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Patient Exposition and Provider Explanation in Routine Interviews and Hypertensive Patients' Blood Pressure Control

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Hypertensive patients' expressing themselves in their own words (Exposition) and providers' giving information (Explanation) during medical interviews were hypothesized to be associated with subsequent blood pressure control. Transcripts of routine return visits to clinics in low-income areas of Houston, TX, were coded using the Verbal Response Modes (VRM) system. VRM indexes of Patient Exposition and Provider Explanation were tested in relation to systolic and diastolic blood pressure obtained during home interviews 2 weeks after the clinic visits. Patient Exposition was significantly correlated with reductions in systolic and diastolic blood pressure from clinic visit to home interview, and Provider Explanation was significantly correlated with lower diastolic blood pressure at home interview. The results suggest that patients' and providers' verbal behavior in medical interviews should be included in predictive models of blood pressure control.

Key words: hypertension, home blood pressure, clinic blood pressure, patient exposition, provider explanation

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In the treatment of hypertension, effective pharmacological agents and treatment strategies have long been available, but less than half the known hypertensives on medication maintain blood pressure (BP) control (Podell, 1975; Wilber & Barrow, 1972). There is widespread belief among investigators and clinicians that the provider–patient relationship is crucial for successful long-term hypertension treatment (Chobanian, 1980; DiMatteo & DiNicola, 1982; Haynes, 1976; Haynes, Taylor, & Sackett, 1979; Stone, 1979; Taylor et al., 1978). Efforts to improve or intensify personal contact with patients have been reported to improve adherence (Finnerty, Mattie, & Finnerty, 1973; Hussein & Syme, 1976; Inui, Yourtree, & Williamson, 1976; McKenny, Slining, Henderson, Devins, & Barr, 1973). Furthermore, some research reports have noted improvements in BP and other cardiovascular risk factors that occur independently of medication, apparently as a function of unspecified features of patient–provider contact in interviews (Armstrong, 1959; Glasunov et al., 1973; Reiser et al., 1951).

Previous research (Putnam, Stiles, Jacob, & James, 1985; Stiles, Orth, Scherwitz, Hennrikus, & Vallbona, 1984; Stiles, Putnam, & Jacob, 1982; Stiles, Putnam, Wolf, & James, 1979) has isolated two components of the verbal interaction that may contribute to the interview's positive impact (cf. Carter, Inui, Kukull, & Haigh, 1982; Inui, Carter, Kukull, & Haigh, 1982). The first component, Patient Exposition, refers to patients giving information about their history and symptoms using their own words (e.g., "I've been waking up with a headache," "My mother died of a heart attack") rather than "yes" or "no" answers to a provider's questions. The Exposition function—the free expression of concerns to an attentive provider—has frequently been found to be associated with patients' positive feelings about their medical care (Freemon, Negrete, Davis, & Korsch, 1971; Koos, 1955; Korsch, Gozzi, & Francis, 1968; Lazare, Eisenthal, Wasserman, & Harford, 1975; Ort, Ford, & Liske, 1964; Putnam et al., 1985; Stiles et al., 1979). Allowing patients to fully describe their symptoms and circumstances should aid diagnosis and treatment, as well as promoting rapport and cooperation. Conceivably, the relief to patients of unburdening to the provider might help relax patients and help reduce BP.

The second component, Provider Explanation, refers to providers giving objective information about illness and treatment, usually at the conclusion of the interview. Explanation, which should be distinguished from the provider's instructing or prescribing function, has also been correlated with patient satisfaction and may promote understanding of and adherence to treatment regimens and faster recovery from surgical procedures (Davis, 1968, 1971; Egbert, Battit, Welch, & Bartlett, 1964; Falvo, Woehlke, & Deichmann, 1980; Hulka, Cassel, Kupper, & Burdette, 1976; Putnam et al., 1985; Smith, Polis, & Hadac, 1981; Stiles et al., 1979; Svarstad, 1974, 1976). Explanation of the reasons for following instructions has been found to be associa-

ted with increased compliance with directives in nonmedical situations (Maddux & Rogers, 1980; Norman 1976). Clearly, giving information about the nature of illness, results of tests, details of treatment plans, side effects, and so forth should permit patients to make more intelligent and constructive decisions about their daily health behaviors. Informing or reminding hypertensive patients about their illness and their antihypertensive regimen (e.g., diet, exercise, medication) should promote BP control.

