

Crash Frequency Benchmarking and behavioral Approaches to Fleet Safety

ASSE PDC June 22, 2017

Session 746

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Session Objectives

Examination of the root causes of motor vehicle crashes provide evidence that driver behaviors contribute more significantly than driver knowledge or lack of skill. Drivers make behavioral choices that increase the risk of a crashes that include following other vehicles with less than the recommended following distance, driving while impaired, driving distracted, driving while fatigued and driving aggressively.

Training, in general, has shown to have less impact on behavioral choices than point-in-time systemic factors. People make decisions on the basis of perceived need weighed against perceived risk. This indicates that driver training, in and of itself, should not be expected to have significant effect on the behaviors that contribute to crashes when system influences point to needs met by those behaviors. This paper and our presentation will address comparing liability crash frequency to similar operations and incorporating behavioral or organizational practices concepts into fleet safety programs. This will allow a company to compare their operations to others and identify ways to strengthen their fleet safety programs.

Crash benchmarking

Crash benchmarking is an approach to comparative assessment of the impact and effectiveness of a fleet safety program. Most crash benchmarking compares the number of crashes to the number of vehicles or the miles driven. This is more effective when used to compare companies or locations that use similar vehicles, operate them in similar ways, and within the same industry. Most benchmarking studies have historically not taken the state of operation into account. This can create distorted comparisons when more vehicles are used in areas with higher crash rates.

Data comparisons by the authors suggest that expected crash rate is influenced by three main variables: industry, type or size of vehicle, and the state of garaging. Considering these three

variables allowed calculation of expected crash frequency. Including company size, based on total premium, in the analysis revealed differences between larger and smaller operations.

The expected crash rate is for property damage (PD) and or bodily injury (BI) events. Crashes with physical damage were excluded unless PD or BI claims were incurred as a result of the same crash. Physical damage was excluded due to the wide range of deductibles. Claims with no incurred costs were excluded from the frequency calculations. The most effective way to explain this is with examples changing one of the variables at a time. The first example uses a contracting fleet with 100 medium trucks (10,001 to 20,000 GVW). The expected range varied by over 100% between the lower and higher expected frequencies.

State	Expected Crash Frequency (rounded to the nearest 10 th)
Florida	4
Kansas	2.6
Massachusetts	6
Oregon	2.8
Rhode Island	4.3
All State Average	4

This example shows the impact of various vehicle types using a 100 vehicle contracting fleet in the state of Florida

Vehicle Size (GVW)	Expected Crash Frequency (rounded to the nearest 10 th)
Light Truck 0 – 10,000	3.4
Medium Truck 10,001 – 20,000	4
Heavy Truck 20,001 – 45,000	4
Extra Heavy Truck Over 45,000	5

The next example shows difference based on industry groupings. The sample was 100 medium trucks in Colorado.

Industry	Expected Crash Frequency (rounded to the nearest 10 th)
Contracting	2.9
Mercantile	2.9
Service	3.0
Energy and Utilities	3.7
Wholesale	4.2

The example below examined a 100 vehicle contracting fleet in Missouri of medium trucks and compares large vs. medium sized companies.

Company Size	Expected Crash Frequency (rounded to the nearest 10th)
Medium	3.3
Large	3.4

When comparing the crash frequency of a company to a larger group it is important to understand the benchmark parameters used in calculating the expected or average crash frequency. Most operations will have unique exposures and benchmarks should be viewed as a comparative estimation.

Elements of an Effective Fleet Safety Program

There are many sample and/or model programs that can be found with an internet search and consensus standards such as ANSI Z 15.1 describe fleet safety program elements that should be considered. While topical phrasing of element category headings may vary between these programs, similar exposures or controls are addressed. Author studies of fleet safety programs have identified program elements and practices shared by companies that have lower crash and vehicle related injury rates. These high-performing companies:

- Select drivers based on their driving history and ability to perform the job
- Establish and communicate expectations on how jobs should be performed and have supportive management practices
- Monitor task completion and performance to the expectations using metrics that measure results and risk
- Provide feedback on performance for both workers and management
- Adapt process to influence behavior that meets expectations
- Document the policies and adaptations

Select drivers based on their driving history and ability to perform the job

Selecting drivers based on their driving history and ability to demonstrate compliance with expectations should also apply to anyone that operates a motor vehicle on company business. For this to be effective, criteria must be established and followed. If exceptions are made they should follow an exception policy that limits the exceptions and how exceptions can be made. Exceptions should be made for some criteria and not for others. For example, an exception could be made for similar experience operating vehicles but should not be made for someone with a major violation that would disqualify them from operating motor vehicles on company business.

