NICE National Institute for Health and Care Excellence

Professional Expert Questionnaire

Technology/Procedure name & indication: IP1914 Radiofrequency denervation for osteoarthritic knee pain

Your information

Name:	Andrew Price
Job title:	Clinical Director and Professor of Orthopaedics
Organisation:	Oxford University Hospitals NHS Trust
Email address:	[redacted]
Professional organisation or society membership/affiliation:	British Orthopaedic Association (BOA), British Association for Surgery of the Knee
Nominated/ratified by (if applicable):	BOA
Registration number (e.g. GMC, NMC, HCPC)	3659225

How NICE will use this information: the advice and views given in this questionnaire will form part of the information used by NICE and its advisory committees to develop guidance or a medtech innovation briefing on this procedure/technology. Information may be disclosed to third parties in accordance with the Freedom of Information Act 2000 and the Data Protection Act 2018, complying with data sharing guidance issued by the Information Commissioner's Office. Your advice and views represent your individual opinion and not that of your employer, professional society or a consensus view. Your name, job title, organisation and your responses, along with your declared interests will also be published online on the NICE website as part of the process of public consultation on the draft guidance, except in circumstances but not limited to, where comments are considered voluminous, or publication would be unlawful or inappropriate.

For more information about how we process your data please see our privacy notice.

Yes ☐ I give my consent for the information in this questionnaire to be used and may be published on the NICE website as outlined above. If consent is NOT given, please state reasons below:

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Please answer the following questions as fully as possible to provide further information about the procedure/technology and/or your experience.

Please note that questions 10 and 11 are applicable to the Medical Technologies Evaluation Programme (MTEP). We are requesting you to complete these sections as future guidance may also be produced under their work programme.

1	Please describe your level of experience with the procedure/technology, for example: Are you familiar with the procedure/technology? Have you used it or are you currently using it? − Do you know how widely this procedure/technology is used in the NHS or what is the likely speed of uptake? − Is this procedure/technology performed/used by clinicians in specialities other than your own? − If your specialty is involved in patient selection or referral to another specialty for this	I am familiar with this procedure having performed it in the past. The technique is not in widespread use in the NHS This is specific to knee surgery

	procedure/technology, please indicate your experience with it.	
2	− Please indicate your research experience relating to this procedure (please choose one or more if relevant):	I have had no involvement in research on this procedure. Other (please comment)
3	How innovative is this procedure/technology, compared to the current standard of care? Is it a minor variation or a novel approach/concept/design? Which of the following best describes the procedure (please choose one):	This is a novel and not well assessed in trials. . Definitely novel and of uncertain safety and efficacy.
4	Does this procedure/technology have the potential to replace current standard care or would it be used as an addition to existing standard care?	It works it has the potential to be of additional value to patients in addition to standard of care.

Current management

5	Please describe the current standard of care that is used in the NHS.	Published NICE clinical guidance for the management of knee OA is used

6	Are you aware of any other competing or alternative procedure/technology available to the NHS which have a similar function/mode of action to this? If so, how do these differ from the procedure/technology described in the briefing?	I am not aware of studies that have a similar mode of action ie radiofrequency ablation of nerves. Genicular artery embolisation is another technique to treat OA but is not nerve ablation method

Potential patient benefits and impact on the health system

7	What do you consider to be the potential benefits to patients from using this procedure/technology?	This could potentially reduce pain in knee OA
8	Are there any groups of patients who would particularly benefit from using this procedure/technology?	This could be a second line intervention in the NICE guidance for treating OA
9	Does this procedure/technology have the potential to change the current pathway or clinical outcomes to benefit the healthcare system? Could it lead, for example, to improved outcomes, fewer hospital visits or less invasive treatment?	It could lead to improved outcomes, fewer hospital visits or less invasive treatment for patients with knee OA
10 - MTEP	Considering the care pathway as a whole, including initial capital and possible future costs avoided, is the procedure/technology likely to cost more or less than current standard care, or about the same? (in terms of staff, equipment, care setting etc)	It would cost more as it is an invasive procedure
11 - MTEP	What do you consider to be the resource impact from adopting this procedure/technology (is it likely to cost more or less than standard care, or about same-in terms of staff, equipment, and care setting)?	As above
12	What clinical facilities (or changes to existing facilities) are needed to do this procedure/technology safely?	No change in facilities

