Published in final edited form as:
Patient Educ Couns. 2008 April ; 71(1): 26–33. doi:10.1016/j.pec.2007.10.019.

Interactive and evaluative correlates of dialogue sequence: a simulation study applying the RIAS to turn taking structures

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Abstract

Objectives—This study explores novel characterizations of turn taking structure and its interaction and evaluative correlates.

Methods—The Roter Interaction Analysis System (RIAS) was applied to videotapes of 51 physicians with a simulated patient (SP) to create a variety of novel turn taking measures including turn frequency, rate of interactivity, density, duration, and statement pacing.

Results—Visits averaged 52 speaker turns with an interactivity rate of 3.9 turns per visit minute. For physicians, turn duration averaged 13.7 seconds with a turn density of 4.2 statements paced at one statement every 3 seconds. For the SP, turn duration was 3 seconds with a turn density of 1.4 statements paced at one statement every 2 seconds. More turns, briefer turn duration and faster physician pacing were significantly related to positive ratings of affective demeanor, interpersonal satisfaction and collaborative decision-making. These measures, and interactivity, were also associated with a RIAS-based patient centeredness score and more overall patient talk.

Conclusions—Turn taking structures can be characterized in novel ways lending depth and richness to our understanding of dialogue, relationships to the patient centeredness of a visit, and evaluative judgments of physician performance.

Practice Implications—The study findings suggest specificity to the interviewing admonishment “talk less and listen more” by enhancing the interactivity of the dialogue and guarding against doctors tendency toward long monologues.

Keywords

RIAS; sequence analysis; turn taking; patient-centeredness

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1. Introduction

Osler's well known dictum "Listen to your patient, he is telling the diagnosis" is a cornerstone of good medical interviewing [1] with a commonsense corollary instructing physicians to "talk less and listen more". However simple the directive, its execution is difficult and effective listening is neither intuitive nor straightforward. It is clear that physicians are verbally dominant in medical exchanges: physicians' contribution to the medical dialogue is estimated to average 60% in primary care with a range from 51% to 77% [2]. Physician identity characteristics such as gender, age, ethnicity, medical specialty, communication skills training, and years of experience influence a physicians' propensity for verbal dominance, as do patient characteristics, including gender, age, ethnicity, and education [3]. Despite Osler's high regard for the centrality of patient talk to effective medical care, it is studied less frequently and less intensively than physician talk [4,5].

An obvious consideration in regard to patient and physician contribution to the medical dialogue is variation in the conversational form that the dialogue may take, including how speakers sequence and exchange speaking turns. As noted by Heritage and Maynard, sequence and turn design are the "bedrock elements" of conversational analysis. There is a massive literature stemming from related qualitative traditions addressing dialogue sequence and trade-offs between accomplishing medical tasks and attending to socioemotional and affective issues such as knowledge and authority, solidarity and distance, and understanding and misunderstanding [6]. Others have also explored the reciprocal nature of turn content from perspectives outside of conversational analysis using more quantitative approaches or qualitative and quantitative hybrids. These include a series of studies using the Roter Interaction Analysis System (RIAS) [7–13] or other coding strategies [14] to relate patient expressions of concern or question asking to empathic or supportive physician statements.

Regardless of the research paradigm, the focus of sequential analysis has been on the content (i.e., diagnosis, bad news, symptom description, treatment negotiation) or function (i.e., interruption, questions, partnership building, support, etc) of turn sequences. We are unaware of any descriptions of turn structures that reflect duration, density, frequency or rate of statement delivery within medical communication, or exploration of the consequences of turn structure for patient evaluation of physician performance. The current analysis was designed with the broad objective of stimulating interest in these questions and to present a preliminary investigation of turn structure within the context of a simulation study.

The specific purpose of the current study is threefold: first, to explore the structural elements of the medical dialogue through turn frequency, interactivity, density, duration and pacing through secondary analysis of a RIAS database; second, to relate these dialogue structures to RIAS measures of patient-centeredness; and third, to relate dialogue structures to simulated patient ratings of satisfaction with interpersonal communication, physicians' demeanor, effective use of nonverbal behaviors and ratings of physicians' decision making orientation.

