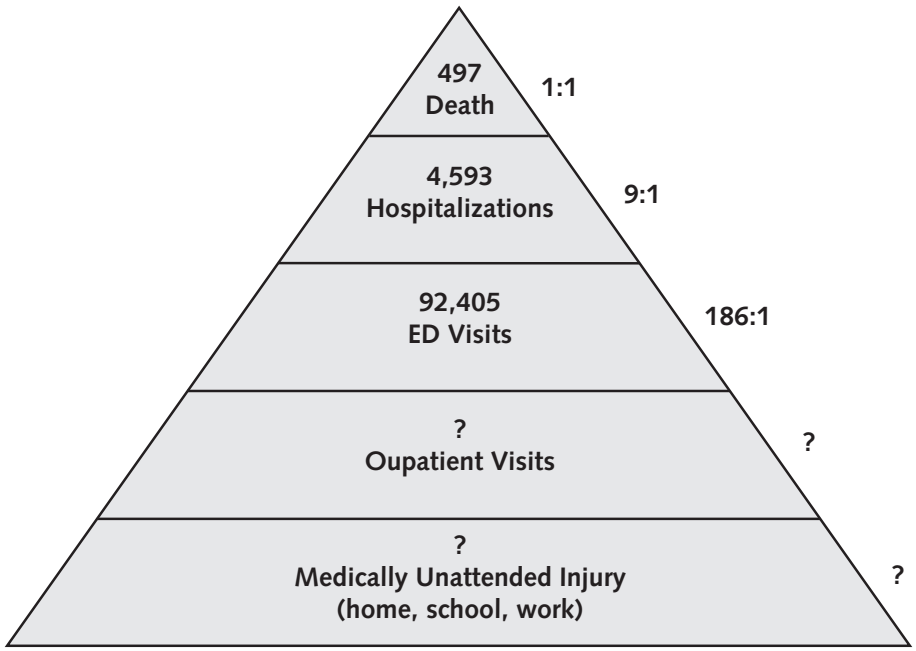
Unintentional injuries,[a] the leading cause of death for North Carolinians ages 10-20, are a serious threat to the health and safety of adolescents.[1] Twice as many North Carolinians ages 10-20 die from unintentional injuries than all other causes combined.[2] Motor vehicle crashes are the most common cause of unintentional injuries suffered by adolescents in North Carolina. In addition to motor vehicle crashes, a large number of adolescents are injured as a result of being cut, struck, or falling. A significant number of cuts, falls, or other injuries are the result of participation in athletic programs.[3] In order to reduce the number of unintentional injuries among adolescents in North Carolina, the Task Force developed recommendations focused on motor vehicle crashes and sports-related injuries.

Unintentional injuries, the leading cause of death for North Carolinians ages 10-20, are a serious threat to the health and safety of adolescents.

Most adolescents do not die from unintentional injuries. For every adolescent death that occurred in North Carolina in 2006 as a result of unintentional injury, there were 9 hospitalizations, 186 emergency department (ED) visits, an unknown number of outpatient visits, and an unknown number of people who did not seek medical attention.[4] (See Figure 6.1 and **Recommendation 8.1**.) The total amount of hospital charges resulting from these injuries in 2005-2006 was more than $223 million.[4]

Figure 6.1
Injury Pyramid, Youth Ages 10-20 Years, North Carolina, 2006



Source: Russell, VC. State of the State: Adolescent Injury. Presented to the North Carolina Institute of Medicine Task Force on Adolescent Health; July 11, 2008; Morrisville, NC.

a Unintentional injuries are defined as injuries judged to have occurred without anyone intending that harm be done.

