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Brief Report

Best Methods of Communicating Clinical Trial Data to Improve Understanding of Treatments for Patients with Multiple Sclerosis

Gurpreet K. Reen, PhD[1,*], *Eli Silber, MD*[2], *Dawn W. Langdon, PhD*[1]

[1]*Department of Psychology, Royal Holloway, University of London, Egham, UK;* [2]*Department of Neurology, King's College Hospital NHS Foundation Trust, London, UK*

ABSTRACT

Background: Patients' understanding of treatment risks and benefits is a prerequisite for shared decision making. Yet, patients with multiple sclerosis (MS) do not accurately understand treatment information provided in regular clinical consultations. **Objectives:** To identify the best methods of communicating clinical trial data to improve the understanding of treatments among patients with MS and to also examine the relationship between patients' understanding with decisional conflict, individual traits, and MS symptoms. **Methods:** A repeated-measures study was used. A sample of relapsing-remitting patients with MS was recruited from National Health Service sites in the United Kingdom. Patients were presented with hypothetical treatment risks and benefits from faux clinical trials. Treatments were communicated using absolute terms, relative terms, and numbers needed to treat/harm. The presence of baseline information with each method was also manipulated. Patients' understanding and conflict in treatment decisions were assessed. Individual traits and MS symptoms were also recorded. **Results:** Understanding was better when treatments were communicated in absolute terms (mean 3.99 ± 0.93) compared with relative terms (mean 2.93 ± 0.91; $P < 0.001$) and numbers needed to treat/harm (mean 2.89 ± 0.88; $P < 0.001$). Adding baseline information to all methods significantly improved understanding (mean 5.04 ± 0.96) compared with no baseline information (mean 1.50 ± 0.74; $P < 0.001$). Understanding was not related to conflict in treatment decisions ($r = -0.131$; $P = 0.391$). Numeracy, IQ, and cognitive impairments were significantly related to patients' understanding of treatments. **Conclusions:** Treatment risks and benefits should ideally be communicated using absolute terms, alongside baseline information. Patients with MS with low numeracy, low IQ, and reduced cognitive skills should be supported during treatment education.

Keywords: decision making, multiple sclerosis, patient education, risk communication.

Introduction

Shared decision making is advocated in patient-centered health care as an ideal approach for making treatment decisions [1,2]. A prerequisite to shared treatment decisions is patients' understanding of available treatments. Accurate treatment knowledge can ensure patients engage with the decision-making process [3], choose a treatment that aligns with their values [2], and adhere to their chosen treatment [4]. Good treatment knowledge can also reduce decisional conflict, which encompasses the feeling of uncertainty in a treatment choice [5–7]. Nevertheless, not all patient groups show accurate understanding of treatment risks and benefits.

Multiple sclerosis (MS) is a chronic inflammatory condition of the central nervous system, often leading to advanced neurological disability [8,9]. Patients with MS are faced with important decisions about disease-modifying drugs (DMDs), which can help delay disease progression. These patients, however, find it particularly challenging to understand DMD information during routine health care [10]. One reason may be the complex risk-benefit profiles associated with DMDs. For instance, some DMDs are moderately effective with low risks, whereas other DMDs offer higher efficacy in exchange for higher risks to patients [11]. It is also possible that individual traits and some MS symptoms can confound patients' understanding of treatments. Intelligence, numeracy, and health literacy can typically influence comprehension of treatments [12–15]. Cognitive deficits, prevalent in 40% to 70% of patients with MS [16], can further affect understanding [17]. Other commonly experienced MS symptoms, such as depression, anxiety, and fatigue [18], may also influence understanding, but these have not been previously assessed. It is essential then that understanding of DMDs be improved for patients with MS.

* *Address correspondence to:* Gurpreet K. Reen, Department of Psychology, Royal Holloway, University of London, Egham TW20 0EX, UK. E-mail: gurpreet.reen.2014@live.rhul.ac.uk.

