A linguistic framework for assessing the quality of written patient information: its use in assessing methotrexate information for rheumatoid arthritis

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Abstract

Patient information leaflets are an important adjunct to verbal exchange between doctor and patient. Their value is dependent upon whether they contain useful information from the viewpoint of the patient and are easily understood. We developed a framework based upon linguistic theory for assessing the quality of written patient information and applied it to a set of leaflets about methotrexate treatment. Items included the overall structure of the text, the technicality of the vocabulary used, the number of content words per clause (‘lexical density’), and the clarity of the role relationship between author and reader. The leaflets consisted of up to nine identifiable sections (range 3–8): background information about the drug, summary of its use, dosage instructions, outline of benefits and side-effects, monitoring information, constraints on patient behavior, storage instructions, and clinical contact availability. Most leaflets contained a high number of content words per clause and the identity of the author was clear in only three (17%). Linguistic analysis provides highly relevant information about written patient information. Together with critical assessment of factual and visual aspects, consideration of key linguistic features should improve the quality of informational texts for our patients.

Introduction

While the fundamental value of written information for patients is generally accepted (Punchak and Kay, 1988; Zion, 1989; Meade and Smith, 1991), there is less confidence about its quality (Payne et al., 2000; Buchbinder et al., 2001). Much of the healthcare literature about quality focuses on statistical estimates of readability of patient information leaflets (Ley, 1988; Davis et al., 1990; Payne et al., 2000). A typical readability index uses an equation based upon average sentence length and average number of words of three or more syllables per sample. They are said to give an estimate of the grade level at which an average child will comprehend 50% of the text (National Health and Medical Research Council, 2000). Most studies have found a large discrepancy between the readability of patient education materials as determined by readability indices and the average patient’s reading ability (Buchbinder et al., 2001).

The validity of readability formulas for evaluating health-related patient materials has been questioned (Vivian and Robertson, 1980; Zion, 1989; Smith et al., 1998). While proponents of readability formulas claim to be measuring text difficulty or comprehensibility, others argue that the comprehension of a text involves a broader range of parameters than that offered by readability formulas.
(Spiro et al., 1980; Duffy, 1985; Davison and Green, 1988). For example, readability formulas do not consider the overall structure or organization of the text, or the vocabulary used. Neither do they take into account the prior knowledge of the reader or the significance of the role relationships between author and reader. While these factors are well accepted amongst linguists as being important for understanding written text, they have not been formally used for the development and evaluation of doctor–patient written information.

The aim of this study was to develop a framework based upon linguistic theory for analyzing the text of written patient information and to apply it to methotrexate leaflets currently provided to patients with rheumatoid arthritis. This linguistic framework may be used to critically appraise doctor–patient leaflets and provide a model for development of new materials.

**Methods**

**Assessment of the quality of information documents about methotrexate**

We sought copies of written drug information routinely provided to patients from the 195 fully registered members of the Australian Rheumatology Association (ARA) (Buchbinder et al., 2001). Eighteen documents relating to methotrexate (the most commonly described drug by this group) were obtained and independently analyzed by two of the authors (R. C. and J. M.), according to the linguistic framework described below. The two linguists then by consensus decided on the most useful aspects of the theory for this body of texts and cross-checked each others’ analysis of the documents. The authors of the methotrexate documents were individuals/hospitals ($n = 15$), the Arthritis Foundation ($n = 1$), a medical journal (Current Therapeutics) ($n = 1$) and a pharmaceutical company ($n = 1$).

**Systemic functional linguistics framework**

The framework is based upon the theoretical construct of systemic functional linguistics (Halliday, 1994). Systemic theory considers how people use language to make meaning and how language is organized to enable meanings to be made. According to the theory, language is viewed as a pattern of interlocking systems, from the smallest unit (e.g. words or phrases) up to the largest (e.g. a paragraph or longer piece of text) (Halliday, 1994). The interaction between text and context is the means by which the reader constructs meaning, so any model of text needs to take context into account. The two types of context identified in this analysis are context of culture and context of situation (Halliday and Hasan, 1989) (see Figure 1). Context of culture refers to the knowledge, values and practices within society which impact upon language used in a text. This shapes the way the text is organized at the macro-level. At the highest level within context of culture is the genre, which considers the organization or structure of the overall text with respect to its specific purpose (Swales, 1990). For example, patient information leaflets about drug therapy may be regarded as a subset of the genre of healthcare materials. The comprehensibility of this information will be affected by expectations of what is considered to be conventional text structure for this particular type of genre (Berkenkotter and Huckin, TXET Mode

