



Are plain-language summaries included in published reports of evidence about physiotherapy interventions? Analysis of 4421 randomised trials, systematic reviews and guidelines on the Physiotherapy Evidence Database (PEDro)

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Abstract

Background A plain-language summary is a short and clearly stated version of a study's results using non-scientific vocabulary that provide many advantages for patients and clinicians in the process of shared decision-making.

Objectives The primary objective was to investigate the extent to which published reports of physiotherapy interventions provide plain-language summaries. We investigate as the secondary objectives if the available plain-language summaries are at a suitable reading level for a lay person and if inclusion of plain-language summaries in these reports is increasing over time and is associated with trial quality (i.e. PEDro score).

Data sources All 4421 randomised controlled trials (RCT), systematic reviews and clinical practice guidelines that included plain-language summaries indexed on Physiotherapy Evidence Database (PEDro) were included.

Main outcome measures Proportion of published reports with plain-language summaries, Flesch Reading Ease Score (FRES) and the Flesch–Kincaid Grade Level (FKGL).

Results The number of published reports with a plain-language summary doubled in the last 6 years. From a total of 34,444 reports indexed on PEDro, only 4421 reports had English plain-language summaries. RCTs with plain-language summaries had higher PEDro scores than RCTs without plain-language summaries (mean difference = 0.8 points, 95%CI 0.7 to 0.8). Only 2% of reports were considered at a suitable reading level by the FKGL formula and 0.1% by the FRES formula.

Conclusions Although the publication of plain-language summaries is increasing over time, the current number corresponds to only 13% of all published reports. In addition the majority of plain-language summaries are written at an advanced reading level.

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Keywords: Readability; Summary report; Physiotherapy; Health information; Health consumer

Introduction

Consumers of healthcare are increasingly searching online for evidence about interventions to manage their health conditions [1,2]. Recent studies show that around 67% of the consumers use the internet as their first choice of search [3].

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Younger persons are more likely to search information online for health purposes [3,4] and spend at least one hour a week on online sources [5]. A recent study [6] shows that articles in scientific journals, whether electronic or print, are ranked as the third most important source of information for health consumers, while general searches on the internet and patient organisation websites were ranked first and second, respectively. This highlights the importance of having summaries of scientific articles written in an accessible language for health consumers.

Several theoretical advantages may arise from people seeking and finding evidence online about interventions to manage their health conditions. The widely recommended process of shared decision-making [7] may be more efficient if patients arrive at a clinical appointment with some background knowledge about the treatments options. For example, patients may have greater awareness of relevant questions to ask if they have already read some information about the available treatment, their effects and side effects and may also be more capable of understanding the advice of their clinician [8]. Also, patients may identify when new treatments are available or become aware of an ineffective intervention, helping them to avoid wasting time discussing it or to protect themselves from an ill-informed clinician trying to encourage such interventions [8]. All this should help to incorporate the patient's priorities, beliefs and preferences into shared decision-making, which is an important element of evidence-based practice [9,10].

The advantages described above rely on lay people identifying high-quality evidence online. Unfortunately, the internet contains evidence of highly variable quality and patients may not recognise what content is reputable. According to a recent survey 61% of health consumers looked online through general websites like Google, while only 17% tried a physician as their first source of information [6]. Some clinicians report concerns about patients wanting to discuss health-related internet content with questionable accuracy and the patient's ability to interpret the information, because these may lead to inappropriate self-diagnosis, or demand for treatment with poor or no evidence [11]. Also, reports of worst-case scenarios are often found on the internet and the overwhelming amount of information available could lead to anxiety and further repeated searches in which patients may find controversial or misleading information [12]. Discouragement of people with health conditions from using the internet to identify healthcare information is, however, a poor solution to this dilemma. They need and ought to be able to search online for research about their condition and to gain a basic understanding of what their searches identify. They can be assisted with process by websites that direct them to scientifically robust research.