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Understanding of treatment information derived from clinical trials can be affected by the methods in which this is communicated. Differences between risks and benefits experienced by a patient group taking a new treatment and another patient group taking a placebo during a clinical trial can be communicated in absolute terms (conveying true differences), relative terms (conveying proportional differences), and numbers needed to treat/harm (conveying the average number of patients to take the treatment for one person to experience an outcome). Absolute terms have been shown to improve understanding compared with other methods in nonclinical [19,20] and clinical [21,22] populations. With the addition of baseline information (i.e., the original number of patients in both groups that experience the risk or benefit), understanding improved regardless of the method [19,20,22]. The only study conducted with patients with MS found better understanding when baseline information was added to absolute terms, but did not examine other methods [23]. There is still a need to systematically investigate all methods with patients with MS.

This study is the last of three experiments investigating optimal methods of communicating treatment information to patients with MS to culminate in an educational intervention. Previous two experiments examined numerical and graphical methods, types of frequencies, and ways of framing treatment risks and benefits. The main objective of the present study was to identify the best method of communicating clinical trial data. Specific hypotheses were as follows: 1) absolute terms would improve understanding, 2) baseline information would improve understanding, 3) patients' decisional conflict would reduce with better understanding, and 4) individual traits and cognitive impairments will be associated with understanding.

Methods

Participants

Patients were recruited from two UK National Health Service clinics. Patients diagnosed with relapsing-remitting MS, taking a DMD, able to provide informed consent, and meeting study sensorimotor task demands were included. There was no selection on the basis of cognitive impairment. Patients were excluded if their condition or medication had changed in the last 4 weeks, or if they had a significant medical and/or psychiatric condition besides MS. Patients had a visual acuity of at least 20/70 [24]. The study received ethical approval from the National Health Service Research Ethics Committee.

Materials

Patients were presented with a hypothetical disease with progressive characteristics similar to MS. Two hypothetical treatments were provided for this disease. Treatment risk-benefit profiles were based on DMD clinical trials [e.g., [25,26]] to mimic real clinical decisions. Risks and benefits were presented for 1, 2, and 5 years of taking the treatment. Each treatment had one minor risk (e.g., flu-like symptoms), one adverse risk (e.g., kidney failure), and one benefit (delays in progression of disease symptom).

Design

A repeated-measures design was used. Treatment risks and benefits were communicated using six different methods: absolute terms, relative terms, and numbers needed to treat/harm, each with or without baseline information (see Fig. 1). Three methods were randomly assigned to each treatment at the beginning of the study. Treatment order was counterbalanced between patients using a Latin square design [27]. The study was conducted with the chief investigator. The session took between 1.5 and 2 hours and included multiple breaks for patients as required.

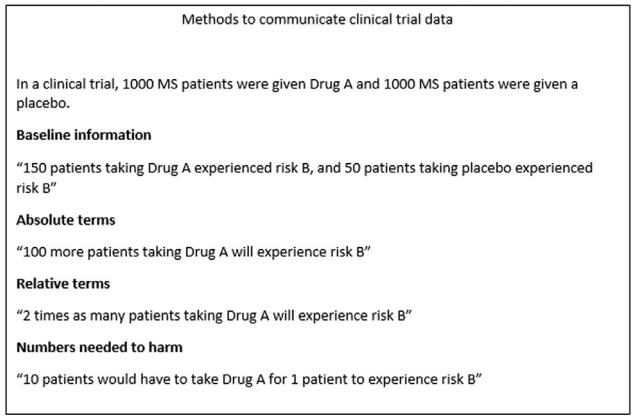

Fig. 1 – Example showing the following methods to communicate clinical trial data: baseline information, absolute terms, relative terms, and numbers needed to treat/harm. It is an example of treatment risk only. Actual study contained hypothetical treatment names and a potential risk (e.g., liver failure). MS, multiple sclerosis.

Measures

Primary outcome measure

Understanding. Six questions assessed understanding immediately after a treatment risk or benefit. Questions were author-developed but adapted from previous studies [28–30]. Patients first reported the number of people who experienced the risk/benefit of the treatment over the three time periods. Answers were deemed correct if within 10% of the precise value [28,29]. Patients then stated the differences in risks/benefits between the treatment and placebo groups over the three time periods. This was a multiple-choice question, with one correct answer out of four possible options.

