

Current practices of health care providers in recommending online resources for chronic pain self-management

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Purpose: Online health resources (websites, apps and social media) may be an adjunct to provide self-management support for people with persistent or chronic pain. Endorsement of online health resources by health care providers is crucial for uptake by end-users. The aim of this study was to investigate the current practices of New Zealand (NZ) health care providers in recommending online resources for persistent pain management, and to identify what factors predict health care providers' recommendations and to explore the common concerns.

Methods: An online survey of NZ health care providers (ie, chiropractors, general practitioners, nurses, occupational therapists, osteopaths, physiotherapists, psychologists, specialist consultants, and social workers) involved in the management of persistent pain was conducted. The recruitment strategy was tailored to each occupation via occupation-specific professional organizations, and by approaching multidisciplinary professional organizations.

Results: Data from 213 health care providers were used in the final analysis. Most of the health care providers were physiotherapists (n=71), followed by chiropractors (n=39) and general practitioners (n=31). Fifty three percent (111/210) of health care providers reported currently recommending online resources. A multivariate logistic regression model showed that specialist interest in treating pain (OR=3.84; 95% CI: 1.66, 8.87; $P=0.002$), and level of confidence in recommending online resources (OR=1.05; CI: 1.04, 1.07; $P<0.001$), positively influenced recommending online resources. The majority of the health care providers (65%, 138/213) were concerned about the safety issues related to the risk of patients misinterpreting online information and to the lack of evidence-based information.

Conclusion: Half of the health care providers surveyed reported recommending online resources, which may suggest limited confidence in recommending, or knowledge of, existing online resources for persistent pain management. Ongoing education for health care providers on evidence-based online resources is required to recommend online resources as a self-management support tool for people with persistent pain.

Keywords: chronic pain, clinical practice, eHealth, mHealth, mixed methods, survey

Plain language summary

There is a growing gap between the number of people with persistent pain and the number of people who can be seen in a timely manner by pain management services. One way to bridge the gap could be by providing education via online resources such as websites, apps and social media. We conducted an online survey of health care providers in New Zealand. We asked about their background, their current practice in recommending online resources to their clients, what resources they recommend, and what concerns they have with recommending online resources. The main findings were:

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- About half of the respondents (111/210) recommend online resources.
- Respondents who had a specialist interest in pain, and higher confidence in recommending online resources were more likely to be recommending online resources.
- Many respondents were concerned about the safety issues related to the risk of clients misinterpreting online information and to the lack of evidence-based resources.

Increasing the opportunities for ongoing education on evidence-based online resources is required for health care providers. In addition, having access to a curated repository of online resources will help them to feel confident in recommending online resources as a tool for supporting self-management in people with persistent pain.

Introduction

Persistent or chronic pain affects one in five people globally¹ and in New Zealand (NZ),² and is the leading cause of disability worldwide.³ Multidisciplinary, cognitive-behavioral therapy (CBT) based interventions enhancing self-management skills such as self-reflection and self-monitoring, active goal setting and problem solving have been shown to improve outcomes by reducing pain-related disability and depression in people with persistent pain.⁴ Access to pain management services or teams of multidisciplinary health care providers who can support people with persistent pain in learning these self-management skills can be limited in Australia and NZ.^{5,6} With increasing global prevalence of persistent pain,⁷ and existing long waiting times to specialist pain management centers,^{5,8} innovative ways of delivering pain management services are imperative.⁹

Self-management websites (eHealth) and smartphone applications (mHealth) have been shown to be efficacious and cost-effective in supporting the self-management of long-term health conditions such as hypertension, diabetes, anxiety and depression.¹⁰ Web-based self-management support may also be a cost-effective and efficient way of providing access to self-management training to people with persistent pain.¹¹ Despite the promise of self-management websites/apps, endorsement of online health resources by health care providers could be crucial for uptake and use by end-users. One qualitative study from Australia¹² and one cross-sectional survey from the UK¹³ investigated health care providers' (eg, general practitioners, psychologists and CBT therapists) views on recommending online resources on web-based CBT in the management of anxiety and depression. Both studies reported that few health care providers

were aware of available evidence-based online resources, and this limited their confidence to recommend such resources. Views of health care providers' on recommending such resources for the management of persistent pain have not yet been investigated.

Understanding health care providers' self-reported use of eHealth and mHealth, and knowledge of and attitudes toward recommending online resources to patients for pain self-management will identify the current practice. Further, the results will identify key factors influencing health care providers' recommendation and integration of online resources for pain self-management that should be considered by developers of pain eHealth and mHealth resources.

