Accidental Poisoning as an Indication of High Accident Frequency

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FOR THE PAST 2 years, the San Jose (Calif.) City Health Department has been testing the hypothesis that the occurrence of a case of accidental poisoning in a family is positively associated with a higher than average incidence of accidents of all kinds.

Study Design

The hypothesis was tested through comparison of the accident experience of two groups of people, called the poison group and the control group. The poison group was made up of families in which one child had ingested, or gave reasonable evidence of having ingested, a chemical poison and had been treated at the San Jose City-County Emergency First Aid Station. The emergency first-aid station, with a physician and nurse on duty 24 hours a day, has an established reputation for the treatment of all types of injury, especially accidental poisoning.

Families in the poison group were entered in the study approximately a week after the occurrence of a poisoning accident. These 118 families were added from time to time during the entire 17 months of the study.

The control group was selected on the basis of one criterion—the family had at least one child under 5 years of age—since childhood poisonings happen almost exclusively to children in this age group. The 80 families in the control group were selected within a 6-week period.

Preliminary geographic analysis of the location of previous emergency first-aid station poisoning cases indicated no pattern of clustering, but rather a seemingly randomized distribution throughout the city. Therefore, a systematic sample of all households in San Jose was taken from the city directory, supplemented by a similar sample from a list of residences in areas of new construction not covered by the directory.

To ascertain the presence of at least one child under age 5, the majority of families were screened by telephone. Families without a telephone were visited by the interviewer.

The family was defined as parents and children only. Other relatives or boarders living in the household were not included in the study.

An accident was defined as an unintended injury of any degree, regardless of place of occurrence, which could be recalled by the respondent, usually the housewife, for herself and other members of her family. The following information about the accident was recorded: how it happened, where it happened, time of occurrence, type of treatment, and resulting disability, if any. After the first visit, only the question about accidents in the preceding month was repeated.

Considerable effort was made to standardize the interviews. All interviewing was done by one person, the coordinator-interviewer. Questions and the interviewer's introduction to the householder were memorized. Both poison

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and control groups were approached in the same manner. The central hypothesis of the study was not mentioned, to avoid putting poison group families on the defensive.

All families were interviewed at monthly intervals. At the initial interview, each family was asked about accidents which had happened during the preceding month, the type of medical care received by children, the sex and age of each member of the family, the highest grade of school completed by adults, family income, and length of residence at the present address. Race or ethnic group of the family, type of residence, condition of dwelling unit, and neatness of housekeeping were noted by the interviewer.

Overall acceptance of the survey was good. There were no refusals to be interviewed the first time. About 1 out of 10 persons refused to be interviewed during some subsequent interview and dropped out of the study. Refusals were not grouped toward the beginning of the interviewing but were more or less evenly distributed throughout the entire 17 months of the study. In no calendar month were there more than three refusals.

As would be expected in a survey conducted over such a long period of time, a number of families were lost because of moving. Those families who moved within the city limits of San Jose, and who left a forwarding address, were continued in the study. About 25 percent of each group moved out of the study area. Some of these families had been interviewed a number of times before moving from San Jose.

Findings

This study was designed with the idea of using the occurrence of an accidental poisoning as a method of finding families with a high accident incidence so that they could be given some form of special attention, such as a nursing visit. Based on this intended use of results, small differences in rates between poison and

Table 1. Rates for three categories of accidents [1] and person-months for all accidents, January 1958–May 1959

Month of study	Accident rates per 100 persons per month						Person-months	
	All accidents		All accidents within 1 week prior to interview		Home accidents			
	Poison	Control	Poison	Control	Poison	Control	Poison	Control
1958								
January	-------	-------	-------	-------	-------	-------	12	-------
February	26. 1	-------	13. 0	-------	13. 0	-------	23	-------
March	18. 9	22. 2	12. 2	18. 5	18. 9	18. 5	74	27
April	11. 5	23. 7	8. 3	12. 2	8. 3	17. 2	96	354
May	-------	-------	-------	-------	-------	-------	-------	-------
June	14. 9	22. 6	8. 5	11. 1	11. 2	14. 1	188	199
July	19. 6	24. 5	9. 2	13. 2	18. 4	18. 9	163	212
August	18. 7	27. 6	8. 6	15. 0	15. 3	19. 3	209	254
September	18. 0	9. 5	9. 8	3. 3	12. 8	4. 8	133	210
October	20. 3	17. 6	5. 5	8. 2	14. 8	12. 7	291	245
November	18. 5	21. 8	6. 8	5. 6	14. 4	14. 0	222	179
December	18. 2	13. 6	8. 4	5. 7	11. 7	11. 4	154	88
1959								
January	15. 5	15. 1	6. 8	6. 8	11. 6	11. 1	336	252
February	14. 7	22. 5	4. 7	9. 6	12. 3	17. 6	211	187
March	25. 6	15. 6	10. 5	10. 1	20. 0	17. 3	285	179
April	18. 9	13. 7	7. 9	8. 6	15. 4	9. 6	228	197
May	24. 4	22. 4	13. 7	9. 9	19. 2	11. 8	234	152
Entire period	18. 8	19. 7	8. 4	9. 6	14. 7	13. 8	2, 859	2, 735

