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COMMUNICATION PATTERNS FOR THE MOST SERIOUS POISON CENTER CALLS

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Abstract

Context—The communication demands faced by specialists in poison information (SPI) are challenging in the health care context.

Objectives—1: Describe SPI communication patterns for the highest risk poison exposure calls using cluster analysis, and 2: describe variation in communication patterns or clusters.

Methods—A sample of 1 year of poison exposure calls to a regional PCC with SPIs' perceived severity rating of major/moderate perceived was collected. Digital voice recordings were linked with medical records and were coded using the Roter Interaction Analysis System (RIAS). Descriptive analyses were applied and cluster-analytic techniques were used to assess variation in call communication and factors associated with that variation.

Results—Cases were described and 4 communication styles were identified. The Informational cluster represents 24% of calls and represent a pattern of relatively high levels of SPI clinical information and caller questions. The Facilitative cluster represents 35% of calls with a pattern of relatively high SPI questions and caller information provision. The Planning cluster represents 33.5% of calls representing a pattern of relatively high levels of SPI relationship talk. The Emotional cluster represents 7.5% of calls representing a pattern of relatively high caller and SPI emotion. Multinomial logistic regression using call/case characteristics as stepwise predictors of cluster membership revealed relationships between cluster membership and number of substances, type of exposure (intentional vs. unintentional), caller relationship to patient, length of call (χ^2 s > 21.59, df = 3, ps < .01) and SPI identity (χ^2 = 88.34, df = 33, p < .01).

Conclusion—This study provides a beginning step to understanding SPI communication behaviors. Our results suggest that SPIs are able to use a range of communication strategies that often involve not only information but also emotional responsiveness and rapport building. Findings also point to the opportunity for future communication training for SPIs to meet the needs of the heterogeneous caller population.

Keywords

communication; poison control; cluster analysis

Introduction

There are associations between effective patient-provider communication and patient outcomes, such as satisfaction, treatment adherence, pain and symptom response, and recovery.^{1–5} The need for improved communication has been recognized in core medical curricula (e.g., medical school, residency) and in trainings sponsored by professional medical and health care societies.^{6,7} The vast majority of the communication research and communication skills training programs have been conducted and evaluated with physicians and have targeted their in-person, one-on-one skills with patients. There is a gap in our understanding of effective communication in telephone health care⁸ and communication with pharmacists and nurses.^{9,10}

The communication demands faced by specialists in poison information (SPI) are challenging in the health care context. SPIs interact with unknown patients via telephone during 1–2 encounters, assessing patients without visual cues and under time pressure. Additionally, the vast majority of poison control center (PCC) encounters are routine, which may make it especially difficult to be vigilant and accurate in managing high risk poison exposures.¹¹ Within these parameters, SPIs must establish credibility, trust and rapport, gather information, assess risk, and communicate a plan.

Current SPI training typically emphasizes the acquisition and application of clinical toxicology knowledge, with little to no formal training in effective and efficient communication skills (Personal communication, AAPCC Managers' Listserv). Little has been published about how SPIs communicate with callers, particularly for the most serious cases. However, SPIs report making a rapid initial assessment of case severity.¹² These provider severity perceptions have been found to affect emergency telehealth providers' decision making processes.¹³ Effective and efficient communication is essential to ensure that poison exposures have a positive patient outcome and is critical in the most serious poison exposures where the stakes are the highest.

The primary objective of this study was to describe SPI communication patterns for the highest risk poison exposure calls. A secondary objective was to examine factors which are associated with the variation in communication clusters. These factors could potentially act as predictors of specific communication patterns that occur in PCCs.

Methods

This study used a sample of poison exposure calls to a regional PCC during October 1, 2007– Sept 30, 2008 and linked the digital voice recordings with the poison control medical record. This retrospective study was approved by the University of Utah Institutional Review board.

