Critical thinking on freezing of gait questionnaire an outcome measure

USED FOR ASSESSING ACTIVITY AND PARTICIPATION

IN PEOPLE WITH PARKINSON'S DISEASE

Patients with Parkinson's disease (PD) often have a problem with pausing or stopping at random moments during their daily activities called the freezing of gait (FOG). Lo et al. (2010) notes that studies have shown that within five years approximately 30% of PD patients exhibit FOG and within the next 5 years 60% have experienced FOG events (51). The biological and neural reasons causing the stop-motion are not well understood. FOG can be dangerous and is detrimental to the PD patient's quality of life.

The Freezing of Gait Questionnaire (FOG-Q) was constructed by the research of Giladi et al (2000). Six questions are scored on a scale of 0-4. The questions include asking for information about general problems with gait (walking), how often and the duration of FOG events and the affect on activities (Giladi et al. 2000, 168-170). (Appendix 1) The questionnaire best measures severity of FOG-Q events. The larger the number by adding the scale results the more severe the FOG.

This critical analysis offers a literature review of FOG-Q research. A discussion of the FOG-Q (interview form) and the NEW FOG-Qself-administered (NFOG-Qsa) is offered. The usefulness for clinics and the sensitivity of results have been noted. Validity and reliability of outcome measures in the studies have been described.

The International Classification of Functioning, Disability and Health (ICF) is the World Health Organization's (WHO) international classification method. A comparison of the FOG-Q and the ICF (Table 1) can be found in Appendix 2. An example of the interview questionnaire for mobility from ICF can be found in Appendix 3.

The purpose of this literature review is to determine if the FOG-Q is a good tool for clinicians to use. We expect to find that the NFOG-Qs are helpful in measuring the severity of FOG events when compared to other methods.

Medical Research Database

Three databases were used, including JSTOR and Science Daily but the most helpful and easiest to use was PubMed. PubMed is accessed online through the US National Library of Medicine (NCBI) which is a department of the National Institute of Health (NIH). The database can be easily searched using title, authors or subject. The best search words were Parkinson's disease, ICF, FOG, and freezing of gait. Automatic suggestions are made by PubMed that lead to other relevant articles. Sometimes the Digital Object Identifier (DOI) which identifies that article and leads to the stable web link for the article. (DOI 2011)

FOG-Q Reliability and Validity

Reliability refers to the number of times the same result is measured under different conditions; when results of research are reliable they are considered to have used the scientific method. In other words results are reproducible. (Stokes 2011, 4)

Validity refers to how well the measurements used are suited to the test. Validity is dependent on scientific method which uses strategies such as a control group and randomizing the choice of participants. (Stokes 2011, 4)

During the FOG clinical interviews and in the self reporting questionnaires PD patients are asked to describe different aspects of the FOG event. They are asked (a) how often it happens, (b) how long the stop-motion (freezing) last, (c) how daily activities and the patient's independence are affected. The answers give a measure of severity.

Giladi et al. (2000) originally created the FOG Questionnaire (FOG-Q) for use as an interview tool for clinicians to use with their patients. Giladi et al. (2000) used a sample of 40 PD patients to determine FOGQ reliability and found the reliability to be high; a Cronbach's alpha equal to 0. 94 was determined.

Giladi et al. (2000) determined the validity of the FOG-Q by comparing their results to results found with the Unified Parkinson's Disease Rating Scale (UPDRS). The correlation between FOG-Q and UPDRS was good. The researchers found that the FOG-Q severity assessment indicated a good correlation with the comparable FOG item on the UPDRS. The study therefore successfully verified the validity of the FOG-Q. In fact the comparison indicated that the FOG-Q does better indicating FOG severity which is not due to falling than does the UPDRS. (Giladi et al. 2000, 167)

Changes have been made to the FOG-Q with time and use. Nieuwboer et al. (2009) explained that the earliest FOG version used 16 items for making

categories to describe the physical functions (PF) and environmental factors (EF) (459). The items were reduced to 10 items and some research use a 6-item scale to help describe the event the PD patient experienced (Nieuwboer et al. 2009, 459). A companion video has also been made available for clinical use.