[1] Excluding original poisoning treated at San Jose City-County Emergency First Aid Station.

control groups, even if they could be conclusively demonstrated, would have little practical importance.

Table 1 shows three types of accident rates for each of the 17 months during which interviewing was done, the rate per person per month for the entire study period, and the number of person-months for all accidents for both poison and control groups. Because the poison group was chosen on the basis of the occurrence of an accident, this accident was omitted from the tabulation.

In order to test the likelihood of chance variation in the rate for all accidents for the total study period, for both poison and control groups, a test for confidence intervals was used with the monthly rate distribution. For the control group this test indicated that if every household in San Jose with a child under 5 years of age had been interviewed, there are 19 chances out of 20 that the mean rate for the entire group would have been between 16.8 and 22.2 per 100 person-months. Since the poison group was not a sample, such a test was inappropriate. However, should one assume that the time period of our study represents a random sample of the indefinite future, such a test would give us the likelihood 19 times out of 20 that the future poison mean rate would be between 16.8 and 21.0 per 100 person-months. Assuming that the means for the two groups are at opposite ends of the confidence intervals (poison 21.0 and control 16.8, an unlikely assumption), the rate differences between the two groups would not seem to be large enough to warrant special attention for the poison group as a whole.

Analysis of the poison and control groups revealed slight differences on certain variables, such as age distribution, income distribution, and education. To see how these differences in population characteristics would affect accident rates, a standardized population technique was used. The effect of using such a technique with various differences in the two groups is shown in table 2.

This technique involved taking a specific rate for the poison group, age for example, and multiplying these rates by the actual proportionate distribution for this variable in the control group. This multiplication gave us a hypothetical number of accidents which would have occurred had the poison group had the same proportionate distribution as the control group for the variable under consideration. With this hypothetical accident total it was possible to produce a single accident rate which would be comparable to the observed rate for the control group. The age-adjusted rate is obtained by multiplying the poison rate by the control person-months for each age group and dividing the sum of the results by the sum of the control person-months.

Adjustment for differences in distribution of

Table 2. Effect of applying various poison group rates to control group distribution

	Accident rates per 100 persons per month		
	Poison group		Control group rate (actual)
	Actual	Adjusted	
Assume:			
Adjusted age distribution for—			
All accidents	18.8	17.9	19.7
Accidents within 1 week of interview	8.4	8.2	9.6
Home accidents	14.7	13.5	13.8
For all accidents—			
Same number interviews completed	18.8	18.1	19.7
Same distribution of—			
School grade completed by mother	18.8	18.8	19.7
Income	18.8	18.5	19.7
Rented and owned dwellings	18.8	17.8	19.7
Length of time resident at current address	18.8	17.6	19.7
Condition of dwelling units	18.8	18.6	19.7
Housekeeping neatness	18.8	18.0	19.7

population characteristics consistently reduced the poison accident rate, further detracting from accepting the hypothesis of increased accident incidence for the poison group. There was little difference in distribution of other variables, not shown in table 2, between the poison and control groups.

An analysis of accidents reported by each group on the basis of type of treatment and place of accident shows little difference between the two groups (tables 3 and 4). In order to discover whether or not similarities in gross overall rates were simply masking different individual accident liabilities, we analyzed the number of accidents which were reported during the first six interviews for individuals who were in the study for six interviews or more. The distribution of these accidents in the poison and control groups is practically identical.

