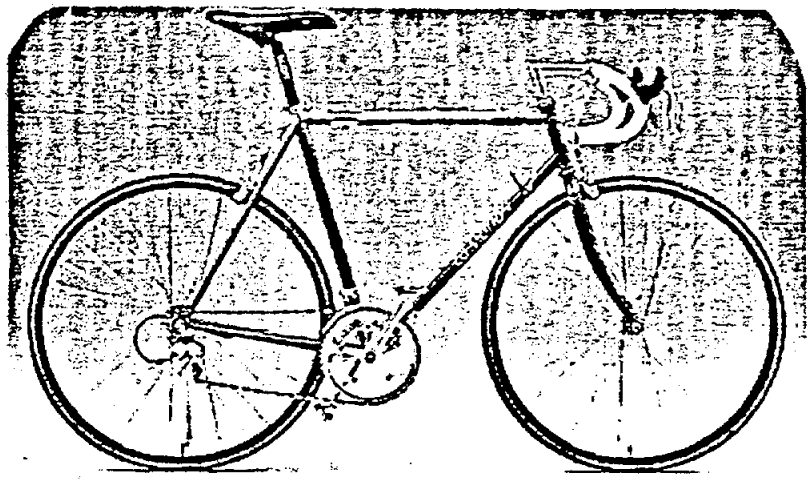
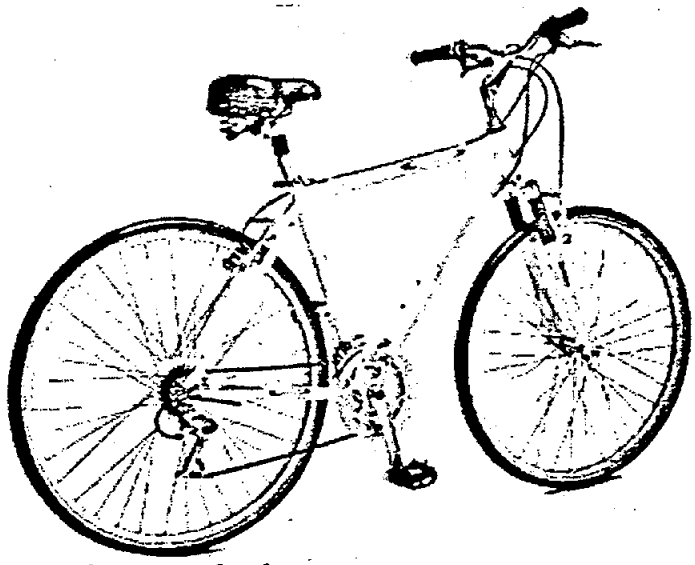
ROAD OR TOURING



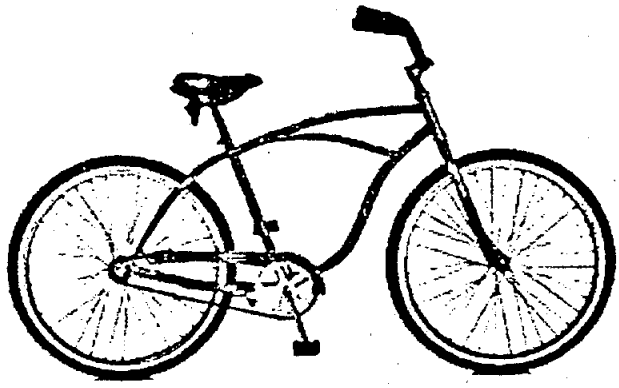
- 700 C (27") wheels
- 14 - 27 gears
- smoother, narrower tires; skinny saddles
- designed for riding on pavement, for longer-distance or multi-day riding, for speed racing, for fitness riding, or for touring
- road models are usually lighter with a slightly shorter wheelbase for quick response
- touring models have a longer wheelbase length, increased shock absorbency, and eyelets for carrying bags and racks
- drop handlebars

HYBRID OR "CROSS"



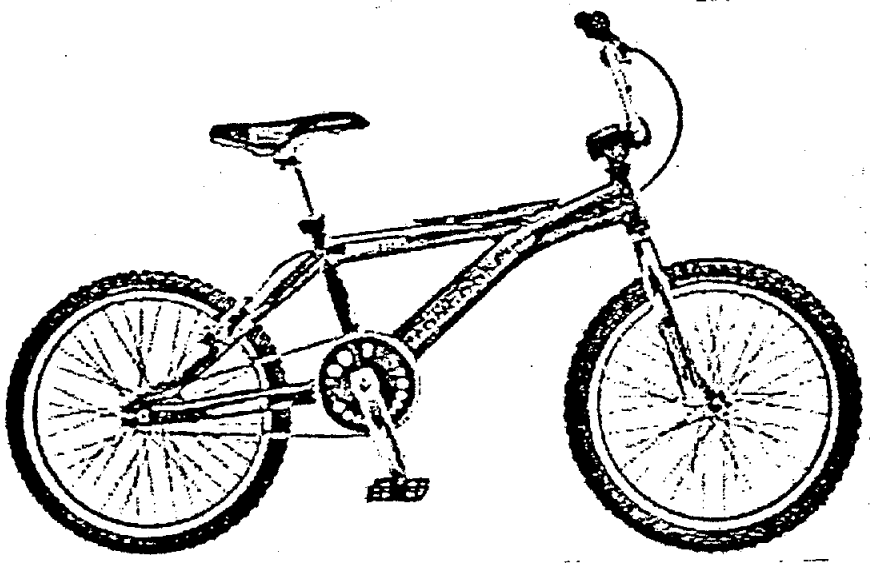
- 700 C (27") wheels, some 26"
- 21 - 24 gears
- a cross between a mountain bicycle and a road bicycle; combines mountain/trail/comfort bicycle seating and handlebar position with wide tires on road bicycle diameter wheels
- designed for use on pavement and dirt trails, but not intended to be a road or mountain bicycle
- designed for serious and recreational riders
- some models have shock absorbent seat posts and handlebar stems
- flat or riser handlebars are used

CRUISER OR CITY



- 26" wheels
- 1 - 7 gears
- wide tires, riser handlebars, upright seating position
- designed for on-road, boardwalk riding
- "old-times" bicycle; bicycle "like I had as a kid"
- heavier models have one speed and coaster brakes; lighter models have many speeds with hand brakes
- riser handlebars

BMX (Bicycle Moto-Cross) OR DIRT



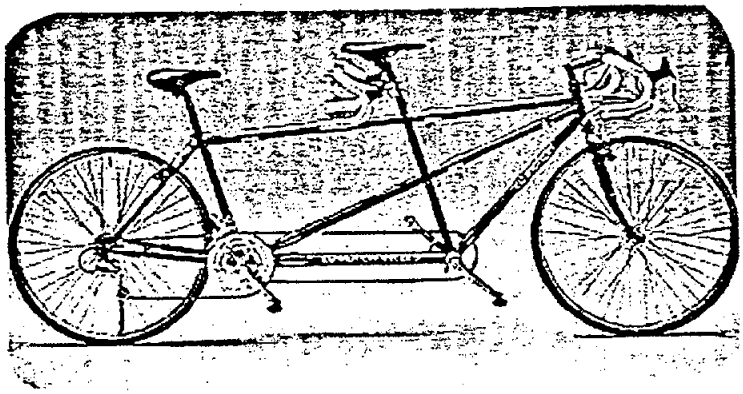
- 20" wheels generally; some models have 24" wheels
- 1 gear
- hand brakes, short wheelbase frames, knobby tires
- designed for general purpose riding, basic transportation, dirt riding and racing, and for hard, frequent, recreational use
- primarily high-riser handlebars

JUVENILE OR YOUTH

- 10", 12", 16", 20", 24" wheels
- 1 gear
- wide tires
- designed for general purpose riding
- primarily high-riser handlebars

- children ages two through six years most commonly use 10", 12", 16" wheel diameter size bicycles
- larger children ages four through six years and children ages six through seven years commonly ride 20" wheel diameter size bicycles with high riser handlebars; this type of handlebar allows a shorter-legged rider to fit a larger wheeled bicycle at a younger age and for a longer period of time.
- One corporate Web site describes 12" wheel diameter size bicycles as appropriate for children ages three to five years, 16" inch sizes as appropriate for children ages five through seven years, 20" inch sizes as appropriate for children ages six through 14 years and 24" sizes as appropriate for boys ages six through 14 years and girls ages nine through 14 years.

TANDEM



- "Bicycle built for two"
- 26" wheels on mountain bicycle models, 700 C wheels on hybrid, touring, and road models
- 1 – 27 gears
- two seats, two handlebars (drop or riser) - rear set of handlebars is stationary, longer wheelbase

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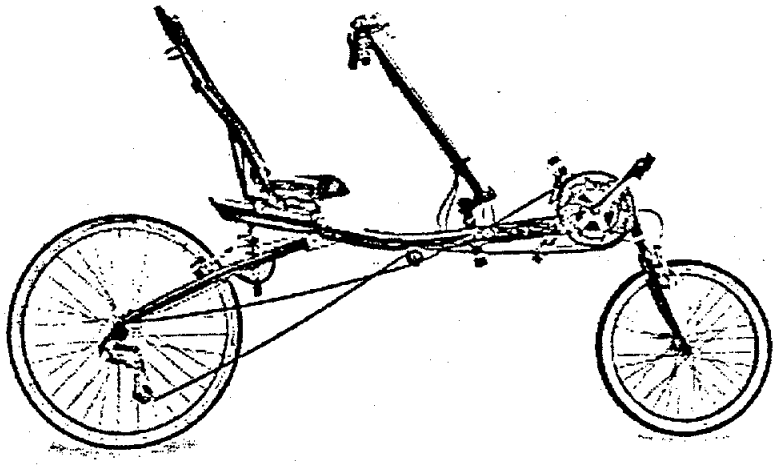
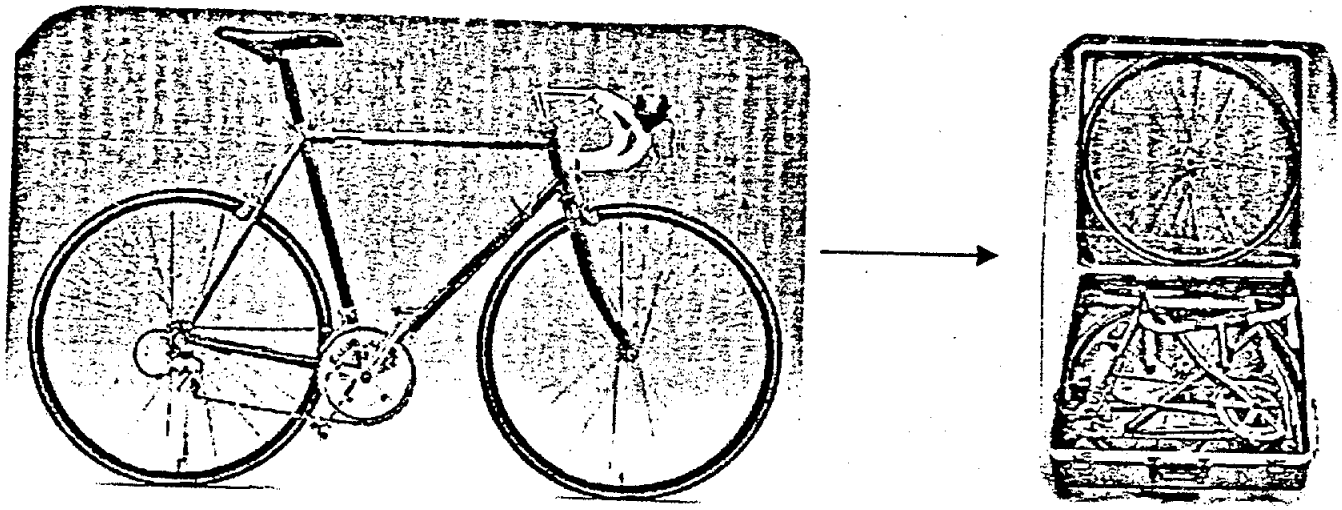
RECUMBENT



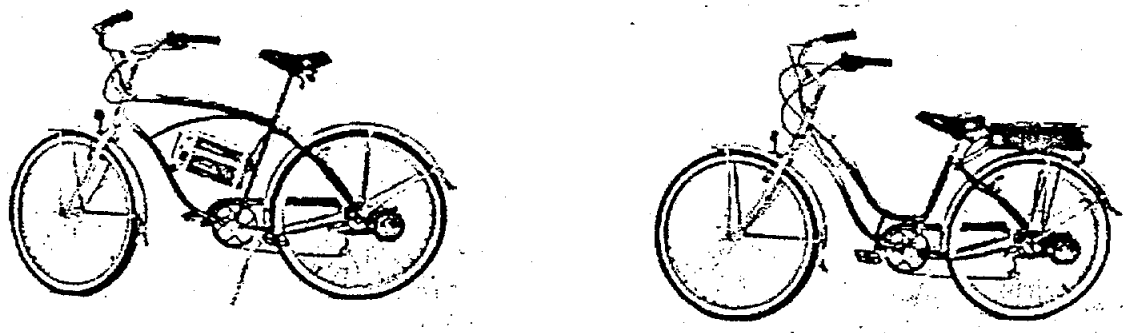
- 20" or 24" wheels
- 21 – more than 100 gears
- designed for use on pavement
- allows riders to sit in a reclining position and pedal with their feet forward
- handlebars under seat or in front of rider at shoulder height

FOLDING



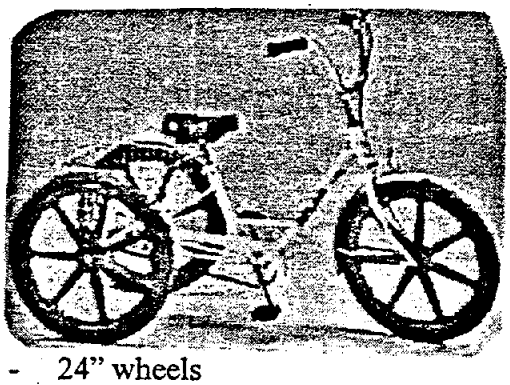
- available in road, tandem, mountain, or recumbent models
- bicycle can be folded up and packaged in a case for portability
- Mitsubishi Montero Sport SUV's (2001 model) are equipped with a folding mountain bicycle in their trunks ("Mitsubishi's Come Equipped with Folding Mountain Bike", newslines, *Bicycle Retailer and Industry News*, May 15, 2001, p.9.)
- All types of handlebars

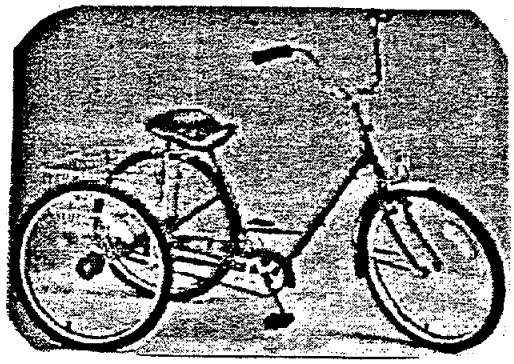
ELECTRIC ASSIST



- several wheel sizes
- up to 21 gears
- designed for short distance, commuter riding
- comes in cruiser, mountain, folding, and adult three-wheeler styles
- emerging bike technology
- has a rechargeable, battery-equipped, electrically powered motor
- riser, high-riser, and flat handlebars

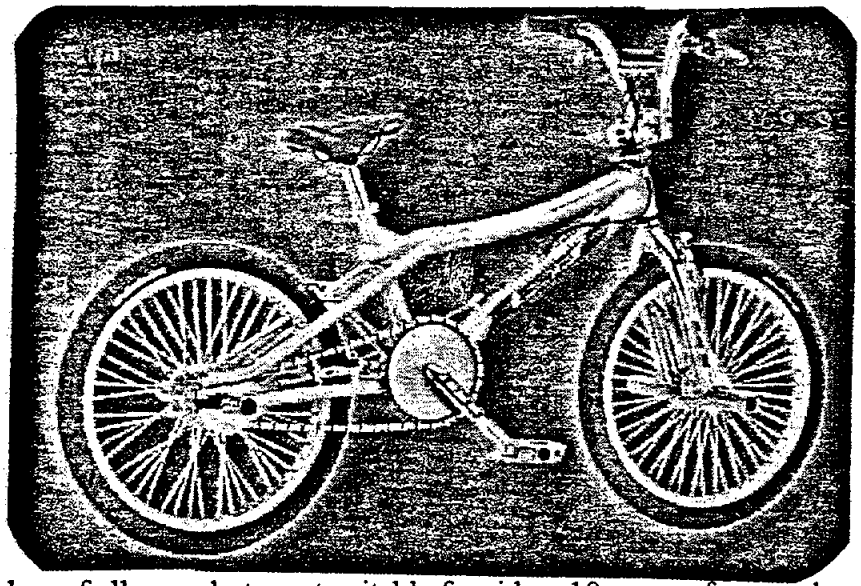
ADULT THREE-WHEELER





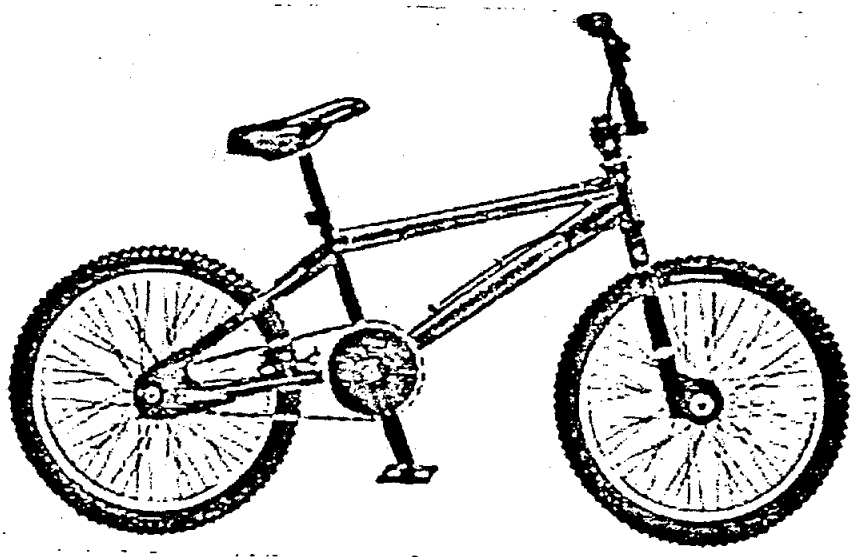
- 24" wheels
- 1 –3 gears
- designed for use by physically challenged riders or riders who need more stability than can be provided by two wheeled bicycles.
- popular in retirement communities
- foot operated coaster brake with front hand brake
- electric assist models and folding models are available
- high-riser handlebars

