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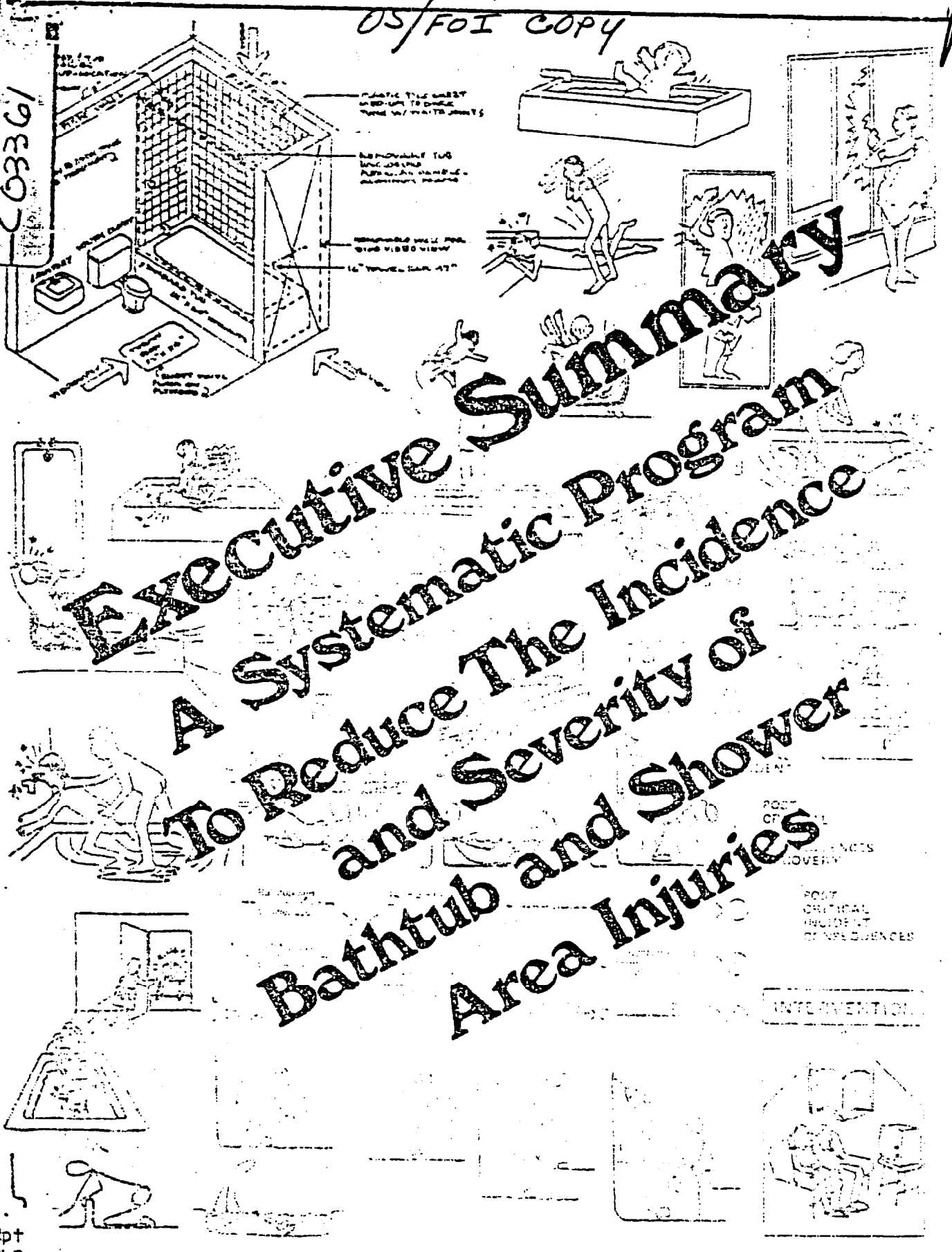

Executive Summary

A Systematic Program To Reduce The Incidence and Severity of Bathtub and Shower Area Injuries

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A Systematic Program to Reduce the Incidence and Severity of Bathtub and Shower Area Injuries

