

FROM: Mason, Robert W.

TO: Hill, Denise

DATE: 12-08-94
TIME: 14:41

CC:

SUBJECT: Caustic Ingestions by Farm Children

PRIORITY:

ATTACHMENTS: Forwarded-> cipmmwr

print

FORWARDED FROM: Mason, Robert W.

FROM: Reed, Laurence D.

TO: Mason, Robert W.
Flesch, Jerome P.

DATE: 12-08-94
TIME: 14:11

CC: Hagedorn, Rosmarie T.

SUBJECT: Caustic Ingestions by Farm Children

PRIORITY:

ATTACHMENTS: Forwarded-> cipmmwr

FYI. Larry

Rose-- please copy for me.

FORWARDED FROM: Reed, Laurence D.

FROM: Hard, David L., Ph.D.

TO: Ehrenberg, Rick

DATE: 12-07-94
TIME: 13:54

CC: Reed, Laurence D.

SUBJECT: Caustic Ingestions by Farm Children

PRIORITY: R

ATTACHMENTS: cipmmwr

Rick,

The attachment is my effort at putting together a draft for a potential MMWR article and to give you something to show the MMWR for consideration. Hopefully, it meets these purposes. Let me know if there is any follow-up needed.

D Hard

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Caustic Ingestions of Clean-In-Place Products by Children on Farms

The problem with ingestion of caustic substances by children has been well documented (1, 1a, 2, 2a). Two separate studies reported 14 cases over 13 years (1973-1986) and 7 cases over 5 years (1984-89) in regionalized service areas of specific hospitals (5,6). The impact of manufacturers reformulating concentrations and implementing child resistant packaging is evident in other studies, and the effect of the Poison Prevention Act and the Hazardous Substances Act have also been credited with significant reductions, (3,4). However, even though the incidence of household caustic product injury dropped significantly during this time, there is still a persistent hazard posed to children who are exposed to caustic industrial-use products (5,6).

Since most farms are managed as businesses, it is not surprising that they use many commercial products that are potentially dangerous to children. Dairy farms in particular, require the use of caustic alkali and acid products, also known as clean-in-place (CIP) products, to clean and disinfect milklines. This is done after each milking, which is at least twice daily. Because these products are not listed for household use, they do not fall under poison prevention guidelines. Since many dairy farms are family-run businesses, where both parents are needed to perform the milking, children are often present in the milkhouse. This is due to a variety of reasons, ranging from financial concerns (cost of childcare), the availability of childcare (often not readily accessible in rural areas), or personal preferences by parents (desiring that they spend time with their children). Even though the children are not actively involved in work activities, this is one area where they are exposed to a hazardous work environment.

Children who ingest CIP products follow the general pattern of childhood ingestion: 1 to 3 years of age and about equally distributed between the sexes. The problem generally arises in the transfer of the CIP substance from a bulk container to a measuring device (often a cup, jar, bottle, etc.), and the child drinks from this container. Since the concentrations of active ingredient is much higher (NaOH 8-25%) than formulations of similar household agents (NaOH 2% for drain cleaners), small amounts are capable of causing deep muscularis necrosis within seconds (5). Cases are identified in which only the residual amounts left in the measuring containers required hospitalization of the child. Injury ranged from mouth burns, to esophageal first degree burns showing erythema, edema, and sometimes hemorrhage; second degree burns exhibiting membranous exudate and blisters; and third-degree burns having shiny black discoloration (6). Some of the esophageal damage resulted in esophageal stricture and perforation, requiring surgery. The esophageal strictures often required additional surgical follow-up procedures.

Discussion

Four cases of CIP product ingestion by children were identified in Wisconsin during February 1990 through October 1991. Also, four cases were identified in a regional area of Pennsylvania during December 1990 through May 1991, with at least one death of a child attributed to CIP products in 1991. Popular trade magazines periodically print letters from readers describing their experiences with CIP poisonings and suggestions for limiting contact with the CIP products by children (ref), which would seem to indicate a persistent enough problem to warrant its attention within the trade press. Anecdotal evidence exists of some farm families who did not realize that the CIP products were inherently dangerous, based on their interpretation of the labeling. Compared to previous studies, the frequency of ingestion for CIP products do not appear to be decreasing. Previous studies identify the transfer of the CIP product from a bulk storage container to a measuring container as being the stage at which ingestion is most likely to occur (3,5). In many instances a parent is present with the child, but has a momentary lapse of attention, during which the child ingests the product or a residual amount left in the measuring container. However, cases have been identified in which the child was able to get to the bulk container and put the product in its mouth (7).

Poison prevention strategies that could be employed are: 1) a more dilute concentration which would lessen the severity of the consequences of ingestion, 2) the formulation of liquid material into a granular or crystalline material which generally limits the extent of damage to the mouth, 3) incorporating child-resistant packaging of the CIP product, 4) providing a child-resistant measuring cup, 5) engineering out the process of transferring of the CIP, 6) remove the children from the hazard, and 7) education of the farm population that use these products. Most of these prevention strategies are unlikely to be implemented because 1) dilution of the active ingredient will require more material handling by the farmer and likely raise his cost due to transportation, 2) granular material has been available for several years, but is not the substance of choice by farmers since it tends to cake with moisture (high humidity conditions are prevalent in dairy barns) and premeasured packets are higher in cost per use than the liquid, 3) incorporating child resistant packaging for the containers is possible, but since the avenue of risk exposure is primarily the transfer of the liquid from bulk to use, it would likely have little effect, 4) at least 1 manufacturer of milking systems produces a unit that uses a closed loop system to inject the correct amount of CIP material when needed from a bulk container; however the likelihood of farmers incorporating a new milking system solely for this component is unlikely due to the cost--in addition, the retrofit of a closed loop systems is highly unlikely due to the engineering factors in systems currently in use (diameters of pipelines, vacuum needed, etc.), and 5) for reasons mentioned earlier, taking children out of the hazardous environment is unlikely due to the social structure of the rural farm family.

Two strategies that seem to hold the most promise are where manufacturers provide a child-resistant measuring container with each unit of bulk product sold; in 1 gallon sizes of liquid CIP product sold now, some manufacturers have incorporated a measuring device within the container itself, and while education is generally of limited effectiveness in injury prevention situations, this is one area where it appears, at least anecdotally, to be effective (3,8). Of course, there is always the issue of public policy, which could require one or a combination of the above recommendations, or other recommendations. However, due to the historic pattern of farms being exempt from enforcement actions (farms with 10 or less employees are exempt from enforcement of OSHA regulations), it is unlikely that this would be a plausible avenue, although one that could be considered.

It would seem that the problem of childhood ingestion of caustic CIP products has not lessened over the years. The most effective and quickest way to impact this childhood injury problem is through education of the farm population, which is both plausible and at least anecdotally effective.

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