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Pain related to intravitreal injections for age-related macular degeneration: a qualitative study of the perspectives of patients and practitioners

Christina Yiallouridou, Jennifer H Acton, Sanjiv Banerjee, Heather Waterman, Ashley Wood

ABSTRACT

Objectives Ocular pain is a commonly reported finding in the intravitreal injection procedure, but post-injection experiences and patient adherence to treatment remain underexplored. We therefore aimed to identify key variations in the intravitreal injection procedure that may influence pain, and to gain insights into the post-injection experience and treatment adherence from the perspective of patients and practitioners.

Design Qualitative semistructured interview study using reflexive thematic analysis of transcripts.

Setting Hospital Eye Clinic in Wales, UK. Interviews were conducted between May and September 2019.

Participants Purposive sample of patients aged ≥50 years with neovascular age-related macular degeneration and no other retinal pathology who had received at least six intravitreal injections, and practitioners including ophthalmologists, registered nurses and optometrists who performed intravitreal injections at the research site.

Results Data saturation was reached with 21 interviews: 14 patients and 7 practitioners. Three main themes were identified from the analysis: fear of losing eyesight and treatment anxiety influence patient adherence to treatment, variability in pain experience during treatment, and post-injection experience and impact on patient recovery. To reassure patients feeling apprehensive about the injections, practitioners promoted safety and trust, and used techniques to manage anxiety. Key variations that may influence pain identified were application of antiseptic 'pressure'. Patients described prolonged soreness and irritation of up to 36 hours post-injection affecting their sleep and recovery.

Conclusion Establishing rapport supported patients to recognise the necessity of ongoing treatment to prevent sight loss; however, inadequate pain management led to undesirable outcomes. Practitioners should use pain assessment tools during and immediately after injection and provide ongoing consistent information to help patients manage pain at home.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The qualitative approach allowed us to gather detailed descriptions of the pre-injection, peri-injection and post-injection experience of patients and their adherence to treatment.
⇒ The study explored the perspectives of patients and practitioners to gain a comprehensive understanding of the patient experience; triangulation facilitates credibility and validity of our findings.
⇒ A limitation of this study was that the participants were recruited from one eye clinic; patients’ experiences may vary across hospitals, particularly where protocols for intravitreal injection differ.
⇒ The study methodology limits transferability; however, we obtained data saturation through in-depth interviews and thoroughly described the research context.

INTRODUCTION

Age-related macular degeneration (AMD) is the leading cause of vision impairment worldwide accounting for 8.7% of cases, with the neovascular subtype resulting in the most severe and rapid vision loss. AMD-associated vision loss can affect activities of daily living, including reading and driving, increasing the prevalence of isolation, loneliness and depression impacting on quality of life and economic independence. While there is no cure for AMD, regular intravitreal injections of anti-vascular endothelial growth factor (anti-VEGF) agents are the most effective treatment for impeding disease progression associated with neovascular AMD and for preserving eyesight. Despite the well-established clinical efficacy and safety of anti-VEGF injections, patients can experience ocular pain during treatment, which can affect patient adherence, potentially hastening vision loss. Patients can currently be treated using anti-VEGF agents ranibizumab,
METHODS

Study design
Using a qualitative design, one-on-one semistructured interviews were conducted with patients and practitioners to explore and understand the meaning of individual experiences. The research team comprised a multidisciplinary group with expertise in clinical ophthalmology, pharmacology and population health to provide a broad spectrum of perspectives on the themes generated.

Participant recruitment and sampling
Patients and practitioners were recruited from a hospital eye clinic in Wales, UK. The provisional sample size ranged between 10–20 patients and 8–10 healthcare practitioners, informed by models of qualitative research. Participants were purposively selected to include a representative range of patients with respect to age, sex, number of injections and, where possible, ethnicity. An opportunity sample of practitioners was based on the total number of injectors at the site. Data saturation relied on the researcher’s interpretation of addressing the research aims and reaching consensus on the data collected.

Data saturation was reached when the researcher deemed that there were three consecutive interviews without additional material arising.

Inclusion and exclusion criteria
Patients were eligible if they were aged 50 years and above, had a diagnosis of neovascular AMD, received at least six intravitreal anti-VEGF injections and were able to provide informed consent. Exclusion criteria for patients included retinal pathology other than neovascular AMD, suffering from very poor hearing or unable to communicate in English or Welsh. Practitioners eligible for participation consisted of those who were ophthalmologists or registered nurses and optometrists and performed intravitreal injections during the course of the study. Practitioners who were unable to communicate in English or Welsh were excluded from the study.

