Title.

Physiotherapy Students' Perceptions And Experiences Of Clinical Prediction Rules

Author names and affiliations.

Authors:

Grahame M Knox [a, b]

Physiotherapist in Charge, Kempsey District Hospital

BAppSc(Phty), PGCertHlthServMgt

Grahame.Knox@newcastle.edu.au

Suzanne J Snodgrass [a]

Associate Professor, School of Health Sciences

BSc(PhysTher), MMedSc(Physio), PhD

Suzanne.Snodgrass@newcastle.edu.au

Tasha R Stanton [c]

National Health & Medical Research Council Early Career Research Fellow

BScPT, MScRS(Physio), PhD

Tasha.stanton@unisa.edu.au

David H Kelly [d]

Lecturer, Physiotherapy, Melbourne School of Health Sciences, Faculty MDHS

BSc, BAppSc(Phty), MEd, MManipPhysio, DClinPhysio

d.kelly@unimelb.edu.au

Bill Vicenzino [e]

Professor of Sports Physiotherapy, School of Health and Rehabilitation Sciences: Physiotherapy

BPhty, GradDipSportsPhty, MSc, PhD

b.vicenzino@uq.edu.au

Benedict M Wand [f]

Professor, School of Physiotherapy

BAppSc(Phty), GradDip(ExSpSc), MAppSc(ManipPhty), PhD

benedict.wand@nd.edu.au

Darren A Rivett [a]

Professor of Physiotherapy

BAppSc(Phty), GradDipManipTher, MAppSc(ManipPhty), PhD

Darren.Rivett@newcastle.edu.au

Postal addresses for each author:

[a] School of Health Sciences, Faculty of Health and Medicine, The University of Newcastle, University Dr, Callaghan, NSW 2308, Australia

[b] Physiotherapy Department, Kempsey District Hospital, River Street, Kempsey, NSW 2440, Australia

[c] School of Health Sciences, The University of South Australia, GPO Box 2471, Adelaide, SA 5001, Australia; and Neuroscience Research Australia, Hospital Road, Sydney, NSW 2031, Australia

[d] Physiotherapy, Melbourne School of Health Sciences, The University of Melbourne, Alan Gilbert Building, 16 Barry Street, Carlton, VIC 3053, Australia

[e] Physiotherapy, School of Health and Rehabilitation Sciences, St Lucia Campus, The University of Queensland, St Lucia, QLD 4072, Australia

[f] **School of Physiotherapy, The University of Notre Dame Australia, Mouat St, Fremantle, WA 6959, Australia**

Corresponding author.

Grahame Knox

Physiotherapist in Charge,

Physiotherapy Department,

Kempsey District Hospital,

River Street,

Kempsey, NSW 2440, Australia

T +61 2 6562 0294

F +61 2 6562 0349

Grahame.Knox@newcastle.edu.au

Abstract

Objectives: Clinical reasoning can be difficult to teach to pre-professional physiotherapy students due to their lack of clinical experience. It may be that tools such as clinical prediction rules (CPRs) could aid the process, but there has been little investigation into their use in physiotherapy clinical education. This study aimed to determine the perceptions and experiences of physiotherapy students regarding CPRs, and whether they are learning about CPRs on clinical placement.

Design: Cross-sectional survey using a paper-based questionnaire.

Participants: Final year pre-professional physiotherapy students (*n*=371, response rate 77%) from five universities across five states of Australia.

Results: Sixty percent of respondents had not heard of CPRs, and a further 19% had not clinically used CPRs. Only 21% reported using CPRs, and of these nearly three-quarters were rarely, if ever, learning about CPRs in the clinical setting. However most of those who used CPRs (78%) believed CPRs assisted in the development of clinical reasoning skills and none (0%) was opposed to the teaching of CPRs to students. The CPRs most commonly recognised and used by students were those for determining the need for an X-ray following injuries to the ankle and foot (67%), and for identifying deep venous thrombosis (63%).

Conclusions: The large majority of students in this sample knew little, if anything, about CPRs and few had learned about, experienced or practiced them on clinical placement. However, students who were aware of CPRs found them helpful for their clinical reasoning and were in favour of learning more about them.

Introduction

Clinical reasoning refers to the thinking and decision-making processes undertaken by the practitioner in collaboration with their patients [1]. Goals and health management strategies are jointly decided based on clinical data, patient choices, practitioner judgment and knowledge [2]. It is a fundamental skill that underpins physiotherapy assessment and management, yet it is challenging to teach to pre-professional physiotherapy students who have minimal clinical experience. It can be difficult for students to learn and develop clinical reasoning skills, so teaching a more formalised and mechanical structure for clinical decision-making may make it easier for students to achieve competency in clinical reasoning [3, 4]. Various tools and strategies have been developed to assist with clinical reasoning: one example of this gaining prominence in the physiotherapy literature is the clinical prediction rule (CPR) [5, 6].

A CPR is a tool derived to facilitate clinical decision-making, being used to either establish a diagnosis, formulate a prognosis, or propose an optimal treatment approach [7]. CPRs do this by combining relevant clinical variables to give a numeric probability of a condition or an outcome [8, 9]. Although there are many CPRs that can be applied in physiotherapy clinical practice, preliminary evidence is emerging that CPRs are underutilised by physiotherapists, who are either unaware of them [10] or reluctant to use them [5, 11].

The extent to which physiotherapists are exposed to CPRs as pre-professional students is unknown. Of the five universities involved in this study, one does not formally teach anything about CPRs in its curriculum, while the other four introduce only a few basic concepts with specific examples of CPRs. A study by our research team found that most physiotherapy clinical educators in Australia were not teaching

CPRs [10], so a comprehensive evaluation of physiotherapy students across Australia would be valuable in order to ascertain how much they know about CPRs. It may be beneficial to teach students a general understanding of CPRs as an aid to learning clinical reasoning, and exposing students to the application of CPRs in the clinic is consistent with an evidence-based approach to physiotherapy learning and practice. Furthermore, if students can be better educated about CPR usage it may help alleviate the fears of some clinical educators that CPRs promote a recipe-based approach to clinical practice [10].

Accordingly the aims of this study were to (1) investigate the understanding, extent and nature of the clinical use of CPRs among final year pre-professional physiotherapy students across Australia; and (2) explore the influence of CPRs on students' learning of clinical reasoning and associated implications in the context of evidence-based practice (EBP).

Methodology

The study involved a cross-sectional survey of final year pre-professional physiotherapy students in Australia using a paper-based questionnaire.

Survey instrument

Development of the questionnaire began with a review of the literature related to CPRs, including those available and relevant to physiotherapy practice. The draft questionnaire was then provided to five academic experts who had published in peer-reviewed international scientific journals on the use of CPRs in physiotherapy. Each expert was asked to comment on the content and face validity of the questionnaire.

All five experts provided feedback on the appropriateness, clarity, comprehensiveness and validity of the questionnaire.

