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P-02

Acute Pain

A Retrospective Review of Peri-Operative Pain Management in Major Lower Limb Amputation: Service Evaluation

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BACKGROUND: Acute postoperative pain is common among amputees and only a minority of lower limb amputees in the UK experience 'good' acute pain control. Pre-operative opioid optimisation and patient education on pain coping strategies are paramount in preparing the patient before surgery. However, Pain management methods differ between hospitals, and the reasons for these variations are unclear due to the absence of research and a standardised approach.

AIMS: To identify variations in peri-operative pain management following major lower limb amputations and analyse them to align with RCOA recommendations for potential improvements in service.

METHODS: A service evaluation was undertaken. Data was collected retrospectively from January to July 2023 from the Trust's electronic patient database using quantitative data recorded through descriptive statistics.

RESULTS: The project involved 29 patients aged 5 to 82, with 28% being paediatric and 41% above 65. Most had above knee amputation, with 45% using mixed (weak or strong) opioids pre-operatively, rising to 90% post-discharge, 55% being strong opioids. Paediatric strong opioid use pre-op and post-discharge remained at 10%. Intra-operatively, analgesic choices varied across age groups, with 50% paediatric patients receiving Peripheral Nerve Blocks (PNB) and epidurals being favoured in the adult population. Perineural nerve catheter infusion (PNC) usage was low at 3.4% in both groups, and anti-neuropathic pain medication use was below 50% for both. Post-operatively, paediatric patients used PCA and epidurals equally, while adults predominantly used PCA with Oxycodone. Pain scores peaked at mild to moderate on Day 2 post-op. Length of stay varied, with an average of 9 days for paediatric patients and 18 days for adults. The contributing factors for length of stay were mixed, including package of care, delays with therapies, wound management and recurrent infections.

CONCLUSIONS: Our data showed that the use of PNC should be considered to minimise opioid adverse side effects and help attenuate both nociceptive and neuropathic pain post amputation5. A multidisciplinary meeting to discuss the patient's pathway is recommended to provide and improve holistic patient care.

Keywords: Post operative Pain, Pain Scores

P-03

Acute Pain

Development of Referral Criteria from the Anaesthetic Pre Operative Assessment Clinic to the Pain Team

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BACKGROUND: There are several well defined risk factors for the development of both poorly controlled acute post surgical pain, and chronic post surgical pain. There has been growing interest in identifying such patients at an earlier stage to pre-empt their pain needs as an inpatient, and for the potential to intervene preoperatively to optimise and potentially prevent severe acute pain or the transition to chronic pain.

AIMS: To outline a set of referral criteria and referral pathways from the anaesthetic pre assessment clinic to the inpatient pain team that is acceptable to both pain team members and pre assessment service members.

METHODS: We used a PDSA cycle of quality improvement to design a tool in conjunction with key stakeholders and users of the referral tool. Serial review and collaboration between nurse and physician stakeholders on the tool resulted in iterative development of a set of referral criteria based on known risk factors and clinical models in this area. Risk factors included pain at the site of proposed surgery, known chronic pain on high dose opioids or anti-neuropathics as well psychological, demographic and operative risk factors.

RESULTS: The referral criteria and treatment decision tree is shown on the poster. We propose three referral streams determined by timescale for optimisation. Urgent (i.e cancer) surgery patients often have the shortest timescale for intervention, non urgent surgery offers the longest time scale for optimisation. For patients where pain intervention may offer an alternative to surgery, or for very complex pain patients, a physician to physician pathway was proposed. Early anecdotal experience of the tool is that is acceptable to key stakeholders.

CONCLUSIONS: An acceptable set of referral criteria and local policy for identifying and optimising patients at high risk of severe acute and chronic post surgical pain has been developed. Further work is needed to provide an evidence base for the pre-operative interventions that can influence post surgical pain, these might include, opioid reduction, pre op psychology, patient education, pre operative pain physiotherapy.

Keywords: Pre-assessment, perioperative medicine, post-surgical pain, pre-habilitation, acute pain

AuthorToEditor: At the time of the meeting there may be additional data to present about the feasibility and acceptability of the tool.

