Medical word use in clinical encounters

Susan Koch-Weser ScD,* William DeJong PhD† and Rima E. Rudd ScD‡

*Assistant Professor, Department of Public Health and Community Medicine, Tufts University School of Medicine, †Professor, Department of Community Health Sciences, Boston University School of Public Health and ‡Senior Lecturer, Department of Society, Human Development and Health, Harvard School of Public Health, Boston, MA, USA

Correspondence
Susan Koch-Weser
Department of Public Health and
Community Medicine
Tufts University School of Medicine
136 Harrison Avenue
Boston
MA 02111
USA
E-mail: skochw01@tufts.edu

Abstract

Objective Doctors often use medical language with their patients despite findings from a variety of studies that have shown that patients frequently misunderstand medical terminology. Little is known about the patterns of medical word use by doctors and patients during clinical encounters.

Methods A content analysis of 16 verbatim transcripts of first clinical encounters between rheumatologists and newly referred patients was conducted to assess how doctors and patients introduced medical words. Medical words were identified via a computer program using a defined list.

Results Doctors did not introduce or use more medical words than patients, but the types of words that doctors and patients introduced did differ. The majority of patient-initiated medical words occurred during the history taking (94%). Doctors did not explain, or use as part of an explanation, the majority (79%) of the medical words they introduced, and patients seldom responded in a way that would indicate whether or not they had correctly interpreted those terms. There was relatively little repetition of medical words within or even across encounters.

Conclusions This study provides insights into how the use of medical terminology could contribute to misunderstanding. Findings suggest that steps already promoted in the literature to improve doctor–patient communication may also ameliorate potential problems arising from the use of medical terminology.

Introduction

Medical terminology is often complex, and within the health-care context everyday words can take on specific and uniquely clinical meanings.[1] It is not surprising, then that patients find it difficult to understand the words that their doctors use or misinterpret their meaning. Although some medical words have entered the general vocabulary so that once unfamiliar terms are now widely used (e.g. 'autopsy' and 'orally'),[2,3] many other relatively common medical words continue to be problematic.[3–9] For example, one study found that only 28% of pre-operative anaesthesia patients correctly interpreted the term 'fasting'.[7] Unexplained medical terminology can also be a barrier to effective communication in clinical encounters, leading to patient anxiety[10] and potentially poorer health outcomes.

Despite its complexity, doctors persist in using medical language with their patients, perhaps because of its precision or to assert their authority.[10,11] In an analysis of transcripts from over 300 clinical encounters, the 40 participating doctors used 'technical terms' in every encounter.[12] Surprisingly, the study's authors concluded that this terminology was not problematic, asserting that the terms used were well known or that the transcript showed that the attending doctor either explained them or dismissed them as not worth knowing. In counterpoint, a survey in one hospital setting found that, although doctors thought that they were using 'everyday language' with patients, both patients and nurses thought that the doctors most often used 'medical language'.[13] The Medical Expenditure Panel Survey found that only 58% of patients reported that their health-care providers explained things in an understandable way.[14]

Medical words may be particularly problematic for the 46% of US adults who, according to the 2003 National Assessment of Adult Literacy (NAAL), have limited health literacy skills and cannot consistently perform text-based tasks related to health-care access and health promotion.[15] NAAL assessed health literacy on the basis of print-based tasks calling on reading and computational skills. The Institute of Medicine (2004) highlighted that health literacy is more than reading, and includes speech and speech comprehension skills as well. At the same time, reading skills often offer a strong proxy of broader literacy skills, because reading is the most efficient way to learn vocabulary.[16] Adults who read a lot, not surprisingly, tend to have larger vocabularies and greater verbal fluency.[17]

This study focuses on vocabulary in medical encounters. In choosing what words to use, speakers make assumptions about their listener's knowledge base.[18] Doctors and nurses often overestimate patients' health literacy level[19] and their knowledge of medical terminology.[2] A variety of studies have examined clinical communication and patient understanding, but only a few have examined the patterns of medical word use by doctors and patients. According to Daltroy,[20] doctors and

patients must accomplish specific communication tasks. Doctors should seek to understand a patient's underlying beliefs and usual coping strategies so that they can describe the models that guide their medical conclusions and treatment choices in ways that facilitate the integration of the new information with a patient's models of disease and past experiences. At the same time, patients must express themselves and participate in decision-making. Such communication requires a high level of information exchange between doctor and patient[21] and in a typical clinical encounter most of the time is spent exchanging information.[22] Yet, we know very little about how medical words are used by doctors and patients in clinical encounters, medical words upon which the success of the exchange may depend.