![Fig. 1. Text and context.](image-url)
1985; Swales, 1990). The next context level, context of situation, is the environment in which the text is actually functioning (Halliday and Hasan, 1989). The key situational aspects impact on the type of language used. Three of these have consequences for language: what is being talked about (field), who is involved (tenor) and the role of language, including channel of communication (mode) (see Figure 1).

Texts reflect these key situational aspects, in that they deal with experience of the world, express interpersonal relations and they are ‘knitted together’ so that they can be understood. The degree to which a given text is understandable to a reader is dependent upon the nature of the topic that is being communicated; the reader’s expectations and prior knowledge, and the perceived role relationship between writer and reader; and the organization of the text and density of information. For example, in reading a patient information document, the expectations of a patient are likely to be something like: ‘doctor using knowledge to assist patient with information which will guide behavior and help prevent any adverse events’. This leads to a further set of expectations about ways the information may be structured, the likely type of information and vocabulary that will be encountered and whether there will be instructions or simply suggestions expressed in the text. Based upon these concepts, we have developed a simple assessment tool to evaluate healthcare text, as shown in Table I, and described below.

Organization or structure of the text (generic structure)
Different types of text generally have a characteristic overall ‘generic’ structure consisting of a series of sections or ‘moves’ which makes sense for a particular audience in a given situation (Hasan, 1989; Swales, 1990; Paltridge, 1997) (Table I). For example, a recipe includes a list of ingredients, method and serving suggestions. Written patient information about a drug might be expected to include identifiable segments of text which provide instructions about drug dosage, information regarding monitoring, as well as accounts of its potential benefits and side-effects. The comprehensibility of a piece of text will be affected by expectations of which ‘moves’ are likely to be included, as well as how these are organized, i.e. their order or sequence. For example, it might be logical for background information about the drug to appear nearer the beginning than the end. For the purpose of provision of written patient information about drug therapy, there may be some ‘moves’ that are considered essential and some that are considered useful, but non-essential.

For each methotrexate document we identified the ‘moves’ that were present as well as the order in which they appeared. By examining the structure of the documents we identified the characteristics of the genre of the doctor–patient drug information leaflet.

Function of each ‘move’ in relation to the reader (rhetorical elements)
The function of each ‘move’ in relation to the reader (e.g. to define, inform or instruct the reader) needs to be clear. These functions are called rhetorical elements (Table I) and their purpose is to influence the reader. For example, background information about the drug may be provided in a leaflet apparently to inform the reader, whereas, in relation to drug dosage, it may be more appropriate to instruct the reader. If the relations between the writer and the reader are not clear from point to point (e.g. expert lay/advisor–independent decision maker), it may not be obvious to the reader what to do with the information that is presented. For example, the reader might be informed that the dose of a drug may need to be increased, but there may be a lack of clarity about who (i.e. doctor or patient) is expected to monitor and vary the dose. For each methotrexate document, we distinguished the rhetorical elements in each of the identified moves.

Technicality of vocabulary used in the text
The ‘technicality’ of the vocabulary used in the text refers to the degree of complexity of the medical terminology and/or other vocabulary used. The author will make vocabulary choices based upon assumptions about the intended readers’ level of

R. Clerehan et al.
understanding and their likely familiarity with particular terms.

**Purpose of the text (metadiscourse)**

Many documents which are designed to support readers in making decisions or following procedures make use of ‘metadiscourse’, i.e. language about the text itself that explains its purpose and assists the reader’s movement around the text (e.g. ‘The main purpose of this leaflet is to...’). The presence or absence of a clear description of the purpose of the text was noted for each of the reviewed methotrexate leaflets.

