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Promoting the use of outcome measures by an educational programme for physiotherapists in stroke rehabilitation: a pilot randomized controlled trial

RPS Van Peppen Institute for Human Movement Studies, Department of Physiotherapy and Research Centre for Innovation in Health Care, University of Applied Sciences Utrecht, **MJ Schuurmans** Research Centre for Innovation in Health Care, University of Applied Sciences Utrecht, **EC Stutterheim** Institute for Human Movement Studies, Department of Physiotherapy, University of Applied Sciences Utrecht, **E Lindeman** Rudolf Magnus Institute of Neuroscience, Department of Rehabilitation and Sport Medicine, University Medical Center Utrecht, Utrecht and **NLU Van Meeteren** Department of Physical activity and Health, TNO Quality of Life, Leiden, the Netherlands

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Objective: To determine the influence of tutor expertise on the uptake of a physiotherapists' educational programme intended to promote the use of outcome measures in the management of patients with stroke.
Design: Pilot randomized controlled trial.
Methods: Thirty physiotherapists involved in stroke management were randomized into two groups and participated in five tutor-guided educational sessions (the Physiotherapists' Educational Programme on Clinimetrics in Stroke, PEPCiS). Groups differed from each other with respect to tutors: one experienced and one inexperienced in stroke care. Primary outcome was 'actual use' (the frequencies of data of seven recommended outcome measures in the patient records of the participating physiotherapists).
Results: The actual use of instruments shifted from a median of 3 to 6 in the expert tutor group and from 3 to 4 in the non-expert tutor group ($P=0.07$). Physiotherapists educated by the expert tutor used a broader variety of instruments and appreciated the educational programme, their own knowledge gain and all three scales of tutor style aspects significantly more than their colleagues of the non-expert tutor group (all $P<0.05$). Univariate analysis on the entire set of data revealed eight factors, including tutors' performance, that were associated with a change score of the use of two or more outcome measures by individual physiotherapists after the educational programme.
Conclusion: In this pilot trial it was not proven that tutor expertise in stroke care influences the actual use of outcome measures, but it warrants a future study with sufficient power to investigate the influence of the tutor.

Introduction

The Australian Physiotherapy Association recommends that 'a clinical justification for physiotherapy services would routinely include the use of outcome measures.'[1] However, like their

Address for correspondence: Roland PS van Peppen, University of Applied Sciences, Institute for Human Movement Studies, Department of Physiotherapy, Bolognalaan 101, 3584 CJ Utrecht, The Netherlands.
e-mail: roland.vanpeppen@hu.nl

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colleagues in other countries[2–7] physiotherapists in the Netherlands[8] fail to regularly use outcome measures. Infrequent use of such measures is apparent also for Dutch physiotherapists involved in stroke management,[9] despite the recommendations for their regular use by several experts in the field[10,11] and in the clinical practice guidelines for physiotherapy management of patients with stroke of the Royal Dutch Society for Physical Therapy.[12] Common barriers to the proper use of outcome measures include lack of experience and uncertainty about the use and interpretation of the instruments.[2,6,9,13,14] Despite these barriers, physiotherapists have reported an overall positive attitude towards the use of outcome measures.[2,9]

Physiotherapists seem to be aware of the importance of the use of outcome measures to assess or monitor the health status of patients for the purpose of diagnosis, prognosis and therapy evaluation as an essential aspect of good clinical practice.[10,11] Outcome measures assist physiotherapists to specifying relevant and attainable treatment goals, getting feedback on the effect of interventions and optimizing communication with patients and other professionals in an interdisciplinary team.[15] There is an increasing need to prove the effectiveness of therapeutic interventions and to improve the transparency of the clinical decision-making process by health care professionals such as physiotherapists. However, physiotherapists often wonder when they need to monitor patients, and what functional impairments or limitations in terms of activities or participation should be assessed.[16]

The importance of education

We hypothesized that the use of outcome measures would increase when physiotherapists were educated about the integrated use of these outcome measures in their daily clinical practice and decision-making during the rehabilitation of patients with stroke.[9] In an attempt to facilitate the practical use of outcome measures by Dutch physiotherapists and hence to improve the transparency of their clinical decision-making process according to the recommendations in the 'physiotherapy stroke guideline', a 'Physiotherapists' Educational Programme on Clinimetrics in Stroke' (PEPCiS – see Appendix) has been developed.

Training is often a precondition for successful behavioural changes of professionals like using outcome measures on a regular basis.[17] In such contexts, interactive and personal training in small groups has shown to be more effective than more traditional lectures in large groups.[18] We try to gain further insights into the educational aspects necessary to induce behavioural change in physiotherapists and to identify the perceived motivational, organizational and institutional barriers to and facilitators for this change, using the theories by Ajzen[19] and Grol[20] respectively. Besides, we are interested in the tutor role. Should the tutor be an expert in the subject matter to facilitate students (or in this case practising physiotherapists) more than non-content expert tutors? In line with what has been found in tutor studies in university education,[21,22] we hypothesized that the content expertise of a tutor will be one of the influencing factors in educating physiotherapists in their professional context.

Consequently, in this pilot study it was evaluated whether the expertise of a tutor is a relevant factor that influences the uptake of education (PEPCiS) on changes in the use of outcome measures to improve professional behaviour.