The process of selection and on-going reviews should be documented and periodically audited to verify it is followed and that the documentation supports the selection criteria. Management should have objectives to comply with the process which are outlined in expectations and mentioned as part of the program responsibilities. Regular performance reviews should include the safe operation of vehicles.

Establish and communicate expectations on how jobs should be performed and management practices

One of the more commonly cited organizational practices relative to safety management systems is comparing performance and behaviors to policies and expectations. For this to be effective, an organization should identify & objectively state the performance they expect, effectively communicate it, and have documentation to support the process. Some fleet safety programs have relied on commercial driving training products to communicate expectations. Commercial driver training products can support company expectations but may fall short in communicating them for driver performance if the expectations are not documented in policies as such.

Objective statements of expectation are essential to performance management in organizations. They should be phrased to be:

- Within the *Performer's Control* – the person can complete the expectation without action by someone else
- Specific – the situation in which the expectation is met is described in precise terms
- Measureable – Observable under normal circumstances (Not requiring unique circumstances for observations)
- Active – requiring action for the expectation to be met (Versus no action)
- Reliable – meaning is clear; two or more people observing the same action agree on whether it meets the expectation
- Tangible – performance can be appraised with a “Yes” or “No”

For example, safe driving theory on following distance can be incorporated into an objective performance expectation. Since the space between vehicles obviously increases with speed, a widely accepted separation distance measure that allows enough time for the driver of the following vehicle to react to speed changes in the followed vehicle is 4 seconds. A company's documented expectation that meets the six criteria above could be: *“Drivers maintain four seconds of distance between their vehicle and vehicles they are following”*.

The context of the message is important and should cover a wide range of topics that include driving vehicles, distractions, fatigue, vehicle inspections, vehicle maintenance, trip planning/journey management, and crash or incident reporting. Careful crafting of expectation statements not only allows performance to be measured but sets the stage for incremental performance improvement.

Monitor task completion and performance to the expectations using metrics that measure results and risk

Most driving performance data are related to aggressive events. Expectations for driving to avoid aggressive events should take into account that some aggressive events help a driver avoid a collision but a high frequency of events may indicate a higher risk of becoming involved in a crash or a disregard for the company fleet safety policies. Using data to identify trends and aggressive event outliers can have more productive results if the range of performance is understood and event rates are calculated.

The statistics shown below are for aggressive events from telematics data collected over a short period of time from a fleet of 70 vehicles. They illustrate the range that can occur with similar vehicles used in a variety of locations.

Maximum	73
Median	3
Mean	7.2
Minimum	1

The wide spread between the mean and median is not unusual for telematics events and event rates. There were 7 drivers with event counts 3 times the median and 7 times the mean. This group would be the drivers initially reviewed for root causes of the aggressive driving. The root causes could include one or more of the following contributors:

- Effectiveness of past coaching discussions and in vehicle observations
- Motor Vehicle Record (MVR) violations prior to and after hire
- Driving expectations for vehicle operation
- Driver Knowledge of the expectations
- Vehicle and work experience or lack of that impacts performance
- Fatigue
- Scheduling or changes during the day or inadequate travel times
- Routing of drivers for work to be completed
- Compensation systems that may unknowingly encourage aggressive driving
- Data integrity/telematics device performance
- Consequences for performance that do not discourage aggressive driving
- Driver outside work responsibilities/situations
- Multiple jobs requiring late starts to on time completion
- Commuting times
- On Time departure at Start Of Work Day
- Distractions
- Vehicle condition
- Breaks and lost time during the work day
- Work flow or scheduling exceptions
- Health and wellness

Additional performance monitoring could involve use of technology, seat belt use and vehicle entry and exit protocols.

Provide feedback on performance for both workers and management

Once performance that does not meet expectations has been identified, drivers and their managers need feedback on the performance. For drivers on a focused improvement plan, more frequent feedback, increased interactions to help them understand the driving expectations, and coaching in techniques that can decrease the frequency of aggressive events may be needed. The goal does not need to be elimination of events but reducing situations where aggressive events are needed to react to traffic situations.

