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ATV and UTV Injuries in Montana: Worker's Compensation Claims Analysis

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KEYWORDS

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UTV
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ABSTRACT

This study investigated workers' compensation claims from 2007 through 2019, and distinguished all-terrain vehicle (ATV) claims from utility terrain vehicles (UTVs). The objective was to investigate accident and injury characteristics, patterns, risk factors and costs among both vehicle types. Data were provided by Montana Department of Labor and Industries, Montana Occupational Health & Safety Surveillance. The dataset contained 951 injury claims involving either ATV or UTV. The medical cost of these claims totaled $13,324,881 and wage loss totaled $4,681,404. Using chi-square of 95% significance, there were significant differences, p-value < 0.05, between vehicle types for part of body injured, cause of injury, nature of injury and cost. Findings can inform riders, safety professionals and employers about strategies to reduce loss of control events and resulting injuries.
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1. BACKGROUND

All-terrain vehicles (ATVs) and utility terrain vehicles (UTVs) are frequently used in the workplace. The modern ATVs were introduced in the U.S. in the 1970s as a three-wheel vehicle (Neves, Brazile and Gilkey, 2018), and were later replaced by the more stable four-wheeled design commonly used today (GAO, 2010). These vehicles consist of large, low-pressure tires, straddle-seats, and handle-bar steering (Neves, Brazile and Gilkey, 2018). Despite their popularity, ATVs are inherently unstable, relying on the driver's ability to shift their bodyweight to offset the tendency to rollover and thus risk-interactive (Jinnah, 2016). In a rollover event, ATV riders are exposed to head, spinal, and other serious crushing injury under the weight of the vehicle (Jinnah and Stoneman, 2016). The UTVs were introduced in 1988 as a safer alternative, with a lower center of gravity, bucket seats with safety belts, steering wheel, speed interlock, and roll-cage or survival space protection (Baker, 2014). Most ATVs were and remain designed to carry a single rider. In contrast, the UTV or side-by-side with bucket or bench seats are designed for carrying passengers. Some of the larger UTVs have both front and rear seats as well as storage capacity (Baker, 2014). The engineering changes over the years have made both ATVs and UTVs safer; however, these vehicles are not without significant risk to the operators and passengers (Gilkey, 2019).

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Several industries utilize these vehicles such as agriculture, construction, security, and search and rescue (Lagerstrom, 2015). The vehicles are used commonly for recreational and increasingly for occupational purposes. ATVs are used in farm work more frequently (hours/year) than for recreation alone (Khorsandi, 2020; Rodgers, 2001). Farm workers are more likely to have a rollover event or to be pinned under the ATV than recreational riders (Khorsandi, 2020; McIntosh, 2016). Recreational and agricultural work-related ATV crashes differ in their major mechanisms, resulting injuries, and speeds, suggesting that injury prevention approaches may need to be customized for each (Khorsandi, 2020).

There are an estimated 400,000 injuries that occur each year with nearly 100,000 ATV riders and/or UTV drivers that seek care in the emergency departments of hospitals across the U.S. (GAO, 2010). ATV fatalities reached a peak in 2008 with an average of 800 deaths per year (CPSC, 2019). The fatality rates have been declining in recent years linked to downturn in the economy, lagging sales, legislation, enhancements in safety features seen in UTVs, and available training for users. The popularity of UTVs is rising in part because of their safety features despite their higher cost. As recently as 2019 the UTVs are outselling the ATV 2:1 and the fatality ratio was an estimated 4:1, ATV to UTV respectively (Gilkey, 2019).

The majority of previous investigations have focused on off-road vehicle fatalities and not workers compensation injury claims or distinguished differences between the two types of vehicles and resulting injury. The Consumer Product Safety Commission (2019) reported that 15,250 fatalities have been investigated since 1982. The loss of life and injuries resulting from ATVs and UTVs use amounted to significant costs to patients, employers, and insurance companies. Helmkamp, Biddle, Marsh and Campbell (2012) estimated economic impacts of ATV related workplace fatalities between 2003 and 2006 to be greater than $100 million. Injuries to the back, spine, and head can have detrimental and lifelong effects. Very few studies have looked at workers' compensation claims related to occupational ATV or UTV injury cases (Lagerstrom, Gilkey, Elenbaas and Rosecrance, 2015). Investigators evaluated 212 claims from Montana from 2007 – 2012 and found "a statistically significant decrease in the number of ATV-related, emergency department-treated injuries in the years 2007-2012". The researchers also found fractures to be the most common injury, and rollover to be the most common loss of control (LOC) event (Lagerstrom, Gilkey, Elenbaas and Rosecrance, 2015).

