

Accessing the Poison Control Center in the 21st Century. How do Patients Find and Contact their Poison Control Center?

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Introduction

Currently there are 55 Poison Control Centers (PCC) in the United States. In any of the 50 states, Puerto Rico, the Federated States of Micronesia, American Samoa, Guam and the U.S. Virgin Islands, a caller that dials the national PCC access telephone number (1-800-222-1222), is routed to the geographically closest PCC assigned to the caller's area code [1]. Functions of the PCCs include providing information and instruction to the public and health care professionals for appropriate management and disposition of poisoned patients and toxic exposures.

In 2012 U.S. PCCs received 3,373,025 phone calls. Of those calls, 2,275,141 were classified as closed (as opposed to ongoing or unresolved) human exposure cases. Of the closed human exposures calls, 93.6% of the exposures occurred at a residence (as opposed to a restaurant or public space) and 72.5% of the calls were made from a residence; only 19.5% of the calls were from a health care facility [1].

Although the total number of human exposure calls to PCCs has declined since 2009, the percentage of call originating from doctors' offices, hospitals and other health care facilities has increased since 2011 [1].

In April 2011 the U.S. House of Representative voted for a bill that cut federal funding to PCCs by 36% [2]. Further budget cuts at the state and local level threaten the survival of many PCCs [3]. Numerous studies have shown that the advice and service from PCCs saves medical costs [3-6]. Public contact and use of PCC resources demonstrate cost effectiveness and public health value, therefore it is important to know how the general public accesses their regional PCC. Our objective is to improve our understanding of how PCC resources are accessed by the public in order to determine how PCCs might improve access. Improved, easier access to PCCs should result in healthcare savings and increased value and potentially funding for PCCs.

Methods

This investigation was an IRB approved observational prospective survey on human exposure calls to the Rocky Mountain Poison and Drug Center (RMPDC) over 5 days in December 2012. RMPDC serves approximately 12 million people in the states of Colorado, Nevada,

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Idaho, Hawaii and Montana. Any person calling the RMPDC regarding human exposure poisoning cases (as opposed to animal exposure or information only calls) was eligible to participate in the survey.

At the completion of the call, according to the operating protocol of the PCC, callers were verbally consented by a Certified Specialist in Poison Information (CSPI) and asked:

- 1) "How did you obtain the phone number of the Poison Control Center?"
- 2) "Are you calling on a cell phone or landline?"

Callers who refused to participate in the survey were excluded. If in the judgment of the involved CSPI, the case needed emergency attention and disposition and participation in the survey would delay care, the caller was excluded from the survey.

Answers to the questions and demographic information was collected from the callers and recorded directly onto the electronic medical record (CasePro San Antonio, TX) and uploaded to NPDS in real time by the CSPIs. Sometimes the callers were not patients themselves. In these cases the only demographic data collected

about the callers was their relationship to the patients. Answers to the questions and approved demographic data were retrieved from NPDS by the investigators.

Based on data from 2010 (69,343 calls received from a private residence, as opposed to a healthcare facility or other institution) the anticipated number of calls to estimate the percentage of callers using cell phones (within 3%) was calculated to be 659 with $\alpha=0.05$ (power=0.95). This assumed that 20% of calls would be made from cell phones.

We used descriptive statistics to characterize the answers. Replies were entered into a dedicated field on the CasePro electronic PCC data collection instrument, which was uploaded in real time to NPDS. Data was retrieved from NPDS and collated by the authors, analyzed and described with simple descriptive statistics in JMP 9.0 (SAS Institute, Cary NC).

Results

During the 5-day study period in December 2012, 1057 human exposure calls were recorded and included. Of these, 688 (65%) callers answered one or two of the survey questions. 586 callers answered the first question (where they obtained the PCC phone number) and 676 callers answered the second question (cellular phone vs. landline).

Of the 688 callers that answered one or both questions, the median age of the exposed patient was 3 years (0.1 to 98 years) and 50% were male. Sixty-eight percent of callers were mothers, 18% were fathers and 6% were grandparents. The rest of the callers were a combination of different family members (aunts, uncles, siblings) and friends of the exposed. Ninety-four percent of the calls originated from a home.

586 callers answered to the first survey question. The largest percentage of these callers obtained the telephone number of the PCC from the internet. (252/586, 95% CI=39.1-47 %.) Only 10.2% of the callers obtained the number from promotional materials such as the brochures and magnets that have the PCC contact number printed on them (**Table 1**).

The majority of respondents (497/676; 74%) called on a cellular phone versus using landline phone.

