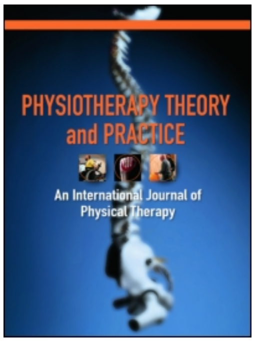

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Adoption of a research-based program for neck disorders implemented in primary care physiotherapy: a short- and long-term follow-up survey study

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ABSTRACT

Neck disorders are common in primary health care (PHC) physiotherapy. A neck-specific exercise program based on research findings was implemented among physiotherapists in Swedish PHC. The aim of the study was to evaluate the adoption of the program. We invited PHC physiotherapists to an educational session including theoretical information and practical training. Before the educational session the participants (n = 261) completed a baseline questionnaire. After 3 and 12 months, we distributed surveys to identify changes in practice and in confidence regarding diagnosis and treatment. We compared data from 3-months and 12-months follow-up, respectively, with baseline data. Self-reported frequency of most of the included assessment methods was unchanged after 12 months. Frequency of assessment of neck proprioception had increased significantly. Specific neck muscle exercise for treatment of whiplash associated disorders was applied more frequently after 3 and after 12 months than at baseline. Frequency of other treatment methods remained unchanged. Confidence in diagnosis and treatment increased significantly, particularly among women. The program was not adopted as expected, but resulted in increased confidence regarding diagnosis and treatment. The provision of a short educational session seemed not to be sufficient to obtain a sustained change in practice.

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Education; implementation; neck disorders; physiotherapy; primary health care

Introduction

One of the largest diagnostic groups in primary health care (PHC) in Sweden is people presenting with neck disorders (Global Burden of Disease Study 2013Collaborators, 2015). This puts high demands on General Practitioners but also on physiotherapists to be up-dated and confident in their diagnosis and treatment skills. Research shows that physiotherapists in Sweden to a high extent use interventions that are not supported by evidence (Bernhardsson et al, 2015), and there is a general need for continuing education regarding evidence-based methods (Fysioterapeuterna, 2015). Occasionally, education concerning evidence-based treatment of people with chronic neck disorders is offered, but the extent to which the new methods are implemented and adopted in practice is seldom evaluated. In general, there is a paucity of studies evaluating the adoption of evidence-based practices in physiotherapy.

The translation of new methods from research to clinical practice is considered a difficult and unpredictable process (Brownson, Colditz, and Proctor, 2012; Grol, Wensing, Eccles, and Davis, 2013). It has been suggested that implementation success depends on the nature of the evidence, the context or environment in which the proposed change is to be implemented, and the method by which the change is facilitated (Harvey and Kitson, 2016; Rycroft-Malone et al, 2002). A well-documented, effective implementation strategy is the provision of educational sessions, and in particular, educational sessions containing interactive components (Forsetlund et al, 2009; Nutley, Walter, and Davies, 2007).

Regarding the treatment of neck disorders, there is a growing evidence base for the application of exercise guided by physiotherapists (Gross et al, 2015; Jull, Falla, Vicenzino, and Hodges, 2009; Page, 2011; Rebbeck, 2017; Ylinen et al, 2003). Specific exercises for deep neck muscles are proven effective for people with long-term non-specific neck disorders (Ylinen et al, 2003). For mechanical neck disorders and radiculopathy, moderate evidence supports combined cervical and shoulder strengthening exercises (Gross et al, 2015).

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An important neck disorder subgroup consists of people who have experienced a whiplash trauma. Half of the individuals who experience a whiplash trauma develop chronic whiplash-associated disorders (WAD) (Carroll et al, 2008). Some of the most frequent symptoms of chronic WAD are neck pain, headache, dizziness, and radiculopathy (Bunketorp and Elisson, 2012; Poorbaugh, Brismée, Phelps, and Sizer, 2008), and WAD is also associated with altered neck muscle function (Jull, Kristjansson, and Dall'Alba, 2004; Landén Ludvigsson et al, 2016b; Peterson et al., 2015a, 2016; Schomacher, Farina, Lindstroem, and Falla, 2012; Woodhouse, Liljeback, and Vasseljen, 2010). For the treatment of chronic WAD, active interventions such as exercise seem to be more effective than passive interventions (Teasell et al, 2010; Verhagen et al, 2007). WAD can be categorized into four grades based on severity (Spitzer et al, 1995). For chronic WAD grade 1 and 2, simple advice can be equally effective as an extensive exercise program (Michaleff et al, 2014), and for acute WAD (grades 1–3) a single physiotherapy advice session has been found cost-effective compared to a physiotherapy package (Lamb et al, 2013). However, results from a large randomized controlled trial on chronic WAD grade 2 and 3 support that neck-specific exercise is effective for pain reduction, and is cost-effective compared to other interventions (Landén Ludvigsson et al, 2017; Landén Ludvigsson, Peterson, Dedering, and Peolsson, 2016a; Ludvigsson et al, 2015).