No previous study has correlated these verbal components with subsequent BP control. We hypothesized that both Patient Exposition and Provider Explanation in routine interviews with hypertensive patients would be associated with subsequent decreases in BP and lower BP levels. Recognizing that BP is complexly determined, we expected that these univariate associations might be small; yet they could be important for developing predictive models for further research.

METHOD

Participants

The medical interview data were collected by a group of the research faculty and staff at Baylor College of Medicine's Department of Community Medicine who were investigating the relationship of medical interactions to outcomes in the treatment of hypertension (Scherwitz, Hennrikus, Yusim, Lester, & Vallbona, 1985).

The entire conversation between each of 217 patients and 1 of 9 physicians or 2 physician assistants were recorded on audiotape. All participants gave informed written consent to the taping and follow-up contacts. The interviews were routine return visits to four community health centers in low-income areas of Houston, TX. Most patients had been seen many times previously for hypertension treatment. The recordings, averaging 8 min. were transcribed verbatim, omitting names and identifying data. Demographic data and background information were collected from the patients' medical charts. Patients' seated BP was usually taken before the interview by the nurse and again by the provider during the physical examination.

Home visits by research assistants, conducted 2 weeks after the recorded medical interaction, included pill counts and BP readings. Seated and standing BP readings were taken using the standard ascultatory technique with a mercury Baunamometer sphygmomanometer; only the seated reading was used in data analyses. Although use of a single reading is not ideal, assistants were trained to follow the American Heart Association's recommendations to avoid biases, including using appropriate cuff size and placement, deflating cuff slowly, and keeping it at the level of the heart. BP measures were

obtained for 170 of the 217 patients (systolic blood pressure was not recorded for one of them). Failures were due mainly to equipment failure or to no home visit (39 patients, most of whom could not be contacted to arrange the visit or refused to be visited).

The patients were mostly minority-group members living in conditions of economic hardship. All patients had a diagnosis of essential hypertension; some were also being treated for other chronic ailments, most often diabetes, obesity, or degenerative joint disease (M = 1 additional diagnosis per patient). The mean age of the patients was 60 years (range = 27 to 88); 81.7% were female; 79% were black, 7% were Mexican-American, and 14% were white. Patients at these clinics averaged 5 to 6 years of formal education.

Providers' backgrounds also varied. Two physician assistants and 1 physician were black males; 4 physicians were white males; 3 physicians were Cuban-American males; and the 1 female physician was from India. Four providers contributed 8 to 13 interviews each; 7 contributed 22 to 26 interviews each.

Verbal Response Mode Coding

Each transcript was divided into grammatically defined units called *utterances* (roughly, independent clauses), and the grammatical *form* and interpersonal *intent* of each utterance was coded according to a 64-category (8 forms × 8 intents) taxonomy of verbal response modes (VRMs) fully described elsewhere (Stiles, 1978a, 1978b, 1979). Coders were 34 university students who were given approximately 30 hr of training (including individual study, group sessions, and practice coding with detailed feedback). Each transcript was randomly assigned to coders until 3 coders, working independently, agreed on 70% or more of the forms and 70% or more of the intents. (Most transcripts required only three codings.) The VRM codes were then combined to create a composite set of codes. Each utterance was given a code if 2 of the 3 coders agreed, or was coded "disagreement" if they did not. At least 2 of the 3 coders agreed on 98.8% of the form codes and 97.0% of the intent codes. Details of training, coding, reliability, and descriptive results are presented elsewhere (Stiles et al., 1984).

Following written criteria, coders divided the transcripts into three segments corresponding to the three commonly identified major tasks in medical interviews: (a) the medical history (in which the patient relates symptoms, difficulties, habits, etc.), (b) the physical examination, and (c) the conclusion (in which the provider explains the findings and makes recommendations and prescriptions).