Topic guides and data collection
The topic guides (online supplemental files 1 and 2) were developed from themes that were identified from reviewing the literature on patients’ experiences of intravitreal injections. Interviews consisted of open-ended questions allowing participants to express personal experiences and views on the topics discussed. A flexible approach permitted the researcher to adapt to the responses using probes and member checking to gain more information of the topic under investigation and to ensure participants’ meanings were understood as intended. In this context, interview questions evolved from the planned topic guide. During the interview, participants were asked to consider their experience of all the injections they have received since diagnosis.

Interviews were conducted between May and September 2019. The researcher explained the aims, expectations and nature of the study before taking consent, and
reassured participants of the confidentiality of their data. Patient interviews occurred either in the participant’s own home or in a private meeting room at Cardiff University, according to the individuals’ preference. Practitioner interviews were conducted at their workplace office. Interviews were audio recorded using an Olympus VN-541PC voice recorder and analysed by the first author (CY). The researcher had no prior experience with qualitative research interviews and has attended training workshops and received guidance from a supervisor with broad experience in interviewing and qualitative research.

Data processing and analysis
Interview data were transcribed verbatim, pseudonymised and thematically analysed using a reflexive (inductive) approach, with the support of NVivo (V.12, QSR International) data analysis software. The six-phase procedure suggested by Braun and Clarke included familiarising with the data, initial coding and labelling of data, searching for themes, reviewing themes, defining and naming themes, and producing the report. Thematic analysis allows perspectives of different participant groups and similarities and differences to be highlighted. Data source triangulation was used to strengthen our findings by collecting data from patients and practitioners. Thematic analysis is not bound to a specific epistemological position and in this study is regarded as a method in its own right to address the research aims.

A preliminary thematic scheme was initially developed and reviewed by the first author (CY). Using a collaborative approach, transcripts (four patient cases, three practitioner cases) were randomly selected and independently coded by the two authors (JHA and AW) to engage in a richer, more nuanced reading of the data, improving rigour of our analysis. The data analysis was primarily conducted by the first author (CY) who had no previous experience in working with intravitreal injections. A journal was also kept to document thoughts and decisions made throughout the study to facilitate reflexivity. Producing the report, themes were reviewed and modified as required to support the interpretation of selected extracts related to the research aims. This study adheres to the Standards for Reporting Qualitative Research guidelines (online supplemental file 3).

Patient and public involvement
The research question and study design were informed by patient views elicited from feedback of a local patient group with macular disease. A summary of study results was sent to all participants who requested it.

RESULTS
Characteristics of study participants
Participant characteristics are presented in table 1. Patients and practitioners had a median age of 82 (range 70–95) and 37 (range 28–59) years, and had a median number of 18 (range 6–50) injections and 3 (range 1–11) years of injection experience, respectively. All participants were English speaking. Patient and practitioner interviews ranged from 14 to 45 min and 10 to 35 min, respectively. Participants are identified as PA for patients and HP for healthcare practitioners, followed by an identification number.

Qualitative results
Data saturation was reached with 21 interviews: 14 patients and 7 practitioners. Thematic analysis revealed three main themes: (1) fear of losing eyesight and treatment anxiety influence patient adherence to treatment; (2) variability in pain experience during treatment; and (3) post-injection experience and impact on patient recovery. Supporting quotations are presented in tables 2–4, respectively, and table 5 compares patients’ and practitioners’ responses within the themes.

During analysis, we were able to identify the following key variations that may influence pain: first, the application of antiseptic and/or anaesthetic. Patients felt different amounts of antiseptic or anaesthetic agents led to differences in the associated burning sensation and affected the overall level of pain experienced. Second, the methods used in carrying out the injection (eg, injection site) were felt to affect the outcome related to pain. Third, the way in which the practitioner communicated was considered important, in the context of providing reassurance or employing distraction techniques.

Theme 1: fear of losing eyesight and treatment anxiety influence patient adherence to treatment
Patients highlight fear of sight loss as outweighing the burden of chronic treatment as drivers of adherence, but considerable anxiety experienced attributed to uncertainty surrounding each injection (see table 2 for illustrative quotations). In the context of the first subtheme, anxiety and uncertainty surrounding each injection, the
Fear and apprehension are described with respect to the steps of a treatment episode. The second subtheme, attitudes and emotions related to chronic therapy as drivers for treatment adherence, encapsulates the fear arising from the entire course of treatment.

