

Penn medical students learn how to respond to bear attacks, avalanches, and dirty bombs

March 11 2024, by Tom Avril, The Philadelphia Inquirer



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The nine victims were scattered across an area half the size of a football field, their bodies hurled by the force from an explosive device.

But only four [emergency responders](#) were on the scene. With burns, fractures, and major bleeding among the likely injuries, how could they determine which of the nine needed help first?

The "explosion" was not real, but rather a training exercise for [medical students](#) at the University of Pennsylvania, during which no one was actually hurt. Still, with their professors watching closely as they scurried from victim to victim, the young doctors-in-training treated it like a life-or-death affair.

The exercise, held at Camp Shelly Ridge, a Girl Scout camp in Lafayette Hill, was part of a two-week elective in wilderness and disaster medicine at Penn's Perelman School of Medicine. Students learn to treat injuries from bear attacks, avalanches, dirty bombs, and chemical weapons, among other dire out-of-hospital scenarios. They also study survival skills such as navigating with a compass and shelter-buildingâ€"an unusual offering for any [medical school](#), let alone an urban, research-focused institution like Penn.

Most of the students were in their fourth year at the medical school, seeking a change of scenery just days before learning where they'll be headed next, in the annual residency-placement exercise called Match Day.

Andy North, a third-year student from Minnesota, knelt to examine Juan Serrano, a fourth-year student who lay on the ground moaning in pretend anguish.

"Are you able to walk?" North asked.

"I can walk, but it hurts to breathe," Serrano replied. "I was driving. It's

the last thing I remember."

Upon determining that Serrano had no penetrating injuries in his chest or abdomen and was able to breathe, North moved on to the next victim despite his patient's continued pleas.

"Help, somebody help!" Serrano cried.

But he would have to wait. Several of the other victims turned out to be in far worse shape, with conditions such as cardiac arrest and amputated limbs, for which the risk of death or permanent disability climbs with each passing minute.

Medicine on Mount Everest

The popular annual course is taught by two Penn Medicine emergency physicians who've done this sort of thing in the real world. One is Danica Zold, an avid outdoorswoman who once treated a stranded climber near the base of Mount Everest. The other is Jonathan Bar, whose list of war stories includes the time he investigated a March 2022 mass poisoning at a Camden preschool.

"At the time, we didn't know if it was a terrorist attack," he recalled.

The culprit turned out to be in the children's milk cartons, which contained an industrial sanitizer that a manufacturer had failed to flush from its milk supply lines, he said. Dozens of children were taken to the hospital but ultimately recovered.

Among the lessons Bar shared with students from that episode: Never try to identify an unknown substance by taking a whiff, lest it be hazardous. An emergency responder made the mistake of doing so on that occasion, telling the physician that leftover fluid in the milk cartons smelled like

vinegar. (Vinegar was indeed one of the ingredients, and the man did not suffer any ill effects from the ill-advised sniff. But it wasn't worth the risk. Identifying chemicals is the job of a chemist.)

At a glance, some of the topics covered during Penn's two-week course seem to have little in common, including water rescues, hunting accidents, and space medicine. The unifying theme is practicing emergency medicine without the tools and staffing available at a fully equipped medical center.

Clear communication, important in any field of medicine, is of particular importance in the wild, said Zold, citing the example of when she helped treat the climber on Mount Everest.

The physician was part of a group making a nine-day trek to one of Everest's base camps when they came across their fellow climber sitting by the side of the trail at an altitude of 13,000 feet.

The woman was suffering from confusion and nausea, clear signs of altitude sickness, Zold determined. Yet the visibly ill climber still insisted she was OK, and that she merely needed to rest for a bit.

Zold gently persuaded the distressed climber that she needed to turn around, a tricky conversation given that the woman, like anyone who attempts the climb, had spent months preparing for it.

"People are very committed at that point," said Zold, who along with other members of her group cut short their own climb in order to help the ailing climber back down to safety.

The explosion scenario

For the explosion training exercise, four students played the role of

responders. Eight other students, along with an assistant instructor in the course, pretended to be the victims.

Brooke Bernardin, a fourth-year medical student from suburban Boston, took on the role of team leader, setting up a command post near the site of the imaginary explosion after the immediate danger was past.

The other three responders fanned out across the surrounding field to assess the casualties. They divided up the task by geographic sector, each running off to render preliminary aid to three victims apiece.

A reasonable instinct, but unfortunately, not the best choice in this case, the course instructors told them afterward. The nine victims were scattered so far apart from each other that the responders were unable to keep them all under constant observation.

As a result, one of the nine "died" from a potentially treatable condition called tension pneumothorax, in which air enters the [chest cavity](#) as the result of traumatic injury, pressing against the lungs to the extent that they can collapse.

In a post-incident debriefing session, Bar suggested a better approach: Designate two rescuers to carry the nine victims to a central location where they could be continuously monitored by a third responder. Bernardin's role, quarterbacking the rescue effort via walkie-talkie, would remain unchanged.

That way, the team could get the most worrisome cases into a rescue helicopter or ambulance as soon as they arrived, said Bar, who is the director of emergency preparedness for Penn's four Philadelphia hospitals.

"Sometimes the best medicine is diesel. Get them to the hospital," he

said.

The students were dismayed.

"We executed a poor game plan," said North, the third-year student from Minnesota.

"It wasn't the most efficient," said Bernardin, the team leader.

Instructors Zold and Bar told them not to be hard on themselves. For a first effort, they had done a good job.

Before the two-week course was over, they would be asked to respond to two more simulations of mass casualty events: one at Penn Presbyterian Medical Center in West Philadelphia, the other during an overnight camping trip in the Watchung Reservation nature preserve in northern New Jersey.

"They'll get a little better each time," Bar said.

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Citation: Penn medical students learn how to respond to bear attacks, avalanches, and dirty bombs (2024, March 11) retrieved 27 April 2024 from <https://medicalxpress.com/news/2024-03-penn-medical-students-avalanches-dirty.html>

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