Title

Physiotherapy Clinical Educators' Perceptions and Experiences of Clinical Prediction Rules

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Abstract

Objectives: Clinical prediction rules (CPRs) are widely used in medicine, but their application to physiotherapy practice is more recent and less widespread, and their implementation in physiotherapy clinical education has not been investigated. This study aimed to determine the experiences and perceptions of physiotherapy clinical educators regarding CPRs, and whether they are teaching CPRs to students on clinical placement.

Design: Cross-sectional observational survey using a modified Dillman method.

Participants: Clinical educators (n=211, response rate 81%) supervising physiotherapy students from 10 universities across 5 states and territories in Australia.

Results: Half (48%) of respondents had never heard of CPRs, and a further 25% had never used CPRs. Only 27% reported using CPRs, and of these half (51%) were rarely if ever teaching CPRs to students in the clinical setting. However most respondents (81%) believed CPRs assisted in the development of clinical reasoning skills and few (9%) were opposed to teaching CPRs to students. Users of CPRs were more likely to be male ($p<0.001$), have post-professional qualifications ($p=0.020$), work in private practice ($p<0.001$), and work in the area of musculoskeletal physiotherapy ($p<0.001$) compared with non-users. The CPRs most commonly known, used and taught were the Ottawa Ankle Rule, the Ottawa Knee Rule, and Wells' Rule for Deep Vein Thrombosis.

Conclusions: Students are unlikely to be learning about CPRs on clinical placement, as few clinical educators use them. Clinical educators will require training in CPRs and assistance in teaching them if students are to better learn about implementing CPRs in physiotherapy clinical practice.

Introduction

Clinical prediction rules (CPRs) are research-based tools designed to assist the clinician in their decision-making. These tools quantify the relative contributions of various clinical features and patient characteristics to provide numeric indices and therefore the probability of an outcome [1, 2]. They can be used to assist in making a diagnosis, establishing a prognosis, or determining the best intervention [3]. CPRs can streamline the assessment process and improve clinical precision [4]. As such, they may reduce uncertainty in patient care [5] and give clinicians more confidence in their decisions [6].

Although long utilised in medicine, CPRs are a relatively new concept in physiotherapy. Whilst CPRs have been developed that are relevant to physiotherapy practice, there is little evidence to indicate that physiotherapists know about them or use them [7, 8]. Moreover, although the impact of CPRs on clinical decision-making in medicine has been investigated [9-11], their impact on decision-making by physiotherapists is largely unknown [12].

The extent to which physiotherapy students are learning about CPRs is similarly unexplored. Physiotherapy clinicians and educators may be unaware of CPRs, or may not appreciate their clinical utility. Consequently, physiotherapy students may not be learning about CPRs from their clinical educators (CEs) who are unfamiliar with the tool. This could be a problem for students as they enter the workforce, where under contemporary demands of evidence-based practice (EBP) they may be expected to know about CPRs and be able to utilise them in their clinical practice.

The aims of this study therefore are to 1) ascertain the awareness and knowledge of CPRs among CEs for pre-professional students; 2) determine the extent to which CPRs are clinically used by CEs and the extent to which they are taught to students in the clinical setting; and 3) establish whether or not CEs find them helpful in progressing their own and their students' clinical reasoning skills.

Methodology

The study design is a cross-sectional observational survey of physiotherapy CEs.

Survey instrument

The ten-page questionnaire comprised mainly closed-ended questions. Any open-ended questions asked for specific information that facilitated categorisation and quantitative analysis of data. The first section (8 questions) asked about CEs' knowledge and use of CPRs as clinicians, why they use them, why they don't use them more often, and whether they deviate from the clinical direction indicated by a CPR. The second section (8 questions) included questions about CEs' use of CPRs with students in the clinical setting, what they teach students about CPRs and why they teach them, why they don't teach them more often, whether they believe CPRs should be taught to students, and their views on the relationship between CPRs and the development of clinical reasoning skills. This second section included a table of 30 CPRs (14 diagnostic, 3 prognostic and 13 interventional), chosen as being more commonly known and also more relevant to physiotherapy practice [13], that were listed by their intended purpose; CEs were asked to indicate which of these they recognised, which they used in clinical practice, and which they taught to students. Participants were also asked to name any CPRs they knew, such as by citing their author(s) or geographical origin. The final section (12 questions) addressed respondent demographic information, including pre-professional and any post-

professional qualifications, the clinical setting in which they worked, and the academic level of students they taught.