Nieuwboer et al. (2009) concluded that there is a strong correlation between the NFOG-Q and the FOG. The researchers were satisfied with the reliability of the NFOG-Q to measure the events but suggested more investigation was necessary to determine the validity of the NFOG-Qsa (462).

Since both PD patients and their carers are requested to answer separately the self reporting questionnaire in their homes; Nieuwboer et al. (2009) produced a study of the agreement between the answers of the PD patients and their carers when using NFOG-Qsa. Videos were taken by the researchers in order to verify the answers on the questionnaires. The video did aid focusing on identifying a FOG event. The only problem with the video-making was that it negatively impacted the estimated severity (time and duration) of the FOG event. Sixty nine of the freezers and their carers were found to have an intraclass correlation coefficient equal to 0. 78 (test re-test reliability) which is within the 95% confidence limits. The researchers' data supported both the reliability and validity of the questionnaire. (Nieuwboer et al. 2009, 460-462)

Nilsson et al. (2010) also researched the validity and reliability of FOG-Qsa and FOG-Q by comparing results with the interview UPDRS-FOG type-item 14

(85-88). The scores correlated well with UPDRS item which is the-Freezing and Fall-related self-efficacy (FES). It was found though that participants who fell and those who had a fear of falling scored higher on the FOGQsa then on the UPDRS item (Nilsson et al. 2010, 89).

Implementations to Clinical Practice and Sensitivity

Snijders et al. (2008) pointed out that the FOG-Q helps clinicians determine if FOG has been experienced by the PD patient and to discern the " subjective severity" (S471). Since FOG has a directional sensitivity more than the FOG-Qs should consider adding an appropriate question (Snijders 2008, S468). Now FOG-Q has questions about turning and gait ignition. Snijders et al. (2008) also noted that it must be kept in mind that NFOG-Q does not score environment or the ON/OFF treatment effects (S468).

NFOG-Qsa is important for clinicians because as Dibble et al. (2010) have noted; the tool is reliable and valid measurement for severity of FOG (115).

The sensitivity of the results was not influenced when filming videos during research studying the agreement between PD patients and their carers (Nieuwboer et al. 2009, 462). This has important implications for using videos to supplement a clinician's knowledge about each PD patient.

Nilsson et al. (2010) concluded that the FOG-Qsa results encompassed all the information received during a FOG interview, although further studies are necessary (92). This is very helpful for clinicians to know. It supports using the self-reporting version of FOG-Q instead of giving interviews. Giving

interviews takes time from other work and ends up costing clinics more than using the self-answered reports from patients and their carers.

Observation of a FOG event is difficult to accomplish because events rarely take place during office visits. The opinion of both the person requiring neurological rehabilitation and their carers is considered critically important because it is unlikely for the doctor or therapist to observe an event.

FOG-Qs and the ICF

The FOG-Q is closely related to two sub-domains of the WHO ICF. A table comparing FOG-Q and ICF can be found in Appendix 2.

The ICF has two main branches. The first is the Body Functions and Disability which is subdivided into Body Functions (BF) and Structures, and Activities and Participation. The second branch is the Contextual Factors which is subdivided into Environmental Factors and Personal Factors (PF). (WHO 2001, 11)

The FOG-Qs do not address environmental factors but they do address BF and daily activities. The ICF sub-domain of EF (environmental factors) and of BF (body functions) were evaluated using an ICF checklist which was administered to a sample of 96 participants. Spearman's correlation analysis was applied with the main new results showing that EF needs to be taken into account for PD patients' profiles; especially to help identify important environmental barriers which hinder those with severe BF impairment. The design of the ICF was found to be a good methodology for determining the data necessary to explore FOG.

Examples of ICF sub-domains particularly related to PD FOG-Q include daily activity, mobility, social participation, role participation and applied cognitive. Activity is being able to perform a task or take an action (WHO 2001, 63). Balance, gait, being able to bathe oneself and get dressed are common limitations for PD patients. These examples demonstrate how a PD patient's home, work and social life are all impacted in ways that need to be better understood. (Appendix 3)

Because of the large number of categories in the ICF (over 1400) clinicians do not have time to use the ICF. (WHO 2001) Therefore studies have been done to identify the most useful categories (sub-domains) for clinicians.