**Anxiety and uncertainty surrounding each injection**

The thought of having a needle entering the eye, and particularly living with the uncertainty of what the procedure might entail was most frightening for the majority of patients. This may be of an unexpected ‘unknown’ complication occurring or informed by a previous adverse experience:

When you see them filling the injection, I’m thinking, oh don’t look at the needle. (PA03)

Remembering a painful past experience, patients worried about injury to their eye:

That was the worst experience… She grabbed the needle and then she couldn’t get the needle out. So, it did hurt quite a bit. (PA07)

In comparison, the practitioners perceived patients to be experiencing feelings of apprehension such as fear, anxiety and suspicion prior to and during the injection procedure. The practitioners used their observations of patients’ reactions to help the patients to develop coping mechanisms to manage treatment-related anxiety. Examples included rapport-building, reassurance and distraction techniques, such as handholding or asking them to focus on their breathing or wiggling of their toes (see table 2).

Some patients were given a warning or indication of impending injection (eg, ‘don’t move’ (PA06)); distraction techniques were commonly reported by patients and practitioners. It was equivocal if warning or distraction achieved the best outcome.

### Table 2  Fear of losing eyesight and treatment anxiety influence patient adherence to treatment

<table>
<thead>
<tr>
<th>Themes/subthemes</th>
<th>Illustrative quotations of patients (PA) and healthcare practitioners (HP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety and uncertainty surrounding each injection</td>
<td></td>
</tr>
<tr>
<td>Fear of the ‘unknown’ and the feeling of suspicion</td>
<td>“It’s always the unknown which is more scary.” (HP6)</td>
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<tr>
<td></td>
<td>“So, I was a bit concerned when I went up and had the thought of having an injection in your eye.” (PA01)</td>
</tr>
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<td></td>
<td>“But you know what’s coming when she says don’t move...And you’re afraid that you’ll move.” (PA06)</td>
</tr>
<tr>
<td></td>
<td>“Because you know, just getting anxious, lying down there.” (PA11)</td>
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<tr>
<td></td>
<td>“Some people just don’t like having the injection full-stop. They just get so anxious!” (HP2)</td>
</tr>
<tr>
<td></td>
<td>“Nobody likes to come and have injection in their eyes. It’s not a nice procedure anyway. Even the thought of it.” (HP5)</td>
</tr>
<tr>
<td>Coping mechanisms to manage apprehension</td>
<td>“I ask them to take a deep breath. Most of them say it’s very nice because they concentrate on breathing and they don’t feel it.” (HP5)</td>
</tr>
<tr>
<td></td>
<td>“The nurse always holds your hand. I feel more relaxed.” (PA11)</td>
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<tr>
<td></td>
<td>“I try to tell them to focus on their breathing and to wiggle their toes basically give them something to focus on. It should have like a tv screen of nice, relaxing music. For people to start meditating, focusing on their breathing, and just relaxing.” (HP4)</td>
</tr>
<tr>
<td></td>
<td>“Um you just got to be very patient with them and just try and reassure them.” (HP3)</td>
</tr>
<tr>
<td></td>
<td>“I like the opportunity of communicating. It eases the nervous tension.” (PA05)</td>
</tr>
<tr>
<td>Attitudes and emotions related to chronic therapy as drivers for treatment adherence</td>
<td>“I’m very grateful to the NHS because the injections I know are very expensive.” (PA14)</td>
</tr>
<tr>
<td>Feeling lucky and grateful</td>
<td>“That’s what it is you know. If they’re going to do something to see if they can help me. Well, you know. Carry on!” (PA04)</td>
</tr>
<tr>
<td></td>
<td>“I’ll do anything to keep my sight.” (PA13)</td>
</tr>
<tr>
<td>Feeling worried to stop receiving treatment</td>
<td>“I always have it every 8 weeks... One time I went for 11 weeks and that really worried me because I thought, oh my goodness what’s going to happen to my eye?” (PA03)</td>
</tr>
<tr>
<td></td>
<td>“…occasionally it’s been a bit longer than six weeks which I’m not very happy about. Because I don’t think it should be longer than six weeks.” (PA02)</td>
</tr>
<tr>
<td></td>
<td>“…one consultant even suggested um discharging me from the clinic. I was a little worried about that… I wouldn’t like to be discharged and then have to rely on my own judgment.” (PA14)</td>
</tr>
<tr>
<td>In adherence to treatment</td>
<td>“Whatever the treatment is, you just have to have it. Not the most pleasant.” (PA12)</td>
</tr>
<tr>
<td></td>
<td>“And of course, now I see the results that they did. My eyesight is improving. I don’t think I’d continue with it if I couldn’t see an improvement.” (PA07)</td>
</tr>
<tr>
<td></td>
<td>“It is over so quickly, and I don’t think I would ever turn it down. I wouldn’t say I can’t have it done, you know...” (PA06)</td>
</tr>
<tr>
<td></td>
<td>“I find it marvellous really. I’m pleased with the way it’s gone, and I can see my daughter and watch the news more.” (PA01)</td>
</tr>
</tbody>
</table>