Case Selection

During the one year time period of the study, SPIs rated the perceived severity of the exposure using categories consistent with outcomes as established by AAPCC NPDDS definitions.¹⁴ SPIs were instructed to use their clinical judgment and predict the severity of each human exposure based on their initial interaction with the caller. The poison control center's electronic medical record system (ToxicallTM) was modified to include a pop-up field that prompted "SPI perceived severity rating" entry of: no effect, minor effect, moderate effect, major effect, and not coded. The "not coded" category was only used for 11% of the cases and assigned post-hoc when a rating was not assigned during the initial call; these calls were therefore not included in the study sample. For further detail on SPI "perceived severity rating" findings please see Poyton et al.¹¹

Call Characteristics

Seven case characteristic variables were examined in the analysis. Data from the ToxicallTM electronic medical record was extracted including: age, number of substances the patient was exposed to, final medical outcome, reason for exposure, caller relationship to patient, and identification of SPI who initially takes a case. Type of exposure was examined as a dichotomous variable (intentional vs. unintentional). Caller relationship to patient was defined as either self, family member, or unrelated other. The sixth case characteristic variable was individual SPI identity. In order to protect the identity of the 12 individual SPIs, the research team was unable to link communication data with individual SPIs. The seventh variable, length of call, was captured by communication software and documented by coders (see next paragraph).

Application of RIAS to poison control calls

The Roter Interaction Analysis System (RIAS)¹⁵ was applied to the selected calls. RIAS is a medical communication coding system in which the smallest phrase or utterance is coded into discrete, mutually-exclusive and exhaustive categories for each speaker (e.g., closed-ended psychosocial question). Typically, an utterance represents a complete thought. The RIAS codes can be considered building blocks or basic communication elements that are typically combined to summarize the dialogue in composite categories. Composite categories are created to reflect both task and process functions of the health care encounter.

For the present study, the SPI composite categories that reflect task-oriented communication behaviors include clinical information provision, question asking, and counseling (i.e., typically recommendations for action). For the caller, the task-oriented composite categories included clinical information provision and question asking. Process functions of healthcare encounters relate to affective or relational communication behaviors. On the part of the health care provider, affectively-oriented communication indicates responsiveness to patient emotions (SPI composite category of emotion talk). Relationship building communication behaviors demonstrate the provider's efforts to partner with the patient by eliciting patient opinions and expectations, checking that patient understands information, and showing interest and attentiveness to patient concerns (SPI composite category of relationship talk). The caller composite category that is associated with call process is emotional talk. Thus, five SPI and three caller communication composite categories were created from the RIAS codes. Example statements for each composite category can be found in the right-hand column of Table 1. For all analyses, ratios of these variables were calculated for each speaker (i.e., the speakers talk in a particular category to the total talk for that speaker).

Analysis

Descriptive analyses were used to determine general call characteristics, both in terms of caller demographics as well as communication behaviors. Pearson correlations were conducted to assess inter-coder reliability. To assess variation in call communication and factors associated with that variation, we used cluster-analytic techniques, entering RIAS composite categories and determining clusters based on conceptual and statistical fit. We first studied the output scree plots to find instances where there was large information loss in reducing the number of clusters.¹⁶ The 4-cluster model, described below, was adopted upon meeting with the research team, who facilitated clinically relevant interpretations of the communication patterns represented in each cluster. Factors associated with variation among communication patterns were determined using multinomial logistic regression entering call/case characteristics as stepwise predictors of cluster membership.

Results

Call Characteristics

The selection process for the final sample is shown in Figure 1. For the present study, we were interested in only those cases rated by SPIs as moderate to major effect (high severity) during the initial call ($n = 2564$ out of 47,034 human exposure cases for the year). From those cases, less than half involved speaking with a health care professional. Because this study focused on communication with lay callers, the cases involving health care professionals were excluded resulting in 1352 cases. To reach our final sample, research staff linked each electronic case record with digital call recordings via a time intensive search process described in detail elsewhere.¹⁷ We successfully linked 85% of cases with a full digitally recorded call, resulting in a final sample of 1150. We compared the linked cases 1150 with the 212 cases we were unable to locate the full digital recording on the ToxicallTM variables outlined below as case characteristics. We found no significant differences between linked and nonlinked cases.

