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Status Report

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Children In Crashes: A Special Issue

This issue of *Status Report* is devoted to coverage of several current activities involving hazards to children in motor vehicle crashes – and especially, hazards to unrestrained children. The focus of this issue is particularly timely in light of Department of Transportation rulemaking to bring about better performance of child restraints in crashes, as well as indications of increasing state interest in passing laws to require that children in motor vehicles be protected by safety belts or other restraints. A number of additional copies of this issue of *Status Report* are available, at no charge, on request by writing to the Institute.

NHTSA Sponsors Regional Restraint Workshops

The first of a series of 10 regional child-restraint workshops, designed to marshal grassroots support for increased protection for children in cars, will be held by the National Highway Traffic Safety Administration (NHTSA) in Atlanta in March.

Citing the small number of children who are adequately protected by child restraints today (see *Status Report,* Vol. 13, No. 5, April 12, 1978), W. Burleigh Seaver, program coordinator from NHTSA's Office of Traffic Safety Programs, told *Status Report* that NHTSA hopes to show leaders of interested local organizations how they can better inform parents and legislators of the dangers facing unrestrained children. Further, he said, the workshops will give NHTSA the opportunity to provide groups with current data and information on techniques to increase the use of restraints by children, as well as provide a forum for leading proponents of child protection to exchange ideas and discuss new approaches to the issue.

Joan Claybrook, NHTSA administrator, emphasized the nature of the problem last year when announcing new standards for restraint devices: "What happens to small children who are unrestrained in a crash is that they literally become flying missiles. All we can do is to issue a standard which will make sure these devices are properly constructed, but the important thing is that they be used."

The format for the workshops will be "highly interactive," explained Seaver. The 35 invited participants at each workshop will be led by a team of workers from the Highway Safety Research Center of the

(Cont'd on page 2)

NHTSA Sponsors Regional Restraint Workshops *(Cont'd from page 1)*

University of North Carolina, who will initiate presentation and discussion of a broad range of topics concerning child safety in cars. The three principal types of information NHTSA seeks to convey to participants are:

- ***Technical.*** That is, to give participants the facts on how child restraints perform, their benefits, and how to use them effectively.

- ***Distributional.*** This area will focus on how to increase the availability and voluntary use of child restraints. It will include questions concerning how to reach and educate parents to restrain their children, and how to distribute restraint devices in the community so that they are easily available to consumers.

- ***Legislative.*** NHTSA wants to provide needed information about child restraint legislation that will allow local groups to ensure that intelligent and effective laws are enacted. Model legislation will be provided, and potentially dangerous loopholes in laws, such as the exemption in Tennessee's law for a child held in an adult's lap, will be explained. (See *Status Report*, Vol. 13, No. 7, May 31, 1978).

In discussing potential state legislation and regulatory action, Seaver stressed that NHTSA is seeking to "show people what they might do to inform their state legislatures and regulatory agencies what they might do to increase child safety."

Among the individuals invited to participate in the workshops will be representatives of groups that have indicated an interest in automotive safety for children, such as hospital and medical auxiliaries, Jaycettes, childbirth education groups, women's clubs, and church groups, he said. State legislators who have shown concern for the problem of unrestrained children will also be asked to participate.

The Atlanta workshop, for which invitations were sent out in early February, will be on March 21-22. It will be followed by meetings in Philadelphia, April 23-24; Newark, April 26-27; San Antonio, May 14-15; Kansas City, Mo., May 17-18; Denver, June 4-5; Chicago, June 7-8; Seattle, June 21-22; and Berkeley, June 25-26. The date for the national meeting in Washington is yet to be set.

Child Restraint Rule Changes Expected This Summer

Rules that would require dynamic crash testing of child restraints at speeds up to 30 mph, using test dummies of standard specifications, are expected to be issued this summer, a National Highway Traffic Safety Administration (NHTSA) official has told *Status Report*.

Vladislav Radovich, of the Office of Vehicle Safety Standards, told *Status Report* that the agency is currently reviewing comments on the proposed rulemaking and conducting its own test programs on various child restraint systems. He said the agency hopes to issue the new rules sometime in midsummer.

The official comment period expired January 5. However, Radovich indicated the agency will continue to review any additional comments concerning both the proposed test dummies or the dynamic crash tests, received by the agency through mid-April.

In an announcement of proposed rulemaking on child restraints issued last May (see *Status Report*, Vol. 13, No. 7, May 31, 1978), NHTSA said the new rules would:

- Amend the existing child restraint standard to cover previously unregulated car beds and infant carriers, as well as car seats and child harnesses. *(Cont'd on page 3)*

- Require systems to undergo 30 mph frontal crash tests when installed according to manufacturer specifications.

- Require restraints equipped with tethers to undergo additional crash testing in 20 mph frontal impacts with the restraint secured only by a lap belt, since surveys have revealed that parents use the tethers only about half the time.

- Stiffen labeling requirements so that size and weight limitations would be listed, along with information on the correct use of the restraint.

The proposed rules have drawn a heavy response from the public, with consumer groups voicing particularly strenuous objections to the crash-test requirements for restraints equipped with tethers, which must be installed according to manufacturer specifications in order to perform properly in crashes. Calling it a "double standard," commenters have asked NHTSA to require all restraints to protect children and infants in 30 mph crashes when secured only by a lap belt, while at least one manufacturer asked for an overall reduction in the dynamic test requirement from 30 mph to 20 mph. (See *Status Report*, Vol. 14, No. 1, Jan. 9, 1979.)