Motor Vehicle Crashes

Motor vehicle crashes are the leading cause of death for adolescents in North Carolina, as well as a major cause of non-fatal injuries.[4] In 2006, 205 youth ages 10-20 years died in motor vehicle crashes, representing almost half of all deaths for this age group. Motor vehicle injuries represented the number one cause of injury-related hospitalizations in North Carolina in 2006 for those ages 10-20 years.[b]

Many strategies have been shown to reduce the number of motor vehicle crashes among adolescents, including creating a graduated driver's licensing (GDL) system, requiring seat belt use for all seating positions, passing primary seat belt laws (which allow law enforcement to pull someone over for not wearing a seatbelt), having high visibility enforcement of existing traffic laws, and having a zero blood alcohol concentration (BAC) limit for adolescents.[5] North Carolina has already adopted and seen positive results with these policies and is regarded as a national leader in this area.

Despite already being a national leader in implementing evidence-based strategies to minimize the rate of motor vehicle crashes in adolescents, North Carolina can make even more progress.

GDL is one example of a successful accident reduction strategy being used in North Carolina. New drivers are particularly vulnerable to crashes during the first year of driving and have dramatically fewer crashes for each additional month they have been licensed. GDL is especially effective because it requires that new drivers under age 18 be accompanied by more experienced drivers during the most vulnerable period of their driving lifetime—the first 12 months.[c,5] Since the implementation of GDL in 1997, there has been a 38% reduction in the population-adjusted crash rate ratio for 16-year-old drivers. Research shows that the benefits of GDL extend to new drivers of any age.[5]

Despite already being a national leader in implementing evidence-based strategies to minimize the rate of motor vehicle crashes in adolescents, North Carolina can make even more progress. Additional strategies to reduce the youth motor vehicle crash rate include redeveloping driver education to more effectively train new drivers and better involve parents, and improving the use of driving while impaired (DWI) checkpoints throughout the state. Although the latter addresses the entire driving population, it would have particular benefits for young drivers.

Driver Education

North Carolina is one of the few states in the country that still fully funds driver education in high schools.[5] In North Carolina successful completion of a driver education course is required to obtain a learner's permit or provisional license if the applicant is less than 18-years-old.[d] North Carolina offers driver

b Proescholdbell S. Head, Injury Epidemiology and Surveillance Unit, Injury and Violence Prevention Branch, Chronic Disease and Injury Section, NC Division of Public Health. Written (email) communication, September 23, 2009.
c NCGS § 20-11
d NCGS § 20-11.

education free of charge to any student enrolled in school in North Carolina.[e] Driver education in schools must consist of at least six hours of instruction and six hours of actual driving experience. Although driver education does help train new drivers, research shows that these programs do not reduce young driver's crash rates.[6,7] Many researchers argue that such programs are geared too much towards teaching skills and are not focused enough on providing driving experience. Current driver education programs also do not provide parents with a clear way to become involved in the driving education of their children.[5]

Although the current model for training new drivers—which focuses heavily on standard didactic, classroom-style education—may not be effective, there is presently no clear evidence about how to design a more effective model. North Carolina has a unique opportunity to be a pioneer in this area because it is one of a few states that provides full funding for driver education programs in schools.[f] The North Carolina Department of Transportation (DOT) receives $34 million to support driver education in high schools. The North Carolina General Assembly directed the North Carolina Department of Transportation (DOT) to conduct a continuation review of the driver education program as part of the FY 2010 state budget.[g] The review requires the DOT to make recommendations for changes needed to "improve efficiency and effectiveness of services delivered to the public."[h] As part of the continuation review, the DOT should consider new models to deliver driver education. The General Assembly should provide continuation funding to pilot and evaluate new driver education programs. The driver education pilots should also include strategies to involve parents in the education of their children. If a revised approach to driver education is determined to be effective for reducing crash risk among youth, it should then be implemented across the state. The Task Force recommends:

The DOT should consider new models to deliver driver education.