Patient age ranged from 0.75 (i.e., 9 months old) to 90 years ($M=22.5$, $SD=19.9$). Average number of substances in question was 1.3 ($SD = .79$, range 1–9), with medical outcome of no effect for 19%, minor effect for 28%, moderate to major effect for 19%, or unknown or unrelated effect for 34%. Call length for was not associated with medical outcome ($p=0.81$). Most cases were unintentional (57% unintentional). Caller relationship to patient showed 15% of patients called for themselves, 62% of callers were family of the patient, and 23% of callers were unrelated to the patient. Patients were evenly split at 50% male and female. Callers were 69% female and 27% male (4% unknown).

Coder Reliability

Using RIAS, two trained coders using direct-entry software coded each call. Inter-coder reliability was calculated on a random sample of 11% of calls ($n=120$) selected throughout the coding period to assess for drift. The RIAS inter-coder reliability was calculated using Pearson correlation coefficients and averaged $>.80$.

Description of General Call Communication

Across all calls, the mean number of utterances per call were 108 ($SD = 51.14$). SPIs talked more, on average; 57% of utterances were made by SPIs compared to 43% by callers. The average call length was 3:58 minutes ($SD = 2.14$). As seen in the “All Calls” column of Table 1, the majority (64%) of caller statements were devoted to providing information about the exposure; averaging 29 informational statements per call. Only 4% of caller statements were devoted to asking questions and even fewer statements were devoted to

expressing emotional concerns (1%). It should be noted that only the most commonly occurring RIAS codes are included in the table (mean frequency > 2.0).

Meanwhile, SPIs devoted 23% of their total talk to providing information about the poisoning (averaging 14.68 statements devoted to providing information per call). Seven percent of SPI talk was devoted to counseling the caller or advising them on what to do about the poisoning. Questions comprised 25% of SPI talk. Of interest, SPIs engaged in a significant proportion (18%) of talk devoted to establishing alliances with the caller (relational talk) and 3% of their communication reflected an attempt at empathic understanding of the caller's situation (emotional talk).

Communication patterns

The first objective of our study was to identify general patterns of poison control communication. Using cluster analytic techniques, based on conceptual and statistical fit, we identified four general patterns of call communication: Informational, Facilitative, Planning, and Emotional. The relative prevalence of each cluster is shown in Figure 2. Table 1 depicts the relative level of specific communication behaviors for each cluster and for "all calls." Across the top row are listed the four clusters followed by "all calls" and examples of statements. The column on the left lists the RIAS composite categories, first for SPI talk and then for caller talk. The RIAS composites are presented with mean frequency and ratio of composite over all talk for each communication cluster and for "all calls." The bottom three cells in the left hand column of Table 1 show the percent of each speaker's total statements devoted to the specific RIAS composite categories, verbal dominance (i.e., ratio of the total number of SPI statements to the number of total SPI and caller statements), and length of call. A visual comparison of the communication patterns are depicted as different lines in Figure 3 with the composite categories being represented on the *x*-axis and the standardized mean amount of the composite categories being represented on the *y* axis.

The most common communication pattern was labeled Facilitative, and represents 35% (N = 403) of the calls. Interactions in this cluster are denoted by a relatively large ratio of SPI talk devoted to asking questions (31%) and caller clinical information provision (73%). Calls falling within this cluster show the lowest portion of SPI talk devoted to clinical information giving and counseling. These calls averaged 3 min and 16 seconds.

Twenty-four percent (N = 276) of the calls reside in the Informational cluster, in which SPIs provide a relatively high ratio of clinical information (32%) and counseling (8%). Callers in this cluster asked a relatively high ratio of questions (7%), yet provided somewhat less clinical information to the SPIs (56%) than two of the other clusters. Calls in this cluster averaged 4 min and 6 seconds.

The Planning cluster consists of 33.5% (N = 385) of the calls and is characterized by a relatively high ratio of SPI relationship talk (24%) compared to other clusters. Also notable, is that SPIs devote an equal proportion of their statements to clinical information provision (20%), asking questions (21%) and relationship talk, with moderate a level of counseling (6%). Calls falling in this pattern show callers asking relatively few questions (2%) and devoting 62% of their talk to providing clinical information. Calls in this cluster averaged 4 min and 15 seconds.