Others asked NHTSA to require that lap-type belts be installed in all cars equipped with passive belt systems, in order to permit parents to secure child restraints in the front-seat position. And one child-restraint manufacturer noted that inertia-reel one-piece lap/shoulder belt combinations with sliding buckle tongue assemblies provide "give" for adult passenger comfort, but fail to hold child restraints securely on sharp curves or in panic stop situations.

Growing Number Of States Study Child-Restraint Bills

Although only one state now has a child-restraint law in force, proposed bills for such legislation already have been introduced in 11 states this year and are expected to be filed in at least 7 more states.

This surge of interest in child passenger protection laws has been shown in a survey of state legislatures by the Highway Users Foundation. The interest, coupled with the push for new rulemaking on child restraints by the National Highway Traffic Safety Administration (NHTSA), indicate the new urgency with which the problems of protecting young automobile passengers are being regarded across the nation.

As of February 22, legislation was reported filed in the following states: Colorado, Connecticut, Delaware, Maryland, Massachusetts, North Carolina, North Dakota, Oregon, Rhode Island, Washington, and West Virginia.

(Cont'd on page 4)

Hearing To Reconsider Bumper Standards

The issue of current federal bumper standards, and in particular an attempt by a bumper manufacturer to have Congress substantially weaken those standards, will be taken up March 27, the first day of a two-day Senate hearing. The hearings by the Consumer Subcommittee of the Senate Committee on Commerce, Science, and Transportation will deal with oversight of the National Highway Traffic Safety Administration.

The hearings, to be chaired by Sen. Wendell H. Ford (D.-Ky.), will open at 9 a.m. each day in Room 5110 of the Dirksen Senate Office Building.

Growing Number Of States Study Child Restraint Bills *(Cont'd from page 3)*

In addition, bills were expected to be introduced in California, Florida, Iowa, Michigan, New Hampshire, New York, and Wisconsin.

Only Tennessee now has a child-restraint law. Adopted after two years of hearings and committee study, it became effective Jan. 1, 1978, applying to all child auto passengers under four years of age. (See *Status Report* Vol. 13, No. 7, May 31, 1978.) The Tennessee law has been criticized for permitting children to be held in older occupants' arms as an alternative to being restrained in a federally approved safety device. (See story on page 6.)

NHTSA officials have encouraged state legislative action on the child-restraint issue. In a new issue paper, NHTSA notes that young children are especially vulnerable to crash injury and "their vulnerability can be reduced only by responsible adult action." States are encouraged to require the proper installation and use of child restraint devices that conform to federal motor vehicle safety standards. (Copies of the NHTSA issue paper on child restraints, DOT HS-803 819, are available by writing NHTSA, General Services Division, NAD-42, 400 Seventh St., S.W., Washington, D.C. 20590.)

A View Of The Child Protection Issue

In response to an inquiry from a state motor vehicle administrator, Ben Kelley, senior vice president of the Insurance Institute for Highway Safety, recently offered the following thoughts:

> I am responding to your letter of January 4 asking for the Institute's views on elements that should be included in an effective law dealing with child restraint use, as well as for whatever information we may have on the subject of children in crashes.
>
> The Institute does not involve itself with the drafting of legislation. However, we have looked quite comprehensively, in a number of studies, at the problems of child death and injury in motor vehicle crashes, as well as at attempts to increase restraint use both by mandatory and voluntary means.
>
> I am happy to pass along to you the results of that work, along with our views as to the elements that must go into any mandatory approach to effectively, substantially increase the levels of protection assured to children who ride in—and, by the millions each year, are in crashes of— motor vehicles. (The issue goes far beyond that of "child restraints," a term commonly used to describe specially-designed seats or harnesses for child occupants in motor vehicles. It is in fact an issue of *child protection*, and that is how we increasingly think of it at the Institute.) . . .
>
> In brief, the enclosed work makes clear that:
>
> 1. More than 90 percent of children are riding about in automobiles *without* the protection of properly-attached safety belts or child restraint systems. Even more startling, some of these children are traveling in cars in which *adult* drivers and passengers *are* wearing their belts—in other words, they are traveling with adults who apparently know the value of belt use yet deny such protection to children!
>
> 2. Efforts to increase child restraint use through exhortation, education, and such incentives as the provision of child restraint systems at no cost or reduced cost have failed to produce significant or sustained increases in use levels.
>
> 3. Virtually every automobile in the United States today is equipped with at least lap safety belts in at least some seating positions. In addition, there are on the market (for those who can afford them and know their value) child restraint systems meeting U.S. Department of Transportation performance standards.

(Cont'd on page 5)

4. The data are clear that children who are *wearing safety belts* or using DOT-approved child restraint systems, and children *who are in the back seats* of automobiles, are far less likely to be killed or injured in crashes than otherwise, *whatever* the age or size of the child.

5. The holding of children on the laps of adults in automobiles is a hazardous practice which should be precluded rather than encouraged. A severe and possibly fatal flaw in the "child restraint" legislation passed in Tennessee last year is that it permits exemptions for children in laps. As recently-conducted tests—films of which we would be happy to show you—make clear, adults are not strong enough to restrain a child in arms in even a moderate-speed impact. Moreover, an unrestrained adult holding a child will become, in a forward crash, a crushing, injury-enhancing force against the child's body.

