Poison control center communication and impact on patient adherence

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Abstract:

Objective. This project explored the communication processes associated with poison control center calls. Methods. In this preliminary study, we adapted the Roter Interaction Analysis System to capture staff-caller dialogue. This involved case selection, wherein adherence and non-adherence cases were selected; call linkage to medical records, where case records were linked with voice recordings; and application of Roter Interaction Analysis System to calls. Results. Results indicate that communications are predominantly provider- driven, Patient age and percentage of staff partnership statements were significantly associated with adherence at the 0.05 level. Increases in age were associated with decreases in adherence to recommendations ($p < 0.001$). Increases in percentage of staff partnership statements (over all staff talk) were associated with increases in adherence ($p = 0.013$). Conclusion. This line of research could lead to evidence- based guidelines for effective staff-caller communication, increased adherence rates, and improved health outcomes.
Keywords Communication; Adherence; Poison control center; Roter Interaction Analysis System (RIAS)

Article:

Introduction

Poor adherence to health-related recommendations is estimated to cost 100 billion dollars yearly, resulting in such adverse outcomes as exacerbation of an existing condition, incidence of new morbidity, patient/provider frustration, compromised future care, and even death (1). The impact of nonadherence is a problem for the 61 Poison Control Centers (PCCs) that respond to the majority of the nation's poisoning episodes (2). In responding to these phone calls, Poison Control Specialists (SPIs) assess the likelihood of toxicity and adverse medical outcomes secondary to exposures. If callers are deemed at-risk for adverse health effects from the exposure, or have engaged in self-harm attempts, they are referred to health care facilities (e.g., local emergency department) for further evaluation and treatment. Across the nation in 2004, 49,362 (2%) callers failed to follow PCC referrals to a health care facility for further evaluation, and many others were lost to follow up or left against medical advice (2). A study from the Pittsburgh Poison Center found that sequelae developed in 31 % of children and 46% of adults who were noncompliant with their recommendations (3). The true cost and morbidity secondary to nonadherence with PCC referral recommendations is not well studied.

Despite the fact that behavioral scientists have been examining adherence in the health domain for over 50 years, less than 10% of the literature is empirical in nature and substantial gaps in knowledge exist (4,5). Most prior work has focused on adherence to physician recommendations within an ongoing relationship of treatment and care (e.g., primary care physicians) (6). More recently there have been studies examining adherence rates via telephone and email contact; however, these typically occur within the context of an ongoing relationship with a provider or care/treatment setting (7). Patient-provider communication is a critical component for virtually all theoretical models of adherence. Research suggests that many of the reasons patients fail to comply (e.g., beliefs in recommendation, barriers, and social support) can be addressed with effective patient-provider

communication (4). Effective communication plays an essential role in adherence, although the research evidence is primarily limited to the area of physician-patient communication (6).

The aims of the current project were two-fold. The fIrst aim was to describe the communication processes associated with PCC telephone calls in which the exposed patient was deemed at risk for serious health consequences and was thus referred to a health care facility. The second aim was to determine if staff characteristics, caller characteristics, and/or communication patterns were able to predict caller follow- through.

Materials and methods

Our study was approved by the University of Utah Investigational Review Board to randomly select cases from the Utah Poison Control Center (UPCC), link cases to call voice recordings, code, and analyze the relevant data.

SPIs document caller information on a confidential medical record within the data management system TOXICALL (Computer Automation Systems, Inc. Version 4.6.13, 2005). Each call to the UPCC is recorded using a digital recording system, Wordnet® (version 2.1, 2005). Digital recordings are stored independently of the electronic medical record. Data for both the electronic medical record and the digital recording system are stored on secure servers.