FREESTYLE OR TRICK



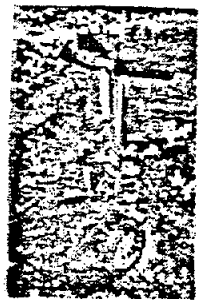
- 20" wheels
- 1 gear
- designed for riders of all ages, but most suitable for riders 10 years of age and older, depending on strength and coordination
- designed for free-form acrobatic and gymnastic tricks
- strong, specially designed wheelbase frames
- high-riser handlebars

JUMPING



- 20" wheels
- 1 gear
- designed for ramp or half-pipe jumping
- stronger wheel rims and hubs, larger and thicker bike frame tubes, front forks reinforced at stress points, stronger seat posts, pedal cranks
- flat or high-riser handlebars

MINIATURE AND CIRCUS



- 6" wheels, 24" wheelbase,
- front and rear suspension, 300 pound weight limit
- marketed for boys 8 – 14 years old, but parents and college students are buying them
- specially-designed flat handlebars

TAB C

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: September 9, 2002

TO : Barbara Jacobson, Project Manager,
Handlebar Petition
Directorate for Health Sciences

THROUGH: Susan Ahmed, Ph.D., Associate Executive Director,
Directorate for Epidemiology
Russ Roegner, Ph.D., Division Director,
Division of Hazard Analysis

FROM : Debra Sweet,
Division of Hazard Analysis

SUBJECT : HA Memo for Handlebar Petition

This memorandum was prepared in response to Petition HP 01-1, a petition requesting regulation of handlebars by way of a performance standard regarding energy dissipation and distribution during impact.

The petitioner specifically discusses minimizing the risk of impact by the end of the handlebar (i.e. the circular cross-sectional end of the handlebar). For this reason, there is discussion in this memorandum about injuries from the end of the handlebar as well as discussion about injuries from the entire handlebar structure.

The paper submitted with the petition described handlebar injuries to children, as did most of the submitted comments. For this reason, the data in this memo are about children under 18-years-old.

Table 1 contains the search criteria used to identify reported incidents with bicycle handlebars.

Table 1. Search Criteria

Databases	Dates	Ages	Product Codes and Definitions	Key Words
National Electronic Injury Surveillance System (NEISS)	1/1/1998 to 12/31/2001	2 years through 17 years	5033 Mountain or All-Terrain Bikes and Accessories 5040 Bikes and Accessories (excluding mountain/all-terrain)	

Table 1. cont'd

Databases	Dates	Ages	Product Codes and Definitions	Key Words
Injury and Potential Injury Incident file (IPII) In-Depth Investigation file (INDP)	1/1/1991 to 6/1/2002	2 years through 17 years	1202 Bikes or Accessories (1991-1993) 5033 Mountain or All-Terrain Bikes and Accessories 5040 Bikes and Accessories (excluding mountain/all-terrain)	Hand Bar
Death Certificate file (DTHS)	1/1/1991 to 6/1/2002	2 years through 17 years	1202 Bikes or Accessories (1991-1993) 5033 Mountain or All-Terrain Bikes and Accessories 5040 Bikes and Accessories (excluding mountain/all-terrain)	

INCIDENT DATA

Deaths

Since 1991, CPSC has received reports of eight children who died after an incident in which the child contacted the handlebar of the bicycle. All of the children received severe abdominal injuries. In two of the incidents, it was specifically reported that the child struck the end of the handlebar. While the remaining six deaths were caused by similar injuries, the point of contact on the handlebar was not reported. The children ranged in age from 4 years old to 17 years old and seven of the children were male. None of the cases mention motor vehicle involvement. Table 2 is a list of these deaths.

Table 2. Deaths from Handlebar Contact

Document Number	Date of Death	Victim Age and Sex	Summary of Incident and Diagnosis
X9165763A	3/14/1991	6 / M	Victim died in bike accident when handlebars struck him in the liver, lacerating it and causing his death.
9118020934 H9450249A	6/19/1991	9 / M	Victim died after a fall onto a sharp-ended handle of bike. He received blunt force injury of the abdomen with liver laceration.
9142077812	8/7/1991	6 / M	Fell from bicycle striking end of handlebar - hypovolemic shock - falling from bicycle.
9326038916	5/30/1993	15 / M	Fell off bike, handlebar trauma to abdomen - liver laceration, blunt abdominal trauma.

Table 2. cont'd

Document Number	Date of Death	Victim Age and Sex	Summary of Incident and Diagnosis
9454011137	7/19/1994	4 / M	Riding bicycle, lost control, fell, handlebar hit him in the abdomen - blunt force traumatic injuries of abdomen.
9812155695 X9910097A	12/24/1998	8 / F	Victim fell from bicycle; she hit the handlebars before falling off causing internal injuries. Her twin sister was operating the bike. It is unknown where the victim was sitting prior to the incident. Victim received blunt abdominal trauma.
9966027396	6/2/1999	17 / M	Crashed while riding bike; probably impact against handlebar on street - peritonitis, laceration of small bowel, blunt impact to abdomen.
991005HCC2002 X9993067A X9982747A NEISS case	6/15/1999	7 / M	Victim was riding down a hill and lost control; fell and handlebars jammed into abdomen – abdominal trauma.

In addition to the eight deaths in which the child was stated to have struck the handlebar of the bicycle, there were 19 children who died of similar injuries in a bicycle accident. These children all received severe injuries to the trunk: bleeding from aorta, liver laceration, intra-abdominal bleeding, blunt abdominal trauma, ruptured spleen, peritonitis, sepsis, laceration to pelvic arteries. Due to the similarity of these fatal injuries to those in the eight handlebar-related deaths, it is possible that some or all of these 19 deaths could have resulted from contact with the handlebar of the bike. Appendix A is a list of the 19 other deaths.

Injuries

NEISS

In the year 2001, there were an estimated 352,244 children between the ages of 2 and 17 years who visited emergency rooms for injuries associated with bicycle incidents. More than 27,100 of these estimated bicycle injuries were to the upper trunk, lower trunk, or pelvis (7.7% of total bicycle injuries). Of these, an estimated 5,042 trunk injuries were the result of the child contacting the handlebar of the bicycle. Bicycle handlebar injuries to the trunk ("handlebar trunk injuries") in 2001 represent 18.6% of all bicycle injuries to the trunk ("trunk injuries") and 1.4% of all bicycle injuries. These percentages are similar to previous years as Table 3 illustrates.

Table 3. NEISS Estimated Bicycle Injuries for 1998 - 2001, children 2-17 years.

Year	Estimated Bicycle Injuries	Estimated Bicycle Trunk Injuries	Estimated Bicycle Handlebar Trunk Injuries
1998	400,200 100%	27,667 6.9% of total	4,814 17.4% of trunk 1.2% of total
1999	417,049 100%	29,361 7.0% of total	4,480 15.3% of trunk 1.1% of total
2000	416,403 100%	29,239 7.0% of total	5,135 17.6% of trunk 1.2% of total
2001	352,244 100%	27,129 7.7% of total	5,042 18.6% of trunk 1.4% of total

The estimate of bicycle handlebar trunk injuries is a conservative estimate based on the summaries in NEISS. The only incidents included in the calculations for this scenario were those in which the brief summary statement said that the child hit the handlebars. Similar to the deaths, the point of contact causing the injury may not have been known, or may not have been recorded in this brief data field. Therefore, an estimate for injuries from particular handlebar components cannot be calculated.

The average and median age of the children treated for trunk injuries from the bicycle handlebars in 2001 was 10 years old. Seventy-nine percent of the estimated children treated were male. Of the estimated handlebar-related trunk injuries, 91.5% (4,612) were such that the children were treated and released from the emergency room. The majority of these children were treated for minor injuries such as contusions and abrasions, lacerations, and hematomas (4,127) before they were released from the emergency room. Four NEISS sample incidents in which the children were treated for minor injuries and released from the emergency room involved motor vehicles. An estimated 485 children were treated for more serious injuries such as fractures, strains or sprains, and other injuries before they were released from the emergency room.

Over 8% of the children (430) treated in the emergency room for handlebar-related trunk injuries in 2001 were transferred to another facility for further treatment, held at the hospital for observation or admitted to the hospital. This compares to 5.9% for the bicycle trunk injuries and 3.3% for all bicycle injuries. The more severe injuries requiring further medical attention (transferred, held, or admitted) included contusions or abrasions, lacerations, internal organ injuries, and other (not specified) injuries.

The specific location on the handlebar that the child contacted was generally not recorded in the NEISS records. However, in one of the cases in the sample, an injury from the end of the handlebar was reported. This incident resulted in a contusion to the lower abdomen and the victim was treated and released from the hospital.

Reported Incidents (IPII, INDP)

From January 1991 through June 1, 2002, the Commission received reports of 147 incidents in which a child was struck by, or fell onto, a bicycle handlebar. Whereas these data are anecdotal and cannot be used to suggest trends or calculate estimates, they do provide detailed information on the incident, what type of bike was involved, the construction and condition of the handlebars and the severity of the injury. Of particular interest is that 37 of the 147 incidents were reported through the National Pediatric Trauma Registry. This is a nationwide set of Pediatric Trauma Centers or Children's Hospitals with a Pediatric Trauma Unit. The set is not a statistically chosen sample and cannot be used to provide estimates of injuries treated in trauma centers; however, it is of substantial interest due to the nature and severity of the incidents. All incidents reported through the Pediatric Registry were children admitted to the hospital, thus the contact with the handlebar of the bike caused a severe injury. Appendix B is a table of the reported incidents.

Trunk Injuries

Eighty-two of the 147 reported incidents involved children who received injuries to the trunk as a result of contact with the bicycle handlebar. Males were involved in 62 incidents and females in the remaining 20. The children ranged in age from 3 to 16 years old and the median age of the children was 9 years old. The majority of the injuries, 42, were serious and involved major abdominal or chest organs: spleen (12), liver (11), gastrointestinal system (10), kidney (4), pancreas (2), heart (1), lungs (1), and hernia (1). The types of injuries included lacerations to the liver or spleen and severed or split kidneys. Twenty-one injuries were chest, trunk, or rib contusions and 18 injuries were reported as abdominal trauma or injury. Six children received injuries to the pubic region and two children were injured in their hip or pelvic region. Some of the children with trunk injuries also received minor injuries to the head or face.[1] Additionally, some children received multiple injuries in a single incident (89 injuries in 82 reported incidents).

There is limited data available about the bicycle or the handlebars in most of the reported incidents. Staff is able to determine handlebar configuration in 21 incidents. The handlebars were either high-rise handlebars with a crossbar (18) or flat handlebars (3). The handlebar grips were intact and in good condition in four of the 15 incidents in which the handlebar grip condition was known. Two of these four incidents resulted in serious abdominal organ injuries (liver, spleen). In the other 11 incidents, the metal was showing on the end of the handlebar, the endcap was missing from the handlebar, there were no grips on the handlebars, or the end of the handlebar was scraped. Six of these 11 incidents resulted in serious abdominal organ injuries (liver, spleen, pancreas, and kidney). Twenty-four of the 82 incidents described the location on the handlebar that was contacted. The children hit the cylindrical end of the handlebar in 12 incidents, the scenario that the petitioner is most concerned about. Another eight incidents refer to the side of the handlebar as the point of contact, but it cannot be determined whether this means the cylindrical end or the handlebar grip location. One child hit the crossbar of the handlebar and one stated that he hit the handlebar, crossbar or both. One child hit the stem of the handlebar and one child hit the front post of the bike. The point of contact in the remaining incidents is unknown.

[1] These head and face injuries are not counted as part of the non-trunk injuries. Since the more severe injury was to the child's trunk, these incidents are included in the count of trunk injuries.

In 47 of the 82 incidents, the bicycle incidents occurred during one of four basic circumstances: riding under normal use (lost balance, hit rut, bump, or rock in pathway, lost control), performing stunts (jumping ramps, wheelies, feet on handlebars), collision with an object (fence, curb, motor vehicle), and experiencing a mechanical failure while riding the bicycles (chain broke, wheel locked, part detached). Nineteen children were riding under normal use, 14 children were performing stunts, nine children collided with an object, and five children experienced mechanical failure. The circumstances leading to the accident were unknown in the remaining 35 incidents. Only two of the 82 incidents with a trunk injury involved a motor vehicle, but the cars were parked and the children ran into the cars.

One of the 82 incidents was not originally in CPSC's databases, but was reported in three submitted comments to the petition. This incident has since been added to the reports of handlebar incidents. Not all of the incidents listed in the comments to the petition were included in staff's count due to lack of detail in the description, without which we could not distinguish them from incidents already accounted for.

Non-Trunk Injuries

CPSC has received reports of 65 incidents involving bicycle handlebars that did not involve the child's trunk area. The children ranged in age from 3 to 15 years old and the median age of the children was 8 years old. Fifty-two of the children were males. The body parts injured and type of injury were not specified in eight of the non-trunk incidents. Forty-three of the 65 incidents reported injuries that were less severe, such as contusions and lacerations to the face, legs, hands, and feet.

There were 14 reports of serious injuries as a result of contact with the handlebars in body parts other than the trunk. Although the petitioner's interest lies in the trunk injuries from handlebars, staff feels it is important to include these injuries as well. Three children were impaled or punctured by the handlebar, one in the neck, one in the thigh and the body part of the third injured child was unknown. Four children received concussions as a result of hitting their heads on the handlebar. Four children suffered fractures to their arms, wrists or fingers. One child had a finger amputated when the handlebar fell on the child's finger. One child suffered damage to his eye and tear duct. The last serious injury resulted first from contact with the handlebar and then contact with the ground below. This child fractured his cheekbones and nose, knocked teeth out, his lip detached from his jaw, he received black eyes, and suffers headaches as a result of the accident.

The handlebar configuration was reported in 14 of the 65 incidents. Twelve of the handlebars were high-rise handlebars with a crossbar and two of the handlebars were flat. In 14 incidents, the handlebar condition was reported. The metal was showing on 13 of those incidents resulting in lacerations and puncture wounds. In the one incident in which the handlebar was intact and in good condition, the child did not require medical attention. Twelve of the 65 children came in contact with the cylindrical end of the handlebar, two children contacted the crossbar or central part of the handlebars, and one contacted a broken part of the handlebar after the handlebar broke. It cannot be determined where the children contacted the handlebar in the other 50 incidents.

The circumstance under which the incident occurred is known in 56 of the 65 incidents. Twenty-two children were riding under normal use, 13 children collided with an object, eight children were performing stunts, and eight experienced mechanical failures. The circumstances

leading to the incidents are unknown in nine incidents. In the remaining five incidents the injured children were not riding the bicycles at the time they were hurt, they were bystanders or handling, but not riding, the bicycle.

Handlebar Ends (Trunk and Non-Trunk Injuries)

The specific concern of the petitioner is the blunt, cylindrical end of the handlebar. Of the 147 reported incidents of handlebar injuries since 1991, at least 24 incidents involved the end of the handlebar. The children ranged in age from 5-years-old to 13-years-old and the median age was 9. Twenty of the children were male and four were female.

Ten children were riding their bicycles under normal circumstances when the incident occurred. Five of the children were stunt-riding on the bicycle. Another two children experienced mechanical problems when they crashed. Two children ran into something causing them to fall and two children were struck by the end of the handlebars while not riding the bicycles. The riding circumstances in the other three incidents are unknown. Eight of the bicycles had high-rise handlebars with a crossbar, three had flat handlebars and the configuration of the remaining 13 is unknown.

The handlebar condition is known in 21 of the incidents. Only one bicycle had handlebar grips that were intact; the victim had internal injuries including a lacerated liver. Five of the bicycles were known to have handlebar grips but the metal was exposed at the end of the handlebar. The injuries included two incidents of a lacerated spleen, a puncture wound to the neck, internal abdominal injuries requiring surgery, and a laceration to the leg. Two incident reports stated that the endcap was missing from the handlebar resulting in traumatic hernia and a puncture wound to the thigh. In 13 incidents, the reports state the metal was exposed at the end of the handlebar. Specific information about the handlebar grip and endcap presence, or condition, is not known in these incidents. These children suffered a lacerated liver, fractured finger, abdominal hematoma, lacerations to the leg, head, face, finger, abdomen, groin, eye and toe, and an unknown injury. In three of the 24 incidents, the handlebar condition was not known. These children suffered from chest contusions, abdominal contusions and a bruised stomach.