The elements of an effective law to protect children in crashes are made clear by the above findings. They are as follows:

— At a minimum, any child able to sit up unassisted—that is, older than about one year old—riding in a motor vehicle should be required to be buckled up in an available safety belt. (Children younger than one year old should be required to be transported in a suitable infant carrier. The U.S. Department of Transportation has announced plans to issue performance standards for such carriers in the near future.)

— In addition, any child passenger in an automobile should be required to ride in a rear seating position, buckled up, unless other children already are occupying all of the rear-seat positions. An exception should be permitted only when the available rear seating position has no belt or DOT-approved child restraint and an available front seating position does have a belt or DOT-approved child restraint system.

— Over and above these minimum requirements, adults should be encouraged to provide additional protection for children riding in cars, in the form of DOT-approved child restraint systems. When such a system is employed, it should be required that the system be attached according to the manufacturer's instructions.

Restraint Systems For Handicapped Children Found Wanting

Tests conducted at the Highway Safety Research Institute of the University of Michigan have shown "the ineffectiveness of many of the currently used restraint systems for protecting handicapped children in school bus collisions," researchers have reported.

"It is quite apparent," the researchers said, "that most devices and procedures have not been adequately impact tested and that the designers of these restraints have little understanding of basic crashworthiness design concepts. The protection of handicapped children involves special problems and considerations not encountered in designing to protect the non-handicapped, but some basic guidelines still apply, such as preventing head contact with hard surfaces by upper-torso restraint, distributing the loads over the skeletal structures as much as possible, and seating occupants in forward-facing positions when possible."

The researchers presented their report to the Society of Automotive Engineers at its recent meeting in Detroit. With the recent enactment of P.L. 94-142, which mandates educational opportunities for handicapped children, one researcher noted, there will be increasing emphasis on the transportation of the handicapped to and from school.

The researchers placed the devices they tested in two basic categories, those with wheelchairs and wheelchair restraints, and those restraints designed to protect children in bus seats, such as harnesses and vests.

The researchers reported that the "padded belt commonly used for restraining children in wheelchairs is also inadequate by itself and should only be used with additional thorax and pelvic restraint." In

(Cont'd on page 6)

Restraint Systems For Handicapped Children Found Wanting *(Cont'd from page 5)*

addition, they found the common practice of placing wheelchairs in side-facing positions in transport vehicles especially dangerous.

They noted that under FMVSS 222, all school buses manufactured after April 1978 are required to have forward-facing seats only. That principle, they said, "should also be applied to the transport of the handicapped, whether or not school bus seats are used."

Tests showed other devices used to restrain handicapped children in bus seats were ineffective, with the exception of the Ford Tot Guard, which "can be an excellent restraint if it is secured by a belt fastened to the bus seat structure and if the child is not too large" for the restraint.

Typically, the other restraint devices commonly used, including harnesses and a vest, were found to distribute the crash forces over a child's vulnerable abdomen, rather than the pelvic region. According to the researchers, the child would "probably be protected more by a simple lap belt, which would tend to keep the forces lower on the pelvis and less on the abdomen."

Copies of the paper, "Impact Sled Test Evaluation of Restraint Systems Used in Transportation of Handicapped Children," by Lawrence W. Schneider, John W. Melvin, and C. Ernest Cooney, are available through the SAE Technical Paper Series, Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096

Research Tests Indicate Hazards Of On-Lap Travel

Child restraint experts have agreed on the dangers of on-lap travel for small children, but in part there have been no data to support their opinions. Now, a research project supported by the Insurance Institute for Highway Safety has shown that it is not possible for adults to adequately restrain children in their laps by holding on to them.

Dinesh Mohan, a member of the Institute research staff when the project was carried out, and Lawrence W. Schneider of the Highway Safety Research Institute at the University of Michigan, have reported on tests conducted to measure the ability of adults to hold on their laps a 7.9 kilogram (17.4 lbs.) infant dummy – representing a six-month-old child.

"The results indicate that the forces that lap-and-shoulder-belted adults can exert in holding an infant dummy in their laps are far less than the inertial force that would be exerted by a 7.9 kg infant decelerated at more than 30 G's," the researchers reported. "Thus in a motor vehicle frontal barrier crash at 50 km/hr, an infant even when held tightly by a restrained adult would almost certainly strike the dash or windshield."

To test the adult clasping strength the researchers belted their adult test subjects snugly to a rigidly fixed automobile bench seat. In a series of tests they measured the subjects' ability to hold on to a grasping bar being pulled away by a cable, and their ability to clasp an infant dummy against varying types of force.

The issue of on-lap travel has become particularly important since the adoption of Tennessee's child restraint law, which permits adults to hold children under four years of age on their laps as an alternative to the use of a proper restraint system. (See story on page 3.) Mohan and Schneider said that studies have indicated this practice is "potentially lethal."

"If the adult is unrestrained the child is likely to be impacted on one side by the vehicle interior and on the opposite side by the adult," the researchers explained. "Thus, the crushing injuries can be greater

(Cont'd on page 7)

than if the child were seated alone and unrestrained. Even if the adult is restrained by a lap and shoulder belt it is unlikely that the child would be protected from impacting the vehicle interior."