Method

Design

In this pilot study, 30 voluntarily participating physiotherapists involved in the management of patients with stroke were stratified based on the setting in which they work (i.e. acute care hospital, rehabilitation centre, nursing home or private physiotherapy practice). Within each stratum, physiotherapists were randomly assigned, using numbered sealed envelopes, to a group taught by an expert tutor (expert tutor group: $N = 15$) or a group taught by a non-expert tutor ($N = 15$). The expert tutor group was taught by a tutor who had extensive experience with outcome measures in stroke (RvP; >10 years), whereas the non-expert tutor group was taught by a tutor with little experience in this respect (MW; <6 months). Both tutors had comparable experience with teaching the programme, which they had gained in a prior

pilot project, as well as with process-oriented tutoring (>3 years) from their regular job as lecturers at the University of Applied Sciences Utrecht.

The randomization schedule, based on a random number table,[23] and envelopes were prepared by an author (ES) not involved in the recruitment of the physiotherapists. The participating physiotherapists were unaware of the differences in expertise between the allocated tutors. Physiotherapists in the expert tutor group and non-expert tutor group received the same educational programme aimed at implementing and enhancing the use of outcome measures in clinical practice. The programme was based on several learning strategies and focusing on the evidence-based practice, clinical reasoning and outcome measures recommended in the clinical practice guidelines for physiotherapy management of patients with stroke. The educational programme was executed from March to June 2007.

Subjects

For logistical reasons, a maximum of 30 physiotherapists were recruited from responders to a 'call for participation' in the newsletter of the Utrecht regional section of the Royal Dutch Society for Physical Therapy. Six weeks prior to the study, all responders received a hard copy of the clinical practice guideline and were instructed to read the whole document thoroughly. In a preparatory meeting, four weeks before the start of the educational programme, all responders were informed about the study. We tried to blind the participants by deliberately leaving them unaware of the precise aims of the study, namely the planned patient record analyses and the contrast between the two tutors. To be included participants had to treat at least one patient with stroke per week on a regular basis.

Intervention

Physiotherapists in both groups attended the same interactive evidence-based training course PEPCiS (see Appendix). The two groups of physiotherapists were taught on different evenings (Tuesdays and Thursdays respectively) in a fully equipped 'clinimetrics classroom' at the Institute for Human Movement Studies, Department of Physiotherapy of the University of Applied Sciences Utrecht, the Netherlands. The classroom setting included physiotherapy equipment, all materials and forms to record the outcome measures, and 'on-line' computers for patient data recording. Both groups were taught in five 2-hour evening sessions over a 14-week period. The five training sessions started in week 11 of 2007 (March), and continued in weeks 13, 15, 20 and 25 (June 2007).

Measurements

At baseline, participants' characteristics, such as gender, setting of practice, age, experience in stroke management, number of treated patients, psychological predictors of behaviour (e.g. motivation according to the theory of planned behaviour[19]) and barriers to and facilitators for the use of outcome measures were assessed.

The primary outcome of this study was 'actual use', measured by the frequency of data of the recommended outcome measures in the patient records of the participating physiotherapists in their own practice routine. Secondary outcomes were: (1) self-reported use of outcome measures by participants; (2) participants' appreciation of the tutoring style of their allocated tutor; and (3) participants' commitment, including (a) the participants' compliance with study procedures, (b) the participants' satisfaction with the educational programme PEPCiS.

Actual use and self-reported use were assessed at baseline and after the end of the 14-week intervention period. Participants' characteristics were assessed at baseline, while participants' appreciation of tutoring style and commitment were assessed at the end of the intervention.

Baseline characteristics

Gender, setting of practice, age, experience in stroke management and number of treated patients were assessed at baseline. Besides psychological predictors of behaviour, barriers to and facilitators for the use of outcome measures were measured with questionnaires.

Psychological predictors of behaviour

Psychological predictors of behaviour in terms of using the recommended outcome measures were assessed at baseline using a questionnaire based on the Theory of Planned Behaviour (TPB).[19] This questionnaire was developed using operationalization instructions from the a manual for health service researchers.[24] The Theory of Planned Behaviour is a model which is widely used to predict a wide range of behaviour and can also be applied to the behaviour of health professionals.[25] The Theory of Planned Behaviour proposes that 'intention to engage in the behaviour' and 'perceived control over the behaviour' (PBC) are the proximal predictors of (professional) behaviour.

We hypothesized that participants with high 'intention' and high levels of 'perceived control' would be more likely to change their professional behaviour and will use outcome measures more regularly. 'Intention' is defined as the motivation to engage in a particular behaviour (in this case: using outcome measures) and indicates the extent to which people are willing to try or how much effort they would invest to perform the behaviour.[19] 'Perceived control' is defined as 'a person's perception of the ease or difficulty of performing a behaviour'.[19]

The 'intention' and 'perceived control' items were rated on 5-point Likert scales. Mean scores were calculated for both items, with a mean score of 5 meaning very high intention and perceived behaviour control, respectively.

Perceived barriers and facilitators

The validated Barriers and Facilitators Questionnaire (BFQ),[9] which includes 20 statements (1–5 scale), was used at baseline to identify perceived barriers to and facilitators for the use of outcome measures in everyday practice in physiotherapy stroke management. An initial analysis of perceived barriers to and facilitators for using outcome measures by professionals involved is a crucial condition for successful implementation[20] of the outcome measures recommended in the clinical practice guidelines for stroke management in daily physiotherapy practice.

Primary outcome

Actual use of outcome measures

The actual use of outcome measures was defined as the frequency of recorded use, of each recommended outcome measure in the clinical practice guideline (0–7), in patient records. This use was assessed by analysing patient records (maximum five per physiotherapist) for the frequency with which the participants used the core outcome measures. Before the start of the educational programme, participants had to bring an anonymous copy of their five most recent (stroke) patient records. The actual use of outcome measures was analysed again at the end of intervention by assessing five new patient records.