EXECUTIVE SUMMARY

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INTRODUCTION

This study, "A Systematic Program to Reduce the Incidence and Severity of Bathtub Injuries", was sponsored by the Consumer Product Safety Commission to address the problem of the over 110,000 bathtub and shower area accidents in America every year. The study was performed by Abt Associates Inc., a social research firm, with assistance from RESEARCHITECTS, Inc., a firm specializing in environmental research. Research proceeded in four phases. First, a literature search was performed, and significant factors associated with bathtub injuries were identified and prioritized. Second, this data was expanded to a series of seventeen accident scenarios, representing all the common factors in the accident system. Third, intervention strategies were developed in response to the accident scenarios, and performance guidelines for safer bathroom products were considered. An economic analysis of the intervention strategies showed which strategies would be most beneficial to society if implemented. Fourth, a conference was held to disseminate research findings to manufacturers, consumers, and government representatives. Final recommendations to the Consumer Product Safety Commission on how best to prevent bathtub injuries are based on both the results of Phases I-III and the response of industry, government, and consumers to these results. It is the hope of the study team that these recommendations will prove useful in both the public and private sectors.

This Executive Summary presents first, discussion of the problem of bathtub and shower area injuries and second, the major recommendations on how to reduce the incidence and severity of these accidents.

FINDINGS ON THE NATURE OF BATHTUB AREA INJURIES

Statistics on accidents, particularly from the National Electronic Injury Surveillance System (NEISS) data base, reveal the following facts:

1. Bathtubs far exceed shower stalls in accident potential, based on both absolute frequency and severity of injuries.

2. Slips and falls are by far the most frequent type of bathtub accident, and these slips and falls frequently occur while entering or leaving the tub or while changing between a sitting and standing position.

3. The hardness of the bathtub surface is the chief agent of injury in slips and falls. Most frequently contact occurs on the tub edge.

4. Most children who suffer severe injuries such as burns and drownings are not being supervised by a responsible attendant when these accidents occur. Many times, the parent has only left the bathroom momentarily, or the child is in the presence of an older sibling.

5. Burns are a less frequent but generally much more severe form of bathtub injury than slips and falls. Over 70 persons die from burns sustained in the bathtub every year.

6. Similarly, drownings are not frequent but merit attention because of the severity of the accident. Over 100 persons drown in bathtubs every year.

7. Children under the age of ten have the most accidents: over 45%, while they comprise less than 20% of the population. Children also account for over 75% of the fatalities.

8. The elderly do not have a disproportionately large percentage of bathtub accidents, but their injuries tend to be more severe. It has also been conjectured by authorities that elderly people tend to bathe less frequently out of fear of injury, thus reducing their exposure rate.

Nearly every tub manufacturer is already aware of the importance of a slip-resistant finish. In the light of these recommended test measures, however, manufacturers and others will need to reevaluate the various methods with which to achieve an acceptable degree of slip resistance in bathtubs and shower stalls. Quite possibly, new materials and production processes will need to be investigated. In addition, it is hoped that industry will respond to the problem of slip-resistance by developing appropriate retro-fit items, since it is possible that in the area of slip-resistance, retro-fit may be the most effective and least costly solution.

Anti-Scald Devices

Our second recommendation addresses the problem of burns from deleterious hot water, which cost society approximately twenty-five million dollars annually. This type of injury is infrequent, but of enormous severity--over seventy persons a year die from burns sustained in the bathtub/shower area.

For retrofit, as well as for new construction, we believe the most cost-effective countermeasure to bathroom burns is to turn down the temperature on the central water heater to 120° F[1], so that hazardously hot water is not available to the tub or shower. We recognize that total implementation of this recommendation may require the redesign of appliances using high-temperature water (mainly the dishwasher) or redesign of the hot water system. However, most homes can presently implement this countermeasure without cost or complication. This recommendation has the added value of reducing energy costs to the homeowner.