The data show that handlebar end-related injuries are not limited to a specific combination of variables. The ends of the handlebars injure children over a wide range of ages. Similar injuries occur when children are riding their bicycles normally and lose control and also when they are performing stunts. Additionally, both high-rise handlebars and flat handlebars are involved in the incidents. The majority of the known handlebar end-related injuries occurred when the metal was exposed because of missing or worn handlebar grips, missing pads, or missing endcaps. Interestingly, even in the incident in which the handlebar grip was intact, the force of the impact resulted in the same type of injury as those in which the metal was exposed.

Potential NEISS Special Study

Oftentimes when specific incident details cannot be determined from incident reports, a NEISS special study is conducted to gather more information. The detailed information necessary to develop requirements for bicycle handlebars includes forces, angles, speed, and point of contact. A NEISS special study would not provide this type of information. The child involved in the incident would not know the speed he was traveling, the force with which he contacted the handlebar, the angle of the handlebars at the time of contact, etc. The child may not

even know what part of the handlebar he contacted, unless the injury could reveal that information.

RESPONSE TO PETITION AND COMMENTS

Petition

In the paper submitted and authored by the petitioner, "Hidden Spears: Handlebars as Injury Hazards to Children," 17 handlebar impact-related incidents were discussed. The data were collected from October 1995 through September 1997 in an urban pediatric trauma center. In-Depth Investigations were performed on seven of the incidents. Some of these investigations were performed in conjunction with the Commission's work on handlebar injuries and therefore are included in staff's account of injuries[2]. The paper discusses qualitative data from investigations and medical records for these incidents. CPSC's data are similar to the petitioner's in such variables as the predominance of males injured, the age of the children injured, and the absence of motor vehicles during the incident.

Comments

Hospitals, trauma and medical centers, safety and health organizations, and a victim's family members submitted letters stating that many, or several, children were treated or hospitalized over the last year for handlebar-related injuries. All letters from these sources were in support of the petition.

Table 4 lists those comments, general form letters, in which handlebar-related incidents were described numerically. However, some of the other supportive comments stated "many," "several," or "a substantial number" of children treated for handlebar-related incidents which are not shown in the table.

Table 4. Data from General Form Letters

Commenter	Incidents	Summaries
Pediatric General and Thoracic Surgery, Children's Hospital of Philadelphia	5	6 M; Victim was riding down a hill and lost control of his bike, the handlebars turned and he was struck in his right abdomen with the end of the handlebar. Injury - Lacerated liver.
		13 M; Victim was struck in the abdomen with his bike handlebar. Injury - Tear in back of stomach, large hole in bowel.
		Male victim with abdominal injuries.
		15 M; Victim was injured riding a BMX bike when he fell on the handlebar. Injury - Shattered kidney.
		15 M; Victim was injured riding a BMX bike when he fell on the handlebar. Injury - Shattered kidney.
University of Pennsylvania Medical Center	1	Victim struck abdomen on end of handlebar. Injury - Fractured pancreas, ruptured abdominal aorta

[2] The petitioner did not provide information on the 17 incidents. Staff could not distinguish between incidents already in CPSC's databases and those not in the databases. For this reason, staff could not add the petitioner's incidents to the CPSC count.

Community Medical Center Healthcare System	Approx. 35	No details, just the statement that approximately 35 children were hospitalized due to injuries sustained after impacting a handlebar.
Lancaster General Hospital	Approx. 7	No details, just the statement that approximately 7 children were hospitalized due to injuries sustained after impacting a handlebar.
Harlem Hospital Injury Prevention Program	2	Handlebar-related incident resulted in a ruptured spleen.
		Handlebar-related incident resulted in a ruptured colon.
Children's Surgical Services, Driscoll Children's Hospital	Approx. 18	Statement that approximately 18 children were hospitalized due to injuries sustained after impacting a handlebar. One specific incident was described as resulting in removal of part of spleen.

Six comments were submitted in support of the petition with more specific information about injuries and scenarios. The following section discusses these specific comments and the data therein. Three comments describe a specific incident involving a 9 year-old boy who was injured by the handlebars of his bicycle. This incident is included in staff's account of injuries and therefore not discussed below.

Comment #5: Victorian Injury Surveillance System. The Victorian Injury Surveillance and Applied Research System (VISS) in Australia, submitted an analysis of handlebar injury cases in support of the petition. Through the Victorian Emergency Minimum Dataset, an emergency department dataset, VISS cites 173 cases of handlebar injuries to children 0-14 years of age, from October 1995 through December 2000. Seventy-nine percent of the handlebar injuries were from bicycles, as opposed to motorbikes, BMX-style bikes (described as such in the comment), tricycles, scooters and others. The majority of injured children were between 5- and 14-years-old and 79% of the children were male. Twenty-three percent of the injuries were to the trunk (abdomen, lower back, pelvis, and hip) and 18% of the cases were hospitalized. VISS also compared the handlebar injuries to a number of other variables such as type of place injury occurred, activity when injured, external injury cause, among others.

Comment #10: Children's Hospital of Columbus, Ohio. The Children's Hospital of Columbus, Ohio submitted a comment supporting the petition. In the comment, the Trauma Medical Director cites 110 patients admitted to the hospital from 1995 through 2000 after receiving an injury related to the handlebars of pedal bikes, motorized cycles, scooters or other cycle. These patients either flew over the handlebars, were riding as a passenger on the handlebars, or struck their body on the handlebar. Seventy-nine of the 110 patients were injured on a pedal bike. Fifty-eight of the 110 patients struck their body on the handlebars. We cannot, however, calculate the number of patients who struck their body on the handlebars of a pedal bike from the information given in the comment.

Comment #25: Children's Hospital of Pittsburgh. The Children's Hospital of Pittsburgh submitted a comment supporting the petition with supplementary data from the Benedum Pediatric Trauma Program at the hospital. The commenter states that the Trauma Program admitted 164 children with bicycle-related injuries in the past year, 30% of which were caused by impact with the bicycle handlebar (approximately 49 incidents).

In addition to discussion about the number of injuries and detailed information about the types of injuries treated, the commenter discusses one specific injury treated at the hospital. This incident was noted in two other comments and has been added to CPSC's total count of reported handlebar incidents. This specific incident was added to CPSC's count because there was sufficient descriptive information to verify that it was not already in CPSC's databases.

Comment #29: Children's Hospital of Philadelphia. The petitioner submitted a comment with data as additional support. This comment estimated "the incidence and costs associated with serious handlebar-related injuries to children." The estimate of the number of handlebar-related incidents was calculated first by using discharge data for 19 state hospitals to develop the "national estimate of incidence of abdominal and pelvic organ injury." The second part of the incidence calculation, "the proportion of hospitalized bicycle-related abdominal and pelvic injuries associated with handlebars" was made from the Children's Hospital of Philadelphia.

The comment states an estimated 1,338 child bicyclists under 20 years of age in the U.S. suffer abdominal or pelvic organ injuries of severity AIS 2 or greater leading to hospitalization. An estimate of 1,040 of these children are injured in bicycle crashes not involving motor vehicles. A further conclusion is that 894 of these injuries are associated with handlebars.

The estimates of handlebar-related incidents may lack statistical validity due to the selection of hospitals and the data collected from the hospitals. The hospitals in the 19 states that submitted discharge data and even the 19 selected states may not be representative of the nation as a whole. The characteristics of the states may differ from those states that did not submit discharge data. Secondly, the proportion of incidents throughout the country was based on the proportion of bicycle handlebar injuries to all bicycle injuries admitted to the Children's Hospital of Philadelphia Trauma Registry from 1996 through 2000. Because this is a children's hospital and a trauma center, the type of injuries brought to the hospital could be different than those brought to other hospitals throughout the country, in both severity and type of injury. The proportion of handlebar injuries in the Children's Hospital of Philadelphia Trauma Center could be higher than the true proportion of handlebar injuries to all bicycle injuries. In an investigation, as part of the joint effort of CPSC and the Children's Hospital of Philadelphia, the investigator stated that the child was brought to the Children's Hospital because the emergency official knew of a study on handlebar injuries at this hospital.[3] This illustrates that the victim was brought to the Children's Hospital because of the involvement of a handlebar when the child might otherwise have been brought to a different hospital. This may inflate the proportion of handlebar injuries treated at the Children's Hospital of Philadelphia.

The sample data in this comment can be used to gain qualitative information about the type of incidents occurring. The sample included 56 child bicyclists admitted to the Children's Hospital of Philadelphia for abdominal or pelvic injuries from 1996 through 2000. Information from the sample data shows that handlebars were involved in 38 of the 44 non-motor vehicle-related bicycle accidents that caused abdominal or pelvic organ injuries. Due to lack of identifying characteristics in these reported incidents, we cannot determine which of the incidents in these 38 handlebar-related trunk injuries were also part of CPSC's effort to collect information and therefore cannot add these incidents to the overall number of handlebar reports.

Comment #33: Sandia Safety Sciences. A representative from Sandia Safety Sciences submitted a comment in support of the petition. The commenter is an adult male who states he has over 30 years of riding experience and experience with medical treatment of other bicycle riders. During this time, he treated numerous handlebar-related injuries to himself and other riders. These injuries included severe lacerations, bruising and internal injuries. The commenter himself suffered a severely bruised liver and broken rib from handlebar-related injuries.

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[3] CPSC worked with the Children's Hospital of Philadelphia to conduct investigations on bicycle handlebar-related incidents. The Children's Hospital forwarded incident information to CPSC, who in turn conducted an on-site investigation of the incident. The completed investigation was sent to the Children's Hospital as well as entered into CPSC's In-Depth Investigation file.

Comment # 34: Harborview Injury Prevention and Research Center. The Harborview Injury Prevention and Research Center submitted a comment in support of the petition with additional data. From 1986 through February 2001, the medical center states that 16% of the children under 15 admitted to the trauma center for bicycle injuries received chest or abdominal injuries. They also state that 17% of the children under 16 years old admitted to the trauma center for bicycle accidents received chest or abdominal injuries. Note that these statistics may overlap. There is not sufficient information in the comment to explain the relationship between the statistics. The commenter feels that "many of these injuries are likely related to abdominal and/or thoracic impact with the handlebars." However, there is no direct cause of the injury given in the data submitted and we cannot attribute the abdominal or chest injuries to the handlebar of the bicycle.

The data in the comments to the petition support staff's findings of incidents from handlebar impact. Young children, as well as adults, are impacting handlebars in low-speed crashes. The impact with the rigid handlebar can cause severe injuries such as internal injuries and trauma, some of which require hospitalization. The submitted data identifies some incidents with handlebar ends, but also shows that the end may not be the only point of impact in handlebar-related incidents.

Appendix A

The following table contains a list of 19 deaths that could have resulted from contact with the handlebar.

Document Number	Date of Death	Victim Age and Sex	Summary of Incident and Diagnosis
9113035711	5/26/1991	11 / M	Victim fell from bicycle; fell onto the bike – lacerated aorta, intraoperative bleeding from aorta, Ehlers-Danlos syndrome.
9150002077 X9196695A	6/14/1991	9 / F	Victim was riding down a hill and was ejected from the bicycle; an unwitnessed incident – laceration of liver.
9134039545	8/12/1991	13 / M	Fell off bike while riding – laceration of spleen.
9245017755	8/2/1992	6 / M	Fell from bicycle – blunt abdominal trauma, acute chemical peritonitis.
9229020762	8/6/1992	16 / M	Victim was riding his bicycle when he wrecked after going over a jump, he apparently sustained a blow to the chest, vomited then aspirated on the vomitus resulting in asphyxiation.
9237042768 X92A0603A	9/11/1992	7 / M	Victim was racing on his bicycle and fell – laceration of liver.
9225045962	9/14/1992	6 / F	Fall from bicycle over handlebars – cerebral hypoxia; intra-abdominal bleeding with coagulaopathy; blunt trauma with laceration of liver.
9341014073	6/29/1993	7 / M	Victim was involved in a bicycle accident with another bicycle while riding in the driveway of his residence – peritonitis, sepsis, blunt abdominal trauma.
9339058121	7/15/1993	16 / F	Victim fell off bicycle to sidewalk – blunt impact to trunk with rupture of liver and hemoperitoneum.
9329203609 X93B0896A	7/22/1993	13 / M	Victim wrecked bicycle on asphalt road surface – aortic laceration; blunt abdominal trauma.
9406092775	6/26/1994	13 / M	Bicycle accident – thoracic and abdominal injuries; blunt force trauma.
9449006906	8/14/1994	16 / M	Victim fell from bicycle – blunt force injuries to torso and complications.
9453029627	9/3/1994	12 / M	Victim was riding bicycle on road and fell off – post operative hemorrhage in splenectomy site.
9713030497	7/8/1997	10 / F	Victim fell while riding bicycle – multiple blunt injuries with lacerations of liver.

Appendix A cont'd.

Document Number	Date of Death	Victim Age and Sex	Summary of Incident and Diagnosis
9806023883	2/28/1998	11 / F	Victim fell from bicycle while jumping dirt mound – ruptured spleen; blunt force abdominal trauma.
9829103460 X9895236A	8/20/1998	10 / F	Victim was riding bicycle and car started to pull out, she tried to stop but fell off the bike and was vaulted over the handlebars and landed on the street – blunt abdominal trauma.
9912061529	5/1/1999	17 / M	Probably blunt impact to chest while bike racing; contusion of heart.
0037022691	4/24/2000	10 / M	Victim had a bicycle accident at home in yard – hemorrhagic shock; blunt trauma to abdomen.
0119019476	9/29/2001	7 / M	Bicycle injury from fall onto cement – acute hemorrhage in pelvis; laceration to pelvic arteries; fracture of left ileum.

Data Source: CPSC databases – DTHS, IPII from 1/1/1991 through 6/1/2002.

Appendix B

The following table lists the 147 reported incidents of children contacting the handlebar of the bicycle. The table includes specific information about the incidents from which the discussion was derived. The first 82 incidents are trunk injuries and the latter 65 incidents are non-trunk injuries.

TRUNK HANDLEBAR INJURIES

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
1	971008CMC1005	7/31/97	12/M	Rosedale, MD	Severe abdominal (1) injuries; surgery	165 180	Grips, metal showing (1,1)	BMX style (1)	End (1,1)	The boy was riding down a dirt path towards a ramp, went up the ramp and while airborne, the handlebars were slightly turned. When he landed, the front tire took a sharp turn. The victim lost control, fell over with the bike and the victim fell on the end of the right handlebar.	Stunt
2	970926CMC1004	9/1/97	7/M	Philadelphia, PA	Lacerated spleen (1)	360R 360L	Grips, metal showing (2,2)	BMX style (2)	End (2,2)	The boy was riding on a cement trail, at an average speed. He ran into a rock in his path, his leg got caught in the pedal, he fell forward and he landed on the end of the handlebar. The scenario says the grips were pushed in during the incident. The boy has circular scars from the end of the handlebar.	Normal
3	971117CMC1007 (terminated) M97B0006A	9/1/97	10/F	Baltimore, MD	Chest (1) contusion	Unknown	Unknown	Unknown	End (3,3)	The girl was injured when struck by the handlebars on her chest.	Unknown
4	971117CMC1008	10/5/97	13/M	Pasadena, MD	Lacerated spleen (2)	<90 >180	Ends scraped from incident (3,3)	BMX style (3)	End (4,4)	The boy was riding down the street zig-zagging, when his left pedal struck the pavement causing him to lose control of the bike. The front wheel turned 90 degrees stopping the bike, thus throwing the victim forward onto the end of the left handlebar. The end of the handlebar struck his lower abdomen.	Stunt
5	I98C0069A	10/1/98	8/M	Brookline, MA	Traumatic hernia (1)	Unknown	Endcap missing (4,4)	Unknown	End (5,5)	The boy fell while riding his bicycle impaling his abdomen on the end of the handlebar. He had a large contusion in a ring formation corresponding to the handlebar end. He healed in 8 weeks, just before scheduled surgery.	Unknown
6	990914CCC0727 I9960262A	6/11/99	12/F	Baltimore, MD	Internal injuries including a lacerated liver (1)	Unknown (at least 90 degrees)	Grips intact (5,1)	Stralght (4)	End (6,6)	The girl was riding the bike in the driveway towards her house when the front wheel of the bike suddenly turned towards the right. The end of the handlebar jammed into the girl's abdomen.	Normal
7	Incident from Comment	9/1/99	9/M	Pittsburgh, PA	Laceration to liver (2)	Unknown	No padding (6,5)	Straight (5)	End (7,7)	Hit a bump weird and landed on handlebar.	Normal
8	010914HEP9001	8/15/01	12/M	Dublin, OH	Abdominal hematoma (2)	Unknown	Metal showing (7,6)	BMX style (6)	End (8,8)	Child "popped a wheelie"; lost balance and feel on handlebar.	Stunt
9	011023HEP9010	9/26/01	10/M	Columbus, OH	Abdomen scratch (3)	Unknown	Metal showing (8,7)	Unknown	End (9,9)	Boy was doing tricks and lost control. He flew over the handlebars and they hit him in the stomach; scraped abdomen.	Stunt
10	I0220075A	12/24/01	13/M	Morganville, NJ	Groin cut (1)	Unknown	Metal showing (9,8)	Unknown	End (10,10)	Boy was doing a wheelie when he lost control; handlebar end cut him from penis to mid-thigh.	Stunt
11	010807HEP9013	8/3/01	8/M	Cerve Coeur, IL	Abdomen contusion (4)	Unknown	Unknown	Unknown	End (11,11)	Handlebars went into abdomen; made too sharp of a turn and fell over.	Normal
12	I0240266A 020423CCC1479	4/14/02	7/M	Gretna, VA	Bruised stomach (5)	Unknown	Unknown	Unknown	End (12,12)	Boy wrecked the bike and the end of the handlebar went into his stomach and bruised it. Also the brake handle went into the groin area and left a puncture wound.	Unknown
13	910617HEP9004	6/13/91	5/F	Torrance, CA	Cont/Abras to ribs (2)	Unknown	Unknown	Unknown	Handlebar end/grip unknown (13,1)	The girl received a contusion/abrasion to her right ribs when the metal right handlebar of a bike (borrowed) poked into her ribs as she fell from the bike.	Unknown
14	970903CMC1003	8/8/97	11/M	Philadelphia, PA	Injury to spleen (3)	360R 360L	Good, grips intact (10,2)	BMX style (7)	Handlebar end/grip unknown (14,2)	The boy was riding his own bicycle. In an attempt to jump a ramp, and over a second, the back of the bike came up, the front came down and hit the topmost part of the ramp. His body came down and was hit in the stomach with the handlebar. Received laceration to spleen and internal bleeding.	Stunt
15	971107CMC1006	9/25/97	14/M	Philadelphia, PA	Severed kidney (1) and pancreas (1)	90R 90L	Grips, metal showing (11,9)	BMX style (8)	Handlebar end/grip unknown (15,3)	The boy was pedaling at an average speed and was standing on the pedals. He attempted to jump a curb, but the front wheel didn't lift up high enough. The wheel turned left and the right handlebar hit the boy in the lower right abdominal area.	Stunt
16	980515CMC1011	3/30/98	6/M	Lansdale, PA	Lacerated liver (3)	360R 360L	Unknown	BMX style (9)	Handlebar end/grip unknown (16,4)	The boy was riding in a gravel parking lot with foundation slabs protruding from the ground. He tried to ride over a stone/cement foundation slab when the front wheel turned and he lost control. He fell and his abdomen hit the left side of the bike's handlebars.	Object
17	980417CMC1010	2/25/98	13/M	Exton, PA	Lacerated spleen (4)	180L 270R	Unknown	BMX style (10)	Handlebar end/grip unknown (17,5)	The boy was riding a friend's bike for the first time. He was on a raised stone wall trying to turn around in the air. As the bike came down on the stone wall, the boy lost his grip and lost control of the bike. He fell to the left while still standing on the bike and the left side fo the handlebar contacted the side of his abdomen. He fell to the driveway further pushing the handlebar into his abdomen.	Stunt