P-04

Acute Pain

Prescribing of Modified Release Opioids at Hospital Discharge

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BACKGROUND: The effects of the international opioid crisis have been well described. Opioids are highly effective analgesia when used appropriately for acute pain, but harmful if used (or continued) inappropriately. Modified release (MR) or patch opioids may be difficult to titrate when used for acute pain, and with current healthcare pressures are felt to be difficult to stop, putting patients at high risk of developing tolerance, dependence and addiction as well as increasing the overall community opioid load. International and national guidance says that modified release opioids should only be used for acute pain in exceptional circumstances.

AIMS: We performed a cross-sectional audit of number and characteristics of patients discharged from an acute hospital in England on modified release opioids/patches.

METHODS: Hospital electronic prescribing system was used to identify all patients discharged on MR/patch opioids during September 2022. Patients receiving these for cancer pain or breathlessness were excluded. Electronic notes were reviewed for demographics, prescribing specialty, opioid type/dose, risk factors for misuse, inpatient pain team review. Discharge summaries were reviewed for weaning advice, and the summary care records reviewed for continued opioid use and dose at 3 months post discharge.

RESULTS: 83 patients discharged on MR/patch opioids during September 2022. Excluded 32 who were receiving them for cancer pain (25) or breathlessness (7). 51 patients (median age 73 (33-92), 47% male) included for analysis. 18 patients (age 39-90, 50% male) were new prescriptions, remainder pre-existing. Included patients were discharged by 14 different specialties but trauma/orthopaedics, geriatrics and acute medicine accounted for 49% patients. Opioids at discharge (all): Buprenorphine patch 19, (37%), morphine 14 (27%), oxycodone 13 (24%), fentanyl patch 3 (6%), tramadol 2 (4%). New prescriptions were buprenorphine 8, oxycodone 9, morphine 2. Inpatient pain team advice was given to 8 (16%) of 51 patients, 5 of whom also received discharge weaning advice. 6 patients received discharge weaning advice only. No patient had more than one risk factor recorded in their clerking for opioid misuse. At 3 months: 25 (49%) patients were on equivalent dose, 15 (29%) had stopped, 6 (12%) decreased dose, 5 (10%) increased dose. The few patients who received pain team input and/or discharge weaning plan were more likely to have decreased or stopped opioids at 3 months.

CONCLUSIONS: Engagement across the organisation is crucial if we are to reduce opioid burden and misuse. Education of prescribers about appropriate opioid use, alternatives such as a short course of immediate release opioids, and safe stewardship as a priority. Further work is required to ensure we are identifying patients felt to be at high risk of misuse and these high-risk patients should be reviewed by the pain team. All patients should receive a weaning plan on discharge. Unsafe prescribing should be fed back to the prescriber along with educational intervention. We have already introduced a system allowing the Pain Team to challenge the prescriber when a new prescription or an increased dose of MR opioids and patches is identified. Patients should also be educated about expected opioid trajectories and appropriate action if they are not meeting them. Crucially, there should be drive at national level to bring the United Kingdom into line with international drug safety bodies in the United States and Australia, and we therefore call on the MHRA to re-appraise the evidence for use of MR opioids in acute pain and consider drafting guidance to improve practice.

Keywords: opioid, prescribing, weaning, safety, modified release

P-05

Acute Pain

A Service Evaluation of Modified Release Opiods in Rib Fracture Patients

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BACKGROUND: Rib fractures account for 10-15% of trauma admissions to A&E globally and are associated with significant mortality and morbidity. Multimodal analgesic strategies are a critical aspect of good care, and often involves opioids. Modified-release (MR) opioids are widely discouraged in acute pain, immediate-release (IR) opioids are preferred when simple analgesics prove ineffective. The complicated and high analgesic demands associated with rib fractures has led to an increase in the use of MR opioids in our Major Trauma Centre, admitting approximately 450 rib fractures patients annually. Acutely, MR opioids are associated with significant side effects, and without a clear de-escalation plan, patients are at risk of developing long term opioid complications.

AIMS: To assess the extent of inpatient and discharge MR opioid prescriptions. To evaluate side effect profiles of MR vs IR prescriptions. To identify factors leading to MR prescription and evaluate current analgesic regimes.