Clinical guidelines in physiotherapy in Sweden are developed in collaboration with the professional organization. At present there are recommendations and local guidelines concerning neck related disorders, but no national guidelines. A neck-specific exercise program based on research findings was tested and positively evaluated by a research team at Linköping University, Sweden (Jull et al, 2008; Landén Ludvigsson et al, 2017; Landén Ludvigsson, Peterson, Dedering, and Peolsson, 2016a; Landén Ludvigsson, Peterson, and Peolsson, 2015; Ludvigsson et al, 2015). This led to the decision to implement the exercise program (Landén Ludvigsson, Peterson, and Peolsson, 2015) in combination with theoretical knowledge and diagnosis testing among physiotherapists in Swedish PHC in 2015.

Implementation of new practices in health care is challenging, and many efforts have failed (Brownson, Colditz, and Proctor, 2012). A strategy that does not result in improved practice represents a waste of resources, thus it is important to identify low-cost strategies that are effective. It is of value to study whether a short educational intervention is sufficient to obtain sustainable change in physiotherapy practice. The aim of the present study was to evaluate the adoption of a research-based diagnosis and exercise program for treatment of neck disorders, implemented among physiotherapists in primary care, in terms of self-reported behavior and confidence, three and 12 months after the education. The hypothesis was that the frequency of performing suggested assessments and applying neck-specific exercises, as well as confidence in treating neck disorders, would increase after 3 months compared with baseline, and that the change would be sustained at 12-month follow-up, when measured at group level. We also hypothesized that passive treatment in terms of TENS/acupuncture would decrease.

Methods

Implementation

In order to implement the neck-specific exercise program, we invited primary care physiotherapists in seven counties in the south and middle of Sweden to an educational session, including both theoretical information and practical training. All the invited physiotherapists work under similar circumstances at PHC centers. Two of the authors of the present study, MLL and GP, specialist physiotherapists with long-term clinical experience of neck disorders and postgraduate education in the area, acted as teachers. They held 12 educational full-day (8 hours) sessions in 9 different locations, all in the premises of a PHC center. Both teachers participated in 10 of the sessions. For two of the sessions, with few participants, only one teacher was present. Each practitioner participated in one full-day session. The education was provided free of charge. The study was approved by the regional ethical review board in Linköping, Sweden (2015/35–31). Filling out and returning the questionnaires was considered informed consent to participate in the study.

Intervention

The education included a theoretical part with information about neck anatomy, neuromuscular functioning, symptoms associated with neck dysfunction (e.g. headache, dizziness), examination, and treatment based on recent research evidence. This was followed by a practical part aimed at analyzing movement patterns, focusing on deep neck muscle function (including proprioception), neck muscle endurance, and dizziness. There was a specific focus on the skill of differentiating cervical headache or dizziness from other kinds of headache/dizziness. Furthermore, neck-specific exercise recommended for people with mechanical neck pain, WAD, cervical headache, or cervical dizziness (Jull, Falla, Vicenzino, and Hodges, 2009; Jull et al, 2008; Landén Ludvigsson, Peterson, and Peolsson, 2015; Ludvigsson et al, 2016, 2015; Page, 2011; Peterson et al, 2015b) was practiced under the supervision of the teachers. Diagnosis and treatment of WAD was given specific attention. See Table 1 for a more detailed description of the content of the education.

Study design and data collection

The study design was an educational intervention with before and after surveys analyzed at group level. At each educational session, the participants were asked to complete a hard copy questionnaire before starting the session to provide a baseline status regarding how people with neck disorders are diagnosed and treated, and to what extent the physiotherapists have confidence in how to handle these problems.

Three months after the educational session, we distributed a first web-based follow-up questionnaire to all the participants who had agreed to complete the baseline questionnaire. We used the tool Publech® Survey, provided by the County Council of Östergötland, to distribute the follow-up questionnaire by e-mail. We sent two reminders to those who did not respond.

We performed a second follow-up 12 months after the educational session, following the same procedure. We updated the email list from the first follow-up, deleting e-mail addresses resulting in automatic responses informing about sick leave, maternity leave or retirement. The remaining participants were considered eligible, and received the 12-months follow-up questionnaire.

Table 1. Content of the education.