Recommendation 6.1: Improve Driver Education

The North Carolina General Assembly should continue funding driver education through the North Carolina Department of Transportation (DOT). The DOT should work to improve the comprehensive training program for young drivers. The revised driver education program should include the following components:

a) The Governor's Highway Safety Program (GHSP) should work with the Center for the Study of Young Drivers at the University of North Carolina (and other appropriate groups) to conduct research to determine effective strategies for enhancing the quality of driver training and to develop pilot programs to

e Individuals may also take driver education at a local professional state-approved driver training program. (NCGS § 20-11).

f Foss, R. Director, Center for the Study of Young Drivers, UNC Highway Safety Research Center. Written (email) communication. July 14, 2009. www.ncdot.org/dmv/driver_services/graduatedlicensing/requirements.htm

g Historically, the North Carolina General Assembly has allocated approximately $34 million to the Department of Transportation in recurring funds to support driver education. In the 2009 session, the North Carolina General Assembly eliminated recurring funds for driver education, replacing it with one-time funding of $34 million pending the results of the continuation review. (The Joint Conference Committee Report on the Continuation, Expansion and Capital Budgets. K28 of Senate Bill 202. North Carolina General Assembly 2009 Session. August 3, 2009.)

h Sec. 6.6E.(c)(6) of Session Law 2009-451

improve driver education. The GHSP should work with the Department of Public Instruction to implement a large-scale trial of the program through the current driver education system in public schools. Any program developed should include materials to involve parents appropriately and effectively in young driver training. Materials should help educate parents as to what types of information, skills, and knowledge are critical to effectively teach their adolescents to drive.

b) **The DOT should fund an independent evaluation of the pilot projects. Evaluation should include collecting data on the driving records of those exposed to the program and those exposed to traditional driver education. If the pilot programs are shown to be successful, they should be expanded statewide.**

More than one-quarter (28%) of drivers ages 15-20 years who were killed in a motor vehicle crash had been drinking.

Reducing Driving While Impaired (DWI)

More than 16,000 people in the United States died in alcohol-related motor vehicle crashes in 2005, representing 39% of traffic related deaths. More than one-quarter (28%) of drivers ages 15-20 years who were killed in a motor vehicle crash had been drinking. Young drivers who have been drinking are less likely to use seat belts, which greatly increases the severity of injuries resulting from crashes. Seventy-four percent of young drivers who had been drinking and killed in motor vehicle crashes were unrestrained.[8] In North Carolina, 25% of high school students report having ridden during the previous 30 days in a vehicle driven by someone who had been drinking alcohol, and 9% reported that they had driven a vehicle one or more times in the past 30 days when they had been drinking alcohol. Similarly, 27% of middle school students report having ridden in the car in the past 30 days with someone who had been drinking alcohol.[9] Implementing strategies which successfully reduce the number of drivers of any age who drive while impaired would have a significant impact on reducing alcohol-related deaths and injuries among adolescents, both as drivers and as passengers. Research into motor vehicle deaths of children younger than 15 shows that in many alcohol crash cases where children younger than 15 are killed, the child's driver (either their own parent or other adult) was the drinker.[10] North Carolina has already implemented one of the more effective approaches, a zero tolerance law for drivers younger than age 21.

Another strategy shown to limit the number of people who drive while impaired is the effective use of regular, well-publicized, and highly-visible sobriety checking stations, also known as sobriety checkpoints. In North Carolina, the Forensic Tests for Alcohol Branch in the Division of Public Health administers the state's Breath Alcohol Testing (BAT) Mobile Unit Program in conjunction with law enforcement agencies throughout the state.[i] As one of the North

i Currently, the Forensic Tests for Alcohol Branch is supported by part of the administrative fee that individuals with DWI convictions pay for license restoration. The current fee is $100, with $50 going to the general funds, $25 to the county, and $25 to the Forensic Tests for Alcohol Branch BAT program within the Division of Public Health.

Carolina Governor's Highway Safety Program initiatives, the *Booze It & Lose It* campaign includes checking stations as well as publicity to reduce drunk driving.