The Patient Exposition Index was the frequency of patient utterances in the medical history segment that were coded "disclosure" or "edification" in both form and intent. These VRMs are first-person or third-person state-

ments conveying subjective or objective information, as specified in the VRM manual (Stiles, 1978a). To illustrate, Patient Exposition utterances include "I'm worried about my heart," "The pills are all gone," "I've run out of pills," and "My heart worries me." Although patients engage in Exposition throughout the interview, the largest portion is in the medical history segment, and the history segment is traditionally considered the time for patients to express their concerns and give their reasons for seeking treatment. We thus followed previous research (Putnam et al., 1985; Stiles et al., 1979) in focusing on Patient Exposition in the medical history segment only. Two patients had no history segment (their interviews began with an examination), so for this index, $N = 215$.

The Provider Explanation Index was the percentage of the provider's conclusion segment utterances that were coded "edification" in form and intent. These were third-person statements conveying objective information; examples include "Your blood pressure is lower this week" and "These pills help control blood pressure." Explanations of illness and treatment are given mainly at the end of the interview, after the history has been taken and the examination performed, and we followed the previous research in focusing on Provider Explanation in the conclusion segment only. To avoid distortions due to percentages based on very small numbers of utterances, we omitted eight conclusion segments that had fewer than 10 utterances, leaving $N = 209$ for this index.

As in the previous VRM studies, the Patient Exposition Index was frequency-based and the Provider Explanation Index was percentage-based. Thus Exposition reflects the *quantity* of patient self-expression, whereas Explanation reflects the *quality* of provider informativeness relative to the total length of the segment. These indexes have shown stronger relationships to patient satisfaction than Exposition percentage or Explanation frequency, respectively (Putnam et al., 1985; Stiles et al., 1979). However, we also performed parallel analyses using the converse indexes.

RESULTS

VRM Indexes

Patient Exposition. Exposition ranged from 0 to 246 utterances ($M = 33.3$, $SD = 34.8$) across the 215 medical histories. Exposition was slightly positively correlated with patients' age ($r = .15$, $p < .05$). Females averaged more Exposition than males ($M = 35.8$ vs. $M = 23.6$), $t(214) = 1.97$, $p < .05$. White patients averaged more Expositions ($M = 55.5$) than either black patients ($M = 30.5$) or Mexican-American patients ($M = 26.7$), $F(2, 208) = 6.81$, $p < .01$. Mean differences among the 11 providers accounted for 33%

of the total variance (R^2) in Patient Exposition, $F(10, 200) = 9.76, p < .001$. Patient Exposition was not significantly correlated with clinic-measured systolic blood pressure (SBP) or diastolic blood pressure (DBP).

Interactions involving sex and ethnicity matches of providers and patients (e.g., possibly greater Exposition in matched dyads) could have occurred, but the heterogeneous sample (which would leave very small *ns* in cells) precluded statistical tests.

Provider Explanation. Explanation ranged from 0% to 43.9% of provider utterances ($M = 12.3\%$, $SD = 9.4\%$) across the 209 conclusion segments studied. Differences among providers accounted for 24% of the variance (R^2) in Explanation, $F(10, 194) = 6.00, p < .001$. Provider Explanation did not vary significantly with patient age, sex, ethnicity, or clinic-measured BP.

Relationship of VRM Indexes to BP

BP indexes used for comparison with VRM indexes were (a) the seated BP taken at the home visit and (b) the change in BP from the clinic visit to the home visit. BP change was measured by subtracting the clinic BP (average of nurse and provider measures if both were taken) from the home-visit BP. Thus a negative change score indicated a decrease in BP from interview to home visit, whereas a positive score indicated an increase.

Averages for the home BP measures were 139 mmHg SBP ($SD = 19$ mmHg, range = 100 mmHg to 220 mmHg) and 83 mmHg DBP ($SD = 13$ mmHg, range = 48 mmHg to 137 mmHg). BP change measures were available for 160 patients (only 159 SBP change measures); equipment or recording difficulties prevented clinic measures for 10 patients. Change scores averaged -2 mmHg SBP ($SD = 22$ mmHg, range = -68 mmHg to $+62$ mmHg) and -3 mmHg DBP ($SD = 14$ mmHg, range = -38 mmHg to $+34$ mmHg).