In the field of physiotherapy, two websites have been developed to help achieve some of the potential benefits and overcome some of the problematic issues discussed above. The first website is the Physiotherapy Evidence Database (PEDro; www.pedro.org.au). PEDro catalogues

the best evidence about physiotherapy interventions (comprising trials, reviews and guidelines). However, PEDro is designed to be used by physiotherapists so the search interface uses scientific terminology. The second website is a consumer interface for PEDro, known as Physiotherapy Choices (<http://www.physiotherapychoices.org.au/>), which was launched in 2006. It contains the same articles indexed on PEDro but also has the option to only return records that have a plain-language summary, which is a short and clearly stated version of the results using non-scientific vocabulary [13]. Also, like PEDro, Physiotherapy Choices presents a method scoring section that provides information about the quality of the study retrieved assisting lay users to identify high-quality evidence.

The existence of the Physiotherapy Choices website means that the value of physiotherapy research will be increased by plain-language summaries being included in a greater proportion of the published reports of physiotherapy research. However, the plain-language summaries must be written at a reading level that allows lay people to understand them.

Objective

The primary aim of this study is to investigate the extent to which published reports of research into the effects of physiotherapy interventions provide plain-language summaries. The secondary aims are to determine: (i) if the proportion of these reports that include plain-language summaries is increasing over time; (ii) if the inclusion of a plain-language summary for a randomised trial is associated with trial quality; and (iii) if the plain-language summaries that are published are at a suitable reading level for a lay person.

Methods

PEDro was selected as the source of the published research reports because it indexes reports of physiotherapy trials at least as comprehensively as other databases [14,15] and has no restriction on the year of publication. Details of how studies are located are available elsewhere (<https://www.pedro.org.au/english/faq/>). The PEDro Partnership was established in 1999 by a group of physiotherapists. They also created the PEDro Scale, which ranges from 0 (low quality) to 10 (high quality). The PEDro and Physiotherapy Choices websites use this scale to assess clinical trials for methodological quality in duplicate [16]. The 11 items evaluated are specified eligibility criteria, true random allocation of subjects, concealed allocation, similar groups at baseline, blinding of subjects, blinding of therapists, blinding of assessors, intention-to-treat analysis, outcome measures obtained from more than 85% of subjects, reporting of results of between-group statistical comparisons, and reporting of point measures with measures of variability [17,18]. System-

atic reviews (SRs) and clinical practice guidelines (CPGs) indexed on PEDro, unlike clinical trials, are not evaluated regarding methodological quality but must meet certain criteria to be indexed, as discussed below.

The criteria for clinical trials to be indexed on PEDro are: (1) the trial must compare two or more interventions or one intervention with a control or sham; (2) at least one of the interventions could be or is part of physiotherapy practice; (3) the intervention must be applied to human subjects representative of the target population (i.e., people with or at risk of developing a health condition or disability); (4) the allocation of subjects must be random or intended-to-be-random; and (5) the report must be published as a full paper in a peer-reviewed journal.

The criteria for SRs to be indexed on PEDro are: (1) published in a peer-reviewed journal; (2) contains a methods section, and (3) has at least one trial that fulfils the clinical trials criteria [17].

The criteria for CPGs to be indexed on PEDro are: (1) produced under the control of a specialised association of the area, professional society, public or private organisation, government agency, or health institution; (2) publicly available; (3) is based on a systematic and recent review of evidence published in peer-reviewed journals; (4) cites at least one randomised clinical trial (RCT) or SR related to physiotherapy; (5) contains systematically developed statements that include recommendations, strategies, and information that assist physiotherapists or patients to make decisions; and (6) contains at least one recommendation about an intervention of physiotherapy or that could become part of physiotherapy clinical practice [19].

Data from all RCTs, SRs and CPGs indexed on PEDro were extracted for this study. Since the intention of the study was to analyse the general content of lay summaries in the field of physiotherapy, all reports of the three designs indexed on PEDro (RCTs, SRs and CPGs) from all subdisciplines were searched and included in the study. The search was performed by one assessor directly on the Physiotherapy Choices website by clicking on the option “Show only records with consumer summaries”. The search and data extraction were conducted on September of 2016 retrieving reports indexed since inception and until this date.

Data extraction

To characterise the sample of indexed records, the citation details (journal, year), area of physiotherapy (PEDro subdiscipline codes), and language of publication were downloaded from PEDro. The subdiscipline codes are: cardiothoracics, continence and women’s health, ergonomics and occupational health, gerontology, musculoskeletal, neurology, oncology, orthopaedics, paediatrics, and sports. For published reports of clinical trials only, the PEDro scale (total PEDro score) was also downloaded. Data extraction was performed by one assessor who exported the search results with the relevant data from all studies identified.