Early research studies in the health literacy field used short and easily administered approximations of reading skills, such as the Rapid Estimate of Adult Literacy in Medicine (REALM), to assess patients' literacy skills.[23] The REALM is a medical word recognition test, and its use has demonstrated that patients in a variety of populations have difficulty reading or pronouncing medical words.[23–31] Such patients may not be able to understand their doctors when they use medical terminology.[32]

The pattern of medical word use by doctors and patients is likely to be shaped by the participants' respective roles and to vary as the encounter progresses from the history, through the examination, and to the discussion of diagnosis and treatment options. Role theory posits that people behave, and expect and encourage others to behave, according to patterns of behaviour they have learned from social contexts.[33] In clinical settings the roles played by doctor and patient will be separate and mutually validating. As the professional, the doctor expects and is expected to demonstrate expertise. One way of fulfilling their role as medical expert is to use medical terminology; if the terminology functions in part to help the doctor 'be a doctor' they may sometimes leave medical words unexplained. Patients, who may not understand all the medical terminology used, in their role as

patient may be deferential to the doctor's expertise and hesitate to interrupt to ask that terminology be explained.

During history taking doctors seek information from their patients and may introduce medical terms in their questions. When giving their history, patients are the 'expert' and those familiar with medical vocabulary may be likely to use medical terms to describe past treatments and illnesses. After the examination, doctors discuss their conclusions and recommendations for action, potentially introducing still additional medical terminology. During this phase of the encounter patients may be less likely to call on their knowledge of medical terminology. Understanding how medical words are used and responded to during clinical encounters can lead to the development of communication strategies for improving patient understanding.

In this exploratory study, we examine the introduction of and response to medical words in 16 clinical encounters between rheumatologists and newly referred patients. By studying encounters in a specialty clinic we are able to examine medical word use as it pertains to one disease area. In addition, as these patients and doctors have not met before, they may be more descriptive in their information exchange because they cannot draw on past experiences together. Content analysis was used to examine a series of hypotheses to test our theory regarding medical word use in clinical encounters:

Hypothesis 1: Doctors will introduce and use more medical words than patients.

Hypothesis 2: The types of medical words introduced by doctors and patients will differ.

Hypothesis 3: The majority of medical words patients introduce will be used to describe their history.

Hypothesis 4: Doctors will be more likely to repeat patient-initiated medical words than vice versa.

Hypothesis 5: Doctors will leave more medical words unexplained than they will explain or use as part of an explanation.

Hypothesis 6: The majority of patients will not ask for clarification of medical terms.

Methods

Data

The data presented here were originally collected as part of a study of doctor–patient communication in a rheumatology clinic.[34] The doctors and patients were audio-taped during their first clinical encounter. The audio tapes were transcribed by medical secretaries and then examined for accuracy by clinically trained reviewers familiar with arthritis-related terminology.

The original study was approved by the hospital's Institutional Review Board. Informed consent was obtained from both patients and doctors. The current investigation was approved by a University Human Subjects Committee.

Sample

For this exploratory study, 16 encounter transcripts were randomly selected from the original study for a detailed analysis of medical word use. In the selected sample, the patients' average age was 52.9 years (SD 15.5, range 28–73 years). Mean years of education was 14.9 (SD 3.7, range 8–22). Nine patients (56%) were female, and 14 (88%) were white. The 16 patients were seen by 11 different doctors; no doctor saw more than two patients. The majority (81.2%) of the encounters were with male physicians, and 50% were with senior physicians, while the other half saw junior clinicians or fellows. Patient and doctor characteristics are summarized in Table 1.

Medical words identification

Medical words in the transcripts were identified via a computer program using a defined list of 13 690 medical words derived from the 2002 Medical Subject Headings (MESH) on the National Library of Medicine website[35] and the trade names of 980 drugs listed on a consumer website.[36] Words that could be considered 'common' or 'high frequency' were removed from the MESH index list. 'Common' words were determined using a list of 7682 words

Table 1 Patient and encounter characteristics (*N* = 16)

Female (%)	56.3
Age (mean ± SD)	52.9 ± 15.5
Years education (mean ± SD)	14.9 ± 3.7
White (%)	87.5
Married (%)	62.5
Working now (%)	53.3
Severity of disease* (%)	
Mild	37.5
Moderate	31.2
Severe	31.2
% Seeing male doctors	81.2
% Seeing white doctors	75.0
% Seeing senior doctors (vs. junior or fellows)	50.0

*Mild, self-limiting (acute) connective tissue diseases (e.g. tendonitis); moderate, chronic inflammatory rheumatic diseases (e.g. osteoarthritis); severe, systemic inflammatory diseases (e.g. lupus).

created from transcripts of children's speech developed by the Home-School Study of Language and Literacy.[37] Standardized frequency index (SFI) values from The Educator's Word Frequency Guide[38] were used to determine 'high-frequency' words. SFI values represent the likelihood that a word will occur in a million words, adjusted for the word's dispersion across the nine content areas and logarithmically transformed into a normal distribution. Words with high SFI values appear frequently in texts from a wide range of subject areas, while words with low SFI values appear much less frequently and are likely to be limited to just a few content areas. Thus, most people will have encountered words with high SFI values; while fewer will have encountered low SFI words. Our cut-off point was at the 5th percentile of SFI values, 42.7; thus, the words remaining in our medical words list were either not included in the original text, or were less frequent than 95% of the words in the corpus.