In addition, a performance guideline, to be applicable only to new tubs and shower stalls, should be established that requires a pressure or thermostatic valve to control water temperature and to prevent scalds. Problems are not anticipated in specifying the nature of either the performance guideline or the accompanying test methods. The Commonwealth of Massachusetts has already integrated anti-scald standards into their 1973

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[1]The appropriate temperature should be in the range of 110° to 120°. Any hotter and burns could result; any lower, given the 5 to 10 degree thermal loss from transmission, and the water may provide insufficient warmth for personal comfort.

and 1974 State Plumbing Code; however, their codes, in order to be fully effective, must at least be amended to include bath valves as well as shower valves. The reason for our emphasis on anti-scald bath valves is that virtually all of the scalding deaths and most severe burns in the bathroom occur as a result of immersion in hot water rather than as a result of being sprayed by hot water.

The present cost differential of a new pressure control valve in comparison to either a new two-handle valve or a one-handle mixing valve is approximately in the range of five to twenty-five dollars. The average cost differential of approximately fifteen dollars would (marginally) make the anti-scald device cost-effective; but we anticipate that larger-scale production will reduce the unit cost of anti-scald devices so as to reduce or eliminate the cost differential.

We cannot universally recommend anti-scald devices as retrofit measures since the implementation cost of from one hundred to one hundred and fifty dollars is not warranted by the savings in injury reduction. However, safety-conscious households may find anti-scald devices to be a worthwhile retrofit item.

Consumer Education

Perhaps the most surprising result of our analysis was the discovery that children under five years of age, who constitute only 8.4% of the population, account for almost 30% of all bathtub/shower injuries (including over 75% of all tub related deaths) and for almost 65% of the social cost associated with bathtub/shower injuries. The total annual cost to society of children's bathtub/shower injuries is $45 million, and well over 90% of those costs are associated with injuries sustained by the child while unattended or non-continuously attended. Although specific product improvements (such as slip-resistant surfaces and anti-scald devices) could reduce or eliminate certain types of children's injuries, we strongly feel that educating parents not to leave children alone in the tub or shower is the most effective means of addressing the entire problem of children's accidents.

Our reliance on parental education is particularly important as a countermeasure to drownings (and other submersion injuries resulting from the hazardous accumulation of water).[1] The project team could not discover cost-effective mechanical intervention strategies to prevent drownings. Since young children can drown in as little as half an inch of water, it is not surprising that the only alternative to parental supervision as a countermeasure to children's drownings, we determined, is to substitute showering for bathing (eliminating the hazardous accumulation of water) in the case of children. However, showering rather than bathing fails to address the entire problem of children's injuries; hence, we recommend that educating parents to continuously supervise their children in the bathroom is the most effective means of reducing children's injuries. We believe that the present degree of inadequate supervision of children is caused by a general lack of awareness of the dangers involved, which could largely be corrected by parental education programs.

Consumer education may also be a valuable countermeasure to bathtub/shower electrocutions, an area which was not addressed in the current study.[2] In particular, a cursory examination into this area suggests that educating consumers not to use hairdryers, radios, and other electrical appliances in the bathroom and to install ground fault interrupters in all bathroom outlets would significantly reduce injury and death by electrocution.

Secondary Recommendations

There are a number of other important intervention strategies to be considered, which are conditionally recommended as a result of this study. The following intervention strategies are all potentially valuable

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[1] Children's drownings (which number over 100 annually) and submersion injuries cost society the remarkable total of over $20 million a year.

[2] Electrocutions caused by interaction of a "live" appliance with a user in the tub or shower are categorized in the NEISS data by the appliance, not the bathtub/shower. In addition, this electrocution data is highly unreliable in the NEISS data, since it includes only emergency room injuries. Next year, when death certificate data is included in NEISS, would be an appropriate time to examine the area of bathtub/shower electrocutions.

in reducing injuries; in several cases, however, certain design or cost problems must be addressed before the strategies can be implemented. They are divided into two groups: new and retrofit (although there is some overlap between the two). Because bathtubs are a durable product and new bathtubs account for only a small number of existing bathtubs, retrofit devices offer the greatest potential for immediate improvement in bathtub safety. In the long term, new tubs must be equipped with safety features as well.