13	Is any specific training needed in order to use the procedure/technology with respect to efficacy or safety?	Training in the procedure would be required

Safety and efficacy of the procedure/technology

14	What are the potential harms of the procedure/technology? Please list any adverse events and potential risks (even if uncommon) and, if possible, estimate their incidence: Adverse events reported in the literature (if possible, please cite literature) Anecdotal adverse events (known from experience) Theoretical adverse events	Ablation of nerves could lead to nerve pain if incomplete ? incidence Ablation/damage to other structures
15	Please list the key efficacy outcomes for this procedure/technology?	Patient reported outcome measures (OKS, KOOS)
16	Please list any uncertainties or concerns about the efficacy and safety of this procedure/?	It may not produce a reduction in pain
17	Is there controversy, or important uncertainty, about any aspect of the procedure/technology?	The outcomes are unknown and have not been tested in RCTs
18	If it is safe and efficacious, in your opinion, will this procedure be carried out in (please choose one):	Most or all district general hospitals. ~~A minority of hospitals, but at least 10 in the UK.~~ ~~Fewer than 10 specialist centres in the UK.~~

		Cannot predict at present.

Abstracts and ongoing studies

19	Please list any abstracts or conference proceedings that you are aware of that have been recently presented / published on this procedure/technology (this can include your own work). Please note that NICE will do a comprehensive literature search; we are only asking you for any very recent abstracts or conference proceedings which might not be found using standard literature searches. You do not need to supply a comprehensive reference list but it will help us if you list any that you think are particularly important.	No
20	Are there any major trials or registries of this procedure/technology currently in progress? If so, please list.	No

Other considerations

21	Approximately how many people each year would be eligible for an intervention with this procedure/technology, (give either as an estimated number, or a proportion of the target population)?	100,000 – probably more
22	Are there any issues with the usability or practical aspects of the procedure/technology?	I believe it is difficult to show that ablation of the nerves has actually occurred ie the nerves are small and not easily identified ie the operator my miss.

23	Are you aware of any issues which would prevent (or have prevented) this procedure/technology being adopted in your organisation or across the wider NHS?	If it was ineffective.
24	Is there any research that you feel would be needed to address uncertainties in the evidence base?	Placebo RCT
25	Please suggest potential audit criteria for this procedure/technology. If known, please describe: − Beneficial outcome measures. These should include short- and long-term clinical outcomes, quality-of-life measures and patient-related outcomes. Please suggest the most appropriate method of measurement for each and the timescales over which these should be measured. − Adverse outcome measures. These should include early and late complications. Please state the post procedure timescales over which these should be measured:	Beneficial outcome measures: Oxford Knee Score KOOS Pain scale ….. all at 2 weeks and then 6 months Adverse outcome measures: Infection Acute increase in pain Vascular injury Skin damage
26	Is there any other data (published or otherwise) that you would like to share with the committee?	No

Further comments

26	Please add any further comments on your particular experiences or knowledge of the procedure/technology,	None

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Declarations of interests

Please state any potential conflicts of interest relevant to the procedure/technology (or competitor technologies) on which you are providing advice, or any involvements in disputes or complaints, in the previous **12 months** or likely to exist in the future. Please use the NICE policy on declaring and managing interests as a guide when declaring any interests. Further advice can be obtained from the NICE team.

Type of interest *	Description of interest	Relevant dates	
		Interest arose	Interest ceased
Choose an item.			
Choose an item.			
Choose an item.			

