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Title	Factors Influencing the Delivery of Intensive Rehabilitation in Stroke: Patient Perceptions Versus Rehabilitation Therapist Perceptions
Type	Article
URL	https://clok.uclan.ac.uk/30754/
DOI	https://doi.org/10.1093/ptj/pzz159
Date	2019
Citation	Janssen, Jessica, Klassen, Tara D, Connell, Louise and Eng, Janice J (2019) Factors Influencing the Delivery of Intensive Rehabilitation in Stroke: Patient Perceptions Versus Rehabilitation Therapist Perceptions. Physical Therapy, 100 (2). pp. 307-316. ISSN 0031-9023
Creators	Janssen, Jessica, Klassen, Tara D, Connell, Louise and Eng, Janice J

It is advisable to refer to the publisher's version if you intend to cite from the work.
https://doi.org/10.1093/ptj/pzz159

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Factors influencing the delivery of intensive rehabilitation in stroke: Patients' versus rehabilitation therapists' perceptions

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Tables: 2

Appendix:1

Abstract

Background

Despite increasing evidence on intensive task-specific practice and aerobic exercise in stroke rehabilitation, implementation remains difficult. The factors influencing implementation have been explored from therapists' perspectives; however despite an increased emphasis on patient involvement in research, patients' perceptions have not yet been investigated.

Objective

To investigate factors influencing implementation of higher intensity activity in people with stroke, and compare this with therapists' perspectives.

Design

A cross-sectional qualitative study.

Methods

Semi-structured interviews with people with stroke who were part of a randomized clinical trial**, the Determining Optimal post-Stroke Exercise** (DOSE) study, which delivered a higher intensity intervention. An interview guide was developed and data analysed using implementation frameworks. Factors emerging from people with stroke were compared and contrasted to factors perceived by rehabilitation therapists.

Results

Ten people with stroke were interviewed before data saturation was reached. Participants had a positive attitude regarding working hard, and were satisfied with the graded exercise test, high intensity intervention, and the feedback monitoring devices. Therapists and patients had contrasting perceptions about their beliefs of intensive exercise and the content of the intervention, with therapists more focussed on the methods and patients more focussed on the personal interactions stemming from the therapeutic relationship.

Conclusions

People with stroke perceived no barriers regarding the implementation of higher intensity rehabilitation in practice and were positive towards working at more intense levels. Contrastingly, from the therapists' perspective, therapists' beliefs about quality of movement and issues around staffing and resources were perceived to be barriers. In addition, therapists and people with stroke perceived the contents of the intervention differently, highlighting the importance of involving patients and clinicians in the development and evaluation of rehabilitation interventions.

Word Count: 3967

Introduction

Intensive rehabilitation, including increased repetitions and aerobic exercise, is advised for people after a stroke.[1-6] However, implementation of intensive rehabilitation within inpatient stroke rehabilitation is still lacking.[1,7-9] A survey amongst American physical therapists highlighted the fact that physical therapists see the benefit of higher aerobic exercise in the stroke population; however current recommendations for levels of intensity were not reached.[10] Identified barriers to reaching these were related to the cardiac status of the patient and lack of staff and time.[11] In addition, within North America, the graded exercise test was underused as a screening tool.[10,11]

A recent multi-site, randomized clinical trial, Determining Optimal post-Stroke Exercise (DOSE) assessed the feasibility of implementing intensive, task-specific, physical therapy during inpatient rehabilitation.[12,13] Patients received either standard care, or a 1 or 2 x1 hour intensive exercise program each weekday for 4 weeks. The graded exercise test was used as a screening tool and a **heart rate monitor (Alpha Mio heart rate monitor wrist watch, MioGlobal, Vancouver, BC) and step counters (Fitbit One, Fitbit Inc, San Francisco, CA; StepWatch Activity Monitor (SAM), modus health, Washington, DC) were worn to provide patient feedback and monitor progression.** This study provided a unique opportunity to explore the perceptions of therapists and patients toward intensive therapy.

From a recent qualitative investigation,[14] 15 therapists involved in the DOSE trial believed the emphasis of the intervention on the quantity, rather than quality of movement, was a barrier to implementing intensive rehabilitation in everyday clinical

practice. In addition, system level factors (i.e. staffing, access to the graded exercise test and monitoring equipment) also impeded implementation.

