

COLORADO PUBLIC HEALTH LABORATORY: PROVIDING ENVIRONMENTAL AND PUBLIC HEALTH PROTECTIONS WITH A DOSE OF PRAGMATISM

by Emily Mumford, writer

Known for the rugged beauty of the Rocky Mountains, Colorado showcases its natural splendor with more than 22 million acres of state and federal parkland. Outdoor enthusiasts from around the world travel to Colorado to hike, ski, fish and explore the relatively untouched natural beauty.

Colorado's newborn screening program was one of the first in the country to add cystic fibrosis screening to its panel and in 2006, added tandem mass spectrometry testing. "We were kind of lagging in that regard," said Butcher, "which was out of character for that program since we have a proactive history." The lab looks for 29 syndromes and runs two screens on each sample, conducting about 70,000 newborn tests per year. The Colorado program also screens babies from Native American reservations, Wyoming and military installations in Japan and Guam.

Part of the state public health laboratory's mandate is to protect this natural legacy through chemical and microbiological testing of waterways to monitor pollutants, as well as to offer testing for outdoor and recreation associated diseases, such as plague, Colorado tick fever, rabies, hantavirus and Rocky Mountain spotted fever.

The state laboratory is located in east Denver in an area known as Lowry. In 1994, Lowry Air Force Base was decommissioned and parcels were sold cheaply to encourage re-development. The state bought the lab's building for \$1 and then gutted and remodeled, opening the new facility in 1996. The area's redevelopment has been successful, said Laboratory Director Dave Butcher, MBA, MT(ASCP)SM.

ROOM TO GROW

The public health laboratory building has 64,000 finished square feet with another 16,000 square feet of unfinished space available for expansion. Although the facility is relatively new, said Butcher, "it was designed before 2001 and we were lacking adequate BSL-3 capacity." After a retrofit, the state lab has three BSL-3 spaces and a state-of-the-art radiochemistry area. The laboratory has a whole body radiation counter that can detect contamination in the lungs of radiation workers. This part of the laboratory can also measure radiation from potentially harmful environmental samples, such as radium, radon or plutonium.

ENCOUNTERING CHALLENGES

After 34 years in Denver, Butcher is definitely at home there, but he grew up in Parkersburg, WV. At West Virginia University, Butcher was drawn to engineering but, when he learned that jobs were relatively scarce in the field, he joined the med tech program. After graduation, Butcher moved to Denver to work in a hospital. He later spent 14 years at Kaiser Permanente, ending up as the administrative laboratory director. He earned an MBA from the University of Colorado and then nine years ago, brought his clinical laboratory and management expertise to the public health laboratory.

When Butcher became lab director, the facility was brand new. But he quickly discovered that there were

some significant infrastructural challenges on his desk. "We did not have new equipment," he said. "The organic chem lab had to be rebuilt from scratch. A key person had just left, the equipment was 20 years old and much of it was out of service." Using know-how gained from years in a clinical lab, Butcher opted to lease the necessary equipment. "It was a bit controversial," he said, "but we used reagent leases to acquire some new equipment. The rest was acquired with CDC grant funds. Our toxicology lab was also very outdated. Then we sent some talented staff for training and now we are fully certified again in radiochemistry, inorganic and organic chemistry."

Decisions like these have been a fact of life for the Colorado laboratory. An unusual funding situation has them receiving absolutely no state money—until now. The lab operates annually on about \$11 million, drawn from grants (33%) and fees (67%). However, the state's general fund has just approved \$900,000 for flu surveillance and public health tracking, starting in July 2009. This money will constitute 1% of the lab's budget and is the first state funding received since 2001.

It took Butcher two years to earn this money and involved working with the governor's office, the health department; and giving countless tours of the facility to legislators and others. Ultimately the legislature voted unanimously in support of the laboratory funding.

Butcher is very happy about the success, but is simultaneously trying to balance recession-related shortfalls. The lab has a staff of 79, but there are currently 10 vacancies. The state has had a hiring freeze for more than a year. Butcher has been able to hold the jobs open, but may not be able to do so indefinitely.

STAFFING SHORTAGES

Like other laboratories, Colorado has been cross-training staff and working short. "To some degree, we needed to be doing that anyway," said Butcher, "to bring ourselves in line with private sector labs... but the situation has been terrible for morale."