Aims

The main aims of the study were: 1) to identify the proportion of NZ health care providers currently recommending online resources in clinical practice and the types of online resources recommended, 2) to assess the influence of specialist interest and other factors affecting their current practice of recommending online resources for pain self-management, and 3) to identify concerns that could be limiting recommendation of online resources.

Materials and methods

Study design

A cross-sectional online survey was administered to NZ health care providers providing clinical care to people with persistent pain. This is the quantitative phase (Phase I) of a sequential mixed method study (QUAN→QUAL).¹⁴ From the survey respondents, a purposive sample of respondents were invited for the qualitative study (Phase II) to further gain in-depth insights on enablers and barriers to recommending online resources for persistent pain management, which will be reported in a separate paper.

Inclusion criteria

Healthcare providers with current annual practicing certificates registered by their respective professional bodies were invited to participate. Healthcare providers approached included: nurses, physiotherapists, occupational therapists, psychologists, dentists, podiatrists, midwives, social workers, chiropractors, osteopaths, pain medicine specialists, rheumatologists, anesthetists, general practitioners, and surgeons. These occupations were

chosen as they may be in teams providing multidisciplinary pain management services.

Ethical approval

Ethics approval was obtained from the University of Otago Human Ethics Committee – Health (approval number: H18/028). An information sheet was displayed at the beginning of the survey. Respondents gave informed consent by completing the survey.

Sample size estimation

We estimated that we required a sample size of 386 respondents. This estimate was based on the number needed to provide sufficiently precise estimates of proportions, under the worst-case scenario of proportions around 0.5, by having 95% CIs (Wald approach) no wider than ± 0.05 . Allowing for a response rate as low as 20%, 1930 eligible potential respondents would need to be approached from each occupation. These numbers were deemed appropriate as they were based on the number of current annual practicing certificates issued to registered health care providers in NZ (N=80,776; data extracted from annual reports of professional bodies updated until mid-2017).

Survey implementation

Given the disparate nature of stakeholder networks, multi-channel purposive and snowball sampling was employed by approaching each occupation-specific group and wider health care networks (see [Table S1](#) for the professional organizations who shared our survey). The recruitment strategy (Email, Facebook, and Twitter) was tailored to each occupation group via occupation-specific organizations (eg, New Zealand Medical Association for Doctors and Physiotherapy New Zealand for Physiotherapists), and by approaching multidisciplinary professional organizations such as the New Zealand Pain Society and Arthritis New Zealand. This survey was administered online using REDCap software.¹⁵ The survey was open for a period of three months from 1 July to 30 September 2018. To maximize responses, a reminder was sent to all invited organizations after eight weeks from the start date of administering the surveys. Respondents were also given the option to enter into a prize draw for a \$100 (New Zealand Dollar - NZD) gift voucher.

Measures

A customized survey was developed, guided by the aims of the study (see [Table S2](#)). The survey comprised five sections: 1) professional background including specialist

interest in pain, 2) current practices in recommending online resources, 3) concerns and level of confidence, 4) key aspects of online information for fostering self-management support and 5) demographic data including NZ census standard ethnicity questions. Section 4 was used mainly for developing a NZ-specific pain resource and thus its findings are not reported in this paper.

Professional background including specialist interest in pain

This section included questions on current occupation (including if the participant is registered), primary role, practice setting, level of education, years of clinical experience and proportion of patients treated with persistent pain. These questions were informed by previous clinician surveys investigating the current use and uptake of online resources by general practitioners¹⁶ and multidisciplinary professionals involved in diabetes management.¹⁷ The question on “Do you have a specialist interest in treating pain (yes or no)” was adapted from a previous online survey assessing the management practices of physiotherapists.¹⁸

Current practices in recommending online resources

This section included questions on whether or not the respondent recommends online resources for pain management (yes or no), and if so what type (smartphone apps, websites, online forums, other) and what specific resources. This section also comprised an open-ended question “Further comments on recommending online resources” to capture any additional comments on recommending online resources. These questions were adapted from a previous survey of psychotherapists using computerized CBT.¹³

Concerns and level of confidence in recommending online resources

The common concerns in recommending online resources were assessed using a closed-ended question with the following options: no issues, confidentiality/privacy issues, time commitment required, safety issues and dealing with new technology. The section also had an open-ended question “Further comments on concerns.” The confidence in recommending online resources was assessed by asking “How confident are you in recommending online resources for persistent pain management.” Respondents used a 0–100 VAS with anchors “Not at all confident” and “Extremely confident.” Both the aforementioned questions were adapted from the NZ Technology Workforce Survey of General Practitioners.¹⁹

Demographic data

The demographic questions were adapted from a previous NZ-based survey of multidisciplinary professionals involved in diabetes management,¹⁷ which also included NZ census standard ethnicity questions.