Patient perceptions have not yet been explored towards intensive therapy. This is surprising as from ethical[15] and methodological viewpoints[16] the patient perspective should be central to the development of new treatments. Patients' beliefs of intensive therapy, safety, and respecting their choice are important,[15] when designing and trialling clinical complex interventions.[16]

Therefore, this study aimed to explore the factors influencing implementation of a high intensity intervention from a patient perspective. In addition, it compared the found factors between the patients and previously published perspectives of rehabilitation therapists delivering the therapy.[14]

Methods

Study Design

This qualitative study was embedded in a constructivist paradigm. This meant that we believed that every individual, including patients and their therapists, attached a different meaning to events happening in their environment.[17] By asking open-ended semi-structured questions to patients and therapists involved in the DOSE trial and being open to the social context, these different views could be exposed. Patients, who had completed the DOSE intervention, were interviewed and transcripts were analysed. Then, found factors were compared with previous found factors of DOSE rehabilitation therapists.[14] Semi-structured

interviews are a widely used form of qualitative interviewing, utilising a topic guide which provides a framework for directed, though flexible, open-ended questions.[18-21] The Standards for Reporting Qualitative Research: A Synthesis of Recommendations was used.[22]

Participant Selection

Participants in the DOSE trial were: adults admitted to inpatient rehabilitation within the first 10 weeks post-stroke with hemiparesis in the lower extremity; able to ambulate for at least 5 meters with up to one person maximum assist; able to understand and follow directions. (ClinicalTrials.gov Identifier: NCT01915368) Additional information on in- and exclusion criteria of the DOSE protocol can be found in Klassen et al 2019.[13]

For this interview study, we sought participants who were randomised **in the 1 or 2 x1 hour intensive exercise program of the** DOSE trial between January 2017 and June 2018 in order to minimise recall bias, but also obtain perspectives from people at various timepoints after discharge in case their perspectives changed. The lead investigator of the DOSE trial only contacted these individuals by email if they had previously consented to being part of further research studies. The email included an information sheet explaining the study and a consent form. **Twenty potential participants were in the DOSE trial within the set timeframe. Eight of these potential participants were not approached as they could not be reached with the provided contact numbers (n=4) or had language (n=2) and cognitive barriers (n=2) that excluded them from conducting a phone interview. Therefore, 12 participants were approached and 10 accepted.** Those who

wanted to take part and provided informed consent were put in contact with the researchers (JJ and LC), who were independent of the DOSE trial and conducted the telephone interview.

The comparator therapists were physical therapists and rehabilitation assistants who had experience of delivering the DOSE intervention. The lead investigator of the DOSE study (TK) identified, invited, and consented the rehabilitation therapists, before one researcher (LC) conducted the telephone interviews. The perceptions of these therapists towards intensive therapy have been published.[14]

Data Collection

The interview guide was based on the interview guide developed for rehabilitation therapists in the DOSE study[14] and the underlying implementation frameworks: Normalisation Process Theory (NPT)[23] and the Consolidated Framework for Implementation Research (CFIR)[24] (see Appendix 1). Both the NPT and the CFIR have been developed to understand factors which influence the implementation of an intervention in a clinical setting,[25] such as the DOSE intervention. The interview guide was reviewed and piloted by two researchers with qualitative and physical therapy experience, one DOSE therapist, and two patients from the DOSE trial who fell outside the inclusion criteria of the study.

The interviews were conducted by JJ and LC via telephone and Skype. Participants were told that the conversation would be recorded and that the interviewer was not part of the DOSE research team, giving participants to opportunity to give an honest

perspective. Criticisms were welcomed. The reason of the interview was explained and the recorder was switched on prior to the participants being asked about their own perceptions and experiences of being involved in the trial. **Interviews lasted on average 34 minutes (range 17-46 minutes).** All participants provided written informed consent and received a $50 (CDN) honorarium to compensate them for their time. Interviews were digitally recorded and transcribed verbatim to enable in-depth analysis.