YES I confirm that the information provided above is complete and correct. I acknowledge that any changes in these declarations during the course of my work with NICE, must be notified to NICE as soon as practicable and no later than 28 days after the interest arises. I am aware that if I do not make full, accurate and timely declarations then my advice may be excluded from being considered by the NICE committee.

Please note, all declarations of interest will be made publicly available on the NICE website.

Print name:	**Andrew Price**
Dated:	**26.09.2022**

NICE National Institute for Health and Care Excellence

Professional Expert Questionnaire

Technology/Procedure name & indication: IP1914 Radiofrequency denervation for osteoarthritic knee pain

Your information

Name:	Dr Arun Bhaskar
Job title:	Consultant in Pain Medicine
Organisation:	Imperial College Healthcare NHS Trust
Email address:	[redacted]
Professional organisation or society membership/affiliation:	The British Pain Society, Faculty of Pain Medicine Royal College of Anaesthetists, Neuromodulation Society of UK & Ireland
Nominated/ratified by (if applicable):	Faculty of Pain Medicine Royal College of Anaesthetists
Registration number (e.g. GMC, NMC, HCPC)	4761448

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Please answer the following questions as fully as possible to provide further information about the procedure/technology and/or your experience.

Please note that questions 10 and 11 are applicable to the Medical Technologies Evaluation Programme (MTEP). We are requesting you to complete these sections as future guidance may also be produced under their work programme.

1	Please describe your level of experience with the procedure/technology, for example: Are you familiar with the procedure/technology? Have you used it or are you currently using it? – Do you know how widely this procedure/technology is used in the NHS or what is the likely speed of uptake? – Is this procedure/technology performed/used by clinicians in specialities other than your own? – If your specialty is involved in patient selection or referral to another specialty for this	I have been using this technique for managing knee joint pain for more than 12 years and are familiar with the various technologies used. This technology is currently used by a significant number of pain specialities who have access to a radiofrequency generator. RF is used widely for managing spinal pain and is a NICE approved procedure for managing axial back pain. If there is a referral stream to pain clinics from orthopaedic surgeons and MSK physiotherapists, then more colleagues would be offering this service. Currently this is used predominantly by pain clinicians in secondary and tertiary care pain clinics. There is certainly scope for this treatment to be offered by orthopaedic surgeons, rheumatologists, rehabilitation specialists and sports medicine physicians. Most patients are referred to the pain clinic for this treatment and vast majority of the referrals are due to the following reasons: - Patients medically unfit to undergo knee joint arthroplasty - Patient too young to undergo knee joint arthroplasty - Patient refusal have knee joint arthroplasty - Post-knee joint arthroplasty persistent pain

	procedure/technology, please indicate your experience with it.	
2	– Please indicate your research experience relating to this procedure (please choose one or more if relevant):	I have done bibliographic research on this procedure. I have done research on this procedure in laboratory settings (e.g. device-related research).
3	How innovative is this procedure/technology, compared to the current standard of care? Is it a minor variation or a novel approach/concept/design? Which of the following best describes the procedure (please choose one):	Established practice and no longer new.
4	Does this procedure/technology have the potential to replace current standard care or would it be used as an addition to existing standard care?	I think the procedure is best described to be used in addition to existing standard of care – physiotherapy, pharmacology and surgical management. It may have a role in delaying elective knee joint arthroplasty by providing effective analgesia especially when pain is the predominant symptom rather than lack of function, range of movement and instability. This could also result in reducing the number of re-do arthroplasties when the prosthesis implanted at the initial procedure reaches the end of its lifespan and this could potentially result in significant savings to the NHS

Current management

5	Please describe the current standard of care that is used in the NHS.	Patients with osteoarthritis of the knee are managed with analgesics, physiotherapy, life style changes and knee joint replacement surgeries
6	Are you aware of any other competing or alternative procedure/technology available to the NHS which have a similar function/mode of action to this? If so, how do these differ from the procedure/technology described in the briefing?	There are centres that could offer cryoablation which involves cooling the nerves rather than heating the nerves in RF lesioning. These are available only in a few centres and in my opinion do not offer any advantage to radiofrequency techniques