Survey piloting

Members of the research team (HD, MP, LH and RG) reviewed the questions to ensure content validity. The survey was subsequently piloted with five multidisciplinary health care providers (two physiotherapists, one occupational therapist and two pain medicine specialists) involved in persistent pain management at a tertiary care hospital in NZ. Feedback was given with regards to content, clarity and ease of completing the survey, and the questions were modified accordingly.

Analysis

Aim 1: Descriptive statistics were presented for demographic data, proportion of health care providers recommending web-based resources, and knowledge and confidence in recommending online resources.

Aim 2: A multivariable logistic regression model was used to explore the factors associated with recommending online resources for pain management (from the question “Do you recommend online resources (eg, websites, apps or social media) to your patients for pain management?”). The following independent variables were planned to be included in the unadjusted analyses: age, gender, ethnicity, qualification, occupation, setting, specialist interest, specialist training, years of clinical experience, and level of confidence.

Using a simplified Hosmer-Lemeshow type approach,²⁰ unadjusted analyses were initially conducted to identify the individual association between each independent variable and dependent variable, with those variables with Wald test $P < 0.25$ included in the final-adjusted analysis. Following the recommendations of Peduzzi et al,²¹ a minimum of 10 positive responses and 10 negative responses were needed for each independent variable, and if this conflicts with the model selection approach described here, theoretical considerations guided the selection of variables for the adjusted model. Standard model diagnostics were performed, including Hosmer-Lemeshow’s goodness of fit test and specification tests. A similar approach was used to model confidence as the dependent variable using linear regression if model residual assumptions hold, or quantile regression modeling medians otherwise. All

statistical analyses were performed using SPSS (IBM, Version 23, Chicago, IL, USA) and two-sided $P < 0.05$ were considered significant.

Aim 3: The concerns that health care providers have with recommending online resources were examined with a count of the concerns selected in the given options, and by analysis of the open-ended follow-up question. We used the General Inductive Approach²² to examine the responses to the open-ended questions. One researcher (HG) coded the responses using words from the participants’ responses, then clustered these into categories. Another researcher (HD) conducted an independent parallel coding and double-checked the initial coding by HG; discrepancies were resolved by mutual discussion.

Results

Respondent characteristics

Of the 261 health care providers who started the survey, 218 completed it, of whom 213 reported they were registered with the appropriate body. Thus, 213 responses were used for final analyses. The demographic and professional characteristics of the health care providers are presented in [Table 1](#). The majority of respondents were women, NZ European, with the age ranges evenly spread. Most of the health care providers were physiotherapists ($n=71$), followed by chiropractors ($n=39$) and general practitioners ($n=31$). Most worked in an urban setting for a government-funded hospital (called district healthboard (DHB) in NZ), or in primary care, or private practice. Over half of the respondents reported seeing up to 25% of clients with persistent pain in their current practice ([Table 1](#)).

Almost 60% of the health care providers had a specialist interest in treating people with persistent pain, and 64% reported completing further training in managing persistent pain. Confidence in recommending online resources was moderate, 46.62 (SD=29.45), on a 0–100 VAS scale ($n=202$).

Aim 1: current practice in recommending online resources

Just over half of the health care providers recommended online resources for persistent pain (53% yes, 111/210) ([Table 2](#)). There was relatively even spread across the proportions of patients to whom online resources are recommended. In terms of type of online resources recommended, most participants recommended websites and apps, particularly the Neuro Orthopaedic Institute’s (NOI) resources.²³

Table 1 Demographic and professional characteristics of respondents (n=213)

	n (%)
Age	
21–30	38 (17.8)
31–40	50 (23.5)
41–50	49 (23)
51–60	56 (26.3)
60+	20 (9.4)
Gender	
Female	138 (64.5)
Male	70 (32.9)
Other	1 (0.5)
No response	4 (1.9)
Prioritized ethnicity	
New Zealand European	147 (69)
Māori	3 (1.4)
Pasifika	3 (1.4)
Indian	7 (3.3)
Chinese	6 (2.8)
Other	41 (19.3)
No response	6 (2.8)
Occupation	
Chiropractor	39 (18.3)
General practitioner	30 (14.1)
Nurse	7 (3.3)
Occupational therapist	19 (8.9)
Osteopath	7 (3.3)
Physiotherapist	71 (33.3)
Psychologist	12 (5.6)
Specialist consultant	14 (6.6)
Social worker	5 (2.4)
Other ^a	9 (4.2)
Setting	
Rural	19 (8.9)
Urban	180 (84.5)
Urban and rural	11 (5.2)
No response	3 (1.4)
Primary role	
District health board	82 (38.5)
Education/research	4 (1.9)
Primary care	40 (18.8)
Primary care and education/research	3 (1.4)
Primary care and private practice	9 (4.2)
Private practice	63 (29.6)
Other	11 (5.2)
No response	1 (0.5)
Highest qualification	
Diploma	18 (8.5)
Undergraduate degree	56 (26.3)

