

Accepted Manuscript of an article published in Journal of Manipulative and Physiological Therapeutics. WFC Award Winning Paper.

Field, J. R. and Newell, D., 2016. Clinical outcomes in a large cohort of musculoskeletal patients undergoing chiropractic care in the United Kingdom: a comparison of self - and National Health Service - referred routes. Journal of Manipulative and Physiological Therapeutics, (1), 54. Available online: <https://doi.org/10.1016/j.jmpt.2015.12.003>

## **Clinical outcomes in a large cohort of musculoskeletal patients undergoing chiropractic care in the UK: A comparison of self and NHS referred routes**

### **Abstract**

*Objectives:* An innovative commissioning pathway has recently been introduced in the UK allowing chiropractic organisations to provide state funded chiropractic care to patients through referral from National Health Service (NHS) primary care physicians. This study utilised data, routinely collected using a web based system to monitor outcomes of patients presenting to chiropractors through this NHS pathway compared with those presenting privately.

*Methods:* A prospective cohort design monitoring patient outcomes comparing self-referring and NHS referred patients undergoing chiropractic care was used. The primary outcome was Bournemouth questionnaire (BQ) change scores. Within and between group analyses was performed to explore differences between outcomes with additional analysis of subgroups as categorised by the STarT back tool (SBT).

*Results:* Eight thousand two hundred and twenty two (n=8222) patients filled in baseline questionnaires. Of these, NHS patients (41%) had more adverse health measures at baseline and went on to receive more treatment. Using percent change in BQ scores categorised at minimal clinical change cut offs and adjusting for baseline differences, low back and neck pain patients presenting privately are more likely to report improvement within two weeks and to have slightly better outcomes at 90 days. However, these patients were more likely to be attending consultations beyond 30 days.

*Conclusions:* This study supports the contention that chiropractic services as provided in UK are appropriate for both private and NHS referred patient groups and should be considered when GPs make decisions concerning referral routes and pain pathways for MSK patients.

### **Introduction**

Musculoskeletal conditions are common in all countries and cultures and are a major burden on health system<sup>1</sup>. In the next 50 years this burden is predicted to increase as the population ages and public health issues such as obesity and lack of activity take their toll.<sup>2</sup>

In the UK, back pain alone accounts for 4.8% of all social benefit claims<sup>3</sup> with the overall cost of MSK conditions estimated at £5-7 billion per year and the number of GP visits estimated at over 30% of all consultations.<sup>4</sup> As national health systems strive to

accommodate increasing demands and resources are stretched the direct and indirect costs of shouldering the MSK burden is increasingly considered a national priority in the UK and in other developed economies.

Historically in the UK, MSK conditions have been managed predominantly within the state health care system although successive governments have attempted to bolster the contribution of the private (independent) sector by providing funded access for patients to care normally considered to be outside the state system. Traditionally outpatient MSK services have been provided by single large organisations covering one or more NHS region. In the 'new' NHS England, MSK care is envisaged to focus more on outcomes rather than targets and to be more patient focused, with greater empowerment, individualised plans and evidence based pathways in care choice as well as extending the freedom of payers to commission new services.<sup>5</sup>

An example of recent changes in such service provision was the development of contracts whereby independent or state sector organisations able to demonstrate achieving a priori excellence and clinical governance criteria as set by the UK government were able to apply to provide care funded by the NHS. These were termed Any Qualified Provider contracts (AQP) and for the first time they enabled organisations providing chiropractic services to accept and be remunerated for patients as referred from primary care physicians (General Practitioners (GPs)) within particular NHS regions. These patients are paid for by the NHS through a set tariff not related to the number of treatments.

Previous research suggests that demographic and condition based differences exist between private and state funded MSK patients, with state funded patients being somewhat less well (greater severity, duration and co morbidity) than private patients.<sup>6</sup> However it is not known if these differences affect response to chiropractic care

In addition, pre-treatment screening of non-specific low back pain patients using the STarT Back Tool (SBT) has been developed and is intended to help GPs and others direct such patients to targeted treatment.<sup>7</sup> Given that its use is increasingly been included in NHS back pain pathways the present authors have described the prognostic utility of this tool in patients presenting privately for chiropractic care.<sup>8</sup> However, little is known about its utility in patients attending for chiropractic through state funded services

This study sought to examine the outcomes of NHS and private patients groups presenting with MSK conditions to chiropractors under the AQP scheme and compare the clinical outcomes of these patients with those presenting privately. Furthermore, it examined the differential outcomes of low back pain patients classified as low, medium and high risk of not improving by the STarT Back stratification tool in both patient groups.