Potential patient benefits and impact on the health system

7	What do you consider to be the potential benefits to patients from using this procedure/technology?	Minimally invasive day case procedure that could give 12-18 months of pain relief Can be repeated as it is not neurodestructive Day case procedure Can reduce the reliance on analgesics – Opioids, NSAIDs, COX2 inhibitors and Gabapentinoids Most importantly if pain is the main debilitating symptom and range of movement is not compromised, knee joint arthroplasty can be delayed and patient may only need surgery once in their life time
8	Are there any groups of patients who would particularly benefit from using this procedure/technology?	Patients with persistent knee joint pain – mainly osteoarthritis Other inflammatory arthritis, post-traumatic knee pain, osteonecrosis due to sickle cell disease, steroid use etc. Lesser benefit in patients with post-TKR persistent knee pain
9	Does this procedure/technology have the potential to change the current pathway or clinical outcomes to benefit the healthcare system? Could it lead, for example, to improved outcomes, fewer hospital visits or less invasive treatment?	Hopefully – this has the potential to delay early knee joint replacement Also would be able to reduce the reliance on systemic analgesics This procedure would not adversely impact on the surgery if knee joint arthroplasty is indicated in the future
10 - MTEP	Considering the care pathway as a whole, including initial capital and possible future costs avoided, is the procedure/technology likely to cost more or less than current standard care, or about the same? (in terms of staff, equipment, care setting etc)	It should not add further costs in the patient pathway as the technology is already in use in most pain clinics that deal with spinal pain. There could be significant savings by delaying the need for early total knee replacement.
11 - MTEP	What do you consider to be the resource impact from adopting this procedure/technology (is it likely to cost	In my opinion it would be incorporating this treatment option in patient pathways; this could mean referral streams to Pain clinics or establishing the service in orthopaedic clinics where there would be cost implications for purchasing the RF generator and disposables

	more or less than standard care, or about same-in terms of staff, equipment, and care setting)?	
12	What clinical facilities (or changes to existing facilities) are needed to do this procedure/technology safely?	As mentioned above, most secondary and tertiary care pain clinics have the technology available for managing low back pain and neck pains as well as peripheral pain problems.
13	Is any specific training needed in order to use the procedure/technology with respect to efficacy or safety?	The clinical practitioners should be trained in the safe use of the RF pulse generator and good technique should be part of the training. Most practitioners should try and learn the procedures on cadavers or phantom models before practising in patients to ensure safety and efficacy

Safety and efficacy of the procedure/technology

14	What are the potential harms of the procedure/technology? Please list any adverse events and potential risks (even if uncommon) and, if possible, estimate their incidence: Adverse events reported in the literature (if possible, please cite literature) Anecdotal adverse events (known from experience) Theoretical adverse events	In the hands of an experienced clinician, this is a safe procedure as there are not many structures in the vicinity that could result in major complications. Common adverse effects are pain during the procedure, minor bleeding and haematoma, flare up of pain post-procedure Nerve damage and risk of foot drop if caution is not exercised when lesioning the lateral tibial site Potential risk of infection at the site of RF cannula insertion Theoretical risk of osteomyelitis
15	Please list the key efficacy outcomes for this procedure/technology?	Improvement in pain scores Better mobility Improved sleep hygiene due to less night pain Reduction in analgesia Reduced GP and hospital visits and avoiding early knee joint arthroplasties

16	Please list any uncertainties or concerns about the efficacy and safety of this procedure/?	Nil
17	Is there controversy, or important uncertainty, about any aspect of the procedure/technology?	No
18	If it is safe and efficacious, in your opinion, will this procedure be carried out in (please choose one):	Most or all district general hospitals.