Coding of medical word introductions

To examine the patterns of medical word introductions by doctor and patient, plus the other speaker's response, the words were coded into one of six categories as follows:

1. Whether the doctor or patient introduced the word

2. The type of medical word used: drug names, diseases and disease processes, parts of the body, symptoms, treatments or medical procedures, names of medical specialties, or 'other' (see definitions of word types in Table 2)

3. Whether the medical word was introduced in a question or statement

4. Whether the medical word related to patient history, diagnosis or treatment

5. If introduced first by the doctor, whether the word was explained or used as part of an explanation or left unexplained

6. The other speaker's response to the word.

The other speaker's response to a medical word's introduction were coded into one of five broad categories which differed slightly for doctors and patients (see Table 3): (1) continuation of the idea or thought in which the word was introduced; (2) request for a definition or clarification of the word; (3) correction (made by the doctor) or confusion (expressed by the patient) resulting from the way the word was used; (4) a short 'yes' or 'no' response; and (5) no response (e.g. a change of topic in the next line of the transcript). If the response was coded as 'continuation', it was also noted whether the other speaker used the same word or a synonym as the discussion continued.

To examine inter-rater reliability, five of the 16 transcripts (31%), which included the introductions of 122 medical words out of a total of 440 (27%), were selected at random and evaluated by a second coder. With each transcript, differences between the two coders were discussed to clarify the coding categories. Inter-rater reliability as measured by κ was high for word type (0.87), questions vs. statements (0.95), and whether the word was introduced as part of a discussion of history, treatment or diagnosis (0.97). Responses to medical words (0.59) and use of a synonym or same word (0.66) had somewhat lower reliability. κ for coding whether the words doctors introduced were explained was very low (0.49); in this case, however, 84% of the words that doctors introduced were not explained, making the population of words relatively homogeneous and a high κ difficult to achieve.[39,40] Even for characteristics with κ < 0.87, the percent agreement

Table 2 Coding scheme for types of medical words

Type of medical words	Definition
Drug names	Drug names (e.g. prednisone, ibuprofen)
	Natural substances used as a drug (e.g. 'taking oestrogen')
Diseases and disease processes	Names of diseases or conditions (e.g. diabetes, arthritis, Raynaud's)
	Adjectives derived from diseases (e.g. arthritic, diabetic, rheumatoid)
	Growths or malformations in the body (e.g. tumour, cyst)
Parts of the body	Body parts (e.g. coccyx)
	Body products not symptomatic of disease (e.g. blood, urine, oestrogen)
	Adjectives placing diseases ∕ problems in the body (e.g. endometrial)
Symptoms	Adjectives or nouns used to describe symptoms ∕ problems (e.g. bluish, diarrhoea, convulsions, inflammation)
Treatments or medical procedures	Non-drug treatment modalities (e.g. splints, acupuncture)
	Medical procedures, operations, interventions (e.g. arthrogram, appendectomy, caesarean, hospitalization)
Names of medical specialties	Types of doctors (e.g. gynaecologist)
	Specialties (e.g. rheumatology)
Other	Words that do not fit in any of the above categories (e.g. alignment, anti-inflammatory, borderline, convalescent, cuff, depressant, diagnosed, dosage, follow-up, invasive, non-steroidal, prognosis, recurrence)

Table 3 Coding scheme for the speaker's response to the introduction of a medical word by the other speaker

Response	Definition
Continuation	Doctor: Continues discussion involving the patient-initiated word or the idea the word helped communicate
	Patient: Continues discussion involving the doctor-initiated word or the idea the word helped communicate and demonstrates understanding of the word (if word is not understood, then word is coded as 'confusion')
Definition ∕ clarification	Doctor: Asks patient to clarify word by asking for more specific terminology (example: patient says 'taking estrogen', and doctor asks which specific drug and dose)
	Patient: Asks doctor for clarification or definition of the word or idea the word helped communicate
Correction (doctor) ∕ confusion (patient)	Doctor: Corrects patient misuse of word
	Patient: Comments demonstrate that patient has not understood the doctor-initiated word
Short response	Doctor: Responds to statement containing patient-initiated word with a short response (e.g. yes, no and uh-huh)
	Patient: Responds to statement containing doctor-initiated word with a short response (understanding is not clearly demonstrated but implied because the follow-up response indicates understanding)
No response	Doctor: Patient's next line is a new topic
	Patient: Doctor's next line is a new topic

between raters was reasonably high, ranging from 74.6% to 85.9%.

Analysis

Paired *t*-tests were used to assess whether doctors introduced and used more medical words than patients and whether they repeated more of the patients' medical words than vice versa. Chi-squared tests were used to test the other hypotheses. SAS, version 8.02 (SAS Institute Inc., Cary, NC, USA), was used in all computations.