The draft questionnaire was next piloted with a sample of convenience of eight recent physiotherapy graduates within 12 months of finishing their pre-professional qualification. They were asked to complete the draft questionnaire individually, and to provide feedback on clarity of questions and ease of completion, as well as indicating the approximate time taken to complete the survey. Following incorporation of their feedback, the questionnaire was finalised.

The 8-page questionnaire was comprised predominantly of closed-ended questions; any open-ended questions requested specific information that enabled categorisation and quantitative analysis of data. There were three sections. The first section (8 questions) examined students' knowledge and use of CPRs in the clinical setting, why they use them, why they do not use them more frequently, whether they may deviate from the clinical path indicated by a CPR if used, and how they accessed information on CPRs. The second section (8 questions) asked about students' exposure to CPRs with their clinical educators in the clinical setting. Students were asked whether they learned about CPRs from clinical educators and what they learned, their views on being taught CPRs by clinical educators, and whether they considered using CPRs affected the growth of their clinical reasoning skills. The second section also included a table of 30 CPRs (3 prognostic, 14 diagnostic and 13 interventional), chosen as being relevant to physiotherapy practice [12], and listed by their intended purpose: students were asked to indicate which of these they were familiar with, and which they had actually used on clinical placement. Respondents were also asked to nominate any CPRs they knew by name, such as by citing the geographical origin or author. The third and final section (5 questions) asked for

simple demographic information, including the type of clinical settings attended for placements.

Sampling and recruitment

Final-year physiotherapy students were surveyed from four undergraduate and three graduate pre-professional programs, with cohort sizes ranging from 21 to 151 students, across five universities in five Australian states. All university programs were accredited, and required students to meet a national set of educational standards mandated by the Australian Physiotherapy Council [13].

Specific methods of recruitment varied at the different universities, but included any or all of the following: flyers placed on physical and/or electronic noticeboards notifying students of the study, and emails sent to final year physiotherapy students via their student email accounts with a copy of the flyer and an Information Statement for Participants. Subsequently, at each university one of the researchers attended a lecture where all or most final-year students were expected to attend, and questionnaires were distributed along with a copy of the Information Statement for Participants. The purpose of the study was explained, and students were invited to either complete the survey then or take it with them to complete later. All completed questionnaires were collected in a drop-off box at each university. No identification was attached to the questionnaires so student anonymity was maintained.

Data analysis

Using the statistical analysis package STATA v11.0 (StataCorp, USA) [14], analysis was comprised of descriptive statistics presented as proportions of respondents, with mean (standard deviation) and range values determined for some parameters. Associations between responses to selected questions were investigated using the

Chi-squared test. Data were checked for normality and non-parametric statistics were used when appropriate.

Results

Across the five universities there were 484 students in final-year programs. A total of 371 completed questionnaires were returned, resulting in a response rate of 77% (371/484). Respondent demographic information is shown in Table 1. The majority of respondents were female (234/371, 63%), and were aged 20-23 years (253/371, 68%). All but one student had attended a clinical placement in a hospital and 56% (209/371) had attended a private practice placement. Nearly two-thirds (238/371, 64%) had completed placements in all three major clinical areas (musculoskeletal/orthopaedics, cardiorespiratory, and neurological) [13] while almost all respondents (338/371, 91%) had attended placements in at least two of these areas. Nearly half (173/371, 47%) had also completed placements in more specialised areas such as paediatrics and women's health.

Awareness and knowledge of CPRs

Sixty percent (222/371) of respondents had not heard of CPRs, with a further 19% (70/371) having never used CPRs (together constituting the 'non-users'), resulting in 21% (79/371) as CPR 'users'. The non-users were not required to answer any further questions about CPRs. No significant differences were found between users and non-users of CPRs in age, gender, type of facility attended or area of practice experienced on clinical placement.

Of the 30 CPRs listed in Table 2, all were known by at least four users, with 20 of the CPRs recognised by more than a quarter (20/79) of the users. Ninety-two percent

(73/79) of users knew at least one CPR on the list, 66% (52/79) knew at least five, and 38% (30/79) knew at least 10 of the CPRs listed. One student recognised all 30 and another three students were familiar with all but two of the CPRs. The median number of CPRs known to student users was 6, with an inter-quartile range (IQR) of 3-12. The CPRs most commonly known by student users were those for determining the need for an X-ray following injuries to the ankle and foot (53/79, 67%) [15], and for identifying deep venous thrombosis (DVT) (50/79, 63%) [16]. Two users were familiar with an additional two CPRs for other purposes not on the list. Thirty-eight percent (30/79) of users were able to name CPRs they knew, mostly the Ottawa Ankle Rule (28/79, 35%) [15] and the Ottawa Knee Rule (16/79, 20%) [17], with only two students able to specifically name another CPR.

Use of and learning about CPRs on clinical placement

Sixty-eight percent (54/79) of users had employed at least one CPR from the list of 30 while on clinical placement, 30% (24/79) had used at least five, and 13% (10/79) had applied at least ten of those listed. The greatest number used by any student was 19 and the median number used by students was two (IQR 0-6). The most commonly used CPRs were for identification of DVT (32/79, 41%) [16], and for determining the need for an X-ray following injuries to the ankle and foot (30/79, 38%) [15].

The most common reasons reported by students for using CPRs, and for not using them more often, are listed in Table 3, along with reasons for wanting to learn about them and perceptions about why students don't learn about CPRs more often. Even though 72% (57/79) of users of CPRs said they considered their clinical educators as a source of information on CPRs whilst on clinical placement, 80% (63/79) reported that educators were either not using CPRs or not teaching them, suggesting that a relatively small proportion of all clinical educators are actually teaching CPRs. Figure

1 shows how often students reported learning about CPRs whilst on clinical placement. Participants were also asked if they advocated the teaching of CPRs to students, with 80% (63/79) in favour and 20% (16/79) expressing no preference; none was opposed to the teaching of CPRs.

Relationship between CPRs and clinical reasoning

The most common single reason stated by students for using CPRs was to assist with their clinical reasoning (59/79, 75%) (Table 3). In addition, 61% (48/79) of student users said they wanted to learn about CPRs to help with the development of clinical reasoning skills (Table 3), and 27% (21/79) had learned on clinical placement how CPRs can help with clinical reasoning. The majority of users (62/79, 78%) believed CPRs aided skill development in clinical reasoning, while less than 4% (3/79) believed CPRs impeded the learning of clinical reasoning. When asked if they had ever considered a CPR but had proceeded contrary to the clinical direction indicated, that is by deciding on an alternate diagnosis, prognosis or intervention, 46% (36/79) of users responded they had deviated from the clinical decision suggested by the CPR.

