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OMB/RECORDS MANAGEMENT DIVISION

SFN 2053 (2/85) 5M



ROLL NUMBER

DESCRIPTION

3025

2001 HOUSE TRANSPORTATION

HCR 3025

2001 HOUSE STANDING COMMITTEE MINUTES

BILL/RESOLUTION NO. HCR 3025

House Transportation Committee

Conference Committee

Hearing Date February 16, 2001

Tape Number	Side A	Side B	Meter #
1	X		1,425
			End 4461
		x	1803 - - 2750 end
Committee Clerk Signature <i>Laurie J. ...</i>			

Minutes: Rep. Weisz - Chairman opened the hearing on HCR 3025; A concurrent resolution directing the Legislative Council to study safety issues related to cell phones and driving.

Rep. Aarsvold: I chose not to have written testimony this morning because the language in House Concurrent Resolution 3025 is thorough and quite specific. I will not repeat that information. I do have a quick compilation of a search of current research and study around cell phone safety. I did this in about ten minutes on the Webb. If you will use the identifiers of "cell phone safety" you will come up with literally hundreds of particular studies that have been done in various countries and various states regarding the safety of cell phones while a driver is using a cell phone. Two years ago, a lot of constituents came to me about what they perceive to be a problem of folks using the cell phone while driving. I have talked with Colonel Hughes of the Highway Patrol and he reminded me that there was a lot of research and a lot of legislation in process actually regarding this particular issue. It was his suggestion that we wait a look at this situation in North Dakota after we have developed some history here and in other states. Since I talked to

him (Col. Hughes) he is having his officers making note of cell phone use in the accident report. In that material I am passing around off the internet you will see that in Oklahoma they found that the cell phone was a prominent part of the accident. We can know that that cell phone was in use. The literature I have points to a problem with cell phones out there. I am more sensitive to the issue, I have observed on numerous occasions in my driving there is a lot of conversation going on cell phones while driving. I have to confess that about two years ago I was involved in one of those accidents myself -- in appropriate use of a cell phone. With that I offer this study resolution.

Rep. Kelsch: (1898) Why study just cell phones? Why not CD players? Why not radios? Why not disciplining children, --- putting make-up on -- ?

Rep. Aarsvold: I certainly would promote the inclusion of those things into the language of this study.

Rep. Schmidt: (1945) I just saw an ad on TV last night where the cell phone people are coming out with phone you don't even need to pick them up. With that new technology you probably don't even need this bill.

Rep. Aarsvold: Certainly I have had that pointed out to me earlier. The industry has taken this concern to heart and are trying to come up with something to minimize the problem. I am told that if you are involve talking on a cell phone your chances of having an accident are the same as if your blood alcohol is a 0.8. Even though we have technology your mind is distracted from your driving.

Rep. Wentz: I am one of the sponsors on this resolution. I put my name on there because I also realize what a distraction cell phones can be when one is driving. I know that I have to dig in my

purse to find a number to dial the cell phone and when driving it is a distraction and not safe. In response to Rep. Kelsch, I know that children can be distracting but I never presumed that I could deal with them while driving. I could yell at them but I couldn't deal with them without stopping first. A cell for some reason I think I can handle while driving.

OPPOSITION TESTIMONY --- (2290)

Thomas Kelsch: I am a lobbyist for Western Wireless Corporation doing business in North Dakota as Cellular One. We are opposed to HCR 3025. We are opposed to it for a couple of main reasons: # 1 We don't think the study is needed --- there are studies going on all across the country -- If my memory serves me correctly, KFYR did an article on this this summer and it showed there were a relatively small number of the accidents are caused by cell phones -- often the accidents were caused by other distractions --- they are many other distractions, and there have been for year -- they include the radio, fast foods, reading, looking at maps, grooming, make-up, getting dressed, other electronic devices, GPS, pagers, children in the back seat, and -- and I have to admit that I have done these things. If you want to punish some one for inattentiveness while driving include these things other than cell phones, include them all. In my regular job as an attorney I have had a couple of cases where somebody was dealing with their radio or their CD player and veered off the road -- Hit a track kid who was running along the road and broke his leg -- another veered off and hit a parked car -- in those cases the person was hit it doesn't matter what the distraction was.

There are safety feature as well -- people who gone into the ditches have called in for help -- there is responsible use of the cell phone and you can with care make use of that travel time to

make me more productive. If you make penalties for the use of cell phones you are penalizing them for these responsible beneficial uses. You may also effect the 'good Samaritans' who will not call in.

As an industry we support legislation that -- does penalize inattentive drivers or distracted drivers who do cause accidents. We support safety but not singling out cell phones to disallow their use while driving.

Rep. Schmidt: (2733) I know you are lawyers and those people who sell cell phones aren't you afraid of law suits -- are you immuned?

Thomas Kelsch: I am not aware of any law suits against the manufacturers of cell phones for the use of that --- certainly the individual can be sued if he causes an accident.

Rep. Thorpe: (2797) this is a study resolution --- I wonder how you can object to a study, don't you think the people doing the study would make a consciences determination and if there was a problem and is there was some solution ?

Thomas Kelsch: The main objection was -- we not sure a study is needed but the main objection is singling out cellular phones -- if you wanted to make a study on distracted drivers and the various causes that cause accidents -- with the idea of putting legislation in against distracted rivers in general regardless of what the distraction is -- we would support that.

Rep. Mahoney: (3019) Do you know of any other distract that quadruples the incidence of accidents like cell phone supposedly do?

Thomas Kelsch: I am unaware of that rate of increase --- our basic point is that it doesn't matter what the distraction is it is the distraction --- so if you study that --

Rep. Weisz - Chairman (3185) Are you aware of any data in the State of North Dakota that

addresses the problem such as the number of accidents due to inattentive drivers?

Thomas Kelsch: I believe and maybe the DOT answer that better but I believe they on accident reports they do record driver distraction ---

Marsha Lembke: I am Director of Traffic Services at the DOT. We do have a category on the crash report that is called "Attention Distraction". The is just a check-off. I do don't recall and I would have to look but it doesn't call for a comment on what the distraction was - - it could be anything --

Rep. Thoreson: (3365) Would we have to have that on the report to gather that type of information? -- to do the study -- to gather the information before we could do a study?

Marsh Lembke: I would --- there is a national study that was done but I don't know of anything specific to North Dakota. So I guess we would have to look into that.

Todd Kranda I am an attorney with the Kelsch Law firm and I represent Verizon Wireless. We are in opposition to this study as currently proposed. The concern is that it is not a broad enough study --- It seems that a study shouldn't focus on a possible situation of only cell phone use. As Rep. Kelsch has said earlier there are many other possible inattentive activities that can and do occur in a vehicle. We don't what the multiple causations would amount to. It is also interesting to note as has been pointed out -- the technology has and is addressing these concerns.

Rep. Thorpe: (3707) Would you have less of a problem with study if we broadened it to "mobile communication devices"?

Todd Kranda: I am not sure that you are widening the study with that approach.

