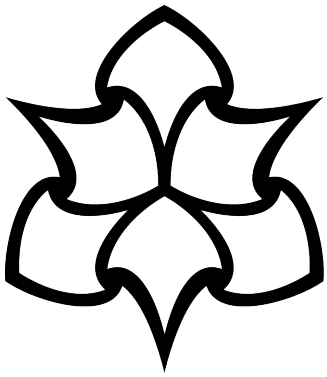

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Evaluation of a rolling rehabilitation programme for patients with non-specific low back pain in primary care: an observational cohort study

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Abstract

Aim: The back rehabilitation programme (BRP) is a group exercise programme for patients with non-specific low back pain (NSLBP) that combines cognitive behavioural therapy (CBT) principles and therapeutic exercise to empower patients to self-manage their condition. Poor attendance and high attrition rates resulted in changes to the format of the programme from a standard sequential approach to a continual rolling approach. The aim of this study was to evaluate the effectiveness of this new approach on patient outcomes and its impact on attendance rates.

Method: A service evaluation, using a retrospective, observational cohort design, of all patients with NSLBP who attended the BRP during a 12-month period was undertaken. Outcome measures used: Bournemouth Questionnaire (BQ); fitness tests: sit to stand test, step test, and walk test (taken at baseline and post programme), and attendance (taken post programme). Data were summarised descriptively using medians, interquartile range and percentages. Wilcoxon Signed Rank test was used to examine differences before and after the BRP ($p < 0.05$).

Results: 56% of patients had an improved BQ score ≥ 47%, indicating a clinically significant change. Inferential testing showed statistically significant improvements in the BQ and all 3 fitness tests post programme ($p < 0.0001$). 62 patients attended the rolling BRP and 41 patients (66%) completed, which was twice the percentage of attendance at the standard programme. However, only 4% of patients who were eligible for the BRP were referred to the programme.

Conclusion: Patients with NSLBP who attended the continual rolling BRP show clinical and statistical improvements. As such, the rolling BRP should be considered by practitioners as an effective management strategy when treating patients with NSLBP. Although the rolling format also appears to enhance attendance, the BRP appears to be underutilised. Thus, awareness needs to be increased in the referring population.

Introduction

Low back pain (LBP) is the leading cause of disability worldwide [1]. Around 85% of LBP is thought to be 'non-specific', that is, there is no recognisable underlying pathological cause [2]. Approximately 20% of patients who seek treatment for their condition are reported to go on to develop persistent symptoms [3] although many sufferers do not seek medical advice [4].

LBP contributes significantly to the health, social and economic burden of both the individual and society. It is associated with reduced activity, deconditioning, functional disability and poor mental health [5]. These issues contribute to greater health care costs, which in part are due to more frequent general practitioner (GP) and accident and emergency consultations; the use of medicines and physical therapy rehabilitation. In addition, increased sickness/absence from work; higher welfare costs; lower tax revenue and reduced work productivity impact on both the society and individuals with LBP [6-8].

Although most LBP is mild and not disabling, some people develop persistent symptoms, which tend to follow a pattern of recurrence and remission [9]. Commonly occurring beliefs in this population are reported to be: catastrophizing; fear avoidance and poor self-efficacy [10]. Cognitive behavioural therapy (CBT) aims to address these psychosocial factors by changing an individual's beliefs and thus their behaviour, and is a recognised and cost effective approach to managing sub-acute and chronic LBP [11].

There are many approaches, with various degrees of effectiveness, for the management of NSLBP. There is strong evidence for the effectiveness of physical activity and exercise in

the management of this condition [9]. Furthermore, it has been found that patients who adhere to their exercise programme have better treatment outcomes than non-adherent patients [12]. Thus, adherence to physical activity and exercise is an essential component of this management strategy [13].

Therapeutic exercise has physical benefits such as improved muscle strength and mass, improved bone strength, improved flexibility and postural stability [14]. It also has psychological benefits such as improved self-efficacy and self-esteem [15]. Although guidelines for the management of long standing LBP indicate that therapeutic exercise and physical activity are beneficial in managing the condition they report that there is no conclusive evidence to identify which specific types of exercise are the most effective [9]. It has been suggested that exercise in this population, should aim to encourage activity and decrease fear of movement [3]. Balague et al., [2] report that the effectiveness of exercise therapy may be due to changes in psychological beliefs rather than due to the physical benefits.

