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SciJourner

Teens Engaging Science Through Journalism

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Volume 2 • Issue 2

MAY • 2010

Baseball Bats Become Weapons

KEITH ALLISON, FLICKR CREATIVE COMMONS

Baltimore Oriole Luke Scott's bat splits during a game.

ABBY SMITH
Fort Zumwalt North High School

During a game between the Rangers and the Blue Jays on April 21, 2009, home plate umpire Kerwin Danley left the diamond on a stretcher after getting hit in the head by a broken bat. On April 25, 2009 Susan Rhodes, a 50-year-old mother of two, was hit in the head by Todd Helton's bat during a Rockies–Dodgers game. She suffered two fractures in her jaw, requiring screws to repair it, and ran up more than $7,000 in medical bills that the Dodgers' insurance carrier may not pay. Rhodes says she isn't sure if she will attend another Dodgers game. And who's to blame her?

Major League Baseball (MLB) has realized that broken bats have become a major problem. Since July 2, 2009, all MLB teams have collected every cracked, shattered or chipped bat during a game so that the University of Wisconsin's Forest Products Laboratory can study them. They are trying to better understand why so many bats are breaking and what can be done to solve it.

"This is our biggest effort to have all the clubs' bats collected," said Pay Courtney, a spokesman for MLB.

Sam Holman, the founder of Original Maple Corporation, a maker of wooden bats, suggested that some companies could be using inferior wood, and that could be the main reason more bats are faltering.

In the days of Babe Ruth, he and every other player used hickory wood bats. Now, due to the desire for lighter weight bats—for faster bat speed and higher batting averages—ash is the preferred choice of wood for most major leaguers, said Angels second baseman Howie Kendrick.

Others prefer maple. Holman claimed that home run slugger Barry Bonds once told him he preferred how maple didn't bend, so he didn't have to compensate with his swing as much as he did with an ash bat.

Maple and ash tend to break in different ways. While ash tends to crack and flake off in smaller chunks, maple tends to fracture in bigger, jagged shards, explained Lloyd Smith, a mechanical and materials engineer from Washington State University, in 2008.

Smith associated some of the differences in breaking patterns to the structure of the pores, which transport moisture inside the trees used to make bats. "Ash is 'ring porous.' Inside the wood there is a whole bunch of pores in the grain areas that carry moisture through the tree. However, in the region of the growth ring, where there isn't any grain, it is more or less solid fiber," said Smith. Good for bats. Unfortunately, the growth ring regions do have weak spots, because voids can concentrate in certain areas. When the ash bat hits a ball, the cell walls collapse in one of these voids and this causes layers of the wood to flake off.

Maple, on the other hand, is "ring diffuse," meaning its pores are more evenly arranged throughout the wood. "So a characteristic of maple that exists today is the barrel is very durable; you don't get these flaking kinds of failures in maple that you did in the ash bats," Smith explained to livescience.com.

Smith suggested requiring thicker handles, like those on older bats, to reduce the number of broken bats.

The Case of the Mysterious Allergic Reaction

KIONTEY TURNER
YES SciJourn Journalist

DAPHNE EMRICK

What happens when KiOntey Turner, a teen emergency medical technician in St. Louis, treats two patients with a mysterious allergic reaction?

Leaving Saint Louis University Hospital in our ambulance after a pretty mild call, we were dispatched to treat two patients having allergic reactions. Dealing with two patients is not something normally done in an ambulance that only has one stretcher, but we were committed and had to do the job that we were assigned.

When we got to the scene, there was a nurse standing outside the clinic. She looked worried, frustrated, and concerned—all at the same time.

"What were the patients exposed to?" we asked. She wasn't quite sure, but they both had been decontaminated—a way to cleanse people of any substance that may cause harm to the body. We could come in to the clinic, examine the patients and transport them to the hospital, the nurse informed us.

We went directly into the room where the patients were held and immediately I saw that both men had hives and very flushed appearances.

I didn't know what to expect, but I did all that I could do for these men until we got to the hospital. We took their blood pressures and kept them calm and collected. Neither of the men spoke English very well and talking to them was a challenge, but it had to be done.

When we got them to the hospital, the staff at Barnes Jewish Hospital was much more concerned about the contamination issue. The nurses decontaminated both patients again to make sure that they were clean.