Theoretical session, approximately 3 hours	Training session for practical skills, approximately 3 hours
• Short introduction of neck pain in general • Anatomy of the neck, including different muscle layers, with a special focus on the deepest layers • Whiplash Associated Disorders – an update of injury mechanisms, diagnosis and treatment of longstanding symptoms (main focus of the theory session) • Neuromuscular function, how to analyze it and how to train it • Cervical headache and dizziness – diagnosis and treatment • Neck-specific exercise – evidence base • Neck-muscle endurance – how to test it and what is normal • Sensory motor control – the relevance to the neck, how to diagnose and how to treat • A brief session on behavioral advice	• Craniocervical muscle testing with stabilizer • Neck-specific exercise • Neck-muscle endurance testing • Test and training of sensory motor control

Survey questionnaires

The research team developed study-specific questionnaires. Questions were influenced by the content of the educational sessions based on recent research findings (Ludvigsson et al, 2016, 2015; Peterson et al, 2015b), but we also added questions about common treatment methods not included in the education. The team members, who are all physiotherapists and experts in the area of neck treatment or implementation discussed the questionnaire to obtain face validity.

The baseline questionnaire contained some background questions (i.e. gender, age, years in practice, average number of patients with neck pain diagnosed per week, and level of postgraduate education in manual therapy). This was followed by questions regarding the frequency of using specific diagnostic measures for patients with neck pain, and neck pain combined with dizziness. A number of questions regarding the frequency of applying specified measures for treatment of different kinds of neck disorders were included. These questions, answered on a five point Likert-type scale: never, not very often, sometimes, often, always; coded 1–5 for data analysis, and the treatment options are presented in the Results section. Finally, the respondents were asked about their confidence in diagnosing neck muscle function and cervical headache. They were also asked about confidence in treating neck-related dizziness, WAD with musculoskeletal symptoms, and WAD with musculoskeletal and neurological symptoms. These questions were answered on a Visual Analog Scale (VAS), from 0 to 100 mm with the endpoints not confident at all and totally confident, respectively.

The follow-up questionnaire, used for both follow-up occasions, was identical to the baseline questionnaire with the following exceptions: It did not include the background question on the level of postgraduate education in manual therapy. The VAS could not be applied in the web-based questionnaire, and was substituted with a grading from 0 to 10. These two similar scales have been shown to be strongly associated with one another when used for the assessment of pain (Thong, Jensen, Miró, and Tan, 2018). For the data analysis, the baseline VAS results were coded 0–10 with 0 from 0–5 mm, 1 from 6–15 mm etcetera. An open-ended question in the follow-up questionnaire provided an opportunity to comment on the course.

Data analysis

We performed statistical analyses using the Statistical Package for the Social Sciences (SPSS) version 23.0. Statistical significance was set at $P \leq 0.05$. The Likert type scale provides ordinal data, which is why a non-parametric rank test was chosen. Data from baseline and the follow-up data collections represent three groups that can be considered dependent, but since all three questionnaires were answered and registered anonymously, data were handled on group level. Data from each one of the two follow-up data collections were compared only with baseline data. The Mann-Whitney U test was considered appropriate for the analysis (Kirkwood and Sterne, 2003). Based on the z value from Mann Whitney U and the total number of observations (N), the effect size r could be calculated. The standard values of r are: small, 0.2; medium, 0.4; and large, 0.6 (Field, 2013).

The analysis of qualitative data from the open-ended questions was based on the description of qualitative content analysis provided by Graneheim and Lundman (2004). The statements were condensed and coded, and codes were thereafter sorted into categories with similar content.

Results

In total, 261 of the 294 physiotherapists who participated in the educational session agreed to participate in the study and completed the baseline questionnaire. Those were included in the three-month follow-up data collection, and 175 individuals answered the questionnaires, yielding a response rate of 67%. In the 12-month follow-up, 123 out of 219 eligible participants responded, yielding a response rate of 56% (47% of the participants in the baseline survey).

Table 2 gives an overview of the respondents at baseline, 3- and 12-month follow-up, also comparing each follow-up occasion with baseline data. The only significant difference regarding the background characteristics between baseline and the follow-up occasions was that the participants reported a higher number of neck patients per week at baseline compared with the two follow-up occasions respectively. At baseline, 58% of the participants had worked more than 5 years in physiotherapy practice, and 52% had more than 5 years' experience handling patients with neck pain. A higher proportion of the men (22%) than of the women (14%) reported having more than basic postgraduate training in manual therapy, a difference that was not statistically significant ($P = .14$).

When the answers from the two follow-up data collections respectively were compared with baseline data, some differences could be identified. Regarding diagnosing patients with neck pain in general, the self-reported frequency of assessing deep muscle function, the frequency of assessing neck muscle endurance, and the frequency of assessing neck proprioception and eye movement pattern in patients with neck pain and dizziness, was significantly higher three months after the educational session than at baseline (Table 3). No differences were found regarding the other items assessed. The change in assessing proprioception in patients with neck pain and dizziness was also found after 12 months (Table 3).

Regarding treatment, the respondents stated that for patients with chronic WAD, they applied exercise for deep neck muscles and neck muscle endurance exercise more frequently at 3-months follow-up compared with baseline, a change that was also found after 12 months (Table 4a). For treatment of patients with neck-related dizziness, applying deep muscle exercise was reported more frequently at three-months follow-up than at baseline (Table 4b). A higher frequency of applying deep muscle exercise for cervical headache after 3 months was not found after 12 months (Table 4c).