**Role relationships expressed in the text**

Language features in text may indicate the author’s assumptions about the relative status of writer and reader (e.g. expert to lay person). Text may be written in an assertive, directive, conciliatory and/or collaborative way, and can use language that is either less personal (e.g. the doctor, patients) or more personal (e.g. I, you).

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**Table I. Framework for evaluating healthcare text based upon systemic functional linguistics**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall organizational or generic structure of the text</td>
<td>series of sections or moves in a text (e.g. background on drug, dosage instructions, account of side-effects)</td>
<td>what identifiable sections of text (moves) are present? are all essential moves included? what is the sequence of moves and is this appropriate?</td>
</tr>
<tr>
<td>Rhetorical elements</td>
<td>the function of each move in relation to the reader (e.g. to define, instruct, inform)</td>
<td>what is the function of each move in relation to the reader? are these clearly defined and appropriate? is there clear guidance about what to do with the presented information?</td>
</tr>
<tr>
<td>Metadiscourse</td>
<td>description of the purpose/structure of the text</td>
<td>is there a clear description of the purpose of the text?</td>
</tr>
<tr>
<td>Headings</td>
<td>signposts in the text for the reader</td>
<td>are headings present? if present, are they appropriate?</td>
</tr>
<tr>
<td>Factual content of text</td>
<td>facts included in the text</td>
<td>is the factual information correct and up-to-date? is the source of information provided? is the quality and strength of the evidence discussed?</td>
</tr>
<tr>
<td>Technicality of vocabulary</td>
<td>the technicality of the medical terminology/other vocabulary that is used</td>
<td>how technical is the vocabulary that is used in the text? is this appropriate?</td>
</tr>
<tr>
<td>Lexical density</td>
<td>density of the content words in the text</td>
<td>what is the average content density of the text (content-bearing words per clause)? is this appropriate (e.g. below 3–4 if possible)?</td>
</tr>
<tr>
<td>Relationship between writer and reader</td>
<td>what is the relationship between the writer and reader (e.g. medical expert to layperson; doctor to his/her patient)?</td>
<td>is it clear who the writer and intended audience is? is the relationship between writer and reader clear and consistent? is the person who is expected to take responsibility for any actions clear?</td>
</tr>
<tr>
<td>Format*</td>
<td>visual aspects such as layout, font size, style, use of visual material etc.</td>
<td>what is the length, layout, font size and visual aspect of the document?</td>
</tr>
</tbody>
</table>

*Format included here for completeness although not a linguistic consideration.
The use of headings
The use of headings (‘macro-themes’) (Martin, 1992) is a feature that should also be considered in any assessment of text quality and may be particularly important for patient information leaflets. Research indicates that readers using texts to inform decisions do not usually read through the information in a linear manner, but ask a series of questions and scan through the document to look for answers (Wright, 1999).

Density of information in the text (lexical density)
Language is made up of what may be called ‘content’ words (e.g. methotrexate, arthritis, discontinue) and ‘non-content’ words (e.g. in, and, whether). The density of information in a portion of text or ‘lexical density’ refers to the average number of content words per clause. In general, written language is denser than spoken language, i.e. it has more content words in relation to non-content words (Halliday, 1985). The average lexical density for spoken English is between 1.5 and 2 compared with between 3 and 6 for written English, depending on the level of formality of the writing (Halliday, 1985). A lexical density analysis was performed on each of the methotrexate documents. In the case of patient information leaflets of more than one page, only the first page was analyzed and abbreviated note-form phrases (i.e. non-clauses) were not analyzed.

Validity of factual content
While not a linguistic consideration, the factual content of the information that is presented should be accurate and up-to-date with a strong evidence base. Contentious issues may need to be acknowledged and the source of information identified, including how expert opinion was derived. It may also be appropriate to describe and discuss the quality and strength of the scientific evidence (National Health and Medical Research Council, 1999).

Visual aspects of text
Similarly while not a linguistic consideration, the visual aspect of the presentation also needs to be taken into account in the assessment of the quality of the texts (Hartley, 1994; Paul et al., 1997; Schriver, 1997). This includes the length, format, layout and graphical aspects of the information being presented.