Group rehabilitation programmes which combine exercise and CBT principles to manage patients with LBP are common in primary care settings. A randomised controlled trial by Johnson et al., [16] evaluated an 8-week primary care group programme, which compared exercise and education using CBT to a control group who were managed using written education and usual GP care. The study reported small, non-statistically significant improvements in pain and disability in the intervention group. However, both groups showed modest improvements in general health as measured using EQ-5D (0.04; 95% CI: 0.01 - 0.09), with most improvement seen in subjects who indicated a preference for a particular intervention. This suggests that patient preference should be considered

when deciding upon a course of treatment, a point also highlighted by Pillastrini et al., [9].

Johnson et al., [16] also concluded that the intervention used in their trial was inexpensive, although little data or analysis was presented to support these claims. Furthermore, only 63% of participants in the study completed four out of eight sessions suggesting high attrition rates, which may have compromised the effectiveness of the programme. High dropout rates were also reported by Gaskell et al., [17] in their pragmatic evaluation of a back rehabilitation programme with only 50% of participants completing all the sessions.

The Back Rehabilitation Programme

A group rehabilitation programme, the 'Back Rehabilitation Programme' (BRP), has been established and operational within a musculoskeletal physiotherapy service in North West England since the late 1990s. The programme, run by physiotherapists, uses a CBT approach to address the biopsychosocial aspects of LBP and aims to empower patients to self-manage their condition whilst improving levels of function despite the presence of pain and regardless of the duration of their symptoms. The programme uses a group format and consists of a combination of education and exercise. Until 2012, the programme consisted of 8 x 2 hourly sessions run sequentially over 4 weeks. Patients accessed the programme after completing a biopsychosocial assessment, four outcome measures and three fitness tests.

The effectiveness of the programme was evaluated by Gaskell et al., [17] using a before-after analysis of 877 patients with LBP. Complete data was obtained for 444 participants. The results showed that there were statistically significant improvements for all outcomes

including pain, disability scores, anxiety and depression, and perceived control (all $p < 0.001$). Thus, indicating that the BRP was effective for patients with chronic LBP. However, as noted previously, the study also found a high attrition rate with only 50% of participants completing the programme.

In 2012, staff running the BRP identified a number of issues with the programme. This included reduced numbers of patients being referred to the class, resulting in the programme running less frequently and thus increasing waiting times. Additionally, more patients failed to attend the initial class and more patients failed to complete the programme. In an attempt to address these issues, a number of changes were made to the format of the BRP and these were implemented in January 2014. In order to encourage attendance, the format was changed to a continual rolling programme, which allowed almost immediate patient access.

The number of outcome tools was reduced from 4 to 1 and included only the Bournemouth Questionnaire (BQ) and three fitness tests. These were completed in a pre-assessment clinic, which was run by the BRP physiotherapist during the hour prior to attendance at the patient's first class. This removed the need for the referring clinician to complete any outcome measures and enabled patients to attend their first session immediately. Post programme outcome measures were completed during the de-brief clinic which ran for 1 hour after the patient's last class. The programme was condensed to 6 sessions over 6 weeks, and reduced to 1 hour 30 minutes in length (45 minutes exercise and 45 minutes education) thus reducing the patient's commitment. Although the programme has been modified to meet patients' needs, no evidence was found regarding the effectiveness of using a rolling approach in rehabilitation and so the benefits of this were unknown. Therefore, the aims of the present study were: 1) to examine the

effectiveness of the rolling programme on a PROM and fitness levels in patients with NSLBP; 2) to investigate if the programme enhances attendance when compared to attendance rates of the previous (2012) programme.