(Continued)

Table 1 (Continued).

	n (%)
Postgraduate diploma	53 (24.9)
Masters	36 (16.9)
MD/MS (Doctor of Medicine/Master of Science)	7 (3.2)
Professional fellowship	22 (10.3)
PhD	13 (6.1)
Other	6 (2.8)
No response	2 (0.9)
How many years' experience do you have in treating patients with persistent pain?^b	
<1 year	22 (10.4)
1–5 years	76 (35.9)
6–10 years	27 (12.7)
>10 years	87 (41)
On an average week, what percentage of your patients have persistent pain?	
0	4 (1.9)
1–25%	112 (52.6)
26–50%	47 (22.1)
51–75%	23 (10.8)
76–100%	27 (12.7)

Notes: ^aOther occupations included: anesthetist/pain management specialist, clinical pharmacist, pain specialist, house officer, medical officer, nurse and counsellor, registered medical officer, speech language therapist and trainee intern. ^b1 missing response.

Aim 2: factors influencing recommendation of online resources

In the unadjusted analyses (Table 3), some of the independent variables could not be entered as planned (ie, occupation, setting, ethnicity and qualification) because they did not meet the minimum requirements of $n=10$ per independent variable level, and/or because of the unequal distribution of the data which did not meet the regression model requirements. Age and years' experience treating people with persistent pain were recoded to have two levels: age, 21–50 years old and >50 years old; years' experience, 5 years or less and >5 years. Of the six independent variables assessed, the predictors 1) specialist interest in treating people with persistent pain, 2) specialist training, 3) years of experience in treating people with persistent pain, 4) confidence in recommending online resources, and 5) age, met our apriori criterion of $P<0.25$. Gender did not meet this criterion.

In the final-adjusted analyses (Table 3), the predictors: 1) specialist interest in treating pain (OR=3.84; 95% CI: 1.66, 8.87; $P=0.002$) and 2) confidence in recommending online resources (OR=1.05; CI: 1.04, 1.07; $P<0.001$)

Table 2 Recommendation of online resources for persistent pain management

	n (%)
Do you recommend online resources (eg, websites, apps, or online forums) to your patients for persistent pain management? (n=210)	
Yes	111 (52.9)
No	99 (47.4)
How often do you recommend online resources for pain management? (n=111)	
For up to 25% of patients	38 (34.2)
26–50%	31 (27.9)
51–75%	18 (16.2)
76% or more	24 (21.6)
What type of resources do you recommend? (n=111^a)	
Websites	101 (91)
Smartphone apps	50 (45.1)
Online forums (eg, Facebook)	9 (8.1)
Other	19 (17.1)
The top 10 resources recommended by NZ health care providers (n=111^a)	
Neuro Orthopaedic Institute's (NOI) group resources (http://www.noigroup.com/en/Resources) (eg, Tame the Beast, https://bodyinmind.org/ , Explain Pain, Lorimer Moseley YouTube clips, Recognise™ or Orientate app, Graded Motor Imagery resources)	53
Mindfulness apps or websites or YouTube videos (eg, Headspace app, Smiling Mind)	39
Retrain pain foundation (https://www.retrainpain.org/)	20
5 min talks on pain (eg, http://www.hnehealth.nsw.gov.au/Pain/Pages/Brainman-Videos.aspx)	15
Peter O'Sullivan videos (http://www.pain-ed.com/)	12
Pain Tool Kit resources (https://www.paintoolkit.org/)	8
Australian Centre for Innovation(ACI) website on chronic pain (https://www.aci.health.nsw.gov.au/chronic-pain)	7
Health Navigator (https://www.healthnavigator.org.nz/health-a-z/c/chronic-pain/)	7
Pain Health (https://painhealth.csse.uwa.edu.au/)	6

Note: ^aMore than one response was allowed.

significantly predicted recommending online resources for persistent pain management.