NHS, National Health Service.
Attitudes and emotions related to chronic therapy as drivers for treatment adherence

Practitioners' interaction with patients to explain how they could benefit from injections was an important factor in adherence. Understanding treatment benefits for preserving eyesight influenced patients' intention to accept the treatment plan:

I would never discontinue the treatments because that's what enables me to still read and drive. (PA14)

Some patients also expressed concerns about disease progression when their appointment was rescheduled to a later date. Despite initial concerns, patients expressed being thankful and grateful for the treatment, generally
Theme 2: variability in pain experience during treatment

Variability in the level of pain was experienced during treatment. In the first subtheme, patients and practitioners recognised preparatory procedural steps, and the second subtheme, ‘intravitreal injection: expecting versus experiencing’, highlights both expectation and experience of pain during the injection. While the final subtheme, impact of quality of care delivery on patient experience, identified the value of individualised care to improve patient experience (see Table 3 for illustrative quotations), apparent dissonance existed between patient experience and practitioners’ expectation of pain.

The variability in pain experienced during intravitreal injections arises from a range of influential factors, including both physical and psychological elements. Inconsistent application of anaesthetic and antiseptic agents, variations in injection techniques and individual pain perceptions all contribute to this wide-ranging variability. Patients describe a diverse spectrum of pain experiences, ranging from dull-aching to sharp sensations, with some attributing the intensity to a perceived inadequacy of anaesthesia. Furthermore, psychological factors such as anxiety, fear and expectations play a key role in shaping the pain experience during the procedure.

Table 4: Post-injection experience and impact on patient recovery

<table>
<thead>
<tr>
<th>Themes/subthemes</th>
<th>Illustrative quotations of patients (PA) and healthcare practitioners (HP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-injection experience and impact on patient recovery</td>
<td>‘Floaters, sometimes spots in the eye that sort of flick around a little bit. But normally after a day or two it wears off… It’s like having a fly in your eye…’ (PA08)</td>
</tr>
<tr>
<td></td>
<td>‘And sometimes you have a lot of floaters. It can leave you with a little sort of floating disks, but they are temporary, they go.’ (PA14)</td>
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<td></td>
<td>‘I get a taxi to come home because my vision in the eye that does have the injection is a bit blurry when I go out to the hospital.’ (PA04)</td>
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<td></td>
<td>‘I’ve had occasions when it waters a lot and occasions when it feels you got sand in your eye.’ (PA03)</td>
</tr>
<tr>
<td></td>
<td>‘…there’s a big black blob…it’s like a black mess.’ (PA06)</td>
</tr>
<tr>
<td></td>
<td>‘Sometimes, you got a feeling of soreness in the eye, a little pain.’ (PA05)</td>
</tr>
<tr>
<td></td>
<td>‘The iodine dries the eye out, so they get discomfort that night and the next day.’ (HP1)</td>
</tr>
<tr>
<td></td>
<td>‘Very often when they come out of the injection, they start blinking or they rub their eyes and this will create a scratch, corneal abrasion. This is very painful once the anaesthetic goes away…’ (HP6)</td>
</tr>
<tr>
<td></td>
<td>‘I have had a headache sometimes. I don’t suffer with headaches, never have. But um, I sort of have an ache just by there [demonstrates on side of eye], I do feel very tired after I’ve had it done.’ (PA09)</td>
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<tr>
<td></td>
<td>‘When the numbness wears off, it then starts to feel a bit sore so often.’ (PA11)</td>
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<tr>
<td></td>
<td>‘Now and then you can have just a slight bleed because…I tend to move my head and I might scratch the eyeball. And that needs more treatment to an extent.’ (PA05)</td>
</tr>
<tr>
<td></td>
<td>‘The aftereffects of the injection I think are worse than the injection itself…Little pain, a little discomfort, a little dryness…it’s only for maybe 24–36 hours and then it’s fine.’ (PA14)</td>
</tr>
<tr>
<td>Home remedies for ocular pain</td>
<td>‘I do not think they need chloramphenicol. I think they just need lubrication…That would improve quite a lot of people’s discomfort afterwards.’ (HP3)</td>
</tr>
<tr>
<td></td>
<td>‘If they feel that they would have any discomfort, I will always advise them to take some paracetamol if they wanted to.’ (HP3)</td>
</tr>
<tr>
<td></td>
<td>‘After the injection sometimes, I take a couple of paracetamol.’ (PA05)</td>
</tr>
<tr>
<td></td>
<td>‘When you get home take couple of paracetamol or whatever painkiller you have, couple of hours of sleep and you will be fine…’ (HP5)</td>
</tr>
<tr>
<td>Instructions and provision of patient information leaflets</td>
<td>‘And give warning to the patient that if their pain is increased, floaters, flashes of light reduce the vision.’ (HP4)</td>
</tr>
<tr>
<td></td>
<td>‘Tell them about the antibiotics they need to take. So, we give antibiotics [chloramphenicol] for four days after the injection. We give them some leaflets if they need to have, emergency contact numbers and then if everything is okay then there’s no problem, the patient will go home.’ (HP2)</td>
</tr>
<tr>
<td></td>
<td>‘They give these eyedrops [chloramphenicol] which you have to use four times a day for four days. They were of help.’ (PA05)</td>
</tr>
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<td></td>
<td>‘Sometimes the pressure can go up after the injection and that can give pain… In future, tell them to take Diamox [acetazolamide], a pressure loading tablet before you inject.’ (HP8)</td>
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<tr>
<td></td>
<td>‘Next day, you get floaty things and think, I hope that’s all right. But then you look at the leaflets and yes, that can happen.’ (PA06)</td>
</tr>
<tr>
<td></td>
<td>‘We will give the antibiotic to take home and the instruction on how they will have it, and a proper leaflet, in case there is any problem when they go home…’ (HP7)</td>
</tr>
<tr>
<td></td>
<td>‘Came home and complied with their instructions…They gave me the antibiotic and used it four times a day for four days.’ (PA13)</td>
</tr>
</tbody>
</table>