These checkpoints are generally of short-term duration and concentrated during holiday weekends and holiday seasons. The campaign has resulted in nearly 102,000 DWI arrests since 2001.

Studies show that checking stations are most effective at reducing motor vehicle crashes when the goal is *deterrence* rather than *arrests*. That is, although checking stations not only result in the apprehension of alcohol-impaired drivers, more importantly they have the potential to deter many more individuals from driving after drinking.[11] The key to having an effective sobriety checkpoint program is to have ongoing, highly-publicized checking stations during a variety of times and in undisclosed locations throughout the year. The wide publicity needs to be backed up with enough enforcement to make such publicity credible. Such a system maintains a sense of uncertainty among drivers about when they could encounter a sobriety checkpoint, thereby reducing the number of individuals who drive after drinking. North Carolina's current *Booze It & Lose It* campaign and use of DWI sobriety checking stations is not as effective as it could be in reducing fatal crashes or changing individual long-term behavior. Despite the large number of arrests made for impaired driving, the rate of alcohol-related crashes and fatalities have changed little. To be more effective, the campaign must be sustained, well-publicized, and occur at a variety of times during the year in undisclosed locations.[5] Therefore, the Task Force recommends:

The key to having an effective sobriety checkpoint program is to have ongoing, highly-publicized checking stations during a variety of times and in undisclosed locations throughout the year.

Recommendation 6.2: Strengthen Driving While Intoxicated (DWI) Prevention Efforts

a) All North Carolina state and local law enforcement agencies with traffic responsibilities should actively enforce DWI laws throughout the year and should conduct highly-publicized checking stations. State and local law enforcement agencies should report at the beginning of each biennium their efforts to increase enforcement of DWI to the North Carolina House and Senate Appropriations Subcommittees on Justice and Public Safety.

b) The North Carolina General Assembly should increase the reinstatement fee for DWI offenders by $25. Funds from the increased DWI fees should be used to support DWI programs, including training, maintenance of checking station vehicles and equipment, expanding the operation of DWI checking stations to additional locations and times, and expanding dissemination of the existing *Booze It & Lose It* campaign.

c) **The North Carolina General Assembly should appropriate $750,000[j] in recurring funding beginning in SFY 2011 to the North Carolina Division of Public Health to work with the Governor's Highway Safety Program, the UNC Highway Safety Research Center, and other appropriate groups to improve the effectiveness of checking stations and to develop and implement an evidence-based dissemination plan for the existing *Booze It & Lose It* campaign. The plan should focus on reaching adolescents and young adults.**

Sports and Recreation Injuries

Participation in sports and recreational activities is an important part of a healthy lifestyle for adolescents but is also a potential source of injury.

Participation in sports and recreational activities is an important part of a healthy lifestyle for adolescents but is also a potential source of injury. To truly improve the health of youth ages 10-20, there needs to be promotion of both increased activity and injury prevention. Although participation in sports is linked to reduced rates of obesity and obesity-related diseases, improved self-image and self-esteem, and improved social and team-building skills, adolescents cannot participate if they are injured. Also, injury has been found to be the single greatest reason adults ages 20-84 years stop exercising. Preventing injury for adolescent athletes therefore can have a positive impact throughout the rest of their lives.[12]

In North Carolina, more than 123,000 people visit an ED for sports and recreational activities per year, of whom slightly more than half (66,000) are younger than age 18. The sports with the most injuries are football, boy's and girl's soccer, and boy's basketball. Each of these sports has a rate of injury in North Carolina of between 2 to 4 injuries per 1,000 games/practices.[13] There are approximately 175,500 high school athletes in North Carolina, two-thirds of whom play more than one sport. These athletes experience over 10,000 injuries per year, with an average injury risk per sport of 1-in-20 per season, or 1-in-5 over four years. In addition, many youth are involved in sports outside of school and almost all youth engage in physical recreation activities such as walking, biking, swimming, skateboarding, dancing, water skiing, hiking, horseback riding, and rock climbing. While these activities all have health benefits, they also place youth at risk for injury. Other recreational activities that are less physically demanding, such as cooking, riding all-terrain vehicles (ATVs), boating, and going on amusement rides, also pose risks.