Aim 3: concerns

Safety issues such as the risk of patients misinterpreting information and the lack of evidence-based information were selected most often for the closed-ended question (67%, 138/213; see [Table S3](#) for the other concerns selected by the participants). From the inductive coding of the open-ended responses, four main categories were identified: 1) safety issues, 2) access issues, 3) lack of specificity, and 4) online resources as a useful adjunct.

Safety issues

Healthcare providers were concerned about the safety risk of patients being directed to poorer quality information,

misinterpretation, and misinformation presented in the online resources; and often viewed online resources as an adjunct to face-to-face treatment. For example, a health care provider explained:

Mostly around patient interpretation of information. Especially with pain, it can become very easy to end up in more dubious corners of the internet ... as clinicians we tend to have a reasonable radar for the legitimacy of online information, but we shouldn't expect patients to have the same skills!

Access issues

The health care providers were also concerned about the *access issues* related to patient's affordability to access the internet, language barriers and literacy issues. For example, a clinician wrote:

Table 3 Factors influencing whether health care providers recommend online resources – unadjusted and adjusted multivariate logistic regression analyses

Unadjusted analyses					
	Independent variable		P	OR	95% CI for OR
Clinician related variables	Specialist interest in treating people with persistent pain	Yes v no	<0.001	6.97	3.74–12.97
	Specialist training	Yes v no	<0.001	4.02	2.20–7.34
	Years' experience treating people with persistent pain	5 or less years v >5 years	0.037	1.80	1.04–3.11
Demographics	Confidence in recommending online resources	0–100 VAS scale	<0.001	1.06	1.04–1.07
	Age	21–50 v 50+	0.166	1.50	0.85–2.64
	Gender	Male	0.854		
		Female	0.574	1.18	0.66–2.12
		Other	1.00	0.00	0.00–0.00
Adjusted analyses					
	Independent variable		P	OR	95% CI for OR
Clinician related variables	Specialist interest in treating people with persistent pain	Yes v no	0.002	3.84	1.66–8.87
	Specialist training	Yes v no	0.195	1.74	0.75–4.03
	Years' experience treating people with persistent pain	5 or less years v >5 years	0.061	2.40	0.96–6.01
Demographics	Confidence in recommending online resources	0–100	<0.001	1.05	1.04–1.07
	Age	21–50 v 50+	0.748	1.17	0.46–2.98

Note: Dependent variable: Do you recommend online resources for persistent pain management (yes/no).

Our clients are elderly and so would likely need assistance to set up and run an online system. Hearing is also a problem for many, and eyesight.

Lack of specificity

Another key theme related to concerns was lack of specificity, the mismatch between the participants' experience and the resource content. For example:

Finding resources tailored for specific individuals that is appropriate to: 1) Their pathology/situation; 2) Their level of understanding and 3) Their language.

As well as the mismatch between the patient and the online resource, health care providers were concerned about the mismatch between their practice and the information presented in the online resource.

Need to ensure that the website resource is evidence based and fits with our ethos and needs of patient.

Online resources as a useful adjunct

As a result of these common concerns, the common view toward online resources was often described as an adjunct

to face-to-face treatment, citing the existing concerns of safety, access issues of patients and lack of specificity in developing a therapeutic relationship with clinicians. Respondents were concerned that an online resource cannot replicate the guidance and checks of in-person persistent pain management. A health care provider explained:

Helping patients with persistent pain is about establishing and developing a therapeutic alliance or relationship with the person. Helping people is more about understanding them, the barriers to recovery they present with, how their symptoms affect their lives. Information must be provided that is tailored to the context of the persons pain complaint. Information that is provided out of context or is provided outside the safety of the therapeutic relationship can easily be mis-interpreted, mis-applied, and promote long term patient iatrogenic disability.

Discussion

We explored the current use of, and the factors that influence the recommendation of online resources (websites and apps) for persistent pain management by NZ health care providers and their common concerns. The health care providers surveyed were divided in terms of whether

or not they recommend online resources for persistent pain management and viewed online resources only as an adjunct to face-to-face treatment. On average respondents had moderate confidence in recommending online resources. Furthermore, having a higher confidence and a specialist interest in treating pain increased the likelihood of recommending online resources.