## **Methodology**

### *Participants*

The design of the study was observational utilising routinely data collected from patients over the age of 16 at a consortium of UK based practices located in the south of the UK. These clinics, in addition to providing care for private self-referring patients were also

providing services to the NHS through an AQP contract with NHS patients being referred by local GPs.

### *Data Collection*

Patient characteristics and outcomes were collected via a web based patient reported outcome measure (PROM) collection system (Care Response, <https://www.care-response.com/CareResponse/home.aspx>). This methodology has been developed to provide validated measures to patients via e-mail links sent automatically, at set follow up time points throughout and beyond the provision of face-to-face care. Using this system, baseline data that included patient and condition related characteristics; STarT Back Tool (SBT) and the Bournemouth Questionnaire (BQ) were collected before the first visit using either the patients' e-mail collected by consent during the initial booking or at the clinic prior to the first appointment. Patients could pick areas of pain according to a pain manikin diagram and were able to indicate more than one area.

Care Response enables exporting of anonymised information from participating practices to a secure encrypted server thus facilitating collation and analysis of large sets of data collected as part of normal practice activity.

### *Patient Reported Outcomes*

The BQ is a condition specific outcome measure and has been extensively validated and characterized.<sup>9-12</sup> It consists of seven 11-point numerical rating scales (0–10) each covering a different aspect of the back pain experience. These were (i) pain; (ii) disability in activities of daily living; (iii) disability in social activity; (iv) anxiety; (v) depression; (vi) fear avoidance behavior; and (vii) locus of control. Subscales are summed to produce a total BQ score (maximum of 70).

Using the Patients' Global Impression of Change (PGIC) Scale patients are asked 'How would you describe your pain/complaint now, compared to how you were when you completed the questionnaire before your first visit to this clinic?' The scale ranges from 1 (worse than ever) to 7 (very much improved). This outcome was dichotomized for each of the follow up points with improvement being defined by a PGIC response of better or much better (score of  $\geq 6$ ).<sup>13</sup>

Subsequently, the BQ and a 7 item patient global impression of change (PGIC) were collected at 14, 30 and 90 days following the initial visit. In addition, participants also completed a 7-point Likert scale measuring satisfaction at the 30-day follow up. The satisfaction scale consisted of 7 items and was preceded by a questions asking 'Overall, how have you found the service and care your received? This would include the way you have been treated by our reception, practitioners or any other contact from us. Please select one of the following': 1) Unacceptably poor, 2) Not as good as I was expecting, I would be concerned if a friend wanted to come to you., 3) Reasonable but nothing special., 4) As I was expecting and I am satisfied with this., 5) Better than I was expecting., 6) Good, I would be happy to recommend to a friend to you., 7) A very high level, I would recommend friends with similar problems to consider

### *Analysis*

For all participants, baseline and follow up data were analysed using descriptive statistics with comparisons between groups using appropriate inferential methods. BQ percent change scores were calculated using the following formula ( $(\text{follow up score} - \text{baseline score}) / \text{baseline score} \times 100$ ).<sup>11</sup>

For low back pain and neck pain patients only, further categorisation of BQ percentage change scores was calculated. We chose the minimal clinical important change cut off points for back pain and neck pain subjects of  $\geq 46$  or  $\geq 35$  percent respectively.<sup>11,12</sup>

Within and between group analyses was investigated using repeated measures general linear methods (GLM) with adjustment for significant baseline differences between groups with change in percentage total BQ scores as the dependent variable. Time interactions were also included in this analysis. Regression models were constructed using the dichotomised PGIC as the dependent variable (where improvement was determined as  $\geq 6$  points) for each follow up point and within the NHS or self-referral groups. An identical analysis was also carried out with dichotomised percent change in BQ scores as the dependent variable. A forward likelihood ratio (LR) logistic regression procedure was utilised for this purpose.