Correlations were computed to assess the relationship between indexes of Exposition and Explanation and measures of BP at home visit and BP change from interview to home visit (Table 1). Patient Exposition in the history was significantly correlated with improvements (i.e., reductions) in SBP ($r = -.16, N = 157, p < .05$) and DBP ($r = -.18, N = 158, p < .05$). Provider Explanation in the conclusion was not significantly correlated with SBP at the home interview, but was significantly negatively correlated with DBP ($r = -.20, N = 163, p < .05$).

A series of residual correlation analyses was done to control for variance due to patient characteristics and differences among providers. When effects of provider differences and of patient sex, ethnicity, and age were all controlled, significant residual correlations were obtained between Exposition

TABLE 1
Correlations of Patient Exposition and Provider Explanation With Measures of BP Control

	BP Change From Clinic to Home Visit		*Home Visit BP*	
	SBP	*DBP*	*SBP*	*DBP*
Zero-order correlations				
Patient Exposition	−.16*	−.18*	−.04	−.11
(*N*)	(157)	(158)	(167)	(168)
Provider Explanation	−.09	−.13	−.11	−.20*
(*N*)	(152)	(153)	(162)	(163)
Residual correlations[a]				
Patient Exposition	−.17*	−.09	−.04	.01
(*df*)	(140)	(141)	(150)	(151)
Provider Explanation	−.07	−.11	−.17*	−.21**
(*df*)	(135)	(136)	(145)	(146)

Notes. Patient Exposition = the number of patient medical history utterances coded "disclosure" or "edification" in both form and intent; Provider Explanation = the percentage of provider conclusion-segment utterances coded as "edification" in form and intent (see VRM manual; Stiles, 1978a). Negative correlations indicate that higher VRM indexes were associated with BP reductions or lower BP levels. *N*s and degrees of freedom vary within rows because of missing data on some measures.

[a]Controlling for patient age, sex, and ethnicity and for provider differences.

*$p < .05$. **$p < .01$.

and SBP change and between Explanation and home SBP and DBP (Table 1). Thus the obtained associations, though small, do not appear to be artifacts of patient demographic differences or provider differences.

Parallel analyses comparing BP outcomes with the converse VRM measures (i.e., Exposition percentage and Explanation frequency) revealed no significant associations.

To explore the clinical implications of the obtained associations, we contrasted the BP indexes of patients who had particularly high levels of Exposition or Explanation with indexes of other patients in this study. Results are illustrated in Tables 2 and 3. Among patients who had 60 or more Exposition utterances, mean change scores were −9.3 mmHg SBP (69% showed decreases, i.e., home measure lower than clinic measure) and 7.7 mmHg DBP (76% showed decreases). By contrast, among patients who had fewer than 60 Exposition utterances, mean change scores were −0.1 mmHg SBP (only 46% showed decreases) and − 1.7 mmHg DBP (53% showed decreases). Among patients who received 20% or more Explanation from their provider, mean home BP was 130.8 mmHg SBP (79% were below 140 mmHg) and 78.0 mmHg DBP (85% below 90 mmHg). By contrast, among patients who received less than 20% Explanation, mean home BP was 142.3 mmHg SBP

(only 40% were below 140 mmHg) and 84.5 mmHg DBP (63% were below 90 mmHg). Thus, patients whose interviews were high in Exposition or Explanation were likely to show BP or lower home BP, respectively, whereas no prediction was possible for patients who had moderate or low levels of Exposition and Explanation. The VRM cutoffs of 60 Exposition utterances and 20% Explanation utterances were chosen post hoc, so these results should be considered as exploratory and tentative.

