Observational Studies

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A biopsychosocial content analysis of Dutch rehabilitation and anaesthesiology websites for patients with non-specific neck, back, and chronic pain

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Abstract

Objectives – Patients with non-specific neck, back, and/or chronic pain increasingly seek information about their condition on websites of healthcare practitioners. This information can influence their treatment expectation and should align with contemporary biopsychosocial (BPS) understanding of pain. It is unclear whether Dutch websites in the fields of rehabilitation and anaesthesiology align with the BPS model. The aim of this study is to assess the BPS content about non-specific neck, back, and chronic pain in Dutch rehabilitation and anaesthesiology websites.

Methods – All Dutch rehabilitation and anaesthesiology webpages were potentially eligible for inclusion. All webpages focusing on the topics of neck, back, and chronic pain were included. BPS content analyses were performed according to a standardised rating method with criteria for biomedical, limited-, and reasonably BPS. Analyses were performed separately for specialisms, and for the three topics. Additionally, frequency of nocebo words usage on the websites is explored.

Results – A total of 71 webpages were included, of which 42 (59.2%) were rehabilitation, 28 (39.4%) were anaesthesiology webpages, and 1 webpage described both. Across all webpages, 7 (9.7%) were rated as biomedical, 54 (75.0%) limited BPS, and 11 (15.3%) reasonably BPS. Differences between specialisms were not significantly different (p = 0.055). Differences between BPS ratings and the topics were significant (p = 0.005). Nocebos were present on 22.2% (n = 16) of the webpages.

Conclusion – Majority of the anaesthesiology and rehabilitation webpages (84.7%) did not achieve a "reasonable biopsychosocial" rate. Improvements are particularly needed in describing pain as a universal and/or normal phenomenon experienced by most individuals, as well as in explaining how an individual's environment influences their thoughts, emotions, and behaviours regarding pain perception.

Keywords: health education, electronic health records, patient education as topic, consumer health information

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1 Introduction

Non-specific neck pain, non-specific back pain, and non-specific chronic pain (hereafter named neck pain, back pain, and chronic pain) are highly prevalent with great personal and social impact worldwide and are the leading cause of disability and primary reason for seeking healthcare [1–4]. People are increasingly relying on online sources for health information, with 53.5% of patients using the internet for medical information [5,6]. Patients

with chronic pain use the internet even more for their information, up to 62.9% [7]. In the Netherlands, in 2023 (~18 million inhabitants), Google searches of the term "neck pain" were done on average 5,400 times per month, "back pain" 9,900 times, and "chronic pain" 1,300 times [8]. A significant portion of patients (59.8%) consider the availability of online information as comparable to or even better than advice from healthcare professionals, and 58.7% does not discuss this information with their healthcare providers [6]. This underscores the pivotal role of website content in impacting their cognition and coping of pain during the subsequent period [9].

Most patients with low back pain (LBP) have beliefs consistent with the traditional biomedical model, which are often taught or reinforced by healthcare professionals [10]. Adequate pain education is deemed important as part of comprehensive pain management [9]. Conversely, inadequate or negative information may increase the burden of pain. Inaccurate negative online information may lead to nocebo effects [11,12]. This has the potential to induce or exacerbate symptoms, heighten anxiety, and significantly impact quality of life and patients' thoughts, beliefs, and perception [11,13–16]. Furthermore, negative beliefs about LBP are associated with increased odds of LBP and disability over 10 years in men [17]. Additionally, it poses challenges to therapy adherence and increases medical costs. Moreover, evidence suggests nocebo can transfer socially, diminishing the effectiveness of future therapies [14,18].

The biopsychosocial (BPS) model is currently recommended for understanding and managing chronic pain; therefore, it is important that websites align their information with the principles of the BPS model while refraining from disseminating nocebos [9]. Studies focusing on websites about LBP showed the presence of biomedically oriented information, both on governmental and physiotherapy websites [9,19]. However, the extent to which Dutch rehabilitation and anaesthesiology websites adhere to the tenets of the BPS model remains unknown. Given the significant impact of nocebos and incorrect information concerning neck, back, and chronic pain on websites, it is necessary to ascertain the accuracy and alignment of information with the BPS model. This understanding is required to know whether and where adjustments are needed, to improve patients' perception of pain, to prevent worsening of symptoms, and ultimately to provide better and more efficient care.

