

Injuries in Commercial Whitewater Rafting

❖ 2001 Annual Report ❖

*A Summary of Injuries Reported by
Licensed Commercial Whitewater Outfitters
on West Virginia Rivers*



Prepared for:

The West Virginia Division of Natural Resources on behalf of the Whitewater Commission

By:

Steven A. Whisman, Ph.D.
West Virginia Prevention Resource Center
Marshall University Graduate College

August 2002

Introduction

From 1994 through mid-2002, commercial rafting outfitters in West Virginia have been required to report injuries sustained by their guests that “occur during the performance of a licensee’s [outfitter’s] services while underway [on the river]” that “require medical treatment by a licensed health care provider, excluding diagnostic analysis” (West Virginia Legislative Rule §47-27-11 [Accident Reports]). This generally has been interpreted by the West Virginia Division of Natural Resources (DNR) to mean that injuries requiring a treatment procedure (e.g., setting a fracture, sutures, etc.) performed by a medical doctor, osteopath, registered nurse, or physician’s assistant must be reported. In this report, an overview and analysis is presented of injuries reported by the commercial rafting industry during the 2001 season under the requirement set forth in §47-27-11. No judgment was made in this analysis as to whether reported injuries conform to reporting requirement, thus, all injury reports submitted by licensed outfitters are included. However, evidence will be presented suggesting that many injuries that were reported fail to meet the reporting requirement, or there was insufficient information included on the injury reporting form to make that determination.

Injuries were unevenly distributed among outfitters (Table 1). Seven outfitters accounted for 69% of reported injuries, while accounting for only 37.3% of commercial river use. The remaining 31% of injuries were unevenly distributed suggesting that some outfitters are over-reporting for documentation, liability, or other undetermined reasons, while other outfitters may be under-reporting or not reporting at all. Determining how many injuries go unreported is made difficult by verification complexities and self-reporting methodologies used by most regulatory agencies (Whisman and Hollenhorst, 1999). However, a moderately positive correlation ($r = 0.63$) was observed between injuries and river use, suggesting that to some extent outfitters

Outfitter	Number of Injuries	Percent of Injuries	Percent of River Use
Ace Whitewater	9	9.6%	12.7%
Alpine Bible Camp	0	0.0%	1.0%
Appalachian Wildwaters	9	9.6%	4.8%
Blackwater Outdoor Center	0	0.0%	0.7%
Blue Ridge Outfitters	8	8.5%	3.2%
Boy Scouts of America	1	1.1%	0.4%
Cantrell Canoes and Rafts	3	3.2%	1.0%
Cavella Outdoors	0	0.0%	0.0%
Cheat River Outfitters	0	0.0%	0.9%
Class VI River Runners	2	2.1%	9.5%
Drift-A-Bit Inc.	5	5.3%	2.9%
Extreme Expeditions	6	6.4%	4.3%
Garrett Community College	0	0.0%	0.1%
Gauley Whitewater LLC	0	0.0%	0.0%
Historic River Tours	0	0.0%	0.3%
Laurel Highlands River Tours	0	0.0%	0.5%
Mountain River Tours	1	1.1%	6.6%
Mountain Streams and Trails	0	0.0%	0.2%
New and Gauley River Adventures	3	3.2%	2.5%
New River Scenic Whitewater	4	4.3%	2.6%
North American River Runners	2	2.1%	7.1%
Passages to Adventure	2	2.1%	0.9%
Precision Rafting	0	0.0%	0.0%
River and Trails Outfitters	1	1.1%	2.7%
River Riders Inc.	1	1.1%	3.5%
Rivers	12	12.8%	4.7%
Rivers II	3	3.2%	4.7%
Songer Whitewater	7	7.4%	6.7%
The Rivermen	13	13.8%	7.7%
USA Raft	0	0.0%	3.8%
West Virginia Whitewater	0	0.0%	0.2%
Whitewater Adv of the Cheat	0	0.0%	0.2%
Whitewater Information	1	1.1%	1.3%
Wildwater Expeditions	0	0.0%	2.5%
Not Reported	1	1.1%	0.0%
Total	94	100.0%	100.0%

reported injuries in proportion to the amount of total river use they accounted for.