Discussion

This survey investigated the perceptions and experiences of pre-professional physiotherapy students in Australia regarding their use of CPRs, and reveals that many have never heard of CPRs and many more are not using them. Those students who had used them reported that they were learning little about CPRs from their clinical educators. The 27% of student users who reported they were ‘sometimes’ or ‘always’ learning about CPRs whilst on clinical placement (Figure 1) represent less than 6% of total respondents, and so most students are unlikely to be taught CPRs in

194 the clinical setting, supporting the findings of our survey of physiotherapy clinical
195 educators [10]. Arguably if students have such a poor understanding of CPRs or are
196 using them inappropriately, it highlights the need for better education regarding EBP
197 (including CPRs) in the classroom and in the clinic.
198
199 The response rate of 77% captures a substantial proportion of final-year students at
200 the universities surveyed. These are broadly representative of physiotherapy
201 programs in Australia as the sample included respondents from both undergraduate
202 and graduate pre-professional programs, a range of cohort sizes, universities located
203 in municipalities of different sizes and across all major states in Australia offering
204 physiotherapy education.
205
206 **Student understanding of CPRs**
207 The results indicate that physiotherapy students' knowledge of CPRs is surprisingly
208 limited, with 60% of respondents having never heard of them. Comments indicated
209 confusion about the term 'Clinical Prediction Rules', with some students unable to
210 differentiate between them and standard clinical reasoning or outcome measures,
211 with two respondents saying "I don't exactly know how Clinical Prediction Rules differ
212 to (sic) clinical reasoning" and "I feel that they might be outcome measures". Overall,
213 knowledge of CPRs was limited, with few students recognising or able to name a
214 CPR. Indeed, only a handful of students reported a wide exposure to many CPRs,
215 and only two students could name a CPR other than the Ottawa Ankle and Knee
216 Rules. This might be concerning given several studies [18-20] have suggested that
217 lack of awareness or understanding of a CPR is a major barrier to its utilisation.
218
219 Even though the term 'Clinical Prediction Rule' was defined at the start of the survey,
220 including variations of the terminology used, several student respondents indicated
221 they had not used CPRs and then made comments suggesting they actually may

have been exposed to CPRs but had a limited understanding. For example, one respondent stated: “I have had experience with some of the statements in the ‘Purpose of clinical prediction rule’ table but have never heard it called Clinical Prediction Rule”. Thus some respondents categorised as being non-users may in fact have been users, albeit unknowingly.

Student experience with CPRs on clinical placement

Use of CPRs by physiotherapy students on placement was also low (only 21% of respondents); even amongst those who had heard of CPRs nearly half (47%) had never used them. Most CPR users were only using a few, with 70% using fewer than five. The most common reasons for this were students not knowing enough about CPRs or not using them often enough (81%) and a perceived lack of use or knowledge about CPRs by clinical educators (80%). This is consistent with a recent survey of physiotherapy clinical educators [10], which found that a large proportion of educators knew little about CPRs and so were unlikely to be teaching them to students on clinical placement.

A CPR should undergo three stages of development (derivation, validation, impact analysis) [9, 21], with progression through each of these stages leading to growing confidence in the clinical utility of the tool (see Table 2). The two CPRs that students were most familiar with had progressed to the impact analysis (final) stage of development. Six of the eight CPRs most commonly known and used by students had been validated (second stage) The finding that students were more likely to know of and use CPRs that had undergone impact analysis, or at least been validated, possibly suggests they may have learned about the stages of development of CPRs and perhaps had more confidence in employing those that had progressed beyond the derivation stage. It may also indicate that their clinical educators were more likely to teach and encourage the use of validated CPRs, or that CPRs that had

been validated were more likely to have been incorporated into clinical practice and teaching.

Students used CPRs, and wanted to learn about them, for multiple reasons. Each CPR is designed and developed to aid with determining either a diagnosis, an outcome, or an ideal intervention [7], and a large proportion (84%) of student users were employing CPRs for one or more of these purposes (Table 3). One student said that CPRs were a “useful guide” that helped overcome their lack of experience. The large majority (80%) favoured the teaching of CPRs to students and not one user respondent was opposed, suggesting that the barriers to student use of CPRs relates more to a lack of knowledge rather than a lack of confidence in these tools [5, 20, 22].

Student perceptions about CPRs and clinical reasoning

While studies may indicate that physiotherapists rely less on research-based evidence than on other sources of information for treatment selection [62], practitioners do in the main have a positive attitude towards learning and clinically implementing EBP [63, 64]. EBP can play a significant role in all aspects of broader patient management – consisting of Examination, Evaluation (including clinical reasoning), Diagnosis, Prognosis, Intervention and Outcomes – by evaluating procedures utilising the analytical tests of sensitivity, specificity and likelihood ratios [65], and which inform the development of CPRs [12]. Students generally felt positive about the relationship between CPRs and clinical reasoning, with three-quarters using CPRs specifically to assist with their clinical reasoning, and more than half believing CPRs aided the development of clinical reasoning skills. Interestingly, comments such as CPRs were “an option, not to replace clinical reasoning” indicated that CPRs were indeed recognised as simply an aid and not a prescription. Consistent with this interpretation, nearly half of the users stated they had proceeded

in a differing direction to the clinical decision suggested by a CPR, citing reasons such as “more complex issues” and “other clinical indicators which contraindicated the findings of the CPR”. This suggests that students often use them to guide, rather than direct, their clinical reasoning.

Limitations

Although the response rate was high amongst potential respondents, 79% (292/371) of respondents were non-users of CPRs; thus only 79 respondents were able to answer subsequent questions about the use and learning of CPRs. Furthermore, it is possible that some non-users had actually used a CPR but were unfamiliar with the term.

The study was limited to five universities in Australia, although these were across five states. The majority of respondents were in undergraduate programs, which is the most common professional pathway in Australia. Professional pathways differ internationally, and it is unknown whether the knowledge or use of CPRs would be different for students completing their pre-professional physiotherapy qualification through varied pathways in other countries.

Future research

Students reported that many clinical educators were not teaching them about CPRs in the clinic and that exposure to CPRs in the classroom by academics was also limited. Future research could therefore potentially develop and evaluate an educational package aimed at assisting physiotherapy clinical educators and possibly academics in using and teaching these tools in the context of evidence-based practice.

Conclusion

This study found that the minority of physiotherapy students who knew about CPRs recognised them as useful for many reasons including as an aid to their clinical reasoning, and expressed that they wished to learn more about them. However the majority of students were unaware of CPRs or were not getting the opportunity to use them or learn about them on clinical placement.

Ethical Approval: Ethical approval for the study was granted by the Human Research Ethics Committees at The University of Newcastle (No. H-2012-0192), The University of South Australia (No. 0000031945), The University of Queensland (No. 2013001154), The University of Melbourne (No. 1341376) and The University of Notre Dame Australia (No. 014035F).

Funding: Nil

Conflict of Interest: None

References

[1] Smith M, Ajjawi R, Jones M. Clinical reasoning in physiotherapy. In: Higgs J, Smith M, Webb G, Skinner M, Croker A, eds. Contexts of Physiotherapy, 1st ed, Sydney: Elsevier; 2009, p. 102-14.

[2] Higgs J, Jones M. Clinical reasoning in the health professions. In: Higgs J, Jones M, eds. Clinical Reasoning in the Health Professions, 2nd ed, Oxford: Butterworth-Heinemann; 2000, p. 3-14.

[3] Edwards I, Jones M, Carr J, Braunack-Mayer A, Jensen GM. Clinical reasoning strategies in physical therapy. Phys Ther. 2004;84:312-30; discussion 31-5.