Rep. Mahoney: (3882) I am reminded of the 'last ditch' defense -- are you afraid of what the

study shows?

Todd Kranda: We are not afraid of the study -- in fact we support studies where they study inattentive situations but we do not want to be isolated out and discriminate against as one industry for what happens in a vehicle when the individual makes that choice when they are so many other -- and you want to focus on one is discriminating --

Rep. Mahoney: (4155) You say discriminating --

Todd Kranda. Yes when you isolate out of a group .. And pointing out that this is a cellular related -- a cellular industry as opposed to the soft drink industry --

Rep. Jensen: (4277) I should think your industry would be willing to support a study like this -- it would be good public relations.

Rep. Pollert - Vice Chairman: (4461) There being no other persons wishing to testify for or against HCR 3025 , we will close the hearing.

Rep. Weisz - Chairman (1845) opened the discussion for action on HCR 3025.

Following discussion, Rep. Price: moved a "Do Not Pass" for HCR 3025.

Rep. Carlson: I second the motion.

On a roll call vote the motion carried: 9 yeas 5 nays 0 absent

Rep. Carlson: Was designated to carry HCR 3025 on the floor.

END (2750)

Date: 4/16/01
Roll Call Vote #:

2001 HOUSE STANDING COMMITTEE ROLL CALL VOTES
BILL/RESOLUTION NO. HCR 3025

House Transportation Committee

Subcommittee on _____
or
 Conference Committee

Legislative Council Amendment Number _____

Action Taken Do Not Pass

Motion Made By Rep. Price Seconded By Rep.

Representatives	Yes	No	Representatives	Yes	No
Robin Welsz - Chairman	✓		Howard Grumbo		✓
Chet Pollert - Vice Chairman	✓		John Mahoney		✓
Al Carlson	✓		Arlo E. Schmidt		✓
Mark A. Dosch	✓		Elwood Thorpe		✓
Kathy Hawken	✓				
Roxanne Jensen		✓			
RaeAnn G. Kelsch	✓				
Clara Sue Price	✓				
Dan Ruby	✓				
Laurel Thoreson	✓				

Total (Yes) 9 No 5

Absent 0

Floor Assignment Carlson

If the vote is on an amendment, briefly indicate intent:

2001 TESTIMONY

HCR 3025

COLLISION DIAGRAM

TELEPHONE INSTALLED?

IN USE?

TELEPHONE INSTALLED?	UNIT 1	UNIT 2	IN USE?	UNIT 1	UNIT 2	INVESTIGATION MADE AT SCENE?	Y	N	INT. & EXTER.	Y	N	PHOTOGRAPHIC TAKEN?	Y	N	EXPLANATION	P	S
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<p>WHAT VEHICLE WERE GOING TO DO</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>WHAT VEHICLE DID</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>TRAFFIC CONTROL</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>
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<p>TYPE OF ROAD</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>ROAD GEOMETRY</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>OBJECTS TRUCK BY VEHICLE OR LOAD ON PART CONTACT</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>
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<p>WEATHER</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>LINE</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>LOCALITY</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>ROAD SURFACE</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>ROAD CONDITION</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>
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<p>POINT OF FIRST CONTACT ON VEHICLE</p> <p>TOP <input type="checkbox"/> BOTTOM <input type="checkbox"/></p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p>	<p>VEHICLE CONDITION</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>	<p>PEDESTRIAN ACTION</p> <p>UNIT 1 <input type="checkbox"/> UNIT 2 <input type="checkbox"/></p> <p>EXPLANATION</p>
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LARGE DELAYS OR OTHER ACTION (SEE SECTION 10 FOR GENERAL INSTRUCTIONS AND ADMINISTRATIVE CHECKS)		BLOCK 1 TYPE 10 MUST BE DESCRIBED WHEN CHECKED	
UNIT 1	UNIT 2	BLK	REMARKS
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		



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Oddly Enough News - updated 12:14 PM ET Feb 13

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Reuters

Saturday February 3 9:28 AM ET

Canada MP wants car cellphone chats to be crime

OTTAWA (Reuters) - A Canadian legislator wants to make it a crime to chat on a cellphone while driving.

Bill Blaikie, a member of Parliament for the small New Democratic Party, introduced a motion Friday calling on the Liberal government to make it a criminal offense to drive while talking on a mobile phone except in an emergency.

"Cellular phones are a great convenience, but when used while driving they present a threat to public safety," Blaikie said in a statement, adding that several provinces were already studying the issue.

He cited the recent case of a three-car pile-up in a Toronto suburb in which five people were seriously hurt when a man ran a red light. He said witnesses reported the driver was using a cellphone at the time

Blaikie said Australia, France, Israel, Italy, Japan, Sweden, Switzerland and Spain have all banned cellphone use by drivers. REUTERS

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Reuters

Wednesday January 24 12:53 PM ET

Americans Favor Laws Against Cell Phones in Cars?

DETROIT (Reuters) - Americans believe using cellular phones while driving can be distracting and lead to more accidents -- but laws against the practice would likely be ignored, according to an insurance industry survey.

The survey, conducted by Roper Starch Worldwide for the Insurance Research Council, found that of the 1,000 adults surveyed, 91 percent believed driving and talking on a cell phone distracts drivers and increases the chance of accidents. Sixty-nine percent said they favored bans on driving and talking on a cell phone.

But only 35 percent said they thought it likely that such laws would be obeyed. The survey, conducted between Sept. 6 and 14, has a margin of error of three percentage points.

Driver distraction has become a growing concern in the auto industry as companies offer more cellular and computer services in vehicles. Several states have considered banning cell-phone use while driving

"These contrary conclusions really are at the heart of the cell phone debate in this country," Dave Golden, director of commercial lines for the National Association of Independent Insurers, said in a statement.

"It's difficult for lawmakers and industry groups to propose meaningful solutions for distracted driving when it appears the public is apparently saying one thing and doing another."

The survey found fewer people saying they used their phone while driving, with 42 percent saying they do, down from 61 percent in a similar survey three years ago. Researchers said they weren't sure if the decline was due to a change in practice or if people were more wary of admitting it.

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Friday February 02 12:36 PM EST

Do Gadgets Drive Drivers to Distraction?

By Randy Dotling
HealthScout Reporter

FRIDAY, Feb. 2 (HealthScout) -- When cars are filled with everything from telephones and global positioning systems to VCRs and Internet browsers, how much is too much?

Armed with driving simulators and plenty of distractions, government scientists hope they're on the road to an answer.

"The problem of gadget overload has been growing for some time," says Phil Spelt, a senior research scientist at the Oak Ridge National Laboratory in Tennessee. "We wanted to find out how these devices could be managed to help drivers instead of hinder them."

"We're trying to find out if there's a particular set of circumstances where multiple devices do become a threat to life and limb," Spelt says.

It's no secret that driving requires full attention. Driver distraction, in fact, is thought to be a factor in as many as half of all highway accidents, according to the Network of Employers for Traffic Safety.