2. Methods

2.1 Study participants and procedures

Fifty-one primary care physicians representing 19 different primary care practice settings participated in the study. Each physician was videotape recorded in his/her office with a single simulated patient. The simulated patient, an African American male in his early fifties, was a professional actor. The identity of the simulated patient was not concealed from the physician and video recording machinery was clearly visible. All 51 physicians interviewed the same actor over a 10-month period.

The physicians were recruited through a number of urban primary care practices and represent 19 different practice settings in the Greater Baltimore and Washington area. The study was described as a study of medical communication in primary care and physicians were told that participation included videotape recording of a routine primary care visit with a simulated patient and the completion of a variety of questionnaires. As an incentive for participation, physicians were also told that they would receive continuing medical education credits, individualized feedback regarding their interviewing skills, and $200 to be paid to them directly or to their organization.

The study was approved by the Committee on Human Research of the Johns Hopkins School of Medicine, and all physicians gave full informed consent for their participation.

2.2 Simulation scenario and simulator training

The physician was given the following information prior to seeing the patient: Mr. Russell is a 55 year old African American male from Baltimore City. He has had hypertension for the past 7 years and his blood pressure has not been well controlled. The day of the visit, his blood pressure is 168/104. He has not been to see a physician for some time; he has initiated the current visit to check on his high blood pressure. The patient does not appear to be overweight and his physical exam and labs show no abnormalities. He is currently on Lisinopril 20 mg per day, HCTZ 25 mg per day and he has no known drug allergies.

Case notes include the following information that would be disclosed to the physician if asked. The patient is single and lives alone, although he does have a girlfriend. He has three children who are 23, 35 and 36 years of age. He is a high school graduate and works as a radiology services technician. Relevant family history includes his mother's death of a stroke and a sister with hypertension and coronary artery disease. A younger brother, who was obese, died suddenly within the last month of a massive heart attack. Current health habits include smoking a pack of cigarettes every 3 days or so, no regular exercise and frequent meals from fast food restaurants. He does not drink alcohol or use any illicit drugs.

Four two-hour training sessions were held with the actor during which a script outline and detailed case notes were reviewed. The actor role-played the scenario with non-study physicians to practice consistent performance and response to variation in wording and questions, using his own words.

2.3 Study measures

2.3.1 Structural measures of dialogue: pacing, density, and interactivity

2.3.1.1 RIAS measures: The number of statements by each speaker was derived from application of the RIAS to the visit videotapes. The RIAS unitizes speech as the smallest expression to which a meaningful code can be assigned, generally a complete thought (referred to as a statement) expressed by each speaker throughout a session. More detail regarding assignment of statements to mutually exclusive and exhaustive code categories that reflect the content and form of medical dialogue is available elsewhere [14]. (See www.rias.org for a bibliography of over 150 RIAS studies).

In the current study, a summary measure of patient-centeredness was used to reflect overall dialogue content and affective tone. Consistent with earlier work, patient centeredness was calculated as: all physician psychosocial and lifestyle categories (including questions and related information and counseling), all patient questions, all patient psychosocial and lifestyle statements, emotional exchange (both patient and physician), partnership building (physician asks for opinion, checks understanding through paraphrase and interpretation, back channels as cues of interest) divided by all physician biomedical categories (questions and information),

physician instructions and directions (orientations), and patient biomedical statements [15, 16].

2.3.1.2 Computation of Turn Variables: With each RIAS code entry, the RIAS software attaches an identifier linking a coded statement to its speaker, interaction code, sequential order, placement in visit phase (opening, history, exam, counseling, or closing) and time (seconds into the interaction). Since a code is not entered at the moment a speaker takes possession of the floor but when a determination of code content can be made, the time variables derived from the RIAS database should be interpreted as an approximation of statement start. In a similar vein, the time interval between the start of two consecutive statements can be seen as an approximation of statement duration and the interval between the first statements of consecutive turns can be regarded as an approximation of turn duration.