Variables of interest

The number of reports and the percentage of annual studies that included plain language summaries indexed on PEDro until September 2016 were analysed in this study. These data allowed the investigation of the extent to which reports provide this tool and whether its publication is increasing over time.

Readability is how easily a text can be read and understood. Many scoring systems, such as the Flesch Reading Ease Score (FRES), the Flesch–Kincaid Grade Level (FKGL), the Simple Measure of Gobbledygook, and the Gunning Fog Index are used to assess the readability of a variety of texts and are highly correlated with each other [20].

All the summaries were analysed for readability level by the Readability Score website using the following scoring systems:

The FRES score ranges from 0 to 100 where higher scores mean the texts are easier to read [21] as described by Zamanian *et al.* [22]. This score is calculated as:

$$206.835 - (1.015 \times \text{total words} / \text{total sentences}) \\ - (84.6 \times \text{total syllables} / \text{total words})$$

The FKGL is a derivation of the FRES, and, unlike the other scores, has its results translated to a US school grade level by using a different weighting factor [21]. Thus, texts with a score of 9.2 are expected to be understandable by an average 9th grade student [21,23]. The FKGL score is calculated as:

$$(0.39 \times \text{total words} / \text{total sentences}) \\ + (11.8 \times \text{total syllables} / \text{total words}) - 15.59$$

The FRES score is one of the most used readability scoring systems [22,24–26] and was selected to enable comparisons to other studies. The FKGL is also a popular readability scoring system and it allows the results to be interpreted according to the school grade system. This may have great applicability when targeting specific groups. Authors could consider what audience they hope to reach and use these school grades as a guide to write their plain language summaries. For example, according to Zamanian *et al.*, “easy to read” texts are the ones written below a US 6th grade level (i.e. between 11 and 12 years old according to the USA grade system), while “difficult” texts are considered to be those above the 9th grade level (i.e. between 14 and 15 years old) [22,27]. Therefore, scores between the 6th and 9th grade are recommended by the United States Department of Health and Human Services (USDHHS) for internet-based consumer health information [28].

There are many automated, internet-based tools that can calculate these readability scores for electronic sections of English-language texts. In the current study, we opted to use

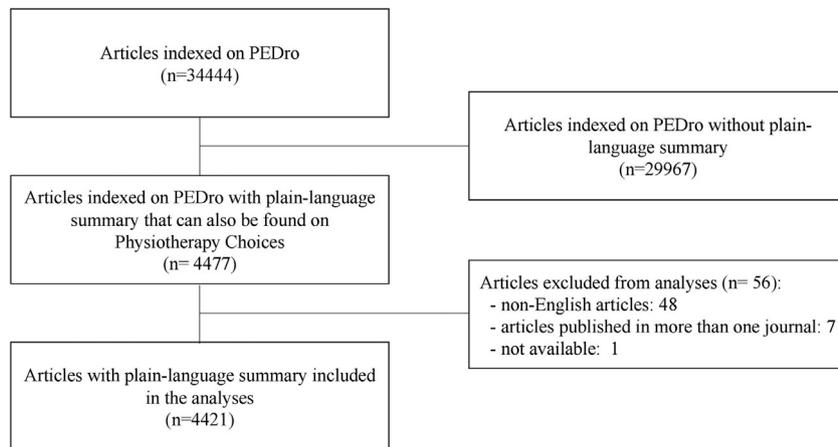


Fig. 1. Flowchart of articles selection for the study.

the Readability Score website (www.readability-score.com) because it is a widely used and recommended [13] tool that provides the various readability scores discussed above, in addition to word and syllable count.

Data analysis

The reading-level data were categorised in accordance with the USDHHS standards and the analysis was performed using SPSS (SPSS, Inc., Chicago, IL). The percentage of published reports that have plain-language summaries was calculated for all reports indexed on PEDro, and then calculated separately for the cohorts of RCTs, SRs and CPGs. To investigate the change over time, annual averages were calculated from the earliest record on PEDro and cumulative number and annual percentages were plotted. To determine whether the inclusion of a plain-language summary is associated with trial quality, the total PEDro score of trial reports that do and do not include one were compared. Finally, for reading level, all 4421 plain-language summaries were analysed using the FRES and the FKGL formulas for reading level. These scores were summarised using means and standard deviations. FRES scores should be between 60 and 100 to be considered at a suitable level for the general public. We also nominated a threshold value for the FKGL of 10 as a suitable level for secondary school students (8th and 9th grade). The cohort of 4421 plain language summaries was assessed against these thresholds and the proportion that were at a suitable reading level according to these thresholds was reported.

