

## Special Article- Stroke Rehabilitation

# The Provision of Feedback in Community Stroke Rehabilitation: The Therapists' Perspective

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## Abstract

**Background and Purpose:** The provision of feedback from the therapist to the patient during post-stroke rehabilitation necessitates astute clinical reasoning and decision making (CRDM). Therefore, if innovative methods of promoting self-managed rehabilitation, such as the use of technology, are to effectively augment therapeutic practice, understanding the CRDM underpinning the provision of feedback is essential. This research explores the CRDM underpinning the provision of feedback during community-based post-stroke rehabilitation by gaining the perspectives of Community Stroke Teams.

**Methods:** Qualitative data analysis from two focus groups using thematic analysis was used to identify major themes. Purposeful sampling was used to recruit community-based individual Occupational therapists (OT) and Physiotherapists (PT) that were specifically involved in facilitating physical rehabilitation to stroke survivors in the patients' home (n=14).

**Results:** Four major themes emerged: the delivery of feedback; adapting feedback to the individual; carers involvement; enabling self-management: the influence of the therapist. Therapists reported providing visual, verbal and tactile (hands-on) feedback which was adapted to the individual's personal and environmental context. However, the focus groups also highlighted how therapists control the rehabilitation process; what they include and who they include.

**Discussion:** In accordance with the ICF model, data suggest the CRDM when providing feedback for stroke rehabilitation in the community is underpinned by the medical, social and contextual components of health. However, how therapists control the rehabilitation process; what they include and who they include is often led by the therapist. This learning experience may impact on further rehabilitation experience(s) or contemporary models of care delivery; such as, autonomous rehabilitation using technology.

**Keywords:** Stroke; Rehabilitation; Feedback; Clinical Decision Making

## Introduction

Stroke is a global problem and the worldwide incidence of stroke is set to escalate from 15.3 million to 23 million by 2030 [1]. In the UK, strokes are the largest single cause of disability [2] costing the economy £8.9 billion a year [3].

Currently therapists play a crucial role in rehabilitation and guiding their patient through the process of post-stroke rehabilitation and recovery which includes both physical and psychological adaptation within the personal and environmental context of the stroke survivor [4]. A key aspect of post-stroke rehabilitation is the provision of appropriate information and feedback to the learner [4,5] and it is also an essential element for maximising experience-dependent plasticity and learning [6].

### Feedback in post-stroke rehabilitation

A number of studies have been carried out to examine feedback for post-stroke rehabilitation [4,5]. Visual [7,8,9,10] and verbal feedback [11,12] has been shown to improve motor and functional performance following a stroke. In addition evidence suggests that

knowledge of performance (KP) is more effective than knowledge of results [13,14] and that external focus (environmental effect) feedback is more effective than internal focus (physical movement effect) feedback when performing functional tasks [15]. However, a recent multi-method pilot study revealed that in practice, Physiotherapists predominantly give internal focus instruction and feedback to their patient [16]. This may highlight a discrepancy between the evidence (study conditions) and clinical practice (real-life conditions).

Much of the evidence supporting conventional post-stroke rehabilitation suggests that feedback is motivating and reinforcing and is provided verbally face-to-face by a therapist which typically involves hands-on therapy [17,18,19,20]. However, observational studies have found an unequal balance of communication whereby therapists spend approximately twice as much time talking than the patient [21,22]. Nevertheless, good communication between the clinician and the patient can lead to better clinical outcome and is therefore considered to be the most important aspect of practice. Furthermore, service users report that they require clear information and regular, consistent, objective feedback [23]. This may suggest that

**Table 1:** Community stroke team one demographics.

Therapist	OT/PT	Years qualified	Qualification	Stroke speciality (time working in stroke in years)
HPA	OT	20	Dip Cot	10
HPB	PT	10	Dip Grad Phys	7
HPC	PT	6	BSc (Hons)	2
HPD	PT	6	BSc (Hons)	1
HPE	PT	5	BSc (Hons)	1
HPF	OT	11	BSc (Hons); MSc OT	8
HPG	PT	8	BSc (Hons); MSc Mod Basic Bobath	6
HPH	OT	6	BSc (Hons); Previous BSc (Hons)	2
HPI	OT	1	BSc (Hons)	1

verbal communication that incorporates feedback is an important element of clinical practice for both the patient and the therapist.