Results

A total of 440 medical words were introduced in the 16 encounters: 237 by doctors and 203 by patients. Table 4 shows summary counts of all

	Mean	SD	Range	*t*-test
Total number of words				
Doctors	3300.7	1128.5	1934–5329	$t(30) = -0.27$,
Patients	3446.4	1799.1	1107–6774	$P = 0.7856$
Total number of medical words				
Doctors	41.8	22.1	14–93	$t(30) = 1.42$,
Patients	31.1	24.2	12–110	$P = 0.1666$
Number of medical words introduced				
Doctors	14.8	6.7	4–26	$t(30) = 0.86$,
Patients	12.7	7.3	4–32	$P = 0.3983$
Said only once				
Doctors	10.9	5.6	2–20	$t(30) = 1.61$,
Patients	7.9	5.1	1–18	$P = 0.1183$
Repeated by other speaker				
Doctors' words	2.0	1.7	1–7	$t(30) = 3.48$,
Patients' words	4.4	2.1	2–11	$P = 0.0016$

Table 4 Summary counts of all words and medical words used across 16 transcripts

words and medical words across the 16 transcripts. On average, doctors did not talk more than patients; doctors and patients used a similar number of words overall [$t(30) = -0.27$, $P = 0.7856$]. Contrary to our first hypothesis, doctors did not introduce or use more medical words than patients. Doctors introduced 15 medical words on average and patients 13, but the difference was not significant [$t(30) = 0.86$, $P = 0.3983$]. Doctors used an average total of 42 medical words per encounter, while patients averaged 31; this difference was also not significant [$t(30) = 1.42$, $P = 0.1666$].

As predicted in our second hypothesis, the types of medical words that doctors and patients introduced were significantly different [$\chi^2(30) = 23.39$, $P = 0.0007$]. Among patients, the four most commonly used types of medical words were *drugs* (28%), *diseases* (27%), words classified as *other* (14%) and *procedures* (11%). For doctors the list included 'diseases' and words classified as 'other' (tied at 23%), followed by *drugs* (18%) and *body parts* (16%). Words categorized as *other* include terms such as 'anti-inflammatory', 'diagnosed', 'nonsteroidal' and 'recurrence'.

As predicted in our third hypothesis, the majority of patient-initiated medical words occurred as patients spoke about their history (94%). In 11 of the 16 encounters all of the patient-initiated medical words were used to describe their history. Only 3% of the medical words that patients introduced were part of a question; in 12 encounters, patients never introduced a medical word in this way. This is in contrast to doctors who introduced 54% of their medical words when asking questions.

As predicted in our fourth hypothesis, doctors on average repeated significantly more of the medical words introduced by their patients than vice versa [4.4 vs. 2.0 per encounter respectively; $t(30) = 3.48$, $P = 0.0016$]. Doctors repeated 15.9% of the medical words introduced by their patients, while patients only repeated 7.3% of the doctor-initiated medical words. Table 5 shows that the medical words introduced by doctors were repeated by patients and vice versa and is organized by type of medical word. While patients and doctors did not often repeat each other's medical words, they were also unlikely to repeat their own. On average, patients used 62% of the medical words they introduced just once, doctors 74%; this difference between doctors and patients was not significant [$t(30) = 1.61$, $P = 0.1183$]. Interestingly, there was relatively little repetition of medical words across the 16 encounters. No single medical word was common to all encounters; the words appearing most often were 'arthritis' (15 encounters), 'inflammation' (10 encounters) and 'thyroid' (8 encounters).

As predicted, doctors did not explain, or use as part of an explanation, the majority (79%) of the medical words they introduced. The types of medical words most likely to be explained or

Table 5 Words introduced by one speaker and repeated by the other

Type	Patient words repeated by doctors	Doctor words repeated by patients
Drug	Amitriptyline, carafate, cortisone, coumadin, darvocet, oestrogen, feldene, imuran, lasix, meprobamate, motrin, naprosyn, plaquenil, prednisone, probenecid, seldane, steroids, tylenol, voltaren	Cortisone, feldene, indocin, medrol, micronase, motrin, nuprin, prednisone, premarin, synthroid, tetracycline
Disease	Appendicitis, arthritis, bursitis, carpal, clot, cyst, diabetic, gout, hepatitis, lupus, lyme, polymyalgia, psoriatic, rheumatoid, sclerosis	Arthritis, gout, hepatitis, lyme, psoriasis
Body	Aorta, coccyx, groin, ovarian, tendon	Buttocks, thyroid
Symptom		Dizziness, inflammation, ulcer
Specialty	Nurse's	Oncology
Treatment	Acupuncture, arthroplasty, biopsy, caesarean, fibrillation, hysterectomy, inflammation, traction	Intravenous, splints
Other	Anti-inflammatory, ruptured, yoga	Diagnosed, dosage

used in an explanation were *drugs* (46%), *symptoms* (20%) and words classified as *other* (19%).

Patients seldom responded in a way that would indicate whether or not they had correctly interpreted the medical words introduced by doctors. And in only one instance did a patient's follow-up comments indicate a misunderstanding. As seen in the example below, it was usually impossible to tell from the transcript whether unexplained words presented an obstacle to patient comprehension:

> Doctor: If you've been on Plaquenil for a while, you're not allergic to it.
>
> Patient: Uh-huh.
>
> Doctor: You're not gonna get any of the other complications which, all of which are rare. Ah, blood problems, kidney problems, other allergic problems, and neurological problems. Ah, so those are often very early manifestations. Ah, the eye problem is a long-term problem. The risk of getting eye problems on taking two Plaquenil a day are somewhere between one in 1000, one in 10,000.
>
> Patient: Uh-huh.