Results
Organization or structure of the text (generic structure)
The leaflets ranged in length from half a page (three leaflets), one page (seven leaflets), two pages (five leaflets), three pages (one leaflet and one letter) and a six-page folded brochure (one leaflet). Nine possible sections or ‘generic moves’ were identified: ‘background of the drug’, ‘summary of use of drug’, ‘dosage instructions’, ‘outline of benefits of drug’, ‘account of side-effects’, ‘information regarding monitoring’, ‘constraints on patient behavior’ (including information about drug interactions), ‘storage instructions’ and ‘clinical contact availability’. In general, these moves could be identified as discrete segments in the structuring of the documents. The frequency of the moves, their typical rhetorical elements and examples are shown in Table II.

There was a large degree of variability between leaflets with respect to the incidence and sequence of the moves. None of the leaflets contained all nine identified moves: in two leaflets, eight of the moves were present. Three leaflets (16.7%) included only three of the nine possible moves. The only ‘obligatory’ moves appeared to be ‘dosage instructions’, present in all leaflets, and ‘account of side-effects’, present in all but one leaflet (n = 17, 94%). ‘Constraints on patient behavior’ also appeared consistently (n = 15, 83%). An outline of benefits was present in only four leaflets (22%). Only one-third of leaflets (n = 6, 33%) provided an offer of clinical contact.

Ordering of information was not always consistent between documents. While the most common opening move was ‘background on drug’ (n = 10, 55.6%), over a quarter of the documents opened with ‘dosage instructions’ (n = 5, 27.8%). Moves such as ‘information regarding monitoring’, ‘account of
side-effects’ and ‘dosage instructions’ were found to recur within some of the documents, i.e. information relating to these topics was scattered through the document rather than included as a cohesive section.

**Function of each move in relation to the reader (rhetorical elements)**

While the function of some rhetorical elements within the moves was uniform between documents (e.g. informing the patient in the account of side-effects), others varied between documents (Table II). For example, for the clinical contact move, in some documents patients were being offered a service (‘please consult your doctor’), whereas in others they were being instructed to initiate a meeting (‘inform your doctor’). Some documents included more than one rhetorical element for the same move.

Several documents contained instructions where responsibilities were not clear, such as ‘The dose may need to be slowly increased’ without specifying who would be responsible for making the decision to increase the dose. Some documents included formal dense prose, combined with no guidance about what to do with the information. For example, in the sentence: ‘Many rheumatologists co-prescribe folic acid which has been shown to reduce adverse effects without compromising efficacy’, it is unclear whether this is simply extra information for the patient or an implicit instruction to take folic acid.

Language denoting uncertainty varied between documents. One leaflet noted that the frequency of a complication was ‘very rare’ and clarified this to mean that it occurred in no more than 1% of people. On the other hand, most documents did not clarify what was meant by frequency terms, e.g. ‘very rarely hair loss may occur’ or ‘less commonly methotrexate can cause gastric ulcers, gum inflammation and mouth ulcers’.

**Technicality of the vocabulary**

In a number of leaflets, statements were made which lacked an awareness of the level of understanding of a lay reader [see also (Askehave and Zethsen, 2003)]. Such terms included: ‘a non-productive cough’, ‘asymptomatic’ effects’, ‘live vaccination’, ‘killed vaccine’ and ‘blood platelets’. In an example

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**Table II. Generic structure of the methotrexate patient information leaflets: moves, number of leaflets (%) that included the move, rhetorical elements and examples (n = 18)**