Researchers have disagreed, however, on the danger of gadgets.

A Canadian study found that the accident rate of drivers using cellular phones is about the same as that of drunken drivers, Spelt says. But another study, funded by a wireless company, suggests that cellular phone use is much less risky than driving drunk.

In the Oak Ridge study, researchers are examining what happened when they sent 36 people on simulated driving excursions. The 20 women and 16 men "drove" in a simulator equipped with a cellular phone, a navigation guidance system, a collision warning system and an Internet connection.

The research is funded by the federal government, which held a hearing last summer to discuss the growing problem of driver distraction.

The drivers each drove for more than an hour on simulated two-lane country and small-town roads.

None of the participants got into a collision, although they missed six out of 540 turns and ran one or two stop signs, Spelt says.

"My sense is that a lot of these mistakes reflect what happens in the real world," he says.

However, some drivers did weave over the road while they looked at the "information sources" in their vehicles, he says.

Many of the drivers acknowledge that they were distracted, and "five or six thanked me for educating them about these devices," Spelt says.

He declined to draw conclusions about the research, saying more statistics need to be analyzed.

Steve Oesch, a spokesman for the Insurance Institute for Highway Safety, says the level of distraction caused by gadgets will depend on how they're designed. "Can they be operated by the driver while the vehicle is in motion, or will they be set up so they can just be operated by the passenger?" he asks.

Also, he says, it makes a difference whether the gadgets are operated by voice or other types of control

"Driving is a complicated task without any distractions," Oesch says. "When you begin to add these additional tasks for the driver, you are potentially making the driving that much more difficult."

What To Do

Keep distractions in your car to a minimum. And don't assume hands-free cellular phones are safer. Research has suggested that they're just as distracting as regular ones. It seems that the important thing is keeping your mind on the road, not just your hands on the steering wheel.

For more on cell phone use during driving, navigate yourself to the Web site of Loyola University. And to read a series of reports on driver distraction, visit the [National Highway Traffic Safety Administration](#).

You also might want to read previous HealthScout articles on [cellular phones](#) and others on [driver distraction](#).

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An Investigation of the Safety Implications of Wireless Communications in Vehicles

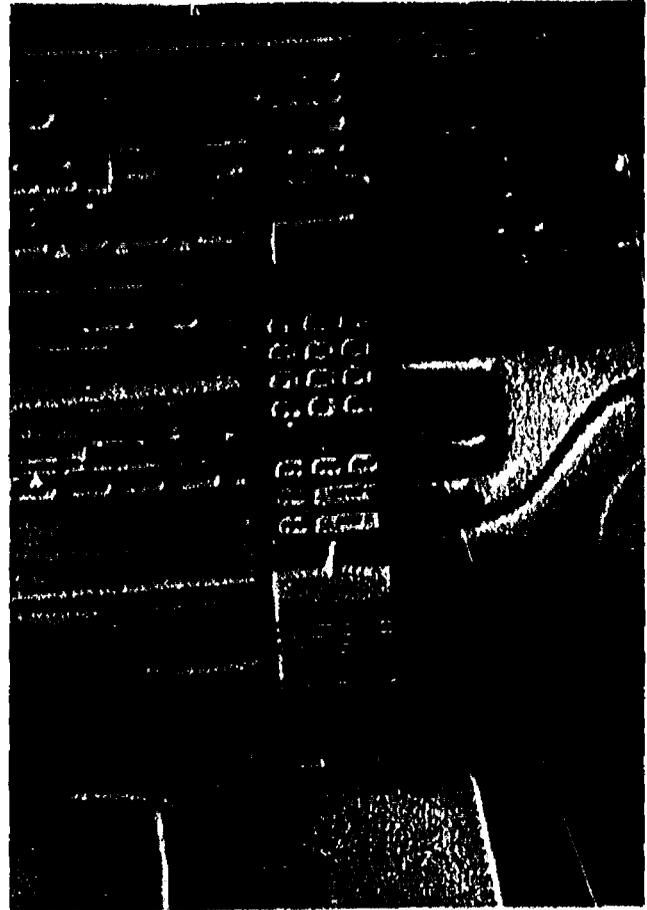


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An Investigation of the Safety Implications of
Wireless Communications in Vehicles

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Preface

The wireless communications industry is perhaps matched only by the personal computer field in the rate at which new products and features are being introduced to the marketplace. In the two years since the research for this report was initiated, the technology has changed dramatically and what was once a novelty, used primarily by businesses, has now become commonplace among the masses. Today, cellular telephones are owned by more than 50 million Americans and new technological breakthroughs have seen a migration from analog to digital architectures along with the recent introduction of "Personal Communications Services (PCS)" as a competitor to the cellular market. Driven by these developments, new capabilities beyond voice communications are being made available at an accelerated rate, compelling the user to upgrade to palm-size devices that allow activities such as checking of e-mail, "surfing the net," receiving stock quotes - from the classroom, the beach or perhaps from our vehicles.

The issues discussed in this report relate to all forms of wireless communications technology that may be used by drivers. In an effort to simplify the language in this report, as a service to the reader, we have elected to use the familiar phrase "cellular telephone" throughout the document, rather than a more general identifier such as "wireless communications device." It should be noted, however, that the issues addressed here-in are independent of the underlying technology, service or carrier and apply to all wireless communications devices and associated systems.

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An Investigation of the Safety Implications of
Wireless Communications in Vehicles

Preface

Executive Summary

The extensive growth in the wireless communications industry over the past ten years has been accompanied by growing concern for the potential hazards of drivers using wireless communication devices from moving vehicles. Given the National Highway Traffic Safety Administration's (NHTSA) mission to save lives, prevent injuries, and reduce traffic-related health care and other economic costs (through regulation, enforcement, economic incentives, educational programs, basic and applied research, and technology demonstration programs), the Agency has taken a particular interest in this issue.

DOT currently has a number of programs that focus on how best to utilize wireless technology in the vehicle to support efficient and effective emergency response (e.g., automated collision notification [ACN], nationwide 911 access to emergency services from vehicles, in-vehicle information on traffic hazards and roadway conditions). In addition, the safety benefits of having a communications capability available within a vehicle are well documented and supported by both law enforcement and consumer safety groups, which frequently promote the use of these devices to ensure the security of the driver as well as to report congestion, crashes, and drunk drivers.

Nevertheless, there has been increasing concern over the safety of using communications devices while driving, particularly within the public sector, and this has been reflected in the growing number of legislative initiatives in the states that address the use of wireless communications in vehicles. In response, NHTSA has prepared this report to help ensure that the public, the wireless industry, and the states have sufficient knowledge upon which to make informed decisions regarding the issues and to identify needed initiatives and research to help ensure that the economic, safety, and convenience benefits of mobile wireless communications can be maintained within an acceptable margin of safety. The objective of this effort is thus to assess the current state of knowledge regarding the safety implications of using wireless communication while driving a motor vehicle and to explore the broader safety issues associated with such use. This report examines the topic by reviewing available data and information on user characteristics, examining crash statistics, performing statistical analyses, and conducting a comprehensive critical review of relevant published research studies.