In this and in subsequent quotes, medical words are underlined and first instances are in bold. Some words may appear to be medical words, but they were not included in the list because they are 'high-frequency' words with a SFI value greater than 42.7 times per million.

In every encounter there was at least one doctor-initiated medical word that was not explained and did not lead to a continued discussion and that the patient did not subsequently use. Overall, 40% of the doctor-initiated words fit this profile. They were most often introduced during the history (64%), usually as part of a question (56% of these instances). Just under one-third of these words were the name of a disease (31% of these instances). A typical example of this is a series of questions used to elicit the patient's history:

> Doctor: Ever had any thyroid problems?
>
> Patient: No.
>
> Doctor: Asthma, bronchitis, pneumonia?
>
> Patient: No.
>
> Doctor: Heart problems, heart murmur?
>
> Patient: No.
>
> Doctor: Blood pressure? You ever have any trouble swallowing?
>
> Patient: Mmm, no.
>
> Doctor: Ok, blood in your stool?
>
> Patient: No.

Doctor: <u>Hepatitis</u>?

Patient: No.

Doctor: Ulcers, <u>colitis</u>?

Patient: No.

History-eliciting questions can be phrased with embedded explanations but that occurred much less frequently. Here is an example from another encounter:

Doctor: Okay. Have you ever <u>psoriasis</u> on your skin, you know <u>scaling</u> in your hair or <u>scaling</u> on your elbows or knees?

Patient: No.

As predicted, patients rarely asked for clarification of medical terms; this occurred in only four encounters (25%). This passage is an example:

Doctor: No cancer. Ok. Any history of <u>thyroid</u> problems?

Patient: <u>Thyroid</u> are what, the throat?

Doctor: Ah, <u>thyroid</u> glands, anybody have high, ah low thyroid, in your family at all?

Patient: No, not that I know of.

Patients responded to the introduction of medical words with short responses – mostly 'yes' or 'no' – about 50% of the time. In almost as many cases (45%) they continued the discussion; in 28% of these encounters, patients went on to use the same word or a synonym. Patients who used medical words at a higher rate (relative to the total number of words in the transcript) were more likely to continue the discussion involving a medical word ($r = 0.61$, $P = 0.0147$).

Only rarely was there an indication that a patient's introduction of a medical word was incorrect or not precise enough. In three encounters, a doctor corrected a patient's misuse of a word, and in five encounters doctors asked patients for more specific medical terminology. Here is an example of a doctor asking for clarification from a patient who uses 'estrogen' as a drug name:

Patient: Yeah, also, um, I take a, he put on, years ago I had a <u>hysterectomy</u> and I was taking a hormone, <u>estrogen</u>, and then I started walking and

I got myself off it. And I was off it for quite a few years. And he put me back on it, uh, which I thought was a good idea because of the fact that, uh (doctor interrupts).

Doctor: So you're still taking that now?

Patient: Yeah, I'm taking that.

Doctor: How much, do you know?

Patient: Um, very small.

Doctor: Is it <u>Premarin</u>?

Patient: <u>Premarin</u>. That sounds a little (doctor interrupts).

Doctor: .625 or 1.25?

Patient: It might be, um, it's a little purple pill.

Doctor: Okay.

Discussion

Although doctors and patients introduced and used similar numbers of medical words, their patterns of use differed significantly and suggest the potential for miscommunication. Patients introduced medical words almost exclusively when relating histories; rarely introducing medical terminology during discussions of diagnosis and treatment. As the history is taken early in the clinical encounter, patients had the opportunity to introduce medical words, especially those related to *diseases* (past diagnoses and disease processes) and *drugs* (current and past treatments), and these are the categories of medical words patients were most likely to introduce. While being able to name drugs and diseases does require some familiarity with medical terminology, patients could be using those words with a limited understanding of the processes and science behind them. Certainly in the case of drugs, aside from describing the pills, only medical terminology *can* be used.

Doctors first used just over half of the medical words they introduced when taking the patient's history. Thus, they were far more likely than patients to introduce medical words in other parts of the clinical encounter, after the history was taken. Accordingly, the words they introduced were relatively less concentrated in the

two categories most used by patients. During the history and the rest of the encounters doctors usually introduced medical words without explanation. The words that the doctors most often explained were *drugs*. Explanations of drugs are very important, but other types of medical words, if left unexplained, might leave patients confused about their condition and how the drug is expected to help them, which in the case of rheumatological disorders has been shown to contribute to non-adherence to the treatment regimen.[20]

It was difficult to tell if patients comprehended the medical terminology being used. The doctors had little reason to think that their patients did not understand the medical words they introduced, as the patients rarely asked for clarification or misused a medical word. When doctors used medical words, patients continued the same discussion 45% of the time. This could mean that many of the medical words doctors used did not interfere with clear communication. However, at the same time, another 40% of the doctor-initiated medical words were not explained and did not lead in to a continuing discussion and were never subsequently used by the patient. The doctors appear to have assumed that their patients understood this set of medical words, too. At the same time it is possible that these unexplained medical words contributed to inaccuracies in the history or to some degree of patient misunderstanding. As noted previously, Roter and Makoul[14] found that only 58% of people report that their health-care providers explain things in a way that they can understand. It is possible that unexplained medical words over the course of the encounter contribute to such findings.