Incidence Rates

A total of 94 injuries sustained by rafting guests were reported in 2001. The frequency of injuries reported on each river segment roughly corresponded with commercial river use. Forty-five injuries (48%) were reported on the Lower New River, which in 2001 accounted for 49% of reported commercial river use (Table 2). This was followed by the Upper Gauley River with 25 (27%) injuries and 15% of river use; Shenandoah with 10 (11%) injuries and 10% of river use; Lower Gauley with 9 (10%) injuries and 10% of river use; Upper New with 4 (4%) injuries and 12% of river use; and Cheat Canyon with 1 (1%) injuries and 1% of river use,

The accuracy of injury incidence rates in commercial rafting is questionable because of suspected over-reporting of minor injuries that may not meet the reporting criteria, and by verification complexities that preclude the determination of how many possibly reportable injuries that go unreported.

Table 2. Reported Injuries and Injury Incidence Rates in 2001 by Designated Whitewater Zones.

River Segment	Number of Injuries	Percent	Incidence per 1,000 User Days
Cheat Canyon	1	1.1%	0.339
Upper New	4	4.3%	0.129
Lower New	45	47.9%	0.386
Upper Gauley	25	26.6%	0.696
Lower Gauley	9	9.6%	0.375
Shenandoah	10	10.6%	0.438
Total	94	100.0%	0.396

Incidence rates in 2001 ranged from 0.129 per 1,000 user days on the Upper New to 0.696 per 1,000 on the Upper Gauley. The overall incidence rate was 0.396 per 1,000 across all rivers (Table 2). These rates are consistent with the highest rate on record of 0.441 per 1,000 reported in 1998, but somewhat higher than the overall rate from previous years. For example, Whisman and Hollenhorst (1999) reported overall injury incidence rates 0.263 per 1,000 for the 1995-97 seasons.

Injuries

The age of persons for whom injury reports were submitted ranged from 11 to 63, with an average of 31 years. A majority was between the ages of 20 to 40 years (45%) or was over forty (17%). Thirteen percent of injured individuals were less than 20 years old, but the age or birth date of 24 (25%) of injured boaters was not reported. Forty-six percent of injured persons were female. Most individuals (60%) sustaining injuries during 2001 had previous rafting experience, meaning they had taken at least one commercial rafting trip prior to the trip on which they were injured. These individuals had taken an average of 3.8 previous rafting trips.

Types of injuries reported in 2001 included lacerations (23%), sprains/strains (22%), contusions/bruises (14%), fractures (10%), dislocations (8%), abrasions (2%), hypothermia (2%), concussion (1%), and illness (1%) as shown in Figure 1. The remaining injuries included other unspecified injuries (11%), or were not reported at all (6%). With exception to a decrease in reported abrasions and dislocations, made up for by an increase in lacerations, these proportions are similar to injury types reported in 1999 (Whisman 2000), 1998, (Whisman 1999) and in 1995 through 1997 (Whisman and Hollenhorst 1999).

The most frequently injured parts of the body involved some part of the face (19%), including the nose (6%), unspecified facial parts (4%), mouth (4%), eye (3%), or teeth (1%). Knee injuries (17%) were prominent, as were injuries to the hip/leg/foot (15%) and injuries to the arm/wrist/hand (13%). Hip/leg/foot injuries included the and lower leg (11%) foot (4%), while arm/wrist/hand injuries included the arm (5%), hand (5%), and thumb (2%). The remaining injuries consisted of injuries to the ankle (9%), shoulder (9%), head (7%), other unspecified body parts (7%), and abdomen/chest/back (3%) (Figure 2).