The report addresses four specific questions as follows:

- Does use of cellular telephone technology while driving increase the risk of a crash?
- What is the magnitude of the traffic safety problem related to cellular telephone use while driving?
- Will crashes likely increase with increasing numbers of users of cellular telephone technology in the fleet?
- What are the options for enhancing the safe use of cellular telephones by drivers?

Based on the information collected it can be concluded that in some cases, the inattention and distraction created by the use of a cellular telephone while driving is similar to that associated with other distractions in increasing crash risk. Both the research studies and crash data reviewed in this report highlight several factors by which cellular telephone use while driving can increase the risk of a crash. Among these, conversation appears to be most associated with the crashes reviewed.

Furthermore, it is clear that at this time there are insufficient data to indicate the magnitude

of any safety-related problem associated with cellular telephone use while driving. This is a consequence of inadequate reporting and thus it cannot be determined whether a problem requiring action exists. Rather it serves to underscore the need for enhancing such data collection at both the state and national levels.

The data also suggest that as the use of in-vehicle wireless communications technology increases there will be an associated increase in related crashes if little changes. However, the accuracy of this prediction in either direction (i.e., increase or decrease in crashes) is uncertain, given the pace at which cellular telephone designs and the functions they can perform are changing. Such changes, along with state legislative initiatives and changes in wireless subscriber characteristics, virtually ensure that usage patterns will change over time and thus influence associated crash trends.

In the report, NHTSA presents a variety of options for enhancing the safe use of cellular telephones by drivers and addressing the many issues raised. These include educational, research, enforcement and legislative considerations and initiatives. The intent is to better define the nature and magnitude of any potential traffic safety problem and assist the public, the states and the industry in making informed decisions on how best to address any issues related to cellular telephone use and driving.

Americans spend substantial amounts of time commuting and members of the public place high importance on keeping up with their tasks and activities. It is therefore not surprising that individuals will attempt to optimize their time in the automobile by doing other things concurrently. It may be unrealistic and perhaps ill-advised to conclude that drivers should have no advanced in-vehicle information systems at their disposal because they might be a source of distraction. A number of intelligent transportation system (ITS) initiatives intended to improve the highway safety and efficiency, are, in fact, focusing on increasing such information availability. These initiatives, however, have heightened NHTSA concern over possible synergistic effects of the various technologies that might increase driver workload beyond acceptable levels.

Until we have a better understanding of the nature and magnitude of any safety related problem, rather than restricting access, the goal should be to make in-vehicle information systems, including wireless communication, as compatible with safe driving as the state-of-the-art allows. This can be accomplished through the application of good engineering and human factors design practice. This must be done while addressing possible adverse safety implications for the population as a whole. In addition, the report offers a number of recommendations for addressing the broad range of issues identified. These recommendations include:

- Improving data collection and reporting.
- Improving consumer education.
- Initiating a broad range of research to better define and understand the problem.
- Addressing issues associated with use of cellular phones from vehicles to access emergency services.
- Encouraging enforcement of existing state laws to address inattentive driving behavior.
- Working with states on legislative options.
- Using the National Advanced Driving Simulator (NADS) and instrumented vehicles to study optimal driver/vehicle interfaces.

- Developing a sound basis for carrying out cost benefit analyses.

Appropriately addressing these recommendations will not only enhance the safety of wireless communication from vehicles in the short term, but ultimately will allow the Agency to bring to the table the information necessary to determine whether more aggressive action is required.

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Report Summary

Introduction

Since the introduction of cellular telephones in 1983, there have been dramatic changes in the cellular industry. With a growth rate of about 40 percent per year, it is estimated that by the year 2000 there will likely be about 80 million cellular telephone users in the United States. Changes in the technology, from heavy, cumbersome and expensive cellular telephones, to inexpensive, miniature hand held units, smaller than a pack of cigarettes, have had a significant impact on when, where and how we conduct our affairs, both business and personal. Societal pressures for increased efficiency, more leisure time, and an improved sense of safety, have placed wireless communications at the forefront of potential solutions for an increasingly mobile and technologically sophisticated populace.

While voice communication has been the primary focus of the cellular industry, recent technological and societal trends—in mobile communications and computer hardware and software (e.g., size, flexibility, connectivity), and the desire to "work on-the-road" have resulted in a move towards integration of technologies. This trend is such that cellular communications can now be the focal point of a truly "mobile office," including e-mail, fax and Internet services in addition to telephone, voice mail and paging capabilities from any location.

It was inevitable that the reduced size, reduced cost and increased functionality of the cellular telephone would find its use by drivers in vehicles increasing dramatically. Indeed, time spent commuting, caught up in traffic and just plain traveling, could now be productive. In addition, the cellular telephone brought with it a sense of security for those concerned about traveling alone in unfamiliar areas or concerned about vehicle breakdown. It is not surprising then that more than 85 percent of cellular telephone owners use their phones at least occasionally while driving, and more than 27 percent use their phones during half or more of their trips.

Cellular telephone use while driving is not without controversy. Public, legislative, and media concern about the safety of using a cellular telephone while driving has been expressed for some time. In recent years, perhaps because of the growing user population, the frequency with which concern has been voiced has grown considerably. It is the frequency with which these concerns have been raised, from the public, members of Congress and the media, that has prompted the research described in this report.

Objective and Scope

The objective of this report is to assess the current state of knowledge regarding the impact of cellular telephone use on motor vehicle drivers while driving, and explore the broader safety issues associated with such use.

While the primary scope of this report focuses on the potential impact of voice communications on driving, continuing development and availability of cellular technologies with integrated office functionality (e.g., network/Internet access, e-mail, paging, etc.) has also raised questions among some observers about the potential implications of such use on traffic safety. Thus, where relevant, consideration is also given to the possible impact of these technological developments.

The approach taken in preparing this report included a review of available literature, targeted data collection, focus groups, public opinion, and the identification of potential links between driver phone use and specific traffic hazards. The information contained in this report is drawn from the broadest range of sources available. Thus, this document reflects the current state of knowledge from a variety of perspectives including the general public, law enforcement personnel, legislators, cellular industry representatives, insurance companies, academia and the government.

It is hoped that the information presented in this report will be useful to the states in addressing the issue of cellular telephone use and safety, to the industry in optimizing the design and implementation of cellular technologies for safety, and to the driving public in using these communications and associated technologies appropriately.

Organization of this Report

The report begins with a general discussion of background information, including the cellular industry's emphasis on safety and a summary of past and present legislative initiatives aimed at limiting the use of cellular telephones while a vehicle is in motion. Chapter 2 presents an overview of "Cellular Telephone Use in America." It presents results from public surveys which describe the changing demographics of the user population. This chapter also provides a closer look at phone user opinions on the safety of cellular telephone use while driving.