Medication Adherence

Contents of medication containers, examined at home visit, were compared with clinic pharmacy records, and adherence measures were calculated by dividing the number of pills or cubic centimeters taken (missing from the container) by the number of pills or cubic centimeters prescribed for the intervening 2 weeks, for comparison with the VRM measures. We had hoped to use these data to examine a possible mechanism of the interview's impact on BP levels (i.e., via changes in adherence). Unfortunately, adherence measures were obtained for only half (108) the patients, because patients mixed new and old batches of pills in the same bottles, failed to fill prescriptions, transferred medications into different containers, or were not visited at home. Among those who had measures, only 86 patients had measures for antihypertensive medication, and only 15 patients had measures for newly prescribed antihypertensive medication. (Adherence to new prescriptions would be most likely to respond to interview variables.) Furthermore, within these subgroups, regimens were heterogeneous with respect to amount and specific agent prescribed.

We conducted extensive exploratory analyses, comparing medication adherence measures with Exposition and Explanation indexes and with BP indexes. These analyses revealed no significant association. However, in view of the reduced *N*, the regimen heterogeneity, and other difficulties in measuring adherence, we cannot rule out the possibility that adherence mediated the observed relationship between interview verbal behavior and subsequent BP.

DISCUSSION

The results partially supported our hypothesis that indexes of interview verbal behavior would be associated with lower subsequent BP among hypertensives. Patient Exposition (patients' amount of talking using their own words in the medical history segment) was significantly correlated with reductions in BP from clinic visit to home interview, but not with BP levels at the clinic or the home interview. Provider Explanation (providers' percentage of giving objective information in the conclusion segment) was significantly correlated

with lower BP at home interview, but not with clinic levels or with change from clinic visit to home interview. The relationships of Exposition and Explanation with BP measures were much the same after statistically controlling for patient age, sex, and ethnicity, and for provider differences, suggesting that the observed VRM–BP correlations were not artifacts of associations with these variables.

The correlations parallel previous findings that greater Patient Exposition in the medical history and Provider Explanation in the conclusion predicted greater patient satisfaction with their interviews (Putnam et al., 1985; Stiles et al., 1979).

As univariate predictors, the observed correlations of VRM indexes with BP indexes were small. However, this is not surprising, considering that they associate a complexly determined physiological state (which has its own measurement difficulties) with a brief event 2 weeks previously. To our knowledge, this is the first empirical evidence associating directly measured medical interview characteristics with subsequent BP. Accurately predicting BP control in naturalistic settings will undoubtedly require complex theoretical models that include many intervening variables—biological, social, and psychological. Our results suggest that patient–provider verbal interaction variables should be included in such predictive models.

The linear associations tested by correlation coefficients reflect clinical goals imperfectly; BPs that do not exceed certain cutoffs are not treated, and reductions below an optimum range are not desirable. The cutoffs used in Tables 2 and 3 are very tentative, but in principle, the sort of approach they illustrate may be useful for finding the appropriate "doses" of interview characteristics.

Tables 2 and 3 show that patients whose interviews included 60 or more Exposition utterances or 20% or more Explanation utterances were more likely to show BP decreases or lower home BP, respectively. These cutoffs, below which outcomes were unpredictable, excluded approximately 80% of the interviews in this study. However, they are below the *mean* levels found in initial interviews (cf. Putnam et al., 1985; Stiles et al., 1982). Patient Exposition in the history segments was less than half that of the initial interviews, averaging 33 utterances versus 86 utterances. Provider Explanation in the present conclusion segments was even lower, averaging only 12.3% of 62 provider conclusion-segment utterances versus 23.0% of 102 provider conclusion-segment utterances in the initial interviews. Thus, the levels of Exposition and Explanation in many of the interviews may have been below the minimal "dose" needed to effect changes in health behaviors.

Our design was correlational, so our results cannot be interpreted as demonstrating a causal relation between verbal interaction and subsequent BP. However, the results are consistent with causal models. We offer some possibilities.

TABLE 2
Numbers of Patients, Cross-Tabulated by Patient Exposition Frequency and BP Change From Interview to Home Visit

	SBP Change From Interview to Home Visit[a]		
Patient Exposition Frequency	*Decrease*	*Increase or No Change*	*Total*
60 or more	20	9	29
Less than 60	59	69	128
Total	79	78	157
	DBP Change From Interview to Home Visit[b]		
Patient Exposition Frequency	*Decrease*	*Increase or No Change*	*Total*
60 or more	22	7	29
Less than 60	68	61	129
Total	90	68	158

Note. Patient Exposition = the number of patient medical history utterances coded "disclosure" or "edification" in both form and intent (see VRM manual; Stiles, 1978a).