Researcher characteristics and reflexivity

The first interviewer was a physiotherapy researcher in musculoskeletal and neurological disorders (JJ). The second interviewer was a physiotherapist and clinician-scientist, with substantial clinical and research experience in stroke rehabilitation (LC). Due to previous publications and experiences, both interviewers were aware of potential factors influencing implementation arising from a therapist perspective, however less aware from a patient perspective.

Data Analysis

All participants were given a participant code and their interviews were transcribed and imported into NVivo 12. **Content analysis was used, with the CFIR as the coding framework.** The CFIR provides a menu of constructs that have been associated with **effective implementation and includes the domains: individuals** (e.g. people with stroke), intervention (e.g. DOSE intervention protocol), inner setting (e.g. stroke rehabilitation settings), and outer setting (e.g. outside the inner setting). **Each domain can be divided into different items, which can be found online (https://cfirguide.org/constructs/). The first and second author coded the** first

two transcripts **using the CFIR framework. Free codes arising inductively from the data, were added throughout the coding period,** in case topics were covered, which did not fit into the CFIR framework. Discussion took place between the two **authors to compare their coding, review differences, and agree on codes. This was also done to ensure that similar decisions were made on how to interpret the framework in context of a patient perspective.** After this, the remaining transcripts were coded by both authors and checked for accuracy. **Finally, the two authors met again to compare and discuss their codes, and then decided on their final codes.** Findings are presented according to the CFIR domain, together with supporting quotes. Participants are identified by their participant code.

Findings from this study were then compared and contrasted against the findings of the rehabilitation therapists[14] in each domain of the CFIR framework. Discussion between authors took place to ensure that interpretation of the framework was consistent.

Ethical Approval

Study ethics approval was obtained from both the University of British Columbia Behavioural Research Ethics Board H16-02449 and UCLan Science, Technology, Engineering, Medicine and Health Board STEMH 560.

Results

Participant Characteristics

Ten people, 5 females and 5 males, with an average age of 58.7 (SD 5.6) years were interviewed between April and July 2018. Ongoing analysis by two researchers

determined that data saturation was reached after 10 participants. Participants were recruited from five different sites across Canada. Although the sites were all in major metropolitan cities (Vancouver, Calgary, Winnipeg), several participants were from rural towns outside of these large cities. **Median time at interview was 5.5 months (range 1-16 months) since stroke and 3.5 months (range 3-18 months) since completing the DOSE intervention. No physical tests were conducted at the time of the interview, however participants' 5-meter walk test scores at the start of the DOSE trial ranged from 0.15 to 0.86 meter/seconds.** Seven participants exercised 2x1 hour per day in the study, 3 1x1 hour per day. More detail is displayed in Table 1.

<Insert Table 1 here>

Factors influencing Implementation for people with stroke

CFIR and free codes are listed in Table 2. Aspects related to the characteristics of the individuals and the intervention were mentioned most frequently. Three free codes were found: 'exercise history' was placed in the domain of characteristics of the individuals, while 'content of intervention' was placed under the characteristics of the intervention. The free code 'family' was placed under the outer setting characteristics of the CFIR.

Findings within the CFIR domains are explained in more detail below.

Characteristics of the Individuals

Patients' knowledge and beliefs on exercise and the importance of rehabilitation were commonly stated as factors influencing engagement with the high intensity intervention. Overall, patients saw the benefit of being involved in intensive exercises with limited prior expectations of rehabilitation.

Exercise history

Most people had been involved in exercise or were active before their stroke.

DP02: I'll go to the gym usually maybe about twice a week, just to do some cardio only for about 20 minutes. I did a lot of sprint training and then I usually walk about 2 hours a day.

DP03: I'd ride my bike a lot…My job entails a lot of walking….. So you might be walking up 6 stories and down, walking all over the job sites and stuff. It wasn't a sedentary lifestyle but I was not an athlete. I didn't go to the gym or anything like that. Just your typical overweight middle-aged guy.

Knowledge and beliefs

Due to the unexpected nature of having a stroke, participants did not have any preconceived ideas about what the rehabilitation should look like.

DP01: I wasn't expecting to have a stroke so I hadn't really thought about it.

However, all participants believed that additional or more intense exercise would be beneficial.

DP08: When I got to the DOSE program: more, do more, and I think that's a lot better, doing more.