Of the two key factors that influenced recommending online resources for persistent pain management, confidence of health care providers in recommending online resources could be more easily modifiable than specialist interest in pain. Based on the technology acceptance model, enhancing health care providers' perceptions of the usefulness and usability of online resources for persistent pain management may increase their confidence in the resource and thus their recommendation of the resource to their patients.¹² Increasing perceptions of usefulness and usability can be achieved by providing continuous professional development opportunities on existing evidence-based online resources for persistent pain. For example, via respective professional organizations, by giving the health care providers time to explore the resource as well as sharing validated tools to assess resource quality (eg, DISCERN for websites²⁴ and Mobile App Rating Scale (MARS)²⁵ for mobile apps). Another possible suggestion could be use of a curated repository of online resources maintained by professional organizations.²⁶ As an example, the Health Navigator charitable trust²⁷ in NZ currently provides reliable online health information for the public and encompasses a curated repository of apps, which are reviewed by health care providers and researchers.

The common concerns expressed in recommending online resources were mainly related to safety risk to patients misinterpreting the information online and to the lack of evidence-based information. There is a general consensus that the quality of online resources for persistent pain is poor and there is limited evidence supporting the clinical efficacy of online resources. A recent scoping review of pain management websites providing information about core self-management skills (eg, self-efficacy building, self-monitoring, problem solving, goal setting) identified 27 websites globally, of which only two websites had been evaluated for efficacy in people with persistent pain.²⁸ Similarly, a comprehensive review of smartphone apps for pain self-management identified no available comprehensive app that met core self-management skills.²⁹ Importantly, only 8% (22/279) of the identified apps had some form of health care providers' input.²⁹

A recent review of apps for pain self-management available in NZ app stores (Android and iOS) found none of the included apps (n=19) were validated in people with persistent pain and none provided culturally tailored information.³⁰ However, there is a growing body of evidence on assessing the validity and reliability of self-monitoring apps in people in persistent pain.^{31,32} The concerns identified from the study are similar to those reported by other health care providers when asked about concerns with recommending online resources for management of other persistent conditions (eg, anxiety and depression;³³ mental health¹²) and other practices (eg, eHealth in general practice).¹⁶ Developers should be encouraged to collaboratively work with health care providers and end-users with persistent pain in testing of the efficacy and risks of using online resources for persistent pain management.²⁶ Some of the safety concerns may be realistic risks that need to be addressed before uptake of online resources is widely promoted. Other concerns may be alleviated by knowing more about how people with persistent pain use online resources to self-manage their symptoms.

Another concern that was expressed was related to patients' lack of access to the internet as a potential barrier to recommending online resources. In 2017, 93.8% of New Zealanders were self-defined as active internet users.³⁴ The usage was lower in older age groups; non-usage at 10% for individuals 65–74 years old, 25% for 75–84 years old, and 50% for individuals older than 85 years.³⁴ Age may be a factor to consider when recommending online resources. However, only a small proportion of New Zealanders who do not use the internet reported cost (6.1%) or not having access to a device (18.3%) as reasons for not using the internet.³⁴ Therefore, addressing the key concerns of health care providers as identified in this study could increase uptake of recommending online resources, which would enable online resources to complement face-to-face care for providing integrated care pathways for people managing their persistent pain.

Approximately half the health care providers who responded to the survey *are* currently recommending online resources for persistent pain management. The most commonly recommended resources are the NOI group resources (eg, Tame the Beast video, Explain Pain and Recognise™ app). These are evidence-informed resources shown to improve health outcomes for people with persistent pain.³⁵ As these were developed by established pain clinicians and researchers in Australia, it is not

surprising that these resources were often recommended by NZ health care providers. The second most-often recommended resources were mindfulness apps (eg, Headspace app). While the Headspace app has been shown to improve stress symptoms,³⁶ it is not validated in people with persistent pain. The national resources recommended by health care providers were the Health Navigator website,²⁷ and the CALM website.³⁷ As both these national resources were developed in conjunction with health care providers (Health Navigator) and an academic institution (the CALM website), this collaboration may have influenced the confidence of NZ health care providers in recommending such resources.

The percentage of respondents recommending online resources is on par or higher than other eHealth resources for other persistent health concerns and in other western countries. For example, an online survey of multidisciplinary health care professionals in Germany found the level of acceptance for online aftercare following inpatient rehabilitation as low (47%, 60/128) or moderate (41%, 52/128).³⁸ Similarly, only 2.4% (12/329) of the UK cognitive behavioral therapists were recommending computerized self-help in 2011.¹³

Strengths and limitations

This is the first study to investigate health care providers' knowledge of, and attitudes toward recommending online resources for supporting pain self-management. The customized questionnaire was piloted with a multidisciplinary team including pain management clinicians and researchers to provide preliminary evidence for content validity. Further, the multivariate regression analyses enabled us to identify the key factors influencing recommending online resources for pain self-management.

