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FACE
Fatality Assessment and Control Evaluation Program
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Hispanic Worker Dies After Being Hit With a Projectile From a Nearby Commercial Lawnmower—North Carolina

SUMMARY

On April 17, 2013, a 30-year-old male Hispanic lawn care worker was injured when struck in the head by a metal projectile from a coworker's lawn mower. He died on April 18, 2013, from his injuries. The lawn care worker was trimming approximately 25 feet away from his coworker when the coworker ran over a pet tie-out stake with a lawn mower. The mower sheared off part of the stake, creating a projectile that struck the lawn care worker on the side of the head. The medical examiner identified the cause of death as blunt force trauma to the head.

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- ***Yard fixtures and debris present during mowing operations.***
- ***Lawn mower discharge deflector facing toward individuals working nearby.***

RECCOMENDATIONS

NIOSH investigators concluded that, to help prevent similar occurrences, employers should:

- ***Require a thorough examination of the work area for debris and fixtures before lawn mowing and require employees to flag or mark objects that cannot be removed.***
- ***Implement a comprehensive safe work practice for lawn care as mentioned in the operating manual for the lawn care machinery (i.e., not pointing the discharge toward any persons or buildings and maintaining a safe distance away from others operating lawn care equipment).***
- ***Consider adding a mulching chute attachment to lawn mowers to catch any potential projectiles.***

Additionally, manufacturers of yard fixtures should:

- ***Consider using bright colors or flags to increase the visibility of yard fixtures, such as metal pet tie-out stakes placed in the ground.***

Additionally, homeowners should:

- ***Remove pet tie-out stakes when they are not in use or purchase a tie-out stake that can be easily removed prior to lawn maintenance.***

INTRODUCTION

On April 17, 2013, a 30-year-old male Hispanic lawn care worker was injured when struck in the head by a metal projectile from a nearby coworker's lawn mower. He died on April 18, 2013, from his injuries. On July 31, 2013, officials of the North Carolina Occupational Safety and Health Administration (NCOSHA) notified the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), Fatality Assessment and Control Evaluation (FACE) program of the fatality. On September 18, 2013, two DSR safety and occupational health specialists and an Epidemic Intelligence Service Officer conducted an investigation of the incident and reviewed the incident circumstances with the investigating NCOSHA safety compliance officer assigned to the case. NIOSH reviewed the medical examiner's report and the death certificate, along with photographs of the incident site and witness statements taken by NCOSHA. On December 18, 2013, the NIOSH investigators interviewed the lawn care worker's employer to gain further details about the incident.

EXPOSURE DESCRIPTION

In 2014, approximately 1,585,000 landscaping and groundskeeping workers and supervisors were part of the U.S. labor force [BLS 2014]. The rates of injuries and illnesses resulting in at least 1 day of lost work for landscaping and groundskeeping workers in 2014 was 264.8 per 10,000 full-time equivalent (FTE) workers, which is more than twice the rate for all workers (107.1 per 10,000 FTE) [BLS 2015, p. 9, 22]. In 2014, preliminary data from the Census of Fatal Occupational Injuries revealed that 84 landscaping and groundskeeping workers died from an injury at work and an additional 32 (preliminary) first-line supervisors of landscaping, lawn service, and groundskeeping workers also died at work. Of these worker and supervisor deaths, 18 (preliminary) or 15.5% involved agriculture or garden machinery [BLS 2015, p. 9, 22]. Since 2003, the numbers of fatalities among workers and among supervisors combined has ranged from 110 in 2010 up to 140 in 2009 [BLS 2015, p. 9, 22; NIOSH 2008].