Coaching, feedback and ongoing discussions should be directed at root causes identified as part of the root cause investigation process. Identifying opportunities for systematic change which can decrease reliance on aggressive events for crash avoidance should be the focus.

Adopt process to change behavior that does not meet expectations

When examining performance at the individual or organizational level, it is important to understand the basics of antecedents, behavior and consequences. If the consequence of performance that does not meet expectations is “training”, the undesired behaviors may not change. Some performance or behavior requires significant and immediate consequences such as removing a driver from jobs that require the operation of motor vehicles. Having and communicating the range of consequences for performance should be part of process that goes beyond just driving.

Document the policies and actions

Fleet safety programs should have two primary objectives: 1) Reduce the risks for motor vehicle crashes. 2) Protect the company assets threatened by loss from crashes. The program policies and practices are designed to reduce the potential for losses. The program documentation, implementation, and ongoing audit/review allow a company to demonstrate that they have & follow a formal program if the company's efforts are questioned after a large loss. Documenting programs/protocols and verifying that they are followed can be very helpful to claims handlers when developing a settlement strategy.

Theory behind Well-Performing Organizations

Safety does not operate, nor has it evolved, in a vacuum. The safety profession has produced & proven a wealth of tools for refining the effectiveness of people doing things together (organizations) that draw on these essential components. The ways in which a company's performance can be measured is also expanding as technology to collect real time data on how processes (activities) are working continues to improve opportunities for gaining insights on how to systematically improve them.

Complexity - increasing numbers of system components interacting in more variable ways - can challenge approaches to understand them, much less influence their effects. Safety theory & practices that were foundational to risk reduction in simpler times/circumstances, and implemented with increasing effectiveness by progressive companies, are being taxed by compounding complexity.

There are few activities carried out by more people, more often and in the face of more compounding complexity that are better examples of the phenomena described above than “Operating Motor Vehicles”. In little more than a generation past, the technologies accepted as common in vehicles today were conceptual or experimental if not outright science fiction. Distraction/inattentiveness/driver error were significantly associated with crashes when vehicles were simpler, with only the most basic protection from harm to occupants when crashes occurred. New technologies converged to produce exponentially safer vehicles & roadways while significantly increasing the variety and flow of distraction sources for the driver. Progress can be described as trading one set of risks for another. In the presenters’ opinion, residual risks associated with operation of modern vehicles that have sophisticated capabilities for crash avoidance, occupant protection and even data gathering are good trades. This is particularly true when considering the parallel evolution of increased motivation for companies to change how risk in complex systems is gauged, understood, and reduced.

As change is influenced and improvement made, horizons expand and more effective control of harmful events is affected. Reaching plateaus of achievement is normal and reveals new opportunities. Some become more recognizable through higher proficiencies – or attentiveness - earned through the improvement process and some through shifting priorities. Other opportunities are revealed as problems that do not respond to the same methods used to achieve the higher operational/organizational performance that is emblematic of well-performing organizations.

“Continuous Improvement is better than Delayed Perfection.” (Mark Twain)

High functioning companies have integrated risk reduction that sustains safety performance well beyond industry norms. These best-in-class companies build capabilities to produce certain management system features that influence what can be described as essential organizational practices.

1. Mandate - a tangible *commitment*, top down, to act with specific purpose
2. Accountability – assurance that meeting expectations associated with the mandate is *systematically* supported
3. Process – Repeatable sequences of actions that produce a *predictable* output
4. Execution – Measured process performance that supports increasingly *effective* output
5. Improvement – Continuous adjustment of processes that verifies & demonstrates the mandate

One of these features, in particular, can be a centerpiece of improvement opportunity for commercial fleet operators. For many if not most organizations, the concept of accountability manifests in a culpability framework for addressing/correcting human error as a cause of incidents or process failures. This is evidenced by the mindset mentioned previously that aggressive driving events can be decreased solely through more or better driver training. While there are situations in which interventions for decreasing aggressive driving events should act on patterns of behavior observed in individual drivers, this traditional approach to accountability is akin to using the

rearview mirror when driving. Accountability frameworks should not be limited to examining the path just traveled and correcting as needed. They should be expanded to consider & tap into the knowledge of people involved on systemic opportunities for improvement. These opportunities do not favor people or systems in improvement strategies but embrace the notion that it is people *in* complex systems that make the systems resilient and highly effective (Dekker).