[4] Jones MA, Rivett DA. Introduction to clinical reasoning. In: Jones MA, Rivett DA, eds. Clinical Reasoning For Manual Therapists, Edinburgh: Butterworth Heinemann; 2004, p. 3–24.

[5] Haskins R, Osmotherly PG, Southgate E, Rivett DA. Physiotherapists' knowledge, attitudes and practices regarding clinical prediction rules for low back pain. Man Ther. 2014;19:142-51.

[6] Learman K, Showalter C, Cook C. Does the use of a prescriptive clinical prediction rule increase the likelihood of applying inappropriate treatments? A survey using clinical vignettes. Man Ther. 2012;17:538-43.

[7] Childs JD, Cleland JA. Development and application of clinical prediction rules to improve decision making in physical therapist practice. Phys Ther. 2006;86:122-31.

[8] Laupacis A, Sekar N, Stiell IG. Clinical prediction rules. A review and suggested modifications of methodological standards. JAMA. 1997;277:488-94.

[9] Beattie PF, Nelson RM. Clinical prediction rules: what are they and what do they tell us? Aust J Physiother. 2006;52:157-63.

[10] Knox GM, Snodgrass SJ, Rivett DA. Physiotherapy clinical educators' perceptions and experiences of clinical prediction rules. Physiotherapy. 2015;101:364-72. doi: 10.1016/j.physio.2015.03.001.

[11] Haskins R, Rivett DA, Osmotherly PG. Clinical prediction rules in the physiotherapy management of low back pain: a systematic review. Man Ther. 2012;17:9-21.

[12] Glynn PE, Weisbach PC. Clinical Prediction Rules: A Physical Therapy Reference Manual. Sudbury, MA: Jones & Bartlett Publishers 2011.

[13] Australian Physiotherapy Council. Accreditation Of Entry-Level Physiotherapy Programs Guide For Education Providers. 2015 [cited; Available from: http://www.physiocouncil.com.au/accreditation/AccreditationGuide15052014.pdf

[14] StataCorp. STATA Statistical Software. 11 ed. College Station, Texas 77845 USA 2009.

[15] Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Worthington JR. A study to develop clinical decision rules for the use of radiography in acute ankle injuries. Ann Emerg Med. 1992;21:384-90.

[16] Wells PS, Hirsh J, Anderson DR, Lensing AW, Foster G, Kearon C, et al. A simple clinical model for the diagnosis of deep-vein thrombosis combined with impedance plethysmography: potential for an improvement in the diagnostic process. J Intern Med. 1998;243:15-23.

[17] Stiell IG, Greenberg GH, Wells GA, McKnight RD, Cwinn AA, Cacciotti T, et al. Derivation of a decision rule for the use of radiography in acute knee injuries. Ann Emerg Med. 1995;26:405-13.

[18] Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud PAC, et al. Why don't physicians follow clinical practice guidelines?: A framework for improvement. JAMA. 1999;282:1458-65.

[19] Eagles D, Stiell IG, Clement CM, Brehaut J, Taljaard M, Kelly AM, et al. International survey of emergency physicians' awareness and use of the Canadian Cervical-Spine Rule and the Canadian Computed Tomography Head Rule. Acad Emerg Med. 2008;15:1256-61.
[20] Graham ID, Stiell IG, Laupacis A, McAuley L, Howell M, Clancy M, et al. Awareness and use of the Ottawa ankle and knee rules in 5 countries: can publication alone be enough to change practice? Ann Emerg Med. 2001;37:259–66.
[21] McGinn TG, Guyatt GH, Wyer PC, Naylor CD, Stiell IG, Richardson WS, et al. Users' guides to the medical literature: XXII: how to use articles about clinical decision rules. JAMA. 2000;284:79-84.
[22] Stiell IG, Brehaut J, Clement CM, Grimshaw J, Graham I, Brison R, et al. Perceived barriers to the implementation of the Canadian C-Spine Rule and the Canadian CT Head Rule. CJEM. 2006;8:206-7.
[23] Haskins R, Osmotherly PG, Rivett DA. Diagnostic clinical prediction rules for specific subtypes of low back pain: a systematic review. J Orthop Sports Phys Ther. 2015;45:61-76, A1-4.
[24] Keogh C, Wallace E, O'Brien KK, Galvin R, Smith SM, Lewis C, et al. Developing an international register of clinical prediction rules for use in primary care: a descriptive analysis. Ann Fam Med. 2014;12:359-66.
[25] Park HB, Yokota A, Gill HS, El Rassi G, McFarland EG. Diagnostic accuracy of clinical tests for the different degrees of subacromial impingement syndrome. J Bone Joint Surg Am. 2005;87:1446-55.
[26] Cadarette SM, Jaglal SB, Kreiger N, McIsaac WJ, Darlington GA, Tu JV. Development and validation of the Osteoporosis Risk Assessment Instrument to facilitate selection of women for bone densitometry. CMAJ. 2000;162:1289-94.
[27] Lydick E, Cook K, Turpin J, Melton M, Stine R, Byrnes C. Development and validation of a simple questionnaire to facilitate identification of women likely to have low bone density. Am J Manag Care. 1998;4:37-48.
[28] Koh LKH, Ben Sedrine W, Torralba TP, Kung A, Fujiwara S, Chan SP, et al. A simple tool to identify asian women at increased risk of osteoporosis. Osteoporos Int. 2001;12:699-705.
[29] Shepherd AJ, Cass AR, Carlson CA, Ray L. Development and internal validation of the male osteoporosis risk estimation score. Ann Fam Med. 2007;5:540-6.
[30] Lesher JD, Sutlive TG, Miller GA, Chine NJ, Garber MB, Wainner RS. Development of a clinical prediction rule for classifying patients with patellofemoral pain syndrome who respond to patellar taping. J Orthop Sports Phys Ther. 2006;36:854-66.
[31] Litaker D, Pioro M, El Bilbeisi H, Brems J. Returning to the bedside: using the history and physical examination to identify rotator cuff tears. J Am Geriatr Soc. 2000;48:1633-7.
[32] Laslett M, Aprill CN, McDonald B, Young SB. Diagnosis of sacroiliac joint pain: validity of individual provocation tests and composites of tests. Man Ther. 2005;10:207-18.
[33] Vicenzino B, Smith D, Cleland J, Bisset L. Development of a clinical prediction rule to identify initial responders to mobilisation with movement and exercise for lateral epicondylalgia. Man Ther. 2009;14:550-4.
[34] Fritz JM, Lindsay W, Matheson JW, Brennan GP, Hunter SJ, Moffit SD, et al. Is there a subgroup of patients with low back pain likely to benefit from mechanical traction? Results of a randomized clinical trial and subgrouping analysis. Spine. 2007;32:E793-E800.