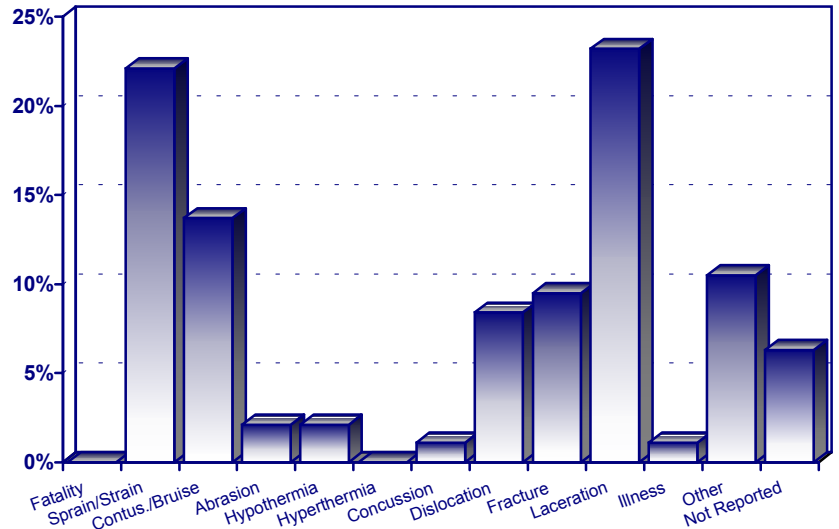


Figure 1. Percent of injuries by type of injury.

Fifty-two percent of injuries involved evacuation of the injured person either to an outfitter base camp or medical facility, or otherwise prevented the injured person from completing the raft trip. This was significantly higher than the 27% evacuation rate in 1998, but consistent with that in 1999 and the three years from 1995 to 1997 when evacuation rates of 47% and 40% occurred, respectively.

Most injuries sustained by commercial boaters occurred in the raft (56%). Injuries sustained on board the raft typically result from collisions between passengers in the raft, being struck by a paddle or other rafting equipment, or entanglement of extremities in parts of the raft. This was followed by injuries occurring in the water after falling from the raft while running rapids (23%). Passengers thrown from a raft are subject to the forces of high volume, turbulent water in which they may encounter boulder

entrapments, floating debris, or other hazards. The remaining injuries occurred on shore (10%), at other unspecified locations (3%) or were unreported (7%).

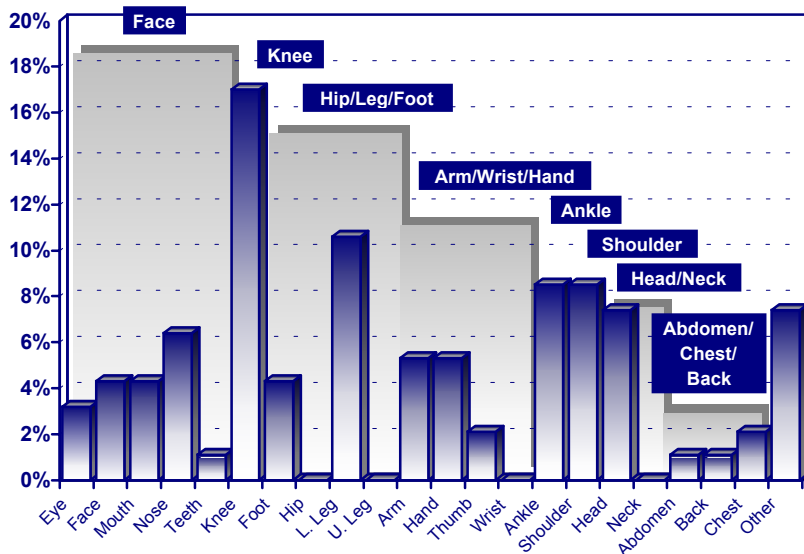


Figure 2. Percent of injuries by injured body part.

On-site administration of first aid for injuries included bandages (22%), application of ice (18%), splinting/immobilization (17%), elevation (11%), direct pressure (10%), antiseptic (9%), and other types of first aid (5%). No first aid was administered for 4% of injuries.

As stated above, the legislative rule governing injury reporting (§47-27-11 [Accident Reports]) specifies that injuries that “require medical treatment by a licensed health care provider, excluding diagnostic analysis” must be reported to the West Virginia DNR. Of the injury reports submitted during 2001, 27% indicated that injured individuals were evaluated by a medical or osteopathic doctor (MD or DO), 16% by an EMT or paramedic, 2% by a registered nurse (RN) and none by physicians assistant (PA) (Figure 3). Ten percent of reports indicated that evaluation of injured individuals was performed by persons with some other training (e.g., First Responder), most likely trip leaders or guides. On forty six (46%) of injury reports, no response was given as to by whom or if the injured individuals were evaluated. Also, only 36% of reports indicated that injured individuals received treatment in the form of a splint or cast (13%), stitches (11%), medication (5%), or other unspecified treatment (6%). Fifteen percent of reports indicated “diagnosis only”, while no response was given as to the type of treatment administered on 49% of reports.