The aim of this study is to assess the grade of BPS information about neck, back, and chronic pain in rehabilitation and anaesthesiology websites related to Dutch hospitals, rehabilitation centres, and independent treatment centres (ITCs). Additionally, the frequency of nocebo words usage on the websites is explored.

2 Methods

Additions to the method are included in Supplementary S1.

2.1 Study design

A cross-sectional content analysis study was performed. A four-phase approach was used. This study did not involve medical research on humans; therefore, ethical approval was not needed.

2.1.1 Phase 1: Rating framework

The biopsychosocial information categorisation checklist (BICC) uses a three-point rating system to rate the degree of (bio)psychosocial information on a webpage (Table 1) [9]. The basis for this rating system is shown in Supplementary S2 and S3. Two examples of social contributors were identified as "primary social examples" due to their proving strong evidence base [9].

The webpages were also assessed for the use of nocebo terminology, defined as a text that might negatively influence the expectation of the reader in terms of disability and/or damage [20].

Table 1: Biopsychosocial rating criteria based on Black et al. [9]

Framework	Rating	Criteria
Biomedical	0	No psychosocial descriptions or examples provided
Limited BPS	1	In addition to biomedical, 1–2 psychosocial descriptions and/or 1–2 psychosocial examples and/or 1–2 social examples are provided
Reasonable BPS	2	In addition to biomedical, 3 or more psychosocial descriptions AND 3 or more psychological examples; OR both primary social examples and 1 or more other social examples are provided

2.1.2 Phase 2: Inter-coder reliability (ICR)

Three assessors (VMDJ, MAH, LRB) were trained by collectively assessing example websites, followed by individual assessment of ten webpages (i.e., physiotherapeutic websites not included in the study). The results were compared, and disagreements were discussed to achieve uniformity. Next ten new webpages were independently assessed and discussed. To quantify the reliability of the assessment, the ICR was calculated based on the results of every new round of assessed webpages, until an ICR of >85% was reached [21]. After the data were collected for the final study, all webpages were assessed by at least two assessors.

2.1.3 Phase 3: Screening and selecting websites

2.1.3.1 Website identification

Websites were collected using a central, open accessible database (www.zorgkaartnederland.nl) between March 2023 and May 2023, encompassing Dutch hospitals, rehabilitation centres, and ITCs in the categories of hospital rehabilitation/anaesthesiology department, rehabilitation centre, and ITC rehabilitation/anaesthesiology.

Inclusion and exclusion criteria are shown in Supplementary S1.

2.1.4 Phase 4: Content analyses

2.1.4.1 BICC

The BICC was merged into the survey program "SurveyMonkey" (nl.surveymonkey.com/). The questions are included in Supplementary S4. The answers of the survey were converted to Microsoft Excel 2021. The frequencies and percentages for each criterion of all checklists were calculated. Details such as the kind of organisation the websites belonged to and whether the webpage contained information on neck, back, and/or chronic pain were noted. Additionally, the frequencies of used nocebos were recorded.

2.1.4.2 Statistical analyses

To investigate potential statistical differences among organisations and/or departments, distinctions were made between hospital settings, rehabilitation centres, and ITCs. This differentiation was also applied to the webpage topics. All statistical analyses were conducted using SPSS version 28.

The BPS rating frequency was counted per setting and per topic. The Fisher's Exact test was employed to examine if the dispersion of BPS ratings significantly correlated with the setting, indicating that the BPS rating is different per setting. Subsequently, the settings were collapsed in two ways: one based on specific departments and the other based on the total of rehabilitation and the total of anaesthesiology websites. The association of BPS ratings among different webpage topics was separately analysed.

Nocebos were per webpage recorded, and the percentage utilising nocebos was calculated. The frequency of nocebo usage and specific terms were noted.

3 Results

3.1 Webpages

A total of 859 webpages were identified through ZorgkaartNederland (Figure 1). Of these, 661 duplicates were identified and excluded, resulting in 198 eligible for screening. After screening, a total of 71 webpages were included (Figure 1), representing all provinces of the Netherlands. Of the total number of webpages (N = 71), 42 belonged to rehabilitation (rehabilitation department in the hospital, rehabilitation centre, and ITCs), and 28 belonged to anaesthesiology (anaesthesiology department in the hospital and ITCs). One webpage was found via rehabilitation and anaesthesiology, and was included in both categories. Consequently, 72 websites (N = 72) were used in the statistical analyses.