The provision of feedback requires a number of judgements to be made by the therapist to ensure that optimal outcomes are achieved. This necessitates the therapist(s) to apply astute clinical reasoning and decision making throughout the rehabilitation process [24].

### Clinical reasoning and decision making (CRDM)

Clinical reasoning refers to the thinking and decision-making processes that are used in clinical practice [24] this has been defined as a process in which the therapist, interacting with the patient and others (such as family members or others providing care), helps patients structure meaning, goals, and health management strategies based on clinical data, patient choices, and professional judgment and knowledge [25].

Although clinical reasoning and the provision of feedback are fundamental to effective practice, little is known regarding the CRDM underpinning the provision of feedback by therapists during community-based post-stroke rehabilitation. Furthermore, due to the increasing demand on services and financial constraints, service needs cannot be met. As a result, there is an increasing drive for the delivery of new, innovative service models such as the use of technology, to increase the amount of time patients spend in therapy by augmenting therapists within the context of home-based rehabilitation [26].

Whilst there is evidence suggesting what forms of feedback are effective, there is firstly; no evidence investigating the CRDM underpinning the provision of various forms and methods of delivering feedback in clinical practice from the perspective of the therapists providing post-stroke physical rehabilitation in the community, secondly; if new, innovative service models such as the use of technology are to be adopted by therapists, it is essential that

they are able to complement the CRDM process. This paper will therefore explore the CRDM underpinning the provision of feedback during community-based post-stroke rehabilitation by gaining the perspectives of the therapists within Community Stroke Teams (CST).

### Methods

A constructivist paradigm [27] was used for data analysis of two separate 90 minute focus groups [28] as this offers researchers the opportunity to explore human experience of people living and interacting in their natural environmental, social and cultural world [27].

### Sampling and recruitment

Purposeful sampling was used to recruit individual Occupational therapists (OT) and Physiotherapists [13] that were specifically involved in facilitating physical rehabilitation to stroke survivors in the patients' home. The researcher visited both teams separately to introduce the study and explain their involvement. This was followed by the distribution of information sheets describing in detail what their participation in the study would involve and letters of invitation to a total of 23 qualified OT's and PT's. Nine out of thirteen from group one (HPA-HPI) agreed to take part and five out of ten from group two (HP1-HP5) resulting in fourteen participants.

Separate focus groups [29] with two teams of community stroke practitioners (n=14) were convened in the community-based work place of each team (details of the therapists are outlined in Tables 1 and 2).

### Procedure

**Data collection:** Members of the groups were known to each other and seated in a circle. They were then asked to sign a

**Table 2:** Community stroke team two demographics.

Therapist	OT/PT	Years qualified	Qualification	Stroke speciality (time working in stroke in years)
HP1	PT	6	BSc (Hons); Basic Bobath	2
HP2	OT	20	Dip Cot; MSc Mods Basic Bobath	15
HP3	OT	2	BSc (Hons)	1
HP4	PT	13	BSc (Hons); Basic Bobath; AdvBobath; MSc Mods	3
HP5	OT	18	Dip Cot	14

consent form and fill in a brief questionnaire on their professional background. The session was then audio-taped and each topic guide based on the underpinning theories of motor-learning, feedback and self-management was presented to the group(s) in turn detailing the discussion areas. For example, these included 'what forms of feedback are routinely given to patients and carers during rehabilitation sessions' and an exploration of their CRDM. During the discussion the therapists were only interrupted when they either digressed to the extent that the discussion was not relevant to the study or they had no further comments on that particular aspect of the discussion. In these cases, they were given prompts and probes to explore further or they were asked a different question to take the discussion forward.

**Data analysis:** The focus group discussions were transcribed verbatim from the tape-recording. These were then checked for accuracy by listening to the recording and matching the audio to the transcription allowing for further accuracy as well as adding moments of expression by the therapists. Following this process, the transcriptions were delivered back to the therapists for respondent validation [30]. None of the therapists in either group contacted the researcher to make alterations to the transcripts.