The final and smallest cluster, Emotional, includes only 7.5% (N = 86) of the calls. In this cluster, the caller exhibits higher proportion of emotional talk (7%) as compared to the other clusters and comparatively little clinical informational talk (52%). SPIs also have a comparatively high ratio of emotional talk (7%) and moderate levels of counseling (8%),

Clinical information provision (25%) and relationship talk (17%). These calls were the longest of the four clusters and averaged 4 min and 31 seconds.

Potential Predictors of Communication Clusters

The second objective of this study was to explore factors associated with the four different communication clusters. We examined both caller characteristics and SPI style. First, we used a multinomial logistic regression using the following call/case characteristics as stepwise predictors of cluster membership: number of substances, type of exposure (intentional vs. unintentional), caller relationship to patient, length of call, and patient age. Type of exposure and patient age were excluded in the final model as insignificant ($p > 0.05$). The exclusion of age was expected because of colinearity found between age and relationship of caller to patient (e.g., parent calling about toddler exposure) and because the person who makes the call is the communicator. Thus, our model included four significant factors associated with cluster membership. Parameter estimates with the facilitative cluster as a reference allowed for group comparisons.

In general, the calls that make up the Facilitative cluster were shorter in length ($\chi^2 = 58.23$, $df = 3$, $p < .01$) and more likely to be made by a relative or family member ($\chi^2 = 277.08$, $df = 9$, $p < .01$) as compared to the calls from the other three clusters. Only one cluster difference was found for number of substances. Informational calls tended to have significantly fewer substances than Facilitative calls ($\chi^2 = 21.59$, $df = 3$, $p < .01$).

Finally, exploratory analyses were conducted on the relationship between SPI and cluster membership. Chi square analysis showed a significant relationship between individual SPIs and communication cluster ($\chi^2 = 88.34$, $df = 33$, $p < .01$). Figure 4 depicts variation in communication patterns by individual SPI

Although not a potential predictor of communication variation (because case outcomes occur at the conclusion of the exposure which may include multiple calls), medical outcomes were examined in relationship to the four clusters. There were no differences in moderate or major call outcome effects among clusters, but no effect calls were significantly less likely in the emotional and informational clusters than the facilitative ($p < .01$) and minor effect calls were significantly less likely in the informational cluster ($p = .02$). ($\chi^2 = 26.65$, $df = 9$, $p = .002$).

Discussion

This manuscript provides insight into the little-studied nature of call communication at PCCs. From a regional PCC, we selected cases for one year based on SPIs' initial severity ratings and described communication patterns and possible predictors of variation in communication. With healthcare providers being increasingly encouraged to move from traditional task-oriented care models to a patient centered care approach,^{18,19} our research is helpful in understanding how both callers and SPIs communicate in order to facilitate an optimal PCC response.

In general, and as expected, callers tended to devote most of their talk to provision of clinical information, with minimal question asking and expression of emotional concerns. SPIs devote approximately a quarter of their talk equally to provision of clinical information and to question asking and slightly less to relationship building. Finally, SPIs counsel callers on what actions to take and on average they convey at least some emotional concern for the caller. From these findings, perhaps what stands out the most is that SPIs, in general, devote nearly a fifth of their talk to relationship building. A key aspect of patient centered care is establishing a trusting therapeutic relationship.^{20–22} Callers are more likely to adhere to

recommendations if the goals are mutually established and understood¹⁹ through a sense of partnership with their provider.

We employed a cluster analytic technique to the RIAS composite variables to identify the content and process of SPI-caller dialogue. Four interactive dialogue patterns were found: Informational, Facilitative, Planning, and Emotional. Only one of the communication patterns, Informational, represents the traditional educational model of care with SPIs relying heavily on an informational approach with a strong component of counseling callers in what to do. Within this cluster, callers ask significantly more questions than the other clusters, albeit only 8% of their statements were in the form of questions. We cannot be certain of the sequence of the verbal exchange; but the Informational cluster may include assertive callers or uncertain callers who are prone to question asking. Caller questions are likely to place SPIs in the position of providing clinical information to address caller concerns. Conversely this cluster may represent a SPI style which is consistent with an educational approach that either invites caller questions or confuses callers thus leading to increased caller questioning.