The next chapter (3) discusses available crash information. All relevant information from the federally sponsored Fatal Analysis Reporting System (FARS), and the National

Automotive Sampling System (NASS) are presented. In addition, the data from the states of Oklahoma and Minnesota, the only two states which attempt to systematically record cellular telephone use prior to a crash, are discussed.

During June 1996, the Japanese National Police Agency conducted a crash investigation program that focused on cellular telephone use. The results of that project are also reviewed. Finally, individual case studies are described to illustrate the circumstances that can lead to a serious crash.

Chapter 4 presents a study drawn from an analysis of the narrative sections of selected (i.e., cellular telephone related) police crash reports from the State of North Carolina. The multi-year analysis was designed to identify changes in frequency of cellular telephone related crashes that may be related to increases in the number of users as well as identify the nature of relevant crashes.

Chapter 5 presents a comprehensive review of simulator, and on-the-road, instrumented vehicle research conducted on cellular telephone use while driving. Available epidemiological studies are also reviewed. A critical analysis of these studies demonstrates their applicability to real world driving situations, and addresses their limitations, given the complexities of cellular telephone use in the driving environment.

The final chapter (Chapter 6), provides a discussion of what was learned in conducting this research and assembling this report. It identifies common threads drawn from the myriad of sources. The discussion also focuses on what is still not known or well understood and makes recommendations for targeted research in a number of arenas. Finally, based on all the information gathered, a set of specific conclusions are presented.

The appendices provide acknowledgments of contributions, copies of selected existing and proposed legislation, a glossary of cellular technology terms, a list of references, a market survey of cellular communications devices currently available (1995) and in use in motor vehicles. In addition, comprehensive critical reviews of the cellular telephone research studies are presented in the Appendix, along with a discussion of human factors considerations for the design of cellular telephones that can influence the safety of their use from a moving vehicle.

Industry Focus on Safety

The cellular industry in general has placed considerable emphasis on safety, both from the standpoint of application and utilization. The Cellular Telecommunications Industry Association (CTIA), various manufacturers as well as service providers have specifically focused on safe driving as an important consideration relating to cellular telephone use. In addition, manufacturers of cellular accessories have specifically targeted safety in their products.

From an examination of cellular telephone products and literature, it is apparent that manufacturers clearly recognize the potential risks of in-vehicle cellular telephone use and make a major effort to educate their users on the "how," "what," "when" and "where," of cellular phone use from the standpoint of safety. For example, they encourage the use of

hands-free equipment in motor vehicles, along with use of memory-dial capabilities and voice activation features. To further safety objectives, the industry is continually improving the ease of use features (particularly for installed car phones) for drivers.

Legislative Initiatives

While the benefits of cellular telephone use have been frequently called out by both the cellular industry and law enforcement authorities, concern regarding the safety of operating a motor vehicle while using the phone has been of sufficient magnitude that legislative action has sometimes been initiated. Such action has taken place within the international community as well as within some U.S. states. In several instances within the international community, legislative action has, in fact, been successfully adopted, typically allowing the exclusive use of hands-free, wireless telephones while driving. In the United States, however, no such attempts have been successful. In Washington state, however, the motor vehicle code was amended to allow use of an "approved" headphone in association with "hands-free" wireless communications systems.

It is interesting to note that, in their legislation, some nations recognize the broader issue of driver distraction. For example, the Swiss Code of Traffic Regulations prescribes that "The driver must concentrate on the road and the traffic while driving. He or she may not carry out activities while driving which negatively impact the operation of the vehicle."

User Demographics and Public Opinion

The recent growth of cellular telephone use is a phenomena that crosses all age and gender boundaries. More than just the latest electronic gadget, cellular telephones have become integral parts of our business and personal lives. They are used to schedule appointments, broker deals, call for assistance, report emergencies and maintain contact with loved ones.

Currently about 9 percent of the more than 50 million cellular telephones in use in the U.S. are owned by people less than 24 years old. A number of surveys have been conducted by industry and other interested groups in attempts to characterize the role that cellular telephones play in American society. An overview of user demographics and reported cellular telephone usage patterns has been assembled from industry surveys. These surveys also address driver concerns and crash rates for cellular telephone users.

It is apparent from these surveys that the use of cellular telephones has greatly expanded as the size and costs of cellular telephones continue to shrink and the potential safety and convenience benefits become more widely recognized. As a result, the user group has grown from the middle-aged businessman to the young and elderly who often make personal calls. Since 1990, the usage patterns have shifted from primarily business use to an emphasis on personal use. The majority of subscribers tout the safety benefits of cellular telephone availability.

Issues of perceived safety and risk of using a cellular telephone while driving, are also highlighted in the survey data. For example, a recent survey by Prevention Magazine

indicated that 18% of respondents believed that their use of cellular telephones was distracting while they were driving, while 85% of the respondents use their cellular telephone while driving at least occasionally. The survey also indicated that 70% of the drivers found cellular telephone use to be the same or more distracting than tuning a car radio. A survey recently released by the National Highway Traffic Safety Administration found similar usage patterns.

Focus groups were conducted with law enforcement personnel who spend much of their day observing driving behaviors. These rookie and veteran police officers were queried as to their personal experience with cellular telephones, their observations of driving behavior and their opinions about cellular telephone use on the highways. Generally, the law enforcement community is supportive of the availability of cellular telephones and their use in vehicles. The immediate notification of true emergencies is a benefit widely acknowledged.

Additional public outreach efforts included detailed discussions with cellular telecommunications industry representatives, Internet queries, and public service notices in local publications. This attempt to tap into "conventional wisdom" demonstrated that drivers are not necessarily aware of their driving performance while they are engrossed in a call. Frequently, the potential hazards cited by some cellular telephone users (such as being careful while dialing) do not match the problems (such as lane meandering) cited by non-users who are sharing the road.

Emergency Response

Cellular telephone users in California made approximately 29,000 emergency calls in 1985. In 1996, it was estimated that 2.8 million emergency calls were made, an increase by a factor of 100. The industry estimates that 18 million such calls will be made nationwide, sometimes overburdening response networks with multiple notifications for non-life threatening events.

Efforts are also underway to seek changes in technology from cellular companies that would enable emergency dispatchers to automatically locate cellular telephone callers. It is unknown at this time how many of these calls are made from vehicles. Unlike calls made using land lines, cellular calls cannot be traced back easily to specific locations. This presents a challenge for emergency responders to locate callers who may be disabled or unsure of their location.

In some states, including California, Colorado, Maryland, Virginia, Delaware, Texas and Florida, the cellular emergency calls are directed to the state police. The increase in the number of calls has been so great, that these states are attempting to build infrastructures to handle the volume of calls received. The state police surveyed are generally appreciative of the quick notification capabilities afforded by cellular telephones. Problems arise, however, when numerous calls are made to report the same incident, or the emergency network is used frivolously. When a serious mishap occurs, as many as 100 or more calls may be received, which jam the lines and potentially prevent other emergencies from being reported. Of greater concern are the 50%-60% of the "911" calls that do not reflect true emergencies.