Transcriptions were then thematically analysed through an iterative process which involved; reading through each response by the therapists, and the identification of information units [31]. Throughout this procedure, the transcripts were revisited for further refinement. The initial process involved, individual focus group analysis i.e. Stroke team one only followed by stroke team two. This allowed for an exploration of different information units to emerge from each team. Following this, connecting information units were then merged to establish a broader 'theme' and sub-themes. Finally, themes were then supported by corresponding statements [32,33].

**Ensuring rigor and reflexivity:** The researcher used respondent validation to ensure that the interpretation of the data matches that of the subject(s). This was done by explaining the transcription to the subject(s) by face-to-face conversation or telephone conversation. The researcher's background as a PT may have influenced the interpretation of the data. Therefore, regular peer and supervisory meetings allowed for the defence and evaluation of data collection procedures and analysis.

**Ethical considerations:** Ethical approval was obtained from the South Yorkshire Research Ethics Committee (REC reference: 08/H1310/63), Sheffield Hallam University Ethics Committee and Sheffield Health and Social Research Consortium research and development department.

## Results

Following prolonged contact with the data, 42 information units were highlighted from the CST one transcript and 53 from the CST two transcripts. Combined, these information units formed 4 themes 18 sub-themes and 31 sub-divisions of themes. The following figure illustrates the four main themes (Figure 1).

### Themes

**The Delivery of Feedback:** Both of the CST's discussed in detail what forms of feedback they gave.

Following the provision of instruction during face-to-face

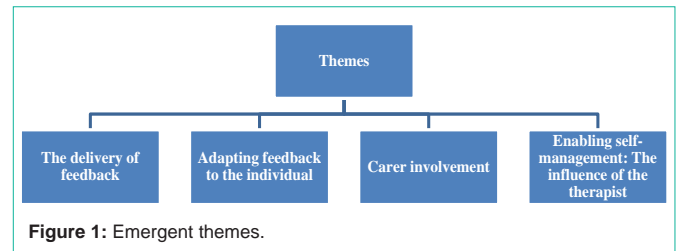


Figure 1: Emergent themes.

contact, therapists described how it was important to give various forms of feedback and what feedback will avoid incorrect movement patterns that may be reinforced,

*"If someone doesn't know where their arm is in space there is no point saying to them put your arm in this position. They need that hands-on feedback and verbal or indeed a mirror like we discussed earlier" HPG.*

*"...as part of your assessment you find out what they respond to so as (HPG)" HPC.*

Interestingly, an OT felt that more frequent and even instantaneous feedback was better because it may reduce the possibility of the patient performing the exercises incorrectly,

*"Feedback is more effective when it is instantaneous as well, like when you giving them feedback as they go along in the session they are more likely to be successful than when you're not there" HPF.*

It was suggested that giving positive feedback is beneficial for the patient as it may give them a boost and for the therapist as it allows them to demonstrate changes over time,

*"...you can give them quite a lot of positive feedback verbally for just being motivated and finding time to do it" HP1.*

**Adapting Feedback to the Individual:** A PT and an OT from each of the teams believed that tailoring and adapting the feedback to the individual was paramount and how they did that depended on the patients: impairments; ability to remember important aspects of feedback and what they respond to,

*"Some of that is based on the type of person that you have been able to establish they are and what they respond more positively to. Some people have impairments that dictate what you give them and what you don't give them." HPA.*

A theme that ran throughout both of the focus group discussions was how the health professionals' CRDM was underpinned by their experience and their empirical understanding of patients to make judgements and assumptions as to which form of feedback they felt was most appropriate. A senior OT described how she tailored her instruction and feedback specifically for the patient,

*"...that is based on the type of person that you have been able to establish they are and what they respond more positively to. What they are actually able to do" HPA.*

When asked if and why they vary the feedback they give to patients she replied,

*"There's different reasons aren't there personality, a parent, environment, careers, you know, what their household is like.*

Having knowledge of the patients' impairments was important to making judgements as to how to deliver feedback. One therapist described how she thought this even dictated what she gave them,

*"Some people have impairments that dictate what you give them and what you don't give them." HPA.*

**Carers involvement:** The therapists were asked if they involve carers in the provision of feedback and how.

A number of factors were highlighted that they take into consideration, such as, how getting the carer involved can be detrimental to their relationship and in some instances the patient can actually resent it,