Results

In September 2016, a total of 34,444 reports were indexed on PEDro. Of these, 4421 (13%) reports had English plain-language summaries and were also indexed on Physiotherapy Choices. Among the 4421 reports with an English plain-language summary, 2803 were RCTs (10% of all RCTs),

1588 were SRs (25% of all SRs), and 30 were CPGs (5% of all CPGs). Fig. 1 shows the articles selected for the study. The Physiotherapy Choices database had 48 reports that were not included in the study because they were in a language other than English, including 19 in Dutch, 11 in Spanish, 8 in French, 6 in German, 3 in Norwegian and 1 in Italian. In addition, 7 plain-language summaries were published in more than one journal (for example, a more concise version of a Cochrane review may be re-published in another journal) [29] and therefore the duplicate studies were excluded.

Table 1 shows frequency, proportion and cumulative frequency of lay summaries per year. The pattern of improvement over time (presented in Fig. 2) shows that the number of plain-language summaries doubled in the last six years. In the analysis of the quality of the studies, the mean PEDro score for RCT with and without plain-language summaries was 5.7 (SD 1.6) and 4.9 (SD 1.5) points respectively, with a mean difference of 0.8 points (95% CI 0.7 to 0.8).

The reading level was evaluated using the FRES and FKGL formulas. The overall mean readability scores show that the plain-language summaries of the articles were written at an advanced reading level. The mean FRES score was 21 and the FKGL was 16. Only 91 (2%) reports were considered below the 9th grade threshold by the FKGL formula and 2 (0.1%) by the FRES formula. Table 2 shows the summary of FRES and FKGL scores for all records categorised by study design.

Discussion

Our findings show that, although the publication of plain-language summaries is increasing over recent years, the number of reports that include plain-language summaries still constitute a low proportion of records. Importantly, the majority of the available plain-language summaries are above the 9th grade reading level, meaning that most summaries are considered to be difficult for lay people to read, according to the USDHHS recommendations.

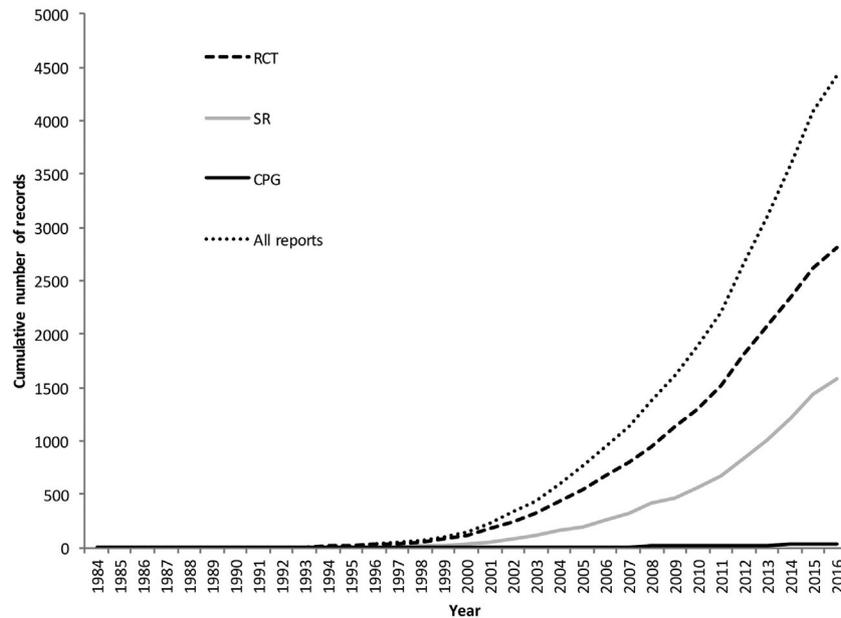


Fig. 2. Cumulative frequency of articles indexed on the Physiotherapy Choices database with a plain-language summary, by year.

Table 1

Number and percentage of published reports indexed on PEDro that contain a plain-language summary, presented as annual data by year of publication and cumulatively.