However, the results of our study need to be interpreted with the following limitations acknowledged. First, while the invitation to participate in the survey was shared widely in NZ, we did not meet our a priori stated sample size (n=386). Although we estimated our sample size based on the reported number of registered health providers updated until 2017, not all health care providers have a specialist interest in persistent pain, or in the use of online resources as a part of self-management support. A better estimate of our total sample size could be the number of registered members of the New Zealand Pain Society, with around 700 registered members. Thus, the response from 213 respondents is a reasonable estimate of health providers working with people with persistent pain

in NZ and enabled us to input some of the key independent variables in the multivariate logistic regression analyses. Second, the respondents are all those who self-elected to complete the survey, increasing the probability that our sample had a high representation of those who have strong opinions either way about recommending online resources. Lastly, given the unequal distribution of responses by occupation, we could not conduct separate analyses by occupation, or include other variables in the multivariate logistic regression such as prioritized ethnicity or type of clinical setting. We therefore do not know if our description of the use of, and enablers and barriers to, recommending online resources apply to all health care providers from all backgrounds in NZ.

Research and clinical implications

This study prompts several lines of future research. First, we do not know *how* online resources are used by health care providers who do recommend them, or at what stage of pain management they are introduced. Second, we need to determine which patients may benefit most from use of online resources for self-management. Identifying patients who may engage with and respond better to, online resources would enable tailoring of service provision. Third, while disseminating knowledge about online resources with health care providers as part of continuous professional development (CPD) is useful, further research is required to understand the best practices for adoption and integration of eHealth and mHealth resources in clinical practice.

In terms of clinical practice, the list of resources most commonly recommended may be useful for other health care providers to recommend to their patients in their clinical practice. Further, given that health care providers' value online resources as a useful adjunct to face-to-face consultations, clinical support tools need to be developed to facilitate clinical conversations regarding patients' current use of online resources, and to enable recommendations for evidence-based online resources to support and reinforce treatment strategies recommended during face-to-face consultations.

Conclusion

Half of the NZ health care providers surveyed reported recommending online resources to their patients with persistent pain. Limited confidence in recommending, or knowledge of, existing online resources was a barrier to more health care providers recommending online resources. The results from multivariate logistic regression model suggest that having a

specialist interest in treating pain, and greater level of confidence in recommending online resources, increased the likelihood of recommending online resources. While there is a consensus in the need for evidence-based information and involving health care providers and people with persistent pain in developing online resources, it is equally important to provide ongoing education for health care providers on evidence-based online resources, and to develop mechanisms for care pathways to utilize eHealth and mHealth resources as part of persistent pain management.

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Supplementary materials

Table SI Professional organizations who shared the survey invitation

<p>Profession specific organizations</p> <p>New Zealand Chiropractors' Association (NZCA)</p> <p>Occupational Therapy New Zealand Whakaroa Ngangahau Aotearoa (OTNZ-WNA)</p> <p>Osteopaths New Zealand</p> <p>Physiotherapy New Zealand</p> <p>Podiatry New Zealand</p> <p>New Zealand Psychological Society (NZPsS)</p> <p>New Zealand Rheumatology Association (NZRA)</p> <p>Social workers at DHBs</p>
<p>Multidisciplinary organizations</p> <p>Accident Compensation Corporation (ACC) treatment providers</p> <p>Allied Health Professional Leaders Network of District Health Boards DHBs</p> <p>Arthritis New Zealand</p> <p>Health Informatics New Zealand (HINZ)</p> <p>New Zealand Medical Association (NZMA)</p> <p>Clinicians and researchers affiliated to the Pain@Otago research theme</p> <p>New Zealand Pain Society (NZPS)</p> <p>The Royal College of General Practitioners (RNZCGP)</p>

Table S2 Online resources for persistent pain self-management survey

1. What is your profession? <input type="checkbox"/> Nurse <input type="checkbox"/> Psychologist <input type="checkbox"/> Physiotherapist <input type="checkbox"/> Occupational therapist <input type="checkbox"/> General Practitioner <input type="checkbox"/> Specialist Consultant <input type="checkbox"/> Dentist <input type="checkbox"/> Osteopath <input type="checkbox"/> Chiropractor <input type="checkbox"/> Podiatrist <input type="checkbox"/> Midwife <input type="checkbox"/> Other _____
2. Are you registered with the appropriate professional body? <input type="checkbox"/> Yes <input type="checkbox"/> No
3. What is your primary role? <input type="checkbox"/> Primary care <input type="checkbox"/> Private practice <input type="checkbox"/> District Health Board <input type="checkbox"/> Education/Research <input type="checkbox"/> Other _____
4. Which of these settings do you practice in? <input type="checkbox"/> Urban community (large city or town) <input type="checkbox"/> Rural community <input type="checkbox"/> Other _____
5. What is your age? <input type="checkbox"/> 21–30 <input type="checkbox"/> 31–40 <input type="checkbox"/> 41–50 <input type="checkbox"/> 51–60 <input type="checkbox"/> 60+
6. Please select the gender you identify with <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Other
7. Which ethnic group(s) do you belong to? <input type="checkbox"/> New Zealand European <input type="checkbox"/> Māori <input type="checkbox"/> Samoan <input type="checkbox"/> Cook Island Māori <input type="checkbox"/> Tongan <input type="checkbox"/> Niuean <input type="checkbox"/> Tongan <input type="checkbox"/> Chinese <input type="checkbox"/> Indian <input type="checkbox"/> Other _____