Given the uncertainty about whether or not patients can understand medical terminology, the tendency of doctors not to offer explanations along with use, and the finding that patients rarely ask for clarification, we would like to call attention to several strategies for improving clinical communication. These strategies might be particularly helpful in addressing the potential problems. Asking patients to repeat what they have been told (often called 'teach back'), a strategy that has long been recommended to increase patient comprehension among patients with limited literacy,[41,42] would provide doctors with an opportunity to learn whether patients have understood them. This strategy is likely to be most helpful in discussions of diagnosis and treatment, a phase of the encounter where we found that doctors continued to introduce unexplained medical terminology.

Doctors frequently introduced unexplained medical terms when asking yes/no questions while taking the history. Patients answer these questions affirmatively or negatively, but it is difficult for doctors to be certain, absent further exploration, that their patients understand the terminology and are responding appropriately. Patients with limited literacy have reported avoiding the embarrassment associated with lack of knowledge by answering 'no' when they do not understand questions on medical forms,[43] and the same stratagem may be employed when providing a history to their doctor.

When posing an yes/no question, some of the doctors embedded an explanation of the medical term being used. This practice requires few additional words but has the potential to greatly enhance patient understanding. With this technique doctors do not need to avoid medical terminology altogether, but can introduce terms in a way that fosters patient understanding and perhaps build patient vocabulary at the same time. Additional research into the effectiveness of embedded explanations is warranted.

Limiting yes/no questions during the history may also be advisable. Yes/no questions are an efficient way for hypothesis-driven physicians to gather the necessary data to rule a series of medical possibilities in or out,[44] Answers to this type of question may be influenced by some patients' desire to hide their lack of understanding. However, when patients are instead encouraged to tell their own story, they may offer more specific information and also provide doctors with some insight into their level of understanding.[20] In addition, allowing patients to talk in this way has the added benefit of enhancing patient satisfaction[45] and having better clinical outcomes.[46]

Another approach to improve patient understanding is to distribute a glossary of terms that is specific to a particular disease or condition.[47] Glossaries can be used to help patients learn the vocabulary needed to provide an accurate history, understand their diagnosis and follow their treatment regimen. The present study makes clear that such glossaries would meet an important need, as doctors often use, but do not define, medical words. To develop a glossary, practitioners must choose which words to include. In this study, with only 'arthritis' and 'inflammation' used in more than 50% of the encounters, no clear vocabulary list emerged on the basis of word counts. This is surprising given the specialized nature of this clinic. This suggests that the most fruitful approach to developing a glossary is to work with patients and providers to develop a list of words that are conceptually important and could lead to serious negative consequences if misinterpreted. In addition, the effectiveness of using print materials to help patients improve their vocabularies requires further research.

This exploratory study has several limitations. The data we used to conduct this exploration were collected over a decade ago; however, they offer a unique opportunity to examine word use in initial encounters in a speciality clinic. While doctor–patient communication certainly has evolved over time, especially with patient's increasing use of the internet, there is also evidence that fundamental aspects of clinical communication, as well as general literacy levels, do not change so quickly. Despite repeated findings over several decades indicating the value of allowing patients to tell their stories,[21] the average number of seconds a patient is allowed to talk before being interrupted has remained relatively steady at around 20 sec.[48–50] Sadly, over the past decade the literacy skills of US adults has actually decreased.[15,51,52] Therefore, although these data are not recent, the vocabularies of the patients and the practice patterns of doctors we analysed should still provide useful insights into and indications of important areas for further research.

This study was based on written transcripts only. As a result, there was no opportunity to observe patients' non-verbal communication, which might signal responses to newly introduced medical words that reinforced or contradicted their verbal response. However, a strength of this study is that these were first encounters, and patients and doctors, unfamiliar with each other, were probably more verbally explicit than they might be as they become better acquainted. A future study, involving patients with a wider range of medical conditions and educational levels, would make it possible to examine how the introduction and response to medical words is affected by various doctor and patient characteristics.

The study included only the first instance of medical words as they occurred in each transcript. Thus, the findings apply only to how such words were introduced and not how they were used throughout the clinical encounters. It should be noted, however, that more than half of the medical words were used only once per transcript. Studying how these words were introduced provides useful insights into medical word use during clinical encounters and suggests strategies to increase patient understanding of medical information.

