# Facet joint injections for people with persistent non-specific low back pain (Facet Injection Study): a feasibility study for a randomised controlled trial

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# Scientific summary

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# Scientific summary

## Background

Low back pain (LBP) is ranked as highest in the Global Burden of Disease in terms of years lived with disability. The National Institute for Health and Care Excellence (NICE)'s 2009 guidelines for the management of non-specific LBP lasting between 6 weeks and 1 year recommended against the injection of therapeutic substances into the back. However, facet joint injections (FJIs) continue to be used. In 2014/15, 81,963 FJI procedures were performed in England for the NHS, an increase from 62,671 in 2012/13.

That pain can arise from facet joints has been proven. Drawing on data from other parts of the musculoskeletal system, it is a reasonable hypothesis that intra-articular injection of corticosteroids could produce at least short-term pain relief in a synovial joint, such as a facet joint, that is causing pain. The current randomised controlled trial (RCT) evidence on the use of intra-articular FJIs is sparse, of generally poor quality and too heterogeneous for any firm conclusions to be drawn regarding efficacy or effectiveness.

There is a clear need for a trial to test the effectiveness of adding FJIs to best usual care (BUC) for the treatment of persistent LBP. There are methodological challenges to setting up and running such a trial. Our feasibility study addressed these methodological issues and tested trial processes and recruitment in an external pilot.

A different team has been funded to test the feasibility of a more explanatory trial comparing active intra-articular injection with a sham control in people who have a positive diagnostic medial branch nerve block (Health Technology Assessment 11/31/02). The two studies will produce complementary data that will inform decisions on the merit of offering therapeutic intra-articular FJIs to selected people with LBP.

## Objectives

In this study we explored the feasibility of running a RCT to test the hypothesis that for people who have suspected facet joint pain contributing to persistent LBP the addition of the option of intra-articular FJIs, with local anaesthetic and corticosteroids, to best usual non-invasive care available from the NHS is clinically effective and cost-effective. Our objectives were to:

1. develop, and evaluate, agreed criteria for identifying people with suspected facet joint pain
2. develop an agreed protocol for the injection of facet joints in a consistent manner
3. develop, and evaluate, a standardised control treatment deliverable in the NHS and congruent with NICE guidance
4. develop and test systems for collecting short-term and long-term pain outcomes, including measures required for economic evaluation
5. demonstrate that recruitment to the main trial is feasible
6. collect the recruitment and outcome data required to inform sample size and number of sites needed for the main study
7. conduct a between-group analysis to inform the decision on the need for a full trial
8. carry out a process evaluation of patient experience within the trial.

## Methods

Before starting the randomised pilot, we addressed the key uncertainties that needed resolving to ensure a robust trial design (objectives 1–3 and part of 4). Subsequently, we ran a randomised pilot study (objectives 5–8 and part of 4).

### *Consensus meeting*

A four-stage process was adopted to ensure that the Facet Injection Study (FIS) was robust and informed by current evidence, that it was acceptable to the academic community and practising clinicians and that it reflected NHS practice. First, we identified key design considerations that are of vital importance for the production of robust and acceptable evidence on an implementable FJI programme. Second, an evidence review of each design consideration was conducted using systematic methodology. Third, an evidence document was prepared that contextualised the pragmatic FIS, outlined the methodological challenges of designing a credible pragmatic trial and presented the outputs from the evidence reviews. Fourth, using the evidence document as a delegate pack, the FIS design considerations were discussed by a consensus conference of clinicians, experts, academics and lay representatives. Attendees were asked to agree on how to diagnose suspected facet joint pain, a protocol for the injection of facet joints and for the BUC package and what effect size is clinically important, and to suggest any potential subgroups that may respond better to FJIs.

### *Feasibility randomised controlled trial*

The primary objective of this trial was to explore the feasibility of running a RCT to test the hypothesis that for people with suspected facet joint pain contributing to persistent LBP the addition of the option of FJIs to best usual non-invasive care available from the NHS is clinically effective and cost-effective.