Ustun et al. (2004) reported that one-fifth of the sub domains explain approximately four-fifths of the variance (the amount the sub domains vary from the group mean) necessary to determine results (7-8). The WHO Disability Assessment Schedule II (WHO DAS II) matches FOG-Q in several instances; Activities and Participation (' getting around') in Domain 2 and Life Activities in Domain 5 (UN 2010, 69). The ICF Checklist covers ADL and matches the FOG-Q in categories such as mobility, body movements and behaviour (UN 2010, 64).

Dibble et al. (2010) have begun a fundamentally important research study using the ICF framework as an organizing tool for setting up the measures used. Potential factors causing impairment to " body structure/function, activity limitations, or participation restrictions" will be identified (112).

The design of the ICF checklist was found to be a good methodology for determining the pertinent data. (Raggi et al. 2011) The ICF sub-domains of EF (environmental factors) and of BF (body functions) were evaluated by Raggi et al. (2011) using an ICF checklist.

Limitations

The FOG symptom of PD is difficult to measure both quantitatively and qualitatively. A quantitative measure is difficult because the biological cause or mechanism has not been determined. Qualitatively it is difficult to observe in the doctor's office or health clinic because patient's rarely experience an event while with a doctor or therapist.

Bartels et al. (2003) suggest that a measurement for ' gait trajectory' may be a good way for reproducible evaluations of FOG by using specific triggers to produce a FOG event. If so gait trajectory needs to be incorporated into the FOG-Q.

Research has shown that FOG has a correlation with frontal functions of the brain. The researchers suggest a holistic approach including careful history taking. (Snijders et al. 2008)

Nilsson et al. (2010) point out that the reliability of the initially designed interview type FOG-Q was found to be reliable but limited due to the large amount of clinician's time needed to teach the meaning of FOG and administering the questionnaire.

Tan et al. (2011) point out the limitation caused because PD patients can not accurately identify FOG (1164).

Shine et al. (2012) reported on new research to observe turning and other timed motion tasks; the purpose of their research is to develop quantifiable measures by careful observation of the tests devised (25).

Future Research

More integration with the ICF items and the descriptions need to be shown to correlate with FOG-Q. The closer the FOG-Q correlates with the ICF the easier it will be to compare.

Ellis et al. (2011) has suggested that the best measures for predicting the quality of life for PD patients were found to be physical function tests as opposed to motor impairment tests. If this is the case then appropriate changes need to be made to the FOG-Q.

Shine et al. (2012) suggested that the FOG-Q and NFOG-Q need to be reassessed so better correlations can be made between a PD patient's perceived freezing experiences and those carefully observed under laboratory conditions.

Conclusion

These studies indicate that the usefulness of FOG-Qsa is considered high for determining the severity of FOG events. The questionnaire needs to be flexible so more questions can be added. PD patients' and their carers' description of a FOG event as self-reported in the FOG-Qsa correlates well according to the current research.

The comparison with ICF pointed out some deficiencies in the FOG-Qs such as the need for environmental factors to be included.

Generally the literature of current research has shown FOG-Q and FOG-Qsa to be both valid and reliable tools to use when evaluating the severity of FOG in PD patients.

(Word count: 2168)

References

Bartels AL, Balash Y, Gurevich T, Schaafsma JD, Hausdorff JM, Giladi N. (2003) Relationship between freezing of gait (FOG) and other features of Parkinson's: FOG is not correlated with bradykinesia. Journal of Clinical Neuroscience. Vol. 10(5), pp. 584-588.

DOI System. (2011) Available at: http://www. doi. org (Accessed 11 Feb 2012).

Ellis T, Cavanaugh JT, Earhart GM, Ford MP, Foreman KB, Dibble LE (2011) Factors associated with excercise behaviour in people with Parkinson Disease Advances in Disability Research. Vol. 91(12), pp. 1838-1848.