Self-efficacy: (Positive) attitude towards working hard

All patients who participated in the intensive exercises twice a day were positive about intensive rehabilitation, despite it being daunting in the beginning.

DP02: Oh. Well, I was really happy to get extra therapy to begin with, you know. And when I was pretty –laughs—it was pretty physically daunting to be honest with you because as a stroke patient, you know, you don't have much endurance.... And so by the end of the day I was just beat.

Intervention characteristics

Factors regarding evidence strength, relative advantage, and complexity, were the three most extracted concepts of the intervention characteristics. One free theme placed under the intervention characteristics was the content of the intervention.

Evidence Strength and Quality

Participants mainly talked about their personal experience of being in the DOSE study and how this had given them the evidence that the intensive intervention worked. No one talked about research evidence.

DP03: …if I hadn't had that DOSE program, I think I would be healing perfectly well, but not nearly at this rate. I don't think I would be where I am now if I didn't have that DOSE program and that physio—intense physio at the beginning.

Relative advantage

Overall, most participants saw the advantage of taking part when they compared themselves with other patients in the hospital.

DP04: I was walking…..yes, I was using the walker but I was walking. I could steady myself, I was playing basketball! I was bowling! And then I watched the other people around me not doing much of anything…….And after I got out, because I had to go back to the doctor there, I would still see some of the same people, and I thought, "Oh, that's really too bad, you should've said yes." I didn't say it out loud but that's what I was thinking.

DP07: I was only aware of one person in the DOSE study when I got there and he was very active and he was recovering very rapidly, much more rapidly than the other patients that were around, and that was kind of an indicator to me that it might be worth doing this if I could get some similar type of recovery, it would be worth a try.

However, two of the three patients who were involved in exercises once a day felt they could have done more and did not see the advantage of being included in the DOSE study.

DP09: I could have been pushed harder….Probably could have been walking more, even more.

Complexity

The graded exercise test and the feedback devices, together with practical issues of incorporating all the sessions in one day, were the main codes in this theme. Participants were able to fit the additional exercise session into their routine.

DP02: No, it was pretty much straightforward. I seemed to understand what was going on, and there was a certain routine. We tried to get in half an hour of walking every session, try to aim for an hour a day, which was good, you know. So, no, it was straightforward.

There was a mixed reaction towards the graded exercise test. During the test some participants indicated that it was difficult.

DP02: Okay, that was the first time I had pushed my heart over a month. And it just about killed me –laughs—because I was on the bicycle I was going "Oh my God", and course, you know like, what do you expect for a person who's had a stroke, it's gonna be difficult. But we had a doctor there supervise the test. So it was kinda good to push myself but it was hard, as you can imagine. If you just take anybody off the street and just put them on a bed have them lay down for 3 weeks and say, "okay, get up and start moving." It's gonna be hard no matter what.

Other participants indicated they were happy the graded exercise test was included as it empowered them to work hard in the exercise sessions.

DP05: Oh! That was kinda cool. There's an exercise bike and—it was actually good for me because …, it actually gave me confidence because you know, they were there monitoring me and I was getting to push myself. Whereas until then, I felt like everyone was trying to coddle me so much, and all of a sudden it was like, "here, get on the bike and go!" And it was really, I think empowering.

The importance of feedback monitoring devices (heart rate monitor and step counter) varied, with some participants not really able to remember what devices were used and others commenting the feedback was a good motivator.

DP06: you could see the progress everyday if they were recording how many steps you've taken or how, you know, where your heart beat has gotten during that session or how much you were in the target zone for how long. And so it was rewarding seeing progress.

Content of the intervention

The therapeutic aims of the DOSE intervention protocol were to progress patients towards 30-60 min of continuous walking activities in an aerobic zone (≥40% heart rate reserve) and complete greater than 2000 steps within a 60 minute therapy session. When asked more specifically about the training goals of the DOSE study, most participants were not aware of their optimal heart rate levels despite being

prompted about this. Only some participants knew there was a certain level set for their heart rate.

DP01: Uh well, I believe we had a goal to have my heart rate …. not really intense but a certain amount of intensity to help recover the abilities.