[35] Cai C, Pua YH, Lim KC. A clinical prediction rule for classifying patients with low back pain who demonstrate short-term improvement with mechanical lumbar traction. Eur Spine J. 2009;18:554-61.
[36] Wainner RS, Fritz JM, Irrgang JJ, Delitto A, Allison S, Boninger ML. Development of a clinical prediction rule for the diagnosis of carpal tunnel syndrome. Arch Phys Med Rehabil. 2005;86:609-18.
[37] Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. Accid Ana Prev. 2002;34:531-9.
[38] Flynn T, Fritz J, Whitman J, Wainner RS, Magel J, Rendeiro D, et al. A clinical prediction rule for classifying patients with low back pain who demonstrate short-term improvement with spinal manipulation. Spine. 2002;27:2835-43.
[39] Fritz JM, Whitman JM, Flynn TW, Wainner RS, Childs JD. Factors related to the inability of individuals with low back pain to improve with a spinal manipulation. Phys Ther. 2004;84:173–90.
[40] Stiell IG, Wells GA, Vandemheen KL, Clement CM, Lesiuk H, De Maio VJ, et al. The Canadian C-spine rule for radiography in alert and stable trauma patients. JAMA. 2001;286:1841-8.
[41] Vicenzino B, Collins N, Cleland J, McPoil T. A clinical prediction rule for identifying patients with patellofemoral pain who are likely to benefit from foot orthoses: a preliminary determination. Br J Sports Med. 2010;44:862-6.
[42] Sutlive TG, Mitchell SD, Maxfield SN, McLean CL, Neumann JC, Swiecki CR, et al. Identification of individuals with patellofemoral pain whose symptoms improved after a combined program of foot orthosis use and modified activity: a preliminary investigation. Phys Ther. 2004;84:49-61.
[43] Altman R, Asch E, Bloch D, Bole G, Borenstein D, Brandt K, et al. Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee. Arthritis Rheum. 1986;29:1039-49.
[44] Sugioka T, Hayashino Y, Konno S, Kikuchi S, Fukuhara S. Predictive value of self-reported patient information for the identification of lumbar spinal stenosis. Fam Pract. 2008;25:237-44.
[45] Wainner RS, Fritz JM, Irrgang JJ, Boninger ML, Delitto A, Allison S. Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for cervical radiculopathy. Spine. 2003;28:52-62.
[46] Hicks GE, Fritz JM, Delitto A, McGill SM. Preliminary development of a clinical prediction rule for determining which patients with low back pain will respond to a stabilization exercise program. Arch Phys Med Rehabil. 2005;86:1753-62.
[47] Wells PS, Anderson DR, Rodger M, Ginsberg JS, Kearon C, Gent M, et al. Derivation of a simple clinical model to categorize patients probability of pulmonary embolism: increasing the models utility with the SimpliRED D-dimer. Thromb Haemost. 2000;83:416-20.
[48] Le Gal G, Righini M, Roy PM, Sanchez O, Aujesky D, Bounameaux H, et al. Prediction of pulmonary embolism in the emergency department: the revised Geneva score. Ann Intern Med. 2006;144:165-71.
[49] Richardson JK. The clinical identification of peripheral neuropathy among older persons. Arch Phys Med Rehabil. 2002;83:1553-8.
[50] Altman R, Alarcón G, Appelrouth D, Bloch D, Borenstein D, Brandt K, et al. The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hip. Arthritis Rheum. 1991;34:505-14.
[51] Sutlive TG, Lopez HP, Schnitker DE, Yawn SE, Halle RJ, Mansfield LT, et al. Development of a clinical prediction rule for diagnosing hip osteoarthritis in individuals with unilateral hip pain. J Orthop Sports Phys Ther. 2008;38:542-50.

[52] Stiell IG, Wells GA, Vandemheen K, Clement C, Lesiuk H, Laupacis A, et al. The Canadian CT Head Rule for patients with minor head injury. Lancet. 2001;357:1391-6.
[53] Mower WR, Hoffman JR, Herbert M, Wolfson AB, Pollack CV, Jr., Zucker MI, et al. Developing a decision instrument to guide computed tomographic imaging of blunt head injury patients. J Trauma. 2005;59:954-9.
[54] Haydel MJ, Preston CA, Mills TJ, Luber S, Blaudeau E, DeBlieux PM. Indications for computed tomography in patients with minor head injury. N Engl J Med. 2000;343:100-5.
[55] Raney NH, Petersen EJ, Smith TA, Cowan JE, Rendeiro DG, Deyle GD, et al. Development of a clinical prediction rule to identify patients with neck pain likely to benefit from cervical traction and exercise. Eur Spine J. 2009;18:382-91.
[56] Fernandez-de-las-Penas C, Cleland JA, Cuadrado ML, Pareja JA. Predictor variables for identifying patients with chronic tension-type headache who are likely to achieve short-term success with muscle trigger point therapy. Cephalalgia. 2008;28:264-75.
[57] Iverson CA, Sutlive TG, Crowell MS, Morrell RL, Perkins MW, Garber MB, et al. Lumbopelvic manipulation for the treatment of patients with patellofemoral pain syndrome: development of a clinical prediction rule. J Orthop Sports Phys Ther. 2008;38:297-309; discussion -12.
[58] Tseng Y-L, Wang WTJ, Chen W-Y, Hou T-J, Chen T-C, Lieu F-K. Predictors for the immediate responders to cervical manipulation in patients with neck pain. Man Ther. 2006;11:306-15.
[59] Mintken PE, Cleland JA, Carpenter KJ, Bieniek ML, Keirns M, Whitman JM. Some factors predict successful short-term outcomes in individuals with shoulder pain receiving cervicothoracic manipulation: a single-arm trial. Phys Ther. 2010;90:26-42.
[60] Cleland JA, Childs JD, Fritz JM, Whitman JM, Eberhart SL. Development of a clinical prediction rule for guiding treatment of a subgroup of patients with neck pain: use of thoracic spine manipulation, exercise, and patient education. Phys Ther. 2007;87:9-23.
[61] Emshoff R, Rudisch A. Likelihood ratio methodology to identify predictors of treatment outcome in temporomandibular joint arthralgia patients. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008;106:525-33.
[62] Turner P, Whitfield TWA. Physiotherapists' use of evidence based practice: a cross-national study. Physiother Res Int. 1997;2:17-29.
[63] Jette DU, Bacon K, Batty C, Carlson M, Ferland A, Hemingway RD, Hill JC, Ogilvie L, Volk D. Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. Phys Ther. 2003;83:786-805.
[64] Iles R, Davidson M. Evidence based practice: a survey of physiotherapists' current practice. Physiother Res Int. 2006; 11:93-103.
[65] Fritz JM, Wainner RS. Examining diagnostic tests: and evidence-based perspective. Phys Ther. 2001;81:1546-64.

Part 1 Awareness and Use of Clinical Prediction Rules

Question 1:

At the present time, which statement best describes your knowledge of Clinical Prediction Rules? *Check one only*.

