

# PATELLOFEMORAL PAIN GROUP (PPG) – A REVIEW OF THE FIRST 100 PATIENTS TO COMPLETE THE COURSE AT THE REGIONAL REHABILITATION UNIT GÜTERSLOH

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## Abstract

Anterior knee pain syndrome is extremely common in the military and has previously often led to medical discharge. The Patellofemoral Pain Group programme of exercises developed at the Defence Medical Rehabilitation Centre at Headley Court has become the first line treatment strategy for this problem in the military. The introduction of this low level, impact free, progressive exercise programme at the Regional Rehabilitation Unit in Gütersloh has also proved useful, leading to improvements in employability of affected soldiers and reduction in symptoms.

## Introduction

Anterior knee pain is not a new problem for the Armed Forces [1-3]. Robinson and Darracott [1], in their 1970 study, reviewed the case notes of all patients treated for knee conditions in the Army Medical Rehabilitation Unit, Saughton Camp, Chester, between 1960 and 1964. One hundred patients, who gave a typical history and signs of anterior knee pain, were selected for the study. Four major signs were used (Box 1) and Robinson and Darracott required at least two of these before accepting the diagnosis for their survey. Their findings showed that of the original 100 patients, only twenty nine were still serving in the Armed Forces and, of the remainder, fifty three had been prematurely discharged as a direct result of their knee condition. The findings were similar to those of Karlson in 1940 [3], who followed up seventy one Army conscripts for between one and twenty years, and found that 14% remained symptom free, whereas 86% had persistent problems, ranging in severity from mild to severe. Hull et al in 1999 [2], stated that “Anterior Knee Pain Syndrome (AKPS), the clinical descendant of Chondromalacia Patellae continues to comprise a large proportion of military orthopaedic outpatient diagnoses. In the author’s own practice, at least half of all new referrals are AKPS, the majority of which are of long-standing duration and are thus leading to employment difficulties.”

The Patellofemoral Pain Group (PPG) programme, a low level periodised programme of progressive exercises, was established at the Defence Medical Rehabilitation Centre (DMRC) Headley Court in response to the ongoing problem of AKPS amongst service personnel and the subsequent reductions in deployable manpower for operational commitments worldwide. The outcomes reported by DMRC were impressive and clearly suggested that the PPG programme should be considered as a first line treatment for AKPS within the Armed Forces.

On 23 September 2003 the first patients were admitted to the programme at Regional Rehabilitation Unit (RRU) Gütersloh. This paper reviews the outcomes of the first one hundred patients who completed the programme between 23 September 2003 and 25 September 2006.

- Pain on direct compression of the patella against the femoral condyles with the knee in full extension.
- Tenderness on palpation of the posterior surface of the medial edge of the patella.
- Pain on resisted extension, sometimes in the form of a painful arc.
- Pain when the patient contracts his quadriceps statically against the resistance of a finger placed against the upper border of the patella, with the knee in extension.

Box 1. Signs of anterior knee pain according to Robinson and Darracott [1].

## An overview of the PPG programme

This is a four day programme based at the British Forces Germany Health Service (BFGHS), RRU in Princess Royal Barracks Gütersloh. Patients are referred from the primary care GPs and physiotherapists according to BFGHS protocols [4]. The protocol for AKPS was drafted by the Director of Secondary Healthcare (Germany), Regional Clinical Director (Gütersloh), Lead Physiotherapist BFGHS, and the Officer in Charge Physiotherapy Department BFGHS (Wegberg). The main purposes of the protocol are:

1. To standardise the management of AKPS across BFGHS.
2. To introduce the appropriate use of Magnetic Resonance Imaging (MRI) in this patient group.
3. To reduce the incidence of unnecessary surgery.
4. To ensure timely decisions are made about patients’ employability.

On admission patients receive a subjective and objective examination by a physiotherapist and a remedial instructor. The subjective assessment includes the use of the Visual Analogue Scale (VAS) for scoring pain [5] and completion of a modified Western Ontario and McMaster’s University (WOMAC) osteoarthritis questionnaire [6]. During the objective examination the physiotherapist and the remedial instructor work as a team and look at the whole patient including their posture, muscle strength and weakness, joint range of motion, balance and proprioception. Other factors that might contribute to knee pain, such as low back or hip pathology, are also considered and if necessary the patient is referred to the RRU Medical Officer for an opinion on their suitability for the programme. The RRU Medical Officer may instigate further investigations and referral for either an Orthopaedic opinion or Occupational Health assessment at this stage.

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Each patient is then supplied with a copy of the PPG booklet [7], which details the twelve week programme to be followed. The programme is explained and discussed with the patients in a group setting, and if necessary, individually, to ensure a full understanding. Emphasis is placed on the fact that this is a self help programme which the patient needs to undertake for three sessions a week only. An educational presentation about anterior knee pain then follows, during which patients are encouraged to ask questions about their condition. They are also given the opportunity of a one to one consultation if required.