Methodology

The new format for the BRP was developed by a working party consisting of one clinical specialist pain management physiotherapist, three senior physiotherapists and one orthopaedic physiotherapy practitioner (the researcher), all of whom were either working or had previously worked on the BRP. Local service guidelines for the management of patients with LBP were followed in the development of the BRP. These guidelines recommended that all non-urgent patients with low back pain should access physiotherapy treatment after completing a triage questionnaire, which included the STarT Back tool [18]. The purpose of the tool is to identify patients with a low, medium or high risk of developing persistent symptoms and so guide approaches to treatment. From this, patients were categorised in terms of their level of risk of developing disability and managed in accordance with this. Patients scoring a low risk of developing disability were assessed, reassured and treated using a self-management approach**.** Those with a medium risk were assessed biomedically to exclude serious pathology, offered traditional physiotherapy and then invited to attend the BRP. Patients identified as being at high risk of developing persistent symptoms were assessed and managed using a biopsychosocial approach prior to an invitation to attend the BRP [18].

All patients over 18 years old, with NSLBP, with or without leg pain who were medically fit enough to participate in the BRP were eligible to attend. Patients who had co-morbidities which would prevent them from being able to exercise; suffered with inflammatory arthritis; had undergone recent major surgery; were pregnant or up to 3

months post partum; had nerve root pain; presented with red flag symptoms or were unsuitable for a group environment, were excluded. Patients who did not meet the BRP inclusion/exclusion criteria or declined to attend, were treated on an individual basis.

The senior physiotherapist running the BRP recorded pre-programme baseline data and post programme data (week 6). This included the following measures: the Bournemouth Questionnaire, to assess patient reported health outcomes; and the 5-minute walk test, 1-minute step test and 1-minute sit to stand test, to assess fitness. In order to describe the patients who accessed the programme, the researcher collected data from the patients' notes regarding their age, gender, duration of symptoms, and occupation. To evaluate attendance, the number of patients who completed the standard format BRP in 2012, which was the last year where the non-rolling format had been used, was calculated. This was compared against the number who completed the new, continual rolling BRP in 2014.

Ethical approval for this study was gained from both the Manchester Metropolitan University Ethics Committee and Bridgewater Community Foundation Trust's Research and Audit Department.

Outcome measures

The Bournemouth Questionnaire

The BQ is a validated multi-dimensional patient reported outcome measure (PROM) which consists of seven items: pain intensity; function during activities of daily living; function during social activities; anxiety; depression; fear avoidance and locus of control [19]. It is the preferred patient reported outcome measure of the local Care Commissioning Group (CCG) for Any Qualified Provider (AQP), and commonly used in

clinical environment for patients with this condition. A reduced score in this test indicates an improvement. Furthermore, a change of 47% between baseline and post treatment scores is reported to be a clinically significant change for patients with low back pain [20].

Fitness tests

The fitness tests, carried out by the physiotherapist completing the pre and post assessment clinics were unchanged from the 2012 programme. They consisted of 5-minute walk test, 1-minute step test and 1-minute sit to stand test. They have been shown to be valid and reliable measures of fitness for patients with LBP [21].

Data Analysis

Patient demographics were summarised descriptively using means, standard deviations and percentages. The clinical effectiveness of the programme was determined by measuring the percentage change in the BQ scores and change in fitness test scores, from baseline to post BRP. Shapiro-Wilk test indicated that the BQ and fitness test were not normally distributed, hence, they were summarised using median and interquartile range (IQR), and presented using Box and Whisker plots. Wilcoxon Signed Rank test was used to examine differences in outcomes before and after the BRP. Descriptive statistics were used to present attendance rates by comparing the percentage of patients who completed the rolling BRP in 2014 to those who completed the standard format BRP in 2012.

Results

Demographic data

In total, 62 patients attended the BRP at the studied site in 2014. Forty-one patients (66%) completed all sessions of the programme. The ages of the completers and non-

completers were similar and more females attended the first session than males. More than three times the number of females compared to males failed to complete all of the sessions. Almost three times as many patients had experienced pain for more than six months compared to those who had experienced pain for six months or less, highlighting the chronicity of the group. Fifty-two percent of non-completers were in paid employment compared to 44% of completers (see Table 1).

(Table 1 about here)

Clinical effectiveness

Thirty-six out of 41 patients (88%) had an improved (reduced) BQ score post intervention. Two patients' scores were worse and three patients' scores did not change. Twenty-three patients had a pre to post programme improvement of 47% or more in their BQ score, indicating that 56% of patients who completed the rolling BRP reported a clinically significant change in their condition [20]. The median baseline BQ score for the completers was 37 (IQR 23 to 43.5). The median post BQ score for this group was 14 (IQR 6 to 34) (Figure 1). BQ scores from pre to post attendance at the BRP was statistically significant ($p < 0.0001$).