[a] $\chi^2 = 4.95, p < .05$.

[b] $\chi^2 = 5.18, p < .05$.

TABLE 3
Numbers of Patients, Cross-Tabulated by Provider Explanation Percentage and BP at Home Visit

	SBP at Home Visit[a]		
Provider Explanation Percentage	*Less Than 140 mmHg*	*140 mmHg or More*	*Total*
20 or more	27	7	34
Less than 20	51	77	128
Total	78	84	162
	DBP at Home Visit[b]		
Provider Explanation Percentage	*Less Than 90 mmHg*	*90 mmHg or More*	*Total*
20 or more	29	5	34
Less than 20	81	48	129
Total	110	53	163

Note. Provider Explanation = the percentage of provider conclusion-segment utterances that were coded as "edification" in form and intent (see VRM manual; Stiles, 1978a).

[a] $\chi^2 = 16.85, p < .001$.

[b] $\chi^2 = 6.21, p < .02$.

One obvious explanation is that the associations were mediated by medication adherence. Our results offer no direct evidence of this, but our data do not permit us to rule it out. Additionally, attentive listening by providers (Exposition) and the giving of information (Explanation) may have had salutary effects on adherence to other treatment components that would promote BP control, such as diet restrictions or exercise.

Psychosocial interview processes can affect BP in ways that do not require regimen adherence. Laboratory studies have shown that people's verbal behaviors in interviews are associated with significant changes in BP across short time spans (Lynch, 1985; Lynch, Long, Thomas, Malinow, & Katcher, 1981; Lynch et al., 1982; Scherwitz, Berton, & Leventhal, 1978). In addition, expressed hostility has been found linked with rises in BP level (Dembroski, MacDougal, & Lushene, 1979; Dembroski, MacDougal, Shields, Petitto, & Lushene, 1978). Evidence from clinical settings suggests longer term reduction of BP and other cardiovascular risk factors may be attributable to "nonspecific" (i.e., as yet unknown) effects of interviewing (Glasunov et al., 1973).

Exposition's association with BP *change* from interview to home visit, in contrast with Explanation's association with home BP *level,* suggests that they might influence BP by different mechanisms. As one speculation, perhaps Exposition—patients' free expression of their concerns—promotes the nonspecific psychosocial effects (e.g., sense of being cared about and respected? reduced hostility?), tending to reduce BP from its preinterview level, regardless of what that level was (cf. Lynch, 1985). This speculation requires that the psychosocial effects of talking with the provider lasted at least 2 weeks. Alternatively, the association might have been mediated indirectly by patient traits: high-Exposition patients may have also talked more freely with the home visitor (prior to the readings, which were taken late in the visit), experienced short-term relief, and thus lowered their BP. A more artifactual account is that patients who talked a great deal in the interview had a short-term increase in BP, so that the "change" at home visit was really a return to their normal (less talkative) baseline. As Lynch (1985; Lynch et al., 1981, 1982) and others have shown, BP increases during talking; if high-Exposition patients talked *while* their BP readings were being taken by the nurse and the provider (but not by the home visitor), then the Exposition results could reflect only brief deviations. However, this hypothesis would suggest that Exposition should have been positively correlated with interview BP, and this was not observed.

Still speculating, Provider Explanation could remind patients why they should adhere to specific aspects of regimens (and which particular aspects might differ across patients, making statistical detection of effects on adherence difficult). Over the subsequent few weeks, the BP of patients who had forgotten should decrease (because of greater adherence), whereas that of pa-

tients who had been adhering should merely not increase (because they would be less likely to forget). By contrast, patients who received less Explanation would be more likely to remain or to become forgetful. This combination of reminding some patients and preventing others' forgetting would produce the stronger correlations with home BP level than with BP change.

For the health-care provider, the findings raise the possibilities that allowing patients to tell their own stories in their own words (as opposed to permitting only "yes" or "no" answers), and giving explanations about illness and treatment, might help promote BP control. Experimental studies are needed to test these possibilities.

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