Year	Annual	Cumulative
	n (%)	n (%)
1984	1 (0.0)	1 (0.1)
1986	1 (0.0)	2 (0.1)
1989	1 (0.0)	3 (0.1)
1991	3 (0.1)	6 (0.2)
1993	2 (0.0)	8 (0.2)
1994	8 (0.2)	16 (0.4)
1995	8 (0.2)	24 (0.6)
1996	9 (0.2)	33 (0.7)
1997	15 (0.3)	48 (1.0)
1998	22 (0.5)	70 (1.3)
1999	24 (0.5)	94 (1.5)
2000	55 (1.2)	149 (2.2)
2001	75 (1.7)	224 (2.9)
2002	117 (2.6)	341 (3.9)
2003	98 (2.2)	439 (4.5)
2004	156 (3.5)	595 (5.4)
2005	166 (3.8)	761 (6.1)
2006	180 (4.1)	941 (6.8)
2007	193 (4.4)	1134 (7.3)
2008	239 (5.4)	1373 (8.0)
2009	240 (5.4)	1613 (8.5)
2010	267 (6.0)	1880 (8.9)
2011	325 (7.4)	2205 (9.5)
2012	452 (10.2)	2657 (10.2)
2013	448 (10.1)	3105 (10.8)
2014	486 (11.0)	3591 (11.5)
2015	498 (11.3)	4089 (12.0)
2016	332 (7.5)	4421 (12.8)

The prevalence of plain-language summaries differed between the different types of reports – being most common among the SRs, with a prevalence of 25%. This finding

may be a result of the Cochrane Collaboration making plain-language summaries a mandatory feature of their SRs since 2013 [30]. Cochrane reviews constituted approximately 43% of the SRs we analysed, which amounts to 682 reports; this is consistent with previous reports (e.g. 32% in 2009 [31]). Authors, reviewers and editors of SRs of physiotherapy interventions that are to be published outside the Cochrane library could promote greater use of plain-language summaries.

Plain-language summaries were less common among the RCTs, with a prevalence of 10%. The exponential increase in the prevalence of plain-language summaries in RCTs published in recent years, combined with the exponential rise in the absolute number of trials being published each year, suggests that the current prevalence of 10% will soon rise to a much larger percentage. This is important because the new findings of specific interventions should be available to consumers to assist the process of decision-making or even to consider new approaches to their condition.

Plain-language summaries were least common among the CPGs. In some cases, this may reflect that the developers consider CPGs to be for healthcare professionals only. However, updated guidelines provide the best available evidence and are considered to be a reliable source of information; thus, encouraging guideline developers to write plain language summaries would help patients to access reliable information about their condition. In other cases, guideline developers may release a separate plain-language webpage for consumers. For example, some of the National Institute for Health and Care Excellence (NICE) guidelines publish a separate interactive flowchart, which patients can use to readily understand recommended decision pathways about management [32]. To our knowledge, there has not been any formal assessment of how often clinical practice guidelines publish separate plain-language resources targeted to patients.

Table 2

Summary of the Flesch Reading Ease Score (FRES) and the Flesch–Kincaid Grade Level (FKGL) for all records on Physiotherapy Choices, and categorised by study design.

Article type	FRES (<i>0 complex to 100 easy</i>) mean (SD)	FKGL (<i>US school grade reading level</i>) mean (SD)	Records with acceptable FRES for lay public (60–100) n (%)	Records with acceptable FKGL for lay public (<10) n (%)
All reports (n = 4421)	21 (17)	16 (4)	2 (0.1)	91 (2.1)
Randomised trials (n = 2803)	20 (17)	16 (4)	3 (0.1)	55 (1.9)
Systematic reviews (n = 1588)	24 (17)	15 (3)	0 (0.0)	34 (2.1)
Clinical practice guidelines (n = 30)	18 (21)	17 (4)	0 (0.0)	2 (6.6)

FRES, Flesch Reading Ease Score; FKGL, Flesch–Kincaid Grade Level.

The association between readability and methodological quality among RCTs may have occurred because authors who recognise the value of robust research methods may also recognise the value of plain-language summaries. Also, journals that are more rigorous on the quality of the research that is published may also be more open to encouraging plain-language summaries. This association was only analysed for RCTs. However, the same association may also hold for SRs because plain-language summaries have been a standard feature of Cochrane reviews since 2013 [30], and Cochrane reviews of physiotherapy interventions have slightly higher quality than their non-Cochrane counterparts [31].