Secondary outcomes

Self-reported use of outcome measures

This was assessed with a 7-item questionnaire relating to the seven recommended outcome measures. The questions invited the participants to report their own use of the seven recommended outcome measures for the five most recently treated patients on a 6-point Likert scale (e.g. 'I used the Berg Balance Scale in [1,2,3,4 *or* 5 *patients: select one option*] for the five patients with stroke I most recently treated.')

Participants' appreciation of tutoring style

This was evaluated after the end of the educational programme, using the Tutor Behaviour Questionnaire (TBQ).[22,26] The Tutor Behaviour Questionnaire consists of 39 items which explore tutoring style in terms of 'knowledge of subject matter' (19 items) and 'skills in process facilitation' (19 items), using 5-point Likert-scale (range 1–5), and 'overall effectiveness', defined as the participants' perception of how well the tutor performed in his or her role (1 item; 1–10 scale).[26] Knowledge of subject matter was assessed using three scales assessing the corresponding subcategories of behaviour: (A1) *use of expertise* (UE) (i.e. the degree to which the tutor used his or her knowledge of the subject matter to help the participants); (A2) *cognitive congruence* (CC) (i.e. the degree to which the tutor understood the participants' existing level of knowledge) and (A3) *test orientation* (TO) (i.e. the

degree to which the tutor focused on summative assessment to direct the physiotherapists' learning).

The 'skills in process facilitation' was assessed by three subscales: (B1) *authority* (AU) (i.e. the degree to which the tutor used authority to direct participants' activities within the group); (B2) *role congruence* (RC) (i.e. the degree to which the tutor was able to empathize with, and relate to, participants' lives); and (B3) *cooperation orientation* (CO) (i.e. the degree to which the tutor was interested in encouraging cooperation among members of the group).[26]

Compliance with study procedures was assessed as attendance at the training sessions and drop-outs rates from the study. Attendance was recorded by the tutors at each session (ranging from 0 to 5 sessions) in programme diaries. Participants had to attend at least four of the five sessions of the educational programme to get credits for the quality register of the Royal Dutch Society for Physical Therapy. Drop-outs were defined as participants who quit the study and were lost to follow-up. Compliance with measurement procedures was assessed by counting the number of participants who (a) delivered their patients' records (to assess actual use), and (b) completed the on-line self-report questionnaires (to assess self-reported use), while recording those who were lost to analysis.

Participant satisfaction

This was determined after the end of the intervention using a 4-item questionnaire. Each item was given a mark between 0 and 10. Information was obtained on satisfaction with the educational programme, in terms of (1) 'organization', (2) 'content', (3) 'knowledge gain' and (4) 'level of participation'.

Statistical analysis

Data were analysed by an independent researcher (ES) with SPSS 12.0 statistical software (SPSS Inc, Chicago, IL, USA), using a significance level of $P<0.05$. Summary descriptive statistics (i.e. central tendencies) were computed for the actual and self-reported use of recommended outcome measures.[23] Differences in numbers of patient records at baseline and at the end of the intervention and actual and self-reported frequencies of use were converted to percentage scores to compare physiotherapists' actual use and self-reported use of outcome measures. The Barriers and Facilitators Questionnaire statements (1–5 points on each statement) were converted to a sum score (max 100 points).

Baseline differences in group characteristics, tutor behaviour, compliance and satisfaction were analysed by either independent samples *T*-test or chi-square test where appropriate.[23] Between-group comparisons were made using the independent *T*-test, while comparisons of the effect of training (i.e. the median of change scores for actual use and self-reported use between baseline and end of intervention) were done with the Mann–Whitney *U*-test.[23]

In addition, factors have to be identified how changes in professional behaviour to use clinical outcome measures in practice are related with tutor content-expertise. Univariate logistic regression analysis was used to select significant determinants ($P<0.2$) to predict an increased use of two or more outcome measures by physiotherapists during the educational programme PEPCiS.

Results

Physiotherapists

Of the 41 physiotherapists who responded to the original invitation, 35 were involved in stroke management and were considered eligible after screening by telephone (Figure 1). However, 5 candidates were unable to fit the training sessions into their schedule leaving 30 participants. Table 1 shows the baseline characteristics of these 30 participating physiotherapists. No statistically significant baseline differences between the groups were found ($P>0.05$).

Primary outcome

Actual use of outcome measures

Both groups increased their median actual use of the seven recommended outcome measures, as recorded in the five patient records, going from a median of 3 to 6 different outcome measures for those trained by the expert tutor and from 3 to 4

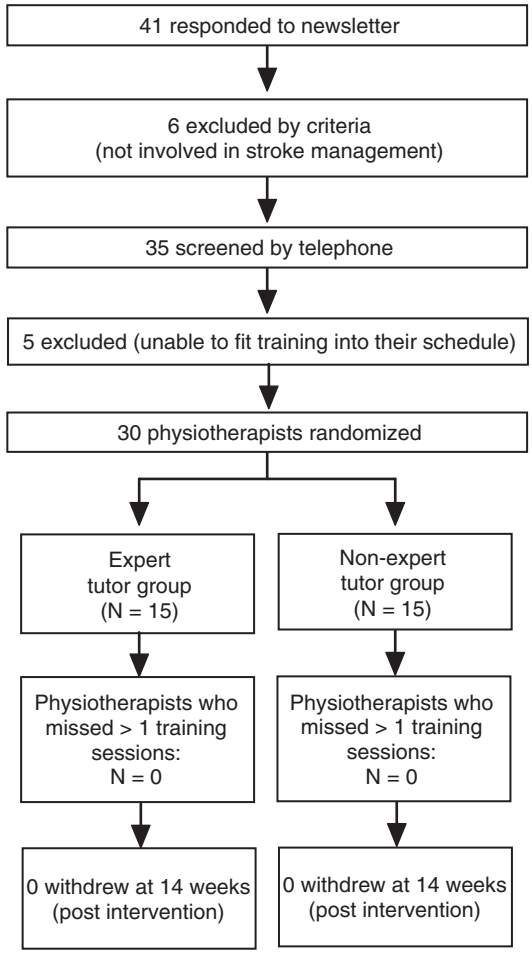

Figure 1 Flow of participants through the trial.