perceiving fear of loss of eyesight as more important than their apprehension about the treatment:

It’s a very small thing to pay to keep your sight. I think that is excellent and we are very lucky to have it. (PA10)
Table 5  Comparison of patients’ and practitioners’ perspectives on the treatment experience

<table>
<thead>
<tr>
<th>Main theme</th>
<th>Subtheme(s)</th>
<th>Illustrative quotations</th>
<th>Practitioners (HP)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fear of losing eyesight and apprehension on patient adherence to treatment</td>
<td>Fear of the ‘unknown’ and the feeling of suspicion</td>
<td>‘I mean the fact that I would just have to have a needle in my eyeball is not very good.’ (PA02)</td>
<td>‘Normally patient says it’s the thought of it you know… they just feel lining something in their eye. They are startle.’ (HP4)</td>
<td>Agreement</td>
</tr>
<tr>
<td></td>
<td>Coping mechanisms to manage apprehension</td>
<td>‘I’m now going to give you the injection [they say] … they prepare you for it.’ (PA14)</td>
<td>‘I explain step by step, so they’re involved. Most patients, I realise, they like that.’ (HP5)</td>
<td>Agreement</td>
</tr>
<tr>
<td></td>
<td>In adherence to treatment</td>
<td>‘So relieved to find you could have some treatment that you didn’t really mind. It was better than nothing.’ (PA12)</td>
<td>‘…talking to the patients in a nice way, in a gentle way, sometimes you can convince them of the benefits of an injection.’ (HP6)</td>
<td>Agreement</td>
</tr>
<tr>
<td></td>
<td>Variability of pain perception during injection</td>
<td>‘…there’s a sting and a pressure. And that’s the same…that’s the only way they can get it in you know.’ (PA06)</td>
<td>‘There is a lot of anaesthetic used… you should not feel anything from that side of things… What they should really feel is a pressure…’ (HP1)</td>
<td>Dissonance</td>
</tr>
<tr>
<td></td>
<td>Impact of quality of care delivery on patient experience</td>
<td>‘She said, I like to wait.’ (PA06)</td>
<td>‘The time is not a bad thing because you need time for the anaesthetic to work better and for your iodine to clean the eye better. Sometimes working too quickly is not a good idea.’ (HP6)</td>
<td>Agreement</td>
</tr>
<tr>
<td></td>
<td>Post-injection experience and impact on patient recovery</td>
<td>‘And she always gets hold of your hand just to reassure you, so she can feel the tension that’s going in there.’ (PA08)</td>
<td>‘If there is someone who is particularly anxious the HCA [healthcare assistant] holds their hand, so there that they have got some sort of comfort there.’ (HP1)</td>
<td>Agreement</td>
</tr>
<tr>
<td></td>
<td>Instructions and provision of patient information leaflets</td>
<td>‘And before I left the hospital I went to my consultant and told him and he said, don’t worry, Blurriness will clear very quickly. And it did.’ (PA05)</td>
<td>‘…if they’ve got breathing problems… I would probably get my colleague to sort of hold up the corner [of the drape]…so their face is not so covered.’ (HP2)</td>
<td>Agreement</td>
</tr>
<tr>
<td></td>
<td>Home remedies for ocular pain</td>
<td>‘They just say to take paracetamol if you do [feel pain].’ (PA06)</td>
<td>‘It gives a bit of a blur initially…you have to explain these things to them. If they’re not being informed about it, they ring because they’re worried about it.’ (HP6)</td>
<td>Agreement</td>
</tr>
</tbody>
</table>