Of the total number of websites (N = 72), 3 (4.2%) webpages informed about neck pain, 3 (4.2%) webpages informed about both neck and back pain, 12 (16.7%) webpages informed about back pain, 1(1.4%) webpage informed about neck, back, and chronic pain, and 53 (73.6%) webpages informed about chronic pain.

3.2 BICC

Across all webpages (N = 72), 7 (9.7%) were rated as biomedical, 54 (75.0%) limited BPS, and 11 (15.3%) as reasonably BPS (Figure 2, Table 2). The ratings were not significantly different between settings (p = 0.055).

The differences in BPS ratings and the topic of pain (neck, back, and/or chronic pain) were significant (p = 0.005). Further inspection revealed that this is because of the high frequency of neck pain in the biomedical rate and

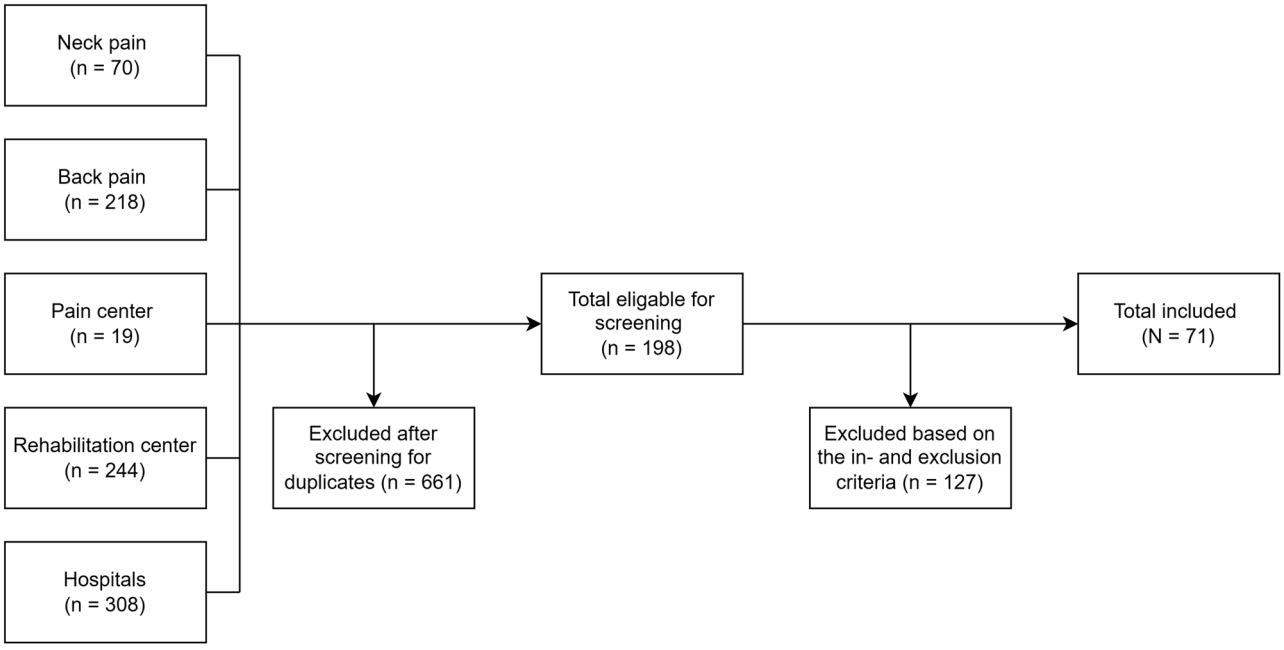

Figure 1: Flowchart selection webpages.

low frequency in the limited BPS rate; the high frequency of back pain in the biomedical and limited BPS rate and the low frequency in the reasonable BPS rate; the low frequency of chronic pain in the biomedical rate and the high frequency in the limited BPS and reasonable BPS rate. The BPS rating of the topics are shown in Figure 3. The full results for neck, back, and chronic pain are shown in Supplementary S5.

Differences in the BPS ratings between anaesthesiology and rehabilitation were not statistically significant (p = 0.137). The detailed results of the rehabilitation and anaesthesiology websites are presented in Supplementary S6. Detailed information of how the rating of the BICC per question is achieved is shown in Supplementary S7.