The present study is a continuation of previous work and looked at injuries from Montana Workers' Compensation claims from 2007 through 2019 involving ATVs and UTVs. The aim of this study is to investigate 951 injury claims from the MT Department of Labor to describe and quantify the patterns, trends, cause, and nature of injuries, affected occupational sectors, and respective costs. Investigators were also interested in comparing similarities and differences between ATV and UTV claims.

2. METHODS

The claims data were extracted from a larger database of claims and were provided by the Montana Department of Labor and Industries, Montana Occupational Health & Safety Surveillance. The summary data were collected on February 10th, 2020 from the Montana Department of Labor and Industry Workers' Compensation Administrative Network. These data were derived from first report of injury (FROI) and subsequent report of injury (SROI) reports, which include information on the worker characteristics, accident factors, benefits paid, employer and insurer. Key words for inclusion were 'ATV', 'All-terrain vehicle', 'Quad-Bikes', 'UTVs', 'Side-by-Sides', 'Recreational Off-Highway Vehicles', and 'Off-Road Vehicles'. The extracted data contained 951 instances of injuries involving either ATV or UTV, a census of claims from 2007 - 2019. The summary data included 878 (92%) cases involving an ATV. Three instances were found to have been misclassified as ATV when they were UTV. Loss of control events were determined by manual review of accident description narrative

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reports. There were 799 (85%) LOC events on which the study focused. Of these, 749 (93.7%) were ATV crashes. The dataset contained 32 variables. Of these, several variables were redundant; for example, 'nature of injury type code' coincides with 'nature of injury type name'. Nine variables were dropped for this reason. Injury time contained an implausible majority (48%) of '1200', and thus was presumed to be a default response and was determined to be excluded. An additional two variables were created from manually reading the accident descriptions. Events were classified as Event Type; it was determined whether the crash was a rollover, non-rollover, ejection or unknown. Descriptions were written by claimants, not researchers, and could be uninformative, such as "ATV accident". These incidents were classified as "unknown". Then, each event was categorized into a cause of the crash, or common factors such as steep incline, collision with object, or sharp turn. All variables except Wage Loss and Medical Cost were categorical. Categorical variables were examined using descriptive and cross-table Chi-square analysis with 95% significance. Frequency of attributes in each variable was then examined to compare patterns and differences between vehicle types. Mean and median were used to compare financial data. Data were analyzed using R version 4.0.2.

3. RESULTS

The descriptive analysis reveals the ratio of male to female instances were similar between vehicle types, 639 (85%) were male for ATV and 41 (82%) were male for UTV. The age group 15-24 years was the most frequent for both groups, followed by 24-34 years. An employee was most likely to have a loss of control event in the first six months of employment, 37% for ATV and 44% for UTV. An accident was most likely to occur in the summer compared to fall, winter, and spring.

Table 1: Gender, Age at Injury, and Tenure

	ATV LOC (N=749)	UTV LOC (N=50)
Gender		
Male	85.3%	82.0%
Female	13.8%	12.0%
Age at Injury		
15 to 24	23.4%	26.0%
25 to 34	20.4%	20.0%
35 to 44	14.3%	20.0%
45 to 54	19.1%	14.0%
55 to 64	16.6%	14.0%
65 to 74	4.9%	2.0%
Undefined	1.3%	4.0%
Tenure		
Less than 6 mos.	36.8%	44.0%
6 mos to 1 yr	8.9%	8.0%
1 yr to 5 yr	25.1%	26.0%
5 yr to 10 yr	11.0%	8.0%
More than 10 yr	13.9%	12.0%
Injury Season		
Spring	19.1%	12.0%
Summer	49.0%	48.0%
Fall	19.1%	22.0%
Winter	7.2%	8.0%

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The industries with the most claims were Agriculture, Forestry, Fishing and Hunting with 63% of all LOC claims. From the descriptions, the most common activity among these was chasing cattle. The claims by industries can be seen in Table 2.

Table 2: Industries with ATV/UTV LOC claims

Industry	ATV LOC claims	UTV LOC claims
Accommodation & Food Services	0.9%	2.0%
Administrative, Support, Waste Management & Remediation	4.0%	NA
Agriculture, Forestry, Fishing & Hunting	63.7%	52.0%
Arts, Entertainment, & Recreation	2.0%	6.0%
Construction	3.3%	2.0%
Educational Services	1.3%	8.0%
Finance & Insurance	0.4%	NA
Health Care & Social Assistance	0.9%	NA
Manufacturing	1.6%	NA
Mining, Quarrying, & Oil and Gas Extraction	1.5%	4.0%
NOC	0.2%	NA
Other Services (Except Public Administration)	0.4%	2.0%
Professional, Scientific, & Technical Services	2.3%	2.0%
Public Administration	11.1%	14.0%
Real Estate, Rental & Leasing	0.5%	2.0%
Retail Trade	1.9%	2.0%
Transportation & Warehousing	0.1%	NA
Utilities	2.0%	2.0%
Wholesale Trade	1.6%	NA

Overall, ATVs had more rollover-associated injuries than any other type (43%) of all injuries. In contrast, UTVs had more non-rollover as the majority of injury causing events (62%). When looking at the occurrence of LOC events, rollovers were common for both vehicle types (50% for ATV, 48% for UTV).