for the non-expert group, these between-group differences were statistically non-significant ($P = 0.07$) (Table 2). Physiotherapists educated by the expert tutor showed a broader use of outcome measures than their colleagues in the non-expert tutor group (Table 4).

Secondary outcomes

Self-reported use of outcome measures

The analysis of the between-group differences in self-reported use showed no significant differences between the groups ($P = 0.48$) (Table 3).

Analysis of between-group differences for each of seven recommended outcome measures showed a statistically significant change scores in favour of the expert tutor group for self-reported use of the Frenchay Arm Test ($P = 0.01$) (Table 4).

Participants' appreciation of tutoring style

Compared with participants in the non-expert tutor group, those in the expert tutor group reported a significantly higher degree of 'knowledge of subject matter' ($P < 0.001$) and 'skills in process facilitation' ($P < 0.001$) for their tutor. Participants in the expert tutor group also rated the overall perceived effectiveness of their tutor significantly higher ($P < 0.001$) (Table 3).

Compliance with study procedures

There were no drop-outs, and the participants in both groups attended at a median of five of the five PEPCiS sessions. After the end of the PEPCiS programme, no significant differences were found between the two arms in terms of the number of anonymous copies of their most recent (stroke) patient records presented by the participants and completion of the on-line self-report questionnaires, (Table 3).

Participants' satisfaction

All participants in both groups ($N = 30$) answered the four questions about satisfaction with PEPCiS. The mean score for satisfaction with PEPCiS as a whole was ranging from 8.0 (expert tutor group) to 6.9 (non-expert tutor group). Physiotherapists in the expert tutor group rated two satisfaction items significantly higher than those in the non-expert tutor group (Table 3).

Univariate analysis

Complete data sets for univariate regression analyses were available for 27 physiotherapists, 13 for the expert group and 14 for the non-expert group. The univariate analysis showed significant associations ($P < 0.2$) between a change score of 2 or more outcome measures

Table 1 Baseline characteristics of participating physiotherapists

Characteristics	ETG ($N=15$)	NETG ($N=15$)	Total ($N=30$)	Statistics	Significance (P-value)*
Gender, female	12	13	25	0.24^{C}	0.62
Setting of practice:				1.45^{C}	0.69
ACH	2	3	5		
RC	0	1	1		
NH	10	9	19		
PPP	3	2	5		
Age				-0.64^{T}	0.53
Mean (SD)	36.5 (9.8)	39.0 (10.2)	37.7 (9.9)		
Range	25–53	22–53	22–53		
Experience in stroke management				-0.60^{T}	0.55
Mean (SD), years	9.5 (8.1)	11.0 (5.6)	10.2 (6.9)		
Range, years	2–27	2–20	2–27		
Number of patients with stroke treated/week,				-0.54^{T}	0.59
Median (mode), *n*	4 (3)	4 (3)	4 (3)		
Range	2–12	3–15	2–15		
Psychological predictors of behaviour:					
Intention, mean (SD)	4.2 (0.4)	4.1 (0.6)	4.2 (0.5)	0.34^{T}	0.74
PBC, mean (SD)	3.7 (0.7)	3.9 (0.6)	3.8 (0.6)	-1.05^{T}	0.30
Barriers and facilitators to use outcome measures:					
BFQ total score, mean (SD)	60.7 (5.2)	62.0 (4.9)	61.4 (5.0)	-0.68^{T}	0.50

ACH, acute care hospitals; BFQ, barriers and facilitators questionnaire; *N*, number of physiotherapists; NH, nursing homes; RC, rehabilitation centres; PBC, perceived behavioural control; PPP, private physiotherapy practices; SD, standard deviation.
[C]Chi-square test.
[T]*T*-test.
*Significant at $P<0.05$.

Table 2 Primary outcome

Outcome variables	Expert tutor group (ETG)		Non-expert tutor group (NETG)		Between-group differences Change T_0 to T_1[#]
	Baseline (T_0)	Post-intervention (T_1)	Baseline (T_0)	Post-intervention (T_1)	
Actual use[a] (*N*)	15	13	15	14	Mann–Whitney (sig.)
Number out of seven RCOMs					
Median (mode)	3 (2)	6 (6)	3 (2)	4 (4)	53.5
[Range]	[0–6]	[1–7]	[0–6]	[0–6]	($P=0.07$)

N, number of physiotherapists; RCOMs, recommended core outcome measures; T_0, baseline; T_1, post-intervention.
[#]Significance at $P<0.05$.
[a]Actual use of outcome measures, based on records of five most recently treated patients (converted to 0–100% scores).

in actual use during PEPCiS, and eight determinants (Table 5).