One of the items concerned providing transcutaneous electrical nerve stimulation (TENS) or acupuncture, examples of passive treatment. The application of

Table 2. Characteristics of the respondents at baseline and at 3- and 12-month follow-up.

		Baseline, *n* (%)	Baseline vs. 3-month follow-up *p*-value	3-month follow-up, *n* (%)	Baseline vs. 12-month follow-up *p*-value	12-month follow-up, *n* (%)
Respondents		261		175 (67.0)		123 (47.1)
Gender	Male	76 (29.3)	0.48*	57 (32.6)	0.21*	43 (35.8)
	Female	183 (70.7)		118 (67.4)		77 (64.2)
Age	<29	78 (30.0)	0.94**	53 (30.3)	0.15**	30 (25.0)
	30–39	81 (31.2)		52 (29.7)		32 (26.7)
	40–49	53 (20.4)		41 (23.4)		33 (27.5)
	50–59	37 (14.2)		23 (13.1)		19 (15.8)
	>60	11 (4.2)		6 (3.4)		6 (5.0)
Average number of patients with neck pain diagnosed/week		2.3	0.02***	1.9	0.00***	1.7

* Chi^2 test; ** Mann-Whitney U test; *** *T*-test.

Table 3. Frequency of using various assessments for general neck pain with or without dizziness at baseline compared with 3- and 12-month follow-up respectively.

	Never, *n* (%)	Not very often, *n* (%)	Sometimes, *n* (%)	Often, *n* (%)	Always, *n* (%)	Mean rank[a]	*P* value[b]	Z/effect size *r*[c]
For a patient with neck pain in general, how often do you assess deep neck muscle function?								
Baseline (*n* = 258)	12 (4.7)	40 (15.5)	96 (37.2)	78 (30.2)	32 (12.4)	1.00		
3-month follow-up (*n* = 170)	0 (0)	9 (5.3)	56 (32.9)	86 (50.6)	19 (11.2)	1.23	≤0.01	−3.914/0.19
12-month follow-up (*n* = 116)	2 (1.7)	12 (10.3)	41 (35.3)	49 (42.2)	12 (10.3)	1.11	0.08	
… analyse cervical movement pattern?								
Baseline (*n* = 258)	7 (2.7)	26 (10.1)	46 (17.8)	87 (33.7)	92 (35.7)	1.00		
3-month follow-up (*n* = 170)	1 (0.6)	6 (3.5)	30 (17.6)	72 (42.4)	61 (35.9)	1.08	0.17	
12-month follow-up (*n* = 116)	1 (0.9)	11 (9.5)	17 (14.7)	49 (42.2)	38 (32.8)	1.02	0.77	
… assess neck muscle endurance?								
Baseline (*n* = 258)	39 (15.1)	85 (32.9)	92 (35.7)	30 (11.6)	12 (4.7)	1.00		
3-month follow-up (*n* = 170)	8 (4.7)	51 (30.0)	69 (40.6)	28 (16.5)	14 (8.2)	1.20	≤0.01	−3.438/0.17
12-month follow-up (*n* = 116)	6 (5.2)	38 (32.8)	53 (45.7)	17 (14.7)	2 (1.7)	1.12	0.07	
If the patient also experiences dizziness, how often do you assess eye movements (ability to follow an object in motion with the eyes)?								
Baseline (*n* = 258)	47 (18.2)	42 (16.3)	61 (23.6)	53 (20.5)	55 (21.3)	1.00		
3-month follow-up (*n* = 170)	13 (7.6)	26 (15.3)	48 (28.2)	41 (24.1)	42 (24.7)	1.13	0.02	−2.286/0.11
12-month follow-up (*n* = 116)	7 (6.0)	25 (21.6)	33 (28.4)	26 (22.4)	25 (21.6)	1.08	0.21	
… assess neck proprioception?								
Baseline (*n* = 252)	57 (22.6)	75 (29.8)	71 (28.2)	38 (15.1)	11 (4.4)	1.00		
3-month follow-up (*n* = 170)	22 (12.9)	41 (24.1)	68 (40.0)	30 (17.6)	9 (5.3)	1.17	≤0.01	−2.823/0.14
12-month follow-up (*n* = 116)	11 (9.5)	41 (35.3)	37 (31.9)	21 (18.1)	6 (5.2)	1.14	0.04	−2.086/0.11
…differentiate between neck origin/other origin of dizziness?								
Baseline (*n* = 255)	6 (2.4)	12 (4.7)	28 (11.0)	98 (38.4)	111 (43.5)	1.00		
3-month follow-up (*n* = 170)	3 (1.8)	7 (4.1)	24 (14.1)	61 (35.9)	75 (44.1)	1.00	0.96	
12-month follow-up (*n* = 116)	2 (1.7)	7 (6.0)	24 (20.7)	35 (30.2)	48 (41.4)	0.93	0.25	

[a]Mann-Whitney U test. Mean rank at baseline is used as a reference, and set as 1.00. A value > 1 means higher frequency.
[b]*P* value when compared with baseline.
[c]Effect size compared with baseline was calculated if the *P* value was ≤ 0.05.