Discussion

We found that the largest percentage of callers to our PCC found the phone number using an internet search engine and called the PCC on a cell phone. This is a dramatic but not unexpected change from previous studies [7] that mirrors the increased use of the internet and cell phones in general. The study was not designed to record which callers had internet access and which didn't. Since ARCHIE the first internet search engine was developed in 1990, thousands of search engines have been developed [8]. With the development of the computer and advances in internet technology, the use of and need for printed

products has decreased as demonstrated by the bankruptcy of large franchise bookstores [9]. In 2007 Bill Gates, the founder of Microsoft, predicted that the use of the phone book (Yellow Pages) by a younger population would drop to nearly zero over the next five years [10,11]. Only one in nine households looks up printed listings and the phone company has made efforts to have the production and delivery of phone books waived [12,13].

A survey on randomly selected metropolitan Baltimore residents in 1981 revealed that about 30% of the interviewees knew to call the PCC in case of a poisoning accident. Among those respondents 20% said that they would use a telephone book to look up the number [14]. Between 1979 and 1986 the New Mexico Poison and Drug Information center surveyed private callers as to where they had found the telephone numbers they were using to contact the PCC and found that the telephone book was the most commonly used reference for PCC contact information in their area [15].

In our survey 43% of the callers to the RMDPC used an internet based reference to look up the telephone number of the PCC and the number of the callers who used a printed phone directory dropped to 7%. Although we did not measure the type of cell phone used, it is possible that many of the calls that originated from cell phones also are also internet-enabled smart phones. We did not attempt to verify whether or not the caller actually had access to the internet and assumed that the majority of callers would. Despite their intent to increase awareness of contact information, promotional materials such as refrigerator magnets were used only by 10% of callers. Although different items have various cost considerations (stickers are less expensive than refrigerator magnets or coloring books), given an average price of \$1-2 for each promotional item and the relatively uncommon usage as demonstrated in this study, PCC funds might be better spent in alternate ways. Promotional materials might be better targeted to specific populations, although this would most likely increase costs prohibitively.

In 1956, the first call was made by a wireless telephone using an automated phone system. Since then the use of wireless cellular phones has been increasing and emergency calls from cellular phones has increased commensurately. It is estimated about 70% of the 911 calls are made from cellular phones [16-19].

According to the 2012 National Health Interview Survey, 38.2% of households do not have a landline telephone and use only cellular phones [19]. Another 2012 survey showed that 85% of the adults in the U.S. own cellular phones [20]. The number of households that have only wireless telephones has also been increasing steadily. A majority of the callers who participated in our survey were mothers with young children who were exposed at home and called from their cellular phone. This result matches the demographics of the National Poison Data System and the cellular phone users in other studies [7]. 42% of adults who only have cellular phone service live with children [19]. Adults living

Table 1 Callers number from promotional materials.

PC Number Source	Internet	Health Care Facility	Promotional Material	Phone Book	Other
	43.0% (252/586)	22.2 (130/586)	10.2% (60/586)	7.2% (42/586)	17.4% (102/586)
95% CI	39.1-47%	19-25.7%	8-13%	5.3-9.5%	

with children were more likely to rely on wireless telephones regardless of the ownership of landline telephones [19]. This has important implications for ease of access to PCCs.

People search for medical information online [20]. With the current increased use and ownership of smartphones capable of accessing the internet, the number of callers who will access the PCC through their cellular phones and mobile internet is expected to continue to rise. In order to promote the availability and function of the PCC to the public, more focused efforts in educating cellular phone users, particularly those with young children, may be effective. Similarly, health care providers may facilitate PCC access knowledge by educating their patients about PCC activities and resources.

By understanding how the public most commonly accesses information to the PCC network, efforts to increase access (and therefore utilization) such as direct routing of cell phones and configuring devices that utilize internet based platforms to recognize PCC applications and direct users to PCC websites and helplines can occur. PCCs should invest in internet-based and

cellphone compatible applications and interfaces in order to increase accessibility and utilization.

Since 2009, PCCS have recorded decreased numbers of calls. Federal and state funding for PCC activity can be affected by decreased utilization, so it is important to be aware of changing access practices and to provide innovative and creative ways for the public to access poison information. The easier it is for people to access PCCs the more likely they will be using it frequently [21]. Younger adults and cell phone users should be approached via internet related methods rather than by traditional printed or promotional products.

Conclusion

Most callers use cell phones to access the PCC for exposures. The PCC phone number is most likely obtained from the internet. Public education dollars may be best spent to create more convenient access for cell phone users and improve Internet search engines to enhance on-line presence of Poison Control Centers.

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