3.3 Use of nocebos

Nocebos were present on 22.2% (n = 16) of the webpages. The number of nocebos per webpage ranged from 1 to 11, with a mean of 2.2. The most common nocebos were “incorrect posture” and “overuse.” The term “incorrect posture” was used six times in total, with a maximum of three times on one webpage. The term “overuse” was used four times

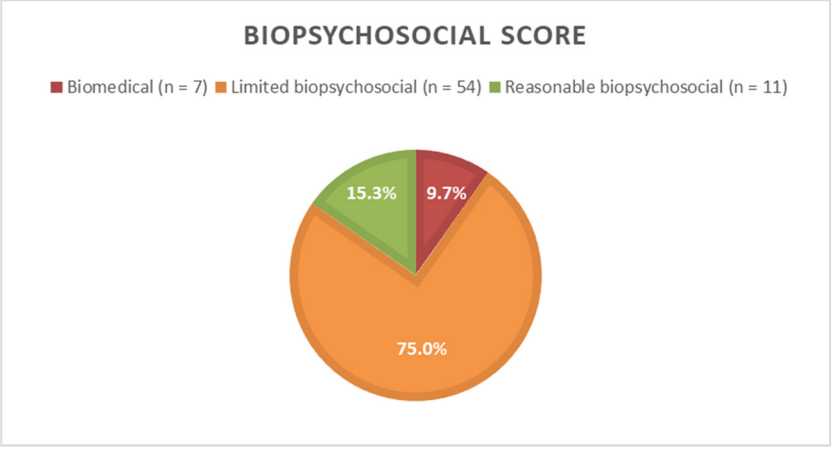

Figure 2: Total biopsychosocial rating.

Table 2: BPS rating of the total websites for neck, back, and chronic pain (N = 72 websites)

	Biomedical		Limited BPS		Reasonable BPS	
	n	%	*n*	%	*n*	%
Hospital rehabilitation department (n = 15)	0	0.0	15	100.0	0	0.0
Hospital anaesthesiology department (n = 19)	2	10.0	14	70.0	4	20.0
Rehabilitation centre (n = 16)	0	0.0	12	75.0	4	25.0
ITC rehabilitation (n = 12)	2	16.7	8	66.7	2	16.7
ITC anaesthesiology (n = 9)	3	33.3	5	55.6	1	11.1

ITC = independent treatment centre.

in total. The nocebo terms that were used and the quotes are shown in Table 3. The detailed results of the BPS rating for the use of nocebo are shown in Supplementary S8.

In 15.3% (n = 11) of the websites, various graphics were shown that presented a fearful representation of pain. Eight websites displayed a painful gesture, with the person placing their hand on the painful spot and/or making a painful facial expression. In three websites, the pain was displayed as a red marker.

4 Discussion

This study presents a national content analysis of Dutch rehabilitation and anaesthesiology webpages. Even though the BPS model is widely recommended for understanding and managing chronic pain including both medical specialty fields, the majority of Dutch webpages (84.7%) did not achieve a reasonable BPS rating. The results of this study largely correspond with another study on which the used BICC is based, which was performed in a different country and in a different setting (i.e., primary care) [9]. Furthermore, these results align with multiple studies on online information by hospitals or governmental websites [22–27]. The results of this study are a bit more positive compared to a study of 449 Dutch primary care physiotherapy websites, which scored substantially lower on the BPS content with the BICC as well [19]. Since these webpages are Dutch as well, it may be assumed that Dutch websites in other medical specialties or other medicine allied professions in the Netherlands also rate low on the BICC rating occurred to chronic pain.

The prevalence of words or phrases containing negative content suggests a potential for inducing nocebo effects among patients. This was found in 22.2% (n = 16)