Staffing has been hit hardest in its fiscal area, "the purchasing, budgeting, financial staff," said Butcher. "We cannot get any waivers to replace the staff who

left and it is increasingly hard to fill requests.”

The lab has also lost a few scientific personnel. The hiring freeze may be lifted soon, but the state has been struggling to pass its budget.

Funding is always the battle. “The fight is never over,” said Butcher. “The lab is always fielding questions on ‘Why? Why not outsource to another state or a private lab?’ We must always defend our position and educate the decision-makers on what we do and why it’s important. So far we have not been directed to cut anything, but all the balls are up in the air.”



Dr. Hugh McGuire is head of Colorado’s molecular science and virology program. Photo courtesy of Colorado’s public health laboratory

A LONG HISTORY

Despite this struggle, the lab has a long history in Colorado. Founded in 1895 by the State Board of Health, its main purpose was to stem the tide of diphtheria. By 1923, the laboratory was also testing for syphilis, typhoid, venereal diseases, tuberculosis and rabies; records also note that the laboratory could analyze water supplies for drinking and culinary purposes and conduct food and drug tests.

MEETING CURRENT NEEDS

Today, of course, the Colorado laboratory tests for a full range of public health and environmental concerns. Its public health microbiology section tests for pathogens that cause foodborne illness, such as shigellosis, salmonellosis and *E. coli* 0157. This section can identify outbreak-associated illnesses, such as Hepatitis A in restaurant workers, pneumonia in nursing homes, measles and mumps in college populations, along with STDs and HIV. The environmental microbiology section tests Colorado’s water, food and dairy supplies to keep consumers safe from contaminants; and a chemistry section tests water for pesticides, herbicides, toxic metals and other organic and inorganic pollutants.

A strong molecular science and virology program, run by Dr. Hugh McGuire and lead scientists Justin Nucci and Dr. Kim Keene, underpins the flu surveillance in the state. “With swine flu, Colorado was one of the first states to get the assay for H1N1 up and running, activating the state’s flu plan,” said Butcher. “[McGuire and Nucci] were staying late and working weekends to make it happen. This section is also capable of identifying West Nile virus, bioterrorism agents and other infectious agents.

Colorado’s public health laboratory is responsible for DUI/toxicology testing of blood and urine for drugs of abuse, as well as blood alcohol. It also maintains the

alcohol breath devices and trains police in their proper usage. Last year the lab ran 6,000 blood alcohol tests, 4,000 blood drug analyses and 19,000 urine analyses for drugs of abuse. “Lab staff go to court to testify,” said Butcher. “It makes it difficult to run the lab tests and meet turnaround expectations when staff are pulled out to attend court sessions.” Tests can detect marijuana, cocaine (crack), methamphetamine (speed), morphine, heroin (snow), LSD and other illicit drugs including abused prescriptions and over-the-counter medications.

As the lab’s relationship with law enforcement suggests, its services have been built around the unique needs of the state. The lab’s biggest partner is the health department, located about four miles away from Lowry. Butcher regrets the distance between the lab and the health department and works to eliminate the idea that the lab is “something different.” He said, “We aren’t always seen as integral since we’re separated. I am always working to build relationships with the health department to make sure they don’t send testing somewhere else. We work closely with the epi[demiology] division and water quality control division—it’s a good relationship.” The lab also works with the National Guard Civil Support, the FBI and local county health agencies.

Looking ahead, Butcher sees a clear need for laboratory strategic planning to cut through the financial difficulties and shifting political theories. “We need to maintain the skills of our current workforce and our state of the art capability. It can be hard to motivate state employees to continue expanding and retraining. We are definitely impacted by hard-to-obtain funding and lack of performance-based pay. But we need to remain on the cutting edge so we can continue to address novel pathogens—like H1N1—with the same degree of proficiency.” ■

Keeping the laboratory linked into the national public health community is also vital. One of the lab’s pragmatic financial successes has been with its laboratory information management system (LIMS). “Our [previous] laboratory information system simply didn’t have the horsepower and we had data integrity problems,” said Butcher. “We had no funding, so we signed up for the LITS+ program through CDC and we still use it—very successfully. We are one of the PHLIP states that transfer data to CDC daily. We have all of the capability—and more—than other LIMS out there.”