Illustrative quotations

- Aimed to echo patients’ views on their experiences.
- Designed to showcase the variance in perception and experience.
- Emphasizes the importance of communication and support in patient care.

Comment

- Agrees or disagrees with the patients’ perspectives.
- Highlights areas of consensus or divergence.

Agreement

- Indicates alignment between patients’ and practitioners’ perspectives.

Dissonance

- Highlights areas of disagreement or conflict.

Open access
Pain experienced during the preparation steps

The preparatory steps are essential for ensuring the safety and comfort of the intravitreal injection procedure. To minimise pain, topical oxybuprocaine 0.4% was applied as an anaesthetic. Antiseptic agents, such as povidone-iodine or chlorhexidine, were carefully used to sterilise the surrounding area. A surgical drape was then positioned to maintain sterility, and an eyelid speculum was inserted for improved access.

Practitioners agreed on the importance of adhering to sterile conditions for injection. A stinging sensation during application of the anaesthetic eye drops (topical oxybuprocaine 0.4%) and povidone-iodine or chlorhexidine was commonly reported. Both patients and practitioners commented on the apparent inconsistency in the procedure for applying anaesthetic and antiseptic agents (see table 3). This inconsistency can be attributed to variations in practitioners’ techniques, the frequency of administration, individual sensitivity to these agents and the time intervals between treatments. These factors collectively contribute to the observed variability and potential inconsistencies in their application. Patients also reported different opinions on the drape application:

I find it [the drape] a little bit, um awkward... I’ll do say, do you mind if I don’t use it because I hate breathing warm air. I feel uncomfortable with that on. (PA08)

Well, I’m glad when that’s [the draping] done. Because you can see the needle otherwise... (PA11)

Intravitreal injection: expecting versus experiencing

Ranibizumab or aflibercept was commonly used anti-VEGFs in this clinic. Most patients experienced a stinging sensation or reported a ‘bump’ felt on the eye upon needle entry, or ‘breaking through the surface’. A key variation was identified in the visit experience attributed to perceived methods used in carrying out the injection which was felt to affect the outcome related to pain (see examples of different methods in table 3, for example, needle position). The pain experience varied across individuals some described it as dull aching, mild, like a ‘pinprick’ or ‘when you’re having your tooth out’, while others experienced a sharp pain because of perceived lack of anaesthesia. The needle insertion was described as painful, but most patients perceived the injections as instant and bearable.

One patient used stronger language to describe the experience:

You then wait for the torture, I call it... The injection. It’s a bad experience. When they push the needle into your eye, it’s like a dull aching pain... (PA07)

On the other hand, practitioners reported that it is unusual to encounter patients who experience pain. See the Comparison of patients’ and practitioners’ perspectives on the treatment experience section for further examples of the dissonance between patients’ and practitioners’ perceptions of the patient experience.

The practitioner further explained that a skilled injection technique required ‘knowledge of anatomy’ and ‘experience’ to lessen a painful injection, consistent with patients’ perception of the technical ability of the individual performing the injection:

I hold the bevel parallel to what I know the anatomical alignment of the sclera fibres. Then when you go in, you don’t really cut any of these fibres. That’s when the pain is felt less. (HP6)

Impact of quality of care delivery on patient experience

Practitioners explained that their level of expertise relied on their ability to make clinical judgements, and upon continual learning and evaluation of performance. When patients reported pain, one nurse practitioner participant described that this led them to reflect on their practice.