The researchers said similar dangers exist for a lap-held infant in airplanes, in crash or turbulence situations. "Until automatic, built-in protection is routinely provided, it is very important that children be adequately restrained when transported in motor vehicles and airplanes," the researchers concluded.

Copies of the research report, "An Evaluation of Adult Clasping Strength for Restraining Lap-Held Infants," may be obtained from the Insurance Institute for Highway Safety, Watergate 600, Washington, D.C. 20037.

School Bus Flammability To Be Reviewed

Saying that "the subject of flammability of transportation vehicles is an ever present concern with the Department," Transportation Secretary Brock Adams has ordered a review of flammability standards for materials used in school bus interiors.

In a memorandum to Joan Claybrook, head of the National Highway Traffic Safety Administration (NHTSA), Adams cited a 1975 National Transportation Safety Board recommendation calling for a tougher flammability standard in all vehicles. Adams told NHTSA to work with the Urban Mass Transportation Administration (UMTA) "to develop an ANPRM (advance notice of proposed rulemaking) to obtain views and information regarding flammability of interior materials used in school buses, leading to a further rule if appropriate."

SUBWAY FIRE SPARKS INQUIRY

Adams' concern about fire safety in school buses and other vehicles apparently has stemmed from discussion of the hazards of polyurethane, a flammable foam plastic frequently used in vehicle seat backs and cushions. Polyurethane cushioning was blamed for a January 17 subway fire in San Francisco that resulted in the death of one fire fighter, injured 40 persons, and destroyed five cars belonging to the Bay Area Transit System.

A UMTA official told *Status Report* that the mass transit agency currently requires the use of neoprene, a self-extinguishing foam plastic, in all federally funded mass-transit vehicles. However, a NHTSA spokesman said that agency cannot legally prescribe that a particular material be used. Instead, the agency requires interior materials used in school buses and other vehicles to meet a horizontal burn rate test of no more than 4 inches per minute under FMVSS 302, the agency's flammability standard. That burn rate, according to NHTSA, was designed to allow vehicle occupants enough time to escape a burning vehicle. While polyurethane is able to meet the horizontal burn test required by the standard, some types of the plastic, when tested with a flame held at the bottom of a vertical surface, will burn with almost explosive rapidity.

According to the NHTSA spokesman, state transportation agencies could require the use of neoprene in school bus seat cushions and backs, but most have opted for the cheaper polyurethane. Both NHTSA and UMTA officials estimated that outfitting new school buses with neoprene cushions would cost about $700 more than school buses equipped with polyurethane seat cushioning.

In his February 27 memo, Adams said he would establish a departmental fire safety coordinating committee chaired by the Office of Environment and Safety to coordinate activities.

Adams also asked NHTSA for a summary of current training procedures for school bus operators regarding emergency evacuation procedures by March 30.

Unsafe at Any Age? Children and Car Safety

Automobile accidents are the No. 1 threat to our children's lives. And most of these deaths are preventable. Here's a surprising report on how you can keep accidents from becoming tragedies.

By Stewart Alter

Imagine a world in which children were required to walk along a ledge three stories above the ground each day on their way to school. For most of us, that idea, let alone that sight, would inspire panic. At the very least, we would insist that the ledges be built with railings to keep the children from falling. We would also want each child to wear protective padding and would insist that the pavement below be redesigned and padded to minimize the impact of any falls that did occur.

Sounds farfetched? In a way, it's not. The impact of a fall from that height is equal to the force of an auto crash at 30 miles per hour, a presumably safe speed. Yet the overwhelming majority of children (as well as adults) riding in cars are neither properly restrained nor protected, and the cars themselves do not provide adequate protection against crash injuries and death.

The dangers of a child's riding unrestrained in a car are not as obvious as those of walking along a three-story-high ledge, but they are just as real and much more relevant.

Motor-vehicle crashes are the No. 1 cause of death for children over the age of one. According to the Chicago-based National Safety Council (NSC), 1,500 children under five died in motor-vehicle related accidents and 70,000 suffered disabling injuries in 1977. (Both of these figures include accidents involving children as pedestrians and cyclists.) Of the 1,500 who died, 910 were riding in cars.

Among children five through fourteen, there were 3,200 motor-vehicle-related deaths and 170,000 disabling injuries in 1977, according to NSC figures. Of those 3,200 children who were killed, 1,340 were automobile passengers.

Be prepared!

There are a thousand rationalizations—drunk drivers, reckless teenagers, and the like—that can be conjured up to try to explain away those alarming statistics. But the fact is that accidents involving young children generally occur under the "safest" of conditions.

A study done several years ago by Ray M. Shortridge and James O'Day of the University of Michigan's Highway Safety Research Institute, based on accident data from Texas, Seattle, and a national sample, reached the following conclusion: "When a small child (five years and younger) was involved as the passenger of a crashed car, the driver was most likely to be a 20-35 year old female, and the crash was most likely to occur in the daylight hours. Few drivers with small children had been drinking, and few drivers with small children were wearing available restraint systems."

The importance of restraining a child properly

Stewart Alter is an associate editor of *Parents Magazine.*

The "No Excuses" Safety Guide

It isn't necessarily going to be easy, but the bottom line is "Don't let your child ride unrestrained in a car!" So don't start the car until your child is buckled in. If he resists, summon up the same resolution that you would use if you were teaching him not to play with fire.