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
18	980617CMC1012	5/8/98	9/F	Schwenksville, PA	Bruised abdominal (6) wall	175R 175L	Good, grips intact (12,3)	BMX style (11)	Handlebar end/grip unknown (18,6)	The girl was with three friends, they were resting after riding for a little while. As she was preparing to go again, she had one foot on a pedal and one foot on the ground. She does not remember what happened, but remembers the handlebar swung around. It contacted her abodmen on the left side and she fell to the ground.	Normal
19	980721CMC1013	6/15/98	11/M	Philadelphia, PA	Blunt trauma to abdomen (7)	>180L >180R	Unknown	BMX style (12)	Handlebar end/grip unknown (19,7)	The boy was coasting on his bike, standing on the pedals with both hands on the handlebars. He does not know exactly what happened, but thinks he hit a small rock and lost control of the bike. The bike went to the right and the handlebars turned, his body went forward and when he landed, his body hit the left side of the handlebar which was up in the air.	Normal
20	980721CMC1014	6/24/98	10/M	Philadelphia, PA	Blunt trauma to abdomen (8)	360R 360L	Bare metal (13,10)	BMX style (13)	Handlebar end/grip unknown (20,8)	The boy was coasting on his bike and talking with his friends. He looked down and noticed he was heading towards a piece of brick and swerved to go around it. He lost his balance and started to fall. The handlebar twisted toward the left and he fell to the right with the right side of the handlebar hitting him in the stomach area.	Normal
21	970808CMC1001	7/11/97	10/F	Pasadena, MD	Labial (2) laceration	225R 100L	Grips, good condition (14, 4)	Stralght (14)	Front Post (21,1)	The girl believed she was going too fast and applied the brakes on the bike. This action threw the victim forward, causing her pubic area to come in contact with the frame post. Bicycle was too big and girl could not sit on seat and put feet on the ground. Medical record says she fell forward on "crossbar."	Normal
22	970818CMC1002	7/3/97	11/M	Williamstown, NJ	Injury to spleen (5)	360R 360L	Unknown	BMX style (15)	Handlebar, crossbar or both (22,1)	The boy was riding a borrowed bicycle. He rode up onto a ramp and as he was suspended in the air he turned the wheel to do a 360. The left side of the handlebar came in contact with his left shoulder, he lost control and when he landed, he came in contact with part of the handlebar. Medical records say he "struck abdomen repeatedly on crossbar."	Stunt
23	011025HEP9001	7/17/01	7/M	New Kensington, PA	Abdominal pain (9)	Unknown	Unknown	BMX style (16)	Crossbar (23,1)	Boy was riding on sandy area, hit rut in trail and lost control.	Normal
24	010717HEP9005	7/12/01	4/M	Fort Worth, TX	Groin contusion (3)	Unknown	Unknown	Unknown	Stem (24,1)	Boy was riding bike showing mom, looked back at mom and hit a curb.	Object
25	980706CCC0565 C9865015A	2/29/96	11/M	Morrisville, PA	Kidney (2) was split and later removed	Unknown	Unknown	Unknown	Unknown	Boy was riding bike with friend on the sidewalk in front of their homes. He was not doing unusual moves and was riding normally. He said he was just beginning to press down on the pedal when the chain came off, causing the victim to be thrown into the handlebars of the bike. The victim then toppled over the handlebars and became entangled in them when both the victim and the bike fell over.	Normal
26	910520HEP9004	5/11/91	8/M	Central Valley, NY	Lacerated chin and contusion to ribs (3)	Unknown	Unknown	Unknown	Unknown	The boy hit his chin on the center bolt of the handlebars and hit his ribs on the handlebars during an accident. It is unknown how the accident occurred.	Unknown
27	910619HEP9004	6/11/91	5/M	Forest Park, GA	Contusion to ribs (4)	Unknown	Unknown	BMX style (17)	Unknown	The boy slammed against the handlebars of his bike while jumping a ramp. He accidentally braked when he reached the ramp throwing his body forward.	Unknown
28	910702HEP9003	6/30/91	8/M	North Patchoque, NY	Contusion to abdomen (10)	Unknown	Uncovered metal (15,11)	Unknown	Unknown	The boy's bike hit a stone causing the wheel to turn and the victim to fall. He fell off the bicycle and received a contusion to the abodomen from the uncovered handlebar of the bike.	Normal
29	911029HEP9003	10/24/91	5/M	Conyers, GA	Contusion to stomach and intestine (1)	Unknown	Unknown	Unknown	Unknown	The boy was riding his bike on a grass surface when he hit a ditch and lost control. When he fell, the handlebar struck his abdomen.	Normal
30	911115HEP9001	11/10/91	7/F	Oxford, AL	Cont/abras to pubic (4) region	Unknown	Unknown	Unknown	Unknown	The girl was riding on an unpaved rocky road. She had an accident causing her to fall on the handlebars and have bleeding in the pubic area.	Unknown
31	911122HEP9001	11/20/91	6/F	Burlington, NC	Contusion to chest (5)	Unknown	Unknown	Unknown	Unknown	The girl was riding her bike for the first time without training wheels. She ran into a fence and lost control. She struck the handlebars and suffered contusions to her chest.	Object
32	P9712335A	4/24/93	7/F	Wareham, MA	Injury to gastrointestinal (2) tract	Unknown	Unknown	Unknown	Unknown	Hit abdomen on handlebar.	Unknown
33	P9710797A	6/29/93	4/M	South Bend, IN	Injury to gastrointestinal (3) tract and liver (4)	Unknown	Unknown	Unknown	Unknown	Fell off bike against handlebars.	Unknown

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
34	P9711053A	7/10/93	5/M	Flint, MI	Injury to gastrointestinal (4) tract	Unknown	Unknown	Unknown	Unknown	Fell onto bike handlebars.	Unknown
35	P9712714A	7/18/93	9/M	Denver, CO	Injury to gastrointestinal (5) tract	Unknown	Unknown	Unknown	Unknown	Fell on handlebars jumped bike over ramp.	Stunt
36	P9711125A	7/20/93	7/M	Westland, MI	Injury to gastrointestinal (6) tract	Unknown	Unknown	Unknown	Unknown	Fell onto bike handlebars.	Unknown
37	P9723047A	8/5/93	11/F	East Amherst, NY	Injury to gastrointestinal (7) tract, contusion of face/scalp/ neck	Unknown	Unknown	Unknown	Unknown	Hit in the stomach by handlebars.	Unknown
38	P9712991A	8/27/93	10/F	Marietta, GA	Injury to liver (5)	Unknown	Unknown	Unknown	Unknown	Crashed bike and hit handlebars.	Unknown
39	P9723114A	8/29/93	8/M	Lockport, NY	Contusion of trunk (6)	Unknown	Unknown	Unknown	Unknown	Fell off bike onto handlebars.	Unknown
40	P9712096A	9/3/93	8/M	Covington, GA	Contusion of trunk (7)	Unknown	Unknown	Unknown	Unknown	Crashed bike and hit handlebars.	Unknown
41	P9711600A	2/24/94	8/M	Morrow, GA	Injury to spleen (6)	Unknown	Unknown	Unknown	Unknown	Fell onto bike handlebars.	Unknown
42	P9712596A	3/23/94	10/M	Holyoke, MA	Injury to liver (5), contusion of trunk (8)	Unknown	Unknown	Unknown	Unknown	Hit a hole, fell onto handlebars	Normal
43	P9712894A	3/30/94	11/M	Porterville, CA	Injury to kidney (3)	Unknown	Unknown	Unknown	Unknown	Struck handlebars.	Unknown
44	P9712265A	4/18/94	10/M	Miami, FL	Injury to liver (7)	Unknown	Unknown	Unknown	Unknown	Hit handlebars.	Unknown
45	P9712690A	4/21/94	16/M	Denver, CO	Injury to other intraabdominal (11) organs	Unknown	Unknown	Unknown	Unknown	Hit parallel bar.	Unknown
46	P9713165A	5/4/94	8/M	Atlanta, GA	Injury to spleen (7)	Unknown	Unknown	Unknown	Unknown	Rode into parked car and hit abdomen on handlebars.	Object
47	P9713127A	6/8/94	9/M	Jacksonville, FL	Contusion of trunk (9)	Unknown	Unknown	Unknown	Unknown	Turned to look behind, handlebars swung into abdomen.	Normal
48	P9713686A	6/20/94	12/M	Aurora, CO	Injury to spleen (8)	Unknown	Unknown	Unknown	Unknown	Fell off bike, handlebars struck him.	Unknown
49	P9712358A	7/6/94	9/M	Keene, NH	Injury to gastrointestinal (8) tract	Unknown	Unknown	Unknown	Unknown	Fell and handlebars hit patient.	Unknown
50	P9713134A	7/10/94	7/M	Jacksonville, FL	Injury to liver (8), open wound to head	Unknown	Unknown	Unknown	Unknown	Fell off bike hitting upper abdomen on handlebars.	Unknown
51	P9714343A	8/9/94	13/M	Smyrna, GA	Injury to spleen (9), heart (1) and lungs (1)	Unknown	Unknown	Unknown	Unknown	Child wrecked bike, hit handlebars.	Unknown
52	P9712368A	8/10/94	6/F	Detroit, MI	Injury to liver (9)	Unknown	Unknown	Unknown	Unknown	Fell from bike and hit handlebars.	Unknown
53	P9713596A	10/12/94	6/M	Chicago, IL	Contusion of trunk (10)	Unknown	Unknown	Unknown	Unknown	Fell off bike hit abdomen on bars.	Unknown
54	P9714870A	10/20/94	7/M	Fontana, CA	Contusion of trunk (11)	Unknown	Unknown	Unknown	Unknown	Fell on the handlebars.	Unknown
55	P9714270A	2/4/95	9/M	Fort Worth, TX	Injury to gastrointestinal (9) tract	Unknown	Unknown	Unknown	Unknown	Fell onto handlebars of bike.	Unknown
56	P9714441A	3/31/95	11/M	Unknown, MI	Injury to liver (10)	Unknown	Unknown	Unknown	Unknown	Handlebars hit belly when child hit curb.	Object
57	P9715469A	5/5/95	8/F	MacClenny, FL	Injury to spleen (10), contusion of trunk (12)	Unknown	Unknown	Unknown	Unknown	Fell off bike, handlebar into chest.	Unknown
58	P9716439A	6/18/95	9/M	Powder Springs, GA	Contusion of trunk (13)	Unknown	Unknown	Unknown	Unknown	Crashed bike, handlebar to abdomen.	Unknown

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
59	P9716715A	7/29/95	16/F	Fresno, CA	Contusion of trunk (14)	Unknown	Unknown	Unknown	Unknown	Fell onto crossbar of bike; believed to be handlebar crossbar, but uncertain.	Unknown
60	P9714622A	8/3/95	14/M	Charlotte, NC	Injury to gastrointestinal (10) tract	Unknown	Unknown	Unknown	Unknown	Abdominal trauma from handlebars.	Unknown
61	P9716724A	8/18/95	12/F	Fresno, CA	Injury to spleen (11)	Unknown	Unknown	Unknown	Unknown	On handlebars foot in wheel fell.	Unknown
62	H95C0016A	12/2/95	8/M	Arlington, TX	Cut abdomen (12)	Unknown	Unknown	Unknown	Unknown	The boy was severely cut on his abdomen when the handlebar cracked and partially detached on his bike. He fell onto the jagged frame.	Mechanical
63	N9670020A	6/1/96	13/M	Prospect Park, NJ	Injury to abdomen (13)	Unknown	Unknown	Unknown	Unknown	The boy injured his abdomen when he fell from the bicycle and the handlebars struck him.	Unknown
64	X96C0736A	11/17/96	6/M	Glassboro, PA	Laceration to liver (11), internal bleeding	Unknown	Unknown	Unknown	Unknown	The boy was hospitalized for critical injury received when he fell on the handlebars of his bike.	Unknown
65	H9920151A	1/20/99	4/F	Scottsdale, AZ	Bruise to chest (15)	Unknown	Unknown	Unknown	Unknown	The girl was riding the bike with training wheels attached. She let go of the handlebars and the handlebars turned 180 degrees and knocked her off of the bike.	Normal
66	F0080003A	2/1/00	13/M	La Habra, CA	Massive internal bleeding: abdomen (14)	Unknown	Unknown	Unknown	Unknown	The boy was impaled on his bicycle handlebar.	Unknown
67	H0080045A	8/3/00	7/F	Lisbon, IA	Lacerations to upper chest (16)	Unknown	Unknown	Unknown	Unknown	The girl was attempting to turn towards the left and fell off the bike. She fell to the pavement landing on top of the bicycle's handlebars. She received treatment at home. Consumer inspected bike and noticed 4" jagged pieces of metal protruding from th bike's frame. The jagged metal pieces protrude from the handlebars front weld.	Normal
68	010706HEP9002	6/27/01	10/F	Douglasville, GA	Lower abdomen contusion (15)	Unknown	Unknown	Unknown	Unknown	Handlebars went into abdomen; collided with another cyclist; friend then fell on top and pushed bars further.	Object
69	010726HEP9003	7/19/02	12/M	Lakewood, CO	Abdomen abrasion (16)	Unknown	Unknown	Unknown	Unknown	Chain jammed, child fell to road, handlebar hit lower abdomen.	Mechanical
70	010726HEP9004	7/20/01	9/F	Aurora, CO	Bruised pelvis (1)	Unknown	Unknown	Unknown	Unknown	Fell off bike, handlebars hit pelvis; ran into basketball pole.	Object
71	010809HEP9001	8/3/01	3/M	Aurora, CO	Bruised ribs (17)	Unknown	Unknown	Unknown	Unknown	Boy was riding bike and hit ribs on handlebar.	Unknown
72	010816HEP9005	8/5/01	10/M	Philadelphia, PA	Blunt trauma to pancreas (2)	Unknown	Unknown	BMX style (18)	Unknown	Boy lost control of bike when front tire blew out and fell forward hitting handlebars.	Mechanical
73	010919HEP9025	8/24/01	5/M	Anniston, AL	Bruised chest and ribs (18)	Unknown	Unknown	Unknown	Unknown	Child was riding bike and fell off porch, hitting chest and ribs on handlebars;	Normal
74	010919HEP9058	8/10/01	12/M	Wheat Ridge, CO	Groin (5) area	Unknown	Unknown	Unknown	Unknown	learning to turn; wheel fell off porch.	Stunt
75	010921HEP9003	9/15/01	6/M	Jonesborough, TN	Scraped and bruised chest (19)	Unknown	Unknown	BMX style (19)	Unknown	Child was hit with bike to groin area while jumping hills, bruising and a lump.	Object
76	010926HEP9004	9/22/01	10/M	Northumberland, PA	Pubic (6) bruising	Unknown	Unknown	Unknown	Unknown	Boy was riding downhill and hit tire of another kid's bike, flew off and hit handlebar with chest.	Normal
77	010928HEP9009	9/22/01	14/M	Everett, WA	Hip (2) contusion/abrasion	Unknown	Unknown	BMX style (20)	Unknown	Boy was riding down hill, got going too fast, lost control and fell .	Mechanical
78	011116HEP9029	10/13/01	7/F	Martin's Ferry, OH	Chest (20) contusion	Unknown	Unknown	Unknown	Unknown	Chain came off, child fell into handlebar.	Normal
79	011116HEP9037	10/17/01	5/M	Greensboro, NC	Bruised chest (21)	Unknown	Unknown	Unknown	Unknown	Girl had seizure while on bike, hit chest on handlebars then fell from bike.	Normal
80	011116HEP9071	10/11/01	6/M	Washington, PA	Abdominal (17) bleeding	Unknown	Unknown	Unknown	Unknown	Boy hit rut in pavement of road, lost control and was thrown over handlebars.	Stunt
81	011130HEP9006	10/20/01	14/M	Aliquippapa, PA	Fractured spleen (12) bruised kidney (4)	Unknown	Unknown	Unknown	Unknown	Boy fell off his bike and caused site of appendicostomy to bleed.	Stunt
82	010709HEP9004	7/5/01	8/F	Canton, IL	Bruised stomach (18)	Unknown	Unknown	BMX style (21)	Unknown	Attempting a jump and fell off and hit handlebars, riding in a bike park with jumps	Object
										Girl was riding bike and turned to look at brother when she hit a parked car.	