For the subgroup analysis we analysed only nsLBP patients who had been categorised as low, medium and high risk by the SBT. Within and between groups analyses were carried out using GLM as above with the grouping variable set as NHS or private patients. In addition we also generated crude and adjusted odds ratios for the likelihood of improvement in self-referring patients as compared to NHS patients as defined by dichotomised PGIC outcomes ( $\geq 6$  points) within each of the SBT risk group categories. For this we used a logistic regression procedure adjusting for all baseline variables indicated as significantly different between these two referral routes.

### *Ethics*

In accordance with the Anglo European College of Chiropractic ethics policy, service evaluation studies are considered below minimal risk and do not require institutional ethical approval. (<http://www.aecc.ac.uk/research/about/>)

## **Results**

### *Baseline Descriptors*

Eight thousand two hundred and twenty two patients completed the initial questionnaire. Of these 41% were NHS patients referred by their GP. Table 1 describes the characteristics of this cohort of patients at baseline as split into NHS and private patient groups. The greatest proportion of patients indicated either back pain, neck pain or both as an area of pain.

Comparing groups it is apparent there are significant differences across a range of both demographic and clinical measures with NHS patients being more likely to be female, be more chronic and have higher severity including radiating pain and higher BQ scores across all domains (Table 1).

Of those patients that identified low back, neck pain or both as an area of pain similar differences between NHS and private patients were seen as with the whole cohort (Table 2 and 3)

Specifically for low back pain patients, NHS patients were significantly more likely to be placed in the HIGH risk SBT group (39.1% v 21.6%), whilst similar proportions were classed as MEDIUM risk (Table 2).

### *Outcomes*

Both private and NHS referred low back pain and neck pain patients showed substantial improvement across the range of outcome assessments' at each of the three follow up points (Tables 4-7). Using the published cut off for MCIC in percent change BQ a smaller proportion of NHS low back pain patients achieved important clinical change over the course of the treatment as compared to private patients (Table 4). This is most marked in the initial 2 weeks from after the initial consultation. Crude odds ratios indicate that overall NHS patients were around 2-3 times less likely to improve in comparison to private patients. However, when adjusting for key baseline confounders, these differences became insignificant at 1 month follow up re-emerging at 90 days. Using the PGIC as a dichotomised outcome, ostensibly identical results emerged even though these two measures are substantially different, one being a summed score across multiple condition based and psychological domains questioning how the patient feels now and the other a 7 point scale asking individuals about their perception of improvement thinking back to how they were when they initially presented.

When adjusted for baseline confounders, differences in percent change in BQ scores for patients with LBP in the two referral groups remained significant only up to 2 weeks into treatment (Table 5 and Figure 1a). Differences were minimal at 1 month but increased slightly at 90 days. However, this remained statistically insignificant. Mean response profiles as determined by analysis of time/group interaction was statistically insignificant over time between groups ( $F=0.75$ :  $p>0.05$ ) indicating the pattern of change was essentially the same between the two referral groups.

For patients with neck pain a similar pattern in the risk of improvement is apparent both in terms of MCIC for the BQ and the PGIC (Table 6). Again, after adjusting for key baseline differences the differences in outcomes are not statistically significant after 2 weeks of chiropractic care. This is even more apparent in the adjusted change in percent BQ scores where there is no substantive difference in adjusted changes scores at any follow up point (Table 7 and Figure 1b).

Table 8 shows that there are significant differences between the number of treatments for each group over time with NHS patient's receiving more sessions over a shorter time, having effectively ended treatment by 30 days, while private patients were still attending for further consultations. The number of treatments received by those presenting with either LBP or NP was similar.