The questionnaire was initially developed based on the published literature on CPRs. It was further developed with input from five academic experts, each of whom had published in international peer-reviewed scientific journals on the use of CPRs in physiotherapy. Each expert was specifically asked to provide comment on the content and face validity of the questionnaire. Feedback was received from all five experts and the questionnaire was modified accordingly.

The survey was piloted with a sample of convenience of six former physiotherapy CEs in the main areas of clinical practice (musculoskeletal, cardiorespiratory and neurological). Each was invited to complete the draft questionnaire individually, and asked to provide feedback on clarity and ease of completion, as well as indicating the time taken to complete it.

Sampling and recruitment

CEs supervising physiotherapy students in Australia were surveyed. Participants were sourced through the database of physiotherapy CEs maintained by the University of Newcastle, Australia. This included educators working in hospitals, community facilities and private practices.

An explanatory letter and reply-paid self-addressed envelope (SAE) was sent to the contact person at each clinical placement site requesting the names of all physiotherapists acting as CEs at their site. From these responses, and from the original database of CEs, a list was created of potential participants. Therefore, questionnaires were mailed directly to named CEs, allowing a response rate to be accurately calculated, and enabling follow-up of non-respondents..

The protocol for the administration of the questionnaire followed Dillman's Tailored Design Method [14], with minor modifications in the follow-up steps allowing more time for potential participants to respond before each reminder; previous studies have found that such minor deviations from Dillman's original Total Design Method [15] do not adversely affect response rates [16]. The Dillman protocol is used widely in published survey research, and incorporates a number of effective methods to maximise the number of respondents [17].

The procedure began with a pre-notification letter to all identified potential participants, alerting them to the imminent arrival of the questionnaire. A survey package containing a letter of invitation, information statement, questionnaire and reply-paid SAE was then posted to potential participants within one week of pre-notification. Removable codes on the front page of questionnaires were used to track non-respondents. Once completed questionnaires were received they were immediately separated from the coding number to protect confidentiality.

Two weeks following the mailing of the questionnaire, a follow-up postcard was sent to participants thanking them for completing the questionnaire and prompting them to return it if they had not already done so. Four weeks later, non-respondents were sent a second copy of the questionnaire with a cover letter and a reply-paid SAE. Four to six weeks after this, a scripted follow-up telephone call was made to those who had still not responded. This not only reminded non-respondents to complete the survey, but also allowed the researchers to uncover reasons for non-response. Consent to participate was inferred by the completion and return of the questionnaire.

Data analysis

Analysis involved descriptive statistics expressed as proportions of respondents, with mean (standard deviation) values calculated for some parameters. Associations were explored using the Chi-squared test. The statistical analysis package STATA v11.0 was used (StataCorp, USA) [18].

Results

From the university CE database and returned lists from clinical site contacts, 292 CEs were identified, with each being sent a copy of the questionnaire. Three were returned undelivered, and during telephone follow-up a further eleven were identified as undeliverable due to the educator being on maternity leave (n=4) or undefined long-term leave (n=2), retired (n=1), or having left employment at the site (n=4). Fifteen additional potential participants were excluded as they did not currently act as CEs. One educator had been identified twice as she worked part-time at two sites. This resulted in a final list of 262 potential participants. A total of 211 completed questionnaires were returned, yielding a response rate of 81% (211/262).