NON-TRUNK HANDLEBAR INJURIES

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
1	910220HEP9002	2/18/91	7/M	Glendale, AZ	Fractured finger serious (1)	Unknown	Metal exposed (1,1)	Unknown	End (1,1)	The handlebar of the bike fell on the boy's finger when he dropped the bike while leaning over to pick something up. The metal was exposed on the handlebar ends from use.	Normal
2	910823HEP9005	8/21/91	11/M	Chicago, IL	Laceration to leg minor (1)	Unknown	Metal exposed (2,2)	BMX style (1)	End (2,2)	The boy was going off of a curb and fell to the left to the ground. The handlebars hit his right lower leg. The grips on the handlebars were worn exposing the metal.	Normal
3	970916CCC2412 X9793020A	9/5/97	7/M	Springfield, MO	Puncture wound to neck serious (2)	Unknown	Grips, metal showing (3,3)	Straight (2)	End (3,3)	Boy was riding bike halfway up the smooth concrete driveway, the chain slipped and threw the boy forward and down towards the handlebar. He lost control of the bike and the right handlebar end (metal protruding) went four inches into the left middle portion of his neck.	Mechanical
4	I00B0195A	11/6/00	13/M	Oceanside, NY	Puncture wound to thigh serious (3)	Unknown	Endcap missing (4,4)	Unknown	End (4,4)	The boy lost control of his bike and fell. He went over the front end and landed on the edge of the handlebars. The endcap was no longer there and the end of the handlebar punctured his thigh. He was airlifted to a trauma center.	Normal
5	H93B0062A	8/6/93	5/M	Glen Allen, VA	Injured partial unk (1)	Unknown	Grip came off, metal exposed (5,5)	Unknown	End (5,5)	The boy was injured when a pedal slid off the shank and the hand grip came off, exposing the sharp end of the metal bar which he hit when he fell.	Mechanical
6	010627HEP9008	6/23/01	8/M	Douglasville, GA	Laceration to leg minor (2)	Unknown	Metal Showing (6,6)	BMX style (3)	End (6,6)	Going down bumpy hill and hit one of the bumps, lost control and fell; handlebar punctured leg.	Normal
7	010710HEP9018	7/2/01	6/F	Fort Worth, TX	Toe laceration minor (3)	Unknown	Metal Showing (7,7)	Unknown	End (7,7)	As a bystander, another child's bike fell on girl's foot. The uncovered handlebar cut her toe.	Wasn't Riding
8	010724HEP9012	7/17/01	4/M	College Park, GA	Head laceration minor (4)	Unknown	Metal Showing (8,8)	Unknown	End (8,8)	While picking up the bicycle, it slipped from boy's grip and the edge of the handlebars hit him in the head.	Wasn't Riding
9	010725HEP9014	7/16/01	8/M	Philadelphia, PA	Head laceration minor (5)	Unknown	Metal Showing (9,9)	Unknown	End (9,9)	Collided with another bike and fell to ground. Handlebar of other bike hit his head.	Object
10	010730HEP9013	7/27/01	7/M	Ethel, MS	Face laceration minor (6)	Unknown	Metal Showing (10,10)	BMX style (4)	End (10,10)	Approaching ramp, but lost balance before he got to the ramp, lost his balance and fell hitting chin on handlebars.	Normal
11	010810HEP9012	8/8/01	11/F	Kernersville, NC	Finger laceration minor (7)	Unknown	Metal Showing (11,11)	Unknown	End (11,11)	Collided with another biker while making turns and the handlebar of the other bike cut her finger.	Object
12	011019HEP9004	9/27/01	9/M	Seneca Falls, NY	Eye laceration minor (8)	Unknown	Metal Showing (12,12)	BMX style (5)	End (12,12)	Child's pant leg got caught in chain; was trying to remove pants from chain and fell over; bike fell on top of him.	Normal
13	910408HEP9003	4/6/91	8/M	Powers, MI	Lacerated chin minor (9)	Unknown	Unknown	Unknown	Middle crossbar (13,1)	The boy was riding his bike, hit a rock and lost his balance. He hit his chin on the central part of the handlebars and lacerated his chin.	Normal
14	990211CCN0128	2/1/99	14/M	Frankfort, KY	No medical attention required partial unk (2)	Unknown (at least 90 degrees)	Good, grips intact (13,1)	Straight (6)	Top tube and center (14,2)	The boy was racing with his friends on a pedestrian mall. There was a failure in the crank area causing the boy to lose control and crash. He contacted the top tube and center of the handlebar.	Object
15	910429HEP9005	4/23/91	6/M	Bryan, TX	Contusion to chin and neck minor (10)	Unknown	Unknown	Unknown	Unknown	The boy was riding his bike when a child jumped in front of him causing him to brake suddenly. This caused the victim to hit his chin and neck on the handlebars, flip over the handlebars and land on his back on the pavement.	Object
16	910625HEP9007	5/24/91	3/F	Cedarville, NJ	Laceration to forehead minor (11)	Unknown	Unknown	Unknown	Unknown	The little girl was a passenger, being held on her uncle's lap while he operate the bike. They rode over a bump causing the victim to fall against the handlebars on her face.	Normal
17	911016HEP9002	9/16/91	5/M	Bridgeton, NJ	Contusion to nose minor (12)	Unknown	Unknown	Unknown	Unknown	The boy was trying to do a wheelie up onto the sidewalk when he was struck by the handlebar.	Stunt
18	910415CCN0998	3/19/91	13/M	Fair Grove, MI	Lacerated upper leg minor (13)	Unknown	Broke, cause of incident	Unknown	Broken section (15,1)	The boy was riding the bike when the left handlebar broke. He was thrown forward onto the broken handle and received a laceration to the inner, upper leg. He still has muscle spasms in area.	Mechanical
19	910801HEP9004	7/31/91	10/M	Murfeesboro, TN	Laceration to leg minor (14)	Unknown	Unknown	Unknown	Unknown	The boy went over a speedbump and flew over the handlebars. The "lever" of his handlebars went into his leg as he slipped over the handlebars.	Normal
20	910501HEP9003	4/29/91	4/F	Pittsburgh, PA	Laceration to mouth minor (15)	Unknown	Unknown	Unknown	Unknown	The girl rode over a curb of a sidewalk, causing her to hit her mouth on the bike's handlebar. She lacerated her lip and contused her tooth.	Object

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
21	910709HEP9005	6/25/91	4/M	Warwick, RI	Cont/Abras to head and eye minor (16)	Unknown	Unknown	Unknown	Unknown	The boy was recently began riding the bike without training wheels. He fell off the right of the bike landing on the pavement and the right handlebar hit the victim in the right eye.	Normal
22	910708HEP9007	7/6/91	12/F	Waynesboro, PA	Concussion, fractured nose, lacerated lip serious (4)	Unknown	Unknown	Unknown	Unknown	The girl fell face first against her bicycle's handlbars then onto a paved street. Loose stones or possibly her bookbag caused the accident.	Normal
23	910823HEP9004	7/26/91	6/M	Eden Prairie, MN	Hematoma toe minor (17)	Unknown	Unknown	Unknown	Unknown	The bicycle fell and landed on the boy's toe.	Unknown
24	910821HEP9001	8/16/91	6/M	Plano, TX	Laceration to foot minor (18)	Unknown	Unknown	Unknown	Unknown	The bicycle fell and landed on the boy's foot. He was just learning to ride and the bike was slightly too big for him, with training wheels on it	Normal
25	F9340147A	9/9/91	9/M	Littleton, CO	Impaled serious (5)	Unknown	Unknown	Unknown	Unknown	The boy was impaled on the handlebar of his bike while jumping curbs.	Unknown
26	H9539202A	2/1/93	4/M	Dallas, TX	Finger amputation serious (6)	Unknown	Unknown	Unknown - mountain bike	Unknown	The boy had a finger amputated when he fell on his mountain bike and the handlebar cut him.	Unknown
27	P9712709A	3/19/93	10/F	Denver, CO	Contusion of lower limb and other/ unspec areas minor (19)	Unknown	Unknown	Unknown	Unknown	Going downhill and struck handlebars	Unknown
28	P9715394A	11/16/94	5/M	Roswell, GA	Injury, other and unspecified partial unk (3)	Unknown	Unknown	Unknown	Unknown	Fell off bike, hit neck on handlebars	Unknown
29	P9715538A	3/16/95	8M	San Bernadino, CA	Concussion, other superficial injuries serious (7)	Unknown	Unknown	Unknown	Unknown	Fell from bike, hit head on handlebars then on concrete	Unknown
30	P9713132A	5/19/95	15/M	Butler, PA	Concussion, open wound to head serious (8)	Unknown	Unknown	Unknown	Unknown	Hit a pot hole and flew on handlebars	Object
31	P9716298A	6/18/95	9/M	Decatur, GA	Injury, other and unspecified partial unk (4)	Unknown	Unknown	Unknown	Unknown	Collided struck abdomen with handlebars on bike	Object
32	P9716521A	7/6/95	6/M	Lincoln Park, MI	Superficial injury of other/multiple/ unspecified sites partial unk (5)	Unknown	Unknown	Unknown	Unknown	Hit a house and handlebars hit abdomen	Object
33	P9716690A	8/22/95	7/M	Warren, MI	Concussion, contusion of face/ scalp/neck serious (9)	Unknown	Unknown	Unknown	Unknown	Fell off hit handle	Unknown
34	X9782601A	4/26/97	6/M	Trumball, CT	Contusions/ lacerations to mouth minor (20)	Unknown	Unknown	Unknown	Unknown	The boy came upon an uneven part of track while riding his bike. The bike made a sharp turn and he fell forwards into the handlebars. The handlebar caused contusion and lacerations to his mouth.	Normal
35	990707CEP9006 NEISS	5/31/99	4/M	Columbus, OH	Cont/Abrasion to the eye minor (21)	Unknown	Unknown	Unknown	Unknown	Boy and his father were riding bikes on the street and crossed the street. The boy walked his bicycle across the street for safety purposes and as he approached the other side, the bike's front tire hit the curb. The tire and handlebars turned and the handlebar hit the victim in the left eye.	Wasn't Riding

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
36	H0140476A	3/2/00	12/M	Houston, TX	Black eyes, lip detached from jaw, fractured cheekbone, knocked out teeth, swollen face and eyes, headaches, fractured nose serious (10)	Unknown	Unknown	Unknown	Unknown	The boy was riding his bike and jumped over a pile of dirt. While in the air, the front wheel detached from the bike, the fork broke and the boy's face hit the handlebars.	Mechanical
37	010629HEP9006 NEISS	6/26/01	4/F	Brooklyn, NY	Laceration to her forehead minor (22)	Unknown	Unknown	Unknown	Unknown	The girl was a bystander in the incident; she was not riding the bicycle involved in the incident. A friend was riding the bicycle and ran into the victim. When the victim was hit by the bike, she fell over and came down on the handlebars striking her forehead just above the left eybrow.	Wasn't Riding
38	F9359005A	4/27/93	7/M	Melbourne, AR	Seriously hurt partial unk (6)	Unknown	Unknown	Unknown	Unknown	The boy was seriously hurt by the handlebars on his bike when he wrecked.	Unknown
39	H93A0022A	9/30/93	5/M	Ft Benning, GA	Cut partial unk (7)	Unknown	Unknown	Unknown	Unknown	The boy was cut by the handlebars on his bike as he used the brake.	Normal
40	N9670020C	6/1/96	5/M	Paterson, NJ	Unknown partial unk (8)	Unknown	Unknown	Unknown	Unknown	The boy was injury by the handlebars of his bike when he fell from the bike.	Unknown
41	010702HEP9012	6/28/01	14/M	Washington, IL	Head laceration minor (23)	Unknown	Unknown	Unknown	Unknown	Child was sitting on his bike's handlebars trying to balance, fell hitting head on handlebars of another bike that was next to him.	Stunt
42	010710HEP9015	7/2/01	7/M	Corpus Christi, TX	Mouth laceration minor (24)	Unknown	Unknown	Unknown	Unknown	Boy hit a rock, wheel turned, boy fell and cut lip on handlebars.	Normal
43	010718HEP9013	7/13/01	13/M	Marysville, WA	Finger sprain minor (25)	Unknown	Unknown	BMX style (7)	Unknown	Child jumped onto curb, came down and wheel came off bike, victim went over handlebars and sprained .finger on handlebars	Mechanical
44	010720HEP9005	7/2/01	11/M	Pittsburgh, PA	Wrist fracture serious (11)	Unknown	Unknown	BMX style (8)	Unknown	Victim doing jumps on ramps, lost balance and fell, wrist hit handlebar.	Stunt
45	010723HEP9006	7/19/01	7/M	Sunbury, PA	Thigh contusion minor (26)	Unknown	Unknown	Unknown	Unknown	Boy jumped a bank in yard, when landed, he and bike flipped in air, flew over handlebar and hit right thigh.	Stunt
46	010724HEP9008	1/19/02	13/F	Philadelphia, PA	Shoulder minor (27)	Unknown	Unknown	Unknown	Unknown	Victim riding with girl on handlebars, car ran light and hit children, handlebar caught shoulder.	Object
47	010731HEP9009	7/24/01	12/M	Hawthorne, CA	Knee contusion minor (28)	Unknown	Unknown	Unknown	Unknown	Victim hit a rut in the sidewalk and lost balance.	Normal
48	010731HEP9011	7/24/02	4/F	Hawthorne, CA	Lip laceration minor (29)	Unknown	Unknown	BMX style (9)	Unknown	Victim fell off bike hit lip on handlebars, lost control on hill and hit a fence.	Object
49	010813HEP9005	8/7/01	9/M	Riverdale, GA	Upper leg contusion minor (30)	Unknown	Unknown	BMX style (10)	Unknown	Victim was attempting a wheelie, hit a rock and front wheel turned and hit leg on handlebar.	Stunt
50	010815HEP9005	7/27/01	7/M	Upper Arlington, OH	Eye socket injury serious (12)	Unknown	Unknown	Unknown	Unknown	As he was getting off of the bicycle, caught foot on bike, kid fell and then bike fell on the kid.	Normal
51	010820HEP9008	8/2/01	5/M	Granbury, TX	Wrists minor (31)	Unknown	unknown	BMX style (11)	Unknown	Child was riding with feet on handlebars, lost control, couldn't find brakes, went into yard then hit post.	Stunt
52	010820HEP9011	8/14/01	5/F	Pekin, IL	Finger sprain minor (32)	Unknown	Unknown	Unknown	Unknown	Victim was riding with mom on sidewalk, tried to get onto sidewalk w/o ramp and lost balance, when fell, finger got bent back.	Normal
53	010828HEP9003	8/8/01	4/M	Columbus, OH	Broken tooth minor (33)	Unknown	Unknown	Unknown	Unknown	Victim riding, got scared and jumped off bike, handlebar hit him in the mouth.	Normal
54	010918HEP9006	9/3/91	8/M	Rutherford, NJ	Bruised chin minor (34)	Unknown	Unknown	Unknown	Unknown	Child ran into curb, then into a fence, fell of bike and then the handlebar hit the chin.	Object
55	010918HEP9030	8/21/01	12/M	Madison Heights, MI	Knee laceration minor (35)	Unknown	Unknown	BMX style (12)	Unknown	Child hit a curb in parking lot, went forward into bike handlebars, hit knee on handlebar.	Object
56	010918HEP9064	8/25/01	11/M	Oakland, CA	Fractured arm serious (13)	Unknown	Unknown	Unknown	Unknown	Child got going too fast, bike wobbled and lost control, handlebars came down on chld's arm.	Normal
57	010918HEP9087	9/9/01	3/M	Torrance, CA	Humerus fracture serious (14)	Unknown	Unknown	Unknown	Unknown	Child collided with sister in a playcar on patio, fell off bike and handlebars landed on his arm.	Object