Retrofit

1) Handholds:

Handholds are effective in reducing the incidence of slips and falls, because most slips occur while raising up or sitting down in the tub or while entering or exiting the tub. Anthropometric research will reveal how many handholds are necessary in the tub and where they should be placed. Handholds must have rounded edges and be durably fixed in place.

2) Nonshatterable shower enclosure:

Use of nonshatterable materials in shower enclosures will effectively eliminate user lacerations caused by falling against and breaking shower enclosures. Nonshatterable materials need not be more expensive than glass.

3) Cushioned tub edge:

While increasing the resilience of the entire bathtub may make it less stable and harder to clean, cushioning only the tub edge (where most injuries occur) is a promising intervention strategy. Development of a cushioning device for the tub edge, with particular attention to sanitation standards, is recommended.

4) Flexible shower hose:

The flexible shower hose used in Europe, or "telephone shower", allows the user to bathe and rinse off in a seated position,

thus reducing the possibility of slips and falls. We recommend that such devices be used and that an anti-siphon feature be perfected, to eliminate the possibility that unclean water will be siphoned from the tub to the water supply.

5) Design towel racks and soap dishes as handholds:

Towel racks and soap dishes with handles are often used by bathers to maintain balance; therefore, they should be made as stable as handholds. These products might then be sold as dual-function accessories.

6) Seat:

A small bath seat for children is recommended as a means of preventing drownings. Seats are also potentially safer for adults because they will be less likely to slip and fall. For the handicapped, seats are particularly useful for facilitating safe bathing.

7) Shower enclosures which cannot pinch body parts:

The sharp railing of shower enclosures may constitute a hazard; therefore, it is recommended that they be designed to prevent pinching or lacerations.

8) Visual display of water temperature:

A device which turns a different color when water is overly hot may be installed in a tub to prevent burnings. Design of such a warning device is recommended for further consideration.

9) Printed educational messages:

Bathroom products, such as soap or bathtub toys, should contain education messages; for example, warning parents not to leave children in the bathtub unattended.

10) First aid materials available:

Easy availability of first aid information and materials to doctor's telephone number is recommended for minimizing injuries resulting from bathtub accidents.

New

1) Placement of fittings:

It is recommended that fittings such as faucets, drains, and the shower head be placed so that the user can maintain his or her balance, i.e., so that a minimum of bending and stretching is required. Anthropometric studies will determine proper placement.

2) Rounded fittings:

Any protruding fittings should be designed with rounded edges so that a user cannot be injured by falling against them.

3) Recessed fittings:

Recessed fittings are recommended so that the user cannot fall against protruding fittings, causing lacerations or bruises. This measure would not be cost-effective on a national basis, but is potentially valuable to the safety-conscious public.

4) Increase height of tub edge:

A higher tub edge would cause users to enter from a sitting position, thus reducing the chances of slipping and falling. The higher tub edge might be achieved by elevating the entire tub (i.e., on a platform) or by increasing the height of the sides, and hence the depth of the tub. Further research into this concept is recommended.

5) Increase curvature of tub edge:

Research is recommended to determine whether changed geometry of the tub edge would decrease the number and severity of injuries involving the tub edge.

6) Eliminate combination tub and shower units:

For the safety-conscious user who is able to afford it, separate bathtub and shower units will enhance the safety of the bathroom. Faucets may be more appropriately placed in separate units, and the surface need not be designed both for sitting and standing.

7) Provide easy discrimination between hot and cold water faucets:

Differentiation between hot and cold water faucets, through shape, texture, or color, is recommended as a low-cost item which will help prevent burn injuries.

8) Enlarge shower stall:

Enlargement of the shower stall to 36" X 42" or 42" square will provide safety-conscious users with a shower which allows the user to stand out of the water stream while adjusting the temperature. In addition, a larger shower stall gives the user a place of refuge if overly hot water is accidently turned on.

9) Telephone or intercom:

It is recommended that parents be made aware of the value of having a telephone or intercom installed in the bathroom so that they can answer it without leaving children alone.