Organizational Practices and Fleet Safety

In 1980, Dov Zohar introduced the concept of Safety Climate (Zohar, 1980) as workers' shared perception of an organization's policies, procedures and practices as they relate to the true/relative value and importance of safety. Since that time, Safety Climate research – including that from the Liberty Mutual Research Institute for Safety Center for Behavioral Sciences - continues expand and mount evidence supporting its utility in predicting future safety outcomes (Christian, Bradley, Wallace, et al., 2009). Practical use of the conceptual underpinnings, supported by ongoing science, reveals opportunities for companies to leverage interactions between functional levels to strengthen shared perception of safety as a priority (Huang, et.al, 2017).

If not implicit in this description of Safety Climate, it is measurable with unique perception surveys based on research supported themes pertinent to the Organizational (“Top Management”) and Group (“My Direct Supervisor...”) levels. Survey findings inform strategies for strengthening the cascading interactions that influence situational decision-making in safety critical activities. It should be pointed out that these strategies rely on participatory approaches for implementation

The organizational practices listed above, in the context of Safety Climates for commercial fleets, provide a framework for focus areas:

1. Mandate - a tangible *commitment*, top down, that no need met by operation of the vehicle fleet supersedes prevention of harm to the driver or the traveling public in its operation
 - a. Established in writing over the signature of the CEO
 - b. Expressed as a value to which other essential values are related (E.g. Productivity, Customer Satisfaction, Sustainability, Community Relations, etc.)
 - c. Supported by improvement initiatives at all levels on par, and integrated with other improvement initiatives (E.g. Quality, Productivity, etc.)
 - d. Enacted through cited relationships between achievements in other improvement initiatives
2. Accountability – assurance that meeting expectations associated with the mandate is *systematically* supported
 - a. Develop Fleet Management Systems that:
 - i. Define specific Fleet operating parameters that are unwavering
 - ii. Recognize & embrace the reality and need for discretionary decision making by drivers
 - iii. Define where the unwavering parameters end and discretionary decision making begins

- b. Develop expectation-driven, cross functional engagement that:
 - i. Reinforces blame-free discussion of situational circumstances that threaten the mandate
 - ii. Generates ideas for improvement/adjustment for circumstances
 - iii. Motivates ongoing involvement in identifying & transferring Best Practice driver decision-making

- 3. Process – Repeatable sequences of actions that produce a *predictable* output
 - a. Supervisory engagement with drivers that enable & reinforce the Fleet Operating Parameters
 - i. Expectation-driven Daily Huddles
 - 1. Reiteration of mandate
 - 2. Review of Fleet Operating Parameters
 - 3. Surfacing of situational changes
 - ii. Performance reviews that reinforce achievement in meeting expectations
 - b. Cross-functional team meetings to continually examine the Fleet Operating Parameters relative to situational circumstances that:
 - i. Are scheduled and agenda driven
 - ii. Are sponsored by a senior member of management
 - iii. Produce Meeting minutes/summary, with improvement recommendations, to the Sponsor
 - iv. Begin with discussion of submitted recommendation status
 - c. Management stakeholders observe improvement process, respond to recommendations, and celebrate contributions of the cross functional team

- 4. Execution – Measured process performance that supports increasingly *effective* output
 - a. Establishment of Performance Measurement that:
 - i. Identifies outcomes (downstream/lagging/dependent variables) to which fleet operating parameter performance may be related
 - ii. Identifies process (upstream/leading/independent variables) measures for the fleet operating parameters identified as related to outcomes
 - iii. Tracks process measures
 - iv. Engages cross functional team in identification of trends to inform adjustment recommendations

- 5. Improvement – Continuous adjustment of processes that verifies & demonstrates the mandate
 - a. Adoption of progress measurement that gauges gap closure (Percent improvement from Baseline) in process metrics identified
 - b. Comparison of deliberate change made to process with observed changes to outcomes

c. Celebration & Reaffirmation

- i. Top down celebration of contributions that achieve milestone improvement
- ii. Statement of value added by the mandate
- iii. Call to action to reaffirm the Mandate

There are proven best-practice elements that should be considered as foundational to Fleet Operating Parameters

Best Practices

Reviewing your program for inclusion of these ten best practices is a way to identify improvement opportunities.