Case selection

To ensure a randomized sample of cases, 10 weeks within 2004 were randomly selected for data collection. From these ten weeks, one day within each week was randomly chosen, from which five adherence cases and five non-adherence cases were selected. Adherence outcome to SPI referral recommendation was documented by the SPIs. In cases of adherence, the SPI typically recorded emergency room staff verification that the caller was seen. In cases of nonadherence to a referral, the SPI documented a subsequent conversation with the caller and learned by the caller's self report that they did not heed the SPI's recommendation. Caller reason for nonadherence was not consistently documented. In sum, 100 cases (50 adherence and 50 non-adherence) were selected for call recording linkage to the electronic medical record. Cases were included only if the patient had been referred to a health care facility.

Electronic record linkage to recorded call

The electronic case record was manually linked with the digital voice recordings using a combination of date and time stamps which are stored in both the data management and voice recording systems. The linkage was validated by listening to each call and matching it with the call record. Of the 100 original calls 81 (41 adherence and 40 non-adherence) were retained for analyses; the remaining 19 calls were omitted from subsequent analyses because, upon listening to the actual call recordings, the case failed to meet the inclusion criterion (i.e., SPI referral to a HCF).

Application of RTAS to poison control communications

We adapted the most widely used medical communication coding system, the Roter Interaction Analysis System (RIAS), which has been found to be applicable to telephone health care (8), to categorize the dialogue between staff and adherent vs. nonadherent patients. The RIAS provides a tool for capturing the content and process of medical dialogue. The system consists of 48 mutual exclusive and exhaustive coding categories which are applied to the smallest unit of expression or statement. The codes are then combined to summarize dialogue patterns.

Task behaviors of the call are primarily captured by codes related to provision of information and gathering information (e.g., question asking). The socio-emotional task of a call is often done through rapport building such as being responsive to caller emotions and concerns (e.g., reassurance and empathy). Statements which reflect facilitation or partnering to reach a healthy related goal are also part of the socio-emotional call task. RIAS coding examples are provided within Table 1. These are not meant as examples of ideal, preferred, or appropriate PCC communication from a quality perspective, but are intended to provide an illustration of the coding system.

In order to apply the adapted RIAS coding scheme to the original digital audio files for the 81 linked calls, two experienced coders (at the Johns Hopkins' RIAS lab) used direct entry software. Inter-coder reliability was calculated on 10% of the tapes. Pearson correlation coefficients for each communication category by speaker (SPIs and caller) averaged ≥ 0.70 (range .70 – .99) which is consistent with existing literature (9,10).

Measures Communication variables

The individual RIAS codes are the building blocks, or basic communication elements, that can be represented as individual category frequencies or as a proportion of all speaker statements throughout the session. For example, SPI questions may be represented as a mean frequency (M = 14.7), which simply denotes the average number of questions per call, or as a proportion or ratio of all SPI statements (21 %). The ratio

Table 1. Examples from categories of the Roter Interaction Analysis System

Call tasks	Examples of call dialogue
Data gathering	SPI: *Please spell the name of the medication for me?; Do you know when he took it?; How are you feeling now?*
	Caller: *What should I do?; Can that tiny amount harm my baby?*
Provision of information	SPI: *A single swallow of Peroxide won't cause vomiting.; What you took can cause kidney damage.*
	Caller: *I take Coumadin; I swallowed about one tablespoon.*
Emotional talk	SPI: *You are going to be just fine.; Try to calm down and talk slowly.*
	Caller: *I'm afraid I will get in trouble if I take my girlfriend to the ER.; I am worried about my son.*
Activating and partnering	SPI only code: *Let's make sure I've got it right . . . ; Hang on while I look the contents up.*

reflects the relative "weight" of a topic in the context of all that a speaker said within a session (11). We created ratios for provision of information (SPI and caller), question asking (SPI and caller), emotional talk (SPI and caller), facilitative talk (SPI only), and agreements (e.g., "uh-huh . . . okay"; SPI and caller). As an indicator of verbal dominance, we also computed the proportion of total caller talk over total staff talk. The categories of communication exchange, described above, comprise most of call communication; however, not all statements are discussed in the present manuscript. Other codes not included in the composite scores were of low frequency (e.g., social chit-chat, laughter, transitions).