The vast majority of patients in both groups reported being satisfied with the care they had received (Table 9). NHS patients were more likely to have had their expectations than private patients (98.5% v 89.2%)

### *STarT Back categorisation*

A GLM analysis was carried out for between and within group and time\*group interactions for percent change in BQ scores as adjusted for the same baseline variables as in the whole cohort back pain analysis above (Figure 2). In the low risk group there were no significant group or group\*time interactions although both groups changed significantly over time (F=5.3; p<0.01). However, in both medium and high risk groups both group (Medium (F=5.4; p<0.05) High (F=5.3; p<0.05) and time (Medium (F=5.9; p<0.01) High (F=8.3; p<0.001) effects were significant with NHS although as percentage outcomes these effects did not persist at 90 days except in the high risk groups. In terms of clinical change, around 80% of private patients and 60-70% of NHS patients achieved a minimally important change of 30% by 90 days follow-up.

### **Discussion**

This study presents the analysis of a very large data set of MSK patients attending for chiropractic care either as self-referring private patients or as referred through the NHS via a GP. The size of the cohort is a strength of this study and the use of an automatic electronic patient driven PROMs system within the participating clinic directly impacts the ability to collect such large numbers.

This is by some way the numerically largest prospective cohort study of patients undergoing chiropractic care. And reporting of the characteristics and outcomes of patients presenting for such a large group of patients is unique in the UK. Results are similar to other UK studies<sup>8,14</sup>, and so the descriptions here of both baseline characteristics and outcomes are likely to provide robust condition specific metrics generalizable to the wider UK populations of patients presenting for private and NHS chiropractic care.

Generally NHS patients were found to be more chronic, in more distress and display more co morbidity than private patients. Private patients, a self-selecting group tend to be healthier and present with less severity at presentation. Similar differences were found between chiropractic patients and those in general practice at baseline in a recent report from Denmark.<sup>6</sup> Analysis of secondary data in the present study suggest those presenting privately are more likely to be have had previous experiences of chiropractic care and bolster the idea that patients often return for such care when presented with future MSK episodes.

On average, NHS patients attended more sessions than those attending privately. The AQP contracts provide a fixed tariff for a course of care to the NHS patient irrespective of the number of sessions whilst private patients pay per visit. We do not have information about compliance with clinicians care plans and it is possible that private patients were unwilling to attend as many sessions. However given that as a group their care was extended over a

longer period a more likely explanation is that differences in visit numbers were not due to financial factors but more likely related to the more complicated health needs of the NHS patients.

In light of the more chronic and complex nature of the presentation of NHS patients it might be surprising that it was more common for private patients' to continue to be receiving care beyond 30 days. However the NHS pathways precludes providing supportive care beyond settling symptoms. In a physiotherapy setting in Ireland public setting patients had more treatment than those self-referring.<sup>15</sup> However in their study there was no upper limit on public funded treatments and it is unknown whether removing such an artificial barrier in this study might ameliorate any differences seen in treatment numbers.

For those with low back and neck pain both private and NHS patient's experienced large and clinically significant reductions in percent change BQ scores. When corrected for baseline differences in severity of symptomatology, there was no significant differences between the private and NHS patients at thirty days and only a small difference at 90 days and then only in neck pain patients. Private patients as a group continued to improve at each follow up assessment whilst the NHS group did see a levelling off of improvement or even a slight deterioration after 30 days.

When dichotomising the change in BQ scores as determined by a minimal clinical cut off point for both back and neck pain large proportions of patients were categorised as having clinically importantly improved over the course of the 90 days, although less NHS patients fell into this category. However, after adjusting for baseline severity statistically significant differences in odds of improvement only remained at early and later follow up points in LBP patients and only at early follow up in neck pain patients.

These proportions were mirrored by a global impression of change outcome as reported by the patient directly, indicating improvement anchored to the phrases 'improved' or 'very much improved'. Given that the MCIC as calculated in previous studies used a similar PGIC to determine such cut off points this might be expected. However, the large proportion of patients reporting important clinical change is notable over the course of this cohorts care.