To explore the magnitude of the time lapse between an actual statement start and the entry of a code, a random sample of 6 of the 51 study visits were coded for turn initiation. The results were then compared to the time stamp for those 6 visits in the RIAS database. We found that the two methods of coding agreed almost completely in the number of turns identified (Pearson Correlation = .99). Physician turn duration differed by an average of .5 seconds between the two methods (time coding averaged 13.3 second turns; range 7.9 – 19.7 seconds, SD = 5.1; RIAS coding averaged 13.8 second turns; range 8.2 – 21.9, SD = 5.4 (Pearson Correlation = . 98) while patient turn duration differed by an average of .7 seconds (time coding averaged 3.4 second turns; range 2.1 – 5.2, SD = 1.1; RIAS coding averaged 2.7 seconds; range 1.7 – 4.3, SD = .88 (Pearson Correlation = .66).

With the caveat regarding the imprecision of the time stamp measure, the RIAS database was used to construct five measures of dialogue structure including: speaking turn, interactivity, turn duration in seconds, turn density, and statement pace, as defined below.

1. Speaker turn is defined as a continuous block of uninterrupted speech of a single speaker (back channels by a second speaker is not considered an interruption). The total number of speaker turns per visit can be interpreted as the frequency of floor exchanges.
2. Dialogue interactivity is defined as the number of speaking turns per session minute, calculated as the total number of speaking turns divided by the session length. For example, a 15 minute visit with 45 turns will average 3 turns per minute and an average turn duration of 20 seconds.
3. Turn density is defined as the average number of statements within a turn by a speaker, excluding the count of any second speaker back channels. The appendix illustrates a patient turn with a density of 7 statements (and excludes 4 instances of physician back channels).
4. Turn duration is estimated as the length of time in seconds spanning the block of uninterrupted speech by speaker (including back channels). The appendix illustrates a physician turn that spans 9 seconds (beginning at 272 seconds into the record, during the history segment, and finishing at 281 seconds).
5. Statement pace is defined as the number of within-turn statements delivered per turn second. The appendix illustrates a physician turn that spans 9 seconds and is comprised of 4 physician statements, and two instances of patient back channels. The pace of within-turn statement delivery is 2.2 seconds (4 statements/9 seconds). A slower rate of statement delivery suggests longer statements or less fluency (due to stutters, restarts, pauses between statements) while rapid delivery suggests brief statements and fluent delivery.

2.3.2 Simulator Measures—Immediately upon completion of the visit, the simulated patient completed an evaluative questionnaire. He was not trained to prefer any particular verbal or nonverbal behavior nor to specifically look for particular behaviors. Included among the post-visit measures were the following, all adapted from prior work for use in the current study:

1. Interpersonal satisfaction: Ratings of overall satisfaction and items like "I would recommend this physician to a friend" and "This doctor really cares about me as an individual" (5 items; Cronbach's Alpha = .91; mean score 4.3, range 3–5).
2. Nonverbal communication effectiveness: Judgment of physicians' nonverbal communication effectiveness was assessed on a 6-point Likert scale (not at all effective to very effective) for the following 6 behaviors: eye contact; smiles; head nods; appropriateness of facial expressions to the communication; seating position; and, effective use of pauses and silence (6 items; Cronbach's Alpha = .83; mean score 4.79, range 3.3 – 6).
3. Affective demeanor: Judgments of the physicians' demeanor were assessed using semantic differential items (e.g., compassionate/distant; interested/bored; friendly/aloof) (9 items, Cronbach's Alpha = .85; mean score 4.33, range 2.6 – 6).
4. Decision-making partnership: Simulated patient ratings on three items: (1) the doctor encourages questions; (2) the doctor encourages involvement in decision making (6-point scale from not at all to very much), and, (3) rating of the doctor decision making orientation (3-point scale): the doctor takes the initiative in deciding what is best (1), the doctor considers some of my ideas but still makes most of the final decisions (2), the doctor and I make the final decisions together (3). Higher scores indicate greater decision-making partnership and the 3-items show good internal consistency (Cronbach's Alpha = .75; mean score 3.8, range 1–5).

2.4 Analysis

Because of the exploratory nature of the study, the primary analysis is descriptive and correlational. Unlike most simulation studies in which physicians are nested within several simulated patients, or the same physician interviewed multiple simulated patients, one simulated patient was used in the study and each physician was recorded only once. Consequently, simple descriptive statistics and Pearson correlation coefficients are reported to explore relationships among the constructed turn variables. Multiple regression analysis is used to explore turn predictors of a summary dialogue measure of patient-centeredness and simulated patient rating's of satisfaction and physicians' performance.