Secondary outcome measures

Decisional conflict. Patients were asked to make a treatment decision: choose a treatment, choose no treatment, or state that they were unsure. Conflict in decisions was recorded using the patient-reported Decisional Conflict Scale (DCS), validated for use in health care decisions [5]. The scale consists of 16 items divided into five subscales: uncertainty, feeling uninformed, values, support, and effective decision.

Individual traits and MS symptoms. Demographic characteristics, disease variables, and disability status of patients [31] were recorded. A short eight-item word recognition task assessed health literacy: the Rapid Estimate of Adult Literacy in Medicine-Revised [32]. Numeracy was assessed by the arithmetic subtask from the Verbal and Spatial Reasoning Scale [33]. The Hospital Anxiety and Depression Scale [34] assessed affective MS symptoms and has been validated for use with patients with MS [35]. Fatigue was assessed via the patient-reported Fatigue Severity Scale [36], originally developed for the MS population [36]. The Wechsler Test of Adult Reading Scale [37] measured premorbid IQ, which is not altered by cognitive deficits [38]. The

Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS) [39] identified cognitive impairments.

Analysis

Sample size estimates were based on a questionnaire that found large effects on the understanding of patients with MS [40]. Because only a few questionnaire items specifically assessed treatment knowledge, a medium effect size (Cohen's d of 0.5 [41]) was assumed. It was estimated that for an alpha of 0.05 and a power of 0.80, a minimum of 45 patients were required.

All statistical analyses were conducted using IBM SPSS 21.0 (IBM Corp; Armonk, New York, USA). A two-way analysis of variance assessed the impact of methods on patients' understanding of treatments. Bonferroni corrections were applied for pairwise comparisons. Pearson product-moment correlations examined the relationship between understanding with standardized DCS scores, individual traits, and MS symptoms.

Results

Of the 82 eligible patients approached for the study, 45 patients agreed to participate (54.9% response rate). The demographic characteristics of the patients are presented in Table 1.

The effect of methods and baseline information on understanding

Average understanding scores for each method were as follows: absolute terms (baseline: mean 5.40 ± 1.03; no baseline: mean 2.58 ± 1.22), relative terms (baseline: mean 4.98 ± 1.39; no baseline: mean 0.89 ± 0.96), and numbers needed to treat/harm (baseline: mean 4.76 ± 1.32; no baseline: mean = 1.02 ± 1.12).

When collapsing across baseline and no baseline conditions, there was a significant main effect of methods on patients' understanding ($F(2, 88) = 36.03$; $P < 0.001$; partial $\eta^2 = 0.45$). Understanding was greater for absolute terms (mean 3.99 ± 0.93) compared with relative terms (mean 2.93 ± 0.91; $P < 0.001$) and numbers needed to treat/harm (mean 2.89 ± 0.88). There was no significant difference between relative terms and numbers needed to treat/harm ($P = 0.745$).

When collapsing across methods, there was a significant main effect of baseline information on patients' understanding ($F(1, 44) = 577.74$; $P < 0.001$; partial $\eta^2 = 0.93$) with greater understanding for baseline information (mean 5.04 ± 0.96) than no baseline information (mean 1.50 ± 0.74).

There was a significant interaction between methods and baseline information ($F(1, 44) = 9.62$; $P < 0.001$; partial $\eta^2 = 0.18$). Adding baseline information to all methods improved understanding.

Table 1 – Demographic characteristics and disease status of patients (n = 45).

Characteristic	Mean ± SD	n (%)
Age (y)	46.76 ± 10.50	
Sex		
Female		36 (80.0)
Male		9 (20.0)
Level of education		
High school		15 (33.3)
College		11 (24.4)
Bachelor's degree		8 (17.8)
Postgraduate		11 (24.4)
Employment status		
Full-time (>16 h)		13 (28.9)
Part-time (<16 h)		10 (22.2)
Self-employed		7 (15.6)
Unemployed		11 (24.4)
Medical leave		3 (6.7)
Retired		1 (2.2)
Time (y) since MS diagnosis	10.68 ± 8.51	
HAI disability scale	1.64 ± 1.77	
Current DMD		
Interferon betas		15 (33.3)
Glatiramer acetate		4 (8.9)
Teriflunomide		0 (0)
Fingolimod		8 (17.8)
Alemtuzumab		4 (8.9)
Dimethyl fumarate		5 (11.1)
Natalizumab		8 (17.8)
Mitoxantrone		1 (2.2)

DMD, disease-modifying drug; HAI, hauser ambulation index; MS, multiple sclerosis.