<table>
<thead>
<tr>
<th>Moves</th>
<th>Number (%)</th>
<th>Rhetorical elements</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dosage instructions</td>
<td>18 (100)</td>
<td>inform</td>
<td>Methotrexate is prescribed as 2.5 mg tablets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>instruct</td>
<td>The weekly dose should be taken with a meal.</td>
</tr>
<tr>
<td>Account of side-effects</td>
<td>17 (94)</td>
<td>inform</td>
<td>There may be a fall in white cells, red cells and platelets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>instruct</td>
<td>Alcohol should be severely limited.</td>
</tr>
<tr>
<td>Constraints on patient behavior</td>
<td>15 (83)</td>
<td>explain</td>
<td>It is generally not necessary to discontinue your Methotrexate over the operation time.</td>
</tr>
<tr>
<td>Information regarding monitoring</td>
<td>12 (66)</td>
<td>inform</td>
<td>Blood tests will be necessary for the first 4 weeks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>instruct</td>
<td>Usually it can be avoided by initially using ...</td>
</tr>
<tr>
<td>Background on drug</td>
<td>11 (61)</td>
<td>define/explain</td>
<td>Methotrexate is available in two brands.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>describe (in general)</td>
<td>In high doses it has been used over the years in the treatment of certain cancers.</td>
</tr>
<tr>
<td>Summary of use of drug</td>
<td>6 (33)</td>
<td>describe/define (specifically)</td>
<td>Methotrexate is used to lessen inflammation.</td>
</tr>
<tr>
<td>Clinical contact available</td>
<td>6 (33)</td>
<td>offer</td>
<td>If I can be of any further assistance, please do not hesitate to contact me.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>instruct</td>
<td>See your local doctor one week after starting Methotrexate.</td>
</tr>
<tr>
<td>Outline of benefits of drug</td>
<td>4 (22)</td>
<td>inform</td>
<td>This improvement includes a decrease in the number of painful and swollen joints.</td>
</tr>
<tr>
<td>Storage instructions</td>
<td>1 (5)</td>
<td>instruct</td>
<td>Keep Methotrexate out of reach of children.</td>
</tr>
</tbody>
</table>

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339
such as the following, ‘Methotrexate may cause a reduction in the number of white cells or platelets in the blood’, it is possible that readers unfamiliar with ‘platelets’ could then mis-read ‘or’ and thus may think platelets is the technical term for white cells. Semi-technical language was also found, such as ‘mechanism of action’ and ‘concomitant drug use’ which, while not involving technical terminology, is based on assumptions regarding readers’ familiarity with particular terms.

Purpose of the text (metadiscourse)
Only two leaflets (11%) provided any communication about the leaflet’s purpose. For example, one leaflet began: ‘The following questions are the ones most often asked by people who are about to commence Methotrexate treatment’.

Role relationships expressed in the text
Five documents (28%) used a question–answer format, signifying that the author had considered the relationship between writer and reader. Throughout the leaflets, the reader was variably referred to either as ‘you’ or ‘the patient’. Only three (17%) documents used ‘I’ or ‘me’ at any time to refer to the author. As well as a lack of clarity regarding the identity of the author, a number of documents appeared to be written explicitly for doctors rather than patients, leading to confusing information such as ‘The blood tests can be used for six months at a time using the Rule 3 exemption notation on the pathology request form’. In one document the role relationship between author and reader could be seen to switch from a relationship between equals (‘This letter serves to follow on from our recent conversation...’), to one between someone who gives orders and someone who takes them (‘It is mandatory that you restrict your alcohol consumption...’).

The use of headings
Fourteen leaflets (78%) used headings to focus the reader’s attention upon the content, while four leaflets (23%) did not use any headings (including the personal letter style). Headings in nine leaflets (of 18, 50%) were considered adequate and appropriate, while headings in five leaflets (of 18, 28%) were not. For example, headings deemed inconsistent and/or inappropriate included technical headings such as ‘Contra-indications’, ‘Preliminary Screen’ and ‘Toxicity monitoring’, or used nomenclature that was either unclear (e.g. ‘Action’) or ambiguous (e.g. ‘Operation’). The formatting of headings was sometimes indistinguishable from highlighted words in the body of the text (e.g. both headings and highlighted words within the text were underlined and in upper case).

Density of information in the text (lexical density)
The lexical density (average number of content words per clause) was 4–4.9 for five leaflets, 5–5.9 for nine leaflets and 6 or above for four leaflets. The following are examples of clauses with high density (vocabulary or lexical items are given in italic): ‘Arising out of its use in cancer, the drug gained a reputation for causing damage to the liver, ...’; ‘A baseline liver biopsy should be considered with history of significant alcohol consumption, hepatitis, jaundice or liver disease.’; ‘...the drug should be stopped for 1 menstrual cycle prior to conception, and 90 days for males.’. Examples of clauses with low lexical density are as follows: ‘Do not take aspirin while on methotrexate.’; ‘...and this restriction should not have any effect on medication.’; ‘The dose therefore has to be individually adjusted, ...’.