Table 4a. Frequency of applying different treatment methods for patients with chronic WAD at baseline compared with 3 and 12 month follow-up respectively.

	Never, *n* (%)	Not very often, *n* (%)	Some-times, n (%)	Often, *n* (%)	Always, *n* (%)	Mean rank[a]	*P* value[b]	Z/effect size *r*[c]
When treating patients with chronic WAD, how often do you apply exercise for deep muscles?								
Baseline (*n* = 257)	3 (1.2)	6 (2.3)	48 (18.7)	116 (45.1)	84 (32.7)	1.00		
3-month follow-up (*n* = 168)	0	4 (2.4)	15 (8.9)	86 (51.2)	63 (37.5)	1.11	0.04	−2.075/0.10
12-month follow-up (*n* = 114)	4 (3.5)	0	11 (9.6)	44 (38.6)	55(48.2)	1.19	≤0.01	−2.942/0.15
… neck muscle endurance exercise?								
Baseline (*n* = 255)	10 (3.9)	31 (12.2)	92 (36.1)	98 (38.4)	24 (9.4)	1.00		
3-month follow-up (*n* = 167)	3 (1.8)	16 (9.6)	41 (24.6)	82 (49.1)	25 (15.0)	1.19	≤0.01	−3.201/0.16
12-month follow-up (*n* = 114)	2 (1.8)	12 (10.5)	23 (20.2)	62 (54.4)	15 (13.2)	1.20	≤0.01	−3.043/0.16
… transcutaneous electrical nerve stimulation (TENS) or acupuncture?								
Baseline (*n* = 257)	17 (6.6)	49 (19.1)	135 (52.5)	54 (21.0)	2 (0.8)	1.00		
3-month follow-up (*n* = 168)	14 (8.3)	37 (22.0)	91 (54.2)	25 (14.9)	1 (0.6)	0.92	0.11	
12-month follow-up (*n* = 114)	10 (8.8)	33 (28.9)	54 (47.4)	17 (14.9)	0	0.86	0.02	−2.401/0.12

[a]Mann-Whitney U test. Mean rank at baseline is used as a reference, and set as 1.00. A value > 1 means higher frequency.
[b]*P* value when compared with baseline.
[c]Effect size compared with baseline was calculated if the *P* value was ≤ 0.05.

this passive treatment method for WAD had decreased at 12-months follow-up compared with baseline (Table 4a).

Regarding confidence, we chose to compare not only the whole group over time, but also subgroups according to gender, as it could be hypothesized that confidence differs between men and women. At baseline, those who had postgraduate education in manual therapy showed significantly higher ($P < .01$) confidence in all the items described in Table 5, compared with those reporting no postgraduate education in the area. When the entire group was assessed after 3 months, for the items diagnosing neck muscle function and cervical headache, treating neck-related dizziness, treating WAD with musculoskeletal symptoms, and treating WAD with musculoskeletal and neurological symptoms, confidence was significantly higher compared with baseline, a change that was also found after 12 months (Table 5).

Women gained confidence from the education to a higher degree than the men, with significantly increased confidence in all aspects (Table 5). Men reported increased confidence regarding diagnosing neck muscle function, treating WAD with musculoskeletal symptoms, and WAD with musculoskeletal and neurological symptoms, but not in diagnosing cervical headache or treating neck-related dizziness (Table 5).

Table 4b. Frequency of applying different treatment methods for patients with neck-related dizziness at baseline compared with 3 and 12 month follow-up respectively.