☐ I have never previously heard of Clinical Prediction Rules and know nothing about them.
↳ GO TO QUESTION 17

☐ I have heard of Clinical Prediction Rules but know little or nothing about them (e.g. educators, other hospital or university staff, or other students may have mentioned them).
↳ GO TO QUESTION 2

☐ I know something of Clinical Prediction Rules (e.g. I have read about them, discussed them with educators). → GO TO QUESTION 2

☐ I know a lot about Clinical Prediction Rules (e.g. I am interested in them, I have some understanding of their basis, use, application). → GO TO QUESTION 2

Question 2:

At the present time, which statement best describes your use of Clinical Prediction Rules? *Check one only.*

☐ I have never used Clinical Prediction Rules. → GO TO QUESTION 17

☐ I rarely use Clinical Prediction Rules (e.g. perhaps only when the educator suggests it).
↳ GO TO QUESTION 3

☐ I use Clinical Prediction Rules sometimes (e.g. I use them whenever it occurs to me, or there are a few that I use regularly with certain conditions). → GO TO QUESTION 3

☐ I use Clinical Prediction Rules often (e.g. I am always thinking how they might apply with any patient). → GO TO QUESTION 4

Question 3:

Why don't you use Clinical Prediction Rules more often? *Check all that apply.*

☐ I do not know enough about them to be able to use them.

☐ I have not had enough practice with their use to be able to apply them.

☐ I do not know how they apply to the patients I have treated on clinical placement.

☐ I prefer to practise my own clinical reasoning rather than a "formula".

☐ They are rarely indicated in clinical practice.

☐ I think they are too time-consuming to apply.

☐ I do not think the research supports their use.

☐ Most of them have not been validated.

☐ Others. *Please specify*: _____

Question 4:

Why do you use Clinical Prediction Rules? *Check all that apply.*

- ☐ To assist with my clinical reasoning.
- ☐ To replace my clinical reasoning when it seems indicated.
- ☐ To streamline assessment procedures.
- ☐ To assist with diagnosis, e.g. so I can be more confident about what I'm dealing with.
- ☐ To assist with prognosis, e.g. so I can give patients an indication of their likely clinical outcome.
- ☐ To assist with choosing an intervention.
- ☐ To make interventions more effective.
- ☐ I think they are an efficient use of my time.
- ☐ They are reflective of current best practice.
- ☐ Others. *Please specify*: _____

_____

_____

_____

Question 5:

How do you feel about Clinical Prediction Rules? *Check all that apply.*

- ☐ I think they are easy to learn.
- ☐ I think they are easy to remember.
- ☐ I think they are easy to use.
- ☐ I do not believe they are useful.
- ☐ I think their value is exaggerated.
- ☐ I think they are difficult to learn.
- ☐ I think they are difficult to remember.
- ☐ I think they are difficult to use.
- ☐ Others. *Please specify*: _____

_____

_____

_____

Question 6:

Have you ever calculated a Clinical Prediction Rule, and then proceeded contrary to the Rule's direction, i.e. decided on an alternate diagnosis, prognosis or intervention? ***Check one box with each type of rule.***

Type of Rule	Often	Occasionally	Rarely	Never
Diagnostic				
Prognostic				
Intervention				

If so, why did you not consistently follow the Clinical Prediction Rule? _____

_____

_____

Question 7:

What are your sources of information about Clinical Prediction Rules? ***Check all that apply.***

- ☐ From educators while on clinical placement.
- ☐ From lecturers/tutors at university.
- ☐ Independent study.
- ☐ Journal articles.
- ☐ Books.
- ☐ Indirectly when researching a topic (e.g. online).
- ☐ From other students who recommend or mention them.
- ☐ Others. *Please specify*: _____

_____

Question 8:

How do you access Clinical Prediction Rules in the clinical setting? ***Check all that apply.***

- ☐ From memory.
- ☐ From educators.
- ☐ From applications downloaded onto electronic devices (iPhone, Blackberry, etc.).
- ☐ Journals/articles on hand.
- ☐ Journals/articles online.

☐ Books at hand.

☐ Laminated cards detailing one or more CPRs.

☐ Tables etc., printed out by the educator or other staff & available at the clinical placement.

☐ Self-formulated tables, references, etc., printed out by myself.

☐ Tables, references, etc. available on computer at the clinical placement.

☐ Self-formulated tables, references, etc. saved on personal computer.

☐ Others. *Please specify*: _____

Part 2 Use of Clinical Prediction Rules with Educators

Question 9:

At the present time, which statement best describes your learning of Clinical Prediction Rules while treating patients in a clinical setting under the supervision of educators? *Check one only*.

☐ I have never learnt about Clinical Prediction Rules on clinical placement.

☐ I rarely learn about Clinical Prediction Rules on clinical placement (e.g. occasionally, maybe if the educator uses it).

☐ I sometimes learn about Clinical Prediction Rules (e.g. some educators seem to use them more often than others).

☐ I am always learning from educators about Clinical Prediction Rules and how I might apply them. → QUESTION 10 OPTIONAL, OTHERWISE GO TO QUESTION 11

Question 10:

Why do you think you haven't learnt about Clinical Prediction Rules more often while on clinical placement? *Check all that apply.*

☐ The educators don't seem to use them.

☐ I think they are too time-consuming to learn.

☐ I think they are too time-consuming to apply.

☐ The research does not support their use.

☐ Educators don't know enough about them to be able to teach them to students.

☐ Educators prefer that we practice our clinical reasoning rather than using a formula.

☐ I don't think they assist student learning.

☐ Others. *Please specify*: _____

_____

Question 11:

Why do you think students should learn about Clinical Prediction Rules on clinical placement? *Check all that apply.*

- ☐ I don't think we should.
- ☐ They are reflective of current best practice.
- ☐ To help with developing my clinical reasoning.
- ☐ To streamline assessment procedures.
- ☐ To assist me with making a diagnosis.
- ☐ To assist me with making a prognosis.
- ☐ To assist me with choosing an intervention.
- ☐ To make my interventions more effective.
- ☐ To improve my evidence-based practice.
- ☐ They assist student learning.
- ☐ I find that I am able to apply them effectively.
- ☐ Others. *Please specify*: _____

Question 12:

What do you learn about Clinical Prediction Rules from educators? *Check all that apply.*

- ☐ I do not learn about Clinical Prediction Rules.
- ☐ I learn specific Clinical Prediction Rules.
- ☐ I learn how I might apply Clinical Prediction Rules, in a general sense.
- ☐ I learn about the development of Clinical Prediction Rules, e.g. with relevant journal articles.
- ☐ I learn how to decide when and when not to use Clinical Prediction Rules.
- ☐ I learn how Clinical Prediction Rules can help with clinical reasoning.
- ☐ Others. *Please specify*: _____

Question 13:

Do you favour or oppose the teaching of Clinical Prediction Rules to students? *Check one only*.

Strongly favour	Slightly favour	No preference	Slightly oppose	Strongly oppose
☐	☐	☐	☐	☐

Comments: _____

Question 14:

How do you feel about Clinical Prediction Rules with respect to your learning of clinical reasoning? *Check one only*.

☐ Clinical Prediction Rules can help the learning of clinical reasoning.

☐ Clinical Prediction Rules have no effect on learning clinical reasoning.