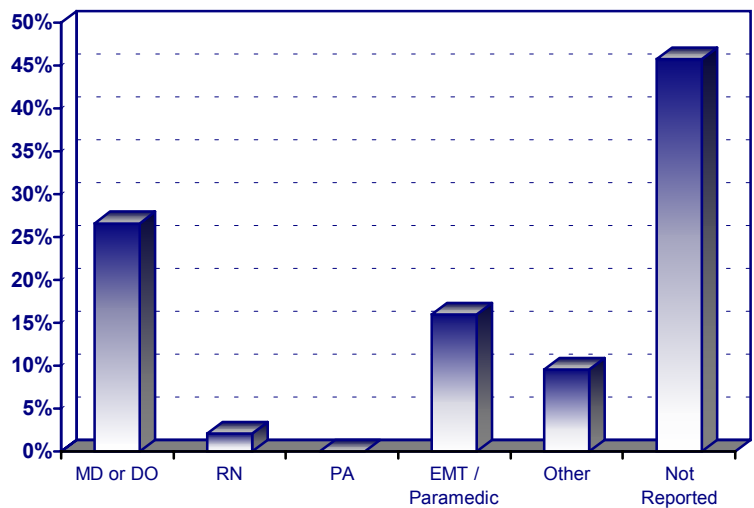


Figure 3. Percent of injuries by type of health care professional treated by.

The large number of body part categories was collapsed to facilitate cross-tabulation for the purpose of identifying injury associations. No statistically significant associations were found between injured body parts and location of occurrence (Figure 4). In all but one of the major body part categories, injuries

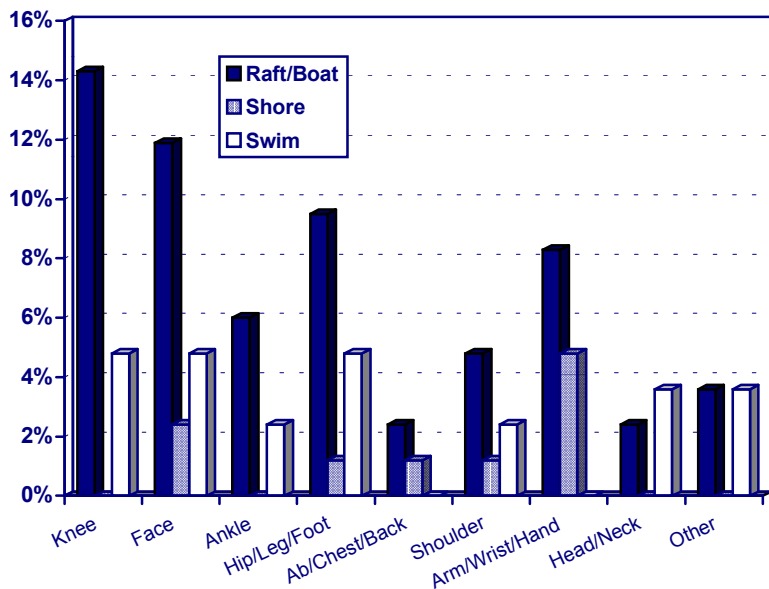


Figure 4. Percent of injuries by injured body part and location of occurrence.

occurred predominantly in the raft. Head/Neck injuries appeared to occur slightly more frequently during a swim. In the years spanning 1995 through 1998, injured body parts appeared to vary by gender, with female boaters more frequently sustaining arm/wrist/hand and facial injuries, while males slightly more frequently sustained injuries to the knee and shoulder. While variations were observed in 2001, no statistically significant gender association was found in the body part injured. Similarly, a gender association appeared to exist in reported injury type. Female boaters appeared to be more likely to sustain sprain/strain and contusion/bruise type injuries, while males appeared more likely to sustain laceration/puncture (Figure 5). None of these associations were statistically significant.