3. Results

3.1 Description of Dialogue Structure

Presented in Table 1 is a summary description of dialogue structures. The simulated visits lasted an average of 13.5 minutes with a mean of 52 turns speaking turns and an interactivity rate of 3.9 turns per visit minute. For physicians, turn duration averaged 13.7 seconds, turn density averaged 4.2 statements, and the pace of statement delivery was .35 per second, or roughly 1 statement every 3 seconds. For the simulated patient, both turn duration and density were substantially less; patient turns averaged 3 seconds, with an average of 1.4 statements, and a statement rate of slightly less than 1 statement every 2 seconds (.55 statements per second). Also reflected in the table, and especially notable considering the simulated nature of the visits, is the broad range of both physician and simulated patient performance.

When all visit talk is considered, physicians contribute roughly 2 statements for each patient statement (278 and 138 statements, respectively). However, as displayed in Table 1, only half of all patient contribution to the dialogue (72 patient statements) was communicated within the patient's speaking turn while the remainder (66 patient statements) were back channels embedded within the physicians' speaking turn.

Also reflected in Table 1, is that the study physicians averaged far fewer back channels than the simulated patient (2 and 66, respectively). When only within-turn dialogue is considered, the ratio of physician to patient talk is almost twice as high as it was for total dialogue, averaging 3.8 physician statements to every patient statement.

3.2 Relationships among dialogue structures

As displayed in Table 2, a variety of relationships among dialogue structures is evident. First, visit length is positively correlated with more speaker turns, more patient and physician talk and greater physician turn density, but *lower* patient turn density (correlation = −.26, p<.07); thus longer visits are associated with a greater number of speaking turns, more physician statements per turn and less patient statements per turn, but more overall talk by both patients and physicians.

The number of speaking turns throughout a visit shows an inverse relationship to patient turn density (Pearson correlation −.50; p<.0001), suggesting that patients convey fewer statements per turn when in visits with high turn frequency. This does not appear to be the case for physicians with no significant relationship evident between number of speaking turns and physician turn density (correlation −.12, p < .4.). Turn frequency is also related to briefer turns for both patient and physicians, faster statement pacing for physicians, higher degree of dialogue interactivity, and more overall talk (for both patient and physician). Thus, the more speaking turns throughout a visit, the less a patient says per turn (but not the physician), the shorter the turns are in duration, the faster the statement pace (by physicians), the greater the rate of interactivity and the more total dialogue exchanged by both patients and physicians.

Interactivity, the rate of turn taking per visit minute, and the total number of speaking turns throughout a visit are related (correlation = .46, p< .0001), but demonstrate a somewhat different pattern of relationship to other dialogue measures. Interactivity is characterized by a rapid pace of statement delivery, low turn density, and short turn duration for both patients and physicians, although the magnitude of the correlations among these variables is substantially lower for patients than for physicians. Most notable, visit interactivity is positively correlated with more overall patient turn talk (correlation = .40, p< .005) suggesting that a more interactive visit provides more speaking opportunities for the patient (even if less is said at each turn) contributing to greater cumulative patient contribution to the dialogue. This is not true for physicians as interactivity is unrelated to the overall amount of physician talk in the visit.

The within speaker patterns show a strong correlation between turn duration and density (Pearson correlation coefficients of .85 and .73 for physician and patient respectively) indicating that longer turns are comprised of more statements. Turn density is not related to statement pacing for physicians (indicating that statement length is not related to the number of statements made), but it is for patients. Dense patient turns are associated with slower rate of statement delivery suggesting that these turns are comprised of longer statements, stutters or restarts, or pauses between statements, while low density turns are characterized by short, fluent one or two word statements.

While patient and physician turn density is uncorrelated (Pearson correlation = .01), there is a significant correlation between patient and physician turn duration (Pearson correlation = .39, p<.01) and statement pacing (Pearson correlation = .57, p<.0001), indicating that the timing

of turns and pace of statement delivery is related across speakers, even when the number of statements is not.