Abstracts and ongoing studies

19	Please list any abstracts or conference proceedings that you are aware of that have been recently presented / published on this procedure/technology (this can include your own work). Please note that NICE will do a comprehensive literature search; we are only asking you for any very recent abstracts or conference proceedings which might not be found using standard literature searches. You do not need to supply a comprehensive reference list but it will help us if you list any that you think are particularly important.	Most published literature is available on searches. I shall find out whether there are any relevant papers awaiting publication
20	Are there any major trials or registries of this procedure/technology currently in progress? If so, please list.	

Other considerations

21	Approximately how many people each year would be eligible for an intervention with this procedure/technology, (give either as an estimated number, or a proportion of the target population)?	Probably 50% of patients with painful knee joint osteoarthritis could potentially benefit from this procedure
22	Are there any issues with the usability or practical aspects of the procedure/technology?	No
23	Are you aware of any issues which would prevent (or have prevented) this procedure/technology being adopted in your organisation or across the wider NHS?	Financial constraints Mind set of orthopaedic colleagues that knee joint arthroplasty is the treatment of choice for managing osteoarthritis of the knee
24	Is there any research that you feel would be needed to address uncertainties in the evidence base?	Patient registry would be a better option rather than RCTs in this situation One of research question could be to look at whether the outcome of RF of the genicular branches could delay arthroplasty of the knee
25	Please suggest potential audit criteria for this procedure/technology. If known, please describe: − Beneficial outcome measures. These should include short- and long-term clinical outcomes, quality-of-life measures and patient-related outcomes. Please suggest the most appropriate method of measurement for each and the timescales over which these should be measured. − Adverse outcome measures. These should include early and late complications. Please state the post procedure timescales over which these should be measured:	Improvement in pain scores Better mobility Improved sleep hygiene due to less night pain Reduction in analgesia Reduced GP and hospital visits Avoiding early knee joint arthroplasties Persistent pain post procedure Infection Nerve damage Need for urgent arthroplasty for unstable knee

26	Is there any other data (published or otherwise) that you would like to share with the committee?	No

Further comments

26	Please add any further comments on your particular experiences or knowledge of the procedure/technology,	

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Declarations of interests

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Type of interest *	Description of interest	Relevant dates	
		Interest arose	Interest ceased
Direct - financial	Received honoraria for teaching the RF technique on the knee joint at cadaver courses for Stryker Ltd	01.06.2021	Ongoing
	Received honoraria with Stryker Ltd for meetings on RF treatment of neck and back pain		
	Received honoraria for teaching RF for back pain and radicular pain for Boston-Scientific Ltd	01.07.2022	18.10.2022
Non-financial professional	Involved in refining Cooled RF technology application for Baylis Ltd	05.04.2008	16.11.2009
	Been teaching RF technology in various courses	01.03.2008	Ongoing
	Been teaching RF for knee joint pain in various courses	14.07.2010	Ongoing
Choose an item.			

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Please note, all declarations of interest will be made publicly available on the NICE website.

Print name:	**Click here to enter text.Dr Arun Bhaskar**

Dated:	**Click here to enter text. 24.09.2022**

NICE National Institute for Health and Care Excellence

Professional Expert Questionnaire

Technology/Procedure name & indication: **IP1914 Radiofrequency denervation for osteoarthritic knee pain**

Your information

Name:	Dr. Thomas Haag
Job title:	Consultant in Pain Management, Visiting Professor at Glyndwr University, North Wales
Organisation:	Betsi Cadwaladr University Health Board (NHS)
Email address:	tomhaag@gmx.net
Professional organisation or society membership/affiliation:	Royal College of Anaesthetists (FRCA); Faculty of Pain Medicine (FFPMRCA); ESRA
Nominated/ratified by (if applicable):	Faculty of Pain Medicine
Registration number (e.g. GMC, NMC, HCPC)	GMC 4558284