- The best protection for a child under five years old is a specially designed child-restraint device or infant carrier. To give a newborn extra support and comfort in an infant carrier, you can cushion his head and shoulders with a rolled-up receiving blanket.

- You don't have a special restraint device for your child? That's not a good excuse. But let's, for the moment, concede that you're driving a rented car and you've left your child's restraint device at home. Now what should you do? What you shouldn't do is hold the child in your arms. If you do have a collision, you won't be able to hold him, and you may crush him with the force of your own body if you're thrown forward. For one thing, the backseat is safer than the front seat, even if the child is properly restrained. The middle of the backseat is the best location. If you have to use a lap belt for a small child (and restraint with a lap belt is better than no restraint at all), position it across the top of the child's thighs.

- Don't strap two children into one belt and don't strap a child into a belt with an adult.

- Children should not be allowed to ride while kneeling on the front seat, nor should they be allowed to ride in the cargo area of a station wagon or in the back of an open truck.

- If children get restless on long trips, don't let them slip out of their restraints. Stop the car, move well off the highway, and let them out to stretch.

- It's best to start your child off in restraints as an infant so he gets used to riding safely. But it's never too late to start. If you use a seat belt yourself, you will set a good example. If your child is already a toddler, give him his first belted seat as a present and not as a punishment. Tell him you have something special for him (which is true, after all!). Let him play astronaut as he buckles up. He can become very proud of the fact that he can buckle up by himself.

in an auto becomes more clear when one understands the enormous forces that come into play in a crash. After a car collides, the passengers in the car begin to move toward the point of collision within a fraction of a second. A 15-pound infant in a 20-mile-an-hour collision, for example, would be flung at the force of 300 pounds. Consequently, holding a child on your lap and in your arms will not protect the child because your hold will be broken by the enormous force at which the child is thrown. You also will be thrown in the same direction as the child, which means there is the added risk of crushing him with your own weight.

Injuries and deaths resulting from passengers in the same car colliding with each other are also frequent, and that can include passengers from the backseat being thrown into passengers in the front seat. Besides occupant-to-occupant injuries, crash passengers are also thrown against various parts of the interior of the vehicle.

The most common injuries to children under age ten in car crashes involve the head, face, and neck area, according to a study of crashes in Michigan done by John W. Melvin and Richard L. Stalnaker of the University of Michigan's Highway Safety Research Institute, and Dinesh Mohan of the Insurance Institute for Highway Safety.

The study concludes that, "the most common sources of these injuries were the instrument panel and the back of the front seat." The study also showed that, "interior surfaces that may not be impacted very frequently by adult heads and faces can be impacted by those of children." Because of federal adult-size-oriented test procedures, it is only the upper part of the dashboard that requires padding, not the lower portion, which children have a greater chance of hitting.

While noting that, "the use of child restraint systems or adult restraints for children under the age of ten years is relatively uncommon" (only 4.7 percent usage, of which only a third were used correctly), the study says that, "Both adult seat belts and child restraints (when used) were found to be effective in reducing injuries in crashes."

(Cont'd on page 10)

Unsafe At Any Age? Children And Car Safety *(Cont'd from page 9)*

The life you save may be your child's.

The effectiveness of using restraints has been well documented. A study of crashes done in Washington state by Dr. Robert G. Scherz, for example, concludes that, "The difference between deaths and disabling injuries between the restrained and unrestrained pre-school children was highly significant. If all of the children in the 0-5 age group had been restrained at the time of the accident, then the . . . deaths may have been reduced from 124 to 13 (down 90%) and disabling injuries reduced from 716 to 238."

Despite the protection they offer, however, child restraints are not only infrequently used, but are generally used incorrectly. Allan F. Williams, of the Insurance Institute for Highway Safety, found in a study of 5,050 cars with at least one passenger under ten years old that 93 percent of those under-ten passengers were not restrained. Also, 16 percent of motor-vehicle child-restraint devices observed were not used, and 73 percent of those in use were not used correctly. The usage of these potential lifesavers declined sharply after age one. But, perhaps more startling, he found that, "Although child passengers were more likely to be restrained if the driver was restrained, more than 75% of the children were not restrained when the driver was, even if the driver was the child's parent."

Why aren't child-restraint systems used? And why, when they are used, are they so often used improperly? One can only guess at the reasons: the cost of buying them, the difficulty of using them, the thought that "accidents happen to other people."

"I would ask parents, 'What are you using a car seat for?'" says Annemarie Shelness, executive director of Physicians for Automotive Safety. Car seats for children have been around for a long time, she observes, but their purposes have been other than crash-injury protection.

Little folks need little seats.

In the past, seats have been used to elevate children so they can look out the window, to hold them steady or support them in the case of sudden stops or swerves, or to keep them from interfering with the driver.

"Now, though, we're in a different concept of safety," Shelness says, "and most parents don't understand what it's about." Seats are still purchased based on elevation, comfort, easy-to-clean features, and the like. "But this is not giving a child the protection that an adult gets from a lap-and-shoulder-combination seat belt," she says.