	Never, *n* (%)	Not very often, *n* (%)	Sometimes, *n* (%)	Often, *n* (%)	Always, *n* (%)	Mean rank[a]	*P* value[b]	*Z*/effect size *r*[c]
When treating patients with neck-related dizziness, how often do you apply exercise for deep muscles?								
Baseline (*n* = 255)	9 (3.5)	24 (9.4)	86 (33.7)	103 (40.4)	33 (12.9)	1.00		
3-month follow-up (*n* = 168)	2 (1.5)	13 (7.7)	50 (29.8)	72 (42.9)	31 (18.5)	1.11	0.05	−2.007/0.10
12-month follow-up (*n* = 115)	5 (4.3)	6 (5.2)	40 (34.8)	49 (42.6)	15 (13.0)	1.03	0.61	
… neck muscle endurance exercise?								
Baseline (*n* = 255)	15 (5.9)	56 (22.0)	95 (37.3)	73 (28.6)	16 (6.3)	1.00		
3-month follow-up (*n* = 168)	9 (5.4)	24 (14.3)	69 (41.1)	52 (31.0)	14 (8.3)	1.09	0.12	
12-month follow-up (*n* = 115)	4 (3.5)	17 (14.8)	56 (48.7)	33 (28.7)	5 (4.3)	1.04	0.47	
…exercise for increased proprioception?								
Baseline (*n* = 248)	49 (19.8)	55 (22.2)	85 (34.3)	52 (21.0)	7 (2.8)	1.00		
3-month follow-up (*n* = 168)	19 (11.3)	37 (22.0)	82 (48.8)	25 (14.9)	5 (3.0)	1.05	0.35	
12-month follow-up (*n* = 115)	16 (13.9)	27 (23.5)	49 (42.6)	21(18.3)	2 (1.7)	1.03	0.67	
… transcutaneous electrical nerve stimulation (TENS) or acupuncture?								
Baseline (*n* = 254)	45 (17.7)	71 (28.0)	113 (44.5)	25 (9.8)	0	1.00		
3-month follow-up (*n* = 168)	37 (22.0)	48 (28.6)	70 (41.7)	13 (7.7)	0	0.92	0.22	
12-month follow-up (*n* = 115)	23 (20.0)	32 (27.8)	51 (44.3)	9 (7.8)	0	0.96	0.54	

[a]Mann-Whitney U test. Mean rank at baseline is used as a reference, and set as 1.00. A value > 1 means higher frequency.
[b]*P* value when compared with baseline.
[c]Effect size compared with baseline was calculated if the *P* value was ≤ 0.05.

Table 4c. Frequency of applying different treatment methods for patients with neck-related headache at baseline compared with 3 and 12 month follow-up respectively.

	Never, *n* (%)	Not very often, *n* (%)	Sometimes, *n* (%)	Often, *n* (%)	Always, *n* (%)	Mean rank[a]	*P* value[b]	*Z*/effect size *r*[c]
When treating patients with neck-related headache, how often do you apply exercise for deep muscles?								
Baseline (*n* = 254)	10 (3.9)	32 (12.6)	70 (27.6)	108 (42.5)	34 (13.4)	1.00		
3-month follow-up (*n* = 165)	2 (1.2)	8 (4.8)	48 (29.1)	80 (48.5)	27 (16.4)	1.13	0.02	−2.317/0.11
12-month follow-up (*n* = 112)	4 (3.6)	12 (10.7)	34 (30.4)	47 (42.0)	15 (13.4)	0.01	0.92	
… neck muscle endurance exercise?								
Baseline (*n* = 254)	11 (4.3)	54 (21.3)	101 (39.8)	71 (28.0)	17 (6.7)	1.00		
3-month follow-up (*n* = 166)	6 (3.6)	22 (13.3)	74 (44.6)	52 (31.3)	12 (7.2)	1.09	0.13	
12-month follow-up (*n* = 112)	4 (3.6)	21 (18.8)	48 (42.9)	34 (30.4)	5 (4.5)	1.02	0.80	
… transcutaneous electrical nerve stimulation (TENS) or acupuncture?								
Baseline (*n* = 54)	27 (10.6)	4 (17.7)	104 (40.9)	76 (29.9)	2 (0.8)	1.00		
3-month follow-up (*n* = 166)	21 (12.7)	31 (18.7)	75 (45.2)	39 (23.5)	0	0.93	0.16	
12-month follow-up (*n* = 112)	15 (13.4)	26 (23.2)	44 (39.3)	27 (24.1)	0	0.90	0.09	

[a]Mann-Whitney U test. Mean rank at baseline is used as a reference, and set as 1.00. A value > 1 means higher frequency.
[b]*P* value when compared with baseline.
[c]Effect size compared with baseline was calculated if the *P* value was ≤ 0.05.

Table 5. Confidence in diagnosis and treatment at baseline compared with 3- and 12-month follow-up respectively for the total group and according gender.