Interestingly, the patients in this study talked most about the interaction between the therapists and themselves. For them the intervention was a way to receive more exercise time with their therapists, who they perceived to be their coach and motivator. Without exception, the participants developed a positive relationship with the therapist team.

DP05: I had an opportunity and I had a lot of people to help me with it. Like I had someone with me 2 hours a day.

DP07: And they know a little bit about you more than just—you build a relationship that's deeper than purely a clinical one. That helps a lot, especially for me during the recovery process, you—stroke tends to remove some of your feelings of humanity, if that means anything and you feel less of a person, and part of the rebuilding is coming to terms with the changes that you're going through, accepting that some of them will to some degree and other be permanent, and having people around you that you feel actually care helps in during the recovery and helps you start regaining a sense of being a worthwhile person again, if that makes sense. And the, all of the therapists I worked with during the program were exceptionally good. They were wonderful people. It's presumptuous but I would like to consider them friends.

Inner setting

There was very limited insight into the culture of the hospital setting and the structural characteristics.

Outer setting

None of the participants raised issues regarding external policies and guidelines. Patients did mention their support network, including family and friends, during the intervention and after they had been discharged from the rehabilitation hospital.

When asked how family and friends supported patients during their stay, one participant answered

DP09: just encouraging me to be involved and to do my best.

Other family members needed to come around to the idea of intense therapy as illustrated by a quote from DP04

DP04: I don't think at first that my sisters thought it was a good thing, only because they know I will push myself to the point, as they came around, they saw that I was really being monitored, I wasn't being pushed, and if I was pushing myself they would temper me back, say, "Okay, you don't have to go gung-ho like that." –laughs- I had boundaries.

This patient also mentioned that a good support network was needed once you were discharged from the rehabilitation hospital.

DP04: I had a really good support system because I scared everybody. –laughs- I had a good friend, ….and he didn't let me sulk—none of that. So my scheduling—he would send me a text, "Okay, you have to go the gym this, this, and this day." And I'll say, "No, I don't want to." "Hey, either you call the bus or I'll come get you." –laughs- So, that was my scheduling. You just have to have a good support system. Don't talk yourself out of exercise.

Comparing and contrasting views of patients and therapists

The perceptions of the patients and the therapists involved in the DOSE study are displayed in Table 2.

<Insert Table 2 here>

People with stroke and their rehabilitation therapists both seemed to base their beliefs of the effectiveness of the intense therapy on the practical and personal experiences, rather than academic evidence. Despite both groups perceiving intensive rehabilitation to be beneficial, the rehabilitation therapists were more reserved in their opinion by their previous education around quality of movement which conflicted with the protocol's focus on quantity. In addition, both the rehabilitation therapists and the people with stroke found the graded exercise test to be helpful and empowering in guiding the progression of the intervention. However, therapists found structural aspects at system level, such as staffing and access to the graded exercise test, to be barriers for further implementation.

Interestingly the patients and the therapists perceived the intervention completely differently. Patients thought it consisted of having additional time with their therapists, who they saw as their coaches to get them through this difficult time. Conversely, the therapists described the intervention in mechanistic terms, such as levels of intensity and number of steps in each training session.

Discussion

Patients were facilitated to undertake intensive exercise by a number of factors, including their positive belief toward intensive exercise, the positive therapeutic relationships they developed and their belief that they would see improvements if they worked hard. Other less prominent facilitators included the use of the graded exercise test and feedback devices.

Patients seemed to perceive fewer barriers to being involved in intensive therapy than their rehabilitation therapists, as therapists were more influenced by their previous education around quality of movement which conflicted with the focus on the quantity of activity. The patients did not have any preconceived ideas about what the rehabilitation should contain and were overall content with the intervention. However, 2 of the 3 patients who were randomised to the one hour/day arm of the trial mentioned that they were happy to be pushed harder.

Patients based their beliefs about the effectiveness of the intervention on practical and personal experiences rather than academic evidence. Similarly, despite the evidence around this topic being available in the literature[1,2] therapists also relied on their own experiences when discussing the effectiveness of the intensive therapy when interviewed in an earlier study. Negative attitudes towards research, poor research literacy, and insufficient time have been identified as factors that hinder implementation.[26-29] In addition, it is important to acknowledge the clinical expertise clinicians possess as an influencing factor for implementation.