Figure 1 about here

The majority of patients demonstrated improvement in their fitness tests post-BRP. Ninety-five percent (n = 39) had an improved sit to stand test; 88% (n = 36) had an improved step test and 95% (n = 39) had an improved walk test. The median baseline sit to stand score for the completers improved from 21 (IQR 15.5 to 23) to 26 (IQR 23.5 to 31.5) post BRP ($p < 0.0001$). A significant improvement ($p < 0.0001$) was found in the

step test post BRP (baseline median: 26, IQR 19.5 – 29; post BRP median: 32, IQR 27 to 34.5). There was also a statistically significant improvement in the walk test following the BRP ($p < 0.0001$, baseline median: 290m, IQR 230 – 326; post BRP median: 365m, IQR 320 - 410) (see Figures 2-4; table 2).

(Figure 2-4 about here)

(Table 2 about here)

Attendance

Thirty-six patients were referred to the standard format BRP in 2012. A total of 12 patients completed all eight sessions (33%). In 2014, 62 patients were referred to the rolling BRP. Forty-one patients (66%) completed the rolling BRP, indicating that twice the percentage of patients completed the new programme compared to 2012.

The total number of patients referred for all conditions to the study site in 2014 was 6940. Referrals were accepted via General Practitioner, Consultant, Clinical Assessment and Treatment service (CATS), a primary care Orthopaedic Triage service or via self-referral. Local audits suggest that approximately 23% of patients referred to physiotherapy complain of low back pain (n = 1596). Therefore, only 4% of patients who were referred to physiotherapy with LBP were actually referred to the BRP.

Discussion

A previous study which investigated the effectiveness of a standard format BRP found that it was effective at improving pain, disability, anxiety and depression, fitness and perceived control in patients with chronic LBP, however, attendance on the programme was poor [17]. It was unknown if changing the format of the programme from a standard

1-8 sequential approach to a continual rolling approach would impact on the effectiveness of the programme, therefore, the present study investigated the effectiveness of a rolling BRP and its impact on attendance rates.

The results of this service evaluation showed that there was a clinically significant change (47%) in PROM scores and statistically significant improvements in PROM scores and in patient's levels of fitness (all $p < 0.0001$). This suggests that the current rolling BRP continues to be an effective modality for managing patients with NSLBP. As such, the rolling BRP should be considered by other practitioners as an effective management strategy when treating patients with NSLBP.

The results also indicate that the rolling format appears to enhance attendance as 66% of participants completed the 2014 BRP, compared to 33% who completed the standard format BRP in 2012. This is higher than in the studies by both Johnson et al., [16] and Gaskell et al., [17]. The possible reasons higher attendance rate in the current study compared to those of Johnson et al., and Gaskell et al., are unknown, however, they may be due to the following.

The condensed duration of the programme from eight 2 hourly sessions in 2012, to six 90 minute sessions in 2014, resulted in a lower patient commitment and therefore may have contributed to the new programme's success. In addition, the flexible nature of the rolling approach enabled almost immediate access to the BRP, thus possibly reducing the number of patients lost due to lengthy waiting times. Furthermore, allowing the patients to return to complete any sessions which they had missed may have further encouraged attendance. However, the times of the programme, which ran mid-morning, may have also been influential. As the rolling format appears to be effective at increasing

attendance, clinicians may consider incorporating a rolling approach to other rehabilitation programmes where this might be an issue.

The current study showed that 52% of the non-completers were in paid employment compared to 44% of completers. Therefore, attendance may have been adversely affected by those in paid employment who may not have been able to get time off work to attend. As such, arranging a class outside of the traditional working day may be more convenient for those who are employed and so may encourage attendance. This is supported by Jack et al. [12] who found that in patients with mechanical musculoskeletal conditions, work schedules were identified by as a barrier to adherence with physiotherapy treatment. Therefore, this strategy should be considered by others when designing rehabilitation classes. Interestingly, more than three quarters (76%) of the non-completers were female despite less than two thirds (63%) of the initial attenders being women. It is currently unknown why more female patients failed to complete the programme, hence a further qualitative study may help to ascertain the possible reasons for this.