Relationship between understanding and decisional conflict

There was no significant correlation between understanding and patients' decisional conflict ($r = -0.131$; $P = 0.391$) or any DCS subscale.

Relationship between understanding with individual traits and MS symptoms

Patients mostly showed symptoms of fatigue and cognitive impairments (see Appendix Table 1 in Supplemental Materials found at http://dx.doi.org/10.1016/j.jval.2017.12.015). Understanding was significantly correlated with numeracy ($r = 0.517$; $P < 0.001$), premorbid IQ ($r = 0.434$; $P < 0.01$), information processing speed ($r = 0.439$; $P < 0.01$), and verbal memory ($r = 0.409$; $P < 0.01$).

Discussion

Patients' ability to understand treatment information is a prerequisite for effective shared decision making [1,2]. Yet, patients with MS do not accurately understand treatment risks and benefits in regular clinical practice [10]. The present study sought to determine the most effective method of communicating treatment information derived from clinical trials to patients with MS. As predicted, absolute terms led to better understanding of treatments compared with other methods. Baseline information substantially improved understanding for all methods. Nevertheless, understanding was not related to patients' conflict in treatment decisions.

Understanding of treatments was low when communicated in relative terms and numbers needed to treat/harm. Relative terms usually result in larger figures than absolute terms and may be misinterpreted for the latter. This is supported by patients' likelihood of selecting a treatment when benefits are communicated in relative terms instead of absolute terms [42]. Low understanding for numbers needed to treat/harm may be explained by its similarity to the 1-in-X format (e.g., 1 in 20, 1 in 75), shown to reduce understanding of treatments [43,44]. These methods should be avoided when communicating treatments to patients with MS.

The present study showed no relationship between patients' understanding of treatments and decisional conflict or the DCS informed subscale, inconsistent with previous studies [5–7]. The absence of this relationship may be a result of differences in perceived knowledge measured by the DCS and objective

understanding assessed in the present study [5,7]. Although the DCS has been validated for real and hypothetical decisions [5], it is also possible that patients' decisional conflict may differ for decisions that can have real consequences. Nevertheless, patients with MS expressing low conflict in decisions should not be assumed to have good treatment knowledge.

As predicted, understanding of treatments showed a relationship with patients' numeracy and premorbid IQ. Health literacy did not show a relationship, possibly because of the measure being too short. With regard to MS symptoms, only cognitive impairments showed a relationship with patients' understanding. A simple assessment of cognition within clinical practice, such as BICAMS [39], could help identify patients requiring support during treatment decision making. This study was, however, not powered to detect relationships between understanding and MS symptoms. Thus, educational support for patients with affective symptoms and fatigue should not be ruled out.

Findings of the present study should be interpreted in light of its limitations. First, hypothetical treatments were provided to avoid risking patients to new or conflicting information about current medication. Nevertheless, outcomes may differ for real treatments in which patients feel emotionally invested and should be evaluated in future work. Second, treatment information was provided in a setting not reflective of a regular consultation, to allow for a systematic assessment of different methods. With the best methods established and incorporated into an educational intervention, future work can implement this in real consultations. Finally, the effect of fatigue and cognitive burden on study outcomes cannot be excluded. Possible effects were minimized by providing breaks and counterbalancing treatments between patients. Fatigue could have influenced scores on BICAMS [44], which was always conducted last in the study. Because BICAMS as a stringent measure identified only mild cognitive impairments in the current patient group, any cognitive burden may have had only a small effect on study outcomes.

Conclusions

The present study is the first to evaluate the best methods of communicating treatment risks and benefits derived from clinical trials to patients with MS. Good understanding was evident for treatments expressed in absolute terms and with baseline information. Patients with MS with low numeracy, low IQ, and cognitive deficits should be supported during treatment education.

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Supplemental Materials

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