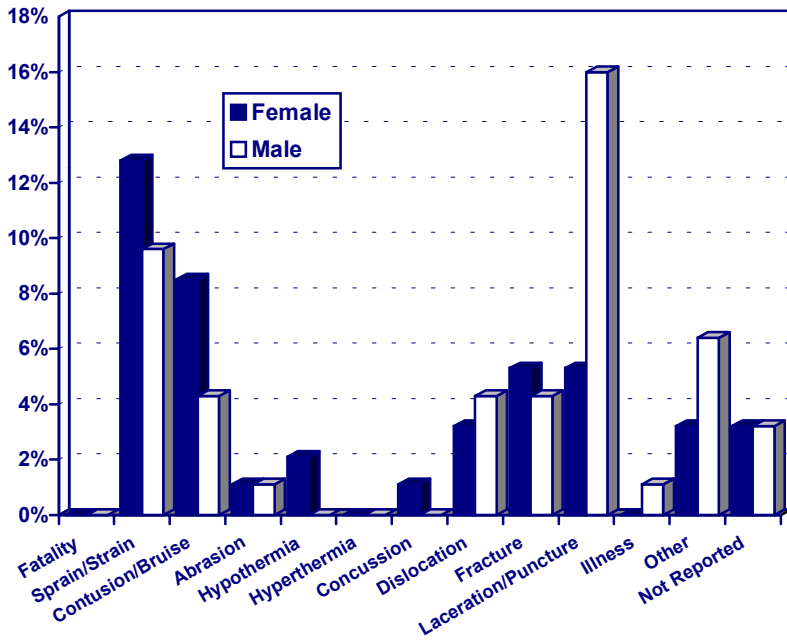


Figure 5. Percent of injury types by gender.

Finally, a statistically significant association was observed between injury type and injured body part. Lacerations more commonly involved injuries to the face, while sprains/strains occurred more often to the knee, ankle, and arm/wrist/hand. Dislocations more often involved the shoulder (Figure 6).

Summary

During the 2001 rafting season, a total of 94 injury reports were submitted on behalf of guests of commercial rafting outfitters who sustained injuries. The average age of injured persons was 31 years, 46% were female, and 60% had previous rafting experience. The overall injury incidence rate was 0.396 per 1,000 rafters for the year, which was consistent with the incidence rate in 1998, but

higher than with the incidence rate observed in 1995-97 and 1999.

The most frequently injured parts of the body were the parts of the face and the extremities (arm/wrist/hand, hip/leg/foot, knee, ankle). Predominant injury types included lacerations and sprains/strains, followed by contusions/bruises, fractures, and dislocations. On-site administration of first aid included bandages, splinting/ immobilization, elevation, direct pressure, and antiseptic. No first aid was administered for 4% of injuries.

Most injuries occurred in the raft as a result of collisions among passengers, being struck by a paddle or other equipment, or entanglement of extremities in parts of the raft. Injuries occurring in the raft more involved all but one of the major body part categories. Head and/or neck injuries occurred slightly more often in the water during swims. No gender association was found in the body part injured or injury type. Lacerations more commonly involved injuries to the face, while sprains/strains occurred more often to the knee, ankle, and arm/wrist/hand. Dislocations more often involved the shoulder

Finally, only seven outfitters accounted for most of the injuries reported in the year, and only 45% of injury reports indicated that injured persons were evaluated by one of the four recognized categories of licensed health care providers. Furthermore, only 36% of reports indicated that injured individuals received treatment in the form of a splint or cast, stitches, medication, or surgery, and 15% percent of reports indicated "diagnosis only." On nearly half of the injury reports submitted in 2001, the type of treatment administered was not reported.

Conclusions and Recommendations

It appears that many injuries reported in 2001 were not necessarily "reportable" under the reporting requirements specified in §47-27-11. As well, a few outfitters accounted for most of the reported injuries, reinforcing the suspicion that a small number of outfitters may be over-reporting while others are under-reporting or not reporting at all.