Respondents were CEs primarily based in the state of New South Wales but also located in three other states and territories in Australia, including metropolitan, regional, rural and remote settings. They supervised students from more than 10 universities from 5 of the 6 Australian states and territories in which pre-professional courses are offered. Demographic information for all respondents is shown in Tables 1 and 2. The majority of respondents were female (146/211, 69%), and had no post-professional qualifications (167/211, 79%). Eighty percent (169/211) worked in hospitals, 12% (26/211) in the community, 10% (21/211) in private practice, and 5% (10/211) in aged care facilities. Eighty-five percent (180/211) of respondents supervised students from other universities in addition to the University of Newcastle (range 1-10 other universities, mean [SD] 2.6 [1.32]).

Awareness and knowledge of CPRs

Forty-eight percent (102/211) of respondents had never heard of CPRs and a further 25% (52/211) had never used CPRs (together comprising 'non-users'), leaving 27% (57/211) as 'users' of CPRs. The non-users answered no further questions about CPRs.

Users of CPRs were significantly more likely to be male (χ^2= 17.45, p<0.001), have post-professional qualifications (χ^2=5.44, p=0.020), work in private practice (χ^2= 14.40, p<0.001), and work in musculoskeletal physiotherapy (χ^2=15.85, p<0.001) (Table 1). There were no significant differences between users and non-users of CPRs in age, years of practice, level of pre-professional qualification, state or country of pre-professional qualification, or state/territory of work.

From the table of 30 CPRs listed (Table 3), all CPRs were known by at least two users, with 21 of the 30 known by at least 23% (13/57) of the users. Ninety-five percent (54/57) of users recognised at least one of the CPRs listed, 63% (36/57) recognised at least five, and 42% (24/57) recognised at least 10 on the list. One educator was familiar with all 30 CPRs and another recognised all but one [19]. The most commonly known CPRs were for identification of injuries to the ankle and foot and the need for an X-ray (37/57, 65%)[20], identification of deep venous thrombosis (DVT) (33/57, 58%)[21], and for identification of injuries to the knee and the need for an X-ray (29/57, 51%)[22]. Fourteen percent (8/57) of users were able to nominate a total of a further 11 CPRs not on the list.

When asked to name any CPRs they knew, by citing their author(s) or geographical origin, only 49% (28/57) of users could do so, the most common being the Ottawa

Ankle Rule (21/57, 37%)[20], the Ottawa Knee Rule (11/57, 19%)[22], and Wells' Rule for DVT (6/57, 11%)[21]. A total of 21 CPRs were named, though most users could only name one or two. Only 14% (8/57) could name three or more, with one able to name ten CPRs.

Clinical use and teaching of CPRs

Eighty-four percent (48/57) of CPR users applied at least one CPR of those listed in their clinical practice, 42% (24/57) used at least five, and 26% (15/57) used at least ten on the list. Two educators (4%) used 20 or more. Sixty-seven percent (38/57) of CPR users taught at least one of the listed CPRs to students, 28% (16/57) taught at least five, and 16% (9/57) taught at least ten on the list, with one CE teaching 22 of them. Of the CPRs most commonly known, used and taught, the three most common, and seven of the ten most common had been validated, while the ten least known, used and taught had not been validated.

The most common reasons for using CPRs were to assist with diagnosis (31/57, 54%), prognosis (24/57, 42%), or intervention (18/57, 32%); 67% (38/57) of users stated one or more of these reasons. Another common reason for using CPRs was to streamline the assessment procedure (18/57, 32%), while 19% (11/57) used CPRs because they are seen as being reflective of current best practice. The most common reasons for not using CPRs more often were a preference for using standard clinical reasoning processes rather than a 'formula' (24/57, 42%), lack of knowledge about CPRs generally (14/57, 25%), and a lack of awareness of CPRs available in their area of clinical practice (13/57, 23%); 70% (40/57) reported one or more of these reasons.

Twenty-one percent (12/57) of CPR users never mentioned them to students, and a further 30% (17/57) rarely told students about CPRs; only 12% (7/57) were 'often'

encouraging students to use CPRs. The most common reasons for not teaching CPRs more often were a lack of familiarity with or knowledge of CPRs – 63% (36/57) reported one or both of these – followed by a desire to encourage students to practice their clinical reasoning rather than using a 'formula' (24/57, 42%). The most common reasons for teaching CPRs were to assist with diagnosis (21/57, 37%), prognosis (18/57, 32%), or intervention (18/57, 32%), with 53% (30/57) teaching them for one or more of these purposes. CPRs were also taught to improve the students' EBP (19/57, 33%), and because they were perceived as reflective of current best practice (14/57, 25%).