To our knowledge this is the first study in the physiotherapy field to estimate the proportion of published reports that provide plain-language summaries and to assess their readability level. A strength of our study was the readability analyses of all plain-language summaries available on PEDro, the most comprehensive database indexing reports of physiotherapy trials. This allowed us to check over 34,000 records for plain-language summaries and even though the proportion with such summaries was low (13% overall), we were still able to analyse over 4000 summaries. This large and representative cohort therefore allowed us to generate precise estimates about the prevalence and reading level of the summaries and to generalise these findings to the physiotherapy field.

A limitation of the study was the fact that we did not analyse the plain-language summaries published in non-English languages. Although these only accounted for 1% of the cohort, we acknowledge the importance of encouraging the publication of these summaries in different languages to promote reliable health information to non-English speakers throughout the world. The use of readability scores may be considered a limitation because they take into account the number of words per sentence and the number of syllables per word [27] but do not directly assess how well the public understands the message conveyed by the summary itself, or the ability of patients to generalise its findings. Although this is a limitation of the scoring systems, their use offers several advantages. They allowed thousands of sections of texts to be assessed with consistency. Another advantage is that many studies have evaluated the readability level of plain-language summaries in specific medical fields, so the use of

these scores allows the data in physiotherapy to be compared to other disciplines.

Our results are consistent with other readability analyses of health information, where most of the plain-language summaries were above the 9th grade level [28,33,34]. This finding is of great importance for scientific writers because, despite the effort put into preparing the plain-language summaries, they are not producing all their potential benefits because texts with readability at advanced levels of difficulty prevent patients from being an active and conscious participant in shared decision-making about their healthcare [20]. The US National Institutes of Health define writing in ‘plain language’ as writing in a way that helps readers understand the content in a document the first time they read it. They affirm it is not unprofessional or ‘dumbing down’ the message. Thus, it is not only about using the simpler words, but to ensure that the text transmits the whole message in an easier way [35].

The reader’s ability to absorb the message from a piece of text is also influenced by previous knowledge and interest in the topic, as well as motivation to learn the new information. Therefore, we suggest that, in addition to publishing plain-language summaries of the current scientific reports, writers also assess the patient’s interests on the subject and what questions they might have [20] to guarantee that it can be read and understood by the public. Future studies should evaluate whether the public are able to read, understand and use the information provided by those plain-language summaries and if the studies are answering patients’ questions about their clinical conditions.

Another point is the quality of plain language summaries. In addition to the readability level, how the summary is written and what information should be given should be considered in future studies. There are initiatives such as Plain Language Expectations for Authors of Cochrane Summaries (PLEACS) [36] or guides developed by groups like INVOLVE [37] that could be used by the research community to produce high quality health information in plain language.

Our view is that journal editors and researchers in the field of physiotherapy should encourage the publication of plain-language summaries and promote research sources such as Physiotherapy Choices, Cochrane summaries and evidence-based consumer health websites for patients. However, such resources will only be widely used if there is active partici-

pation of healthcare professionals. These professionals could encourage patients to seek accessible and reliable healthcare information by promoting these online sources. Furthermore, the promotion of scientific research on social media by sharing plain-language summaries, infographics or video animations with the main findings, which is currently rising, may be a means of popularising this information among lay persons. Perhaps a greater role could be undertaken in this method of dissemination by authors, editors, government health promotion bodies, and patient associations.”

Conclusion

Although the publication of plain-language summaries is increasing over time, they currently exist in only 13% of all published reports of clinical trials, systematic reviews and practice guidelines in the field of physiotherapy. In addition to the small proportion of research records with plain-language summaries, the difficult reading level prevents lay persons from accessing good quality evidence about their health problems, which alienates them from the process of shared decision-making.

Key messages

- Research articles use complex language. A plain-language summary explains the article in simple words. It can help lay people to understand the main findings.
- We checked how often these summaries are used and how easy they are to read.
- We used the Physiotherapy Choices website to find the articles.
- We found that few of the articles had these summaries. Most of them were hard for lay people to read.
- It would help lay users if more of these articles had simple summaries.

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Conflicts of interest: None declared.

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