing their blood to check their glucose concentration several times a day. But soon it may be possible to monitor glucose without puncturing the skin.

Researchers at the State University of New York at Buffalo are testing a new method that collects and measures the glucose that diffuses naturally through the skin (Science News. 1999;155:187). “We are exploring the possibility of having a noninvasive method to analyze glucose,” says Luis A. Colon, PhD, associate professor of chemistry at the State University of New York at Buffalo.

Colon and colleagues collected glucose samples from 10 volunteers without diabetes by attaching a small reservoir filled with collection fluid (water) to the surface of the skin. Within 5 minutes, glucose diffused into the collection fluid. Samples were then analyzed using extremely sensitive capillary electrophoretic techniques that can detect the small amounts of glucose that come to the skin surface. The transdermal (through the skin) sampling method is painless and poses no risk of infection, because there is no direct contact with blood.

The researchers obtained baseline glucose readings from the volunteers after they had fasted for at least 6 hours. Samples were collected from blood and transdermally. Volunteers then ingested a beverage with a high glucose content (100 g). The researchers tested volunteers’ glucose levels using samples collected both ways. When the amount of glucose in blood increased, the amount in the transdermal samples increased as well.

“If we can establish the natural correlation between the amount of glucose in the blood and the amount that comes through the skin, I envision a sensor that we can attach to the skin to give patients a continuous glucose reading at home,” says Colon. The next step is to test a large number of people with and without diabetes.

The researchers are trying to miniaturize the collection reservoir so that it can be made into a wearable device. “We suspect that we would have to calibrate this method to the individual, since every person has different skin properties,” Colon says.

Reported by Terri Yablonsky Stat.
Research in Brief

A large study of two groups of data from patients diagnosed with diabetes based on the American Diabetes Association criteria of a diagnostic threshold of 126 mg/dL (7.0 mmol/L) shows that 60% of the individuals with a fasting plasma glucose concentration between 126 mg/dL and 139 mg/dL have normal hemoglobin A1c levels. The authors argue that these patients should not be diagnosed with diabetes [JAMA. 1999;281:1106-1109].... In neonates, hyperinsulinemia is often caused by focal islet-cell hyperplasia that can be diagnosed by pancreatic catherization and intraoperative histologic studies, and treated by partial pancreatectomy (N Engl J Med. 1999;340:1169-1175).... A study of 808 serum samples shows that enzyme immunoassays for the detection of antinuclear antibodies reliably detect negative samples and are best used as a screening tool, with positive results confirmed by an indirect fluorescent immunoassay (Am J Clin Pathol. 1999;111:503-506).... Exposure to organic solvents during pregnancy is associated with a significantly increased risk of birth defects [JAMA. 1999;281:1189-1196].... Recurrence of bronchioloalveolar carcinoma in transplanted lungs occurs commonly (N Engl J Med. 1999;340:1071-1074).... Presumptive administration of albendazole, a new, broad-spectrum antiparasitic drug, to all immigrants to the United States who are at risk for intestinal parasitosis, is more cost-effective than universal screening and treatment of infected patients (N Engl J Med. 1999;340:773-779).... The median homocysteine level in US children aged 13 and 14 is approximately one half of adult levels, results supporting folic acid and possibly vitamin B12 as agents that reduce homocysteine levels [JAMA. 1999;281:1189-1196].... Annual influenza vaccinations of health care professionals is effective in preventing serologically proven influenza and results in reduced absenteeism [JAMA. 1999;281:908-913].... Overexpression of annexin II on acute promyelocytic leukemia cells increases the production of plasmin and may explain hemorrhagic complications frequent in patients with acute promyelocytic leukemia (N Engl J Med. 1999;340:994-1003).... Lower intake of dietary fat does not appear to be associated with a reduced risk of breast cancer [JAMA. 1999;281:914-920].

Capitol Chat

The Blood Products Advisory Committee to the Food and Drug Administration held a meeting to discuss the use of nucleic acid testing of whole blood. During the public comment period, ASCP submitted a statement that was read aloud by the advisory committee chair, Blaine Hollinger, MD. The ASCP letter stated, “the risk of infected transfused blood will not be any greater due to the use of nucleic acid amplification testing, but the management of patients and potential lookback cases raise concerns for patients and the laboratory.” The Senate Public Health Subcommittee to the Health, Education, Labor, and Pensions Committee held a hearing on bioterrorism on March 25, 1999. The hearing, chaired by Sen Bill Frist (R, Tenn), focused on surveillance of, response to, and treatment of potential bioterrorist attacks.... In California, Assemblywoman Charlene Zettel (D, San Diego) modified legislation she introduced earlier this year that would create a licensure category for directors of waived laboratories. The bill would now allow a laboratory director to delegate responsibility for oversight of a waived laboratory to a technical consultant.... Public health advocates organized a letter to the Senate and House Appropriations Committees urging support for $215 million to fund the National Breast and Cervical Cancer Early Detection Program, administered by the Centers for Disease Control and Prevention (CDC). ASCP President James Linder, MD, FASCP, signed the letter that supports breast and cervical cancer screening and outreach services to high-risk, low-income, and medically underserved women in the United States.... The CDC announced the appointment of several new members to the Clinical Laboratory Improvement Advisory Committee.... The ASCP Washington Office has created a new instant e-mail information service just for resident physicians. With this new benefit ASCP resident physicians can receive information from the ASCP Washington Office delivered directly to their e-mail address. To subscribe to this service, send an e-mail message to: requests@wash.ascp.org Then, for resident physician information, in the title or body of your message write: subscribe residentsASCP. Until next month...©

From Robin E. Stomler, director of the ASCP Washington Office.
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