EMPLOYER

The employer was a small, family-owned, landscaping business servicing nearby neighborhood homeowners and businesses. At the time of the incident, the employer's business was approximately 3 years old, was managed by the owner and his brother, and employed six seasonal contract workers. The workers serviced approximately 10 lawns each day, depending on the customer's property size. Larger, commercial properties required 1 or more days to complete lawn care services whereas residential yards usually required less than an hour. The usual work shift was from 8 a.m. to 5 p.m., 5 days per week, with a 1-hour break for lunch. Typical employee activities included mowing grass, trimming plants and foliage, gardening, and occasionally trimming trees during most months of the year but more frequently during the spring, summer, and fall. The most senior worker typically operated the mower while other workers trimmed, unless a worker required training on a specific piece of equipment. On the day of the incident, the owner was working in his home office in the same neighborhood. The owner was not bilingual; rather the lawn care worker (the victim) typically assisted with translating for Spanish-speaking workers. This was the company's first fatality.

WRITTEN SAFETY PROGRAMS and TRAINING

The employer did not have a formal written occupational safety and health program. Workers were verbally instructed to maintain a "safe distance" from the mower and to conduct activities in separate areas of the yard. They were made aware of the possibility of objects being thrown from lawn mowers if run over. The workers were also instructed to examine the yard, check for debris, and remove smaller objects such as rocks, sticks, and decorations. Workers mowed around larger objects such as furniture and fixtures. The employer required and provided workers with safety goggles and hearing protection.

VICTIM

The 30-year-old Hispanic male lawn care worker was approximately 64 inches tall and weighed 130 pounds. According to the employer, the lawn care worker was a college-educated Central American immigrant and had been in the United States for approximately 12 years. Although his first language was Spanish, he was functionally fluent in English. He worked as the lead landscaper for the current employer for about a year and a half. He received verbal safety training through continuous conversations with the employer with no formal on-the-job training. At the time of the incident, the lawn care worker was wearing safety goggles, as required by the employer, but it was unknown if he was wearing any hearing protection. The lawn care worker previously worked for another landscaping company.

INCIDENT SCENE

At the time of the incident, the lawn care worker was using a weed trimmer in the backyard of a private residence. The homeowner was a customer during the February through November cutting season for nearly 2 years prior to the incident. The home is set on a 13,000-square-foot lot with an approximately 7,500-square-foot backyard. The yard drops approximately 15 feet from the back of the property to the front of the property line, with some minor variations in grade. The metal projectile was from a spiral pet tie-out stake used to secure a pet on a leash in the homeowner's backyard. The backyard has several mature trees, garden décor, and equipment (Photo 1). The lawn care worker was located approximately 25 feet from the operating lawn mower while using a trimmer.

Photo 1. Incident scene. Backyard of private residence.
(Photo courtesy of NCDOL/OSH.)

EQUIPMENT/PERSONNEL

The mower was a 2009 Toro Grandstand commercial stand-on mower, model 74558, and purchased new at the start of the business, approximately 3 years before the incident (Photo 2). The mower was maintained and serviced regularly, according to manufacturer recommendations, by employees or the local dealer. The mower's operator manual is available online from the manufacturer's website in English, Spanish, and French [TORO 2008]. The distance from the ground to the bottom of the mower deck was about 4 inches. The distance from the ground to the flexible rubber grass discharge deflector ranged from 1–9 inches. According to the manufacturer, the maximum travel speed of the lawn mower moving over the ground was approximately 8 miles/hour, and the speed of the blade of this mower was 8,500 feet/minute or 96.6 miles/hour at the tip of the blade. Lawn mowers operate at blade speeds of 3,000 revolutions/minute and can propel an object at a speed up to 232 miles/hour [Coopwood 1976].