Those child-restraint devices, which are designed to be used for children up to about four years old, weighing up to 40 or 50 pounds, fall into four basic types: an infant carrier, a protective shield, a traditional car seat, and a safety harness. All of the buckles and straps, including the top-anchorage strap that people frequently don't use, must be secured for the safety of the child.

If no child-restraint device is available, then small children should be made to use regular lap seat belts with the seat belt across the top of the child's thighs. Older children should use both the lap and shoulder straps. It is also safer to sit in the backseat than the front seat, even if restrained, and the middle of the backseat is the safest location.

While regular seat-belt restraint is better than no restraint at all, the first and best choice for a small child is a child-restraint device because it is designed to meet his special needs in a crash.

"The biggest problem we find is to get people who use these restraints to use them correctly," says Deborah Richards, chairman of Action for Child Transportation Safety (ACTS). "They don't understand why it has to be so complicated. But these restraint systems are made this way for a specific reason, not just to confound the parent," she says.

One of the special problems a small child faces in a crash, apart from the fact that his body is simply not as well developed as an adult's, is that his head is heavier in relation to the weight of his body. Also, his center of gravity is higher, and he does not have long, heavy adult legs as anchors, so it is easier for a child to be thrown into the air on the impact of a crash. That is why, in restraint systems that have them, the anchorage straps need to be fastened.

There's another compelling argument for purchasing a well-designed restraint system for your child: a child's pelvic area is small, and the risk of a regular seat-belt buckle riding up into the abdomen, which is unprotected skeletally, is greater for a child than for an adult. "That is why a child restraint has not only a harness across the hip area but a crotch strap, which attaches to the hip strap," says ACTS's Richards. "The crotch strap

holds the hip part of the harness down so it can't slip."

(Information about which restraint devices have been tested and found to be safe can be obtained by sending 35 cents and a self-addressed envelope to Physicians for Automotive Safety, 50 Union Avenue, Irvington, N.J. 07111.)

Our unsafe cars.

For Dr. William Haddon, Jr., president of the Insurance Institute for Highway Safety, ensuring the safety of children in cars extends to the design of cars themselves:

"We've known medically in this field since the early 1940's that the human body is very rugged when it comes to taking the very large but very transient forces of crashes, *provided* that it is properly packaged. Unfortunately, most people riding in motor vehicles are not properly packaged. The design of new vehicles is still so technologically backward that a teacup being sent through the mail as a present is usually riding in a safer package than the men, women, and children of the United States in brand-new imported and domestic vehicles.

"The tragedy is that people don't know that many of those killed or injured in crashes would not be injured or killed if long-available technology had been applied both by vehicle manufacturers and by their users. About 90,000 people are being killed each decade because automatic crash padding—known as air bags, developed in the late 1960's—has been withheld by vehicle manufacturers.

"It has also been known since the mid-1940's that the worst thing that can happen to you in a motor-vehicle crash is to have the doors fail, allowing you to be dumped out. Yet the doors on even new motor vehicles are so flimsy that huge numbers of people continue to be ejected to their

(Cont'd on page 12)

The Whys And Wherefores Of Fatal Crashes

What are the statistical circumstances surrounding passenger-car accidents in which children are killed? The Fatal Accident Reporting System, part of the National Highway Traffic Safety Administration, has collected data on highway deaths since 1975. The figures below represent passenger-car accidents in which children ten years old and under were killed in 1975 through 1977 and is 92 percent complete for the first three-quarters of 1978.

In that period, a total of 3,653 children in that age group were killed: 2,505 of them five years old or under and 1,148 aged six through ten.

Time of day:

Most of the auto accidents involving the death of children under eleven years old occurred between noon and 6 p.m. (38 percent), 32 percent between 6 p.m. and midnight, 10 percent between midnight and 6 a.m., and 20 percent between 6 a.m. and noon.

Weekday vs. weekend:

Sixty-two percent of the child fatalities occurred on weekdays; 38 percent on weekends.

Location:

One-third of the children died in passenger-car accidents in cities. Two-thirds occurred in rural and suburban settings and on highways.

Number of occupants:

In 27 percent of the accidents in which children died there were three occupants in the car. There were four occupants in 22 percent of the crashes, two occupants in 18 percent, six to ten in 16 percent, and five in 14 percent.

Speed:

More than half (53 percent) of the children died in accidents at speeds estimated at 55 miles per hour; 16 percent died in crashes at 40 to 50 miles per hour; and 15 percent at a speed of 35 miles per hour or less. For the remaining 16 percent of the deaths, the speed was not known.

Kind of accident:

The majority of children aged ten and under (69 percent) died in accidents in which one car collided with another. Collisions with fixed objects, such as poles or road abutments, accounted for 19 percent of the deaths, and accidents not involving collisions were responsible for 12 percent of the deaths.

Ejection:

In 22 percent of those fatalities, the child had been totally ejected from the car; in 2 percent, there had been partial ejection. For the remainder of the deaths the information on ejection either had not been reported or was unknown.

Unsafe At Any Age? Children And Car Safety *(Cont'd from page 11)*

deaths. In many crashes, even when the doors don't open, the side structure is so flimsy that the impacting vehicle penetrates deeply–with disastrous results."

The car-safety outlook is brightening a little, however. Beginning in the 1980's, according to the National Highway Traffic Safety Administration (a branch of the Department of Transportation), newly manufactured cars sold in the United States will be required to have built-in passive restraints–either air bags or seat belts that don't have to be buckled.