(Continued)

Table S2 (Continued).

8. Qualification <input type="checkbox"/> Diploma <input type="checkbox"/> Undergraduate <input type="checkbox"/> Postgraduate diploma <input type="checkbox"/> Masters <input type="checkbox"/> MD/MS <input type="checkbox"/> Professional Fellowships <input type="checkbox"/> PhD <input type="checkbox"/> Other _____
9. Do you have a specialist interest in treating people with persistent pain? <input type="checkbox"/> Yes <input type="checkbox"/> No
10. Have you completed any specialist training or pain-specific CPD for treating patients with persistent pain? <input type="checkbox"/> Yes <input type="checkbox"/> No
11. How many years of experience do you have in treating patients with persistent pain? <input type="checkbox"/> <1 year <input type="checkbox"/> 2–5 years <input type="checkbox"/> 6–10 years <input type="checkbox"/> >10 years
12. On an average week, what percentage of your patients have persistent pain? <input type="checkbox"/> 0% <input type="checkbox"/> 1–25% <input type="checkbox"/> 26–50% <input type="checkbox"/> 51–75% <input type="checkbox"/> 76–100%
13a. Do you recommend online resources (eg, websites, apps or social media) to your patients for pain management? <input type="checkbox"/> Yes <input type="checkbox"/> No
13b. If yes, how often do you recommend online resources for pain management? <input type="checkbox"/> Up to 25% of patients <input type="checkbox"/> 26 to 50% <input type="checkbox"/> 51 to 75% <input type="checkbox"/> 76% or more
13c. If yes, what type of resources do you recommend? <input type="checkbox"/> Smartphone apps <input type="checkbox"/> Websites <input type="checkbox"/> Online forums (eg, Facebook) <input type="checkbox"/> Other
13d. If yes, please name the online resource(s) that you recommend?
13e. Further comments on recommending online resources.
14. Do you believe a need for developing NZ-specific online resources? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure

(Continued)

Table S2 (Continued).


15. How confident are you in recommending online resources for persistent pain management?					
					
Not at all confident			Extremely confident		
16. What concerns, if any, do you have in recommending online resources for pain management?					
<input type="checkbox"/> No concerns <input type="checkbox"/> Confidentiality/privacy <input type="checkbox"/> Time (eg, increased workload, higher expectations) <input type="checkbox"/> Safety (eg, risk of patient misinterpreting information, lack of evidence-based information) <input type="checkbox"/> Dealing with new technology (eg, not familiar with it, never used it, no time to learn) <input type="checkbox"/> Other _____					
16b. Further comments on concerns.					
17. How important do you think these website/app aspects are for people with persistent pain to enhance their self-management:					
	Not at all important	Slightly important	Important	Very important	Extremely important
Provides evidence-based information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developed by and/or in collaboration with a health provider	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Considers the type of persistent pain condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Addresses cultural beliefs of a patient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Underwent scientific validation (ie, tested for efficacy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Must be endorsed by national and/or independent professional organisations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. How important do you think these online website/app contents are for people with persistent pain to enhance their self-management:					
	Not at all important	Slightly important	Important	Very important	Extremely important
Self-efficacy building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-tailoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-monitoring of symptoms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Goal setting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problem solving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shared decision making	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social support (eg, moderated online forums)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cultural relevance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Do you have any further comments?					

Table S3 Frequency of concerns in recommending online resources

Concerns (N=213)	n (%)
None	39 (18)
Confidentiality/privacy	13 (6)
Time (eg, increased workload, higher expectations)	361 (17)
Safety (eg, risk of patient misinterpreting information, lack of evidence-based information)	138 (65)
Dealing with new technology (eg, not familiar with it, never used it, no time to learn)	71 (33)
Other	381 (18)

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