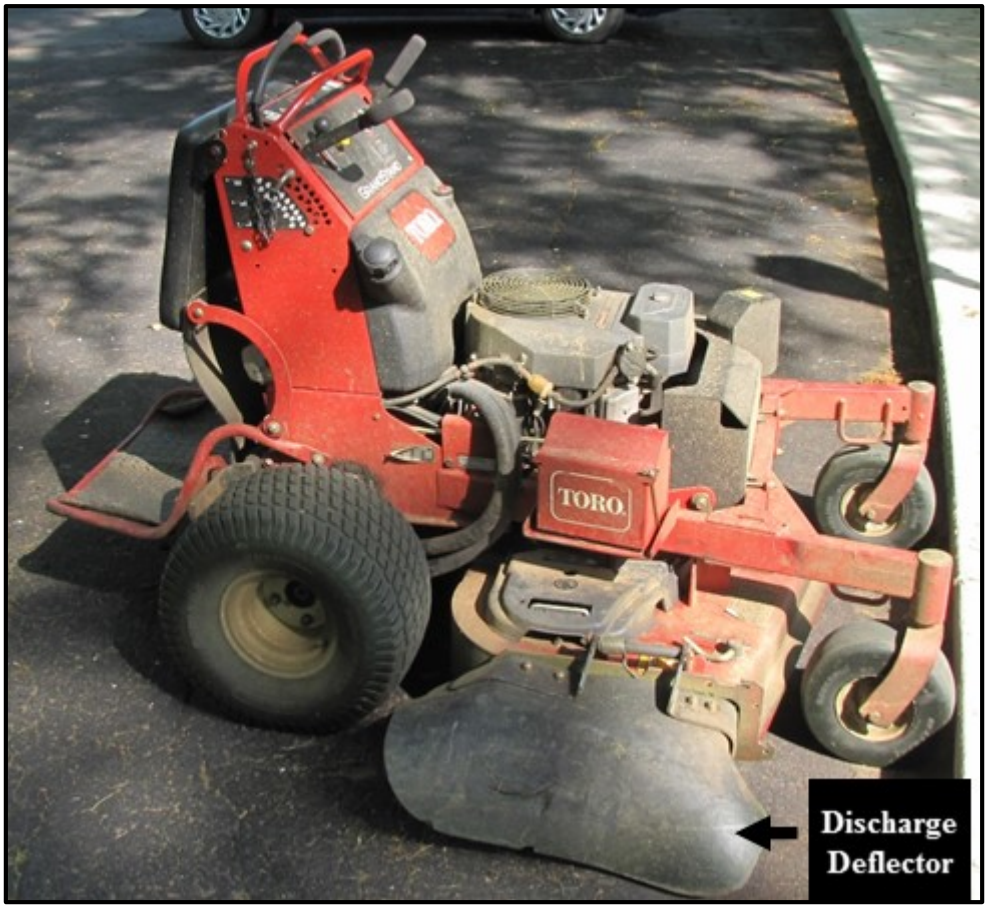

Photo 2. Stand-on lawn mower involved in this incident.
(Photo courtesy of NCDOL/OSH.)

WEATHER

The incident occurred on April 17, 2013, at approximately 2:20 p.m. On the day of the incident, the weather was mostly cloudy with no precipitation, and the temperature was in the 70s [Weather Underground 2013]. The weather is not believed to have been a contributing factor in this incident.

INVESTIGATION

On April 17, 2013, at approximately 2:00 p.m., the lawn care worker and his coworker went to trim and mow a residence. The two workers had completed eight residences and had three remaining for the day. The lawn care worker was operating a weed trimmer approximately 25 feet from his coworker who was operating the stand-on mower. Both were wearing safety goggles. Before beginning work at this home, the lawn care worker and the coworker examined the yard for debris. At the time of the incident, the lawn mower was traveling from the left side of the yard to the right in relation to the home. As a result, the discharge deflector would alternate facing the house and the back fence. Nearing completion of the yard, the lawn mower struck the metal pet tie-out stake, shearing off a metal piece, discharging it out from under the

lawn mower and hitting the lawn care worker on the side of the head. The discharge deflector was facing the area where the lawn care worker was standing when the incident occurred, although his exact location when struck by the metal projectile is not clear. There was no information on whether the deflector was in the horizontal position, as recommended by the manufacturer, at the time of the incident (Photo 2). The homeowner was working in their home office and noticed a loud noise but returned to work after seeing the lawn care worker on the phone. The homeowner was unaware the lawn care worker was involved in an incident until the ambulance had arrived.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following unrecognized hazards as key contributing factors in this incident:

- ***Yard fixtures and debris present during mowing operations.***
- ***Lawn mower discharge deflector facing toward individuals working nearby.***

CAUSE OF DEATH

The medical examiner listed the cause of death as traumatic brain injury resulting from blunt trauma to the head due to metal spike/anchor projectile.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Employers should require a thorough examination of a work area for debris and fixtures before lawn mowing and require employees to flag or mark objects that cannot be removed.