3.3. Relationships between dialogue variables and RIAS variables

The RIAS constructed variable of patient-centeredness is correlated (in bivariate analysis) with more speaker turns, shorter patient and physician turns, faster rate of physician and patient statements, higher interactivity, and more total patient talk; it is not related to visit length, total physician talk, or turn density for either patient or physician. Multivariate analysis of the RIAS-based patient-centeredness score revealed independent relationships with faster rate of physician statement delivery (standardized beta = .38) and physician back channels (standardized beta = .28). This model explains 20% of the variance (adjusted) in the patient-centeredness score ($R = .48$; $R^2 = .23$; Adjusted $R^2 = .20$).

3.4. Relationships between dialogue variables and simulated patient ratings

The simulated patient's ratings of physician demeanor, interpersonal satisfaction, nonverbal effectiveness and decision making partnership were all related to higher turn frequency, shorter turn duration (both patient and physician), faster physician statement pace, and more talk (both patient and physician) in bivariate analysis. Since the simulated patient ratings were substantially correlated (Pearson correlations ranged from .56 to .74), regression analysis was run to explore the independent relationships between these ratings and turn structures. Within-turn patient talk was a significant independent predictor of interpersonal satisfaction (standardized beta = .38), explaining 12% of the variance (adjusted) ($R = .38$; $R^2 = .14$; adjusted $R^2 = .12$) and physician demeanor (standardized beta = .47), explaining 21% of the variance (adjusted) ($R = .47$; $R^2 = .22$; Adjusted $R^2 = .21$).

Multivariate analysis of ratings of decision-making partnership revealed several independent relationships with turn variables, including the number of complete turns (standardized beta = .38), physician back channels (standardized beta = .25), and faster rate of patient statement delivery (standardized beta = .25). When taken together, this model explained 28% (adjusted) of the variance in decision making partnership ratings ($R = .56$; $R^2 = .32$; Adjusted $R^2 = .28$).

4. Discussion and Conclusion

4.1 Discussion

This study sheds new light on the relationships among structural elements of dialogue, interaction process analysis, and patient (albeit simulated) experience of care. Some relationships were as expected; the greater the number of speaker turns and the longer and more interactive the visits, the more the patient and physician talked throughout the visit. Moreover, in more interactive visits both patients and physicians had shorter, faster, and less dense speaking turns. Several unexpected relationships also emerged. Interactivity was associated with *more* overall patient talk even though it is also associated with less dense and shorter speaking turns. So, when patients are engaged in more interactive visits, the average density and duration of their turns is less, but their overall contribution to the visit dialogue is more. For physicians, interactivity is also associated with lower turn density and duration, but this does not affect their overall talk. In fact, turn density and, to a lesser extent, turn duration show opposite relationships by speaker to visit length. Denser and longer physician turns are associated with longer visits, but denser patient turns tend to be associated with shorter visits. A speculative application of this finding may act to reassure physicians who fear that opening the patient floodgates, so to speak, by encouraging patients to elaborate on concerns will lead to time consuming, off-topic patient monologues. In fact, it appears to be the physician who is more likely to consume visit time with long turn monologues.

Variation in physician performance is a fascinating aspect of our study findings. Particularly in light of the scripted nature of the simulation, the broad range of physician behaviors is noteworthy. Given exactly the same case, some physicians took as long as 44 minutes to conduct their visit while others took less than 5 minutes. Independent of visit length, other structural measures of physician dialogue also varied a great deal. For instance, interactivity ranged from a slow 1.6 turns per minute to a very rapid rate of 7.8 floor exchanges per minute. Physician turn density ranged from 2 to almost 9 statements while turn duration varied from a brief 6 seconds to a half minute. The simulated patient's performance also varied, but this was by design. The actor was trained to follow the physician's lead and readily disclose concerns and suggest workable solutions, but only when asked relevant questions, prompted to elaborate on related topics, or invited to brainstorm. Consequently, patient performance can be considered a direct consequence of physician behavior in the visit. Why should the dialogue structure matter? The answer is not only as Osler suggested that the patient is conveying the diagnosis, but that the medical dialogue enhances the therapeutic relationship and the development of a more collaborative partnership. The patient ratings of satisfaction, physician demeanor, nonverbal effectiveness, and decision making partnership were related to many elements of dialogue structure in bivariate analysis. The simulated patient clearly preferred doctors who engaged him in the up and back of dialogue by providing more speaking turns, characterized by shorter turn duration (both patient and physician), faster statement pace (physician), and more overall dialogue (patient and physician).