Neither the medics nor myself knew what substance caused the allergic reaction, but after looking at the MSDS (Material Safety Data Sheet)—a form that explains the allergic reactions, severe reactions and other effects that the said chemical could have on the human body—we came to the conclusion that we were exposed to potassium sulfate (K_2SO_4).

Potassium sulfate is described as a non-flammable skin irritant, when the skin is exposed to it for a period of time. This chemical can also have negative effects on two specific body systems: the respiratory and integumentary system. The respiratory system controls a person's breathing and the exchange of oxygen and carbon dioxide throughout the body. The integumentary system is the skin, which regulates body temperature and also is the first line of defense when fighting off any illness. When someone is exposed to potassium sulfate, the skin gets irritated. Hives and rashes can form and cause the person to itch severely. If the respiratory system is also exposed to this chemical, the throat can swell shut in order to protect itself.

Treating these patients was hard work and a risk for the medics. While treating these men, the medic crew and myself came into slight contact with potassium sulfate, which resulted in all of us experiencing a minor itching feeling on our hands and face. We informed the nursing staff at Barnes Hospital and we were told to return to headquarters, remove all of our clothes, rinse off in cool water, and then use soap and water to clean our bodies. Our clothes were immediately washed clean and we were back out on the streets.

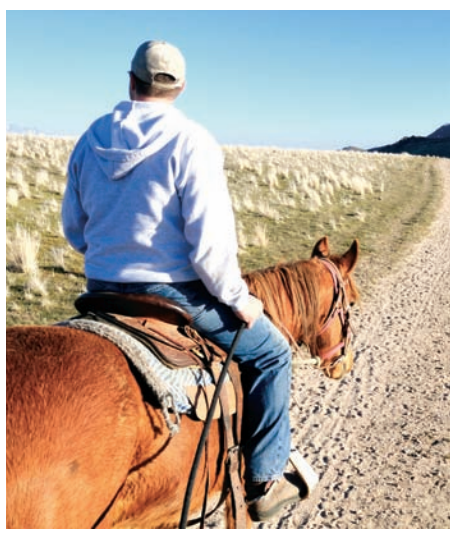
Horse Therapy

HALEY GOEBEL
St. Charles High School

When you wake up in the morning you take it for granted that you will be able to get out of bed on your own. But for someone who suffers from a physical disability, even the act of getting out of bed is a team effort. Research released in July 2009 from Washington University School of Medicine Program in Occupational Therapy now shows that a new therapy technique with horses could help people with certain disabilities lead more fulfilling and active lives.

This new therapy technique is hippotherapy, also known as therapeutic horsemanship. What makes hippotherapy so different from other therapy techniques is the use of the horse as a therapeutic tool. Hippotherapy uses the natural movement of a horse to help patients with disabilities.

According to the National Center for Equine Facilitated Therapy, patients from as young as two years old to adults can benefit from hippotherapy. What makes hippotherapy so successful is that the gait of the horse is very similar to the gait of a human, which means that patients can help build the muscles that are key to walking on their own.



FLICKR-CREATIVE COMMONS

Horse therapy helps people with disabilities lead more fulfilling and active lives.

According to Barbara Smith, a registered occupational therapist in Massachusetts, by sitting in different positions on the horse, a hippotherapy patient can strengthen individual muscles that are important in day-to-day activities. When patients sit sideways they must adjust their weight which helps increase balance. Lying on their stomachs allows joint stimulation and strengthens neck muscles. Hippotherapy has been shown to help patients improve balance, posture and coordination, according to the American Hippotherapy Association (AHA).

Hippotherapy has also been shown to help with patients' overall mental health. According to the AHA, hippotherapy can help patients with a wide variety of illnesses including autism spectrum disorder, cerebral palsy, learning disabilities, and traumatic brain injury or stroke.

If hippotherapy is so successful, why is it not more commonly used? According to Aetna Insurance Co., hippotherapy is still in the investigational phase. They say there is not enough valid scientific data to support hippotherapy as a treatment strategy.

However, research from Washington University School of Medicine has substantiated the benefits of hippotherapy. According to Tim Shurtleff, the lead researcher for the Washington University study and an occupational therapist, "Beliefs about the positive effects of hippotherapy are strongly held, but not yet fully supported by objective evidence."

Shurtleff and the rest of the team from Washington University used a video motion capture technique, which involved placing surface markers on the patients. They then recorded the results as the patients sat on a mechanical barrel that simulated a horse's movement. The team recorded the results over a 12-week period.