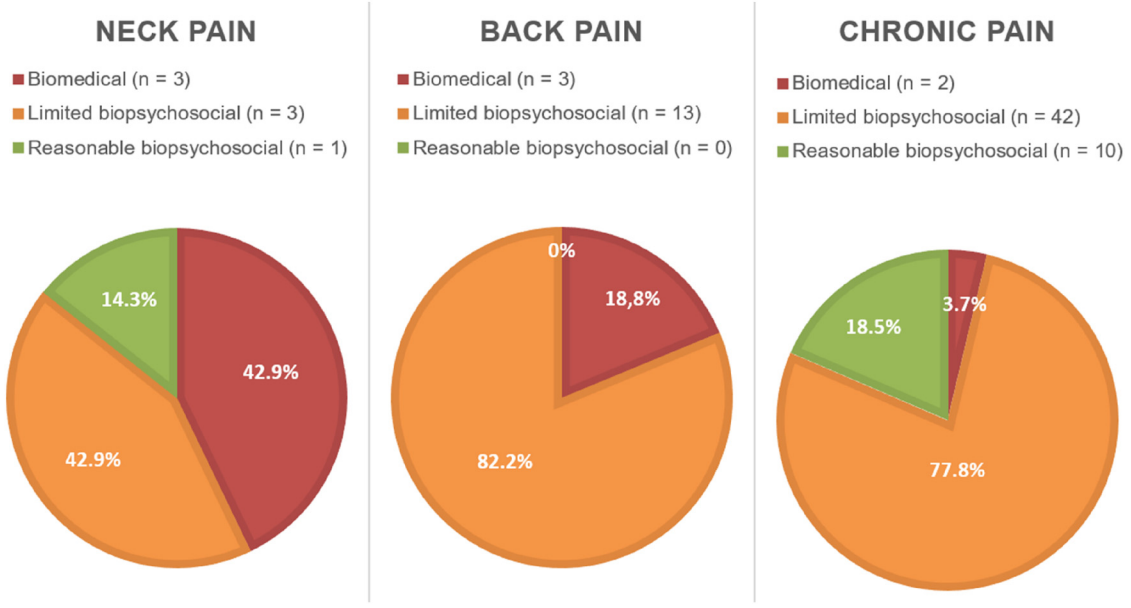

Figure 3: Biopsychosocial rating per topic.

Table 3: Nocebo terms and contextual quotes used on the websites (*N* = 16)

Nocebo terms	Number of websites using the nocebo term	Quotes
Incorrect posture	6	"Neck pain can have various causes, such as: incorrect posture; collapsed vertebrae." "Causes of chronic neck pain can include: Adopting a certain (incorrect) posture for a long time." "The main causes are: Incorrect posture: maintaining an incorrect posture for extended periods of time forces some muscles to work extra hard. This creates muscle tension, which in turn causes physical stress. This can lead to chronic back pain, among other things." "If these complaints persist for more than three months, it is considered chronic neck pain. This has various causes, such as incorrect posture or an inflammatory condition." "Studies show that chronic neck pain is a common problem, with prevalence increasing with age, although it also occurs in younger people, often as a result of incorrect posture or accidents." "Many people think that chronic neck pain is always the result of a serious underlying condition, such as brain or spinal disorders. In reality, neck pain can often arise from common causes, such as muscle fatigue, overuse, or incorrect posture." "A build-up of repetitive strain from poor or prolonged sitting at work causes incorrect posture, which leads to pain in the neck area." "Incorrect posture, especially while sitting or using electronic devices, can increase your risk of neck pain." "People who sit for long hours every day, such as office workers, have a higher risk of developing chronic neck pain due to prolonged static postures and lack of exercise. Using computers and other devices with incorrect posture can further increase the risk of neck pain." "The cause may be due to physical strain (repetitive movements, static movements, and/or poor posture), environmental factors, or psychological strain (stress)." "The pain may be caused by overexerting the back, prolonged straining of the back muscles, or poor sitting posture." "Chronic back pain is a long-term pain condition. These complaints often cause people to move differently and put different strain on the back, causing it to become unbalanced. This reduces back function. This downward spiral results in worsening back pain. You may no longer be able to work due to your back pain."
Improper function/use	2	"If the back does not function properly, the muscles tense too much or at the wrong time." "Incorrect use of muscles causes tension, pain and limited range of motion."
Overuse	4	"Overuse: placing excessive strain on the back can cause chronic back pain. This can occur, for example, when lifting objects that are too heavy and/or when using incorrect posture while lifting." "Many people think that chronic neck pain is always the result of a serious underlying condition, such as brain or spinal disorders. In reality, neck pain can often arise from common causes, such as muscle fatigue, overuse, or incorrect posture." "The pain may be caused by overexerting the back, prolonged straining of the back muscles, or poor sitting posture." "Repetitive lifting or sudden, irregular movements can overload or strain the muscles or ligaments of the spine. If you are in poor physical condition, persistent overload or strain can cause painful muscle cramps."
Caution with twisting movement	1	"Stretching and twisting movements often aggravate the symptoms, as do sitting, standing and strolling for long periods of time."
Muscle fatigue	1	"Many people think that chronic neck pain is always the result of a serious underlying condition, such as brain or spinal disorders. In reality, neck pain can often arise from common causes, such as muscle fatigue, overuse, or incorrect posture."
Unstable	2	"Because the spine is unstable, the ligaments and joints in the spine thicken. This causes the nerve channel to narrow, and the nerves become increasingly compressed." "One cause could be: long-term instability in the back, often due to muscle imbalance."
Damage	2	"In many cases, the signalling function of pain (tissue damage) is lost. Pain is usually a signal in your body that arises from damage." "Pain are signals that indicate that tissue damage has occurred."