Giladi N, Shabtai H, Simon ES, Biran S, Tal J, Korszyn AD. (2000) Construction of freezing of gait questionnaire for patients with Parkinsonism. Parkinsonism and Related Disorders. Vol. 6(3), pp. 165-170.

Lo AC, Chang VC, Gianfrancesco MA, Friedman JH, Patterson TS, Benedicto DF. (2010) Reduction of freezing of gait in Parkinson's disease by repetitive

robot-assisted treadmill training: a pilot study. Journal of NeuroEngineering and Rehabilitation Vol. 7, pp. 51- 59.

Nieuwboer A, Rochester L, Herman T, Vandenberghe W, Emilk GE, Thomaes T, Giladi N, (2009) Reliability of the new freezing of gait questionnaire: Agreement between patients with Parkinson's disease and their carers. Gait and Posture. Vol. 30, pp. 459-463.

Nilsson MH, Hariz GM, Wictorin K, Miller M, Forsgren L, Hagell P. (2010) Development and testing of a self administered version of the Freezing of Gait Questionnaire. BMC Neurol. Vol. 10, pp. 85-93.

Raggi A, Leonardi M, Ajovalasit D, Carella F, Soliveri P, Albanese A, Romito L. (2011)
Disability and profiles of functioning of patients with Parkinson's disease described with ICF classification. Int. J. Rehabil. Res. Vol. 34(2), pp. 141-50.

Shine JM, Moore ST, Bolitho SJ, Morris TR, Dilda V, Naismith SL, Lewis SJG. (2012) Assessing the utility of freezing of gait questionnaires in Parkinson's disease. Parkinsonism and Related Disorders. Vol. 18, pp. 25-29.

Snijders AH, NIjkrake MF, Bakker M, Munneke M, Wind C, Bloem BR. (2008) Clinimetrics of freezing of gait. Movement Disorders. Vol. 23, pp. S468-S474.

Stokes EM. Measuring neurological conditions and rehabilitation. Chapt 10 in Rehabilitation outcome measures. London (England): Churchill Livingstone Elsevier; 2011. p. 93-106

Tan DM, Physio M, McGinley JL, Danoudis ME,, Phsio M, Iansek R, Morris ME. (2011)Freezing of gait and activity limitations in people with Parkinson's disease. Arch Phys Med Rehabil. Vol. 92, pp. 1159-1165.

UN ESCAP. (2010) WHO ICF Manual Analysis. Available at: http://www. unescap. org/stat/disability/analysis/index. aspx/ (Accessed10 Feb 2012).

Ustun B, Chatterji S, Kostanjsek N. (2004) Comments from WHO for the Journal of Rehabilitation Medicine special supplement on ICF core sets. J. of Rehabilitation Medicine Supplement. Vol. 44, pp. 7-8.

WHO World Health Organization. (2001) ICF Agenda Fifty-Fourth World Health Assembly. WHA54. 21. Available at: http://www. who. int/classifications/icf/wha-en. pdf (Accessed 02/11/12).

APPENDIX 1

Freezing of Fog Questionnaire (FOG) (Giladi et al. 2000, 169)

Giladi N, Shabtai H, Simon ES, Biran S, Tal J, Korszyn AD. (2000) Construction of freezing of gait questionnaire for patients with Parkinsonism. Parkinsonism and Related Disorders. Vol. 6(3), pp. 165-170.

APPENDIX 2

Comparison of (FOG-Q) with ICF

Giladi N, Shabtai H, Simon ES, Biran S, Tal J, Korszyn AD. (2000) Construction of freezing of gait questionnaire for patients with Parkinsonism. Parkinsonism and Related Disorders. Vol. 6(3), pp. 165-170.

WHO ICF Manual, UNESCAP Analysis [Online] 7 Oct 2010 [cited 12 Feb 2012]

http://www. unescap. org/stat/disability/analysis/index. asp

Appendix 3Example of Interview Questionnaire: ICF Questionnaire on Mobility

UNESCAP, United Nations ESCAP. WHO ICF Manual Analysis 7 Oct 2010

http://www. unescap. org/stat/disability/manual/