

# **Evaluation of the Effectiveness of the Training and Education Modules in the North American Fatigue Management Program**

**The study plan is designed to address the following questions:**

1. Is the NAFMP effective in: (1) improving driver sleep quantity and quality, psychomotor performance, eating habits and exercise habits; (2) improving carrier best practices in scheduling and safety climate; and (3) reducing near-crashes or crashes, missed workdays, and health care claims?
2. Can any positive changes seen immediately after implementation be maintained throughout the observation period?
3. Does the NAFMP provide a positive return on investment?
4. Does the impact of the NAFMP differ between long-haul and regional truck drivers?
5. Is the NAFMP acceptable to truck drivers? What are the barriers and incentives for completing the training? What are the drivers' opinions about the NAFMP web site and how can it be improved? Has the program changed drivers' and carriers' perception of the risk of fatigued driving?

The information collection plan is based on a prospective, observational before-and-after study design. Carrier management, CMV drivers, and other personnel will complete their respective training modules. Primary study outcomes focus on drivers' sleep and driving performance. Information relevant to these outcomes will be collected during a 3-month baseline observation period followed by drivers' completion of NAFMP Modules 3 and 8, and additional data collection during a 5-month post-training observation period. Drivers will self-report information about their satisfaction with the training, sleep patterns, and behaviors and attitudes that correlate with fatigue. Each driver will report information to the study team primarily using a dedicated Smartphone with pre-installed apps (study-specific questionnaires). The study team will also collect objective information about drivers' anthropometric measurements, as well as real-time data about sleep patterns, hours on duty, and driving performance. The majority of objective data will be sourced from an actigraph (a device worn by the driver); from specialized equipment installed on the driver's vehicle (a standard electronic log device, plus study-specific equipment); and from safety, crash, and administrative data reports obtained from the carrier. Finally, the study team will collect information from carriers about management practices relevant to fatigue reduction, and the costs of implementing the NAFMP.

## Overview of Key Activities and Data Collection During the Study Observation Periods, by Activity Type and Time Frame

Study Plan, Expanded View			DATA COLLECTION PERIODS										
			START -UP	BASELINE (month)			POST-INTERVENTION (month)				CLOSE- OUT		
				1 <sup>(1)</sup>	2 <sup>(2)</sup>	3	4 <sub>(1)</sub>	5 <sub>(2)</sub>	6	7	8		
Carrier	Enrollment	Recruitment and participation agreement	<input type="checkbox"/>										
	Safety climate	Management Practices Questionnaire	<input type="checkbox"/>										<input type="checkbox"/>
	NAFMP Modules	1: FMP Introduction and Overview 2: Safety Culture and Management Practices 9: Driver Scheduling and Tools					<input type="checkbox"/>	<input type="checkbox"/>					
	Electronic reports	ELD file, Admin/cost file; crash/safety/violation event reports		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Driver Enrollment and Close-out Procedures	Briefing and Debriefing Sessions	Initial briefing: Driver application, Briefing discussion, Informed consent, Background questionnaire, Receive dedicated study equipment (Smartphone and actigraph)	<input type="checkbox"/>										
		Post study debriefing: Discussion, Return smartphone and actigraph; Post Study Questionnaire											<input type="checkbox"/>
Driver Training and Quality Assurance	Actigraph	Actigraph Training	<input type="checkbox"/>										
	NAFMP Modules	3: Driver Education 8: Driver Sleep Disorders Management					<input type="checkbox"/>						
	Monthly phone briefing	Scheduled opportunity to address questions with the research team		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Driver – Active data collection	Periodic Questionnaires	<ul style="list-style-type: none"> <li>o Job descriptive index</li> <li>o Exercise and food consumption</li> <li>o Family interactions questionnaire</li> <li>o Short form 36 version-2 questionnaire</li> </ul>		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>		

	Daily smartphone questions	<ul style="list-style-type: none"> <li>o Psychomotor vigilance test (PVT)</li> <li>o Karolinska Sleepiness Scale (KSS)</li> <li>o Fatigue scale</li> <li>o Stress scale</li> </ul>		<i>3 times/day</i>	<i>3 times/day</i>	
		<ul style="list-style-type: none"> <li>o Difficulty of drive scale</li> <li>o Degree of drive hazards</li> </ul>		<i>At completion of each duty cycle</i>	<i>At completion of each duty cycle</i>	
		<ul style="list-style-type: none"> <li>o Sleep log</li> </ul>		<i>Before and after each sleep period</i>	<i>Before and after each sleep period</i>	
Driver – Passive data collection	Wrist actigraphy	Objective measures of activity as proxy measures of sleep and wake times		<i>Continuous</i>	<i>Continuous</i>	
Vehicle – Passive data collection	Electronic logging device (ELD) <sup>(3)</sup>	Automatic log of service hours (start/end times for drives and breaks) which can be aligned to data from driver’s wrist actigraphy and sleep log		<i>Continuous</i>	<i>Continuous</i>	
	Study equipment	Install/remove study instrumentation (VDS and FMS)	□			□
	Vehicle performance data system with real-time fatigue monitoring system (FMS) <sup>(4)</sup>	<ul style="list-style-type: none"> <li>o On-board accelerometers identify trigger events such as braking, swerving, contact with objects</li> <li>o Video camera oriented to the highway</li> <li>o Video camera oriented to the driver’s face</li> <li>o Fatigue detection software</li> </ul>		<i>Continuous monitoring with event-driven data capture (vehicle and video)</i>	<i>Continuous monitoring with event-driven data capture (vehicle and video)</i>	

(1) Week 1 of the month, (2) Mid-month, (3) Standard equipment on most commercial vehicles, (4) Study equipment