The calls shortest in duration fall within the most common communication pattern, Facilitative. This cluster showed more SPI question asking and more caller information provision than in the other clusters. It is likely that for calls in this cluster, SPIs are directing the conversation by asking questions about the exposure and the caller is providing information in response which is consistent with a traditional medical history taking approach. Efficiency is a concern at PCCs and less directive, more facilitative SPI approach appears to be associated with significantly shorter calls.

Call patterns that were associated with less traditional, more patient-centered approaches to care are represented by the Planning and Emotional clusters. By far the smallest cluster was the Emotional. In this grouping, callers exhibited significantly more emotion talk and very little informational talk, while SPIs appeared to be emotionally responsive and engaged in moderate information provision, relationship talk and counseling. SPIs asked fewer questions in this cluster as compared to the others. This cluster likely represents distraught callers who may have trouble executing a plan due to their distressed state. Here SPIs are called upon to manage callers' affective state, as well as use a range of communication behaviors to move the client to action. Typically trying to educate callers when distressed is ineffectual unless given in brief segments.²³ From the present study, we have no way of determining whether SPIs' level of information provision is optimal to promote adherence by distressed callers.

The fourth cluster is Planning in which the SPI engages in more relationship talk than in the other clusters. Calls in this cluster show fairly equal proportion of SPI statements devoted to each of the following: provision of clinical information, question asking and relational talk (20 % to 24%). Callers respond with moderate information provision and ask few questions. One explanation for this cluster is that SPIs are trying to partner with reticent callers in order to convince or engage them to participate in necessary treatment. An additional explanation is that SPIs are providing only the necessary information (i.e., minimal) and quickly directing the caller to take action.

Our final objective was to examine factors associated with variation in communication. Calls in the Facilitative cluster were significantly shorter and more likely to be made by a relative than the other three communication patterns. To determine if perhaps communication pattern was dictated by SPIs interacting with worried family members, we conducted further analysis. Although the Facilitative cluster had the highest absolute number of related callers and significantly more than the Emotional or Planning cluster, the

percentage of related callers compared to all callers was actually lower than the Informational cluster. This suggests that while the type of caller may contribute to communication pattern used, it cannot fully explain it.

We also found that variation in communication was predicted by individual SPIs. Our results indicate that some SPIs show a more predominant style of communicating. For example, over 50% of the communication by SPI 6 (as seen in Figure 4) falls within the Facilitative pattern. This finding is consistent with other research findings which suggest that providers have personal styles of communication or a consistent communication approach.^{1,24–26} In contrast, other SPIs show a more versatile or flexible style to communicating with callers. SPI 12 appears to use the four communication patterns fairly equally. One explanation for a versatile SPI style of communication is that some SPIs tailor or individualize their communication to caller needs and concerns. Unfortunately our cell sizes are too small to examine whether call/case characteristics are associated with differences in SPI communication style.

Our results point to potential areas for training. Both the Facilitative and Planning cluster demonstrate elements of a patient-centered care approach. The Planning cluster is similar to what the “ideal” poison control call should be: providing information and directing callers to action through a relational approach. Additionally, the Facilitative cluster exemplifies efficiency or speed in obtaining caller information through questions; however, the guide to action through relationship is not as evident as in the Planning cluster. A good portion of the poison control calls are already a part of these two clusters, possibly signifying that SPIs are doing a good job of this, despite the fact that some calls demand a different communication approach. Training could be provided to SPIs in Facilitative and Planning communication styles in order to further approach the “ideal” model. Provider communication behaviors which support caller involvement and participation in care should be a PCC goal as these patient behaviors are associated with multiple patient outcomes.^{27,28}

Limitations

Our sample is restricted to one regional center. Although the center’s caller data is consistent with most benchmarks established by American Association of Poison Control, we caution generalizability of our findings. Although stringent protocols were followed, our findings may show bias from coding errors and missing data. Additionally, our examination cannot show direction of dialogue but rather the occurrence of specific communication behaviors. Future research, using sequential analytic techniques, can provide insight into SPI-caller reciprocity or lack thereof.