Discussion: OSHA and other lawn maintenance organizations recommend a thorough sweeping of a work area, removing debris and temporary fixtures, such as metal stakes, before performing any landscaping tasks [OSHA no date; KSU 2009]. Employees or homeowners should flag or mark objects that cannot be removed so they are more visible. OSHA provides the following specific recommendations on sweeping an area before mowing in order to reduce the risk of injury from thrown objects:

- Clear the work area before you begin.
- Pick up sticks, bottles, rocks, wires, and other debris before you begin.
- Keep children and bystanders away from the area.
- Wear long pants to protect your legs from debris.
- Wear safety glasses at all times unless you are inside an enclosed cab.
- Workers in the area should wear safety glasses and a face shield when operating string and brush trimmers.
- Shut off equipment when crossing a sidewalk, driveway, or road.

Recommendation #2: Employers should implement a comprehensive safe work practice for lawn care as described in operating manuals for lawn care machinery (i.e., not pointing the discharge toward any persons or buildings and maintaining a safe distance away from others operating lawn care equipment.)

Discussion: Employers should train employees to follow safe operating procedures as described in operating manuals for lawn care machinery. Training should be conducted in the language and literacy level of each worker. Landscaping companies should ensure that employees perform a pre-use inspection of all equipment, replacing any damaged parts before use. The training should include the following elements, at a minimum, to prevent injury [TORO 2008; Virginia Tech 2014; KSU 2009; TAMU 2011]:

- Follow the guidelines in the operating manual.
- Wear personal protective equipment (PPE) (i.e., hearing protection, eye protection, seatbelts, steel-toed shoes, and long pants). *Note: A type II hardhat with protection against lateral impact and a face shield would offer maximum protection against flying objects.*
- Ensure that all equipment shields and guards are in place and functioning. Never remove shields to increase clipping discharge or for any other reasons.
- Never operate with the discharge deflector raised, removed, or altered, unless using a grass catcher.
- Never operate with the power take-off shield or other guards not securely in place.
- Be sure all interlocks are attached, adjusted properly, and function properly.
- Turn off the mower engine before unclogging the discharge chute.
- Only operate in good light, keeping away from holes and other potential hazards.
- Keep hands and feet away from the spinning blades at all times.
- Never raise the deck with the blades running.
- When operating push mowers, wear shoes that optimize traction.
- Never operate on wet grass. Reduced footing could cause slipping, and soft turf conditions can affect the machine's stability.
- Use caution while operating near drop-offs.
- Slow down and use caution when making turns and when changing directions on slopes.
- Slow down and use caution when making turns and crossing roads and sidewalks.
- Stop blades if not mowing.
- Keep bystanders and pets away.
- Do not allow any additional riders on riding mowers.
- Never leave a running mower unattended.

The manufacturer uses safety decals on the unit and explicit warnings in the manual that the unit should not be operated near bystanders (Photo 3). The manufacturer does not define a safe distance because several factors can influence how far a projectile may travel.

OSHA provides safety guidelines for landscape and horticultural services [OSHA no date]. The Consumer Products Safety Commission and the National Association of Landscape Professionals have developed additional safety guidelines and safety training for lawn maintenance equipment [CPSC 2013; NALP, no date]. The American National Standards Institute and Outdoor Power Equipment Institute have developed guidelines for developing safe lawn maintenance equipment for the landscape industry [ANSI/OPEI 2012, 2013].