Generally when looking at SBT risk groups NHS patients in medium and high risk groups did less well, with this difference being marginally more marked in medium and high risk groups. However these differences, while being statistical were clinically small with the majority of patients achieving clinical change in both referral groups by 90 days. This similarity in outcomes for SBT groups of patients undergoing chiropractic care has been reported before.<sup>16</sup>

The patients sampled here reported almost uniformly being satisfied with the care they received even if they did not achieve a positive outcome. This is in concord with prior work on patients' descriptions of their experiences having attended chiropractors.<sup>17</sup> In this study those referred via their GP were more likely to have had their expectations of treatment exceeded. There are differences in the care provided to the two groups with NHS patient's attending more sessions, which may account for this. Also higher proportions of private patients had previously seen a chiropractor and so are likely to have appropriate

expectations of how they will be treated. It is possible that in general those paying for private care expect a different standard of service than those whose care is funded by the state.

The pattern of change in patients in this cohort is similar to other studies<sup>18</sup> and mirrors the expected clinical course for low back pain at least. In addition a secondary analysis of expected regressions to the mean values as calculated using R<sup>2</sup> regression coefficients between baseline and follow up total BQ scores<sup>19</sup> were marked indicating that this phenomena probably contributed, along with natural history<sup>20,21</sup> and treatment effects to the changes seen in BQ scores over time, although these were generally smaller in the NHS group.

It is interesting that there was a deterioration of outcomes noted in the NHS group after they had finished attending for treatment (by 30 days) whilst further improvement was seen in the Private group who were more likely to continue care beyond this. Previous work has suggested that prolonged treatments in the form of supported or maintenance care improves longer-term prognosis.<sup>22,23</sup> NHS patients received more sessions but at higher frequency early in care and this may suggest that duration of care is a significant factor separate from number of visits. Further work is needed in this area.

### **Conclusion**

This study characterised a large number of private and NHS referred patients as cared for by chiropractors and provides a unique and robust description of characteristics and outcomes in this patient group for the UK. In terms of improvement, those presenting for chiropractic care either privately or via their NHS GP experienced excellent results across a range of patient reported outcome and experience measures. This remained true regardless of the STarT back category where substantive improvements in outcomes were seen in all three risk groups regardless of referral status.

### **Limitations**

This study design precludes any conclusions regarding putative treatment effects associated with chiropractic care as factors including regression to the mean or natural history may underlie a significant proportion of the improvements seen. In addition, NHS referred patients in this sample have been subject to selection by their GP and as such may not represent all those presenting with spinal pain to GPs, limiting generalisability to this wider population.

Furthermore, it is possible that the higher proportion of NHS patients indicating care had exceeded expectations may have had differing expectations of care compared to self-referring patients and the history and experience within a different health care setting may have influenced self-reporting of these outcomes

Lastly, patients were recruited from a limited group of clinics in the south of England and it is possible that demographic and condition specific characteristics may be different in other parts of the UK, although this is unlikely.