Conclusions

This study provides a beginning step to understanding SPI communication behaviors. Our results suggest that SPIs are able to use a range of communication strategies. Although the majority of communication in these encounters involves gathering and giving information regarding exposures, our study indicates that SPIs also respond at both an emotional and rapport building level, which has implications for patient outcomes.^{1–5} Additionally, this study shows that variation in communication patterns are likely driven by caller relationship to patient and by SPI style. The latter, individual differences in SPIs communication approaches, suggests that some SPIs rely heavily on a particular communication approach (i.e., provision of information) regardless of caller differences. This finding may indicate the opportunity for future training in a patient-centered approach so SPIs can better meet the needs of the heterogeneous caller population. SPIs from across North America have voiced the desire for communication skills training.²⁹ Developing communication competencies and offering communication skills training will not only keep SPIs’ professional skills

consistent with other health care disciplines but is likely to improve patient care and SPI satisfaction.

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Sampled Calls at a Regional PCC

Figure 1.
Selection criteria and sample sizes

Figure 2.
Relative prevalence of cluster membership

Figure 3.
Standardized communication behavior by cluster

Figure 4.
Cluster membership by SPI

Table 1
Communication clusters and all calls: Mean Frequency of coded RIAS composites and ratio of composite codes to total talk

	PLANNING		FACILITATIVE		EMOTIONAL		INFORMATION		ALL CALLS		STATEMENT EXAMPLES
RIAS Composite	Mean	Ratio(SD)	Mean	Ratio(SD)	Mean	Ratio (SD)	Mean	Ratio (SD)	Mean	Ratio (SD)	
SPI TALK(STATEMENTS)											
Emotional Talk	2.36	0.03 (0.02)	1.474	0.02 (0.02)	5.58	0.07 (0.04)	1.96	0.03 (0.02)	2.22	0.03 (0.03)	"I'm worried about your son's condition"
Relational Talk	17.03	0.24 (0.04)	8.28	0.15 (0.04)	13.15	0.17 (0.05)	9.97	0.15 (0.04)	11.79	0.18 (0.06)	"Let's figure out a way to get you to the hospital"
Clinical Information	14.37	0.20 (0.06)	9.13	0.17 (0.06)	20.67	0.25 (0.08)	21.01	0.32 (0.08)	14.68	0.23 (0.09)	"This drug can cause heart problems"
Counseling	4.79	0.06 (0.04)	2.71	0.05 (0.04)	5.93	0.08 (0.04)	5.53	0.08 (0.05)	4.32	0.07 (0.05)	"Go to the emergency room"
Questions	14.49	0.21 (0.04)	15.78	0.31 (0.05)	12.57	0.18 (0.06)	12.51	0.20 (0.06)	14.30	0.25 (0.08)	"When did you take the pills?"
Total SPI talk	69.90		51.04		73.58		63.57		61.84		
CALLER TALK (STATEMENTS)											
Questions	1.37	0.02 (0.02)	0.98	0.02 (0.03)	2.79	0.04 (0.03)	3.52	0.07 (0.05)	1.89	0.04 (0.04)	"Is it safe to give him water?"
Emotional Talk	0.74	0.01 (0.01)	0.16	0.00 (0.01)	4.08	0.07 (0.04)	0.50	0.00 (0.01)	0.76	0.01 (0.02)	"I'm really scared"
Clinical Information	33.38	0.62 (0.09)	26.98	0.73 (0.08)	29.27	0.52 (0.10)	26.62	0.56 (0.09)	29.04	0.64 (0.12)	"He weighs 42 pounds"
Total Caller Talk	53.75		36.64		57.11		47.43		46.30		
Dominance		0.56 (0.05)		0.58 (0.05)		0.55 (0.07)		0.57 (0.06)		0.57 (.06)	(SPI Talk/Total Talk)
Total All Talk	123.66		87.69		130.69		111.00		108.14		
Call Length	4:15		3:16		4:31		4:06		3:53		