	Baseline		3-month follow-up				12-month follow-up			
	n[a]	Mean rank[b]	*n*[a]	Mean rank[b]	*P* value	Z/Effect size, *r*[c]	*n*[a]	Mean rank[b]	*P* value	Z/Effect size, *r*[c]
Confidence in diagnosing affected neck muscle function										
Total group	248	1.0	165	1.5	≤0.01	−7.103/0.35	111	1.5	≤0.01	−6.311/0.33
Women	175	1.0	111	1.5	≤0.01	−5.731/0.42	72	1.5	≤0.01	−5.335/0.34
Men	71	1.0	54	1.5	≤0.01	−4.248/0.38	39	1.4	≤0.01	−3.412/0.33
Confidence in diagnosing cervical headache										
Total group	248	1.0	165	1.3	≤0.01	−4.298/0.21	111	1.2	≤0.01	−3.337/0.18
Women	175	1.0	111	1.3	≤0.01	−4.078/0.30	72	1.3	≤0.01	−3.194/0.20
Men	71	1.0	54	1.2	0.14	-	39	1.1	0.25	-
Confidence in treating neck-related dizziness										
Total group	248	1.0	165	1.3	≤0.01	−4.156/020	111	1.3	≤0.01	−4.177/0.22
Women	175	1.0	111	1,3	≤0.01	−3.847/0.28	72	1.3	≤0.01	−3.824/0.24
Men	71	1.0	54	1.2	0.10	-	39	1.2	0.09	-
Confidence in treating WAD with musculoskeletal symptoms										
Total group	248	1.0	165	1.5	≤0.01	−7.866/0.39	111	1.6	≤0.01	−7.309/0.39
Women	175	1.0	111	1.5	≤0.01	−6.441/0.47	72	1.6	≤0.01	−6.340/0.40
Men	71	1.0	54	1.6	≤0.01	−4.779/0.43	39	1.5	≤0.01	−3.855/0.37
Confidence in treating WAD with musculoskeletal and neurological symptoms										
Total group	248	1.0	165	1.4	≤0.01	−6.5020.32	111	1.5	≤0.01	−6.573/0.35
Women	175	1.0	111	1.4	≤0.01	−5.082/0.37	72	1.6	≤0.01	−6.128/0.39
Men	71	1.0	54	1.5	≤0.01	−3.926/0.35	39	1.3	≤0.01	−2.643/0.25

[a]There were fewer answers to this question than the former questions, why the numbers in general are lower than in Tables 1–3.
[b]Mann-Whitney U test. Mean rank at baseline is used as a reference, and set as 1.00. A value > 1 means higher level of confidence.
[c]Effect size compared with baseline was calculated if the *P* value was ≤ 0.05.

Regarding confidence, effect sizes were low to medium (Table 5).

Comments on the educational session were provided by 25 individuals in the 3-month follow-up, and in the 12-month follow-up the number of answers to the open-ended question was 15. The analysis of the comments resulted in three categories; quality, outcome, and suggested improvements.

Regarding quality the participants stated that the quality was perceived to be high, with skilled and knowledgeable teachers recruited from the researcher community, and that the content had a solid evidence base. However, there was also a comment that posed doubt regarding the evidence base.

The outcome of the educational session was described in terms of improved skills and confidence, changes in practice and a spread of the gained knowledge to colleagues. Some participants had not had the opportunity to apply the new knowledge due to changes in their working situation.

Suggestions for improvement were to divide the course into two days, or to provide a follow-up session for repetition. This suggestion became even more prominent after 12 months. There were also calls for more practical training, more focus on diagnosing and differentiating between different causes of pain, and a suggestion to strive for a more advanced level.

Discussion

Principal findings

The most important finding was that most of the self-reported changes in behavior identified after three months were not sustained over time. Increased assessment of deep muscle function and application of research-based methods for treating WAD were the only changes that persisted after 12 months. Confidence in handling neck disorders increased after 3 months, a change that was sustained after 12 months. Despite this, sustainability for other assessment methods and treatment of other neck disorders was low. This shows that some important parts of the program have been adopted by the practitioners, while other changes based on the program were not sustained.

Strengths and weaknesses of the study

It was considered a strength that a high number of physiotherapy practitioners from a wide range of PHC centers could be offered the same education, and that they all were invited to participate in the study. The response rates for the two follow-ups (67% and 56% respectively) were, however, lower than expected from a limited and selected target group. A drop-out analysis was performed comparing responder characteristics between the three data collections, and no significant differences were found for any item available. This indicates that the responders at follow-up were representative for the whole group. There could, however, be a selection bias, as only half of the participants from baseline responded to the 12-month follow-up. Individuals who felt that the training improved their performance and their confidence may have continued to participate, while those who found the training to be less useful dropped out. This loss to follow-up must be considered a major issue when interpreting the results.

Another limitation is that all data were self-reported, and may be influenced by social desirability, with higher compliance reported than what is actually the case. Further it cannot be judged if the diagnostic tests or the exercises were provided according to the protocol. A study design with monitoring and assessment of actual performance would have strengthened the findings. In addition, the educational session involved training in specific skills rather than introducing a defined treatment package. It is part of the physiotherapists' professionalism to apply different methods according to the problems presented by each patient.

No pilot testing of the study-specific questionnaire was performed, which can be seen as a limitation. The questions, however, were short and clear, and we doubt that they were misunderstood. The baseline questionnaires were distributed anonymously and could not be linked to the follow-up questionnaires, which must be considered a limitation. An effect of this was that no individuals could be followed over time and data had to be analyzed only at group level. The two follow-up occasions were thus handled independently, with each follow-up compared only with baseline data.