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1	Please describe your level of experience with the procedure/technology, for example: Are you familiar with the procedure/ technology? Have you used it or are you currently using it? − Do you know how widely this procedure/technology is used in the NHS or what is the likely speed of uptake? − Is this procedure/technology performed/used by clinicians in specialities other than your own? − If your specialty is involved in patient selection or referral to another specialty for this procedure/ technology, please indicate your experience with it.	I started with this treatment modality in 2015 and have performed it ever since on a regular basis. I am well familiar with the Fluoroscopy guided as well as Ultrasound guided technique, both of which I teach at national and international courses. I am an active faculty member of ESRA, ISURA/RAUK and WIP where often my expertise is sought in this modality. I was instrumental in developing the Ultrasound guided technique which has been adopted by ESRA and RAUK. When I started we where one of 3 centres in the UK offering this treatment. It is now more widely spread reflected by the keen interest shown by UK colleagues at courses. This modality is likely to spread significantly due to the excessive waiting times for joint replacements (bridging therapy!) and as a viable alternative for patients with significant co-morbidity where the op risk is deemed too high or patients prefer a non-surgical treatment option (first). It is mostly Anaesthetists performing this technique, followed by orthopaedic surgeons and interventional radiologists.

2	– Please indicate your research experience relating to this procedure (please choose one or more if relevant):	I have done bibliographic research on this procedure. I have done research on this procedure in laboratory settings (e.g. device-related research). I have done clinical research on this procedure involving patients or healthy volunteers. I have published this research. Other (please comment)
3	How innovative is this procedure/technology, compared to the current standard of care? Is it a minor variation or a novel approach/ concept/design? Which of the following best describes the procedure (please choose one):	Novel treatment modality based on sound anatomical studies identifying the genicular nerves Established practice and no longer new, in a growing numbers of centres
4	Does this procedure/technology have the potential to replace current standard care or would it be used as an addition to existing standard care?	Has the potential to offer effective pain relief in whom surgery is not an option or not desired

Current management

5	Please describe the current standard of care that is used in the NHS.	Conventional therapy (education, physio, medication, aides) , intra-articular injections, surgery, including joint replacement

6	Are you aware of any other competing or alternative procedure/technology available to the NHS which have a similar function/ mode of action to this? If so, how do these differ from the procedure/technology described in the briefing?	Cryotherapy and chemical neurolysis to same anatomical targets. Cryotherapy unlike RF ablation is not neuro-destructive.

Potential patient benefits and impact on the health system

7	What do you consider to be the potential benefits to patients from using this procedure/technology?	Effective, longer term pain relief and functional improvements as a result with minimal risks compared to surgery. Medication sparing.
8	Are there any groups of patients who would particularly benefit from using this procedure/technology?	Patients for whom surgery is not advisable or too risky. Patients who wish to pursue non-surgical treatment (first) before (possibly) considering surgery. Bridging therapy whilst waiting for surgery
9	Does this procedure/technology have the potential to change the current pathway or clinical outcomes to benefit the healthcare system? Could it lead, for example, to improved outcomes, fewer hospital visits or less invasive treatment?	This treatment should have a firm place in the treatment pathway of chronic knee pain, particularly if surgery is deemed of questionable benefit, too risky or not wanted by patients. Yes and cheaper from an health economic point
10 - MTEP	Considering the care pathway as a whole, including initial capital and possible future costs avoided, is the procedure/ technology likely to cost more or less than current standard care, or about the same? (in terms of staff, equipment, care setting etc)	Cheaper as it has the potential to offer an alternative to surgery. Can be done in a day case setting under ultra-sound guidance and local anaesthetic with or without sedation. Short recovery period , usually less than 1 hour.
11 - MTEP	What do you consider to be the resource impact from adopting this procedure/ technology (is it likely to cost more or less than standard care, or about same-in terms of staff, equipment, and care settings)?	Will cost considerably less than surgical treatment
12	What clinical facilities (or changes to existing facilities) are needed to do this procedure/technology safely?	Sterile environment within a clinical setup allowing basic monitoring and recovery arrangements. Can be done in a day case setting with patients being able to mobilise within an hour or the definitive treatment
13	Is any specific training needed in order to use the procedure/technology with respect to efficacy or safety?	Proficient skills in ultrasound and/or fluoroscopy guided procedures required as taught in national and international workshops

