Patients were evacuated from New York's Langone Medical Center when backup power failed.

HURRICANE SANDY

Researchers battle storm's wrath

New York University lost crucial mouse colonies, but students and staff helped to save equipment and patients.

BY BRENDAN BORRELL

For Benjamin Bartelle, the first sign that Hurricane Sandy was no ordinary storm came when each of the lab's windows popped open, scattering papers across the floor. It was about 7.30 p.m. on 29 October, and Bartelle was on the fifth floor of the Skirball Institute of Biomolecular Medicine, part of the New York University (NYU) Langone Medical Center in Manhattan. Outside, in exposed parts of the city, winds were gusting at up to 160 kilometres per hour as the storm made landfall.

Bartelle, a recent PhD finishing his last experiments in protein engineering, braced the windows shut with 20-litre water bottles. Soon after, an alarm sounded at the fish facility down the hall, and Jesus Torres-Vasquez, who studies blood-vessel formation in zebrafish, came up to check. That's when the building went dark. Sixteen blocks to the south, a record storm surge had caused the East River to break its banks, flooding a substation and triggering a blackout across the downtown area. But the Langone Medical Center, also located alongside the river, was threatened in a more direct way.

As Hurricane Sandy battered the US eastern seaboard that night, the many universities, labs and research stations in its path would feel the

effects of power outages, damaging winds and flooding. None was hit as badly as the Langone.

The medical centre was within the evacuation zone that had been declared the day before, but hospitals and nursing homes were exempt because of the risks of moving patients. The 705-bed Tisch Hospital and three connected research buildings at the Langone are equipped with backup generators and meet all safety standards, according to the NYU. Sandbags were stacked around the buildings in preparation, and maintenance workers were on call. Staff at underground mouse facilities would be working through the night to monitor tens of thousands of mice used in research projects from cancer to neurobiology.

At the Skirball, the backup power kicked in after a few minutes, but something was still amiss. Neurobiologist Wenbiao Gan and his lab staff took the lift down to the basement to find it more than ankle deep in water. They waded in to retrieve lasers and other equipment. When Bartelle saw them return with wet trouser legs, he looked out of the window. The other medical centre buildings were dark, including the Joan and Joel Smilow Research Center, a 13-storey glass and brick edifice that is also part of the Langone centre, and nearest to the river. If the Skirball was getting wet, the Smilow centre was in even bigger trouble; its basement, housing

about 10,000 mice and rats, is almost 10 metres below water level. The flood waters had surged into that building so forcefully that animal-care workers had to evacuate. The mutant and transgenic mice housed in quarantine there were left to their fates.

Bartelle headed for a residence hall but was soon dragged into a different drama, when a member of the hospital staff came in shouting: "We have to evacuate the patients from Tisch Hospital! We need all the hands we can get!" By 9 p.m., hundreds of medical and graduate students had assembled in the hospital lobby. Under the direction of the New York City Fire Department, they scaled 16 flights of stairs and brought 215 patients down on plastic sleds. On the ground floor, the patients — some of them in a coma, others recovering from surgery — were transferred to gurneys and ambulances and on to other hospitals. The students were still working 12 hours later.

By then, it was clear that much of the Langone had flooded, with freezer outages and water damage affecting the labs of 30–50 principal investigators. Worst affected was the Smilow, where severe flooding in the basement disabled the pumps feeding fuel to backup generators on the roof. A leak also spilled diesel inside the animal facility, and all the mice there drowned or died from inhaling diesel fumes. Neurobiologist Gordon Fishell lost about 2,500 mice representing 40 genetic variants, which he had developed for studies of forebrain development over more than a decade.

As NYU officials tally the damage, they will inevitably have to address the issue of whether the disaster could have been avoided or minimized. "Putting animals (or electrical control equipment) in a basement within a stone's throw from a tidal river is not a wise idea," immunologist Alan Frey wrote in an e-mail to *Nature* after losing all of his mice, which were housed at the Smilow. At the Texas Medical Center in Houston in 2001, Tropical Storm Allison destroyed millions of dollars of equipment and killed thousands of lab animals ranging from mice to monkeys. In the aftermath, engineers constructed flood gates and moved animal facilities and crucial components of the power system out of the basement.

The Smilow, which opened in 2006, can withstand a storm surge of about 3.7 metres — 20% higher than that expected from a once-per-century flood, according to the NYU. Now that Sandy has overtopped those defences, officials say that they will be assessing what they can do differently in the future.

Bartelle, whose work was spared by the disaster, says that he won't forget the efforts made that night to get patients out of harm's way — especially by students and researchers at the Smilow who knew they were facing disastrous losses to their work. "Why does the tragedy happen to the person right next to you? They don't deserve it any more than you do," he says. "It's going to be difficult moving forward for everybody." ■