*"...you get carers who are over prescriptive at supervising exercises and tasks that you have asked them to do, you don't want the carer to be sitting over them like some kind of school teacher saying whether it is right or it is wrong" HP5.*

However, if the carer did wish to be involved in the process, it was suggested that this was positive; especially in helping the patient remember what to do and maintaining motivation,

*"...for those that do want to be involved, they are just so valuable" HPF.*

*"...there is no doubt you see much bigger improvements..."HPF.*

Although members of the groups described clear advantages of the carer being involved in the process; they also described disadvantages. Both of the focus groups spoke negatively about the carers' involvement in the provision of assistance with the exercise program and questioned their ability to provide assistance in the way therapists wanted,

*"...some carers are not quite clear on what they should be doing with them. So we'll be practicing something that either you haven't asked them to do or they are doing it in the wrong way. They are really keen and want to help but aren't actually helping" HPE.*

**Enabling self-management: the influence of the therapist:** Throughout the focus group discussions, both teams expressed the need to feel in control of what the patient did and what influences their rehabilitation. In particular, members of the teams described how it is important to avoid the patient making errors and then reinforcing those errors. When asked about how much they worry about error they replied,

*"Obviously when you are not there with them, if they are not doing it correctly they are not getting instant feedback." HPF.*

The therapists also discussed how patients are unaware of making mistakes (errors) because of their lack of ability to understand movement patterns and also because of their impairment(s). In conversation they discussed,

*"... a lot of people aren't aware they are doing the movement patterns wrongly because of their stroke" HPE.*

All (CST south) – *"Even people who haven't had a stroke can't!"*

*"... you need that constant feedback from a PY or an OT until they get that feeling that is ok but that takes a long time" HPC.*

*"We actually provide the patient with afferent input by putting our hands on the patient as well, which you can't get from a computer or anything else." HPC. HPC agrees, "yeah... that extra tactile information."*

However, in contrast to this, one therapist from the CST south pointed out that she liked the notion of the using technology to negate the need for someone to point out their movements,

*"...it is about the actual patient empowerment side again isn't it? That's why the Wii FIT will actually be potentially quite good from that point of view that they can have feedback that they can literally see then and there and they have to do it themselves as such. They're getting it directly to them rather than someone else having to point it out" HPE.*

## Discussion

In harmony with the International Classification of Functioning Disability and Health (ICF), the focus groups highlighted a number of factors that therapists take into consideration when providing feedback to the patient during the rehabilitation process. They described how the pathology, impairments, functional status, participation in society needs, and contextual factors are considered when giving feedback to patients. However, the focus groups also highlighted how therapists control the rehabilitation process; what they include and who they include.

Findings suggest that therapists provide a model of service delivery that is led by their empirical knowledge and understanding. However, this model of delivery may not be conducive to motor learning and self-management and may also influence the personal context of users. This may impact on the uptake of more contemporary model of rehabilitation where feedback is provided by a computer in the absence of a therapist [34].

### The importance of context

The ICF considers the interaction between; pathology (body structure and function), impairment (signs & symptoms), activities (functionality) and participation (social integration); however, it also takes into account the influence of contextual factors, namely: personal factors and their personal and social environment. By taking a bio psychosocial approach to disability; including contextual factors: the ICF has now become the main conceptual framework for understanding the chronic consequences of stroke [35].

One area in particular that emerged from the data is the importance of context. Therapists described how personal and environmental circumstances can influence what forms of feedback therapists give. They described how they felt they needed to establish 'what type of person' their patient was in order to provide the most effective form of feedback. This included the personality, background, interests and their environment. This highlights how therapists feel that the stroke survivor's personal factors are considered and in fact play a part in how they individualise their intervention. Environmentally, therapists described how the patients environment can play a role in how they structure their intervention and how it can provide indirect feedback. For example, a less familiar environment can enable the patient to evaluate their ability by having to overcome everyday environmental obstacles.

This concurs with previous research exploring the perspective of



the multi-professional outreach team [36]. Their study highlighted how the team members believed that working with the patients in their home environment enabled them to gain a greater understanding of the person as an entity. In accordance with these focus groups they suggested that gaining an understanding of the contextual factors was vital to the provision of a rehabilitation program.