Studies have shown that worsening pain is a barrier to exercise adherence [12]. Whilst this was not examined in this study, due to the variable nature of LBP some patients attending the BRP may have experienced an exacerbation in their condition. This could have been perceived as an adverse reaction to the BRP and may have contributed to drop out rates. Additional barriers to exercise are reported to be low self-efficacy, anxiety, depression and low levels of social activity and whilst this was not examined in this study, these are problems commonly found in patients with LBP [22] and therefore it is possible that these factors may have contributed to patients not completing the programme. In addition, family dependents, transportation problems and readiness to change have also been linked with adherence to exercise [12].

Anecdotal feedback from the clinicians running the BRP suggested that there were enhanced group dynamics as a result of new people joining a class which already contained patients who had been attending for a few weeks, with 'experienced' patients offering encouragement and support to the 'new' patients. According to Burke et al., [23] the opportunity to interact with others can increase group cohesion, which has been shown to improve adherence to exercise [24]. As the format of the BRP encouraged group interaction, this approach may have positively influenced the programmes' attendance.

Adherence also appears to be influenced by patient beliefs, preferences to and expectations of treatment [6]. A qualitative study which investigated participant experience of exercise programmes for NSLBP found that patients want to play an active role in their rehabilitation as well as receive explanation regarding their condition [25]. In the current study, although patient records indicate that following assessment, the goals and treatment plan had been agreed with the patient, the notes do not specify if patients were asked regarding their preferences and expectations. It is therefore possible that the patients may be agreeing with clinicians' suggestions but not specifically indicating their particular preference to treatment and this may have negatively affected attendance rates on the programme. 'Shared decision making' which is endorsed by The King's Fund, involves clinicians and patients working collaboratively to decide upon the most appropriate course of management for their condition. The process, which should consider both the clinical presentation and the informed preferences of the patient has been reported to encourage patients to manage their own health and has been shown to improve outcomes, including treatment adherence [26].

Although the exercise circuit was predetermined, the exercises were individualised for the patients depending upon their specific needs. For example, some patients were taught Pilates based exercises, whereas more disabled patients performed chair based exercise. It has been reported that individualised within a group and or supervised exercises were more effective than unsupervised exercises at improving attendance and adherence in patients with chronic musculoskeletal pain, including low back pain [13]. In the current study, exercises were supervised, with warm-up and pre/post stretches done together as a group but other exercises completed at the patients' own pace thus incorporating an individualised and graded approach. It is possible that the individualised, flexible approach used in the present study could have enhanced attendance rates of the BRP [13].

Simplifying the referral process to the BRP by reducing the outcome tools from four to one did not appear to encourage practitioners to refer patients onto the BRP as only approximately 4% of the estimated number of patients who were referred to the study's site with low back pain during 2014, commenced the programme. This suggests that the programme appears to be underutilised. This may be due to a number of possibilities. For example, patients may have been offered the programme but declined to attend; they may not have met the inclusion/exclusion criteria and therefore would have been treated individually; they may have required more support such as in a pain management environment or their condition may have resolved.

Alternatively, the clinician may not have offered them the opportunity to attend because they were unaware of the new, more flexible format or because they were not following the local service guidelines for the management of patients with LBP. In order to manage patients with high STarT Back scores, physiotherapists who can refer to the BRP, have received some training in undertaking a biopsychosocial assessment. However, Johnson

et al., [16] questioned whether brief training in CBT approaches to managing LBP was sufficient to result in a significant clinical change in practice, suggesting that staff who are not confident in using this assessment approach may struggle to challenge patients' beliefs. Some staff, therefore, may have a preference towards a more traditional, biomedical as opposed to biopsychosocial approach to management. This issue may be addressed by regular staff supervision and training. Additionally, further studies to investigate approaches to managing persistent LBP would be valuable. The approach to the management of persistent LBP is of particular importance as according to Nijs et al., [27], before treatment, patients hold a strong biomedical view regarding chronic pain and that a clinician who also holds this view may encourage fear avoidance and therefore a poorer long-term outcome.