## References

1. Becker, A. et al., 2010. Low back pain in primary care: costs of care and prediction of future health care utilization. *Spine* 2010; 35(18): 1714–1720.
2. Ellis B, Silman A, Loftis T et al. Musculoskeletal health. A Public Health Approach. Arthritis Research UK. 2014: 1–58.
3. Public Health England. Obesity and disability. 2013; Available at: [http://www.noo.org.uk/uploads/doc/vid\\_18474\\_obesity\\_dis.pdf](http://www.noo.org.uk/uploads/doc/vid_18474_obesity_dis.pdf) (Accessed: 26 February 2013).
4. Department of Health. The Musculoskeletal Framework. 2006; Available at: [http://www.susanoliver.com/pdf/MSF\\_Final.pdf](http://www.susanoliver.com/pdf/MSF_Final.pdf) (Accessed: 13 February 2013).
5. Ham C, Baird B, Gregory S, et al. The NHS under the coalition government. 2015; Available at <http://www.nhshistory.net/kingsfund%20reforms.pdf> (Accessed: 27 February 2013).
6. Hestbaek, L. et al. Low Back Pain in Primary Care: A Description of 1250 Patients with Low Back Pain in Danish General and Chiropractic Practice. *International Journal of Family Medicine* 2014; (15): 1–7.
7. Hill, J.C. et al., 2008. A primary care back pain screening tool: Identifying patient subgroups for initial treatment. *Arthritis Care & Research* 2008; 59(5): 632–641.
8. Field J, Newell D. Relationship between STarT Back Screening Tool and prognosis for low back pain patients receiving spinal manipulative therapy. *Chiropractic & Manual Therapies*, 9.
9. Bolton J, Breen A. The Bournemouth Questionnaire: a short-form comprehensive outcome measure. I. Psychometric properties in back pain patients. *J Manipulative Physiol Ther* 1999; 22(8): 503–510.
- 2012; 20(1): 1–16.
10. Bolton J, Humphreys B. The Bournemouth Questionnaire: a short-form comprehensive outcome measure. II. Psychometric properties in neck pain patients. *J Manipulative Physiol Ther* 2002; 25: 141-148
11. Hurst H., Bolton J. Assessing the clinical significance of change scores recorded on subjective outcome measures. *J Manipulative Physiol Ther* 2004; 27(1): 26–35.
12. Bolton J. Sensitivity and specificity of outcome measures in patients with neck pain: detecting clinically significant improvement. *Spine* 2004; 29(21); 2410–7
13. Newell D, Bolton J. Responsiveness of the Bournemouth questionnaire in determining minimal clinically important change in subgroups of low back pain patients. *Spine* 2010; 35(19): 1801–1806.
14. Gurden, M. et al. Evaluation of a general practitioner referral service for manual treatment of back and neck pain. *Primary Health Care Research & Development* 2012; 13(03): 204–210.
15. Casserley-Feeneya S, Buryb B, Dalyc L, et al. Physiotherapy for low back pain: Differences between public and private healthcare sectors in Ireland—A retrospective survey. *Manual Therapy* 2008; 13: 441–449
16. Newell D, Field J, Pollard D. Using the STarT back tool: Does timing of stratification matter? *Manual Therapies* 2014 Aug 9. pii: S1356-689X(14)00144-1. doi: 10.1016/j.math.2014.08.001. [Epub ahead of print]
17. Hurwitz E, Morgenstern H, Yu F. Satisfaction as a predictor of clinical outcomes among chiropractic and medical patients enrolled in the UCLA low back pain study. *Spine* 2005; 30(19): 2121–2128.

18. Artus M, de Windt D, Jordan K, et al. The clinical course of low back pain: a meta-analysis comparing outcomes in randomised clinical trials (RCTs) and observational studies. *BMC Musculoskeletal Disorders* 2014; 15(1): 68.
19. Barnett A, van der Pols, J, Dobson J. Regression to the mean: what it is and how to deal with it. *International Journal of Epidemiology* 2005; 34(1), 215–220.
20. Hestbaek L, Leboeuf-Yde C, Engberg M et al. The course of low back pain in a general population. Results from a 5-year prospective study. *J Manipulative Physiol Ther* 2003, 26(4):213-219.
21. Pengel, L.H.M. et al., 2003. Acute low back pain: systematic review of its prognosis. *BMJ (Clinical research)* 2003; 327(7410): 323–0.
22. Descarreaux, M. et al., 2004. Efficacy of Preventive Spinal Manipulation for Chronic Low-Back Pain and Related Disabilities: A Preliminary Study. *J Manipulative Physiol Ther*, 27(8): 509–514.
23. Senna M, Machaly, S. Does maintained Spinal manipulation therapy for chronic non-specific low back pain result in better long-term outcome? *Spine* 2011; 18:1427-1437

Table 1: Baseline characteristics of patient groups across whole cohort

	NHS Funded (N=3371)	Private patients (N=4851)	Sig
Age (mean)	49.1	49.2	ns
Days to 1 <sup>st</sup> appointment (mean)	1.5	0.43	*
Female (%)	60.2	48.3	*
New patient (%)	78.0	61.1	*
Seen before (%)	2.7	21.1	*
Head pain (%)	5.8	2.8	*
Neck pain (%)	36.7	31.0	*
Shoulder pain (%)	23.7	23.1	ns
Back pain (%)	78.6	73.8	*
Upper arm pain (%)	5.5	4.9	ns
Lower arm pain (%)	6.1	4.3	*
Above knee pain (%)	32.8	23.1	*
Below knee pain (%)	13.7	8.5	*
Pain > 30 days in year (%)	54.9	46.5	*
Reoccurring (%)	76.0	64.1	*
Days since 30 days no pain (%)			*
< 3m	32.7	56.0	
3-12m	33.4	21.6	
1-5y	21.5	13.1	
6-10y	4.6	3.3	
>10y	6.8	4.8	
BQ SCORES (mean)			
Pain	6.7	6.2	*
ADL	6.2	5.5	*
Social	5.7	4.9	*
Anxiety	5.6	4.5	*
Depression	4.4	3.0	*
Work	5.9	4.8	*
LOC	5.7	4.9	*
TOTAL	40.2	34.0	*