This study has highlighted how therapists are mindful of the need to provide feedback that considers the patients environment and who is involved in their rehabilitation (i.e. family members).

### **The involvement of carers/family members**

In addition to their personal environment; their social environment was also considered. In particular, how carers / close family members may be involved in the rehabilitation process. Noticeably, they paid particular attention to the relationship of the patient and carer as well as describing a degree of empathy to the carers' lifestyle and requirements. For example: whether the carer actually wanted to be involved; whether involving the carer to provide feedback may disrupt the relationship with the patient and importantly, whether the carer needed respite particularly if the patient was heavily dependent on the carer. To add to this, it was also apparent that the therapists were not confident that carers had the ability to ensure the patient carried out exercises correctly in the absence of the therapist. Nevertheless, the groups suggested that carers who are keen to be involved enhance the outcome of therapy.

The therapists in these focus groups suggested that in most instances patients and their carers do not have the ability to carry out exercises correctly or be analytical of the movements without professional input. They suggested a number of reasons for this such as, patient impairments, lack of understanding of the required movements and for carers; to what extent they wanted to be involved in the rehabilitation process. Although paradoxically, they liked the idea of testing the Nintendo Wii FIT because it will give concurrent, instant feedback for the patient without the therapist or carer having to provide any input. However, it was apparent that therapists paid careful attention to ensuring patients carried out errorless movement patterns and were concerned by other influences that may hinder this.

### **Instruction / feedback provision**

Talvite [22] systematically observed Physiotherapist (n = 5) and patient (n = 7; 4 neurological, 3 orthopaedic inpatients) verbal and physical communication during treatment sessions in a hospital setting. She concluded that therapists appeared to use verbal and manual (hands-on) feedback out of routine rather than a result of careful consideration. However, this research suggests that therapists take into account the personal, cognitive and physical impairment(s) of their patient when deciding on what form of feedback to provide and how they may deliver them. For example, some patients may respond better to visual rather than verbal feedback whereas others may require hands-on therapy which utilises intrinsic feedback.

The focus groups discussed what forms of feedback therapists provide and also what their reasons were. The overriding factor with both groups centred on what they thought would be effective in enabling the patient and carer to perform an exercise correctly and how the feedback would be effective given the individualism of the patient and their context. In other words, how they could provide

a form of feedback that the patient would understand or be able to respond to, be able to remember and produce better performance. To provide feedback they described how they used verbal and visual feedback. Interestingly, they suggested that instant feedback was better. However, the literature suggests that although instant feedback produces better immediate results, there is little retention of the improved performance. In addition, the performer then relies on the feedback to maintain their improved performance [5].

Other considerations for providing feedback involved the patients' impairments and what they felt the patient would respond to. For example, one of the therapists suggested that some patients may have cognitive impairments that may affect their ability to assimilate information. Practical and motivational factors were also discussed (such as trying to encourage patients to adhere to exercise programmes).

In accordance with these findings, Maclean et al, [37] suggests that rehabilitation professionals commonly believe that motivation affects the outcome of therapy and that highly motivated patients are more likely to view rehabilitation as essential to recovery. This may explain why the therapists in these focus groups discussed how they felt the need to provide positive encouragement during treatment and as a form of feedback. In other words, if the therapists can 'get the patient on board', treatment is more likely to be successful. However, Wulf [38] suggests that allowing the learner to control the timing, frequency and presentation of movement demonstrations can enhance learning. She also speculates that self-controlled feedback may influence motivation and independence which may question the balance of control in the treatment sessions observed by Talvite [39].

### **Limitations**

Firstly, this study is limited to the opinion and perspectives of fourteen therapists within two teams within the same NHS trust who are only involved in the provision of physical therapy (does not include all members of the community stroke team involved in the care of the service user). Whilst this study focused on the physical aspects of rehabilitation, further research may include other members of the multi-disciplinary team such as, speech and language therapists and specialist nurses. Secondly; the focus groups report the therapists' opinion of the CRDM underpinning the provision of feedback which may not reflect actual practice, observation methods would help determine discrepancies between perceived and actual practice.