Patients undertake a ten minute low level warm up period followed by the Triple Hop Test [8-10] and the Step Down Test [11,12]. These are scored using a limb symmetry index [13,14]. Test scores are discussed with individual patients, as are the results of the initial clinical assessment. The tests and assessments allow the therapy team to prioritise the components of the PPG programme for each individual patient. The emphasis is on the patients' understanding of the programme.

Patients have an opportunity to practice each element of the exercise programme for a full day. Instruction and guidance is provided by the physiotherapist and the remedial instructor throughout, on both a group and an individual basis. The emphasis is again on the patients' understanding of the programme, reinforcing the concept that it is up to the individual to take responsibility for his or her own exercise once he/she returns to Unit. Patients who require disposable exercise equipment such as Theraband receive an initial supply from the RRU.

On day four the RRU medical officer, together with the physiotherapist and the remedial instructor review the assessments and outcomes scores with the patient. The clinical team ensure that the patient understands the programme and is encouraged to make contact with the PPG team should additional advice be required. The Functional Activity Assessment (FAA) score (Table 1) [15] is agreed by the clinical team and is used by the RRU medical officer as an adjunct to confirming or changing the patients' PULHHEEMS grading [16].

Twelve weeks after starting the programme, patients are reviewed at RRU Gütersloh by the clinical team, when the subjective and objective tests are repeated. The next step in the patient's rehabilitation is dependent on the scores achieved and the progress made on the exercise programme. There are a number of options available to the Medical Officer:

1. The patient undertakes additional tests such as a figure 8 run and 800 metre run [17]. If the patient is able to complete either or both of these tests pain free, a place is offered on the next available lower limbs rehabilitation course.
2. The patient may have made some progress but not enough to tolerate three weeks of residential rehabilitation, and may therefore remain on the PPG programme for a further twelve weeks, after which a further assessment takes place and the appropriate decision made at that time with regard to admission.
3. The patient's symptoms have worsened and a further opinion/investigations may be appropriate.
4. The patient's symptoms and test results are such that a medical discharge from the Army is considered.
5. The patient may have made such progress that further rehabilitation is not required. All patients in this category receive a Personal Fitness Test (PFT) and Combat Fitness Test (CFT) training programme which is completed under the guidance of their Unit Army Physical Training Corps Instructor. These patients are discharged from the PPG programme.

### Functional Activity Assessment

- |   |                                                     |
|---|-----------------------------------------------------|
| 1 | Fully fit for trade and general military duties     |
| 2 | Fit for trade but unfit for general military duties |
| 3 | Unfit for trade and general military duties         |
| 4 | Sedentary duties only                               |
| 5 | Non effective                                       |

Table 1. Defence Medical Rehabilitation Service Functional Activity Assessment (FAA) Score.

## Method

Data was collected from every patient who completed the PPG programme between 23 September 2003 and 25 September 2006.

The FAA, VAS and the modified WOMAC – PPG were chosen because of their focus and relationship to function [5,6,15] and, arguably, demonstrate positive changes in the patients' medical status and subsequent availability for deployment

## Results

Twenty three of the first 100 patients through the Gütersloh RRU PPG programme were excluded from data analysis. Of the 23 data sets that were excluded, the commonest reason was inability to attend the three month follow up visit due to posting – these 11 soldiers were referred to their nearest RRU. Four patients had incomplete data sets and four did not attend follow up visits. The remainder were excluded because of being non-military in one case, one case where another medical condition precluded objective testing, one soldier was medically discharged before the three month review point and a single soldier who was diagnosed as having a torn anterior cruciate ligament rather than AKPS. He subsequently underwent successful surgical repair and rehabilitation. Out of the 77 patients analysed 67 were male with a mean age of 29 years of age, the female patients were an average of three years younger. The smoking rate was 35%.

The VAS pain score comparison between admission and three month review (Table 2), represents 36 (46%) patients reporting a reduction in pain; in the high range (VAS 7 – 10), there was a decrease from 54 (70%) to 28 (36%) patients at three months with a corresponding increase in the number of patients in the mid range (VAS 3 – 6) from 20 to 38 (26% to 49%) and a smaller increase in the low range (VAS 0-2) of 3 to 11 (4% to 14%) patients. At six months 63% of patients reported lower pain scores.

The WOMAC (PPG) score comparison between admission and three month review is given in Table 3 and demonstrates improvement in pain and stiffness associated with activities of daily living (ADL) in two thirds of patients. Twenty one (42.8%) of these patients scored between 80/100 and 100/100 with a score of 100 representing a symptom free patient. At six months the proportion of patients reporting improvement in scores over admission was approximately the same (62.8%) with the remainder reporting a worsening of pain and stiffness. One patient scored 9/100 representing severe incapacity when performing ADLs; they also reported pain levels reaching VAS 10/10 and was subsequently medically discharged.