The BQ was chosen because it is a measure of the patients' perception, it is clinically relevant as it is specific to low back pain, and its use removed the need to use multiple questionnaires. Although the level of detail in the information it provided may have been sacrificed due to its simplicity, it has been shown to be a reliable, valid and sensitive tool in this population [20].

Additionally, the long-term effectiveness of the rolling programme was not considered in the present study, and as such, the long-term effects of BRP are unknown. Therefore, it is recommended that this be investigated in future research. Finally, although STarT Back Tool data is collated on entrance to the physiotherapy service, due to missing data, the STarT Back scores of the individual patients attending the BRP were not considered during this study. Hence, further evaluation to investigate if the BRP is as effective for medium and high STarT Back scorers would be useful. Finally, the cost-effectiveness of this intervention was not examined in the present study, it is hoped that this would be

investigated in future studies as this may help to guide decision making with respect to resource allocation for patients with this condition.

Conclusion

In summary, patients with NSLBP who have attended a rolling BRP have been shown to have statistical improvements in a PROM and fitness tests. The PROM results showed that there was also a clinically significant change in their condition [20]. As such, the rolling BRP should be considered by other practitioners as an effective management strategy when treating patients with NSLBP. In addition, the rolling format also appears to improve attendance. However, the BRP appears to be underutilised. To maximise the use of BRP, it is important that awareness is increased in the referring population and strategies to achieve this should be considered and acted upon. This may be achieved by regular staff supervision and training.

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Figure 1

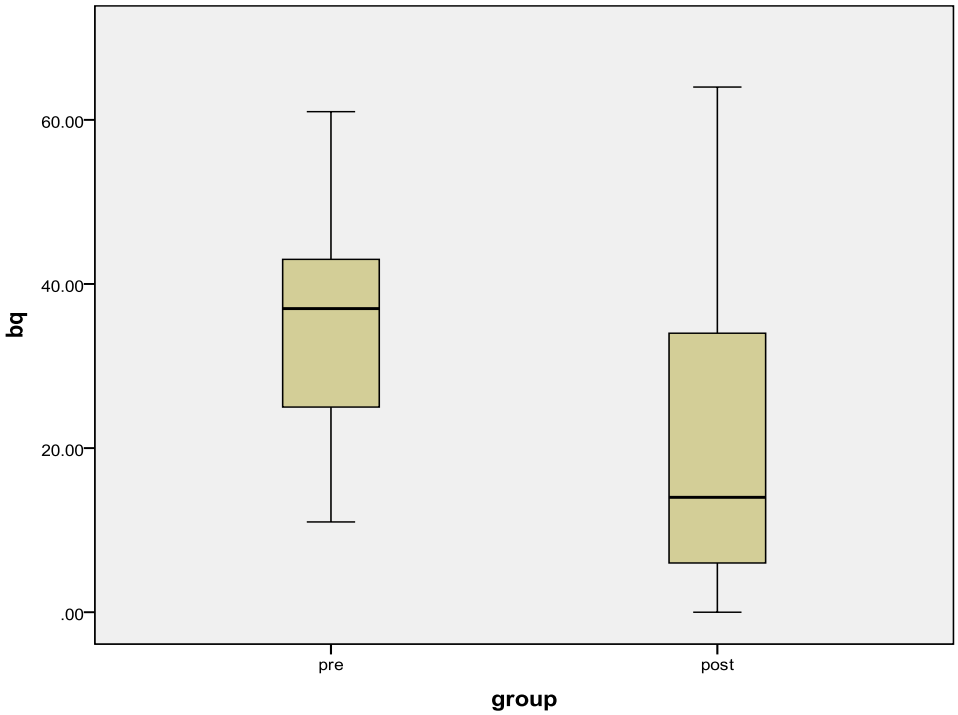

Fig. 1. Box and Whisker Plot illustrating the pre (baseline) and post Bournemouth Questionnaire (BQ) results.