In this sample the patients tended to be well educated; years of education ranged from 8 to 22 years, with a mean at 14.9 years. They were also seeking care in a specialty clinic for a condition they may have been managing for some time. The doctors may have felt that these patients would understand them. However, level of education does not translate directly into health literacy,[53] and doctors often overestimate their patients' skills.[19] The patterns revealed by this study raise several areas of concern, independent of the actual health literacy levels of the patients involved. First, doctors rarely explained terminology, nor did they check for understanding. Patients did not ask questions about terminology, and the ones they introduced tended to be words for drugs or diseases, neither of which necessarily indicates a deeper understanding of concepts. Finally, more than half of the medical words introduced were not repeated, indicating that patients are exposed to a variety of words over the course of the encounter, which

could present a particular challenge. This study provides insights into how the use of medical terminology could contribute to misunderstanding, as well as suggesting that steps already promoted in the literature to improve doctor–patient communication may also ameliorate potential problems arising from the use of medical terminology.

References

1 Bell C. A hundred years of Lancet language. *Lancet*, 1984; **2:** 1453.

2 Byrne TJ, Edeani D. Knowledge of medical terminology among hospital patients. *Nursing Research*, 1984; **33:** 178–181.

3 Chapman K, Abraham C, Jenkins V, Fallowfield L. Lay understanding of terms used in cancer consultations. *Psycho-oncology*, 2003; **12:** 557–566.

4 Boyle CM. Difference between patients' and doctors' interpretation of some common medical terms. *British Medical Journal*, 1970; **1:** 286–289.

5 Cole R. The understanding of medical terminology used in printed health education materials. *Health Education Journal*, 1979; **38:** 111–121.

6 Hadlow J, Pitts M. The understanding of common health terms by doctors, nurses and patients. *Social Science & Medicine*, 1991; **32:** 193–196.

7 Hume MA, Kennedy B, Asbury AJ. Patient knowledge of anaesthesia and peri-operative care. *Anaesthesia*, 1994; **49:** 715–718.

8 Norris P, Simpson T, Bird K, Kirifi K. Understanding of pharmacy-related terms among three ethnic groups in New Zealand. *The International Journal of Pharmacy Practice*, 2001; **9:** 269–274.

9 Wright V, Hopkins R. Communicating with the rheumatic patient. *Rheumatology & Rehabilitation*, 1977; **16:** 107–118.

10 Chapple A, Campion P, May C. Clinical terminology: anxiety and confusion amongst families undergoing genetic counseling. *Patient Education & Counseling*, 1997; **32:** 81–91.

11 Castro CM, Wilson C, Wang F, Schillinger D. Babel babble: physicians' use of unclarified medical jargon with patients. *American Journal of Health Behavior*, 2007; **31** (Suppl. 1)**:** S85–S95.

12 Skelton JR, Hobbs FD. Concordancing: use of language-based research in medical communication. *Lancet*, 1999; **353:** 108–111.

13 Bourhis RY, Roth S, MacQueen G. Communication in the hospital setting: a survey of medical and everyday language use amongst patients, nurses and doctors. *Social Science & Medicine*, 1989; **28:** 339–346.

14 Roter D, Makoul G. *Objective 11-6: Healthcare Providers' Communication Skills.* Healthy People 2010. Washington, DC: US Department of Health and Human Services, 2003.

15 Kutner M, Greenberg E, Baer J. A first look at the literacy of America's adults in the 21st century. NCES 2006-470. Washington, DC: National Center for Education Statistics, 2006.

16 Miller GA. On knowing a word. *Annual Review of Psychology*, 1999; **50:** 1–19.

17 Stanovich KE, Cunningham AE. Where does knowledge come from? Specific associations between print exposure and information acquisition. *Journal of Educational Psychology*, 1993; **85:** 211–229.

18 Damico JSDSK. Language and social skills from a diversity perspective: considerations for the speech-language pathologist. *Language, Speech & Hearing Services in the Schools*, 1993; **24:** 236–243.

19 Bass PF 3rd, Wilson JF, Griffith CH, Barnett DR. Residents' ability to identify patients with poor literacy skills. *Academic Medicine*, 2002; **77:** 1039–1041.

20 Daltroy LH. Doctor-patient communication in rheumatological disorders. *Baillieres Clinical Rheumatology*, 1993; **7:** 221–239.

21 Roter D, Hall JA. *Doctors Talking with Patients/ Patients Talking with Doctors: Improving Communication in Medical Visits.* Westport, CT: Auburn House, 1992.

22 Winefield HR, Murrell TG. Verbal interactions in general practice. Information, support and doctor satisfaction. *Medical Journal of Australia*, 1992; **157:** 677–682.

23 Davis TC, Long SW, Jackson RH *et al.* Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Family Medicine*, 1993; **25:** 391–395.

24 Bennett CL, Ferreira MR, Davis TC *et al.* Relation between literacy, race, and stage of presentation among low-income patients with prostate cancer. *Journal of Clinical Oncology*, 1998; **16:** 3101–3104.

25 Chesson AL Jr, Murphy PW, Arnold CL, Davis TC. Presentation and reading level of sleep brochures: are they appropriate for sleep disorders patients? *Sleep*, 1998; **21:** 406–412.

26 Davis TC, Arnold C, Berkel HJ, Nandy I, Jackson RH, Glass J. Knowledge and attitude on screening mammography among low-literate, low-income women. *Cancer*, 1996; **78:** 1912–1920.