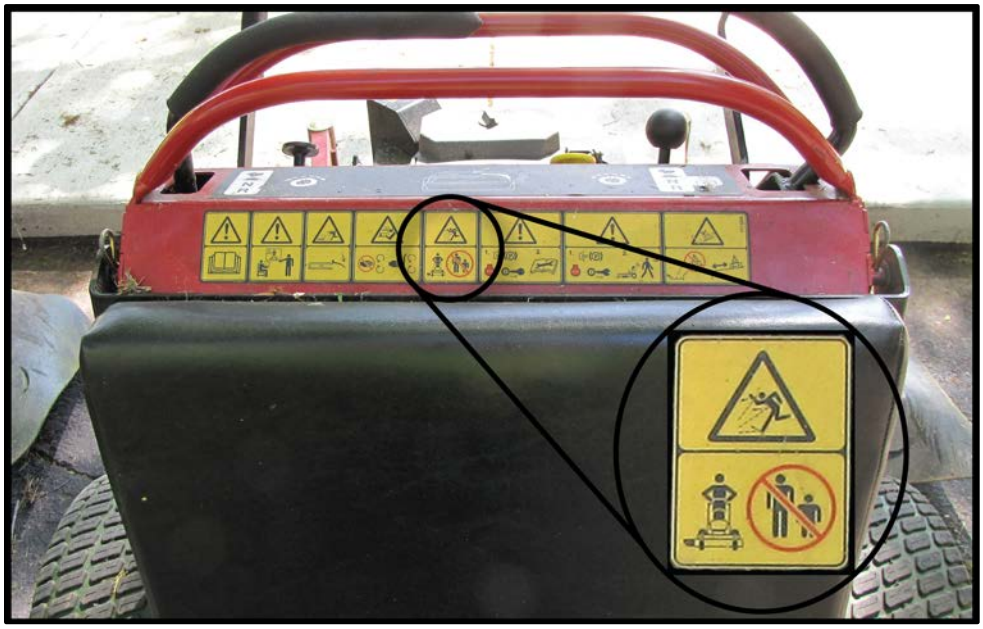

Photo 3. Safety decals below the operating controls, showing hazards of operating a lawn mower, with expanded view of warning about flying debris, and that other people should stay away from the mower while in operation.

In this incident, formal safety training in the employee's own language may have increased awareness of the potential for a small object to become a projectile if run over with a mower. The lawn care workers may also have considered working in different sections of the yard rather than near the mower.

Recommendation #3: Landscaping companies should consider adding a mulching chute attachment to lawn mowers to catch projectiles.
Discussion: Operators should keep the deflector lowered as outlined in the owner's manual, unless operating a grass catcher. Commercial lawn mowers can be fitted with a mulch chute to recycle cut grass to help catch any projectiles. Such accessories can be added by the distributer during purchase or later to the unit. Discharge deflectors can warp, diminishing their structural integrity and reducing the ability of the deflector to prevent an object from becoming a projectile. A damaged or warped discharge deflector should be replaced.

Recommendation #4: Manufacturers should consider using bright colors or flags to increase the visibility of yard fixtures, such as metal pet tie-out stakes placed in the ground.

Discussion: Manufacturers of pet restraint stakes should consider offering pet tie-out stakes in a variety of highly visible colors to reduce trips, foot injuries, and potential projectiles from lawn mowers. Stakes with bright colors would increase visibility and will alert lawn care workers and homeowners to remove them.

Recommendation #5: Landscaping companies and workers should advise homeowners to remove pet tie-out stakes when they are not in use or purchase a tie-out stake that can be easily removed for lawn maintenance.

Discussion: Landscaping companies and workers should encourage homeowners to remove all yard fixtures including pet tie-out stakes when they are not in use or purchase a tie-out stake that is brightly colored, marked, and easily removed for safe mowing. Homeowners should also be encouraged to use pet tie-out stakes that are brightly colored and place them in marked areas for better visibility to reduce risk of injury to anyone accessing the area, with the understanding that this for the safety of the workers and the homeowners.

DISCLAIMER

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INVESTIGATOR INFORMATION

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