#	Doc Number	Date	Age/ Sex	City/State	Injury/ Body Part	Steer Angle	Handlebar Condition	Handlebar Configur.	Part of Handlebar	Summary	Riding Behavior
58	010925HEP9001	8/30/01	12/M	Caledonia, OH	Eye minor (36)	Unknown	Unknown	Unknown	Unknown	Front wheel locked up on bike, was thrown from bike and flipped over handlebars.	Mechanical
59	011004HEP9005	9/26/01	13/M	Baker, LA	Head minor (37)	Unknown	Unknown	Unknown	Unknown	Child fell off bike, little mark on head, was jumping ramps.	Stunt
60	011010HEP9001	9/17/01	13/M	Grove City, OH	Scraped chin minor (38)	Unknown	Unknown	BMX style (13)	Unknown	Front wheel came off while riding on sidewalk, was thrown from bike nd hit chin on handlebars.	Mechanical
61	011115HEP9027	10/11/01	14/F	Oakland, CA	Head minor (39)	Unknown	Unknown	Unknown	Unknown	Child was crossing street at a stoplight and was hit by a car; cut forehead.on handlebars of bike.	Object
62	011115HEP9040	10/14/01	11/F	Seattle, WA	Forehead minor (40)	Unknown	Unknown	Unknown	Unknown	Child hit bump in road, lost control, bounced around and crashed, hitting forehead on handlebars.	Normal
63	011116HEP9054	10/23/01	13/M	Sunbury, PA	Face laceration minor (41)	Unknown	Unknown	Unknown	Unknown	Performing stunts, jumping ramps, on dirt bike path and hit face on handlebars when he was coming down.	Stunt
64	011128HEP9002	10/7/01	12/F	Pittsfield, MA	Bruised knuckles minor (42)	Unknown	Unknown	BMX style (14)	Unknown	Girl hit small hole in sidewalk and lost control, fell off bike and handlebars hit her after.	Normal
65	X0210067A	12/5/01	4/M	Greenwood, IN	Mouth minor (43)	Unknown	Metal Showing (14,13)	Unknown	Unknown	Fell off tricycle and hit mouth on handlebars of another bike.	Wasn't Riding

TAB D

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: November 5, 2002

TO : Barbara Jacobson, Project Manager,
Handlebar Petition
Directorate for Health Sciences

THROUGH: Mary Ann Danello, Ph.D., Associate Executive Director,
Directorate for Health Sciences
Lori E. Saltzman, M.S., Director,
Division of Health Sciences

FROM : Jason R. Goldsmith, Ph.D., Physiologist,
Directorate for Health Sciences, x-1387

SUBJECT : Petition HP01-1, Petition for Bicycle Handlebar Performance Standard

BACKGROUND:

This memorandum has been prepared in response to Petition HP 01-1, submitted by Flaura Koplin Winston, M.D., Ph.D., which requests the Commission "to regulate the safety of (bicycle) handlebars by way of a performance standard regarding energy dissipation and distribution during impact." The petitioner asserts that bicycle handlebars pose a risk of pancreatic, intestinal, renal, liver and splenic injuries, particularly to young children. A recent publication by the petitioner (Winston et al., 1998), included with the petition in support of her assertion, demonstrates that these serious abdominal injuries occur subsequent to low-speed falls from bicycles onto handlebars, wherein the handlebar acts as a blunt spear, causing the injuries upon impact. Additionally, the petitioner states that a recent research study that she coauthored (Arbogast et al., 2001) (also submitted in support of the petition) indicates that redesign of the handlebars, such that the impact energy of the small diameter handlebar end is dissipated and spread over a larger surface area, will minimize the risk of abdominal injuries.

The Division of Hazard Analysis staff[1] examined CPSC databases for deaths, injuries, and reported incidents amongst children 2- to 17-years-old that involved bicycle handlebars. From January 1, 1991 to June 1, 2002, eight deaths were found that were due to severe traumatic abdominal injuries resulting from impact with bicycle handlebars. These blunt force injuries included three cases of a lacerated liver and one case of a lacerated bowel. The details of the

[1] CPSC Memorandum from Debra Sweet, Division of Hazard Analysis, to Barbara Jacobson, Directorate for Health Sciences, entitled "HA Memo for Handlebar Petition", September 2002.

other four injuries resulting in death are unknown. During 2001, 5042 trunk (includes chest and abdomen) injuries were estimated to have occurred as a result of impact with bicycle handlebars for which treatment was received in U.S. emergency rooms. Of these injuries, 81.9% of the children were treated for minor injuries, such as contusions, abrasions, lacerations and hematomas (localized collections of blood in an organ, space, or tissue, due to breakage of a blood vessel), and released from the emergency room. An additional 9.6% of the injured children were released after treatment for more serious injuries, which included fractures, strains and sprains. The remaining 8.5% of the injured children required further treatment and/or observation subsequent to visiting the emergency room. These children had injuries that included contusions, abrasions, lacerations, and internal organ injuries. A survey of CPSC incident data from January 1, 1991, to June 1, 2002, revealed 147 bicycle handlebar-related incidents, of which 82 resulted in injuries to the trunk. Forty-two of these trunk injuries were serious injuries; they included injuries to the spleen (12), liver (11), gastrointestinal tract (10), kidney (4), pancreas (2), heart (1), and lungs (1), as well as one herniation.

Based on a review of the materials provided by the petitioner, information received during the comment period, CPSC epidemiological data, and a review of the injuries associated with bicycle handlebars reported in the medical literature, the Health Sciences' staff has assessed the types of abdominal injuries that may occur as a result of impact with bicycle handlebars subsequent to a fall.

ASSESSMENT OF INJURIES:

The types of injury resulting from impact with bicycle handlebars are dependent on the handlebar type and mounting relative to the rider, the kinetic energy and trajectory of the bicycle rider, the contact point on the handlebar at the time of collision, and the anatomical region of the body that is impacted by the handlebar. Collision with the handlebar has the potential to produce a variety of injuries, ranging from bruises, abrasions, and lacerations, to more serious injuries, such as head injuries, impalements, bone fractures, groin injuries, and the focus of the petitioner's attention, abdominal injuries. The more serious injuries may require urgent care, hospitalization, and surgical intervention, and with or without such care, have the potential to be fatal.

A review of the CPSC epidemiological data and medical literature suggests that bicyclists, and in particular children, are prone to experience serious abdominal injuries as a result of impact with bicycle handlebars. Canty et al. (1999) suggest that bicycle handlebar injuries are more common in children (occurring almost exclusively in 5- to 10-year-olds) than in adults, due to the less well-developed abdominal wall musculature of the child, their newly developed riding skills, the diverse nature of their at-risk activities, and their frequent crashes. These injuries may occur at slow speeds, and even when the bicycle is stationary.

As documented in the medical literature, no abdominal organ is immune to traumatic injury from collision with bicycle handlebars; impact with the handlebars can produce the following traumatic abdominal injuries:

- gastrointestinal (Acton et al., 1994; Bergqvist et al., 1985; Canty et al., 1999; Clarnette and Beasley, 1997; Kurkchubasche et al., 1997; Mehta et al., 1993; Schimpl et al., 1992; Sparnon and Ford, 1986; Strouse et al., 1999),
- pancreatic (Acton et al., 1994; Arkovitz et al., 1997; Bergqvist et al., 1985; Clarnette and Beasley, 1997; Fraser 1969; Graham et al., 2000; Holland et al., 1999; Ohno et al., 1995; Sparnon and Ford, 1986; Winston et al., 1998),
- splenic (Acton et al., 1994; Bergqvist et al., 1985; Clarnette and Beasley, 1997; Sparnon and Ford, 1986; Winston et al., 1998),
- hepatic (Acton et al., 1994; Bergqvist et al., 1985; Clarnette and Beasley, 1997; Läckgren et al., 1988; Nehoda et al., 2001; Nehoda and Hochleitner, 1998; Sparnon and Ford, 1986; Spitz 1999; Winston et al., 1998),
- renal (Acton et al., 1994; Bergqvist et al., 1985; Clarnette and Beasley, 1997; Sparnon and Ford, 1986; Winston et al., 1998),
- abdominal herniations (Cullinane, 2000; Dreyfuss et al., 1986; Kubalak 1994; Kubota et al., 1999; Mitchiner 1990; Perez et al., 1998; Roberts 1964),
- mesenteric and peritoneal injuries (Acton et al., 1994; Bergqvist et al., 1985; Sparnon and Ford, 1986),
- traumatic arterial occlusions (Roth and Boyd, 1999; Stanton et al., 1986),
- transections of the common bile duct (Rohatgi and Gupta, 1987), and
- ruptures of the abdominal aorta (Tracy et al., 1996).

Although in some handlebar injury cases reported in the literature and found in CPSC databases the involvement of the handlebar end was not specifically mentioned, the nature of many of these injuries suggest that it may have been. Clarnette and Beasley (1997) suggest that although the velocity at impact may be relatively low, the small cross section of the handlebar end is a major factor contributing to organ damage. Further, they state that the high proportion of lacerations observed in this type of trauma, often to the groin area, may result from the sharp metallic end of the handlebar protruding through the soft rubber handle grip. Acton et al. (1994) demonstrated in a prospective study of bicycle-related abdominal injuries that there was a highly statistically significant association between serious abdominal injury and handlebars that lacked plastic or foam covering the metal ends. Of 21 handlebar-related injuries in this study, 10 were serious abdominal traumatic injuries, all of which were associated with handlebar ends that lacked plastic or foam covering. In contrast, of the 11 minor abdominal injuries, seven handlebars had ends with plastic or foam coverings, one did not, and the state of the rest are unknown.

Proper diagnosis of abdominal injuries is of critical importance. Externally, an injury from collision with the handlebar may be revealed by a bruise or skin disruption. However, it appears that the presence of external bruising or other skin disruptions is a poor indicator of the types of internal organ injury mentioned above. Indeed, Clarnette and Beasley (1997) point out that in a survey of 32 handlebar injuries, external bruising was found in only 31% of the cases with blunt abdominal trauma. Moreover, patients with abdominal injuries are often asymptomatic until several hours to two days after the fall (Acton et al., 1994), which further complicates the proper initial diagnosis of internal injury. Patients may appear to have only minor injuries at first inspection and later develop symptomatology of greater diagnostic value, returning to the hospital with what is then recognized as a severe underlying injury.

Given the wide variety of reported abdominal organ injuries in the medical literature that are attributed to collision with bicycle handlebars, each type of injury will be discussed more thoroughly below. Where details are available, specific information such as handlebar style, location on the handlebar where impact occurred, presence or absence of handlebar end caps or handle grips, and pertinent patient information (including the medical treatment required and the duration of hospitalization), has also been included.

Gastrointestinal Injuries

In the medical literature, gastrointestinal (GI) tract injuries are the most prevalently reported abdominal injury associated with bicycle handlebars. These injuries consist primarily of perforations/ruptures (piercings / forced tearing) and hematomas. In the diagnosis of GI injuries, the site of impact may be identified by a focal bruise or disruption of the skin, whereas internally, a computed tomographic (CT) scan may reveal injury to the bowel, which is also usually focal (Strouse et al., 1999). In many cases, recognition of a bowel injury having occurred may be difficult unless one becomes adept at reading CT scans (Canty et al., 1999; Kurkchubasche et al., 1997; Strouse et al., 1999). Subtle findings of bowel injury, such as free intraperitoneal (within the abdominal cavity) air and bowel wall thickening, that are often found on CT scans are critical indicators of this type of injury. These findings must be recognized so that perforations or infarctions (areas of tissue degradation due to obstructed blood flow) can be immediately attended to surgically. Delays in proper diagnosis can lead to additional sickness or death (Strouse et al., 1999).

Two perforated bowel injuries due to handlebar ends lacking plastic or foam covering of the metal ends, in children age 10 and 11 years, are reported by Acton et al. (1994) in a two-year prospective study (a study design where patients who have not yet had the outcome event of interest are monitored for the number of such events that occur over a set time). Both of these injuries required surgical repair. In one case, medical attention was not sought until 15 hours after the fall, at which time increasing pain and vomiting had developed. In both cases, despite hospital admission, proper diagnosis of the abdominal trauma took up to 48 hours to be made. Mehta et al. (1993) describe a 4-year-old who received a duodenal (pertaining to the duodenum, the first segment of the small intestine) hematoma subsequent to a blunt bicycle handlebar injury. This injury was treated conservatively. The duodenum is susceptible to this type of injury due to its relatively fixed retraperitoneal position (posterior position within the abdominal cavity) and proximity to the spinal column (Mehta et al., 1993).

Several retrospective studies (study designs in which cases where individuals who had the outcome event of interest are collected and analyzed after the outcomes have occurred) have also identified injuries to the GI tract as a result of bicycle handlebars. Bergqvist et al. (1985) in a 30-year review of hospital records for cases of pediatric abdominal injury identify 6 cases of a ruptured small intestine and 2 cases of duodenal rupture (out of a total of 26 bicycle handlebar-related injuries). In a retrospective review over a 15-year period of pediatric cases of blunt abdominal trauma that resulted in isolated bowel injuries, 18 of 21 cases were found to be due to bicycle handlebars (Schimpl et al., 1992). Six of these cases involved duodenal ruptures (ages 6-9), eight involved jejunal (pertaining to the jejunum, the portion of the small intestine that

extends from the duodenum to the last portion, the ileum) ruptures (ages 6-9) and three involved colon (the major portion of the large intestine) ruptures (ages 10-11). In almost all cases, the children had localized contusions of the skin, and in all cases surgical repair of the bowel was necessary. In a study designed to explore the mechanisms and patterns of GI tract injury in children with blunt abdominal injury, 79 children, aged 4 months to 17 years old, are identified as having reported to a pediatric trauma center over a 12-year period with documented injury of the gastrointestinal tract from blunt trauma (Canty et al., 1999). Of these 79, 10 were due to blunt trauma from bicycle handlebars. The most common injury was perforation of the GI tract. Four cases of duodenal hematomas and three small bowel perforations are identified by Sparnon and Ford (1986) in a 10-year retrospective review of pediatric bicycle handlebar-related injuries. The duodenal injuries required prolonged therapy and hospital stays that averaged 29 days in length. The bowel perforations all required surgery and averaged 21 days of hospitalization. In a study of 22 children (between 2- and 15-years-old) who had sustained intestinal injuries as a result of blunt abdominal trauma over a 6-year period, four injuries were due to bicycle handlebars (Kurkchubasche et al., 1997). Finally, in a retrospective analysis of hospital records over a 5-year period, performed by Clarnette and Beasley (1997), 32 children (mean age 10 years) are identified who had suffered blunt abdominal trauma or lacerations resulting from bicycle handlebars. Included in these injuries were three cases of bowel perforation, all of which required surgical repair, and a duodenal hematoma.

Pancreatic Injuries

Reported injuries to the pancreas include transections/fractures (a cut through the organ that completely divides the organ into parts), lacerations, pancreatitis (inflammation of the pancreas), pseudocysts (a collection of fluid and necrotic tissue whose walls are formed by the pancreas), contusions, and injury to the duct system. Signs and symptoms of pancreatic injury can be minimal and initially difficult to elicit in patients (Graham et al., 2000). As a result, late presentation and diagnosis are common. Pancreatic injuries can often be treated conservatively, such as with intravenous fluids and analgesia. However, surgical intervention may be required, particularly if pseudocysts develop, as is common after pediatric pancreatic injury (Arkovitz et al., 1997; Graham et al., 2000).

A pancreatic injury in a 7-year-old that resulted from collision with the "upturned" handlebar of his bicycle is reported by Fraser (1969). No information is available as to the style of handlebar that was upturned in this case. Treatment of this injury required two surgical operations; the first revealed a swollen pancreas that was surrounded by a clot, whereas the second, performed after pseudocyst formation and subsequent rupture into the peritoneum, revealed a lacerated pancreas that required surgical repair. Ohno et al. (1995) describe a 7-year-old patient that suffered a pancreatic injury as a result of a bicycle handlebar. In this patient, a large pseudocyst developed as a result of disruption of the pancreatic duct. Treatment in this case consisted of a 200-day hospital stay, during which fluid accumulation in the pancreas was minimized with a drainage catheter until normal drainage was spontaneously restored.

In a two-year prospective study, Winston et al. (1998) identify one child who suffered a pancreatic fracture as a result of a fall onto the bicycle's unpadded and otherwise unprotected stemcrown, rather than the handlebar end. (This is the only report of a bicycle handlebar-related

abdominal injury to specifically have excluded the handlebar end in the injury mechanism.) This injury did not involve penetration of the skin. Acton et al. (1994) in a report of a one-year prospective study, identify four cases of traumatic pancreatitis in children (ages 4, 6, 6, and 8 years of age) subsequent to collision with bicycle handlebars that did not have plastic or foam covering the metal ends. One of these injuries required surgery and all four were associated with hospital stays between 52 and 156 days in length.