Although it is impossible to prevent all accidents from occurring, many sports- and recreation-related injuries are preventable. There are many evidence-based strategies for reducing specific sports-related injuries such as improving warm-up and training programs, requiring the use of safety gear such as mouth guards,

j The North Carolina Department of Transportation estimates it would cost $750,000 to improve the effectiveness of checking statesions and to develop and implement an evidence-based dissemination plan for the existing *Booze It & Lose It* campaign. (Nail D. Assistant Director, Governor's Highway Safety Program, North Carolina Department of Transportation. Written (email) communication. June 12, 2009.)

and doing more to accurately assess injuries when they occur. For example, there are an estimated 3,000 anterior cruciate ligament (ACL) tears in North

Carolina each year. This is a particularly difficult injury to recover from, often requiring surgery and intense rehabilitation. Approximately 80% of people with ACL tears develop osteoarthritis within 15 years of their injury. However, well-designed warm-up and training programs can reduce ACL injury for adolescents by 90%, as well as prevent 50% of other knee or ankle injuries.[12,14,15]

Another problematic injury is mild traumatic brain injury or concussion. Prompt recognition and management of concussion is important to ensuring that adolescents do not suffer the severe neurologic consequences associated with repeat concussion that have been observed in collegiate and professional athletes.[16,17] There is a need for increased education and awareness among parents, coaches, and athletes of the nature and management of sports-related concussions.[18] Likewise, there are evidence-based strategies to reduce the risk of recreational injuries, such as wearing protective gear (e.g. a helmet when biking, skateboarding, in-line skating, or riding a scooter or ATV); following proper safety precautions (e.g. having lifejackets on hand when boating); and being aware of one's surroundings when walking, running, and engaging in other activities near traffic.[19]

Although it is impossible to prevent all accidents from occurring, many sports- and recreation-related injuries are preventable.

Each sport has its own unique risks as well as a number of proven approaches to reduce injuries. However, rather than focus on specific types of injuries from specific sports, the Task Force focused on prevention strategies that will have a broad impact and reduce risk for those participating in a variety of sports and recreational activities. Although there are many effective strategies to prevent injury for a number of sports , there is currently no definitive source of information for school and community sports administrators and coaches to refer to when implementing policies to prevent injury. In addition to the need for the promotion of model policies, there is also a need for injury prevention training. Coaches, athletes, and parents need to be educated on potential injuries associated with each sport, as well as how to reduce the risk of these injuries.

In order to enhance the role of injury prevention educators across the state, the Task Force recommends:

Recommendation 6.3: Fund Injury Prevention Educators

a) The University of North Carolina Injury Prevention Research Center should hire three full-time employees for the dissemination of evidence-based injury prevention programs and policies to schools and youth sports clubs across the state. Staff would:

1) **Train coaches and other youth athletic staff/volunteers and employees of local Parks and Recreation Departments on how to implement evidence-based programs proven to reduce youth sports and recreation injuries, such as those developed by staff at the University of North Carolina Injury Prevention Research Center.**

2) **Develop and distribute materials targeting parents to increase awareness of the frequency of sports and recreation injuries and to provide information on how to prevent the most common sports and recreation injuries.**

3) **Implement injury prevention programs in schools and youth sports leagues and monitor compliance.**

b) **The North Carolina General Assembly should appropriate $300,000[k] in recurring funds beginning in SFY 2011 to support this effort.**

k The UNC Injury Prevention Research Center estimates it would cost $300,000 in salary and benefits to support three full-time employees for the dissemination of evidence-based injury prevention programs and policies to schools and youth sports clubs across the state..

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