27 Davis TC, Crouch MA, Long SW *et al.* Rapid assessment of literacy levels of adult primary care patients. *Family Medicine*, 1991; **23:** 433–435.

28 Davis TC, Mayeaux EJ, Fredrickson D, Bocchini JA Jr, Jackson RH, Murphy PW. Reading ability of parents compared with reading level of pediatric patient education materials. *Pediatrics*, 1994; **93:** 460–468.

29 Fortenberry JD, McFarlane MM, Hennessy M *et al.* Relation of health literacy to gonorrhoea related

care. *Sexually Transmitted Infections*, 2001; **77:** 206–211.

30 Gordon MM, Hampson R, Capell HA, Madhok R. Illiteracy in rheumatoid arthritis patients as determined by the Rapid Estimate of Adult Literacy in Medicine (REALM) score. *Rheumatology*, 2002; **41:** 750–754.

31 Kaufman H, Skipper B, Small L, Terry T, McGrew M. Effect of literacy on breast-feeding outcomes. *Southern Medical Association Journal*, 2001; **94:** 293–296.

32 Institute of Medicine. *Health Literacy : A Prescription to End Confusion*. Washington, DC: National Academies Press, 2004.

33 Biddle B. *Role Theory: Expectations, Identities and Behavior*. New York: Academic Press, 1956.

34 Katz JN, Daltroy LH, Brennan TA, Liang MH. Informed consent and the prescription of non-steroidal antiinflammatory drugs. *Arthritis & Rheumatism*, 1992; **35:** 1257–1263.

35 National Institute of Medicine. *Medical Subject Headings*. 2002. Available at: http://www.nlm.nih.gov/mesh/filelist.html, accessed 18 January 2002.

36 MedicineNet.com. *Medications Index*. 2002. Available at: http://www.medicinenet.com/script/main/AlphaIdx.asp?li = MNI&p = A_PHARM, accessed 27 February 2002.

37 Snow CE. The theoretical basis for relationships between language and literacy in development. *Journal of Research in Childhood Education*, 1991; **6:** 5–10.

38 Zeno S. *The Educator's Word Frequency Guide*. New York: Touchstone Applied Science Associates, 1995.

39 Shrout PE, Fleiss JL. Intraclass correlations: uses in assessing rater reliability. *Psychological Bulletin*, 1979; **86:** 420–428.

40 Shrout PE, Spitzer RL, Fleiss JL. Quatification of agreement in psychiatric diagnosis revisited. *Archives of General Psychiatry*, 1987; **44:** 172–177.

41 Doak CC, Doak LG, Friedell GH, Meade CD. Improving comprehension for cancer patients with low literacy skills: strategies for clinicians. *Cancer Journal for Clinicians*, 1998; **48:** 151–162.

42 Doak CC, Doak LG, Root JH. *Teaching Patients with Low Literacy Skills*, 2nd edn. Philadelphia, PA: J.B. Lippincott Company, 1996.

43 Schwartzberg J, Lagay F. *Health Literacy: What Patients Know When They Leave Your Office or Clinic. Web Article]*, 2003. Available at: http://www.ama-assn.org/ama/pub/category/print/5154.html, accessed 19 March 2005.

44 Bates B. *A Guide to Physical Examination and History Taking*, 5th edn. Philadelphia, PA: Lippincott, 1991.

45 Stiles WB, Putnam SM, James SA, Wolf MH. Dimensions of patient and physician roles in medical screening interviews. *Social Science & Medicine*, 1979; **13A:** 335–341.

46 Orth JE, Stiles WB, Scherwitz L, Hennrikus D, Vallbona C. Patient exposition and provider explanation in routine interviews and hypertensive patients' blood pressure control. *Health Psychology*, 1987; **6:** 29–42.

47 Rudd R, Zobel E, Fanta C *et al.* Asthma: in plain language. *Health Promotion Practice*, 2004; **5:** 334–340.

48 Marvel MK, Epstein RM, Flowers K, Beckman HB. Soliciting the patient's agenda: have we improved? *JAMA*, 1999; **281:** 283–287.

49 Rabinowitz I, Luzzati R, Tamir A, Reis S. Length of patient's monologue, rate of completion, and relation to other components of the clinical encounter: observational intervention study in primary care. *British Medical Journal*, 2004; **328:** 501–502.

50 Langewitz W, Denz M, Keller A, Kiss A, Ruttimann S, Wossmer B. Spontaneous talking time at start of consultation in outpatient clinic: cohort study. *British Medical Journal*, 2002; **325:** 682–683.

51 Kirsch IS, Jungblut A, Jenkins L, Kolstad A. *Adult Literacy in America*. Washington DC: US Department of Education, 1993.

52 Rudd RE. Health literacy skills of U.S. adults. *American Journal of Health Behavior*, 2007; **31** (Suppl. 1)**:** S8–S18.

53 Kutner M, Greenburg E, Jin Y, Paulsen C. The Health Literacy of America's Adults: Results from the 2003 National Assessment of Adult Literacy. NCES 2006-483. Washington, DC: National Center for Education Statistics, 2006.