Bergqvist et al. (1985) in a 30-year review of hospital records for cases of pediatric abdominal injury identify one case of pancreatic injury out of a total of 26 bicycle handlebar-related injuries. No details of the nature of this injury are provided. In a study performed at a pediatric trauma center wherein records for a 14-year-period were examined for cases of pancreatic injury, 26 such cases were found (ages ranged from 26 months to 15 years), all of which were due to blunt trauma (Arkovitz et al., 1997). Of these, bicycle handlebars caused seven, the most common mechanism of injury. The pancreatic injuries amongst these seven consisted of transections, duct injury, contusions, lacerations, and pseudocysts. In an 11-year survey of pancreatic trauma injuries to Scottish children (age range 1-11 years), 10 out of 11 compression injuries of the pancreas were caused by impact of the end of bicycle handlebars (Graham et al., 2000). These were localized impacts to the epigastrum that resulted in the compression of the pancreas against the spinal column. Ten cases of pediatric traumatic pancreatitis are identified by Sparnon and Ford (1986) in a 10-year retrospective review of bicycle handlebar-related injuries. In this study, these injuries represented the most common injury type and the most serious in terms of morbidity. Four of these injuries were associated with a duodenal hematoma, three developed pseudocysts, and seven of the 10 required surgery. The mean length of hospitalization for these 10 injuries was approximately 43 days. Holland et al. (1999) cite four children ranging in age from 1.9- to 15.1-years-old who reported to one institution over a 9-year period with pancreatic trauma, such as contusions, lacerations, and pseudocysts, from a bicycle handlebar. In this study, this mode of injury was second only to motor vehicle accidents. Finally, of 32 children (mean age 10 years) found by Clarnette and Beasley (1997) to have suffered blunt abdominal trauma or lacerations resulting from bicycle handlebars during a five-year study period, five were injuries to the pancreas. Two of the children suffered transections of the pancreas, which necessitated surgical repair, whereas three others suffered from pancreatitis, which was managed nonoperatively.

Splenic Injuries

Splenic injuries reported in the medical literature include lacerations, ruptures, bruises and contusions of the organ. Winston et al. (1998) in a two-year prospective study report on two cases where a child suffered a laceration of the spleen. In one of these cases, the location of impact was known to be the rubber-covered handlebar end. In the other, it could not be determined if the impact involved the crossbar or rubber-covered handlebar end. In the report of a one-year prospective study, Acton et al. (1994) identify two cases of traumatic injury to the spleen that were the result of collision with bicycle handlebars that had neither plastic or foam covering the metal ends. One injury (12-year-old) consisted of splenic bruising and contusions, and the other (14-year-old) splenic rupture.

Bergqvist et al. (1985) in a 30-year review of hospital records for cases of pediatric abdominal injury identify six cases of splenic rupture out of a total of 26 bicycle handlebar-related injuries. Five cases of ruptured spleens are identified by Sparnon and Ford (1986) in a 10-year retrospective review of pediatric bicycle handlebar-related injuries. These injuries were all treated nonoperatively. In a retrospective analysis of hospital records over a 5-year period, Clarnette and Beasley (1997) identify 32 children (mean age 10 years) that suffered blunt abdominal trauma or lacerations resulting from bicycle handlebars. Of these injuries, the most common was splenic rupture, which occurred in nine children. In all nine cases, the injury was managed nonoperatively. One of these patients presented in hypovolemic shock (shock resulting from excessive blood loss).

Hepatic Injuries

Injuries to the liver include lacerations, hematomas and injury to the duct system. Injury of the liver can be particularly serious given the major blood supply to the liver.

Nehoda et al. (2001) report on the occurrence of eight severe liver hematomas in riders 17- to 45-years-old that occurred over a 3-year period as a result of a crash and subsequent fall onto the handlebars of mountain bikes. Based on the evidence of their skin marks, Nehoda et al., postulate that they fell on their handlebar bar ends, all of which lacked plastic or foam covering. The bar ends referred to in these cases are straight upright metal handlebar end attachments that are fitted to the end of the handlebars to facilitate climbing. All eight patients were managed nonoperatively with transfusions of as much as five units (a unit is approximately equal to a pint) of packed red blood cells (for purposes of comparison, 6 units of blood are typically used for heart surgery). Nehoda et al. (2001) report that subsequent to their recommendation in 1998 (Nehoda and Hochleitner, 1998) that the straight handlebar bar ends that were once common on mountain bikes be replaced with foam-covered bent ends, the incidence of such injuries to the liver fell dramatically (from eight over the period between 1995 and 1997 to just one over the period from 1998 to 2000) in the face of increasing mountain bike injuries (Nehoda et al., 1999, 2001). Nehoda et al. (2001) suggest that there is a significantly increased risk of liver injuries associated with handlebar bar ends, which is compounded by the shape of the bars, angle height, and the presence of protective padding on the bar ends. Spitz (1999) reports on the death of a 10-year-old boy who, after significant blood loss due to laceration of his liver caused by the handlebar of his bicycle, went into cardiac arrest. At autopsy, the boy was found to have a patterned stamp mark with two distinct concentric circular abrasions of the skin in the area overlying the liver, suggestive of the exposed end of his bicycle handlebar. The author of this paper warns that the presence of hypovolemia and shock, coupled with an abdominal wound such as this boy had on his skin, should signal the potential for underlying life-threatening abdominal trauma. A 6-year-old patient with liver injury consequent to being struck in the abdomen by her bicycle handlebars during a fall is described by Läckgren et al. (1988). This patient suffered for several weeks with attacks of abdominal pain due to a clot having formed in part of the hepatic duct. By ten weeks after the injury the attacks ceased, eliminating the need for surgical intervention.

In a two-year prospective study, Winston et al. (1998) report on two cases where a child fell on the handlebar end and suffered liver lacerations. In one of these cases, the handlebar end was

rubber covered, and in the other, the end was exposed rusted metal. In neither case was the skin penetrated. Acton et al. (1994) in a one-year prospective study report one case of a lacerated liver in an 11-year-old, subsequent to collision with bicycle handlebars lacking plastic or foam covering of the metal ends. This injury required 59 days of hospitalization.

Bergqvist et al. (1985) in a 30-year review of hospital records for cases of pediatric abdominal injury identify three cases of liver injury out of a total of 26 bicycle handlebar-related injuries. Two cases of liver injury are identified by Sparnon and Ford (1986) in a 10-year retrospective review of pediatric bicycle handlebar-related injuries. These injuries required five surgical operations, and a mean hospital stay of 16 days. In the report of a five-year retrospective study, Clarnette and Beasley, (1997) identify four children with liver trauma resulting from bicycle handlebars. In all four children, the trauma was managed nonoperatively.

Renal Injuries

Subsequent to blunt trauma from bicycle handlebars, the kidneys may be contused, lacerated, or completely transected. Winston et al. (1998), in the report of a two-year prospective study on handlebar-related injuries, identify one case where a child fell on the rubber-covered handlebar end and suffered a laceration of a kidney. This injury did not involve penetration of the skin. Acton et al. (1994) in a one-year prospective study report one case of a lacerated kidney in a 12-year-old, subsequent to collision with bicycle handlebars that lacked plastic or foam covering the metal ends.

Bergqvist et al. (1985) in a 30-year review of hospital records for cases of pediatric abdominal injury identify six cases of renal injury out of a total of 26 bicycle handlebar-related injuries. Five cases of renal injury are identified by Sparnon and Ford (1986) in a 10-year retrospective review of pediatric bicycle handlebar-related injuries. These injuries consisted of two contusions, one laceration, and two transections of the kidney, three of which required surgery. Finally, in a five-year retrospective study, Clarnette and Beasley (1997) report on two children that suffered renal contusions resulting from bicycle handlebars, both of which were managed nonoperatively.

Hernias

Several cases of traumatic hernias of the abdominal wall have been reported in the medical literature as a result of blunt impalement on bicycle handlebars. In these injuries, termed handlebar hernias by Dimyan et al. (1980), the skin is intact and the abdominal organs are usually free of major injury. However, the layers of the abdominal wall have been compromised, which allows the bowel to become incarcerated (protrude through the torn abdominal wall), creating a noticeable bulge under the skin. Wood et al. (1988) first described this mechanism of abdominal wall injury. The mechanism is believed to be due to the fact that the handlebar end is too blunt to pierce the skin (i.e., covers too great of a surface area to penetrate), yet the sudden application of force is great enough to disrupt fascial and muscular layers of the abdominal wall. Given that skin is more elastic than the underlying layers, the skin remains intact, whereas the underlying muscle and fascia are disrupted (Kubalak, 1994). Both the increase in intra-abdominal pressure and force application to the abdominal musculature may play a central role in the subsequent abdominal herniation (Kubota 1999; Shiomi et al., 1999). Moreover, the creation of a free space

beneath the skin into which the underlying organs can prolapse is required for the development of the abdominal wall herniation (Shiomi et al., 1999). An open surgical repair of these injuries is necessary, however this may be supplanted by laparoscopic surgery as this technique becomes more widespread (Kubota et al., 1999). Typically, patients with these injuries complain of pain and a bulging in the abdomen, and present with a bruising or abrasion of the skin, although in some cases, no visible markings are evident.

Dreyfuss et al. (1986) describe an 11-year-old who sustained a handlebar injury to the lower abdomen. The patient complained of pain and abdominal bulging and presented with a handlebar end imprint on the skin. In this case, the fascia and muscle were disrupted, whereas the peritoneum was contused but still intact. Roberts (1964) reports on a similar injury to a 9-year-old who sustained a traumatic blow to his abdomen from one of his handlebars. No bruising of the skin was reported in this case, and the muscle and fascia were torn and the peritoneum was intact.

In contrast, Kubota et al. (1999) report on a 9-year-old boy with a painful bulging in his lower right abdomen who had no bruising or abrasion of the skin. Nevertheless, in this case, the fascia and muscle were disrupted and the peritoneum was torn as well. Three additional reports of pediatric hernias (ages 8-, 7- and 11-years-old) detail the presence of bruising on the skin, and the underlying disruption of the muscle, fascia and peritoneum (Kubalak 1994; Mitchiner 1990; Perez et al., 1998, respectively). The patient described in Perez et al. (1998) fell against a rubber-coated handlebar.

Cullinane (2000) has reported on a handlebar hernia in which the stomach of a 24-year-old BMX bike rider was both perforated and incarcerated. This is the first reported case of a handlebar hernia with intra-abdominal organ injury.

Mesenteric and Peritoneal Injuries

Five cases of significant hematomas of the peritoneum (the membrane that lines the abdominal wall) are identified by Sparnon and Ford (1986) in a 10-year retrospective review of pediatric bicycle handlebar-related injuries. Acton et al. (1994) in a one-year prospective study identify one case of a peritoneal hematoma and torn mesentery (the membranous fold that attaches organs to the body wall) in a 14-year-old, subsequent to collision with bicycle handlebars that had no plastic or foam covering the metal ends. This injury required surgery and 26 days of hospitalization. In a 30-year review of hospital records for cases of pediatric abdominal injury, one case of a ruptured mesentery due to impact by bicycle handlebars was reported by Bergqvist et al. (1985).

Traumatic Arterial Occlusion

Two occlusions of the external iliac artery subsequent to bicycle handlebar injury have been described in the literature. The case of an 11-year-old boy who received a blunt injury from the end of his bicycle handlebars during a fall is described by Stanton et al. (1986). Initially, no signs of the injury were present and the patient reported only abdominal pain. However, within 24 hours a discoloration of the skin appeared that coincided with the diameter of the handlebar end, and the patient complained of numbness and coolness in his right leg. By 48 hours the

patient was complaining of increasing weakness. Exploratory surgery revealed that the right external iliac artery had been extensively damaged internally, leading to its occlusion and the decrease in circulation to the leg and the patient's symptoms. This injury required vascular surgery and the placement of a prosthesis. Roth and Boyd (1999) describe a similar injury to the external iliac artery of a 30-year-old man who was struck by the handlebar end of his bicycle during a fall. In this case, the blunt injury produced a circular laceration to his left groin and the contusion and dissection of the artery, resulting in total occlusion of the vessel.

Transection of Bile Duct

The first reported case of a bicycle handlebar causing a transection of the common bile duct involved a 10-year-old (Rohatgi and Gupta, 1987). Subsequent to a fall on his bicycle and striking the handlebar he complained of severe pain in the abdomen and presented with only a contusion of the skin overlying the abdomen. After days of observation, exploratory surgery was performed, during which the peritoneal cavity was found to contain a large amount of bile-stained fluid, the gallbladder was distended with bile, and the common bile duct that would normally secrete the bile into the gastrointestinal tract was completely transected and no longer patent. Rohatgi and Gupta (1987) describe such injuries as being unusual, yet often fatal if not recognized.

Rupture of the Abdominal Aorta

Tracy et al. (1996) describe the fatal abdominal injury suffered by a 13-year-old boy subsequent to a fall on a bicycle and likely impact with the handlebars. Despite surgical repair of two aortic tears in the abdominal region and a tear of the renal artery, the child subsequently died after a delayed rupture of another tear in the aorta just below the kidney. The authors of this report suggest that the energy of the impact may have been concentrated on a small target on the bicycle such as the handlebar end, which resulted in a large force being transferred to a concentrated area. Like other handlebar-induced abdominal injuries, Tracy et al. (1996) point out that such injuries can occur with minimal or no injury to the surface of the abdomen.

DISCUSSION

Whereas, some of these injuries may not require surgical intervention, a good many do. An overarching concern is that in those cases where surgery or urgent care is required, such care is often delayed, due in part to the lack of external signs of abdominal injury. As one example, Boswell et al. (1996) cite the death of a child from a bicycle handlebar-induced abdominal injury that was attributed to the delay in seeking treatment. Proper use of diagnostic tools and recognition of underlying trauma is particularly important in these cases.

The bicycle types, handlebar styles, and the location on the handlebar where impact occurred are not known in all handlebar-related injuries. However, in some cases, involvement of the handlebar end can be surmised, given the nature of the injury (e.g., external markings and/or very concentrated internal injury of an abdominal organ from blunt trauma). These incidents, and those where the point of contact was known to be the handlebar end, suggest that flat, riser and high riser handlebars may be frequently involved in these injuries. The potentially

dangerous small cross-sectional ends of these handlebar styles will be directed at the rider's body when the front wheel is turned approximately 90 degrees from a forward direction. These three styles of handlebars are often found on juvenile/youth bikes, street or hybrid bicycles, BMX and mountain bikes. The prevalence of this type of handlebar in injury-producing incidents is illustrated in one retrospective 10-year review of bicycle handlebar injuries at a particular hospital (Sparnon and Ford, 1986). In this study, 10 cases out of 30 occurred in the last year of the review, and seven of the 10 cases were related to BMX designs. The authors of this report state that the apparent increase in injuries in the last years of the study may be due to the wide handlebars found on the BMX bicycles, which pass very closely to the abdomen when the front wheel is turned sharply to one side. Moreover, in all 16 CPSC in-depth investigations of serious handlebar injuries in which handlebar type was known, it was described as either straight or BMX style. In contrast, the configuration of the drop type handlebars commonly found on racing bicycles may not present a similar risk potential given the close proximity of the bar end to the top portion of the bar. Moreover, when this style of handlebar is turned approximately 90 degrees away from a forward direction, the nonblunt "c-shaped" profile of the handlebar faces the rider.

Some of the abdominal injuries described above were known to have involved handlebars that were missing end caps or handle grips, devices that normally cover the bare metal end of the handlebar. It is important to note that in most cases, the presence of these devices in their current form does not prevent the occurrence of blunt traumatic injuries to the abdominal organs. This is due to the fact that most end caps, and many handle grips, do not significantly increase the diameter of the handlebar end or provide significant padding, and therefore do little to dissipate the forces during an impact. The principal difference between those handlebars with end caps or handle grips and those without is the greater potential for the exposed metal handlebar end of the latter to disrupt the skin and produce laceration injuries, particularly if the metal is sharp.

To prevent the serious injuries that may result from collision with handlebars, several authors have recommended that bicycle handlebars be redesigned (Acton et al., 1994; Clarnette and Beasley, 1997; Nehoda and Hochleitner, 1998; Winston et al., 1998) and/or that proper sizing of bicycles occur, such that alignment of the handlebars with the abdomen is minimized (Winston et al., 1998). Redesign strategies proposed by these authors include curving the handlebars away from the rider, padding and increasing the cross-sectional area of the handlebar ends, making the handle grips telescopic, making the handlebars collapsible on impact, and, in the case of some bicycle types, limiting the freedom of front-wheel rotation.

CONCLUSION:

Seemingly uneventful falls off of bicycles on to bicycle handlebars can produce a variety of injuries, including serious life-threatening abdominal injuries that require hospitalization, surgery, and/or prolonged treatment. Blunt trauma to the abdomen from a handlebar can produce minor injuries, such as bruises and abrasions, to more severe injuries, such as laceration injuries; intra-abdominal organ injuries that include those to the small and large intestine, stomach, pancreas, spleen, liver, kidneys, and gallbladder; and vascular injuries to the abdominal wall and

arteries that supply the abdomen and lower limbs. Blunt trauma from the handlebar ends is implicated in many of these injuries. Individuals with injuries to the abdominal organs may have delayed symptomatology and no external signs of trauma. As a result, they may not present for medical help until they are critically ill, the consequences of which may include significant blood loss, infection and/or death.

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TAB E

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: May 29, 2003

TO : Barbara J. Jacobson, Project Manager, HS

THROUGH: Hugh M. McLaurin, AED, ES

FROM : Vincent J. Amodeo, ESME

SUBJECT : Petitioner's Claim of Feasibility for Reducing Handlebar Injuries; HP 01-1, Petition for Bicycle Handlebar Performance Standard

Introduction

The petitioner requests the Commission to regulate the safety of bicycle handlebars by establishing a performance standard for energy dissipation and distribution during impact. The petitioner claims that the risk of abdominal injuries associated with impacting the ends of handlebars will be minimized by modifying the ends of the handlebars. A research paper submitted with the petition also suggests that limiting the amount of steering angle of the handlebar will help address these injuries.