Research methods in implementation include a wide range of qualitative and quantitative methods (Peters et al, 2013). This study can be categorized as a pragmatic trial, however not big enough to include randomization to a control and an intervention group, which would have strengthened the design. Process evaluation is a method that is recommended for implementation studies, and includes both qualitative and quantitative data collections over time (Moore et al, 2015). The inclusion of qualitative data collected over time would have strengthened the study design, but was not possible due to limited resources. Nor could feedback and audit, known to increase practice change over time (Ivers et al, 2012), be provided, as the implementation intervention consisted of one single educational session. We thus chose to limit our data collection to pre and post assessment of the participants' self-reported knowledge, skills, and confidence.

The reporting of implementation studies can include a variety of outcome variables, factors affecting implementation and implementation strategies (Peters et al, 2013). In the present study, we particularly focused the implementation strategy used, and outcome in terms of practitioner adoption of new techniques and gained confidence. Other factors that might have affected adoption, such as contextual factors at each unit that was represented among the participants, was not assessed. Context can be measured using instruments such as the Implementation Climate Scale (Ehrhart, Aarons, and Farahnak, 2014). In our case, with participants representing a high number of settings, it was not considered relevant to assess context.

Results in relation to other studies

Implementation success is influenced by the method by which the process is facilitated (Rycroft-Malone et al, 2002). We used an educational session with interactive components to facilitate change by strengthening capability and motivation, as changed behavior depends on capability, opportunity, and motivation (Michie, van Stralen, and West, 2011). Opportunity is assumed to lie implicit in the professional practice. The inclusion of elements of interactivity has earlier been shown to be important to achieve changed behavior among health care professionals (Grimshaw et al, 2012). The strategy was successful in parts, but the low level of sustainability, and the participants request for a follow-up session suggests that it was insufficient.

Another factor influencing implementation is the extent to which the innovation is perceived to be better than the current practice (i.e. the relative advantage) (Rogers, 2003). In the present study, a relative advantage with the new program, could be that before the educational session, physiotherapists perceived a lack of diagnosis and treatment options for patients with chronic neck pain, particularly WAD. Positive expectations regarding the program may have influenced the initial adoption, which was also the case when a tool for lifestyle interventions was implemented in Swedish PHC (Carlfjord et al, 2010). The program implemented in this study was informed by recent research findings. According to Rycroft-Malone et al. (2002), evidence is one of the most important factors for implementation success.

The educational session paid special attention to the assessment of muscle function, in particular for diagnosing chronic WAD, which may explain why this practice, and also the application of exercise for deep muscles/muscle endurance in patients with WAD, increased and was sustained. Passive treatment in terms of TENS/acupuncture, with less support from research (Kroeling, Gross, and Goldsmith, 2005), was expected to decrease in frequency as a secondary effect of the education, but had not changed after three months. It is hard to tell if the decrease found after 12 months was attributed to the education, but it could not be completely ruled out.

The hypothesis was that practitioners would gain confidence in treating neck disorders after participation in the education. Confidence levels among the practitioners was significantly high, at both follow-up occasions, despite the fact that other reported changes did not pertain. Self-reported confidence does not appear to be a measure that is sensitive to actual shifts in frequency of practice. Women reported increased confidence to a higher extent than their male colleagues, a difference that could not be explained by differences in experience or in the level of postgraduate education. Research in psychology shows that males consistently report higher self-esteem than females, which is referred to as a gender confidence gap (Bleidorn et al, 2016). This gap seems to be present also in physiotherapy. Managers offering continuing education should be aware that men and women may act differently in these aspects, and it could be worth persuading male workers to attend education even though they do not express a perceived need.

The assessment and treatment techniques that were included in the educational session were not adopted as expected. The effect size of the behavior changes reported was generally low, and it is hard to tell whether the change has clinical relevance. Studies of behavior change in different areas show that substantial changes are not easy to achieve. When professional behavior change strategies are evaluated and presented in systematic reviews, a median absolute improvement in care of 4–6% is what is usually found (Grimshaw et al, 2012). In the present study, however, changes in confidence regarding diagnosis and treatment of WAD showed effect sizes close to 0.40, which is considered a medium size effect, and thus a positive outcome (Field, 2013).

Implications and future research

Implications for practice are that a more structured implementation strategy with the provision of audit and feedback, and follow-up in terms of a repeated session as requested by the participants, should be included in future efforts to increase the use of research-based methods in physiotherapy practice. Future research should also include the assessment of contextual factors in the settings where the new practice is implemented.

Conclusions

In conclusion, the research-based diagnosis and exercise program for physiotherapeutic treatment of neck disorders in PHC was not adopted as expected. However, important parts of the program, in particular regarding assessment of neck disorders and treatment of chronic WAD, were reported to have increased in frequency. The theoretical and practical educational session also seems to have resulted in increased confidence among the physiotherapists in the management of neck related disorders. An implication of the study is that a short educational session seems not to be sufficient to obtain sustained change in practice, and a structured implementation strategy would probably result in a higher degree of adoption and sustainability.

Conflict of Interest

The authors declare no potential conflict of interest.

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