Factual content
None of the documents specified their sources of information or gave a sense as to the quality and/or strength of evidence to support the information that was provided, and none identified any contentious issues. In spite of this, the factual information varied widely between documents. For example, advice about alcohol consumption varied from no advice, to statements such as ‘It is important that you limit your intake of alcohol to less than one glass a day of light beer...’ and ‘Refrain from use of alcohol’. No document provided details of any additional sources of information to which readers might refer.
Visual aspects of text

Thirteen leaflets were in the form of continuous prose, six of which featured long paragraphs (seven or more lines). The remaining five documents were in note form, with one using bullet points, one numbers, one dashes and two ‘implied’ bullet points. Five leaflets used enumeration unnecessarily, i.e. where the order of information was unimportant. Four used a font smaller than 12-point, inconsistent with Royal National Institute for the Blind recommendation that documents be produced in at least a 12-point font (Albert and Chadwick, 1992). Seven documents (39%) used inconsistent formatting in the body of the text, usually concerning bolding and underlining, using underlining both for a heading and also for emphasis. Seven of the leaflets (39%) used inconsistent layout and formatting in the body of the text. One document included visual material.

Discussion

This is the first time to our knowledge that a framework based upon linguistic theory has been developed to assess the quality of written doctor–patient information leaflets. The main elements of systemic functional linguistic theory that we identified as being relevant for the assessment of drug information leaflets for patients were: overall organizational structure of the text (generic structure), the purpose of each section (or move) and whether this is clearly communicated (rhetorical elements), technicality of the vocabulary and whether the factual content is presented appropriately, lexical density of the text (or how many content words were present in each clause), and the clarity of the role relationship between author and reader.

From the set of texts we reviewed, we found that the drug information leaflet has an identifiable generic structure. Up to nine moves were identified, although only two (dosage instructions and account of side-effects) appeared to be ‘obligatory’. Inclusion of the other seven moves was highly variable. This suggests the lack of a standard approach, with little agreement between practitioners about either

the purpose or extent of information that should be provided. We also identified potential problems for readers when, within the same move in a leaflet, they may be receiving different signals about what to do with the information presented. In addition, the identities and responsibilities of author and reader were not always clearly defined. Rarely were there any linguistic signals to direct the reader though the text. For example, 23% of documents did not use headings at all and fewer than half were judged as using them adequately. Headings need to be transparent and consistent, as they assist patients to find answers to specific questions they have (Wright, 1999). In addition, the use of longer paragraphs within a (comparatively) short document may add unnecessarily to the cognitive load. Conversely, it is possible, in a compressed noteform document that there is a lower limit below which a patient may feel they lack sufficient information (Punchak and Kay, 1988).

The average number of content words per clause (lexical density) was five or more for 13 of the 18 leaflets (72%). This is at the upper end of the lexical density scale, i.e. away from the ‘spoken-like’ end of the continuum and towards the written academic end (Halliday, 1985). If the lowest level for all types of written English is estimated at 3, then these leaflets appear to be aimed at a more academic, scientific reader. We recommend that the lexical density in patient information leaflets needs to be nearer the spoken end, aiming for the 3–4 range.

These linguistic considerations have not been previously considered in the context of the doctor–patient information leaflets or more general printed health education material (Paul et al., 1997). Document design issues such as layout, font size and style, and use of visual material are commonly considered to impact upon patients’ capacity to comprehend patient information leaflets (Schriver, 1997; Hartley, 1994, 1999) and extensive checklists based upon critical review of the relevant research literature exist (Paul et al., 1997). These checklists have generally focused upon design characteristics as well as ‘content characteristics’ such as the use of short words and sentences (Paul et al., 1997). However, a recent study found that these issues did not
influence the effectiveness of print materials, as assessed by knowledge, attitudes, acceptability or behavior change (Paul et al., 2003). While the authors suggest various explanations for their findings, it is possible that the linguistic considerations we have outlined may make important contributions to effectiveness of printed health education materials.