α = Mann Whiney U <0.01; \*=Chi Square <0.01; ns = not significant

Table 2: Baseline characteristics of patient groups reporting back pain

	NHS Funded (N=2591)	Private patients (N=3537)	Sig
Age (mean)	47.7	48.0	ns
Female (%)	60.1	47.7	*
Head pain (%)	3.5	1.8	*
Neck pain (%)	27.7	23.8	*
Shoulder pain (%)	17.8	15.9	ns
Above knee pain (%)	37.8	24.3	*
Below knee pain (%)	15.1	7.9	*
Pain > 30 days in year (%)	77.1	46.3	*
Reoccurring (%)	54.9	64.1	*
Days since 30 days no pain (%)			*
< 3m	32.7	56.7	
3-12m	33.7	21.9	
1-5y	22.0	12.1	
6-10y	4.7	3.3	
>10y	7.0	4.8	
SBT categories (%)			
Low	26.4	46.3	*
Medium	34.5	32.0	
High	39.1	21.6	
BQ SCORES (mean)			
Pain	6.8	6.3	$\alpha$
ADL	6.4	5.6	$\alpha$
Social	5.9	5.1	$\alpha$
Anxiety	5.7	4.6	$\alpha$
Depression	4.6	3.1	$\alpha$
Work	6.1	5.0	$\alpha$
LOC	5.7	5.0	$\alpha$
TOTAL	41.2	34.7	$\alpha$

$\alpha$  = Mann Whiney U <0.01; \*=Chi Square <0.01; ns = not significant

Table 3: Baseline characteristics of patient groups reporting neck pain

	NHS Funded (N=1207)	Private patients (N=1486)	Sig
Age (mean)	49.0	46.1	ns
Female (%)	66.3	56.1	*
Head pain (%)	13.2	6.8	*
Back pain (%)	59.4	56.7	*
Shoulder pain (%)	45.4	42.2	ns
Above elbow pain (%)	10.5	8.1	*
Below elbow pain (%)	11.1	6.9	ns
Pain > 30 days in year (%)	79.7	66.5	*
Reoccurring (%)	54.8	63.8	*
Days since 30 days no pain (%)			*
< 3m	32.7	56.7	
3-12m	32.7	21.9	
1-5y	22.0	13.1	
6-10y	4.7	3.3	
>10y	7.0	4.8	
<b>BQ SCORES (mean)</b>			
Pain	6.6	6.1	$\alpha$
ADL	6.1	5.3	$\alpha$
Social	5.4	4.5	$\alpha$
Anxiety	5.8	4.9	$\alpha$
Depression	4.5	3.3	$\alpha$
Work	5.8	4.9	$\alpha$
LOC	5.6	5.0	$\alpha$
TOTAL	40.0	34.0	$\alpha$

$\alpha$  = Mann Whiney U <0.01; \*=Chi Square <0.01; ns = not significant

Table 4: Clinical outcomes for back pain subjects at each follow up point

	NHS Funded	Private Patients	Odds of improving (Private v NHS)	
<b>BQ change score ≥ 46%</b>	<b>% Improved</b>	<b>% Improved</b>	<b>Crude OR (95%CI)</b>	<b>Adjusted OR (95%CI)*</b>
14 days	43.3	50.5	1.6 (1.3 to 1.8)	1.8 (1.5 to 2.2)
30 days	57.0	58.7	1.2 (1.0 to 1.5)	1.2 (1.0 to 1.6)
90 days	54.6	60.9	1.5 (1.2 to 1.7)	1.7 (1.3 to 2.2)
<b>PGIC ≥ 6 points</b>				
14 days	43.9	69.3	2.9 (2.4 to 3.4)	2.0 (1.7 to 2.4)
30 days	68.2	75.3	1.4 (1.2 to 1.7)	0.9 (0.8 to 1.2)
90 days	63.7	79.7	2.2 (1.8 to 2.8)	1.6 (1.2 to 2.1)