### **Implications for physiotherapy practice**

Previous research has highlighted the discrepancy between the evidence (study conditions) and clinical practice (real-life conditions) [16]. This research suggests that there are many factors taken into consideration when providing feedback in practice. In accordance with the ICF model [40]; these focus groups and other exploratory studies suggest that their CRDM is underpinned by the medical, social and contextual components of health when providing feedback for stroke rehabilitation in the community. This emphasises how more research is needed to explore the links between the provision of feedback and the context in which it is provided.

However, the focus groups also highlighted how therapists control the rehabilitation process; what they include and who they include in that the rehabilitation experience is often led by the

initial influence of the therapist. The therapist establishes a model of delivery that is individual to the stroke survivor within their personal and social environment. This learning experience may indeed impact on further rehabilitation experience(s) or contemporary models of care delivery; such as, autonomous rehabilitation using technology. This may therefore limit the stroke survivors' ability to adopt a much needed self-managed rehabilitation paradigm. Therefore, in addition to newer methods of delivering rehabilitation (such as the use of technology), work is required to educate therapists in the provision of therapy that includes methods of delivering feedback that facilitates independent rehabilitation. This will place less demand on services whilst empowering stroke survivors and close family members to carry out and continue their recovery beyond the acute and sub-acute period independently.

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## References

- Strong K, Mathers C, Bonita R. Preventing stroke: saving lives around the world. *Lancet Neurol*. 2007; 6: 182-187.
- DoH. National Stroke Strategy. London Crown Copyright; 2007.
- Saka O, McGuire A, Wolfe C. Cost of stroke in the United Kingdom. *Age Ageing*. 2009; 38: 27-32.
- Langhorne P, Coupar F, Pollock A. Motor recovery after stroke: a systematic review. *Lancet Neurol*. 2009; 8: 741-754.
- van Vliet PM, Wulf G. Extrinsic feedback for motor learning after stroke: what is the evidence? *Disabil Rehabil*. 2006; 28: 831-840.
- Subramanian SK, Massie CL, Malcolm MP, Levin MF. Does provision of extrinsic feedback result in improved motor learning in the upper limb poststroke? A systematic review of the evidence. *Neurorehabil Neural Repair*. 2010; 24: 113-124.
- Ertelt D, Small S, Solodkin A, Dettmers C, McNamara A, Binkofski F, et al. Action observation has a positive impact on rehabilitation of motor deficits after stroke. *Neuroimage*. 2007; 36: 164-173.
- Winstein CJ, Gardner ER, McNeal DR, Barto PS, Nicholson DE. Standing balance training: effect on balance and locomotion in hemiparetic adults. *Arch Phys Med Rehabil*. 1989; 70: 755-762.
- Sackley CM, Lincoln NB. Single blind randomized controlled trial of visual feedback after stroke: effects on stance symmetry and function. *Disability & Rehabilitation*. 1997; 19: 536-546.
- Walker C, Brouwer BJ, Culham EG. Use of visual feedback in retraining balance following acute stroke. *Phys Ther*. 2000; 80: 886-895.
- Engardt M, Ribbe T, Olsson E. Vertical ground reaction force feedback to enhance stroke patients' symmetrical body-weight distribution while rising/sitting down. *Scand J Rehabil Med*. 1993; 25: 41-48.
- Whitall J, McCombe Waller S, Silver KH, Macko RF. Repetitive bilateral arm training with rhythmic auditory cueing improves motor function in chronic hemiparetic stroke. *Stroke*. 2000; 31: 2390-2395.
- Cirstea CM, Pfito A, Levin MF. Feedback and cognition in arm motor skill reacquisition after stroke. *Stroke*. 2006; 37: 1237-1242.
- Cirstea MC, Levin MF. Improvement of arm movement patterns and endpoint control depends on type of feedback during practice in stroke survivors. *Neurorehabil Neural Repair*. 2007; 21: 398-411.