Since many of the turn structures are related to one another, the multivariate analysis provides insight into independent explanations of variance in the simulated patient ratings. In this regard, patient within-turn talk was the turn variable that most strongly predicted both satisfaction and positive ratings of physician demeanor. Since within-turn talk reflects substantive contribution to the dialogue, we think that this data support Osler's observation in a direct way; telling one's story is important in building an affectively supportive and satisfying relationship. Interestingly, the patient's perception of an effective decision making partnership also includes physician back channels. This suggests that physicians' facilitation of patient turns through back channels, as well as more speaking turns, each make an independent contribution to the patient's perception of decision making partnership. Inasmuch as back channels signal interest and attentiveness, we think that patient's confidence in brainstorming solutions or weighing options is enhanced when they perceive the physician as receptive to their ideas. The message to continue speaking may be equally as important to patients as the offer of an opportunity to speak.

While the focus of this study is turn structure, not content, the relationship between turn structures and patient-centeredness suggests new insights into the interplay of dialogue form and content. The patient-centeredness score is significantly associated with frequent, brief turns, more rapid statement delivery and more patient contribution to the dialogue. This implies that it is not just particular content of the visit that captures key care elements but also the dialogue scaffolding upon which the exchange develops. Again, the multivariate analysis helps focus these findings, although the identification of a single variable should not be interpreted as dismissing the role of related variables that share variance. Two physician turn variables, use of back channels and rapid statement delivery, account for 20% of the variance in patient-centeredness. It is notable that the first of these variables facilitate greater patient talk through (physician) encouragement of patient turn completion, while the latter reflects less physician talk through more concise physician statement delivery.

4.1.1 Limitations—Some limitations of the study are obvious. While a sample of 51 physicians is relatively large for a study of this kind, and attempts were made to have the simulated visits appear as authentic as possible by incorporating the session into routine office hours, this is a simulation study. The patient was a trained actor and no effort was made to

conceal his identity from the physician or to clandestinely videotape the sessions. Moreover, only one actor was used in the study to visit all 51 physicians. It is possible that the simulator's ratings could have changed over time as he gained experience or that his ratings are different in fundamental ways from those of actual patients. We are reassured that the ratings did not show any relationship to date of interview over the 10 month data collection period for any evaluative measures, suggesting that our actor was largely consistent in his judgments over time. Furthermore, the pattern of relationship between the simulated patient ratings of satisfaction, demeanor, nonverbal effectiveness, collaborative decision making and RIAS-based measures of a patient-centered interviewing style is consistent with other reports in the literature using actual patients [14,15]

The study is exploratory and descriptive in nature and was not designed to test hypotheses. As a result, there is the possibility that some relationships among turn variables may appear statistically significant by chance. For instance, with 60 reported correlations in Table 2, one might expect 3 of these to reach statistical significance level of .05 by chance and less than one (.6) to reach a statistical significance level of .01. Since inspection of the table shows 32 correlations at the <.01 level, it is unlikely that the pattern of variable relationships evident in the table is spurious.

As noted earlier, the estimates of time-related turn variables are imprecise as there is a time lag between a speaker claiming the floor and a coder's recognition of a statement content and entry of a code. Based on our small reliability study in which precise timing of turns was recorded, we estimate an average time lag to be approximately ½ second on patient turn initiation. We think this reflects a tendency for the (in this case the simulated patient) to claim the floor but take more time than the physician (an extra ½ second) to articulate his statement, perhaps reflecting uncertainty or the thinking process (ummm, hmmmm) or speech errors (I'm –I'm, I've – what I wanted to ask is …..). In contrast, physicians appear more direct and articulate than patients in their statements. As a result, RIAS coding tends to mark patient starts later than time coding thereby extending the duration of the physician turn by a comparable interval (the RIAS-based computed estimate of turn duration was .5 seconds longer for physician turns and .7 seconds shorter for patient turns than the more precise time measure). Over the longest visits (with 51 turns) the cumulative effect of this error is approximately plus or minus ½ minute per speaker.