Crash Data

The National Highway Traffic Safety Administration uses a variety of data sources to identify emerging safety problems, monitor trends and evaluate the effectiveness of various countermeasures. Primary tools include the Fatal Analysis Reporting System (FARS) and the National Automotive Sampling System (NASS) funded by NHTSA, and police crash reports collected by the states.

The FARS and NASS data sets rely upon police crash reports as a source for information regarding crashes. The FARS adds additional official records to their files (such as driver records and available medical data). The NASS program employs trained investigators to document and photograph vehicle damage and scene data, as well as to gather additional information from interviews and medical records to enhance the data file.

In recent years, both NASS and FARS have attempted to identify cellular telephone use as a pre-crash factor from police crash report narratives. Although there is a serious under-reporting bias in the data, there are trends which show that cellular telephone use is a growing factor in crashes. Driver inattention is the most frequently cited pre-crash condition for drivers who use cellular telephones.

Specific aspects of cellular telephone use have been identified which demonstrate that phone conversation rather than dialing is the most frequently reported related factor. Contrary to expectations, the majority of drivers were talking on their telephones rather than dialing at the time of the crash. A few drivers also were startled when their cellular telephones rang and, as they reached for their phones, they ran off the road. Other driver factors included driving too fast for conditions or failing to yield. The overwhelming majority of cellular telephone users were in the striking vehicle, and struck cars or other large objects that were in clear view of the driver.

Only Oklahoma police crash reports contain a data element that recognizes telephone installation and telephone use related to a crash. Police officers are limited to recording cellular telephones they can see (such as installed car phones) after a crash. Portable units are not likely documented. The data contained in the crash reports cite driver inattention as a major factor in cellular telephone related crashes. The number of crashes that may be attributed to cellular telephone use is, however, much smaller than would be predicted in a statistical model based upon driver inattention factors.

The highway safety record should provide definitive data on the role that cellular telephone use plays in traffic crashes. Unfortunately, only Oklahoma and Minnesota provide police crash report (PCR) forms with data elements that specifically address cellular telephone use as a pre-crash variable. Minnesota, however, only reports the presence of a cellular telephone; not its use. Therefore, it is not clear whether the small number of cellular telephone-related crash reports in these and the NHTSA (FARS and NASS) data sources indicates under-reporting or reflects the inherently safe operation and use of cellular telephone technology. A discussion of the uses and limitations of existing data sets is presented.

The Japan National Police conducted a highway safety data collection effort focused on cellular telephone use during June 1996. The results of that project are not consistent with U.S. data in terms of driver actions and crash types, but they provide a useful basis for comparison.

Analysis of North Carolina Police Crash Report Narratives

To provide additional insight into factors associated with cellular telephone use that might be related to crashes, a detailed analysis of crash narratives was executed. Using the narrative portion of the police crash reports in the North Carolina database, an analysis related crash incidence to the number of cellular telephones (as a surrogate for use while driving) reported for each of several years.

The models built from that data indicated a statistically reliable increase in crash incidence with increased numbers of cellular phones over several years. However, this analysis involved a small amount of data from a single state and required several assumptions that must be validated. Moreover, predictions may suffer if the future differs from the past in terms of substantial changes in product design, patterns of cellular telephone use, distribution of cellular telephone users, availability and use of other services, and so on.

Several reasons are given for possible under-reporting and over-reporting of cellular telephone involvement in the crash narratives that may influence the interpretations and predictions of trends. The analysis therefore provides plausible but not conclusive evidence for a trend toward increased cellular telephone-related traffic mishaps as more and more drivers purchase such products and services.

Review of the Scientific Literature

A literature review was conducted of simulator, test track, on-road and epidemiological studies of cellular telephone use while driving. The simulator and test-track studies reviewed paint an interesting and fairly consistent picture. With respect to the dialing task, the studies suggest the following. When compared to driving alone, cellular telephone manual dialing can be disruptive of vehicle control activities like lanekeeping and speed maintenance. However, this disruption does not always appear, especially in closed-course environments. Voice dialing emulations generally support this feature as a desirable design goal.

Manual dialing is sometimes, but not always, found to be more disruptive than manually tuning a radio. Subjective assessments by test participants indicate that they are generally aware of the demanding nature of manually dialing a cellular telephone. Many studies report driver behavior that resembles attempts to compensate for such disruptive effects (e.g., by slowing down).

Voice communications, if sufficiently frequent and simple to perform, appear to enhance driving performance with fatigued drivers. Simple conversations appear to have little

impact on lanekeeping and speed maintenance, but sometimes affect driver situational awareness (e.g., increased reaction times, reduced mirror sampling). The relationship between the conversational materials used in these studies and the content of normal cellular telephone communications is unknown.

Based on the results of the on-the-road studies of cellular telephone use conducted to date, the following patterns arise. First, on-the-road disruptions by manual dialing to lanekeeping or speed maintenance, as compared to manual radio tuning, appear to be small to nonexistent. On the other hand, data indicate that both manual radio tuning and manual dialing can be disruptive to driving and crash data indicate radio tuning is itself associated with crash involvement.

The magnitude of visual attention demand while dialing is sometimes less than that associated with manual radio tuning, though at other times dialing may demand greater numbers of glances and total time the eyes are off the road. Driver situational awareness (as supported by mirror sampling) appears to be reduced, though some experimental evidence exists that this reduction occurs only under conditions where drivers judge it to be acceptable, i.e., quiet motor ways. Cognitively demanding voice communications appear to also increase driver brake reaction times, again indicating a reduction in situational awareness.

There is currently no way to determine how closely behavior in the simulator or test track would match behavior exhibited on the roadway other than to compare the two sets of results obtained with identical test materials and protocols. One comparison of on-road study results with those obtained in a part-task simulator using the same dialing and voice communications tasks and materials led to somewhat different results. In general, it appears that in those studies, professional heavy vehicle drivers allowed the driving task to deteriorate more in the simulator than they did on the road. This suggests that the consequences of primary driving task failure on the road provide an incentive to the drivers to maintain consistent performance while driving on public roads. This incentive can be difficult to adequately emulate in the simulator environment.

The conclusions to be drawn from assessments of the effects of hands-free voice communications tasks are less clear. On-road studies indicate that if the voice communications activities have any effects, they are on driver situational awareness and not on vehicle control performance per se. The simulator studies that show vehicle control disruption may reflect an experimental artifact, i.e., that drivers do not place as high a priority on the driving task in a simulator as they do on the road.

The literature review findings may be summarized as follows. Manual dialing can be disruptive of both vehicle control performance, and situational awareness and judgment. The incidence and magnitude of vehicle control disruption while driving on public roads appears to be less than that encountered in driving simulators or on test tracks, but may nonetheless pose a safety concern. On-road studies indicate that if hands-free voice communications activities have any detrimental effects, they are on driver situational awareness and not on vehicle control performance.

Discussion

The data and information discussed in this report cover a broad range of issues related to the safety of using cellular telephones while driving. It is clear that trends in both cellular technology and patterns of use described in this report have been shown to have both positive and negative implications for safety. It is also evident that significant deficiencies exist in available information and data that prevent a clear and conclusive determination of whether cellular telephone use while driving is a significant safety problem.

