



FMCSA Safety Program Effectiveness Measurement: Carrier Intervention Effectiveness Model, Version 1.1—Report for FY 2015 Interventions

The Carrier Intervention Effectiveness Model (CIEM) provides the Federal Motor Carrier Safety Administration (FMCSA) with a tool for measuring the safety benefits of carrier interventions conducted under the Compliance, Safety, Accountability (CSA) enforcement program. The CSA program includes an array of carrier intervention types that replace the universally-implemented compliance review that was used as part of the previous enforcement model. The new enforcement model was designed to improve the level of safety in the operation of commercial motor vehicles.

Using a phased approach, FMCSA began implementing the CSA program in 2010. During the implementation period, some carriers were still subject to compliance reviews under the earlier enforcement program. The safety impacts of these compliance reviews were previously measured by the Compliance Review Effectiveness Model (CREM). The new model, CIEM, incorporates both compliance reviews and additional intervention types when assessing safety benefits. Additional intervention types include:

- Warning letters.
- Offsite investigations.
- Onsite focused investigations.
- Onsite comprehensive investigations.

This approach yields national-level measurements of the effectiveness of FMCSA’s current carrier interventions. Table 1 shows the safety benefits of all interventions, as calculated by the CIEM, for fiscal years (FYs) 2014–15. In 2015, carrier interventions led to an estimated 7,136 crashes prevented, 3,965 injuries prevented, and 212 lives saved.

MODEL FINDINGS

The model was implemented for carriers receiving the specified intervention types in FY 2015. Table 2 presents two sets of data for FY 2015 and its two

Table 1. Estimated crashes prevented, injuries prevented, and lives saved from FY 2014–15.

Fiscal Year	Crashes Prevented	Injuries Prevented	Lives Saved
2014	5,811	3,316	168
2015	7,136	3,965	212

preceding fiscal years. Columns B through D show by type the number of interventions conducted by FMCSA and its State partners for each of the three fiscal years. Columns E through G give the number of carriers receiving these intervention types as their first intervention in those fiscal years.

Total interventions decreased slightly from 34,932 in FY 2014 to 34,695 in FY 2015 (less than 1 percent). This follows an 8.5 percent decline in total interventions in FY 2014.

Overall, the set of FMCSA intervention types specified in the model are shown to have reduced motor carrier crash rates in FY 2015 (as in prior years). Consistent with prior years’ results, crash rate reductions are generally more pronounced for the smaller carrier size groups (see Table 3). While total carrier interventions declined slightly in FY 2015, overall estimated safety benefits in terms of crashes and injuries prevented and lives saved increased.

Additional Analysis

Further analyses were performed by implementing the model for two subsets of the full treatment group: carriers whose first intervention in a year was not a warning letter, and carriers whose first intervention was a warning letter. This further analysis provides a measure of the effectiveness of CSA warning letters. These findings suggest that warning letters, which are much less expensive than more labor-intensive interventions, can be an efficient tool in reducing crashes for many carriers.

Table 2. Carrier interventions by type, and number of carriers by first intervention.

A	B	C	D	E	F	G
Intervention Type	Number of Interventions FY 2013	Number of Interventions FY 2014	Number of Interventions FY 2015	Number of Carriers Who Received this Intervention as their First in FY 2013	Number of Carriers Who Received this Intervention as their First in FY 2014	Number of Carriers Who Received this Intervention as their First in FY 2015
CSA Warning Letter	20,225	20,535	20,443	20,206	20,529	20,437
Offsite Investigation	619	381	169	591	334	146
Onsite Focused Investigation	9,388	7,376	7,911	8,913	6,995	7,471
Onsite Comprehensive Investigation*	5,796	5,891	5,395	5,451	5,587	5,140
Non-ratable Review	2,112	749	777	2,028	687	740
Total	38,140	34,932	34,695	37,189	34,132	33,934

*Compliance Reviews are now included as Onsite Comprehensive Investigations.

Table 3. Net percent reductions in crash rates after a carrier received an intervention.

By Carrier Size Group	FY 2013	FY 2014	FY 2015
1 (1–5 power units)	43.6%	47.0%	53.4%
2 (6–20 power units)	40.6%	35.5%	37.2%
3 (21–100 power units)	23.1%	20.9%	22.4%
4 (100+ power units)	9.0%	0.2%*	1.2%*

Note: Negative crash rate reductions indicate increases in crash rates.

*Non-statistically significant net reduction.

MODEL APPROACH

The model computes carrier crash rates, defined as crashes per carrier power unit (PU), for carriers receiving interventions (i.e., treatment group carriers) for defined periods prior to and following the interventions. The difference between these carriers' pre- and post-intervention period crash rates represents the change in their safety performance during this timeframe. To remove the effect of confounding factors from the calculation of the change in safety performance, the difference between pre- and post-intervention period crash rates is adjusted by the change in crash rates experienced by the general carrier population during a corresponding timeframe. To control for systemic differences between small and large carrier operations, these adjustments are made within carrier size groups determined by their PU count. A set of carefully

designed filters is used to identify and remove missing and outlier carrier data.

The model incorporates statistical significance testing, which only considers size group changes in crash rates that are statistically significant. Statistically significant results, measured in terms of crashes prevented, injuries prevented, and lives saved, are then extrapolated to incorporate those carriers that received interventions but were not included in the initial model calculations because of missing or inaccurate data.

In summary, the FY 2015 data on pre- and post-intervention safety performance provide strong evidence for the effectiveness of FMCSA's carrier interventions, as in previous years. Future implementation of the model will enable FMCSA to continue to measure the impacts of carrier interventions.

To read the complete report, please visit: <https://doi.org/10.21949/1503462>