The move to passive restraints follows a long history of failure to get people to use restraints voluntarily. Television commercials have been unsuccessful. And even legislation isn't the answer.

On January 1, 1978, a law became effective in Tennessee requiring that parents keep their children under the age of four properly restrained in a child-restraint system. Unfortunately, however, the law both exempts older children and was passed with a dangerous loophole: the parent is permitted to hold the child in his arms while riding.

Well-meaning as it may have been, the law has not proved to be particularly successful. In an evaluation of the law in the fourth month after it was passed, Allan Williams of the Insurance Institute concludes that, "proper use of child restraint systems had not increased greatly, and the potential of the law for harm because of increased travel in arms or on laps cannot be discounted. More than 80% of Tennessee children observed were not using child restraints anchored by seat belts, although use rates had increased in Tennessee cities to a greater extent than in comparable Kentucky cities not affected by the law. Use rates were particularly low at ages two and three."

Asked whether she thought other states should follow Tennessee in passing similar laws, Joan Claybrook, administrator of the National Highway Traffic Safety Administration (NHTSA), replies: "I have a good feeling about that. I feel it ought to be a minimum requirement." Says Claybrook: "The value of making the usage of child restraints a statewide priority is that it brings it to the forefront of people's attention. The disadvantage is that it becomes a joke if it's not enforced, and it *is* hard to enforce."

Claybrook's agency has proposed new testing and performance requirements for regulating child restraints. In addition, in the child-restraint area, the agency has arranged for a series of ten conferences to be held around the country in the spring, with a national conference to follow in the fall.

"We will bring together different organizations with particular interests in child-transportation safety and try to give them materials, information, and techniques about how to tell new mothers and younger mothers and fathers why child-restraint devices should be used," she explains.

Asked why she thought this would succeed when national TV campaigns have failed, Claybrook answers: "This has to be done very much on a personal level. What we're attempting to do is go through lots of local groups," among them prenatal-care centers, hospitals, and PTAs, in order to encourage child restraint as, "something that's part of our routine. Only if we penetrate at that level is it going to make any difference."

There is no single area to concentrate on in reducing the deaths and injuries affecting children in cars. But restraining children properly is a giant step toward protecting them. And there is a little bonus that comes with it–namely, better behavior.

"Children riding in car seats exhibited very high levels of appropriate or safe behavior, whereas children not riding in car seats exhibited very low levels of appropriate behavior," concludes a study by Edward R. Christophersen of the Kansas University Medical Center. And, he observes, "When car seats were introduced to those children who previously had not used them, the level of appropriate behavior improved dramatically."

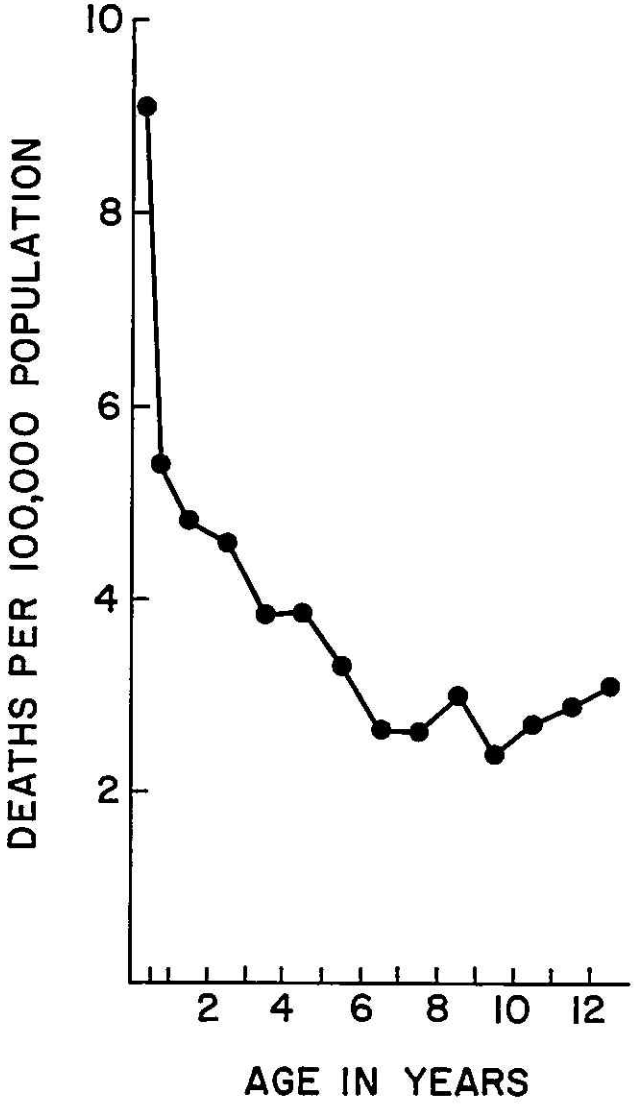
Study Reveals High Risk For Infant Riders In Cars

Infants as motor vehicle occupants have an "extremely high" death rate compared to older children, a Johns Hopkins University professor has reported.

In a study supported by the Insurance Institute for Highway Safety, Susan P. Baker, a faculty member of the university's School of Hygiene and Public Health, found an "extremely high death rate in the first year of life, especially for children less than six months old." These high rates have not previously been recognized, Baker said in a preliminary report on the study, nor "has the fact that between ages 1 and 6, the highest death rates prevail among the youngest children."