Discussion

The objective in this pilot study was to detect differences between participants trained by a tutor who had extensive experience with outcome measures in stroke care versus those trained by a tutor with less experience. Both groups increased their actual use of outcome measures after participating in the Physiotherapists' Educational Programme on Clinimetrics in Stroke (PEPCiS), going from a median of 3 to 6 different outcome measures for those trained by the expert tutor and from

Table 3 Secondary outcomes

Outcome variables	Expert tutor group (ETG)		Non-expert tutor group (NETG)		Between-group differences Change T_0 to T_1[#]
	Baseline (T_0)	Post-intervention (T_1)	Baseline (T_0)	Post-intervention (T_1)	
1) Self-reported use* (*N*)	15	13	15	14	Mann–Whitney (sig)
Number out of seven RCOMs median (mode) [Range]	4 (5) [0–6]	6 (7) [5–7]	4 (4) [0–6]	5 (5) [4–7]	76.5 ($P=0.48$)
2) Participants' appreciation of tutoring style (TBQ) (*N*)		13		13	*T*-statistics (T_1)-between groups (sig.)
2a) TBQ subject matter expertise (total of three scales), mean (SD)		72.7 (5.0)		56.1 (11.9)	4.63 $P<0.001$[#]
2b) TBQ process facilitation skills (total of three scales), mean (SD)		71.1 (4.5)		59.7 (6.8)	5.10 $P<0.001$[#]
2c) TBQ overall effectiveness (appreciation, 1–10 scale), mean (SD)		8.3 (0.5)		6.2 (1.5)	4.87 $P<0.001$[#]
3a) Compliance with study procedures Attendance/drop-out					
Number of PTs (*N*)		15/0		15/0	0.26
Number of sessions, median, range 0–5		5 (4–5)		5 (4–5)	$P=0.80$
Delivered patient records		13		14	0.59
PTs lost to analysis in (*N*)		1		1	$P=0.56$
Completed self-report questionnaires:		13		14	0.59
PTs lost to analysis in (*N*)		2		1	$P=0.56$
3b) Participants' satisfaction (range 0–10) about:					
Organization of PEPCiS, mean (SD)		7.7 (0.8)		6.9 (1.9)	1.34 $P=0.19$
Content of PEPCiS, mean (SD)		8.9 (1.0)		7.8 (1.9)	3.56 $P=0.02$[#]
Knowledge gain by PEPCiS, mean (SD)		8.6 (1.0)		6.5 (2.2)	3.26 $P=0.03$[#]
Own participation in PEPCiS, mean (SD)		6.9 (0.8)		7.1 (1.3)	−0.36 $P=0.72$
Overall score of the four PEPCIS items		8.0		6.9	

N, number of physiotherapists; PT, physiotherapist; RCOMs, recommended core outcome measures; SD, standard deviation; T_0, baseline and T_1, post-intervention; TBQ, Tutor Behaviour Questionnaire.
[#]Significance at $P<0.05$.
*Self-reported use of outcome measures based on a questionnaire about five most recently treated patients (converted to 0–100% scores).

3 to 4 for the non-expert group. However, the added value of an expert tutor could not be proven ($P=0.07$), although physiotherapists educated by the expert tutor were more satisfied about the tutor. Furthermore they seem to use a broader variety of instruments than their colleagues in the non-expert tutor group, when looking at the change scores between baseline and post intervention in the Motricity Index, 10-m walk and Frenchay Arm Test.

Physiotherapists tended to overestimate their self-reported use of outcome measures. This overestimation may have been caused by their tendency to give socially desirable answers, because recommendations in clinical practice guidelines and ethical professional requirements imply that they are expected to use outcome measures. A post-hoc analysis at the baseline of the present study showed that physiotherapists perceived that they used more outcome measures as recorded

Table 4 Between-group differences in actual and self-reported us of the seven recommended outcome measures

Outcome variables	Expert tutor group (ETG) T_1 minus T_0 (ΔE)	Non-expert tutor group (NETG) T_1 minus T_0 (ΔC)	SD_E/SD_C	Between-groups ΔE–ΔC	Mann–Whitney *U*-test (*Z*)	Sign. (*P*)
Actual use[a] (%):						
Motricity Index	50	20	34/36	30	2.04	0.04[#]
Trunk Control Test	41	15	34/39	26	1.36	0.17
Berg Balance Scale	35	26	36/28	9	0.69	0.51
Functional Ambulation Categories	52	23	38/39	29	1.29	0.20
10-m walk	32	5	21/18	27	2.34	0.02[#]
Frenchay Arm Test	17	−7	–/26	24	2.02	0.04[#]
Barthel Index	27	7	39/21	20	0.69	0.50
Self-reported use[b] (%):						
Motricity Index	49	33	36/36	16	1.06	0.30
Trunk Control Test	32	16	42/38	16	0.91	0.38
Berg Balance Scale	44	30	36/33	14	1.44	0.16
Functional Ambulation Categories	43	43	44/43	0	0.05	0.97
10-m walk	30	16	23/22	14	1.12	0.28
Frenchay Arm Test	39	4	–/10	35	2.57	0.01[#]
Barthel Index	42	13	46/41	29	1.02	0.33

[#]Significance at $P<0.05$.
C = control group (non-expert tutor group); E = experimental group (expert tutor group); *n* = number of physiotherapists.
PT, physiotherapist; SD, standard deviation.
[a]Actual use of outcome measures, based on patient records of five most recent treated patients (recalculated to 0–100% scores).
[b]Self-reported use of outcome measures is based on a questionnaire about five most recent treated patients (recalculated to 0–100% scores).

in self-reported questionnaires (median = 4) than they actually did in patient records (median = 3). After the intervention, the participants reported a median use of 6 recommended outcome measures, whereas our analysis found an actual use of 5 measures.