The present analysis differs from our previous study which focused on whether core topics were adequately considered (Buchbinder et al., 2001) and did not address the way this content is developed linguistically. Based upon our judgment, the results of studies that have identified what patients would most like to know, and pharmaceutical guidelines for provision of drug information (Kay and Punchak, 1988; Punchak and Kay, 1988), we identified nine core topics that we considered appropriate to include in written patient information about drug therapy (Buchbinder et al., 2001) (Table III). In contrast, for the purpose of this linguistic assessment, we identified the communicative moves that characterized the generic structure of the patient information leaflet. Four moves did not correspond to any of the core topics (Table III).

Table III. Comparison between generic moves identified from linguistic assessment of methotrexate leaflets in current study and core topics identified as being important to include in a doctor–patient drug information leaflet in previous study

<table>
<thead>
<tr>
<th>Generic moves</th>
<th>Core topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dosage instructions</td>
<td>dose how and when to take drug what to do if dose is missed expected time to improvement</td>
</tr>
<tr>
<td>Account of side-effects</td>
<td>potential side-effects what to do if side-effects occur</td>
</tr>
<tr>
<td>Constraints on patient behavior</td>
<td>discussion of drug interactions</td>
</tr>
<tr>
<td>Information regarding monitoring</td>
<td></td>
</tr>
<tr>
<td>Background on drug</td>
<td></td>
</tr>
<tr>
<td>Summary of use of drug</td>
<td>purpose of medication</td>
</tr>
<tr>
<td>Clinical contact available</td>
<td>expected time to improvement</td>
</tr>
<tr>
<td>Outline of benefits of drug</td>
<td>likely duration of therapy</td>
</tr>
<tr>
<td>Storage Instructions</td>
<td></td>
</tr>
</tbody>
</table>

Two of these moves (information regarding monitoring and background on drug) were frequently present in these texts (in 66 and 61%, respectively). This suggests that the previous analysis focusing only on specific items of content was unable to detect important features present in patient information leaflets. On the other hand, all but one of the core topics was represented within the generic structure.

Even notwithstanding caveats and cautions about other knowledge being necessary, papers continue to be published which advocate a particular readability formula to use (Davis et al., 1990; Meade and Smith, 1991; Payne et al., 2000). Problems identified with the use of readability formulas include the fact that they are based on the premise that individuals read at the level of their completed formal education, yet there is no reliable relationship between the number of years of schooling and the grade levels at which people can read (Redman, 1993). The formulas take no account of non-textual dimensions such as context (prior knowledge, purpose for reading) and cultural differences (Bruce and Rubin, 1988). They do not measure any of the ‘top-down’ factors involved in reading comprehension such as recognizing the structure and organization of a text (Spiro et al., 1980; Zion, 1989) or such ‘bottom-up’ de-coding factors as density of information (not word length) and appropriateness of language. Formulas do not provide information about how much, and what exactly, readers do—or do not—understand in a text (Charrow, 1988). The common variables that increase readability scores are long sentences and polysyllabic words, yet it is possible that the presence of long sentences and certain polysyllabic words may in fact serve to assist readers to make connections between the thought-units contained in clauses and sentences. As demonstrated in this study, a linguistically based model for the assessment of written patient information can contribute important understandings not provided by statistical readability measures.

We chose to re-analyze a small subset of leaflets about methotrexate that were routinely provided to patients by their rheumatologists in Australia in 2000. The leaflets studied are now 4 years old and...
the information provided may not be representative of what is written today, particularly with the wider use of electronically disseminated information. In addition, no document was dated, so there was no way of checking the version of a text being used and thus the currency of the information.

We have proposed a systemic functional linguistics framework for assessing the text quality of written patient information that includes consideration of the generic structure, technicality of the vocabulary used and lexical density, together with a critical assessment of the factual content and visual aspects of these materials. Further work will clarify how useful this approach is found to be by writers of patient information and this will be complemented by development and testing of a protocol based upon the framework for reader-focused evaluation. A multidisciplinary approach to writing patient information materials that includes expertise in applied linguistics may improve the quality and effectiveness of informational texts for our patients.

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References


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