Figure 2

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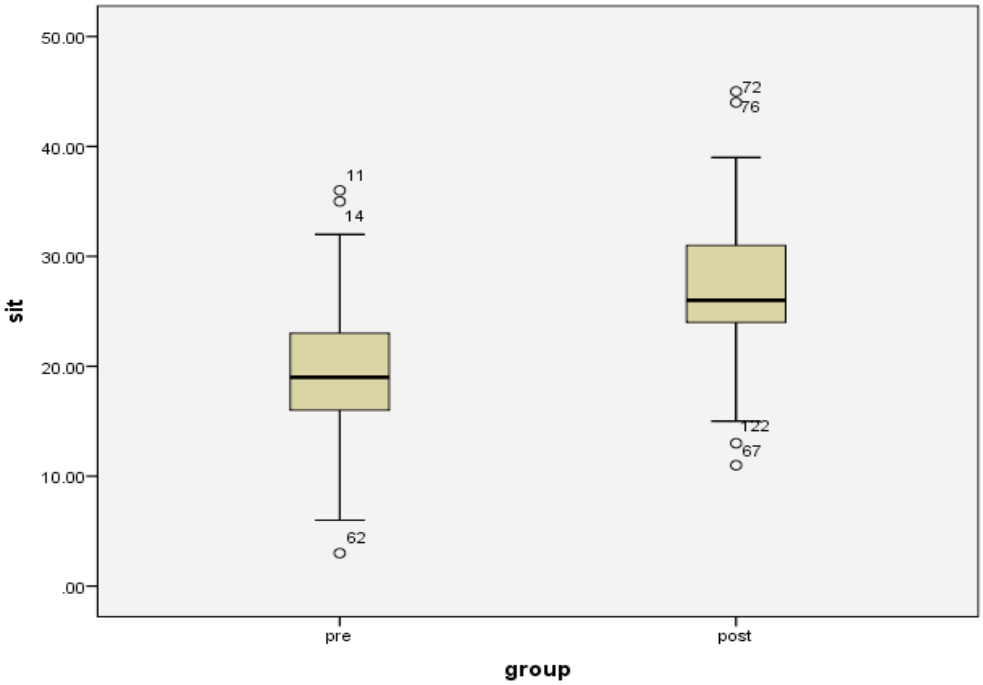

Fig.2. Box and Whisker Plot illustrating the pre (baseline) and post sit to stand to results.

Figure 3

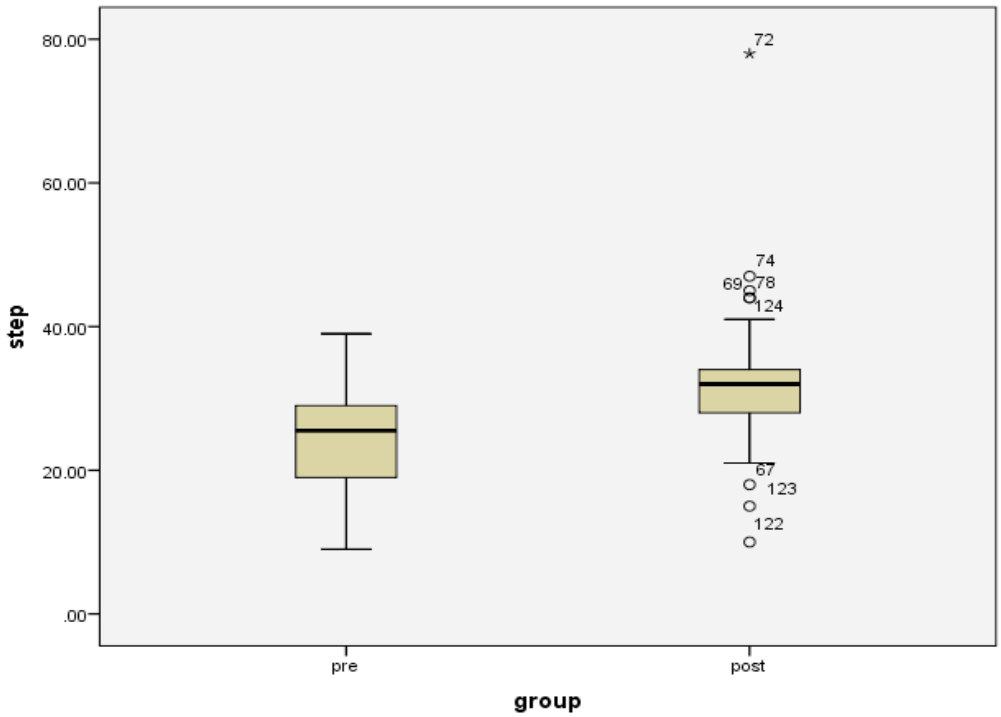

Fig.3. Box and Whisker Plot illustrating the pre (baseline) and post step test results.