To our knowledge, this is the first study to examine the effects of differences in content expertise between tutors in physiotherapy education. Studies in university education have been inconclusive about the effects of tutor content expertise differences.[21,22] In the present study, the two tutors differed in content expertise as regards clinical experience in using clinical assessments in patients with stroke. Although the study participants evaluated several important aspects of tutoring style (knowledge of subject matter, skills in process facilitation and overall effectiveness of the tutor), other possible confounding aspects, such as personality and seniority, were disregarded. In a future study with sufficient power, we intend to investigate the influence of tutor expertise as well as interfering factors, such as performance of tutors, in order to establish and improve the effectiveness of educational interventions as a part of implementation strategies for the regular use of outcome measures by physiotherapists.

The physiotherapists participating in this study were self-selected and the majority worked in nursing homes. They probably volunteered because they had a more than average interest in caring for patients with stroke and hence a greater intention to use the clinical practice guideline and its recommended outcome measures (Table 1). Thus these therapists can be regarded as a preferred group of interest. Moreover, they might represent a specific subgroup of 'innovators' or 'early adopters'.[27] Overall the physiotherapists in this study claimed a more frequent use of outcome measures before the educational programme than a randomly addressed group of physiotherapists who

Table 5 Univariate logistic regression analyses

	Univariate analysis		*P*-value	Odds (95% CI)
	B (beta coefficient)	SE		
Gender (female)*	−1.76	1.20	0.14*	0.17 (0.02–1.82)
Age (≤ 34 years)*	2.11	0.89	0.02*	8.25 (1.45–46.86)
Experience (≤ 9 years)*	3.40	1.20	<0.01*	30.00 (2.87–313.47)
Number of treated patients*	0.20	0.12	0.10*	1.22 (0.96–1.54)
Initial actual use at T_0 (≤ outcome measures)*	3.00	1.01	<0.01*	20.00 (2.77–144.31)
Initial self-reported use at T_0 (≤ 2 outcome measures)	0.45	0.82	0.59	1.56 (0.31–7.82)
Setting of practice	0.08	0.45	0.86	1.09 (0.45–2.61)
Allocated tutor (expert tutor)*	−1.06	0.80	0.19*	0.35 (0.07–1.66)
PT's intention (T_0)*	−1.71	1.06	0.11*	0.18 (0.02–1.46)
PT's attitude (T_0)	−0.43	0.70	0.54	0.65 (0.17–2.56)
PT's perceived behavioural control (T_0)	−0.26	0.59	0.66	0.77 (0.24–2.46)
PT's self-efficacy (T_0)	0.12	0.84	0.89	1.13 (0.22–5.87)
Organization of PEPCiS	−0.09	0.27	0.72	0.91 (0.53–1.54)
Content of PEPCiS	−0.31	0.45	0.50	0.74 (0.30–1.78)
Increase of knowledge by PEPCiS	0.07	0.21	0.72	1.08 (0.72–1.61)
Own participation in PEPCiS	0.30	0.40	0.46	1.34 (0.62–2.92)
BFQ – personal competence (3 items)	−0.18	0.17	0.27	0.83 (0.60–1.15)
BFQ – application (4 items)	−0.12	0.15	0.43	0.89 (0.66–1.19)
BFQ – appraisal of information (3 items)	−0.25	0.40	0.54	0.78 (0.36–1.71)
BFQ – professional attitude (4 items)	−0.07	0.30	0.83	0.94 (0.52–1.68)
BFQ – incentives (3 items)	0.28	0.26	0.27	1.32 (0.80–2.18)
BFQ – regulation (2 items)	0.12	0.44	0.79	1.13 (0.48–2.65)
BFQ – TOTAL	−0.06	0.08	0.48	0.95 (0.81–1.10)
TBQ – subject-matter expertise (3 scales)	0.01	0.03	0.69	1.01 (0.95–1.08)
TBQ – process facilitation skills (3 scales)	0.01	0.05	0.80	1.01 (0.92–1.12)
TBQ – overall effectiveness (rating of tutor; appreciation ≥7 on 1–10 scale)*	1.20	0.85	0.16	3.33 (0.63–17.57)

SE, standard error of the estimate; PEPCiS, Physiotherapists' Educational Programme on Clinimetrics in Stroke; BFQ, Barriers and Facilitators Questionnaire; TBQ, Tutor Behaviour Questionnaire.
*Significant determinant of actual use of outcome measures after PEPCiS ($P<0.2$).

responded to a recent survey in the Netherlands ($N=167$).[9]

In line with this survey, a notable finding of the present study is the extremely infrequent use of the Frenchay Arm Test (FAT). Although the FAT was introduced among Dutch physiotherapists in 2002, it still seems to be a relatively unknown outcome measure for classifying arm and hand use of patients with stroke.[9]

The present study had certain methodological limitations, in that tutors were not blinded and the physiotherapists, who were unaware of the precise objectives of the study, were semi-blinded. The sample size in this pilot study is quite small and highly selected, which makes it difficult to use a regression analysis and to generalize the conclusions. Although several authors[28,29] have advised against using statistical analysis in pilot studies, our analysis suggests a potential effect of the level of tutor expertise in the educational programme investigated in the present study. A sufficiently powered study should shed light on the true contrast of effectiveness for tutor experience in education.

The univariate logistic regression analysis on the entire set of data from the present study revealed eight factors that were associated with a change score of 2 or more outcome measures before and after the educational programme PEPCiS. Since the tutors' performance was one of the predicting factors this factor warrants further investigation in multilevel analysis in a future larger trial.