Relationship between CPRs and clinical reasoning

Of the CEs that used CPRs, 53% (30/57) reported they used them to aid with their own clinical reasoning. Additionally, 39% (22/57) of CPR users also reported teaching CPRs to students in order to help with the development of students' clinical reasoning skills, and 32% (18/57) taught students how CPRs may help with decision-making in the clinical setting. In addition, 60% (34/57) of users believed CPRs assisted the development of clinical reasoning skills, while only 12% (7/57) believed CPRs hindered skill development in clinical reasoning. When asked if they favoured or opposed the teaching of CPRs to students, 51% (29/57) were in support and 40% (23/57) had no preference. Only 9% (5/57) were opposed to the teaching of CPRs.

Participants were also asked if they had ever employed a CPR, but then consciously proceeded contrary to the clinical decision indicated by the CPR, i.e., by deciding on an alternate diagnosis, prognosis or intervention. Two-thirds (38/57, 67%) of users had deviated from the clinical direction indicated by a CPR.

Discussion

This survey explored the experiences and perceptions of physiotherapy CEs regarding the use of CPRs, and reveals that few are using the tools in their practice and even fewer are teaching them to the students they supervise.

The high response rate (81%) [14] captures a substantial proportion of CEs affiliated with the University of Newcastle. Based on registrant data from the Physiotherapy Board of Australia [23], respondents were representative of physiotherapists registered to practice in Australia, although proportions in age are lower in the under-26 years, as might be expected amongst a population of CEs compared to physiotherapists in general. Years of experience as CEs showed similar proportions to those found in a study of perceptions of clinical education models in Australia [24]. Moreover, with 85% of respondents supervising students from other universities (as well as the University of Newcastle), the sample is arguably broadly representative of CEs in Australia.

CEs most likely to be using and teaching CPRs were male, have post-professional qualifications, and/or were in private practice, yet more than half of all surveyed educators (53%) did not fit these demographics. Furthermore, the 12% of users who reported 'often' encouraging the use of CPRs by students represented only 3% of all respondents. Given these figures, most students are unlikely to be learning about CPRs whilst on clinical placement.

Awareness and knowledge of CPRs

The results demonstrate that knowledge of CPRs amongst physiotherapy CEs is relatively poor, with nearly half (48%) of respondents having never heard of them. There was also some confusion expressed in returned questionnaires about what constituted a CPR, with some respondents indicating they use various methods of clinical decision-making and suggesting they might be using CPRs without knowing

the term. Amongst those reporting using CPRs, 37% had only heard of a handful (less than five) of derived CPRs, and half (51%) could not name a CPR.

Clinical use and teaching of CPRs

Usage of CPRs amongst physiotherapy CEs is also very modest, with about half (48%) of those who had heard of CPRs not using them. A majority of users of CPRs were only using a few CPRs, with 58% using fewer than five. Some expressed the view that there were few available for their area of practice, but this may be due to a lack of awareness rather than availability: 57% of CPR users ventured a lack of knowledge or awareness as a reason for not using CPRs more often. Users of CPRs were significantly more likely to work in musculoskeletal physiotherapy, which may be a reflection of there being more CPRs available in this field relevant to physiotherapy practice [13], but is likely also a result of physiotherapists having a more diagnostic role in this than in other fields of practice.

Even amongst those who used CPRs, half (51%) were rarely if ever teaching them to students, and 78% were teaching fewer than five CPRs. Comments by respondents reflected a negative perception or perhaps erroneous understanding about CPRs, such as not wanting students to follow a ‘recipe’, or that the use of CPRs would ‘foster technician-based practice’. However there were also positive comments about their value in enhancing clinical accuracy. A balanced view was expressed by one respondent; CPRs “should be an adjunct to clinical reasoning, not replace it”.