Call characteristics

Call variables of interest were recorded from the electronic record and included caller status (i.e., call for self vs. other), sex, age, route of exposure (e.g., oral vs. skin), reason for exposure (i.e., unintentional vs. intentional), and time since exposure. Also, SPI recommendations were documented, as were follow-up attempts and follow-up outcomes (i.e., went to a HCF vs. failed to go to a HCF). The final sample of 81 calls represents the work of 10 (of the 11) SPIs at the UPCC with the lowest number of calls received by a SPI being 3 and the highest number being 14. It should be noted that each SPI was assigned a number so that we could statistically control for SPI and related variation in communication.

Analyses

Descriptive statistics were used to describe the sample and the general communication patterns. Logistic regression was used to explore the association between communication and adherence. Each communication

factor was examined individually with adherence, and factors that had a statistical significance of $p < 0.20$ were considered candidates for the model. These factors were put in a backwards stepwise regression which yielded the final model.

Results

Descriptive results of call variables

Of the 81 calls, 39 were placed by males and 42 were placed by females. The majority of calls (n = 45; 55.6%) were made by a family member of the patient. Less frequently (n = 13; 16%), calls were placed by the patients themselves; the remaining calls were placed by a non-relative (n = 17). In a few cases, the relationship of the caller to the patient was unknown (n = 6). The age of the exposed individual ranged from two years to ninety-two years, with a third of calls (n = 29; 35.8%) being placed in reference to younger patients (<_ 18years). Just over half the calls (n = 41; 50.6%) were in regards to unintentional toxic exposures, although a large number of the calls (n = 33; 40.7%) were in reference to intentional exposures related to abuse or misuse of toxic substances. The remaining calls were unable to be identified as intentional or unintentional, as they were related to contamination (n = 1; 1.2%), malicious tampering (n = 2; 2.5%), unexpected adverse reactions to food/drugs (n = 3; 3.7), or unknown causes (n = 1; 1.2%).

Descriptive results of communication variables

BIAS codes demonstrated a wide range of frequencies per call; to illustrate, a table of more commonly occurring BIAS codes (i.e., mean frequency > 2.0) is provided below (see Table 2).

We found that, on average, the staff talked 39% more than the caller (see Table 2), suggesting that PC communications are predominantly provider-driven. The SPIs devote nearly half of their communication to both gathering information (i.e., question asking) and providing information. Finally, SPIs divide their remaining dialogue relatively equally among emotionally responsive statements, statements which reflect attempts to partner with and activate caller, and agreement statements. Approximately two-thirds of the caller communication involved providing information to the SPI (see Table 2). Interestingly, the caller question-asking categories averaged less than 2 occurrences per case (not included in table). Caller statements reflect agreement with what the SPI is saying and relatively little talk is devoted to the expression of emotional concerns.

Table 2. Frequencies of RIAS codes

RIAS codes for staff	Mean# of coded responses	SD	Ratios (over total staff talk)	SD
Gives information	21.6	14.7	27%	.1
Question asking	14.7	4.8	21%	.1
Emotional talk	11.0	7.4	14%	.1
Facilitative talk	9.8	4.7	14%	.1
Agreements	11.2	6.0	15%	.1
# of referrals	2.3	1.8	–	–
Total staff talk	74.1	27.7		
RIAS codes for caller	**Mean**	**SD**	**Ratios (over total caller talk)**	**SD**
Concern, worry	2.6	3.5	4%	.0
Gives information	35.9	16.2	65%	.1
Shows agreement, understanding	9.0	6.1	16%	.1
Total caller talk	55.9	24.3		
RIAS codes for caller & staff	**Mean**	**SD**		
Dominance (staff/caller) ratio	1.4	0.3		
Total talk (staff & caller)	129.9	48.7		