The results indicate substantial benefits in head stability and trunk support, and the ability of children with spastic diplegia cerebral palsy to reach their arms. Spastic diplegia is a form of cerebral palsy that delays muscle growth in the legs; this leads to a tightness in the joints that decreases mobility. Even more surprising, the patients showed sustained progress made during their 12-week hippotherapy sessions.

Shurtleff went on to say, "We have shown that hippotherapy is a therapeutic tool that makes a measurable and visible difference in basic skills that form the foundation of most functional activities of everyday life."

Video Game Offers Real Science

WILL WHISTLER-BROWN
St. Charles High School

Have your parents ever told you to stop wasting your time playing a video game? Next time, just tell them that you're studying to become an epidemiologist.

Epidemiology is the study of epidemic and pandemic diseases, their causes and how they spread among people. In the last few years more attention from the scientific community has focused on possible ways to use video games, specifically Massively Multiplayer Online Role Playing Games (MMORPGs) such as *World of Warcraft*, to simulate the reactions of people infected with a highly contagious disease, as suggested in a 2007 report in the *Lancet Infectious Diseases* medical journal.

"Human behavior has a big impact on disease spread. And virtual worlds offer an excellent platform for studying human behavior" said Professor Nina Fefferman, in a 2007 interview with the BBC. Fefferman is a researcher at Tufts University School of Medicine who specializes in studying viral diseases. Other researchers question how well a game environment would represent real life reactions. Fefferman acknowledged that a game environment might lead people to make riskier decisions, but also said that those behaviors could be estimated and allowed for when drawing conclusions.

The idea of using computer models to simulate epidemics is not a new one. The difference is that all the other computer models are number based, not people based, and almost none of those computer models figure in the host's behavior. For example, traditional models might not include a factor such as curiosity. When an event occurs that is newsworthy, reporters flock to the area and may on their return journey carry the infection back home.

Interest in a human-controlled simulation was sparked back in 2005 when a programming glitch in the MMORPG *World of Warcraft* caused a highly contagious disease, meant only to exist in a high-level zone, to infect major cities in-game and cause mass panic. Some people tried to act as first responders, doing what they could to keep others alive, while others purposely infected themselves and traveled to other areas to infect as many people as possible.

BLIZZARD ENTERTAINMENT

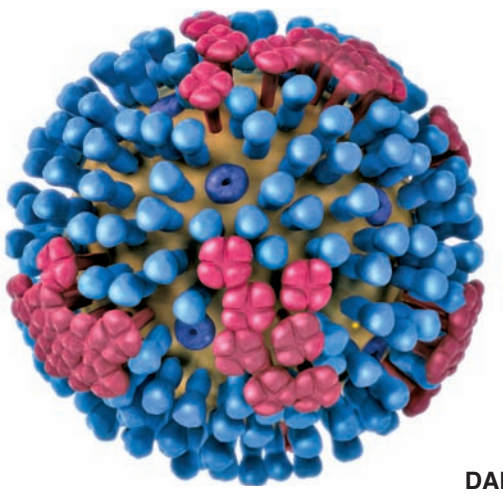
A glitch in the online game, *World of Warcraft* , provided clues on how diseases spread in the real world.

Eventually, the game moderators imposed a voluntary quarantine that was ineffective at best. So far, this scenario has not been recreated and the glitch has been fixed.

To date, no other disease studies have been done using MMORPGs, but some high-ranking developers at Blizzard, the company that makes *World of Warcraft*, have indicated via forum posts on the official *World of Warcraft* web site that their company may be willing to participate in further studies.

In the future, epidemiologists may be able to introduce diseases into a game world and then record the effect on the player population, but for now it was just a glitch.

H1N1 Virus Attacks United States



DAN HIGGINS, CDC

They are still out there—a three-dimensional representation of the proteins that make up the surface of a H1N1 virus. H1N1 virus is still making Americans sick.

HEATHER RISENER
Fort Zumwalt North High School

In 2009, the virus H1N1 affected Americans. This led Americans to believe that they were in great danger, becoming more aware of how to protect themselves against this virus.

The H1N1 flu, commonly known as "swine" flu, has hit America hard. According to the Centers for Disease Control and Prevention (CDC) web site, during the months from April 2009 until January 16, 2010, there have been a total of 11,690 deaths and 257,000 hospitalizations due to this flu.