\*=adjusted for sex, visits so far, days since 30 days of no pain, pain >30 days in year, recurrence, Baseline BQ total, leg pain above knee, leg pain below the knee

Table 5: Percent change in total BQ for back pain patients at each follow up point (crude versus adjusted for covariates)

	Crude change (%)		*Estimated marginal means (95%CI)		F	p	*Difference (95%CI) (NHS-Private)
	NHS	Private	NHS	Private			
14 days	30.0	46.3	33 (29-37)	43 (39-47)	11.8	0.01	-10.3 (-16.2 to -4.0)
30 days	44.3	56.4	47 (45-50)	50 (47-54)	1.4	0.24	-3.0 (-8.0 to 2.0)
90 days	48.2	60.4	52 (48-56)	58 (53-63)	3.2	0.07	-6.5 (-13.7 to 1.0)

\* = Univariate GLM adjusted for sex, visits so far, days since 30 days of no pain, pain >30 days in year, recurrence, Baseline BQ total, leg pain above knee, leg pain below the knee

Table 6: Clinical outcomes for neck pain subjects at each follow up point

	NHS Funded	Private Patients	Odds of improving (Private v NHS)	
<b>BQ change score ≥ 35%</b>	<b>% Improved</b>	<b>% Improved</b>	<b>Crude OR (95%CI)</b>	<b>Adjusted OR (95%CI)*</b>
14 days	43.3	50.5	1.3 (1.1 to 1.7)	1.6 (1.2 to 2.2)
30 days	57.0	58.7	1.1 (0.8 to 1.4)	1.3 (0.9 to 1.9)
90 days	54.6	60.9	1.3 (1.0 to 1.7)	1.5 (1.0 to 2.1)
<b>PGIC ≥ 6 points</b>				
14 days	45.0	62.3	2.0 (1.6 to 2.6)	1.6 (1.2 to 2.1)
30 days	66.8	68.2	1.1 (0.8 to 1.4)	0.9 (0.8 to 1.3)
90 days	58.9	71.5	1.8 (1.3 to 2.4)	1.3 (0.9 to 1.9)

\*=adjusted for sex, visits so far, days since 30 days of no pain, pain >30 days in year, recurrence, Baseline BQ total, arm pain above elbow, arm pain below the elbow

Table 7: Percent change in total BQ for neck pain patients at each follow up point (crude versus adjusted for covariates)

	Crude change (%)		*Estimated marginal means (95%CI)		F	p	*Difference (95%CI) (NHS-Private)
	NHS	Private	NHS	Private			
14 days	30.0	40.0	32.3 (28-36)	37.3 (33-42)	2.6	0.11	-5.0 (-11.2 to 1.1)
30 days	42.1	45.5	43.5 (39-48)	42.6 (36-49)	0.05	0.82	1.0 (-7.0 to 9.0)
90 days	40.1	42.9	41.8 (36-48)	51.1 (45-57)	3.9	0.47	-9.0 (-18.0 to -0.1)

\* = Univariate GLM \*=adjusted for sex, visits so far, days since 30 days of no pain, pain >30 days in year, recurrence, Baseline BQ total, arm pain above elbow, arm pain below the elbow

Table 8: Number of treatments at each follow-up point for back and neck pain patients

	Back Pain		Sig	Neck Pain		Sig
	NHS	Private		NHS	Private	
14 days	3.5	2.7	<0.001	3.5	2.6	<0.001
30 days	6.6	3.6	<0.001	6.7	3.9	<0.001
90 days	6.7	4.1	<0.001	6.7	4.3	<0.001

Table 9: Satisfaction with treatment for whole cohort and back and neck pain patient subgroups.

PGIC score	Cohort	
	NHS	Private
≥ 4. (As I was expecting and I am satisfied with this)	98.7%	93.7%
≥ 5. (Better than I was expecting)	98.5%	89.2%