Those CEs teaching CPRs to students did so not only for aiding decisions regarding diagnosis, prognosis and intervention, but also for the wider aims of improving students’ awareness and use of EBP and because CPRs represent current best practice. The primary reason many CEs were not teaching CPRs to students was a lack of awareness or knowledge. The CPRs most commonly known, used and taught

were found to be more likely to be those that had been validated, suggesting that CEs were aware of the stages of development of CPRs and had more confidence in utilising those that had been validated.

Relationship between CPRs and clinical reasoning

Two-thirds of users indicated they had at times deviated from the clinical decision indicated by a CPR, with varying reasons cited such as preferring to "depend on clinical reasoning" and the complexity of "patients with multiple comorbidities". Thus a majority of CPR users were utilising them as an adjunct to assessment and management, perhaps to guide, but not direct, their own clinical reasoning. CPRs were often taught to assist with the development of students' clinical reasoning skills, with most user CEs (81%) believing CPRs aided the improvement of clinical decision-making skills. The greater use of CPRs by musculoskeletal physiotherapists possibly relates to the need for clinicians in this field to commonly apply a hypothetico-deductive approach to clinical reasoning [25], and requiring tools to aid in the decision-making process that reduce risk of error by being evidence-based.

Limitations

Although the overall response rate was high, 73% (154/211) of respondents were non-users of CPRs: consequently only 57 respondents answered subsequent questions about the use and teaching of CPRs. The recruitment process restricted participants to one university database, however this still resulted in recruitment of CEs from across half (four) of Australian states and territories. These CEs supervised students from 53% (10/19) of universities in most (five of the six) states and territories offering physiotherapy courses in Australia.

Future research

Future surveys could explore CE views and experiences internationally to determine possible variations in CE responses in different countries. Future studies might also survey physiotherapy students to ascertain their exposure to CPRs whilst on clinical placement and associated perceptions in order to determine their knowledge and understanding of the use of CPRs. Another potential line of research could investigate clinicians who know about CPRs but choose not to utilise them, and exploring their reasons for doing so.

Conclusion

This study found that many CEs were unaware of CPRs, and many others were not using them. CEs using CPRs generally utilised them as a tool to assist their clinical practice and decision-making and that of their students, although many only used a few specific CPRs. As a result, pre-professional students are being exposed to few, if any, CPRs in the clinical setting.

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Table 1
Demographic and educational characteristics of survey respondents. All data are expressed as a number (percentage) unless otherwise indicated.

	Study participants (n=211)	CPR users (n=57)	CPR non-users (n=154)	Profession demographics [23]
Gender				
Male	65 (31)	30 (53)	35 (23)	6937 (30)
Female	146 (69)	27 (47)	119 (77)	16198 (70)
Age (years)				
25 & under	6 (3)	3 (5)	3 (2)	2566 (10)
26-30	54 (26)	16 (28)	38 (25)	4954 (20)
31-40	72 (34)	18 (32)	54 (35)	7082 (29)
41+	78 (37)	19 (33)	59 (38)	9891 (40)
Missing data	1 (0)	1 (2)	0 (0)	
Pre-professional physiotherapy qualification				
Diploma	16 (8)	4 (7)	12 (8)	
Post-graduate diploma	6 (3)	2 (4)	4 (3)	
Bachelor degree	179 (85)	49 (86)	130 (84)	
Masters degree	9 (4)	1 (2)	8 (5)	
Missing data	1 (0)	1 (2)	0 (0)	
State or country of pre-professional qualification				
New South Wales	145 (69)	42 (74)	103 (67)	
Australian Capital Territory	3 (1)	0 (0)	3 (2)	
Victoria	12 (6)	2 (4)	10 (6)	
Queensland	10 (5)	2 (4)	8 (5)	
South Australia	7 (3)	2 (4)	5 (3)	
Western Australia	3 (1)	1 (2)	2 (1)	
New Zealand	4 (2)	3 (5)	1 (1)	
United Kingdom	18 (9)	2 (4)	16 (10)	
Other country	8 (4)	2 (4)	6 (4)	
Missing data	1 (0)	1 (2)	0 (0)	
Post-professional qualification	44 (21)	18 (32)	26 (17)	
No post-professional qualification	167 (79)	39 (68)	128 (83)	
Years of practice				
< 2	0 (0)	0 (0)	0 (0)	
2-5	28 (13)	9 (16)	19 (12)	
6-10	69 (33)	18 (32)	51 (33)	
11-15	39 (18)	9 (16)	30 (19)	
16-20	23 (11)	5 (9)	18 (12)	
> 20	50 (24)	15 (26)	35 (23)	
Missing data	2 (1)	1 (2)	1 (1)	
Mean number of years (SD)	14.4 (7.5)	14.0 (8.9)	14.5 (9.1)	