Some family injury surveys, in which the same families were interviewed over a period of time, showed a noticeable decline in their reporting of accidents. Whether this is due to an actual decline in the number of accidents, or to a decrease of interest in the study, has not been determined. Nevertheless, we were concerned with this question. In the poison group, individuals had fewer interviews than in the control group. To test the effect of fewer interviews on the accident rate, we used the adjusting technique mentioned above. The results are shown in table 2, which shows what would have happened had the poison group been selected and retained in the study in the same manner as the control group.

Another item with which we were concerned was the ability of the individual to recall accidents. While the interviewer asked about all accidents that had occurred to the family within the past month, accidents were coded separately according to those which had occurred within a week prior to the interview and those which had occurred in the remainder of the month. Of the total accidents reported, 46.6 percent were reported as occurring within a week prior to the interview, 50.2 percent within the rest of the month, and 3.2 percent were reported as date unknown. Logically, one would expect three times as many accidents to be reported in the first 3 weeks of the interview month as in the week prior to the actual interview. However, the tabulation of accidents reported within 1 week prior to the date of interview, does show a distribution similar to that found for all accidents (table 1).

Table 3. Percentage distribution of all accidents,[1] by type of treatment

Type of treatment	Group	
	Poison	Control
None	26.3	24.8
First aid	62.4	64.1
Medical attendance	6.3	6.9
City-County Emergency First Aid Station	3.0	1.3
Hospital outpatient department	1.5	2.2
Hospital inpatient department	.2	.2
Not stated	.4	.5

[1] Excluding original poisoning treated at San Jose City-County Emergency First Aid Station.

Table 4. Percentage distribution of all accidents,[1] by place of occurrence

Place of occurrence	Group	
	Poison	Control
Own home	69.0	60.7
Other home	9.1	9.3
Work	4.4	5.5
School	3.9	3.1
Motor Vehicle	1.7	1.1
Public place	8.7	18.5
Not stated	3.2	1.7

[1] Excluding original poisoning treated at San Jose City-County First Aid Station.

Accident Morbidity Data

In testing the hypothesis that accidental poisoning may be associated with a higher than average incidence of accidents, the study uncovered accident morbidity data which are similar to the findings of other accident studies. The distribution of accidents by age group is given in table 5. The distribution of home accidents shows a pronounced age-specific rate differential. The higher accident rates are associated with the younger age groups (table 5). While the home accident rates for both poison and control groups were nearly identical for most ages, in the poison group slightly higher

rates were noted for age groups 1–2 years and 3–4 years.

Figures are available showing the location of greatest accident liability in the home. Excluding the original poisoning, for males in both poison and control groups the largest number of accidents occurred in the yard, with 22.2 percent of accidents in the poison group and 18.0 percent of those in the control group occurring there. For females in both groups, the kitchen was the most dangerous place; 22.3 percent of accidents in the poison group and 23.7 percent of those in the control group occurred in the kitchen.

As to the hour of the day of greatest accident liability, we see a peak from 10:00 a.m. to 12:00 noon, and another peak from 2:00 p.m. through 6:00 p.m. Accidents reported between these hours were coded to the nearest hour.

The degree of correlation of all accidents for poison and control groups, by month, was tested. The correlation was almost zero, indicating that seasonal variation, if it exists, is lost in random movement of the rates up and down by month.

During the course of the study, nine individuals in the poison group had a second accidental poisoning. Only one of these came to medical attention, being treated at the emergency first-aid station. Checking the cards of the nine individuals who had repeated poisoning against various poison group statistics revealed no leads which would have helped to predict this recurrence. One control group family did have a case of accidental poisoning which was treated at the emergency first-aid station, and this family was transferred to the poison group. In the control group there were six additional cases of accidental poisoning which received no medical attention. Checking the six cases against various control group statistics revealed no leads which would help us to separate this group from the entire control group.

Considering the relatively low incidence of accidental poisoning, the fact of repetition of such an accident to the same individual in 9 cases out of 118 may be a major finding. However, this finding should be interpreted with caution. Let us assume that accidental poisoning of any form is randomly distributed and that the occurrence of one incident to a child does not influence the likelihood of the same child experiencing a subsequent poisoning. From these two assumptions, we would expect to have the same number of accidental poisonings per month per person in the susceptible age group in both the poison and control groups. Remember that we are assuming that the occurrence of the initial poisoning does not affect the likelihood of a subsequent poisoning. There are about 50 percent more person-months in the susceptible age group in the poison group than in the control group; thus we see that the

Table 5. Rates for all accidents [1] and for home accidents, and person-months for all accidents, by age group