(*Continued*)

Table 3: *Continued*

Nocebo terms	Number of websites using the nocebo term	Quotes
Wear and tear	3	"Some people without any significant degree of wear and tear in their back can still experience significant pain."
Collapsed vertebrae	1	"Neck pain can have various causes, such as: incorrect posture; collapsed vertebrae."
Vertebral displacement	3	"For example this could be a hernia or a significant shift in the vertebrae relative to each other." "Causes of chronic neck pain can include: Vertebral blockage or vertebral displacement." "Back pain can sometimes be caused by misaligned vertebrae or a displaced vertebra, causing a pinched nerve." "A common cause is a tilted pelvis, which causes the spine to misalign."

of the webpages in this study. The information provided may have implications for patients health and well-being, potentially causing unnecessary anxiety and incorrect health-related decisions [28]. Many examples of nocebo exist, importantly, using fearful information seem to have a negative influence on clinical outcomes, which could potentially also be done already by online information [29]. The occurrence of phrases containing negative content suggests a potential for inducing nocebo effects among patients.

An important limitation of this study, was that the criteria in the BICC for achieving a "limited biopsychosocial" rating were relatively easy to meet compared to the "reasonable biopsychosocial" rating. A webpage can be rated as limited BPS, by only providing, in addition to biomedical, 1–2 psychosocial descriptions and/or 1–2 psychosocial examples and/or 1–2 social examples. To achieve the highest result, a reasonable BPS rating, the requirements are much more extensive. This is because in addition to biomedical, it had to provide three or more psychosocial descriptions AND three or more psychological examples (Table 1). To bridge the gap between limited and reasonable BPS, and to provide more nuance, an extra classification for "moderate biopsychosocial" or a reconsideration of the criteria would be useful. The BICC should also be reevaluated to address potential misrepresentation and misapplication. Further, the absence of consented criteria and a validated method for identifying nocebos also led to open interpretation of text as nocebos. Future research should consider establishing criteria for reproducible identification of textual nocebos. A potential limitation arises from the exclusive reliance on data sourced from the ZorgkaartNederland database for website compilation, thereby exposing it to the potential influence of selection bias. To address this concern, a quality control measure was implemented. Two experts meticulously reviewed the dataset, assessing its completeness. Subjecting the data to this dual-review process fortified the study against possible selection bias. A notable strength of the study lies in acknowledging the researchers' pivotal role in determining outcomes, leading to the implementation of multiple measures aimed at reducing bias. Over 85% agreement on ICR was achieved, ensuring consistency in analyses and interpretations. Also, all webpages were assessed by at least two assessors that prevented information bias.

This study demonstrated that improvement is needed in mentioning "The occurrence of pain is described as an universal and/or normal phenomenon, experienced by most individuals in their lifetime" (description 1) and "Discusses how each individual's unique environment (social) will influence their thoughts, emotions and behaviours towards the perception of pain" (description 4), with implementation rates of respectively only 39.4 and 1.4%, refer Supplementary S7. According to the BPS model, websites should not only provide psychosocial descriptions but also include psychological and social examples; the present ratings were 63.4% providing psychological examples, and 56.3% provided social examples. The social determinants are often neglected in the BPS model of pain, as seen on the websites, while their role are unsustainable [30].

Overall, there seems to be an urgent need for effective implementation strategies to transform the rehabilitation and anaesthesiology websites that are more sufficiently consistent with the full BPS model and a better source of information. The research findings of this study should encourage to thoroughly evaluate and if needed rewrite the information on their websites concerning neck, back, and chronic pain to better reflect the current consented understanding. For the purpose of implementation, it is the proposal that guidelines and care standards include a section on information, recommendations, education, and language to be used towards patients, which can be used on individual websites, or linked towards professional organisation's websites. Partnering with patient representatives to ensure

patient-centredness of content and delivery of the information is recommended.

In conclusion, the majority of the anaesthesiology and rehabilitation webpages (84.7%) did not achieve the desired reasonable BPS rate. In addition, 22.2% of the websites provide nocebos, which can lead to negative expectations, exacerbation of symptoms, impacting quality of life, and diminishing the effectiveness of future therapies. There is a need for improvements of the contents of websites to improve patients' understanding and perception of pain and ultimately to provide better information and care.

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