Safety and efficacy of the procedure/technology

14	What are the potential harms of the procedure/technology? Please list any adverse events and potential risks (even if uncommon) and, if possible, estimate their incidence: Adverse events reported in the literature (if possible, please cite literature) Anecdotal adverse events (known from experience) Theoretical adverse events	Temporary mild bruising and numbness of the overlying skin of treated area is common Case reports on bleeding/vascular injuries Case reports on Pes anserine damage potentially giving rise to lateral instability of knee Case reports of (often temporary) numbness of overlying skin Theoretical injuries to motor nerves and post ablation neuritis Charcot neuropathy (theoretical - no case reports)
15	Please list the key efficacy outcomes for this procedure/technology?	Pain Scores (i.e. VAS) and /disability/functional scores such as WOMAC, Oxford Knee Score, ODI
16	Please list any uncertainties or concerns about the efficacy and safety of this procedure/?	Poor outcome post 6 month in patients with poor self-efficiency (https://www.britishpainsociety.org/static/uploads/resources/files/March_PAN_20_1_Cover_to_Cover.pdf) p. 17
17	Is there controversy, or important uncertainty, about any aspect of the procedure/technology?	Uncertainty about which ablative RF modality is superior in terms of quality of pain relief and duration of effect
18	If it is safe and efficacious, in your opinion, will this procedure be carried out in (please choose one):	Most or all district general hospitals

Abstracts and ongoing studies

19	Please list any abstracts or conference proceedings that you are aware of that have been recently presented / published on this procedure/technology (this can include your own work). Please note that NICE will do a comprehensive literature search; we are only asking you for any very recent abstracts or conference proceedings which might not be found using standard literature searches. You do not need to supply a comprehensive reference list but it will help us if you list any that you think are particularly important.

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REVIEW

Selective Sensory Denervation by Means of Radiofrequency (RF) Ablation: a Novel Non-surgical Treatment Approach in Chronic Joint Pain: a Narrative Review on Its Application on Knee Hip and Shoulder

Andrea Tinnirello[1] · Carola Santi[2] · Thomas Haag[3]

Accepted: 5 July 2022

Abstract
Chronic joint pain has a major negative impact on the quality of life of patients. A large percentage of patients does not respond to conservative treatments and is not candidates for joint replacement surgery. Thanks to focused anatomical studies, the major sensory nerves could be identified in the main joints. This led to the emergence of novel treatment option consisting in selective denervation of sensory nerves, by means of radiofrequency. The purpose of this review is to discuss the efficacy of radiofrequency denervation of the hip, knee, and shoulder and to define its role in the management of chronic joint pain. Narrative review. The main targets for the denervation of the hip are branches of the femoral and obturator nerves. Pain relief for 6 months has been demonstrated in multiple studies. Radiofrequency may be applied to sensory branches of the lateral pectoral, axillary, and suprascapular nerves to treat shoulder pain. A significant reduction in pain lasting for 3–6 months has been found in 50–85% of patients. The genicular nerves and the suprapatellar plexus are mainly responsible of the innervation of the knee and they can be located by bony landmarks. Studies on the knee joint suggest that radiofrequency can be more efficient than steroid and hyaluronic acid injections. A growing number of studies suggests that radiofrequency denervation is effective in reducing chronic joint pain, particularly in the knee joint. Positive outcome predictors and precise inclusion criteria are still lacking as well as indication for the best denervation modality.

Keywords Radiofrequency · Joint pain · Shoulder pain · Knee pain · Hip pain · Joint replacement · Chronic pain

Introduction

Chronic joint pain has a major negative impact on the quality of life of many patients who often find little comfort from conservative treatments, including medications.