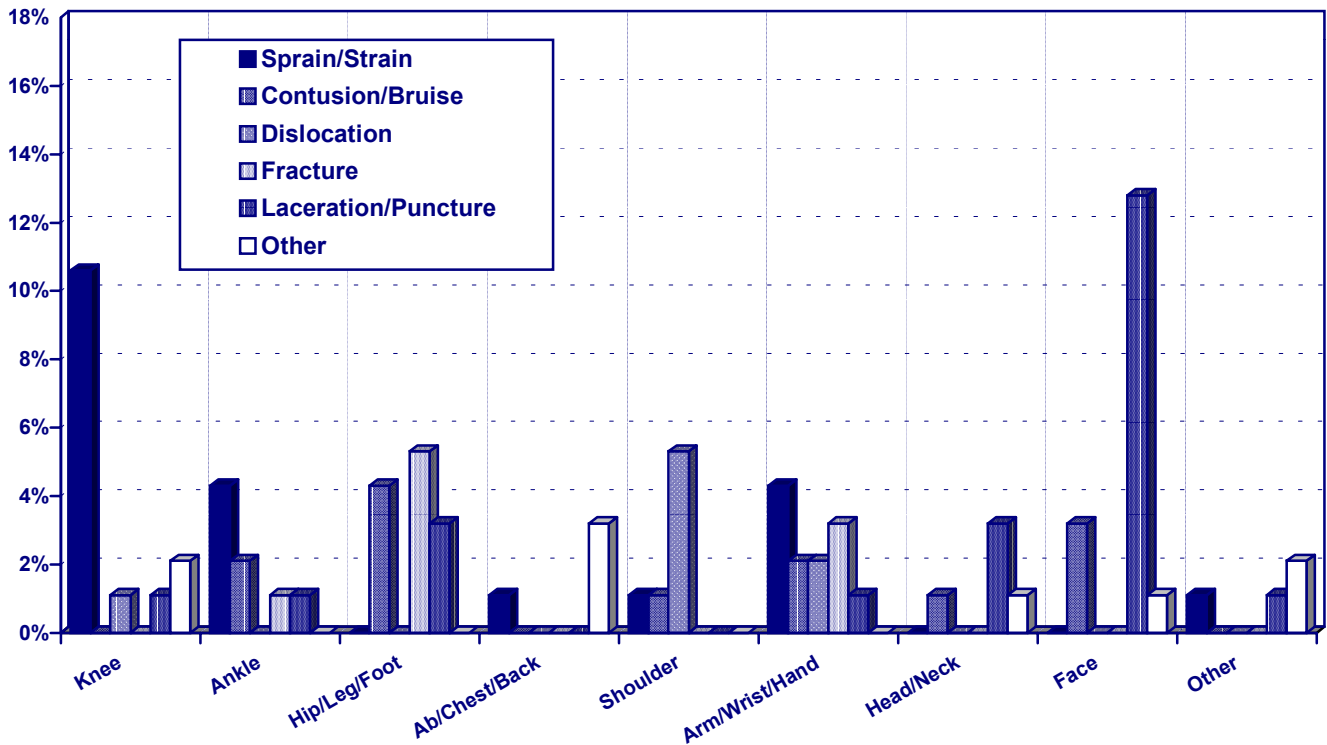


Figure 6. Percent of injured body parts by injury types.

Similarly, verification limitations make it difficult to determine if or how many injuries go unreported. Combined, these factors are cause for concern in that they almost certainly affect the determination of actual incidence rates or the true characteristics of rafting injuries. More effort is needed to verify injury rates and severity. As in the September Whitewater Commission meetings of 1996 and 1999, it is recommended that the Commission emphasize the importance of and need for accurate injury reporting, and reiterate the definition of a reportable injury as specified in the current reporting requirements.

References

- Whisman, S. A. and S. J. Hollenhorst. 1999. Injuries in Commercial Whitewater Rafting. *Clinical Journal of Sports Medicine*. 9:18-23.
- Whisman, S. A. 1999. Injuries in Commercial Whitewater Rafting: 1998 Annual Report. Report to the West Virginia Whitewater Commission. Available at http://www.state.wv.us/dnr/law/white/rivermgt/Injury/98_inj_rpt.pdf.
- Whisman, S. A. 1999. Injuries in Commercial Whitewater Rafting: 1999 Annual Report. Report to the West Virginia Whitewater Commission. Available at http://www.state.wv.us/dnr/law/white/rivermgt/Injury/99_inj_rpt.pdf.