### *Research methods*

The study ran in five NHS acute trusts in England.

Patients who were referred to a trust for the treatment of LBP that had been present for at least 6 months, after failure of conservative treatment, were considered as potential participants. We aimed to recruit 150 patients. We expected up to 40 participants to be recruited at each participating centre. Recruitment was planned to be primarily from pain clinic services.

We recruited people aged ≥ 18 years who had at least moderately troublesome LBP present for at least 6 months, who had undergone registered health professional delivered treatment for LBP in the 2 years prior to study entry and who had suspected facet joint pain.

All participants received the best usual conservative care package agreed in our consensus exercise. This consisted of one initial session and five follow-up sessions. Those randomised to FJIs had these within 2 weeks of randomisation. Up to six facet joints (L3/L4, L4/L5 and L5/S1) bilaterally in each participant were injected at the discretion of the treating clinician. We randomised participants at the end of the first treatment session to ensure that baseline pain data were collected close to intervention and that all participants received some conservative care.

### *Participant identification*

At each site we actively identified referrals to secondary care for patients with LBP.

Potential participants had a diagnostic assessment for suspected facet joint pain by a study physiotherapist. Baseline data were collected, and consent was obtained, for eligible participants at the time of this appointment. Randomisation was performed centrally by Warwick Clinical Trials Unit using a remote telephone randomisation system.

### Outcome assessment

As a feasibility study, the main outcomes were process related. Data included quantitative data collected as part of recording trial activity (e.g. attendance rates, compliance) and qualitative data from interviews and small group discussions with patients, research therapists and staff.

The primary clinical outcome was an 11-point numerical rating scale for pain collected via text messaging over 3 months following randomisation. For those participants unable or unwilling to use a text messaging system, we used a paper-based system.

Our second primary outcome was back pain related disability [measured by the Roland–Morris Disability Questionnaire (RMDQ)] at 3 months.

### Statistical considerations

If the desired standardised mean difference indicative of a minimally clinically important difference is in the range of 0.3–0.4, then if we recruited around 150 participants, after allowing for 20% loss to follow-up, the probability of proceeding to a full trial is around 50% if the true effect is zero.

The resulting 75 patients in the active injection group would have allowed us to estimate the proportion who had 'true' facet joint pain, based on achieving immediate pain relief, with a precision of 11% if the true proportion was 62%.

Our proposed primary analysis for pain was the difference in the area under the curve values from our pain measurements over 3 months. We specified RMDQ at 3 months as a second primary outcome. If there was not a positive signal suggesting an early reduction in pain, then we would not proceed to a full trial.

Poor recruitment meant that between-group analyses were not possible. The analyses therefore focus on trial process measures, presenting overall descriptive data on study participants, assessing performance of outcome measures and estimating acquisition costs of study interventions.

## Results

### Consensus

Fifty-two people attended the consensus meeting: 19 pain consultants/physicians, six anaesthetists, 12 physiotherapists/physical specialists, four academics, three psychologists, two radiographers and six lay representatives.

Agreement was reached at the consensus meeting on the effect size and choice of subgroups. Some further clarifications were needed for three of the design considerations: diagnosis, the process of FJI and the BUC package. The final agreements from this process were taken forward in the design of the randomised pilot study.

### Feasibility trial

Recruitment started on 26 June 2015 and, after 26 participants had been randomised, the trial was terminated by the funder on 11 December 2015 because of poor recruitment.

### Process evaluation

It was found that approval delays, which were outside the control of the research team, delayed the start of recruitment. Sites were ready to begin the trial at the planned starting point, but the long delay meant that staff were not available at the sites when approvals were in place. It was specified in the funding brief that the study was to recruit participants from pain clinics and we had evidence that a large proportion of patients in pain clinics have back pain. However, during the screening process there were limited numbers of patients who met our criteria. Many of the patients approached had undergone multiple treatments. It was also difficult to identify patients with back pain when screening referrals.

### *Outcome data*

Although there were missing data in the text message responses for pain, these were largely replaced by the results of a written pain diary. We achieved usable outcome data on 23 out of 26 (88%) participants for the primary outcome. All pain-related outcomes show the expected improvement between baseline and follow-up.