The present pilot study was designed with two tutors. Because of the cross-level interaction between the participants and their allocated tutor, a multilevel analysis randomized at tutor

level would be necessary to detect effects at the level of the participants. To preclude bias by non-content expertise dependent aspects of each tutor, a larger cluster randomized study to test the hypothesis 'PEPCiS results in an enhanced use of two or more outcome measures by physiotherapists' is necessary with, based on a power calculation with 280 physiotherapists, a comparison of 10 expert and 10 non-expert tutors, each of them educating a group of 14 physiotherapists. Using these techniques in more robust future trials would allow corrections for the effects of other factors, such as 'intention' on the numbers of outcome measures recorded in electronic patient records.

In addition, we need to examine the impact of improved use of outcome measures by therapists on the outcome and quality of care at the level of the patients, nested within therapists. So, in future guideline implementation research not only effects have to be investigated at the level of physiotherapists (do they act according to the guideline recommendations), but also at the level of patients (does guideline-driven therapy result in better patient outcomes?).

Clinical messages

- Education seems to be a valuable way to promote the use of outcome measures by physiotherapists involved in stroke rehabilitation.
- Tutors with content expertise seem to be more effective in educating physiotherapists to change their professional behaviour than tutors without content expertise.
- Trials with large sample sizes are more valuable than trials with a small and specific data set.

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References

1 Australian Physiotherapy Association. APA Position Statement – Clinical justification and outcome measures. Accessed from https://apa.advsol.com.au/staticcontent/staticpages/position_statements/public/ClinicalJustification&Outcome%20Measures.pdf 2003.
2 Abrams D, Davidson M, Harrick J, Harcourt P, Zylinski M, Clancy J. Monitoring the change: current trends in outcome measure usage in physiotherapy. *Man Ther* 2006; **11**: 46–53.
3 Akinpelu AO, Eluchie NC. Familiarity with, knowledge, and utilization of standardized outcome measures among physiotherapists in Nigeria. *Physiother Theory Pract* 2006; **22**: 61–72.
4 Chesson R, Macleod M, Massie S. Outcome measures used in therapy departments in Scotland. *Physiotherapy* 1996; **82**: 673–79.
5 Lennon S. Physiotherapy practice in stroke rehabilitation: a survey. *Disabil Rehabil* 2003; **25**: 455–61.
6 Maher C, Williams M. Factors influencing the use of outcome measures in physiotherapy management of lung transplant patients in Australia and New Zealand. *Physiother Theory Pract* 2005; **21**: 201–17.
7 Mayo N, Cole B, Dowler J, Gowland C, Finch E. Use of outcome measures in physiotherapy: survey of current practice. *Can J Rehabil* 1994; **7**: 81–82.
8 Oostendorp RAB, Pluimers DJ, Nijhuis-van, der Sanden MWG, Wensing M. Physiotherapy patient documentation: the Achilles heel of evidence-based practice? [In Dutch: Fysiotherapeutische verslaglegging: de Achilleshiel voor Evidence-based Practice (EBP)?]. *Ned Tijdschr v Fysioth* 2006; **116**: 56–61.
9 Van Peppen RPS, Maissan JF, Van Genderen FR, Van Dolder R, Van Meeteren NLU. Outcome measures in physiotherapy management of patients with stroke: a survey into self-reported use, and barriers to and facilitators for use. *Physiother Res Int* 2008; **13**: 255–70.
10 Jette DU, Bacon K, Batty C *et al*. Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. *Phys Ther* 2003; **83**: 786–805.
11 Parker-Taillon D. CPA initiatives put the spotlight on evidence-based practice in physiotherapy. *Physiother Can* 2002; **24**: 12–15.
12 Van Peppen RPS, Hendriks HJM, Van Meeteren NLU, Helders PJM, Kwakkel G.