CPR=clinical prediction rule; SD=standard deviation

Table 2
Employment and clinical education characteristics of survey respondents. All data are expressed as a number (percentage) unless otherwise indicated.

	Study participants (n=211)	CPR users (n=57)	CPR non-users (n=154)	Profession demographics
State or territory of work				
New South Wales	189 (90)	54 (95)	135 (88)	7131 (29) [23]
Australian Capital Territory	16 (8)	0 (0)	16 (10)	460 (2) [23]
Tasmania	5 (2)	2 (4)	3 (2)	398 (2) [23]
Northern Territory	1 (0)	1 (2)	0 (0)	153 (1) [23]
Type of facility *				
Tertiary teaching hospital	89 (42)	25 (44)	64 (42)	
Secondary referral hospital	52 (25)	11 (19)	41 (27)	
Primary health facility, community hospital	28 (13)	5 (9)	23 (15)	
Community centre and/or home visits	26 (12)	6 (11)	20 (13)	
Private practice – 1-3 physiotherapists	12 (6)	8 (14)	4 (3)	
Private practice – 4 or more physiotherapists	9 (4)	5 (9)	4 (3)	
Aged care facility	10 (5)	2 (4)	8 (5)	
Not-for-profit organisation	1 (0)	1 (2)	0 (0)	
Area of practice *				
Musculoskeletal	70 (33)	31 (54)	39 (25)	
Orthopaedics	45 (21)	13 (23)	32 (21)	
Acute/cardiorespiratory	45 (21)	11 (19)	34 (22)	
General inpatient	40 (19)	8 (14)	32 (21)	
Neurological	34 (16)	8 (14)	26 (17)	
Rehabilitation	55 (26)	7 (12)	48 (31)	
Community	40 (19)	9 (16)	31 (20)	
Paediatrics	19 (9)	5 (9)	14 (9)	
Aged care	12 (6)	0 (0)	12 (8)	
Women's health	4 (2)	1 (2)	3 (2)	
Hand therapy	2 (1)	1 (2)	1 (1)	
Lymphoedema	2 (1)	0 (0)	2 (1)	
Burns	1 (0)	1 (2)	0 (0)	
Chronic pain	1 (0)	0 (0)	1 (1)	
Mental health	1 (0)	0 (0)	1 (1)	
Intellectual disability	1 (0)	1 (2)	0 (0)	
Clinical educator experience (years)				
< 2	32 (15)	11 (19)	21 (14)	45 (13) [24]
2-5	79 (37)	19 (33)	60 (39)	134 (39) [24]
> 5	93 (44)	26 (46)	67 (44)	163 (48) [24]
Missing data	7 (3)	1 (2)	6 (4)	1 (0) [24]
Mean (SD)	6.4 (5.4)	6.2 (5.1)	6.5 (5.5)	
Other universities supervised				
0	27 (13)	10 (18)	17 (11)	
1	38 (18)	6 (11)	31 (20)	
2	63 (30)	13 (23)	50 (32)	
3	45 (21)	14 (25)	31 (20)	
4	21 (10)	10 (18)	10 (6)	
5	10 (5)	3 (5)	7 (5)	
6 or more	3 (1)	0 (0)	3 (2)	

Missing data	4 (2)	1 (2)	5 (3)
Number of students supervised per year			
Mean (SD)	6.8 (5.4)	7.7 (7.7)	6.5 (8.1)

* Multiple answers possible so may add up to more than 100%
CPR=clinical prediction rule; SD=standard deviation

Table 3
Knowledge, use and teaching of Clinical Prediction Rules (CPR) by purpose (n=57). All data are expressed as a number (percentage) unless otherwise indicated.