The graded exercise test used in this study was perceived to be beneficial and empowering for people with stroke and their therapists alike. Knowing that the therapists were allowed to push the people with stroke without major safety issues helped build therapists' confidence, while the confidence of people with stroke lay in the feedback they received from their monitoring devices. However, practical issues surrounding the graded exercise test, such as access to the test and the professionals, remain barriers in the implementation of this test in clinical practice.

Patients in this study perceived the higher intensity rehabilitation intervention to consist of having additional time with their therapists, who they saw as their coaches to get them through this difficult time. Peiris et al. also found that patients perceived that their relationship with physiotherapists was more important than the content of the therapy.[30] **Others have also found that support from qualified personal to exercise is a facilitating factor for partaking in exercise.[31,32]** Contrastingly, the therapists described the intervention in mechanistic levels, such as 1 or 2 sessions of one hour per day of aerobic exercise within task-specific walking activities,

focussing on upright gait-related activities in an aerobic zone, and the inclusion of the graded exercise test, heart rate monitor, and step counters. Future research could look at possible ways of capturing patients' viewpoints when developing and trialling new interventions. For example, standard intervention frameworks such as the TIDier checklist[33] do not acknowledge the establishment of a therapeutic relationship between a patient and clinician, and yet patients in our study felt this was the most important benefit. The lack of focus on therapeutic relationships has implications when investigating fidelity within trials, as possible aspects may be lost when up-scaling interventions if they are not clearly defined as part of the intervention in the first place.

The CFIR framework has been developed to explore implementation of health innovations into practice. While this worked very well for the therapist participants in a previous study,[14] the framework did not fit as well from a patient perspective. Inner and outer setting characteristics were not well defined from a patient perspective. For example, it was unclear whether a patient's family viewpoint were included in the inner setting or outer setting. With the current increased focus of involving patients in the research process, more emphasis needs to be placed on capturing the patients' perspective when discussing implementation issues.[34]

Limitations

There is a chance of selection bias in the sample recruited. People with stroke who were positive about exercise and who had positive experiences in the trial might have stepped forward to be interviewed. The analysis showed that participants had been active prior to their stroke, however their exercise history showed that only

some were very active prior to having a stroke, indicating there was a mixed level of people recruited to this study. The time between completing the trial and the time of the interview might have caused some levels of recollection bias, however different time points were selected purposefully to incorporate reflections over time.

Conclusions

Patients' perceptions about intensive therapy were different than their therapists. Patients perceived the benefits of intensive therapy to result from the therapeutic relationship in guiding and motivating them along their recovery journey, while therapists perceived the therapy in terms of the units of exercise delivered. Given the contrasting views, it is important to consider both patient and therapist views when developing rehabilitation interventions.

Author contributions

Concept/idea/research design: J. Janssen, T.D. Klassen, L. Connell, J.J. Eng

Writing: J. Janssen, T.D. Klassen, L. Connell, J.J. Eng

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Data analysis: J. Janssen, L. Connell

Project management: J. Janssen, T.D. Klassen, L. Connell, J.J. Eng

Fund procurement: J.J. Eng

Providing participants: T.D. Klassen

Acknowledgements

We wish to acknowledge the patients involved in the DOSE study who talked openly about their experiences of being involved in high intensity interventions. We also wish to thank Chelsea Chua for her assistance with the transcriptions.

Funding

The study was supported by the Canada Research Chair Program, Canadian Institutes of Health Research (FDN 143340 operating grant to JJE and Doctoral Award to TDK) and Heart and Stroke Canadian Partnership for Stroke Recovery.