Overall, known cases, hospitalizations and deaths caused from the H1N1 virus in the United States have totaled 57 million cases. Of those, 19 million were people 17 years old and younger, 33 million were 18 to 64, and 5 million were 65 or older, reports the CDC.

According to Dr. Jeffery Taubenberger from the National Institute of Allergy and Infectious Diseases, the patterns of damage to the airway in the swine flu autopsies closely matched those from earlier 1918 and 1957 flu pandemics.

According to the CDC, the flu attacks the entire respiratory system, but mainly targets three major organs: lungs, bronchial tubes, and trachea.

The World Health Organization (WHO) has provided information based on autopsy reports that in all cases the upper respiratory tract is inflamed and severely damaged. In more than half of the H1N1 cases, the lower respiratory tract is also inflamed, or damaged. In more than two-thirds of the cases there was also damage in the air sacs in the lungs.

Healthy young adults are at risk for contracting the H1N1 virus and protecting yourself is very important. "Getting vaccinated is the best way to protect yourself and your family against the H1N1 flu virus," said Kathleen Sebelius, the head of the U. S. Department of Health and Human Services on September 11, 2009. "Fighting the flu is a shared responsibility, and it is up to all of us to help prevent the spread of the flu in your community."

On their web site, the staff of the Mayo Clinic published that there are many more things you can do to protect yourself from the H1N1 virus. These include washing your hands often, using tissue when you sneeze or cough, sneezing or coughing against your inner arm or sleeve, not touching your eyes or nose without washing your hands first, staying away from people who are sick, limiting contact with others if you are sick, staying home if you are sick, and trying to keep healthy by eating well and exercising.

In a June 11, 2009 news conference, Dr. Margaret Chan, Director General of the WHO, said that the virus is now unstoppable. She mentioned that symptoms of the H1N1 virus are different in adults and children. Adults suffer from difficulty breathing or shortness of breath, pain or pressure in the chest or abdomen, sudden dizziness, confusion, severe or persistent vomiting, and/or flu-like symptoms which improve, but then return with fever and worse cough. Children, on the other hand, experience fast breathing or troubled breathing, bluish or gray skin color, not drinking enough fluids, severe or persistent vomiting, not waking up or feeling lethargic, being so irritable that the child does not want to be held, and flu-like symptoms that improve, then return with a fever and worse cough.

FRANCIS MAYNE, FLICKR CREATIVE COMMONS

Head injuries and even picking your nose as a youth can have long-term consequences.

Don't Pick Your Nose!

NATHAN BOLDEN
YES SciJourn Journalist

Do you play football, soccer, or any other contact sport? Do you pick your nose? According to John Morley, Professor of Gerontology at St. Louis University's Medical School, some of these activities could seriously affect the brain. Something as small as picking your nose, or even playing contact sports, can increase you risk of developing Alzheimer's Disease, Morley told participants at the Saint Louis Science Center's SciFest 2009 in October.

Research has shown that taking hard hits to the head—for example, heading a soccer ball or getting tackled in football—can cause major brain damage and or head trauma that can lead to many other side effects, says Morley. Effects can include dizziness, headaches, confusion, amnesia, loss of consciousness, and the inability to perform to potential during the following school year, according to sportsinjurybulletin.com. There is emerging data that indicates that men who play in the National Football League are much more likely to develop Alzheimer's and dementia, Morley told *SciJourner*.

Alzheimer's disease is a fatal brain disease that 5.3 million Americans are living with today and the seventh-leading cause of death in the United States, according to the Alzheimer's Association. Alzheimer's destroys brain cells, causing memory loss and problems with thinking and behavior severe enough to affect work, lifelong hobbies or social life. The disease gets worse over time, and is fatal.

Even stranger, according to Morley, "nose picking can lead to Alzheimer's." Picking your nose can inflame the cribiform plate—a horizontal bone in the in the nose. This platelike bone is closely connected to the olfactory bulb—the part of the brain that regulates your ability to smell. According to Morley, inflammation in the nose, sets off a cascade of cytokines, which are proteins that interact with the immune system to assist with the body's response to infection. This, in turn, leads to increased amyloid-beta protein production, the causative agent in Alzheimer's disease. In other words, when picking your nose, you irritate certain parts of it and cause inflammation, which may indeed cause Alzheimer's Disease.

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SciJourn is a collaboration between the College of Education at the University of Missouri–St. Louis and the Saint Louis Science Center's Youth Exploring Science program.

This material is based upon work supported by the National Science Foundation under Grant No. DRL-0822354