Purpose of Clinical Prediction Rule	Know of	Use in practice	Teach to students
Identification of injuries to ankle and foot (need for X-ray).[20]	37 (65)	29 (51)	23 (40)
Identification of deep venous thrombosis.[21]	33 (58)	23 (40)	18 (32)
Identification of injuries to knee (need for X-ray).[22]	29 (51)	24 (42)	17 (30)
Low back pain, diagnosis of sacroiliac joint problem.[26]	27 (47)	20 (35)	16 (28)
Assessment of seriousness of injury to cervical spine (need for X-ray).[27]	25 (44)	17 (30)	11 (19)
Whiplash-associated disorders, and at risk of developing chronic symptoms.[28]	24 (42)	12 (21)	7 (12)
Diagnosis of rotator cuff tear.[29, 30]	23 (40)	14 (25)	10 (18)
Patellofemoral pain, and likely to benefit from patellar taping.[31]	22 (39)	16 (28)	10 (18)
Risk of osteoporosis.[32-35]	22 (39)	12 (21)	10 (18)
Low back pain, diagnosis of spinal stenosis.[36]	21 (37)	14 (25)	10 (18)
Low back pain, and likely to benefit from lumbar stabilisation exercises.[37]	20 (35)	14 (25)	11 (19)
Diagnosis of carpal tunnel syndrome.[38]	19 (33)	12 (21)	9 (16)
Diagnosis of subacromial impingement.[29]	18 (32)	13 (23)	9 (16)
Low back pain, and likely to respond to spinal manipulation.[39, 40]	18 (32)	8 (14)	4 (7)
Neck pain likely to be cervical radiculopathy.[41]	17 (30)	11 (19)	8 (14)
Assessment of seriousness of head injury (need for CT scan).[42-44]	16 (28)	9 (16)	6 (11)
Patellofemoral pain, and likely to benefit from orthotics.[45, 46]	14 (25)	11 (19)	6 (11)
Diagnosis of osteoarthritis of the hip.[47, 48]	14 (25)	9 (16)	6 (11)
Diagnosis of osteoarthritis of the knee.[49]	14 (25)	8 (14)	5 (9)
Diagnosis of pulmonary embolism.[50, 51]	14 (25)	6 (11)	5 (9)
Treatment of lateral epicondylalgia with MWMs (Mobilisations With Movement) and exercise.[52]	13 (23)	6 (11)	4 (7)
Low back pain, and likely to respond to mechanical traction.[53, 54]	11 (19)	5 (9)	4 (7)
Neck pain, and likely to benefit from thoracic spine manipulation.[55]	10 (18)	5 (9)	3 (5)
Shoulder pain, and likely to benefit from cervico-thoracic manipulation.[56]	8 (14)	4 (7)	2 (4)
Headache, likely to respond to trigger point therapy.[57]	6 (11)	5 (9)	5 (9)
Risk of peripheral neuropathy.[58]	6 (11)	4 (7)	4 (7)
Neck pain, and likely to benefit from cervical traction.[59]	6 (11)	3 (5)	2 (4)
Neck pain, and likely to benefit from cervical spine manipulation.[60]	5 (9)	2 (4)	2 (4)
Patellofemoral pain, and likely to benefit from lumbar spine manipulation.[61]	5 (9)	2 (4)	1 (2)
Treatment of temporomandibular joint pain with splint.[19]	2 (4)	0 (0)	0 (0)
Other CPRs for any condition except low back pain	7 (12)	5 (9)	4 (7)
Other CPRs for low back pain.	5 (9)	5 (9)	5 (9)
None of the above	3 (5)	3 (5)	3 (5)
Mean (SD) number of CPRs per user	9.0 (7.6)	5.8 (5.9)	4.2 (5.5)

SD=standard deviation