- **Identify all jobs that require the operation of motor vehicles** and include operation of motor vehicles in the job description or listing of job functions. Employees or contractors operating under your authority should be included. Operation of vehicles from full time driving to incidental use on an occasional basis should be included.
- **Adopt a policy that only employees on the list of “approved drivers” may operate motor vehicles on company business.** Criteria to be placed on the list of approved drivers should include meeting the company driving record criteria prior to and during employment, gaining and acknowledging an understanding of the fleet safety policies, completion of a road test to verify the skills and behaviors for operating vehicles as outlined in the fleet safety program are present, acknowledging and agreeing to comply with distractions policies and agreeing to comply with other aspects of the fleet safety program. Managers and supervisors should agree to enforce the policies and comply with them.
- **Establish, follow and audit a motor vehicle driving record verification program.** The program should outline what defines an acceptable driving record, the minimum frequently driving records will be checked and consequences for not meeting the driving record criteria. This should include a policy on reporting of all citations and convictions. Where state driver notification programs exist they should be used.
- **Establish, document, communicate and reinforce distractions policies.** The policy should prohibit a wide range of activities including use of technology and tasks that take a driver’s eyes off the road, hands off the controls and mind off of driving. Management must agree to comply to set an example. Operational policies should be reviewed to identify ways drivers are distracted by routine business and practices modified to reduce the potential for drivers engaging in work tasks while driving.
- **Identify use of non-owned vehicles and establish controls** to reduce the risk from this exposure. Drivers of non-owned vehicles should be included in the fleet safety program and drivers must be on the list of approved drivers to operate non-owned vehicles on company business. The controls should include driver qualifications, completion of a non-owned vehicle agreement, providing documented insurance limits meeting those found for a typical

vehicle and that drivers are expected to provide maintenance that meets the manufacturer's minimum recommended maintenance schedules.

- **Establish, document and reinforce driving behaviors for the operation of motor vehicles on company business.** Concepts covered in commercial training materials should be explained in the context of being expectations and should address how vehicles are operated and maintained. Topics should include: speed limits (company and posted), following distance, use of mirrors, vehicle maintenance and inspections, keeping windows clean, proper tire inflation, operation in bad weather, locking vehicles, planning routes, driving in parking lots, prohibition on U turns, securing equipment within the vehicle, not operating while impaired or fatigued, use of turn signals, scanning while driving, use of restraint systems (seat belts) and use of technology for directions. Management should agree to the expectations and set an example by complying with policies.
- **Documenting crash reporting protocols and crash scene documentation.** What is expected of drivers, supervisors and other management should be documented and communicated. The procedures should address crash scenes, reporting crashes, crash root cause investigation, crash reviews by management and consequences for crashes. Other types of loss such as theft, fire or storm damage loss reporting should be included.
- **Establish vehicle maintain standards and vehicle inspection process.** This should include maintenance to be performed based on mileage and time. The responsible party should be identified and facilities to be used. Records should be kept to show vehicle maintenance occurred and was performed per the schedule. Vehicle inspections schedules for damage and interior condition should be established and documentation maintained to show inspections were performed. Audits should be performed to verify the process and schedules were followed.
- **Identify fatigue triggers and establish a process to keep fatigued drivers from operating motor vehicles on company business.** Fatigue can have many sources including medical, work scheduling, commuting times, family issues and personal choices. A process to allow work to be done by others or delayed should be established to reduce the potential for a fatigued driver operating a vehicle on company business. Management should look for signs of fatigue and have a process to keep fatigued drivers out of vehicles used on company business.
- **Establish a process to monitor driving performance.** Driving performance should be measured using a combination of observations, data and program audits. Observations could include random observations and scheduled inspections for policy compliance and vehicle condition. Data can come from a variety of sources and include fuel usage reports, telematics data and in vehicle video event recorders. Data should be reviewed to identify outliers and individual performance plans created for drivers needing improvement. The action plans should be based on root causes identified as part of a analysis to identify root causes. Crashes are more commonly associated with driver behavior than lack of knowledge and action plans have a higher potential for changing behaviors when they do not rely just on training.

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