The FAA scores for admission, three month and six month review are given in Table 4 and show an improvement in functional ability, represented by an increase in the proportion of patients graded FAA 1 or 2 from 19.5% to 49.4%, and in fact two individuals improved sufficiently to become fit for full military duties. There was a modest decrease in the number graded for sedentary duties only (FAA 4) but two patients were actually reclassified as non-effective at the three month review. By six month review approximately half of the analysed cohort were unavailable, but 65.5% were now graded FAA 1 or 2, indicating full or potential deployability, depending upon the trade and local Medical Officer's decision. Nine patients were worse at six month review than admission.

	VAS										
	0	1	2	3	4	5	6	7	8	9	10
<b>Admission (n=77)</b>	0	2 (2.6)	1 (1.3)	3 (4)	5 (6.5)	3 (4)	9 (11.6)	14 (18)	23 (30)	11 (14.2)	6 (7.8)
<b>3 months (n=77)</b>	9 (11.6)	2 (2.6)	0	11 (14.2)	7 (9)	7 (9)	13 (17)	11 (14.2)	6 (7.8)	8 (10.3)	3 (4)
<b>6 months (n=35)</b>	1 (2.8)	0	1 (2.8)	5 (14.4)	1 (2.8)	7 (20)	6 (17.2)	4 (11.4)	5 (14.4)	4 (11.4)	1 (2.8)

Table 2. Number of patients (%) with Visual Analogue Scale (VAS) Pain Score 1 – 10 at admission, three & six Month Reviews.

	WOMAC(PPG) Scores									
	1-10	1-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
<b>Admission (n=77)</b>	0	0	3 (4)	8 (10.3)	9 (11.7)	20 (26)	18 (23.4)	11 (14)	6 (8)	2 (2.6)
<b>3 months (n=77)</b>	0	1 (1.3)	2 (2.6)	7 (9)	9 (11.7)	8 (10.3)	13 (17)	16 (20.7)	15 (19.4)	6 (8)
<b>6 months (n=35)</b>	1 (2.8)	0	0	3 (8.6)	6 (17.2)	6 (17.2)	8 (23)	5 (14.2)	5 (14.2)	1 (2.8)

Table 3. Number of patients (%) with WOMAC (PPG) Scores between 0-100 at admission, three and six Month Reviews. The WOMAC (PPG) score measures perception of pain and stiffness in association with the activities of daily living, with a score of 100 representing no symptoms at all.

	FAA score				
	1	2	3	4	5
<b>Admission (n=77)</b>	0	15 (19.5)	44 (57)	18 (23.5)	0
<b>3 months (n=77)</b>	2 (2.6)	36 (46.8)	23 (30)	14 (18)	2 (2.6)
<b>6 months (n=35)</b>	3 (8.5)	20 (57)	2 (5.8)	6 (17)	4 (11.7)

Table 4. Number of patients (%) with FAA scores of 1-5 at admission, three and six months.

## Discussion

Arguably the most important outcome of this review is that the PPG programme is worthy of further research and evaluation; in particular a statistical analysis of the data to take account of confounding factors such as possible bias in interpretation of FAA scores and the potential for skewed results from patients with bilateral knee pain.

The results and anecdotal evidence from patients who have completed the PPG course suggests that a low level, impact free and targeted exercise programme can lead to a reduction in pain and improved function, potentially resulting in an overall increase in the numbers of deployable personnel. It is important to recognise that the RRU only makes recommendations as to functional ability and it remains a decision of the parent unit's medical officer as to whether a soldier is sufficiently fit to be deployable. Closer examination of future data with regard to individual trades may allow more specific recommendations to be made.

Anecdotal evidence from patients at the three month review attributes the reduction in pain to an increase in lower limb joint flexibility and Hull et al [2] suggest that the hamstrings and iliotibial band frequently need stretching and "most patients will have some definite improvement with correct physiotherapy" [11,12]. There is evidence to show that patients who refrain from all activities which provoke pain such as sport and impact type exercise, which is common amongst Service personnel, report reductions in pain [19]. Fundamental to this programme is advice to stop all impact, dynamic sporting and other potentially aggravating activities for the first three months. This may include certain military duties and therefore require the patient to be downgraded P7 L7 LD or ND, temporarily, in order to ensure patient compliance with the programme and support and understanding at Unit level. Patient compliance is recognised as an essential facet of the whole programme and does require the individual Units to allow their personnel to take part in prescribed exercise therapy, instead of Unit Remedial physical training [20,21]. Patient questionnaires used regularly over the last five years at RRU Gütersloh, indicate that the PPG booklet, given to every soldier

taking part in the programme, has been successful in alerting Unit Training Officers and Army Physical Training Corps Instructors to the specific needs of these soldiers. Closer liaison between this RRU and Units within the catchment area has also proved successful in ensuring that patients are supported and encouraged to continue their individual exercise programmes on return to Unit.

## Conclusions

The PPG programme at RRU Gütersloh has demonstrated its ability to reduce pain and improve functional ability in many soldiers suffering from anterior knee pain. It requires motivation and compliance on behalf of the individual and the parent unit. Further studies will hopefully allow more detailed analysis of outcome in regard to specific trades.

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