The mean total cost of performing a FJI was estimated at £419.22 per patient. The mean total cost of the full course of physiotherapy treatment was estimated to be £264 per participant. The mean total cost of the overall treatment package (comprising one injection and six physiotherapy sessions) was estimated at £683.22 per participant. This is similar to a NHS tariff cost for a course of FJIs of £686.84.

EuroQol-5 Dimensions (EQ-5D) diary scores indicate marked fluctuations in health-related quality of life in the first few weeks after randomisation. In particular, there is a substantial short-lived improvement in the first few days after the initial treatment.

### *Study interventions*

Both the BUC package and the procedures for FJIs were acceptable to participants and ran smoothly.

## Discussion

Our overall aim was to explore the feasibility of running a RCT to test the hypothesis that, for people with suspected facet joint pain contributing to persistent LBP, adding the option of FJIs, with local anaesthetic and corticosteroids, to best usual non-invasive care available from the NHS is clinically effective and cost-effective.

In the first part of the study we considered the main clinical and scientific challenges that needed to be addressed before the start of the trial. Specifically, we developed an agreed standardised approach to the injection of facet joints and we achieved consensus on which patients to consider for FJIs and what a package of BUC should consist of.

An important outcome from this study is the finding that pain clinics are not the most appropriate place to recruit participants. The people attending these clinics were, on the whole, less likely to be suitable for the study than those who had not yet been referred. There were also substantial operational issues with the clinics, which were unfamiliar with recruiting to RCTs, meaning that, even after approvals had been obtained, the start of recruitment was delayed. Nevertheless, at the time the study was terminated we had explored alternative recruitment areas and there were some indicators that recruitment was improving.

### *Strengths and weaknesses*

All of the key uncertainties that needed to be considered before a main trial have been addressed. That we have achieved consensus on describing the population of interest, the control and the active intervention is a real strength of this project. Furthermore, we have demonstrated that participants are able to comply with the recruitment process for the study and provide initial data for us to assess our non-standard approaches to clinical data collection: the Patient Generated Index.

The key weakness of this study was the failure to achieve our expected recruitment targets and the consequent termination by the funder. There had been very substantial organisational barriers to the set-up of the trials. A 10-month delay between the first application for research ethics approval and the green light to start recruitment at the first site meant that adequate recruitment was a challenge. Although the funding brief specified that recruitment should be sought from pain clinics, it became apparent in the course of this study that this was insufficient.

### *Is a main study still needed?*

It has been argued that the question of the effectiveness of intra-articular FJIs is no longer relevant, as this approach has been superseded by radiofrequency denervation of the medial branch of relevant lumbar nerves. New NICE guidance for LBP and sciatica that was published in 2016 recommends radiofrequency denervation in selected patients who have had a positive diagnostic block. It also suggests that research into the long-term effectiveness and cost-effectiveness of radiofrequency denervation is a key research recommendation. There remains a need for robust studies of both the efficacy and the effectiveness of invasive procedures, such as intra-articular FJIs or radiofrequency denervation, for people with suspected facet joint pain.

## Conclusions

The procedures and paperwork for the study require only minor improvements but the title of the study should be reconsidered to avoid raising patients' expectations of receiving an injection.

In undertaking this process evaluation we aimed to identify aspects of the study design that have the potential to threaten the success of a full trial. Although our data were limited in scope, particularly from patients, they sufficiently identified major threats.

All key uncertainties that needed to be considered to run the main trial have been addressed. We demonstrated in the randomised pilot that eligible patients who were invited to join the trial were interested in the study and could comply with the study procedures. We also successfully collected frequent short-term outcomes, which has allowed us to identify relevant short-term harms and benefits.

We have shown that it is feasible to run such a trial, but any future trial would need to learn lessons from this with regard to recruitment.

## Trial registration

This trial is registered as EudraCT 2014-000682-50 and Current Controlled Trials ISRCTN93184143.

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