Musculoskeletal (MSK) conditions account for more than 22% of the total burden of ill health (morbidity) in the UK [1]. One out of four adults with arthritis reports experiencing severe joint pain, which is one of the main reasons for joint replacement. The main cause for chronic joint pain is osteoarthritis (OA) [2]. A considerable number of patients suffers from painful OA of various joints for many years before becoming surgical candidate. The 2019 guidelines from the American College of Rheumatology give a strong recommendation for oral NSAIDs and intra-articular steroid injections, besides exercise and weight loss, as non-surgical management of hip OA [3]. Unfortunately, there is a large percentage of patients that does not respond to conservative treatment or who is not able to tolerate side effects of NSAIDs, leaving a treatment gap [4]. Opioids are not recommended since they are not associated with improving of pain related function, compared to non-opioid medications; their chronic use is also associated with worsening of osteoporosis without mentioning the well-known side effects (nausea, constipation, dizziness, hormonal suppression) and risk of addiction [5].

Surgery also comes with its share of risks and is not always successful. Many patients continue to suffer from

This article is part of the Topical Collection on *Surgery*

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https://

20	Are there any major trials or registries of this procedure/technology currently in progress? If so, please list.	Not to my knowledge

Other considerations

21	Approximately how many people each year would be eligible for an intervention with this procedure/technology, (give either as an estimated number, or a proportion of the target population)?	A significant number of patients at an advanced age (>75 age) or patients considered too young for major joint surgery such as replacement. Could be offered as a first line treatment in this group. Patients with significant co-morbidity posing an increased anaesthetic risk
22	Are there any issues with the usability or practical aspects of the procedure/ technology?	Training
23	Are you aware of any issues which would prevent (or have prevented) this procedure/ technology being adopted in your organisation or across the wider NHS?	Capacity issues
24	Is there any research that you feel would be needed to address uncertainties in the evidence base?	Different RF modalities to be examined in head-to-head comparisons

25	Please suggest potential audit criteria for this procedure/technology. If known, please describe: - Beneficial outcome measures. These should include short- and long-term clinical outcomes, quality-of-life measures and patient-related outcomes. Please suggest the most appropriate method of measurement for each and the timescales over which these should be measured. - Adverse outcome measures. These should include early and late complications. Please state the post procedure timescales over which these should be measured:	Beneficial outcome measures: Pain scores, functional scores, medication use, primary care/ hospital visits, health economics (https://pubmed.ncbi.nlm.nih.gov/31238925/) Adverse outcome measures: (motor) nerve damage, poor outcome (beyond 6 months) due to poor self-efficacy
26	Is there any other data (published or otherwise) that you would like to share with the committee?	https://pubmed.ncbi.nlm.nih.gov/31238925/

Further comments

26	Please add any further comments on your particular experiences or knowledge of the procedure/technology,	I perform this procedure strictly under ultrasound guidance on a regular basis

NICE National Institute for Health and Care Excellence

Declarations of interests

Please state any potential conflicts of interest relevant to the procedure/technology (or competitor technologies) on which you are providing advice, or any involvements in disputes or complaints, in the previous **12 months** or likely to exist in the future. Please use the NICE policy on declaring and managing interests as a guide when declaring any interests. Further advice can be obtained from the NICE team.

Type of interest *	Description of interest	Relevant dates	
		Interest arose	Interest ceased
Industry	Consultancy and educational events (lectures and workshops) for AVANOS	X	
Industry.	Consultancy for Stryker	X	
Choose an item.			

I confirm that the information provided above is complete and correct. I acknowledge that any changes in these declarations during the course of my work with NICE, must be notified to NICE as soon as practicable and no later than 28 days after the interest arises. I am aware that if I do not make full, accurate and timely declarations then my advice may be excluded from being considered by the NICE committee.

Please note, all declarations of interest will be made publicly available on the NICE website.

Print name:	**Dr. Thomas Haag**
Dated:	**19.09.2022**