To demonstrate the feasibility of the relief requested in the petition, the petitioner presents a concept for collapsing, or telescoping, handlebar ends in order to reduce the number of injuries associated with handlebar impact.

According to the information in the petition, modifications to the handlebar design were developed by analyzing the hazard pattern and incorporating features that will reduce the forces that cause injury. The petitioner projects a reduction in the number of injuries that would occur if these modifications were present on bicycles. In essence, the petitioner claims that adding one degree of freedom to the handlebar (allowing the end to telescope under a certain force application), and limiting another degree of freedom (limiting the rotation of the handlebar) will reduce impact injuries to abdominal organs.

The NEISS database, while providing information on injury diagnosis, body part injured, and part of the bicycle involved, does not provide sufficient detail to determine the specific angle of impact with the handlebar. The area of impact on the handlebar may be the end in some cases, but it is not known in what orientation that impact occurred. The impact may be in a direction along the axis of the handlebar end. It may be in a direction at some angle to the handlebar end, which would affect the performance of the petitioner's proposed device. Further, the relative angle between the handlebar end and the surface of the human body may not be constant; it is very

likely that these parts move significantly in angular relation to one another during impact. This too will affect the performance of the device, because it is limited in motion to compression along the axis of the handlebar end. Finally, the petitioner presents no information to support the suggestion that limiting the steering rotation of the front wheel will reduce injuries.

The petitioner describes an accident scenario involving a loss of control that occurs when the rider hits an obstacle that stops the forward motion of the bicycle, and to regain balance, the rider turns the handlebar "*perpendicular to his/her abdomen. The child's momentum carries him forward, impacting the end of the handlebar, and the child falls to the ground while still in contact with the handlebar. The distal end of the handlebar collides with the ground, forcing the proximal end into the child's abdomen.*" While this description may reflect statements gleaned from injury reports, ES staff believes it is an oversimplification of the dynamics of the many possible crash scenarios and therefore cannot be relied upon as a description of the only sequence of events that is likely to occur.

Hazard Pattern

The energy equations of physical motion used to analyze the injury-causing forces are developed from a specific crash scenario in which the bicycle with rider hits an object and the bicycle immediately stops. The rider continues forward due to his/her momentum and impacts the end of the handlebar. The rider and handlebar continue forward until the opposite end of the handlebar impacts the ground. The assumption is that the combined weight of the rider and the bicycle is acting on the impact. ES believes that it is unrealistic to use the full weight of the bicycle and rider in developing the energy equations because this assumes that no part of the rider or bicycle is in contact with the ground.

The assumption of the position of the handlebar is key in determining the feasibility of the petitioner's design. Given the unpredictable way in which a rider in any given set of circumstances may lose control of his or her bicycle, there would seem to be a large number of ways in which the rider may suffer an impact. It is, however, unlikely that in every case, the rider's torso rests perpendicular to the end of the handlebar before the other end of the handlebar contacts the ground, as described by the petitioner. If the handlebar were in fact turned so that it is "perpendicular to the rider's abdomen", the handlebar would be in a severe turn, and the overturning response of the bicycle may then throw the rider in a direction not aligned with the handlebar end. Because of the dynamics of bicycle steering, unless the bicycle is moving at very low speed, a large handlebar angle causes an immediate and very powerful reaction that causes the bicycle to lean to one side. The responsiveness of this reaction is so quick that it seems unlikely that a rider moving at even a moderate velocity will predictably remain in contact with the handlebar end and ride it down to contact with the ground.

The force analysis depends upon the assumption that the rider will contact the end of the handlebar and then stay in that position until the other end contacts the ground. The forces used by the petitioner both in evaluating the injury potential, and in designing the telescoping mechanism, are based on this assumption. This point is important in assessing whether the proposed mechanical device would address the injuries. If the orientations of the rider and handlebar and ground are different than assumed by the petitioners, then the forces will be different from those calculated. If the direction of force application on the end of the handlebar is at some angle to the end of the handlebar, then the telescoping mechanism may not telescope at the force described, if at all. The device will only telescope in relation to the angle between the direction of the force and the axial direction of the end of the handlebar. An impact with the end of the handlebar, but not in alignment with it, could well generate enough force to cause injury.

There is no question that impacts with handlebars can result in severe injuries. It seems likely that there are cases in which the direction of impact is nearly along the axis of the handlebar end. However, it seems clear that other cases could occur with impact at some significant angle to the axis of the handlebar, and even if the telescoping end collapsed, the forces involved would be significantly different from the design assumption. There is no evidence to suggest how many cases involve the angle of impact needed for the petitioner's device to have the most effect.

Retractable Handlebar Design

The main purpose of the retractable handlebar design is to reduce the forces at impact that the child is exposed to during a fall. The claim is made that the telescoping handlebar design will reduce the impact force by approximately 50 percent, thereby reducing the number of injuries. There are a number of assumptions made in this claim.

It is not clear how the equations of motion are derived, as some of the variables used in the equations are not clearly defined. For instance, no relation is given to any reference plane for the angle of accident impact, and the angle of the handlebar at impact relative to the ground or the rider is also unclear.

The researchers cite statistics (Sturtz, 1980) for compressive tolerance of the pediatric liver and spleen that are used as comparative values for the force calculations. However, the values cited in the Sturtz paper (2649 N for liver and 785 N for spleen) are each based on a statistical sample of one and are therefore not reliable values. In addition, the values are based on large contact area loads applied to isolated cadaverous organs, not point loads applied to the abdominal region of living tissue as would be the case in an incident involving contact with the end of the handlebar. Further, the researchers indicate that the proposed design would not prevent injury to the spleen. Therefore, the values cited in the Sturtz paper are of little comparative value to the handlebar analysis.

The proposed handlebar design is a spring-mass-damper system that is intended to retract at impact to absorb the majority of the energy. Each end of the handlebar system would contain such a device. When a child would impact the handlebar end during a crash, the spring in the damper system would compress. The analysis does not account for the fact that the child's abdomen will also compress during impact. This is important because the abdomen acts as another, very soft, spring in series with the comparatively strong metal spring. When a load is applied to a system with a soft spring and a strong spring in series, the strong spring does not compress until the soft spring has been compressed enough to support the load necessary to compress the strong one. In the bicycle case, the amount of compression of the abdomen (soft spring) that occurs before the strong spring (device) compresses may well be enough to cause injury. In order for the spring in the telescoping handlebar to retract upon impact with the relatively soft abdomen, its spring constant would have to be low. This could result in a handlebar that may not be stable enough to support normal steering loads, presenting stability hazards to a rider.

The proposed design includes a grease damper that would prevent the bar from returning to its original position with the same "force rate" that caused it to initially compress. It is not clear how the grease damper is intended to function from the image of the prototype system shown. It appears that the grease damper is intended to delay the release of the compressed spring once motion has stopped, but why this would reduce impact force is not explained.

The petitioner uses the derived equations of motion to calculate forces at impact for the specific scenario described earlier, at various undefined angles of impact, and then uses the average of these values for comparison to the force required to rupture the spleen and liver. There is no rationale given as to why the average value is chosen here instead of the maximum or any other value. The petitioner then claims this average value would be reduced by approximately 50 percent at impact, but does not give a sample calculation to support this claim.

The petitioner discusses how this is only a prototype and that further work would need to be done to optimize the system. The petitioner discusses changing spring rates and damping grease, but it is unlikely that any one set of spring and grease could account for all possible scenarios. Variations in rider speed, size, weight, bike configuration, angle of impact, impact surface, etc. would make it difficult to optimize one design that would be suitable for all situations. Therefore, ESME staff believes that the claim that the design reduces impact forces by 50 percent has not been validated in the material submitted by the petitioner.

Summary and Conclusion

The petitioner has asked the Commission to regulate the safety of bicycle handlebars by establishing a performance standard for energy dissipation and distribution during impact. To demonstrate the feasibility of such action in reducing injuries, the petitioner describes a mechanical device that will allow the ends of the

handlebars to compress somewhat under a certain force application. A research paper submitted with the petition also suggests that limiting the amount of steering angle of the handlebar will help address impact injuries but no supporting information is presented.

ESME has examined the proposed design to determine whether feasibility of reducing injuries has been demonstrated. The examination is informal and based solely upon the information presented in the petition. It is clear that the intended function of the proposed device is to absorb energy upon impact, thus averting some of the injury potential under a given set of circumstances. However, it is the opinion of ESME staff that the petitioner has not adequately demonstrated that the basic approach of retractable handlebar ends will address the reported injuries in a quantifiable manner. The staff believes that variations in rider speed, size, weight, bike configuration, angle of impact, impact surface, etc. would make it difficult to optimize one retractable handlebar design that would be suitable for all situations. Given the range of unknown variables about handlebar-related incidents, the level of potential effectiveness of the device cannot be accurately estimated.

TAB F

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: May 22, 2003

TO : Barbara J. Jacobson, Project Manager,
Directorate for Health Sciences

THROUGH: Hugh McLaurin, Associate Executive Director
Directorate for Engineering Sciences

FROM : Troy W. Whitfield, Mechanical Engineer
Directorate for Engineering Sciences

SUBJECT : Petition HP 01-01 --- Petition for Handlebar Performance Standard

INTRODUCTION

This memorandum is provided in response to Petition HP 01-01 asking the Consumer Product Safety Commission (CPSC) to issue a performance standard for bicycle handlebars "regarding energy dissipation and distribution during impact." The petitioner cites abdominal organ injuries suffered by young children when they contact the handlebars during a fall from a bicycle even when the children are traveling at low speeds. The petitioner states that serious injuries occur because the handlebar acts like a blunt spear causing the injuries upon impact. There are currently no mandatory or voluntary standards in the U.S. with energy absorption criteria for the handlebars, handlebar ends, or handlebar stem.

MANDATORY REGULATIONS IN THE U.S.

The requirements for bicycles in the Federal Hazardous Substances Act (FHSA) Regulations, 16 CFR Part 1512, became effective in 1976. These regulations include safety requirements for reflectors, wheels and tires, chains, pedals, braking and steering systems, and for structural components such as frames and forks.

The requirements for the steering system at §1512.6(c) specify the position of the handlebar ends to assure comfortable and safe control of the bicycle. Section §1512.6(d) requires the ends of the handlebars to be capped or covered. End-mounted devices such as handlebar grips and end plugs must pass a performance test to assure that they will withstand a removal force of at least 66.8N (15 lbf)[1].

[1] In the international system of units, the unit of force is the Newton expressed as N, which is the force that imparts to an object with a mass of 1 kg an acceleration of 1 m/sec2. In English units, the unit of force is the poundal expressed as lbf, which is the amount of force that accelerates a 1-lb object 1 ft/sec2.

More specifically, the current requirements for the steering system at §1512.6 of the FHSA regulations are for the handlebar stem, handlebar, handlebar ends, and handlebar and clamps. These requirements are as follows:

(a) *Handlebar stem insertion mark.* The handlebar stem shall contain a permanent ring or mark which clearly indicates the minimum insertion depth of the handlebar stem into the fork assembly. The insertion mark shall not affect the structural integrity of the stem and shall not be less than 2-1/2 times the stem diameter from the lowest point of the stem. The stem strength shall be maintained for at least a length of one shaft diameter below the mark.

(b) *Handlebar stem strength.* The handlebar stem shall be tested for strength in accordance with the handlebar stem test, Sec. 1512.18(g), and shall withstand a force of 2000 N (450 lbf) for bicycles and 1000 N (225 lbf) for sidewalk bicycles.

(c) *Handlebar.* Handlebars shall allow comfortable and safe control of the bicycle. Handlebar ends shall be symmetrically located with respect to the longitudinal axis of the bicycle and no more than 406 mm (16 in) above the seat surface when the seat is in its lowest position and the handlebar ends are in their highest position.

(d) *Handlebar ends.* The ends of the handlebars shall be capped or otherwise covered. Handgrips, end plugs, control shifters, or other end-mounted devices shall be secure against a removal force of no less than 66.8 N (15 lbf) in accordance with the protective cap and end-mounted devices test, Sec. 1512.18(c).

(e) *Handlebar and clamps.* The handlebar and clamps shall be tested in accordance with the handlebar test, Sec. 1512.18(h). Directions for assembly of the bicycle required in the instruction manual by Sec. 1512.19(a)(2) shall include an explicit warning about the danger of damaging the stem-to-fork assembly and the risk of injury to the rider that can result from overtightening the stem bolt or other clamping device. The directions for assembly shall also contain a simple, clear, and precise statement of the procedure to be followed to avoid damaging the stem-to-fork assembly when tightening the stem bolt or other clamping device.

INTERNATIONAL STANDARDS

The International Standard, "Cycles – Safety requirements for bicycles for young children" (ISO 8098:1989) covers "requirements for bicycles that are suitable for younger children, aged from about 4 years to 8 years." This standard specifies requirements for brakes, frame/fork assembly, wheels, steering, and other sub-assemblies of bicycles. It also provides a number of performance tests including a brake system load test, a hand-brake test, and a steering assembly test. It includes guidelines for instructions on the use and care of bicycles.

Similar to the FHSA regulations, the ISO standard requires the ends of the handlebars to be fitted with handlebar grips or end caps that will withstand a removal force of 70N (16lbf). The 1992 amendment to this standard requires the handlebar grips or caps to be made of resilient material and have an enlarged end with a minimum diameter of 40 mm (1.57 inches) (ISO 8098:1989/Amd.1:1992 (E)).

The ISO standard also specifies the following restrictions for the rotation of the handlebar: "The steering shall be free to turn through at least 60° but not more than 75° either side of the straight-ahead position..."

VOLUNTARY STANDARDS IN THE U.S.

The ASTM Committee F08 on Sports Equipment and Facilities - Subcommittee F08.10 on Bicycles, initiated an activity in late 1995 to develop standards for certain bicycle components. This was done at the request of CPSC staff who had reports of injuries from falls as a result of broken bicycle components such as forks and seat posts. The following task groups were formed to develop performance test criteria:

F08.10.01 - Handlebars and Stems
F08.10.02 - Suspensions and Forks
F08.10.04 - Frames; and
F08.10.05 - Use Classification.

To date, one standard has been developed by Task Group F08.10.05. This standard describes the expected use conditions for bicycle operation (F 2043-00 Standard Classification for Bicycle Usage).

In addition to its work on structural integrity, the F08.10.01 Task Group on Handlebars and Stems is considering the issues presented in the petition. At its May 2001 meeting the group discussed the petition and agreed to consider a handlebar end-cap standard to address injuries sustained from faulty or failed end caps. Some Task Group members expressed concern that a flexible or shock-absorbing end on a handlebar could present other hazards associated with bicycle control. The concern was that such a handlebar could be susceptible to greater rates of mechanical failure or reduce rider control by providing distorted or cushioned feedback through a less rigid handlebar.

On November 6, 2001, the CPSC staff wrote a letter to the Task Group Chairman requesting the group to provide a letter of commitment regarding their willingness to consider voluntary performance standards for bicycle handlebars. During their November 2001 meeting, attended by a CPSC engineer, the Task Group voted affirmatively to respond to the staff's request. In a letter dated December 13, 2001, the Task Group Chairman provided a summary of the proposed scope of work and a preliminary schedule. The Task Group decided to address "spearing type injuries, caused by the end of the handlebar impacting into the abdominal and pelvic areas." The Task Group also decided to limit the scope to "single speed bicycles, with 20-inch wheels or smaller and riser (BMX style) handlebars." The schedule provided was as follows:

May 2002 - Definition of scope and feasibility study
May 2003 - Feasibility study complete
November 2004 - Written standard for vote

In a letter dated February 8, 2002, CPSC staff sent additional information to the Task Group. This included relevant in-depth investigations, incident reports, and comments received in response to the February 14, 2001, Federal Register notice requesting comment on the petition (HP 01-01). The staff asked the Task Group to consider expanding its scope to include children's bicycles with wheels 24" or smaller regardless of the handlebar configuration or whether they have single or multiple speeds.

CPSC staff attended a Task Group meeting on May 8, 2002. Some Task Group members did not favor expanding the scope because of concerns that different handlebar configurations may require different solutions. With CPSC staff concurrence, the Task Group decided to begin with the limited scope as defined at their November 2001 meeting. The Task Group agreed to consider expanding the scope to other sizes and types of children's bicycles in the future. The Task Group clarified that their use of the terminology "spearing type injuries" was not meant to limit the scope to penetrating wounds alone. They also acknowledged the CPSC staff view that an effective requirement would need to address more than intact handlebar grips and end caps. The Task Group did not outline the feasibility study requirements at this meeting.

At a Task Group meeting held on November 7, 2002, the members voted to table most of their current backlog of activities in order to concentrate on the handlebar issue. The Task Group Chairman suggested two possible approaches to address handlebar-related injuries: filled handle bar ends to prevent "cookie cutter" type punctures, and limited handle bar rotation for 20" bicycles. One task group member passed around a prototype handle bar grip with an expanded diameter designed to provide some deflection under a compressive or side load. Each member was tasked to come forward with additional ideas for discussion at the next meeting.

At the Task Group meeting held on May 7, 2003, there was further discussion about permanent caps for the handlebar ends and about the need for increasing the diameter of the handlebar ends to address blunt trauma injuries. An important consideration is the durability of the materials used. Members will try to determine the basis for the diameter of handlebar ends specified in the current ISO bicycle standard. A draft recommendation will be circulated to the Task Group members for comment. The next meeting will be held in October 2003.