Although the RIAS time stamp is imprecise, we do not think that the time and cost of more precise timing of turn starts would lead to more meaningful or substantively different conclusions than those derived from the RIAS database.

4.2 Conclusions

This study has characterized turn taking in a novel way and sheds new light on the relationships between dialogue structures and both patient centeredness and patients' evaluative judgments of a visit. Sequential analysis is not new; studies have long addressed the content or the function of turn sequences from a variety of research paradigms. For instance, Street and Millay, illustrating a content focused approach to sequencing, found that patients' verbal behaviors were significantly correlated with physicians' patient-centered responses [14] and Robinson and Heritage found that the format and function of physician questions (open or closed-ended) during the opening phase of the medical visit predicted patient satisfaction [16]. Neither of these studies, or others of which we are aware, however, focused on turn structure. It is within this context, that the current study makes its contribution in exploring the interplay between form and content and the perspective from which we conclude that patient-centeredness is not just what is said during the medical encounter, but also how the dialogue unfolds.

While our study is exploratory, and the findings are limited, we nevertheless believe that the approach is promising and the research implications noteworthy. A challenge not often taken in our field (or others for that matter) is to go beyond what has been comfortably done in the past by viewing familiar phenomenon in new ways. This may be best done by bridging competing paradigms, such as those represented by historically qualitative and quantitative research traditions, to create a new synthesis in analysis of medical communication. We suggest that using a RIAS database to address questions in new ways, as described in this study, makes a contribution to this end by adding a powerful new methodological strategy to our interaction analysis toolbox.

We are unaware of any descriptions of turn structures that reflect duration, density, frequency or rate of statement delivery within medical communication, or exploration of the consequences of turn structure for patient evaluation of physician performance. The current analysis was designed with the broad objective of stimulating interest in these questions and to present a preliminary investigation of turn structure within the context of a simulation study.

4.3 Practice implications

There are both practice and research implications of the study. First, in terms of clinical practice the findings have relevance by providing specificity to the interviewing admonishment to talk less and listen more. We suggest that increasing the interactivity of the exchange is an effective mechanism to this end. Interactivity may be enhanced by limiting the duration and density of physicians' speaking turns. This can be done by chunking information so that turns are focused, brief and clear. For example, when presenting treatment options it is not uncommon for physicians to organize a discussion in the following way, "There are several ways to treat your condition – let me summarize the options and then we can talk about them and you will have a chance to ask questions". This approach is likely to result in long monologues with little meaningful patient engagement in the dialogue even if the physician is careful to offer the patient a chance to speak when he/she is finished. Providing information in brief chunks, punctuated by checks for patient understanding and requests for questions or comments, can transform a long monologue into a two-way interaction. Simply turning the floor over to patients by eliciting questions, asking for patient opinion or probing interpretation and understanding are also useful ways to encourage patient engagement. Finally, physicians' uses of back channels encourage continuation of turn to completion and thereby enhance patient contribution to the medical dialogue in a substantive way.

The study also has implications for communication research and its methods. We have described a novel approach for analysis of medical dialogue – one that focuses on turn structure rather than content –and thereby illustrated how important one can be to the other. While our study is exploratory, and the findings are limited, we nevertheless believe that the approach is promising and the clinical implications noteworthy. A challenge not often taken in our field (or others for that matter) is to go beyond what has been comfortably done in the past by viewing familiar phenomenon in new ways. This may be best done by bridging competing paradigms, such as those represented by historically qualitative and quantitative research traditions, to create a new synthesis in analysis of medical communication.

Acknowledgments

This work was supported by a grant from the National Heart, Lung, and Blood Institute (1R01-HL69403).

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APPENDIX: ILLUSTRATION OF TURN DEFINITION

Patient turn illustration

The patient turn follows (previous) physician probe of patient opinion and spans statement numbers 79 through 89. The patient turn includes 2 psychosocial statements, 1 statement about therapeutic regimen and 4 lifestyle statements. Turn duration is approximately 16 seconds, beginning 150 seconds into the record (during the history segment) and finishing at 166 seconds.

Interspersed within the patient turn are 4 physician back channels.