Baker said these findings are "noteworthy because some surveys suggest that young children, especially the very young, are less likely than older children to travel in cars."

Previously published mortality statistics have combined age groups, "with the result that childhood age differences in the number of occupant deaths have been obscured," the researcher said. However, by analyzing data on 1976 crash victims compiled by the Department of Health, Education, and Welfare, Baker found that the occupant death rate from ages 6 to 12 remained fairly constant, at about 3 deaths per 100,000 population annually. The rate climbed steadily as occupant age decreased, reaching a figure of 4.8 for one-year-olds. Children younger than six months had a death rate of 9.1, the highest among occupants below the age of 13, the study said (see figure).



ON-LAP POSITION MORE DANGEROUS

"The high death rate in infants may be partly due to a greater likelihood of being in the front seat and/or held in someone's arms; both front seat position and on-lap travel place children at increased risk of being injured and killed," Baker commented.

(Research by the Insurance Institute for Highway Safety has found that in crashes, even adults wearing seat belts are unable to restrain children held on the lap [see story p.]. Where restraints are not used – as in most cases – children traveling on laps are more susceptible to being seriously injured or killed from being crushed between adults and unyielding interior structures. See *Status Report*, Vol. 13, No. 5, April 12, 1978.)

The high rate of crash deaths among infants "calls for emphasis on their need for protection," Baker concluded. "Only 7 percent of children in the U.S. are restrained when they travel, and almost all countries with seat belt laws have exempted children from required use." Among the possible solutions cited by the researcher were greater use of automotive restraints, special head protection, and "vehicle designs that automatically protect even unrestrained infants."

Australian Child Restraint Campaign Found Ineffective

About 3,500 children, many of whom are not properly restrained while traveling in motor vehicles, are killed or injured in crashes each year in Australia, despite mandatory child restraint laws, according to a recent report prepared by Australia's Department of Transport.

Since 1972, all Australians eight years of age or older have been required to wear seat belts. This legislation has reduced motor vehicle injuries and deaths, according to the study. Four states (which include most of the country's population) subsequently required the use of child restraints by some occupants younger than eight. These laws, it was reported, have not resulted in widespread compliance or a reduction of injuries to children. (For information on the effects of child restraint legislation in Australia and the U.S., see *Status Report*, Vol. 13, No. 17, Nov. 30, 1978.)

The report cited four reasons why the benefits afforded by belt-use laws to older occupants were not repeated by child-restraint laws for younger occupants.

- Child restraints are not often specially installed in cars, since manufacturers are not required to do so.

- Many parents do not accept or are not aware of the need for child restraints.

- Most of the child restraint legislation is complex, applying differently to various age groups and seating positions.

- The child restraint laws have not been strictly enforced.

PUBLICITY CAMPAIGN CONDUCTED

In an attempt to persuade parents to properly restrain their children in cars, the Department of Transport launched a press and radio campaign. The publicity material described the use of particular types of child restraints for different age groups and recommended the use of conventional seat belts if child restraints were not available. It also recommended that children ride in the back seat, particularly if no special restraints were available. The overriding tone of the message was one of pathos ("Ten little Australians won't be home tonight").

Both press and radio publicity were used in the state of Victoria. South Australia received only radio messages. Western Australia, the control state, received no messages at all.

The effectiveness of this campaign was measured by roadside observation of cars and interviews with drivers immediately before and three months after the publicity program. The results were:

- Neither the use of child restraints nor the use of seat belts by children increased.

- There was no decrease in the use of child restraints that were not approved by the Standards Association of Australia.

- Children, restrained or not, were not relocated to rear seating positions.

In short, the publicity campaign was not effective. (These results are similar to the outcome of a television campaign conducted by the Insurance Institute for Highway Safety, urging safety belt use. See *Status Report*, Vol. 7, No. 11, June 12, 1972.)

Free Fall Study Misinterpreted

In a letter to Joan Claybrook, head of the National Highway Traffic Safety Administration, the Insurance Institute for Highway Safety has pointed out that an auto maker's docket filing "misinterpreted the findings of a free fall study conducted by the Highway Safety Research Institute (HSRI) of the University of Michigan under Institute sponsorship."

Renault had characterized the HSRI study as demonstrating "that the cerebral tolerance of the child [is] greater than that of the adult," in comments to the docket on proposed new rules requiring crash testing of child restraints. The study was cited in support of a Renault claim that the head injury criterion (HIC) minimum tolerance level of 1,000 is "not justified."

(A HIC is a mathematical formula used for determining the severity and duration of head impacts.)

The Institute noted that the study, which was presented during the 21st Stapp Car Crash Conference in 1977, pointed out that

> A HIC value of 1,000 is intended to reflect the combination of impact acceleration and pulse duration which will cause most people to sustain concussion injury. This type of concussion would normally be rated AIS (abbreviated injury scale) = 2. ... . Since all of the cases simulated (in the study) had at least a concussion and/or a skull fracture, it is not possible to determine the validity of a threshhold value of 1,000. . . .

"In summary," the Institute told Claybrook, "the HSRI free fall study provides no information concerning the validity of a HIC of 1,000 as a minimum tolerance level for children *or* adults."

On The Inside

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