Age group (years)	Rates per 100 persons per month				Person-months	
	All accidents		Home accidents		Poison	Control
	Poison	Control	Poison	Control		
Under 1	16.9	28.7	16.4	24.8	213	129
1–2	35.5	32.1	31.4	26.1	612	433
3–4	22.8	20.4	18.5	14.4	319	416
5–9	16.4	17.4	8.7	8.2	312	414
10–14	14.1	16.0	8.3	6.9	121	175
15–24	14.1	21.3	8.9	14.9	348	249
25–44	10.3	13.6	7.2	9.6	920	877
45–64	----------	16.7	----------	14.3	10	42
Not stated	----------	----------	----------	----------	4	----------
All ages	18.8	19.7	14.7	13.8	2,859	2,735

[1] Excluding original poisoning treated at San Jose City-County Emergency First Aid Station.

nine cases in the poison group and the six cases in the control group actually represent an identical rate. While the assumptions stated above may be questioned, if they were true, the "repetition" of accidental poisoning observed would be exactly what we would expect on the basis of chance alone.

Discussion

Data gathered by this study about the nature of accidents were somewhat limited since the study included only families with a child under 5 years of age. The study was designed with the intent of providing a test of the possibility of using the fact of poisoning as a technique for finding families with a high incidence of accidents.

Results do not seem to favor using accidental poisoning as an indication that a family is subject to a high incidence of accidents of all kinds. We gathered no systematic evidence to indicate that a poisoning accident made the family more aware of safety and more receptive to information on safety. Furthermore, we did not get information as to the level of potential hazard of various toxic materials, nor as to their storage.

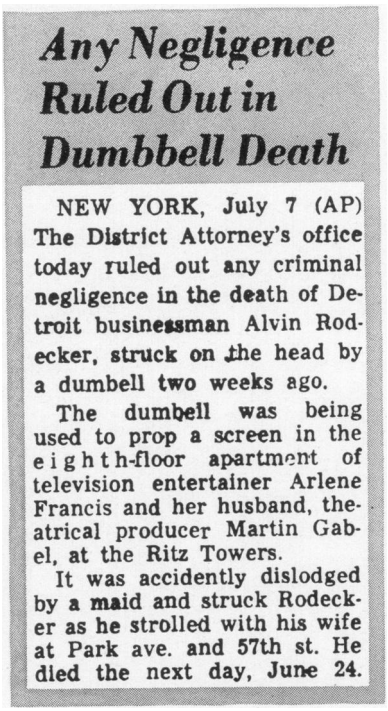
Summary

The San Jose (Calif.) City Health Department tested the feasibility of using the occurrence of a case of accidental poisoning treated at an emergency facility as an indicator of a family with a high incidence of accidents. However, such families experienced no more accidents than the average of similar families, except for a slightly higher rate for home accidents in the poison group for ages 1–2 years and 3–4 years.

The accident experiences of 118 poison group families and 80 control group families were obtained by means of periodic household interviews. Poison group families were chosen on the basis of having a child under 5 years of age who had been treated for poisoning at the San Jose Emergency First Aid Station. Control families were made up of a systematic sample of all families in San Jose who had one child under 5 years of age. Comparison of the accident rates for the poison and control groups revealed no major differences. Accidental poisoning cases treated at an emergency facility do not seem to be a means of casefinding for families with a high incidence of accidents.

Genesis of an Accident

In the July issue of *Public Health Reports*, Dr. Albert L. Chapman, Assistant Surgeon General, Public Health Service, discussing "The Anatomy of an Accident," described how a series of unsafe acts led to an injury caused by a flower pot falling from a window. While his text was in the hands of the printer, an accident remarkably similar to the hypothetical accident outlined by Dr. Chapman was reported by the Associated Press, as shown here in a clipping from the *Washington Post*. The tragic event gave substance to Dr. Chapman's conviction that unsafe acts in themselves are the important target in accident prevention campaigns.



Any Negligence Ruled Out in Dumbbell Death

NEW YORK, July 7 (AP) The District Attorney's office today ruled out any criminal negligence in the death of Detroit businessman Alvin Rodecker, struck on the head by a dumbell two weeks ago.

The dumbell was being used to prop a screen in the eighth-floor apartment of television entertainer Arlene Francis and her husband, theatrical producer Martin Gabel, at the Ritz Towers.

It was accidently dislodged by a maid and struck Rodecker as he strolled with his wife at Park ave. and 57th st. He died the next day, June 24.