Staff made individualised adjustments depending on the specific needs of the patient, which impacted on the overall comfort of the patient, with the potential for less anxiety and reduced perception of pain. Strategies were adapted, such as applying more anaesthetic or waiting longer than normal for the anaesthetic to take effect:

If you give a bit of more time for the anaesthetic to settle is a much better experience for the patient... That patient might be somebody whom you need to wait for a little bit more. (HP7)

The injection procedure was demanding, but the practitioners acknowledged that their interactions affected patients’ experiences:

Talk to the patient... You want to make them feel as they can trust you and that’s a really important part to get that sort of therapeutic relationship going... Patients will know you. They will know how you work, and they will know exactly what to expect... (HP2)

Theme 3: post-injection experience and impact on patient recovery

The experience of patients following their injections and recovery was discussed with painful or discomforting side-effects highlighted as negatively impacting patient experience and recovery. Patients experienced blurred vision, ‘floaters’, watery eyes or grittiness (see table 4). Many patients also reported eye pain, eye irritation or itchiness following their injection, and some associated their experiences with headaches and the anaesthetic wearing off, also leading to trouble resting or sleeping:

Very often I’m getting very gritty and sore... I can’t sleep, honestly because of the irritation is there all the time... It’s very itchy. (PA08)

Soreness and irritation were the most common experiences following an injection, usually lasting between 24 and 36 hours. Practitioners explained that povidone-iodine may cause the eye to dry out after the injection and
blinking or rubbing the injected eye may further cause corneal abrasion which can contribute to pain.

Home remedies for ocular pain
Pain resulting in sleep disturbance had negatively impacted patients’ recovery. To manage post-injection experience, one patient deliberately scheduled the appointment early in the day to avoid having problems sleeping at night and reported applying a hot compress after the injection:

If you have an injection first thing in the morning, if there is any discomfort, the worst is over by the time you go to bed… If it’s a late injection and my eye is very sore, then I might have a very restless night… I get a like a compress with hot water on my eye. (PA14)

Practitioners generally advised patients to take their usual pain relief medication including paracetamol or ibuprofen to manage any pain at home.

Instructions and provision of patient information leaflets
Both patients and practitioners highlighted the importance of recognising aftereffects, their management and how this can improve patient experience and recovery (see tables 4 and 5 for illustrative quotations), this included provision of instructions and patient information.

Consistent with clinical protocol, clear instructions and provision of information leaflets educated patients on their antibiotic prescription, common side-effects and potential complications (see table 4). All patients read the leaflets and were instructed to use chloramphenicol antibiotic eye drops four times a day for 4 days. The leaflets addressed concerns regarding post-injection eye appearance, vision changes, and emphasised prompt contact with the urgent eye clinic for any specific symptoms or concerns. This was reported as reassuring to patients. Practitioner communication in the context of advising and providing reassurance was identified as a key variation impacting on the patient experience.

Comparison of patients’ and practitioners’ perspectives on the treatment experience
Practitioners unanimously acknowledged the fear and apprehension experienced by patients before intravitreal injections through observation, addressing concerns and creating a supportive environment. Some practitioners asserted that patients primarily feel pressure rather than pain during the procedure, focusing on the use of anaesthetics to minimise discomfort. They reassured patients that any sensations are temporary and manageable, offering clear explanations and highlighting patient education. This includes educating patients about home remedies like cold compresses and over-the-counter pain relievers to manage any post-injection discomfort or pain, and emphasising adherence to treatment. Table 5 presents exemplar quotes that highlight the overall comparisons discussed.

Discussion
Building on previous research that focused on quantitatively assessing pain during anti-VEGF treatment, this study examined patients’ and practitioners’ perspectives using an in-depth qualitative approach to gain insight into patient experience and treatment adherence. These findings contribute to an increased understanding of the patient experience by indicating that post-injection ocular pain is more common than previously recognised with soreness and irritation experienced up to 36 hours following most anti-VEGF injections, while also affirming experiences reported in similar cohorts. The analysis showed the value of patient-practitioner interactions to facilitate understanding of treatment expectations and individual needs, and highlighted where practitioners can assess and best address advice to patients for controlling pain before and immediately after injection.

Pain is commonly induced by ocular surface irritation, vitreous inflammation or an increase in intraocular pressure (IOP). Most patients reported side-effects including grittiness, soreness and irritation 4–6 hours after treatment, with the latter likely to be associated with the return of full corneal sensitivity 40 min after application of anaesthesia, or because of the irritant properties of iodine. Long-lasting ocular pain between 24 and 36 hours was found in the present study, but has not been previously reported in studies of patient experience. However, headache reported in this study has been previously associated with an elevated post-injection IOP and found in individuals who experienced episodic migraines following anti-VEGF treatment. Practitioners referred to reviewing patients’ medical records to determine history of allergies, ocular infections and IOP to treat patients accordingly.