Differences between the vehicle types appeared within the Nature of Injury (NOI). A contusion was more likely than a sprain or tear in a UTV incident, and vice versa for ATV. There were significant differences within Part of Body (POB) ($p = 0.005$). On an ATV, injuries to the back and chest were most common. While looking at UTV injuries, the extremities were most frequently injury POB. As shown in Table 3, back and spine was the leading body part for ATV injuries, regardless of LOC event type.

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Table 3: Part of Body by Event Type

	Rollover		Non-rollover		Ejection	
ATV	Back/Spine	24.7%	Back/Spine	18.2%	Back/Spine	28.9%
	Chest	12.7%	Wrist	14.0%	Wrist	10.8%
UTV	Back/Spine	6.0%	Hand/Finger	6.0%	Head	4.0%
	Internal Organs	6.0%	Neck	4.0%	Back/Spine	2.0%
	Multiple Lower Extremities	6.0%	--	--	Multiple Upper Extremities	2.0%

There were significant differences (p = 0.002) for Cause of Injury (COI). The most frequent COIs were riding on inclines, rough terrain, and/or collision with an object.

Table 4: Cause of Event

	Cause	Percentage
ATV	Incline	16.4%
	Rough Terrain	15%
	Collision W/Object	12.6%
UTV	Incline	22%
	Collision W/Object	14%
	Sharp Turn	14%

The present study shows some differences in NOIs between ATVs and UTVs. Table 3 shows that sprain or tear, contusion, and fracture are the three most common natures of injury for both vehicle types.

Table 5: Nature of Injury

	Nature	Percentage
ATV	Sprain or Tear	29.5%
	Contusion	25.4%
	Fracture	22.7%
UTV	Contusion	34.0%
	Sprain or Tear	20.0%
	Fracture	16.0%

A summary of the financial data, Medical Cost and Wage Loss, can be seen below in Table 5. Neither Medical Cost nor Wage Loss are significantly different (p = 0.47 & p = 0.45 respectively).

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Table 6: Medical Cost and Wage Loss

		N	Min	Q1	Median	Q3	Max	Mean
Medical	ATV	248	$202	$4,617	$14,329	$28,856	$4,849,679	$46,663
	UTV	16	$178	$2,525	$23,110	$39,643	$327,222	$43,988
Wage Loss	ATV	235	$19	$1,087	$3,863	$10,900	$218,904	$15,071
	UTV	16	$31	$1,070	$3,962	$14,633	$316,079	$38,389

If we consider medical cost to be an indication of severity and look at LOC instances greater than or equal to the mean, we can see that Back Including Spine is the most common body part injured for both ATV and UTV (32% and 75% respectively). The next most common are head (11%) and chest (8%) for ATV, and neck (25%) for UTV.

4. DISCUSSION

This research successfully identified patterns, characteristics, similarities and differences within the 951 claims provided for several variables of interest. The investigation was an extension of the first study by Lagerstrom et al. (2015) and included the sentinel comparison between ATV vs UTV injury claims. While there were many more ATV claims 878 compared to 73 UTV, investigators recognized differences in patterns and characteristics of injury work-related claims. The previous study by Lagerstrom et al. (2015) reported fractures as the most common injury type as did the present study. Similar patterns with some differences in NOIs between ATVs and UTVs. The investigative team found differences between the ATV vs UTV claims when looking at outcome in the context of LOCs, POBs, NOCs, and costs. This study is the first of its kind in comparing the workers' compensation claims of ATVs and UTVs, and in identifying which risk factors are common in each industry.

5. LIMITATIONS

This study has a number of limitations. The Workers' compensation claims were provided as summary data with recognized inherent information bias limitations. Possible errors may have occurred by the person filing a claim may not have known the distinction between ATVs (saddle seat, handlebars, etc.) and UTVs (bucket seat, steering wheel, survival space, etc.). Colloquially, many people may refer to all off-road vehicles as ATVs (Jennissen, 2016). There may be other misclassifications that could not be determined from the description. It is unlikely that this number would greatly affect our findings, as they were consistent with previous work (Lagerstrom et al., 2015).

6. CONCLUSION

Examining the injury claims can help us understand the differences and commonalities in the risk factors for both ATVs and UTVs. There were significant differences in part of body injured, cause, and nature of injury. Although there was not a significant difference in the costs, the difference in the number of claims is suggestive of an overall difference in safety.

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