☐ Clinical Prediction Rules hinder the learning and/or development of clinical reasoning.

☐ I don't know whether Clinical Prediction Rules affect the learning of clinical reasoning.

Comments: _____

Question 15:

Please indicate which Clinical Prediction Rules you know of, and which you have actually used on your own clinical placements, for the following purposes? *Check all that apply, otherwise leave blank.*

Purpose of Clinical Prediction Rule	Know of	Used on placement
Identification of deep venous thrombosis		
Diagnosis of pulmonary embolism.		
Risk of osteoporosis.		
Risk of peripheral neuropathy.		
Low back pain, diagnosis of spinal stenosis.		
Low back pain, diagnosis of sacroiliac joint problem.		
Low back pain, and likely to respond to spinal manipulation.		
Low back pain, and likely to respond to mechanical traction.		
Low back pain, and likely to benefit from lumbar stabilisation exercises.		
Other for low back pain. Please specify:		
Assessment of seriousness of Head Injury (need for CT Scan).		
Assessment of seriousness of injury to Cervical Spine (need for X-Ray).		
Neck pain likely to be cervical radiculopathy.		
Neck pain, and likely to benefit from cervical traction.		
Neck pain, and likely to benefit from cervical spine manipulation.		
Neck pain, and likely to benefit from thoracic spine manipulation.		
Whiplash-associated disorders, and at risk of developing chronic symptoms.		
Headache, likely to respond to trigger point therapy.		
Treatment of temperomandibular joint pain with splint.		
Diagnosis of subacromial impingement.		
Diagnosis of rotator cuff tear.		
Shoulder pain, and likely to benefit from cervico-thoracic manipulation.		
Treatment of lateral epicondylalgia with MWMs (Mobilisations with Movement) and exercise.		
Diagnosis of carpal tunnel syndrome.		
Diagnosis of osteoarthritis of the hip.		
Diagnosis of osteoarthritis of the knee.		

Purpose of Clinical Prediction Rule	Know of	Used on placement
Patellofemoral pain, and likely to benefit from lumbar spine manipulation.		
Patellofemoral pain, and likely to benefit from patellar taping.		
Patellofemoral pain, and likely to benefit from orthotics.		
Identification of injuries to knee (need for X-Ray).		
Identification of injuries to ankle & foot (need for X-Ray).		
Others. *Please list and/or describe by intent, effect, etc.*:		

Question 16:

Do you know any Clinical Prediction Rules by name? If so please list e.g. by author, origin:

_____

_____

_____

_____

<u>Part 3 Some Information About You</u>

Question 17:

Your gender?

☐ Male ☐ Female

Question 18:

Your age? _____

Question 19:

In what type of facility have you had clinical placements? *Check all that apply.*

☐ Tertiary teaching hospital

☐ Secondary referral hospital

☐ Primary health facility, community hospital

☐ Community centre and/or home visits

☐ Private practice – small, 1-3 physiotherapists

☐ Private practice – large, 4 or more physiotherapists, with or without multiple sites

☐ Other. *Please specify*: _____

Question 20:

In what areas have you had clinical placements? *Check all that apply.*

- ☐ Musculoskeletal (e.g. outpatients, private practice)
- ☐ Orthopaedics (e.g. wards, outpatients, emergency department)
- ☐ Acute/Cardio-respiratory
- ☐ General inpatient
- ☐ Neurological
- ☐ Rehabilitation
- ☐ Community
- ☐ Specialist (e.g. Paediatrics, Women's health, Hand Therapy) *Please specify*: _____

  _____
- ☐ Other. *Please specify*: _____

Question 21:

Have you had any clinical placements other than in the state in which you study?

- ☐ Interstate *Please specify*: _____

  _____

  _____
- ☐ Overseas *Please specify*: _____

  _____

Please feel free to write below any further comments or thoughts you may have on Clinical Prediction Rules, your use of them, or their applicability to clinical reasoning:

_____

_____

_____

_____

_____

_____

_____

THANK YOU FOR YOUR TIME IN COMPLETING THIS SURVEY

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

	Study participants (n=371)	CPR users (n=79)	CPR non-users (n=292)
Gender			
Male	136 (37)	30 (38)	106 (36)
Female	234 (63)	48 (61)	186 (64)
Missing data	1 (0)	1 (1)	0 (0)
Age (years)			
Mean (SD)	23.2 (3.1)	23.5 (2.9)	23.1 (3.2)
Range	20-45	20-33	20-45
Type of facility attended for clinical placements *			
Tertiary teaching hospital	277 (75)	61 (77)	216 (74)
Secondary referral hospital	141 (38)	33 (42)	108 (37)
Primary health facility, community hospital	212 (57)	34 (43)	178 (61)
Community centre and/or home visits	172 (46)	30 (38)	142 (49)
Private practice – 1-3 physiotherapists	117 (32)	18 (23)	99 (34)
Private practice – 4 or more physiotherapists	115 (31)	24 (30)	91 (31)
Special school/Paediatric centre	13 (4)	1 (1)	12 (4)
University clinic	6 (2)	1 (1)	5 (2)
Aged care facility	5 (1)	0 (0)	5 (2)
Area of practice experienced on clinical placements *			
Musculoskeletal	339 (91)	66 (84)	273 (93)
Orthopaedics	241 (65)	44 (56)	197 (67)
Acute/cardiorespiratory	325 (88)	66 (84)	259 (89)
General inpatient	185 (50)	35 (44)	150 (51)
Neurological	266 (72)	50 (63)	216 (74)
Rehabilitation	263 (71)	42 (53)	221 (76)
Community	158 (43)	28 (35)	130 (45)
Paediatrics	124 (33)	14 (18)	110 (38)
Women's health	30 (8)	3 (4)	27 (9)
Aged care	7 (2)	1 (1)	6 (2)
Amputees	6 (2)	2 (3)	4 (1)
Cancer/palliative care	5 (1)	0 (0)	5 (2)
Mental health	4 (1)	1 (1)	3 (1)
Lymphoedema	3 (1)	0 (0)	3 (1)
Hand therapy	2 (1)	1 (1)	1 (0)
Spinal cord injuries	2 (1)	0 (0)	2 (1)
Burns	1 (0)	0 (0)	1 (0)
Chronic pain	1 (0)	1 (1)	0 (0)
Sports injuries	1 (0)	0 (0)	1 (0)
Animal	1 (0)	0 (0)	1 (0)

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

Table 2
Knowledge and use by student users (n=79) of CPRs listed by purpose and in order of best known to least known. All data are expressed as a number (percentage) unless otherwise indicated