- Fasoli SE, Trombly CA, Tickle-Degnen L, Verfaellie MH. Effect of instructions on functional reach in persons with and without cerebrovascular accident. *Am J Occup Ther*. 2002; 56: 380-390.
- Durham K, Van Vliet PM, Badger F, Sackley C. Use of information feedback and attentional focus of feedback in treating the person with a hemiplegic arm. *Physiother Res Int*. 2009; 14: 77-90.
- Ballinger C, Ashburn A, Low J, Roderick P. Unpacking the black box of therapy -- a pilot study to describe occupational therapy and physiotherapy interventions for people with stroke. *Clin Rehabil*. 1999; 13: 301-309.
- Dejong G, Horn SD, Gassaway JA, Slavin MD, Dijkers MP. Toward a taxonomy of rehabilitation interventions: Using an inductive approach to examine the "black box" of rehabilitation. *Arch Phys Med Rehabil*. 2004; 85: 678-686.
- Hartveld A, Hegarty JR. Augmented feedback and physiotherapy practice. *Physiotherapy*. 1996; 82: 480-490.
- Wohlin Wottrich A, Stenström CH, Engardt M, Tham K, von Koch L. Characteristics of physiotherapy sessions from the patient's and therapist's perspective. *Disabil Rehabil*. 2004; 26: 1198-1205.
- Roberts L, Bucksey SJ. Communicating with patients: what happens in practice? *Phys Ther*. 2007; 87: 586-594.
- Talvitie U. Socio-affective characteristics and properties of extrinsic feedback in physiotherapy. *Physiother Res Int*. 2000; 5: 173-189.
- Tyson SF, Burton LJ, McGovern A, Sharifi S. Service users' views of the assessment process in stroke rehabilitation. *Clin Rehabil*. 2014; 28: 824-831.
- Edwards I, Jones M, Carr J, Braunack-Mayer A, Jensen GM. Clinical reasoning strategies in physical therapy. *Phys Ther*. 2004; 84: 312-330.
- Higgs J. Clinical reasoning in the health professions: Elsevier Health Sciences; 2008.
- DoH. Equity and Excellence: Liberating the NHS. London: Crown Copyright; 2010.
- Guba EG LY. Paradigmatic controversies, contradictions, and emerging influences. In: Lincoln NKDaYS, editor. *The Sage Handbook of Qualitative Research* (3rd ed). California: Thousand Oaks, Sage; 2005; 191-215.
- J G. The Use of Focus Groups in Research into Health. In: M Saks JAE, editor. *Researching Health: Qualitative, Quantitative and Mixed Methods*: Thousand Oaks, Sage; 2007.
- Kitzinger J. Focus groups. *Qualitative research in health care*. 2006: 21-31.
- Lincoln YS, Guba EG. *Naturalist inquiry*. Beverly Hills, CA: Sage; 1985.
- Vaughn S, Schumm JS, Sinagub JM. *Focus group interviews in education and psychology*: Sage Publications; 1996.
- Pope C MN. Qualitative methods in health research. In: N CPaM, editor. *Qualitative Research in Healthcare* (3rd ed). Oxford UK: BMJ Books, Blackwell Publishing Ltd; 2006. 1-11.
- Pope C, Ziebland S, Mays N. Analysing qualitative data. *Qualitative research in health care*. 2006; 3: 63-81.
- Parker J, Mawson S, Mountain G, Nasr N, Zheng H. Stroke patients' utilisation of extrinsic feedback from computer-based technology in the home: a multiple case study realistic evaluation. *BMC medical informatics and decision making*. 2014;14: 46.
- Gottlieb A, Golander H, Bar-Tal Y, Gottlieb D. The influence of social support and perceived control on handicap and quality of life after stroke. *Aging (Milano)*. 2001; 13: 11-15.

36. Wottrich AW, von Koch L, Tham K. The meaning of rehabilitation in the home environment after acute stroke from the perspective of a multiprofessional team. *Phys Ther.* 2007; 87: 778-788.
37. Maclean N, Pound P, Wolfe C, Rudd A. Qualitative analysis of stroke patients' motivation for rehabilitation. *BMJ.* 2000; 321: 1051-1054.
38. Wulf G. Self-controlled practice enhances motor learning: implications for physiotherapy. *Physiotherapy.* 2007; 93: 96-101.
39. Talvitie U, Reunanen M. Interaction between physiotherapists and patients in stroke treatment. *Physiotherapy.* 2002; 88: 77-88.
40. Organization) WWH. International classification of functioning, disability and health: ICF. Geneva: 2001.