Previous physician turn:	78	D>P34 ?opinion	146 2 - Histor0 - No Blo300

Patient turn:	79	P>D16 GIVES-ps	150 2 - Histor0 - No Blo---
	80	P>D16 GIVES-ps	151 2 - Histor0 - No Blo---
	81	D>P19 BC	153 2 - Histor0 - No Blo---
	82	P>D14 GIVES-thera	156 2 - Histor0 - No Blo---
	83	D>P19 BC	156 2 - Histor0 - No Blo---
	84	P>D15 GIVES-ls	160 2 - Histor0 - No Blo---
	85	P>D15 GIVES-ls	161 2 - Histor0 - No Blo---
	86	D>P19 BC	162 2 - Histor0 - No Blo---
	87	P>D15 GIVES-ls	163 2 - Histor0 - No Blo---
	88	D>P19 BC	165 2 - Histor0 - No Blo---
	89	P>D15 GIVES-ls	166 2 - Histor0 - No Blo---
Next turn:	90	D>P15 GIVES-ls	171 2 - Histor0 - No Blo---

Physician turn illustration

The physician turn follows a previous patient question about therapeutic regimen and spans statement numbers 126 though 131. The physician turn includes 2 information statements (on therapeutic regimen), a counseling statement (therapeutic regimen) and an open-ended question (therapeutic regimen). Turn duration is approximated at 9 seconds, beginning 272 seconds into the record (during the history segment) and finishing at 281 seconds.

Interspersed within the physician turn are 2 patient agreements.

Previous patient turn:	125 P>D29 ?thera	270 2 - Histor0 - No Blo---

Physician turn begins:	126 D>P14 GIVES-thera	272 2 - Histor0 - No Blo---
	127 D>P39 C-med/thera	274 2 - Histor0 - No Blo---
	128 P>D18 agree	275 2 - Histor0 - No Blo---
	129 D>P14 GIVES-thera	277 2 - Histor0 - No Blo---
	130 P>D18 agree	279 2 - Histor0 - No Blo---
	131 D>P29 ?thera	281 2 - Histor0 - No Blo---
Next turn:	132 P>D14 GIVES-thera	281 2 - Histor0 - No Blo---

Table 1

Dialogue Characteristics

Duration of Visit	13.5 minutes (range 4.7 – 44)	
Number of Speaker Turns	52 (range 13 – 157)	
Interactivity (total turns per minute)	3.9 (range 1.6 – 7.8)	
Turn Taking Characteristics	Physician (n=51)	Simulated Patient
All visit talk	278 (range 68 – 1033)	138 (range 48–340)
Total within-turn talk	276 (range 68 – 1033)	72 (range 20– 182)
Total out-of-turn talk (back channels)	2 (range 0 – 19)	66 (range 15–192)
Turn density (average statements per turn)	4.2 (range 2.2 – 8.8)	1.4 (range 1.2 – 2.0)
Average length per turn (in seconds)	13.7 (range 5.9 – 31.9)	2.9 (range 1.7 – 6.5)
Rate of statement delivery (within-turns)	.35 (range .18 – .51)	.55 (range .26 –. 80)

Table 2

Relationship among dialogue variables

	Within-turn talk (patient)	Within-turn talk (doctor)	Interac-tivity	Rate of delivery (patient)	Rate of delivery (doctor)	Turn duration (patient)	Turn duration (patient)	Turn density (patient)	Turn density (doctor)	Speaker turns	Visit length
Visit length	.76***	.96***	−.13	−.01	.16	−.13	.23	−.26	.44**	.75***	---
Speaker turns	.97***	.79***	.46***	.14	.49***	−.36**	−.36**	−50***	−.12	---	
Turn density (doctor)	−.12	.38**	−.70***	−.14	−.13	.13	.85***	.01	---		
Turn density (patient)	−.30*	−.39**	−.49***	−.42	−.59***	.73***	.39**	---			
Turn duration (doctor)	−.33	.10	−.88***	−.39**	−.59***	.49***	---				
Turn duration (patient)	−.24	−.33*	−.52***	−86***	−.74***	---					
Rate of delivery (doctor)	.42**	.37**	.68***	.57***	---						
Rate of delivery (patient)	.07	.19	.40**	---							
Interactivity	.40	.01	---								
Within-turn talk (doctor)	.75***	---									
Within-turn talk (patient)	---										

*** p <.001;

** p<.01;

* p<.05