Nevertheless, there are some findings and issues that are fundamental to the question of the safety of using cellular telephones while driving. For example, driver inattention, a key outcome of driver distraction, has been implicated in many traffic crashes. While cellular telephones clearly have distraction potential, from many standpoints, such effects may be minimized if drivers are aware of the hazards, are judicious in their use of the technology, and if ergonomically sound cellular telephone designs are used. This highlights the important role the industry can play in consumer education and in ensuring that cellular telephone designs and in-vehicle applications are appropriately implemented.

Furthermore, while safety benefits of cellular telephone use are well recognized, they are not without drawbacks. Solutions must be sought to minimize the burden on emergency response centers from multiple reporting and non-emergency calls, which themselves may place drivers at greater risk.

The deficiencies in cellular telephone related crash data highlight the importance of developing improved data collection strategies. The discussion of these deficiencies points out the care that must be exercised in interpreting the data that is available.

Care must also be exercised in considering the impact of proposed solutions. Thus, while both hands free dialing and hands-free conversation may reduce the risk of a crash for the individual driver, by reducing such risk more drivers may be willing to use the cellular telephone while driving or may be willing to engage in longer conversations. To the extent that conversation itself contributes to risk, the overall impact may be a net loss in safety across the population of cellular telephone users.

A review of the research literature and, in particular, a survey of wireless technologies reveal that there were extensive differences between the various wireless communications devices in terms of design features that could influence ease-of-use and hence could potentially impact safety. These "human factors" aspects of the systems encompass specific design considerations related to the display, controls, size, shape, location and other features that can influence the operability of the devices in terms of the demands on the driver. To the extent that these design considerations can influence demands on the driver, it is suggested that industry attention to them may offer significant benefits in reducing risk associated with use of cellular telephone systems.

Finally, the rapid changes in cellular technology and the associated increase in functionality points out that solutions to today's safety issues may not address those of the future. Indeed, future trends, not only with regard to wireless communications, but also within the context of Intelligent Transportation System (ITS) technologies have the potential to overload the driver. NHTSA is specifically interested in possible synergistic effects of advanced in-vehicle technologies that may impact on highway safety. Such synergistic effects may impact either negatively or positively on safety. A safety-negative impact might arise, for

example, if cellular telephone use combined with use of an electronic route guidance system while driving proves too demanding for the driver to handle. On the other hand, a safety-positive synergy might arise between, say, cellular telephone use and a crash avoidance system that alerts the driver to possible crash risks that might arise while the driver is on the telephone. Little is currently known about the synergistic effects of advanced in-vehicle systems on highway safety. NHTSA thus considers it important to develop a better understanding of safety risks that might arise with use of advanced in-vehicle technologies, used both singly and in combination, while driving. NHTSA also seeks to identify opportunities to capitalize on crash avoidance systems that promote the safe use of other in-vehicle technologies that enhance travel efficiency, safety, and satisfaction. Thus, the importance of ergonomic considerations in the design and integration of all in-vehicle technologies must be considered of paramount importance.

What conclusions can be drawn, given the available data? The cogency of a conclusion depends on the adequacy of evidence, the degree to which the conclusion logically follows from the evidence, and the degree to which no relevant information has been omitted from consideration. These three points will be considered for each of the following key questions:

- Does use of cellular telephone technology while driving increase the risk of a crash?
- What is the magnitude of the traffic safety problem related to cellular telephone use while driving?
- Will crashes likely increase with increasing numbers of users of cellular telephone technology in the fleet?
- What are the options for enhancing the safe use of cellular telephones by drivers?

Does cellular telephone use while driving increase the risk of a crash?

The available evidence is adequate to support the conclusion that the answer to this question is "Yes," at least in isolated cases. The conclusion appears reasonably plausible, particularly in light of the trends in the data, the growing complexity of the technology, and the inherent distraction potential of using such devices from a moving vehicle. What remains unknown is the relative contribution of cellular phone use, per se, and characteristics of the involved drivers (e.g., less capacity to time-share attention between cellular telephone use and driving tasks, greater propensity for risk taking, fatigue).

What is the magnitude of the traffic safety problem related to cellular telephone use while driving?

The data reviewed here are inconclusive as to the magnitude of the problem. Cellular telephone use while driving is currently inadequately reported in crash records. As a result, the data that could serve as a basis for determining the magnitude of the crash problem do not exist. The lack of data cannot be interpreted to mean that there is no problem of sufficient magnitude to warrant action. The trends in the available data reviewed in this report, the growing complexity of the technology and the sensitivity of political and societal considerations, only serve to reinforce the need to collect more comprehensive and accurate

data. In the recommendations that follow various approaches are proposed for enhancing the availability and quality of the data to support a more accurate determination of the magnitude of the problem.

Will crashes likely increase with increasing numbers of cellular telephones in the fleet?

Again, the answer is "Yes", if the North Carolina data and modeling results are any indication. The adequacy of that data and modeling results are modest at best. The logical strength of the statistical predictions depends on the representativeness of the data sample to the country as a whole and the adequacy of assumptions behind the model (e.g., national cellular telephone counts as a surrogate for frequency of cellular telephone use while driving). Extrapolation from statistical models assumes that the future will be like the past. It is evident that cellular telephone designs are evolving and cellular telephone usage patterns will change over time.

The ultimate impact of these changes on crashes cannot be predicted with great confidence. Thus, the answer to the question is less cogent than the answer given to the first question, and has been duly qualified in this report. Nonetheless, it logically follows from the above that if more cellular telephones are in use, then there will be more opportunity for distraction and, hence, there will likely be an increase in related crashes - unless, of course, changes take place in the technology or its use that mitigates such a trend.

What are the options for enhancing the safe use of cellular telephones by drivers?

People in general are finding it harder and harder to keep up with all of the tasks and activities for which they are responsible. American motorists in particular spend substantial amounts of their day in automobiles, vans, trucks, and buses. It is not surprising that people will attempt to optimize their time in the vehicle by doing other things. It is unrealistic and ill-advised to suppose that drivers should have no advanced in-vehicle information systems at their disposal. A number of intelligent transportation system (ITS) initiatives intended to improve the highway safety and efficiency, are, in fact, focusing on increasing such information availability. These initiatives, however, have heightened NHTSA concern over possible synergistic effects of the various technologies that might increase driver workload beyond acceptable levels.

Goals, then, should include making in-vehicle information systems, including cellular telephone technology, as compatible with safe driving as the state-of-the-art allows through the application of good engineering and human factors design practice, and educating drivers about the potential risks associated with using this technology while driving. This must be done while addressing possible adverse safety implications for the population as a whole.