Conflict of Interest statement: none declared

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Table 1: Demographic information participants

Partici-pant number	Gender	Centre	Trial arm	Age at interview (years)	**Time since stroke (months)**	**Time since end of DOSE trial (months)**
DP1	Male	1	2x 1 hour	57	**4**	**2**
DP2	Male	2	2x 1 hour	61	**5**	**3**
DP3	Male	2	2x 1 hour	60	**9**	**7**
DP4	Female	3	2x 1 hour	64	**12**	**10**
DP5	Female	3	2x 1 hour	58	**5**	**3**
DP6	Female	4	2x 1 hour	63	**6**	**4**
DP7	Male	1	1x 1 hour	58	**5**	**3**
DP8	Female	4	2x 1 hour	44	**9**	**8**
DP9	Male	4	1x 1 hour	61	**3**	**1**
DP10	Female	5	1x 1 hour	61	**18**	**16**

1 Table 2: Therapists' and patients' perceptions of factors influencing implementation of a high intensity intervention (DOSE)

Consolidated Framework for Implementation Research (CFIR)		
Characteristics of Individuals		
Therapist		**Patients**
Knowledge and Beliefs	**- DOSE fit better with some people's belief system than others due to conflict with quality of movement versus quantity of movement** **- Some people's beliefs changed once they had trialled the intervention**	**- Belief that extra exercise is beneficial** **- Limited expectations prior to study involvement** **- Limited concerns about it being too much/ working too hard- actually positive about intensity/ doing more**
Self-Efficacy	**Therapists gained confidence to 'push people harder' due to:** **- The graded exercise test making them confident patients had the 'all clear'** **- Seeing patients able to work harder**	**- Patients tended to be able to work hard and work out routines/ support strategies that worked for them**

	- Using heart rate monitors and step counters as objective measures	
Individual Stage of Change	**- Most individuals were in the preparation or contemplation stage of change** **- Some recognised their practise had already changed** **- Others still felt they would 'step back' to their everyday clinical practice**	
Other Personal Attributes	**- Most therapists had some previous exposure to research and were keen to be involved.** **- Two participants felt obliged to take part in the trial**	**- Exercise and lifestyle history** **- most people active/ open to exercise**
Intervention Characteristics		
Evidence Strength and Quality	**- Practical experience of using the intervention tended to outweigh publications.** **- Some mention of the importance of having underpinning research**	**- Personal experience rather than academic evidence**

Relative Advantage	**Graded exercise test gave therapists the advantage of knowing they could push the patient harder**	- **Comparison between patients whilst on stroke rehab unit helped reinforce positive beliefs.** - **Participants in the 1 hour per day exercise group did not see a relative advantage.**
Adaptability	**Research protocol needs to be adaptable for clinical reality (e.g., more focus on upper limb/ education for some patients)** **- Therapists thought that "pre-gait" activities were essential, though recognised doing this first may reduce intensity.**	
Complexity	**- Graded exercise test and the monitoring of heart rates enabled therapists to push patients harder than they normally would have (more radical).** **- The need for a graded exercise test and the equipment make the intervention more difficult to implement**	**- Graded exercise tests accepted and not an issue** **- Feedback devices seen as helpful to monitor outcome, but problematic when unreliable.** **- Patients felt they were able to have structure to their day to fit in extra sessions**

	- The frequency and duration of sessions was considered difficult to implement outside of the study	
Design Quality and Packaging	**- Therapists liked the structure and detail of the manual and paperwork, particularly tips and ideas.** **- The structured format helped support different therapists treating the same patients.**	
Content of intervention	**-Treadmill** **- Walking** **- Exercise test**	**-Walking** **-Positive effect of therapists** **-More time with the therapists**
Inner Setting		
Structural Characteristics	**- Concerns regarding staffing to enable the duration of therapy outside of the study** **- Shift required in how therapists prioritize treatment and buy-in from all therapists and managers when scheduling to allow for longer sessions.**	

Networks and Communication	**- Communication important to ensure treatment schedules work to allow for longer sessions**	
Culture	**- Recognition that these therapists worked in research intensive departments**	
Readiness for Implementation	**- Leadership engagement recognised as important to support the resources required**	
Available Resources	**- Need for graded exercise test, and ideally equipment (HR monitors, step counters, treadmills, harnesses)**	
Outer Setting		
Patient Needs and Resources	**- Recognition that this type of intervention will not be suitable for all (especially elderly with co-morbidities).** **- Patients generally liked the high intensity and felt they accomplished something.**	

	- The therapists were surprised how hard patients worked and tolerated intensive regime.	
External Policies and Guidelines	**The Canadian guidelines for stroke state a graded exercise test should be undertaken which poses a challenge for implementation**	
Family influence		- **Family generally supportive (both practical and emotional) during rehabilitation** - **On-going influence**

1