Figure 4

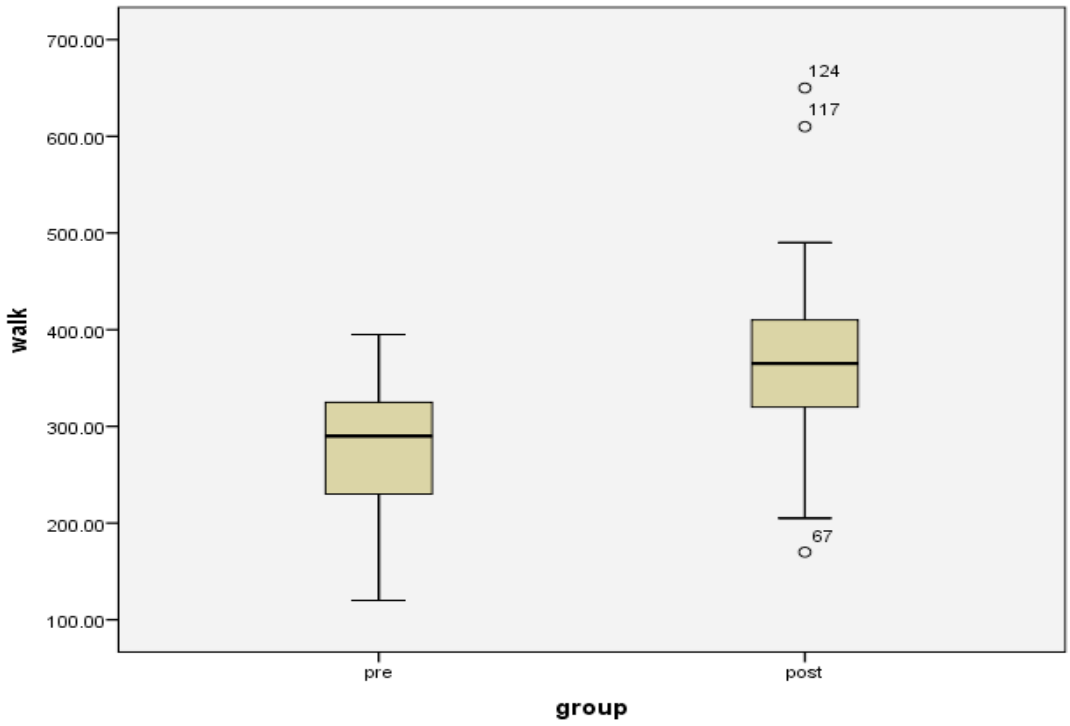

Fig.4. Box and Whisker Plot illustrating the pre (baseline) and post walk results.

Table 1 Patient demographics for the 2014 rolling BRP.

	TOTAL	COMPLETERS	NON-COMPLETERS
Number (n) of patients (%)	62	41 (66%)	21 (34%)
Age (in years)			
Mean	54	55.2	52.4
Range	26-80	35-76	26-80
Standard Deviation	11.6	10.8	13.1
Gender n (%)			
Female	39 (63%)	23 (56%)	16 (76%)
Male	23 (37%)	18 (44%)	5 (24%)
Duration of symptoms n (%) (Range 2 months – 'years')			
> 6 months	45 (72%)	31 (76%)	14 (67%)
≤ 6 months	16 (26%)	8 (19%)	8 (38%)
Unknown	1 (2%)	1 (2%)	
Paid employment n (%)	29 (56%)	18 (44%)	11 (52%)

Table 2 Results of statistical analysis of the outcome measures.

Outcome Measure	**Baseline**		**Post BRP**		**Difference**
	Median	IQR	Median	IQR	*p* value
BQ	37	23-43.5	14	6-34	<0.0001
Fitness tests					
Sit to stand	21	15.5-23	26	23.5-31.5	<0.0001
Step test	26	19.5-29	32	27-34.5	<0.0001
Walk test	290	230-326	365	320-410	<0.0001