Our findings align with previous literature in that providing clear instructions and acknowledging patient concerns or expectations build rapport and can contribute to a positive patient experience. Provision of information leaflets after treatment helped patients in the study to recognise common side-effects, providing a form of reassurance. Additionally, instructing patients on their prescription antibiotics or not to rub their eye after the injection can help reduce the risk of itching and pain, previously reported to influence patient engagement with treatment. However, the chronicity of AMD and the routine nature of the anti-VEGF injections could lead patients to perceive pain as less salient, influenced by previous experiences and the variable intravitreal injections reported in this study. Practitioners should
consider routinely warning patients of potential pain and advice on home remedies for ocular pain relief, such as local ice compress and analgesic use. Ice, for instance, had shown effectiveness as a local anaesthetic during injection and cooling-based anaesthesia.

Repeated injections have been linked to morphological changes to the sclera and believed to contribute to greater difficulty with needle insertion. This study could not substantiate these observations; nevertheless, patients revealed a degree of pain during injection consistent with previous findings reporting a ‘little prick’ and sharp sensation. Our analysis reports dissonance between patients’ expectations and their actual experiences during injection. Some patients reported a pressure, but others experienced a dull-aching, sharp or just a mild pain, different to practitioners’ views on a feeling of pressure. Practitioners typically use the term ‘pressure’ to reassure patients; however, mutual trust and providing realistic expectations are important aspects of treatment. Practitioners reported the importance of technical competency and continuing professional development. This is consistent with professional guidelines, indicating that practitioners should periodically review and evaluate their performance. Not all practitioners acknowledged the proportion of patients experiencing pain and this highlights the importance of implementing patient feedback.

Moreover, despite the extensive literature comparing the effect of different anaesthetic techniques to address pain during an intravitreal anti-VEGF injection, no method of anaesthesia has been shown to eliminate pain completely; it is common for patients to experience mild pain during injection. A 0.4% solution of oxybuprocaine used in the clinic under study delivers a maximum anaesthetic effect after 5 min when administered at 90-second intervals and lasts for 15–20 min. Our findings support allowing enough time to reach adequate anaesthesia; however, alternative methods may be investigated to meet patient needs, such as subconjunctival injection and anaesthetic gel.

Increased pretreatment anxiety has been significantly related to greater perceived pain during injection. Anticipatory anxiety can lead to oversensitivity and muscle tension around the eyes and face. In this study, apprehension was attributed to being able to see the surgical needle and patients’ fear of an eye injury leading to muscle tension and ‘jumping’ reactions. These have occasionally affected the practitioner injecting; altering needle position and causing an abrasion to the eye. In emotion theory, startle and pain are described as innate reflexes or reactions in response to existing stimuli. Patients could learn using deep breathing exercises to initiate muscle relaxation, helping themselves manage apprehension more effectively.

Non-adherence has previously been linked to fear of the injection and disbelieve regarding its benefits. Our study supports that establishing and maintaining a therapeutic relationship contributes to patients’ confidence and engagement with their treatment course. Patients’ motives for continuing treatment were related to their understanding of the severity of the consequences of untreated AMD and the treatment benefits, giving them the ability to carry out daily living activities.

### Strengths and limitations
A key strength is the combined data from both patients and practitioners. Purposive sampling can be prone to researcher bias; however, to minimise this, judgements were based on the eligibility criteria of the sample. Individual interviews were conducted in a private setting assuring participants of the confidentiality and anonymity of their data to reduce social desirability response biases. In addition, interviews were conducted by an inexperienced interviewer and could have impacted interview quality; nevertheless, note-taking and probing questions have resulted in collecting meaningful data on patient experiences consistent with study aims. In this single-centre study, the findings presented are geographically limited and may not be transferable to other regions of the UK or countries, particularly where protocols and scope of practice may differ. While the sample size was small, it is consistent with models of qualitative research, and data saturation was assumed, given that no new information related to the themes was found in the final interviews. A wider sample may be reached through the use of a standardised questionnaire. However, a thorough description of the research context and sufficient data collected through in-depth interviews was presented, to allow readers to assess whether the findings are transferable to their context.

### Conclusion
Ocular pain was a widely reported side-effect in many but not all anti-VEGF injections, with soreness and irritation commonly reported to last for up to 36 hours affecting patient recovery. Practitioners should adapt pain assessment tools to evaluate the patient experience during and following each injection and deliver ongoing information to support patients in managing pain at home. Generally, patients recognised that adherence to treatment was essential to reduce the risk of further vision loss.

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### Competing interests
None declared.

### Patient and public involvement
The research question and study design was informed by patient views elicited from feedback of a local patient group with
REFERENCES