Purpose of Clinical Prediction Rule	Know of	Used on placement	Stage of Development [12, 23, 24]
Identification of injuries to ankle & foot (need for X-Ray) [15]	53 (67)	30 (38)	Impact analysis
Identification of deep venous thrombosis [16]	50 (63)	32 (41)	Impact analysis
Diagnosis of subacromial impingement [25]	38 (48)	16 (20)	Derivation
Risk of osteoporosis [26-29]	38 (48)	11 (14)	Validation
Identification of injuries to knee (need for X-Ray) [17]	37 (47)	18 (23)	Impact analysis
Patellofemoral pain, and likely to benefit from patellar taping [30]	34 (43)	19 (24)	Derivation
Diagnosis of rotator cuff tear [25, 31]	30 (38)	16 (20)	Validation
Low back pain, diagnosis of sacroiliac joint problem [32]	29 (37)	15 (19)	Validation
Treatment of lateral epicondylalgia with MWMs (Mobilisations with Movement) and exercise [33]	29 (37)	12 (15)	Derivation
Low back pain, and likely to respond to mechanical traction [34, 35]	26 (33)	5 (6)	Derivation
Diagnosis of carpal tunnel syndrome [36]	25 (32)	10 (13)	Derivation
Whiplash-associated disorders, and at risk of developing chronic symptoms [37]	25 (32)	4 (5)	Derivation
Low back pain, and likely to respond to spinal manipulation [38, 39]	24 (30)	6 (8)	Validation
Assessment of seriousness of injury to Cervical Spine (need for X-Ray) [40]	24 (30)	2 (3)	Impact analysis
Patellofemoral pain, and likely to benefit from orthotics [41, 42]	23 (29)	10 (13)	Derivation
Diagnosis of osteoarthritis of the knee [43]	23 (29)	9 (11)	Validation
Low back pain, diagnosis of spinal stenosis [44]	23 (29)	8 (10)	Validation
Neck pain likely to be cervical radiculopathy [45]	23 (29)	6 (8)	Derivation
Low back pain, and likely to benefit from lumbar stabilisation exercises [46]	22 (28)	12 (15)	Validation
Diagnosis of pulmonary embolism [47, 48]	20 (25)	4 (5)	Impact analysis
Risk of peripheral neuropathy [49]	15 (19)	7 (9)	Derivation
Diagnosis of osteoarthritis of the hip [50, 51]	15 (19)	4 (5)	Validation
Assessment of seriousness of Head Injury (need for CT Scan) [52-54]	15 (19)	2 (3)	Impact analysis
Neck pain, and likely to benefit from cervical traction [55]	14 (18)	3 (4)	Derivation
Headache, likely to respond to trigger point therapy [56]	12 (15)	3 (4)	Derivation
Patellofemoral pain, and likely to benefit from lumbar spine manipulation [57]	12 (15)	3 (4)	Derivation
Neck pain, and likely to benefit from cervical spine manipulation [58]	12 (15)	2 (3)	Derivation
Shoulder pain, and likely to benefit from cervico-thoracic manipulation [59]	11 (14)	2 (3)	Derivation
Neck pain, and likely to benefit from thoracic spine manipulation [60]	11 (14)	1 (1)	Validation
Treatment of temperomandibular joint pain with	4 (5)	0 (0)	Derivation

splint [61]		
Other CPRs for any condition except low back pain	2 (3)	1 (1)
Other CPRs for low back pain	0 (0)	0 (0)
Nil	6 (8)	25 (31)
Median (IQR) number of CPRs per user	6 (3-12)	2 (0-6)

CPR=clinical prediction rule; IQR=inter-quartile range

Table 3
Most common reasons reported by student users of CPRs (n=79) for using and learning about CPRs. All data are expressed as a number (percentage)

Why do you use CPRs?	
Assist with making a diagnosis	52 (66)
Assist with making a prognosis	26 (33)
Assist with choosing an intervention	33 (42)
Make interventions more effective	13 (16)
One or more of the above four reasons	66 (84)
Assist with clinical reasoning	59 (75)
Streamline assessment procedures	28 (35)
Because they are reflective of current best practice	14 (18)
Why don't you use CPRs more often?	
Lack of practice with their use	47 (59)
Lack of knowledge about their use	45 (57)
One or both of these reasons	64 (81)
Why do you think you haven't learnt about CPRs more often while on clinical placement?	
Educators don't seem to use them	54 (68)
Educators don't know enough about them to be able to teach them to students	24 (30)
One or both of the above two reasons	63 (80)
Educators prefer that students practice standard clinical reasoning rather than using a formula	34 (43)
Why do you think students should learn about CPRs on clinical placement?	
Assist with making a diagnosis	55 (70)
Assist with making a prognosis	38 (48)
Assist with choosing an intervention	46 (58)
Make interventions more effective	20 (25)
One or more of the above four reasons	67 (85)
Help with developing clinical reasoning	48 (61)
Streamline assessment procedures	31 (39)
Improve use of evidence-based practice	23 (29)
Because they are reflective of current best practice	21 (27)
Assist student learning	16 (20)

CPR=clinical prediction rule

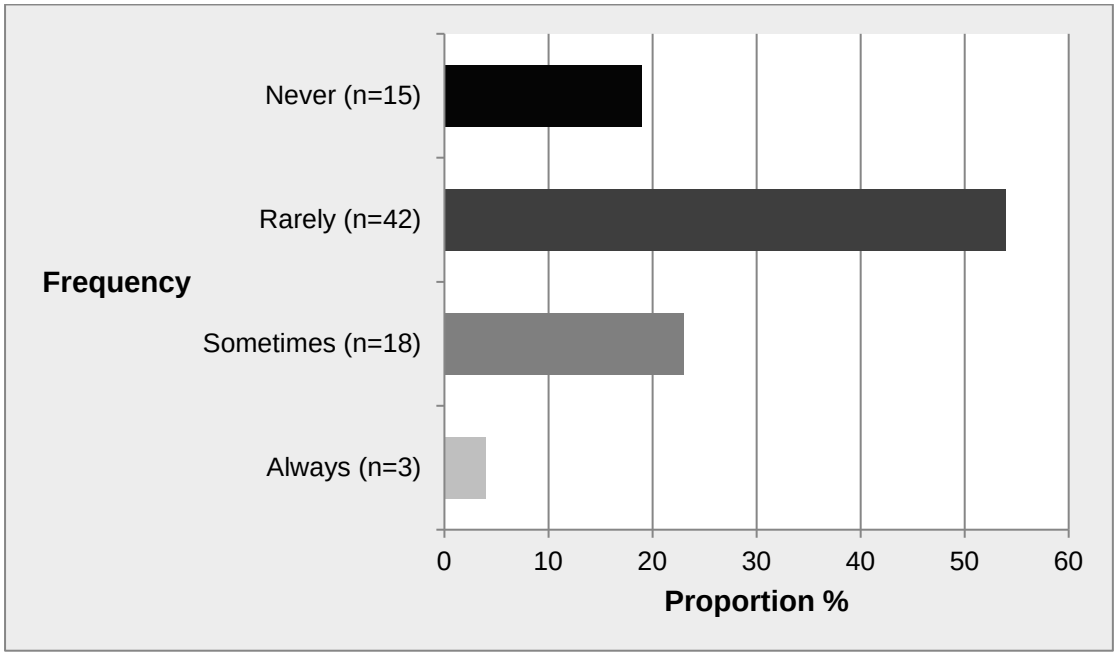

Figure 1. Proportions of student users who reported learning about CPRs whilst on clinical placement.