Recommendations

The National Highway Traffic Safety Administration's mission is to save lives, prevent injuries, and reduce traffic-related health care and other economic costs. The Agency develops, promotes, and implements effective educational, engineering (including human factors engineering), and enforcement programs to prevent or mitigate motor vehicle crashes and reduce economic costs associated with vehicle use and highway travel. It is therefore appropriate that this report concludes with a set of recommendations on promoting the evolution and use of cellular telephone technology that is safe for use while driving.

Improved Data Collection and Reporting

- States are encouraged to record the use of a cellular telephone during a crash as part of the normal crash investigation process. This reporting may be accomplished through an expanded set of minimum standard crash data elements being developed by NHTSA and FHWA as enhancements to the Critical Automated Data Reporting Elements (CADRE). This enhanced reporting would greatly improve the ability to characterize the magnitude and nature of any traffic safety problems associated with cellular telephone use while driving.
- Information regarding cellular telephone use and crash involvement should be incorporated into telephone surveys. This data gathering could be achieved through the Motor Vehicle Occupant Safety Survey conducted periodically for NHTSA. This survey work could augment crash reporting by the States to provide additional data on public perceptions of and non-crash-related experiences with cellular telephone technology in automobiles over time.
- Law enforcement officers are encouraged to note cellular telephone use on warnings or citations for moving violations, such as speeding or reckless operation of a vehicle. Such information is distinct from police crash reports (PCRs) because no crash occurred. This type of information might be used to characterize driver-vehicle behavior and performance that serve as "distraction indicators." These indicators and their frequency of occurrence might eventually be used to develop a model that uses safety-relevant indicators to predict cellular telephone-related crash rates.

Improved Consumer Education

- Educational materials should be developed and disseminated to educate the driving public on the hazards of driving while distracted during cellular telephone use. These

materials would inform drivers of the subtle influences of cellular telephone use while driving (e.g., loss of situational awareness even though lanekeeping is good). ~~They could illustrate driving conditions where cellular telephone use is particularly~~ ill-advised. Cellular telephone etiquette could be taught that provides guidance on how to politely refuse, postpone, or abruptly halt a conversation when driving conditions demand it. Drivers could be taught to recognize signs of "attentional impairment" in other drivers as part of defensive driving. Consumers might be given information on cellular telephone design features that may make them easier or harder to use. Consumers could be sensitized to issues of cellular telephone technology installation or placement, and crashworthiness (e.g., as it may interfere with a deploying airbag). These types of educational and outreach materials would sensitize the driving public to issues of distraction while driving and provide them with useful strategies to cope with such hazards.

Improved Cellular Telephone Research and Development

- It is recommended that research be conducted using the National Advanced Driving Simulator (NADS) and instrumented vehicles to better understand naturalistic driver behavior while using a cellular telephone. Insights into the circumstances of call initiation, call frequency, call length, and call content would be of great benefit to formulate more realistic test protocols for cellular telephone research and product evaluation.
- Human factors research should be directed to determine workload-reducing design features of cellular telephones. Some types of cellular telephones appear easier or harder to use than others based upon size, shape, configuration, visual display attributes, and data entry mechanisms and logic (see Appendix F). Human factors research results could be provided to manufacturers in the form of ergonomic design guidelines. The results could also be provided to consumers to better inform them during product selection. Preliminary guidelines exist for cellular telephones (e.g., Green, Levison, Paelke, and Serafin, 1995), but more research is required to better understand and define the impact different design choices have on a driver while the vehicle is in motion.
- It is recommended that development of "intelligent answerphone" technology be pursued for use in the automotive context. Parkes (1993) introduced the concept of an "intelligent answerphone" as a system that would divert, record, and interrupt messages appropriately based on sensed driving conditions. The development of such a system goes far beyond anything the authors are aware of that the cellular telephone industry has marketed or reported on to date. Such advanced concepts would likely require some of the same sensed information as that being developed in the Intelligent Transportation System (ITS) initiative. Thus, this recommendation would

fit well within a broader effort to integrate ITS systems (route guidance systems, crash avoidance systems, collision notification systems) with cellular phone technology.

Emergency Services

- Multiple calls for the same incident can overwhelm an emergency service line and actually slow an emergency services response. It is recommended that appropriate federal and state agencies, representatives of the Cellular Telecommunications Industry Association (CTIA) and other wireless communications associations, and national organizations representing Emergency Services examine and evaluate potential solutions to this problem. Planning of cooperative efforts are already under way.
- It is recommended that a nationwide standard emergency number be created so that travelers would always know a unique cellular telephone emergency number regardless of their location. Several states have already developed specific emergency phone numbers to be used exclusively by cellular subscribers (e.g., "#77" or "*FHP"). A nationwide standard would require cooperation among cellular telephone manufacturers, the states, and the Federal Communications Commission (FCC). Cooperative action has already begun which includes FCC rules enabling cellular telephone access to all land line response centers. NHTSA is currently working with government and industry groups to develop a unique nationwide cellular emergency response number.

Enforcement, Legislative Options, and Cost-Benefit Analysis

- As discussed in detail in this report, it is unlawful to driver recklessly in all states in the U.S. and a number of states have laws on their books that prohibit careless and inattentive driving. States are encouraged to actively enforce their reckless and inattentive driving laws, regardless of the causes of such behavior. When law enforcement officers observe reckless or inattentive driving associated with cellular telephone use, this should be noted on the citation or warning (see previous recommendations on this point). States without inattentive driving laws should consider enacting such provisions.
- The complexity of the issues, along with the inconclusive nature of empirical evidence pointing to a cellular telephone related traffic safety problem, suggests caution in formulating and implementing legislation restricting the use of cellular telephones at this time. Legislative proposals have been introduced in some States that prohibit the use of cellular telephones that require the driver to manually operate or hold the phone. These legislative initiatives seem to be based on the assumption

that hands-free cellular telephones are acceptable while driving, but hand-held cellular telephones are not. Hands-free designs should reduce the demands on the driver associated with dialing, holding, reaching for or picking a handset. This in itself might be seen as a clear and unequivocal safety gain. However, hands-free designs will do nothing to mitigate the distraction potential of cellular telephone conversation. Proposed legislation may inadvertently promote greater use of cellular telephones among drivers who currently limit or altogether avoid cellular telephone use while driving by implying that hands-free designs must be safe, thus increasing exposure to other potential risks that may still exist.

- An effort should be initiated to examine the cost-benefit trade-offs of legislative actions related to cellular telephone use while driving. Potential costs of unrestricted cellular telephone use may include those associated with distraction-induced crashes and degraded driving performance. On the other hand, benefits of unrestricted cellular telephone use include more efficient use of commuting time, emergency service notification capability, and the conveniences attendant to closer communications with family, business, and community.
- Costs of legislative restrictions may result in a need to invest in more expensive and sophisticated cellular equipment, restricted access while driving to otherwise desirable features, unforeseen secondary consequences (e.g., increased exposure to other safety hazards), and enforcement costs. Potential benefits of empirically grounded legislation would include savings in personal injury, property damage, and crash-caused congestion (delay) costs. An effort to codify and represent the costs and benefits of alternative legislative actions, would support more informed decision making.

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