The development of a clinical practice stroke guideline for physiotherapists in The Netherlands: A systematic review of available evidence. *Disabil Rehabil* 2007; **29**: 767–83.
13 Turner-Stokes L, Turner-Stokes T. The use of standardized outcome measures in rehabilitation centres in the UK. *Clin Rehabil* 1997; **11**: 306–13.
14 Pollock AS, Legg L, Langhorne P, Sellars C. Barriers to achieving evidence-based stroke rehabilitation. *Clin Rehabil* 2000; **14**: 611–17.
15 Hammond R. Evaluation of physiotherapy by measuring outcome. *Physiotherapy* 2000; **86**: 170–72.
16 Glasziou P, Irwig L, Mant D. Monitoring in chronic disease: a rational approach. *BMJ* 2005; **330**: 644–48.
17 Lomas J. Teaching old (and not so old) does new tricks: effective ways to implement research findings. In Dunn EV, Norton PG, Steward M, Tudiver F, Bass MJ. eds. *Disseminating research/changing practice*. London, Sage, 1993.
18 Powell CV. How to implement change in clinical practice. *Paediatr Respir Rev* 2003; **4**: 340–46.
19 Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. Vol 50. 179–211.
20 Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. *Lancet* 2003; **362**: 1225–30.
21 Dolmans DH, Gijselaers WH, Moust JH, de Grave WS, Wolfhagen IH, van der Vleuten CP. Trends in research on the tutor in problem-based learning: conclusions and implications for educational practice and research. *Med Teach* 2002; **24**: 173–80.
22 Schmidt HG, van der Arend A, Moust JH, Kokx I, Boon L. Influence of tutors' subject-matter expertise on student effort and sachievement in problem-based learning. *Acad Med* 1993; **68**: 784–91.
23 Portney LG, Watkins MP. *Foundations of clinical research applications to practice*, second edition. New Jersey, Prentice-Hall, 2000.
24 Francis JJ, Eccles MP, Johnston M *et al*. *Constructing questionnaires based on the theory of planned behaviour, a manual for health services researchers*. Newcastle upon Tyne: Centre for Health Services Research, University of Newcastle, 2004.
25 Eccles M, Grimshaw J, Walker A, Johnston M, Pitts N. Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. *J Clin Epidemiol* 2005; **58**: 107–12.
26 Groves M, Rego P, O'Rourke P. Tutoring in problem-based learning medical curricula: the influence of tutor background and style on effectiveness. *BMC Med Educ* 2005; **5**: 20.
27 Rogers EM. *Diffusion of innovations*. New York, The Free Press, 1983.
28 Beurskens AJ, de Vet HC, Kant I. [Roaming through the methodology. VIII. Pilot studies: sense and nonsense]. *Ned Tijdschr Geneeskd* 1998; **142**: 2142–45.
29 Lancaster GA, Dodd S, Williamson PR. Design and analysis of pilot studies: recommendations for good practice. *J Eval Clin Pract* 2004; **10**: 307–12.
30 Rothstein JM, Echternach JL, Riddle DL. The Hypothesis-Oriented Algorithm for Clinicians II (HOAC II): a guide for patient management. *Phys Ther* 2003; **83**: 455–70.
31 Vreeman DJ, Taggard SL, Rhine MD, Worrell TW. Evidence for electronic health record systems in physical therapy. *Phys Ther* 2006; **86**: 434–46.
32 Haynes RB, Devereaux PJ, Guyatt GH. Clinical expertise in the era of evidence-based medicine and patient choice. *Vox Sang* 2002; **83**(suppl 1): 383–86.
33 Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. *Phys Ther* 2002; **82**: 1098–107.
34 World Health Organization. ICF-introduction. *The International Classification of Functioning, Disability and Health*. Geneva: WHO, 2001. http://www.who.int/classification/icf/intros/ICF-Eng-Intro.pdf
35 Schenkman M, Deutsch JE, Gill-Body KM. An integrated framework for decision making in neurologic physical therapist practice. *Phys Ther* 2006; **86**: 1681–702.

Appendix – Physiotherapists Educational Programme on Clinimetrics in Stroke (PEPCiS)

The PEPCiS course book is based on the recommendations for the use of clinical assessments in the Dutch Clinical Practice Guideline on Physiotherapy management of patients with Stroke (CPGPS)[12] and consists of 89 pages of text, including detailed explanations on the 25 unique outcome measures, including the seven

outcome measures recommended in this clinical practice guideline. PEPCiS supports physiotherapists to enhance the use of the recommended outcome measures by integrating the triad of clinical reasoning in physiotherapeutic stroke management,[30] objectifying patients' functional recovery with the help of outcome measures,[16] and recording these outcomes.[31] The physiotherapists participating in PEPCiS use the data of their own patients. The content of the programme, summarized below, is based on (1) evidence-based practice (EBP) principles, as described by Haynes *et al.*[32]; (2) learning strategies, such as interactive teaching, measurement skills training, peer learning, discussions and reflective thinking; and (3) professional education tools such as: (a) the Rehabilitation Problem Solving Form (RPS),[33] based on the International Classification of Functioning, Disability and Health (ICF)[34] and (b) the Hypothesis-Oriented Algorithm for Clinicians II (HOAC II)[30] for neurological physiotherapy practice.[35]

The core set of seven recommended outcome measures of the clinical practice guideline included in the present study consisted of the Motricity Index (MI), Trunk Control Test (TCT), Berg Balance Scale (BBS), Functional Ambulation Categories (FAC), 10-m walk (TMW), Frenchay Arm Test (FAT) and Barthel Index (BI).[12] This core set should be applied to all patients with stroke in all phases after stroke, in each setting where physiotherapists work.[12] The time required to administer all seven recommended outcome measures is about 45–60 minutes.[12] The programme is offered in a fully equipped 'clinimetrics classroom', with software available for the recording of patient data.

Content of PEPCiS

Session 1	• Introduction EBP, ICF and RPS as educational tools
	• Peer learning and reflective thinking about outcome measures used by participating physiotherapists
	• Discussions about the use of outcome measures in clinical reasoning and clinical decision making
	• General introduction to physiotherapeutic stroke management
	• Participants' own patient records guiding participants in PEPCiS.
Session 2	• Theme: Walking and mobility-related activities
	• Introduction of software for recording patients' data
	• Introduction of three recommended outcome measures: interactive teaching on FAC, TMW and BBS
	• Training measurement skills and peer learning
	• Discussions about prediction models (walking).
Session 3	• Theme: Hand and arm use
	• Introduction of HOAC II
	• Introduction of two recommended outcome measures: interactive teaching on MI and FAT
	• Discussions about prediction models (hand and arm use).
Session 4	• Theme: Integration of outcome measures, therapeutic (SMART) goals and evaluations
	• Introduction of two recommended outcome measures: interactive teaching on TCT and BI
	• Peer learning with RPS and patients' data (platform presentations by participating physiotherapists).
Session 5	• Theme: How to communicate using outcome measure data
	• Peer learning, using HOAC II and RPS in physiotherapeutic stroke management during everyday practice.

SMART, specific, measurable, attainable, realistic and timely; HOAC, Hypothesis-Oriented Algorithm for Clinicians II; MI, Motricity Index; FAT, Frenchay Arm Test; RPS, Rehabilitation Problem Solving Form; BI, Barthel Index; TMW, 10-m walk; BBS, Berg Balance Scale; EBP, evidence-based practice; ICF, International Classification of Functioning, Disability and Health; PEPCiS, Physiotherapists' Educational Programme on Clinimetrics in Stroke.