Variation in call variables and communication related to adherence outcomes

Candidate predictors of adherence were identified using a series of simple logistic regressions. Variables that attained values of p <_ 0.20 were included in the univariate logistic regressions. Specifically, patient age, percentage of SPI partnership statements (over all SPI talk), percentage of information provision statements by SPI (over all SPI talk), and percentage of caller emotional talk (over all caller talk) met initial criteria for inclusion in further analyses. In contrast, percentage of SPI emotional talk (over all SPI talk), percentage of questions asked by SPI (over all SPI talk), percentage of SPI agreement statements (over all SPI talk), percentage of caller information provision (over all caller talk), percentage of caller question-asking (over all caller talk), and percentage of caller agreement statements (over all caller talk) did not meet criteria and were not retained for further analyses.

Backwards stepwise regression revealed that only Patient Age and percentage of SPI partnership statements were significantly associated with adherence at the 0.05 level. An increase in age was associated with a decrease in likelihood of adherence to SPI recommendation (OR = 0.95, $p < 0.001$). An increase in percentage of SPI partnership statements (over all SPI talk) was associated with an increase in the likelihood of adherence (OR = 1.11, $p = 0.013$).

Discussion

By conducting this preliminary study, we are able to provide insight into both the content and clinical process of caller and SPI telephone communication related to incidents of toxic exposure that warrant HCF referrals. To do so, we applied the most widely used medical communication coding system, RIAS, to PCC encounters. We found that SPIs devoted roughly half of their dialogue to gathering information and providing information. Callers devoted approximately two thirds of their communication to provision of information. SPIs talked 1.4 times more than the caller. There is little other research on the content of brief medical emergency phone interactions; however, the ratio of SPI to caller talk is consistent with findings from research on patient-physician encounters (12).

Despite the emergency nature of these calls, SPIs devote substantial dialogue to emotional responsiveness (14%) and to statements which have a facilitative or activating role (14%). Other investigators and scholars have noted that, even in emergency care, provider attention to relational factors is critical to efficiency and cooperation (13,14).

Role of communication in adherence to poison control center referrals

There is a paucity of evidence-based research on telephone communication behaviors that promote adherence despite world-wide consumers rapidly increasing their use of telephone health advice (15–18). As such, a final aim of this project was to assess the predictive role PCC communication plays in adherence to HCF referrals. We found that in cases in which SPIs used more partnership statements the likelihood of caller adherence was increased. This finding is consistent with results from the general health adherence literature (19–21). Partnership communication skills are important in trust building with clients and in helping them make informed decisions and are equally important in promoting adherence to provider recommendations (22).

Limitations

Caution is warranted in broadly generalizing from these preliminary findings. The sample size for this study is small and findings are based on SPIs and calls at one regional poison center. Furthermore, the calls in this study are somewhat biased as they are based only on cases in which SPIs' followed up and were able to determine outcomes (i.e., receiving HCF attention vs. self-report refused referral). Future research should include all PCC calls to more fully understand the range of challenges callers pose. Finally, RIAS has not previously been applied to PCC communication and has only been limited in its application to telephone health care, and so further adaptation of the system may be needed.

Conclusions

This preliminary study describes poison control communication and seeks to examine the predictive role of communication to adherence to SPI referrals to HCFs. It is likely that telephone health care requires specialized communication techniques, as well as more general health communication skills, and thus, may require specialized education and training in communication. For instance, in one study, clinical staff indicated a need for instruction on the ability to extract information, good listening skills, and demonstrating patience, a caring approach, and a good telephone manner in dealing with callers (23). We hope that this line of research will lead to future work to establish evidence-based practice guidelines for effective SPI-caller communication, increased Poison Control referral adherence rates, and subsequently improved health outcomes. Increasing the current understanding of relevant communication components in calls to the PCC provides important information to incorporate into poison center training programs and may possibly have applications for other emergency communication specialists (e.g., 911 dispatchers) as well.

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