METHODS: Hospital database records were used to identify trauma patients admitted between 1/6/23-31/8/23, which were then filtered by the relevant ICD codes. Data was collected using local electronic prescribing and discharge summaries. Patient demographics, length of hospital stay, respiratory co-morbidity, chronic pain, number of rib fractures, rib fracture score, ward analgesia, antiemetic, oxygen, regional intervention and discharge opioids were recorded.

RESULTS: A total of 134 patients were identified, 27 records excluded due to duplication or incomplete data. 63.5% of patients were male and an average age of 62 years. 23% had respiratory co-morbidity, 21% had chronic pain, and the average length of hospital stay was 9.3 days. Inpatient IR opioids were widely used, and MR opioids were used less frequently (99% and 26% of patients respectfully). Discharge MR opioids were prescribed for 13% of patients, and of these, 42% had chronic pain. Regional analgesia, performed in 27% of patients, did not reduce the prescription of MR opioids. The rate of inpatient MR opioid use was higher in the regional analgesia group, with 72% prescribed an inpatient MR opioid compared to 26% of all patients. At discharge 13% of patients were prescribed an MR opioid regardless of whether they received regional analgesia or not. Patients prescribed a PCA (15%) had reduced discharge MR opioid prescriptions (6% v 13%). Inpatient antiemetic and oxygen use in the MR opioid population was higher: IR v MR patients; 39% v 82% and 18% v 28% respectively. Respiratory comorbidity did not

impact MR opioid or regional use but was associated with an increased average hospital stay (11.9 days v 9.3 days) and oxygen requirement (41% v 20%). Multimodal analgesia was not fully utilised with low prescribing rates of NSAIDS (32.7%), Gabapentinoids (7.6%), Ketamine (5%).

CONCLUSIONS: Opioids have an important role to play in the management of patients with fractured ribs. 1 in 4 patients received MR opioids during their admission, and half of these patients were prescribed MR opioids on discharge. Patients prescribed MR opioids on discharge did not have higher than average rib fracture scores but were more likely to have chronic pain. Neither inpatient nor discharge MR opioids were reduced by regional analgesia. The mode for rib fracture score in regional analgesia patients was higher than for all patients, 9 and 6 respectfully which may partially explain this finding. The increased use of oxygen and antiemetic in the MR opioid population, is a powerful finding in discouraging the prescription of MR opioids. Chronic pain patients were overrepresented in the regional or MR opioid patient groups, despite similar rib fracture scores. They also had a longer than average length of hospital stay (15.6 v 9.2 days). Ensuring these patients are prescribed effective analgesia could see improvements in reducing MR prescription and length of hospital stay.

Keywords: Modified Release, Opioids, Rib Fractures

P-06

Acute Pain

A Qualitative Exploration of Emergency Clinicians' Experiences of Caring for Patients Presenting with Back Pain

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BACKGROUND: Back pain guidelines are predominantly based on data from primary care. The back pain population presenting to emergency medical services (EMS), including hospital emergency departments and emergency ambulance services, appears to be different to primary care with greater numbers of individuals with serious pathology. Little is known about emergency clinicians experience of delivering care to this patient group.

AIMS: The primary aim of this study was to explore the experiences of emergency clinicians in caring for patients experiencing back pain. The research aim was informed through engagement with emergency clinicians and patient representatives. The objectives of the study were:

-To explore understanding of the term "back pain".

-To explore perceptions of whether these patients make up a significant proportion of the EMS case load.

-To explore the care that clinicians provide and their confidence in offering that care.

-To explore opinions of what, if anything, would improve care for this patient group.

METHODS: This was a qualitative exploration using reflexive thematic analysis to construct themes from a series of semi-structured interviews. The interviewer and primary coder (MC) was an experienced academic paramedic who had an insider position in relation to emergency care. Other members of the research team (CR, JM, DM) provided oversight and reviewed work as it progressed.

RESULTS: Thirteen interviews were conducted with a range of emergency clinicians (doctors, paramedics, nurses and physiotherapists) four themes and ten sub-themes were constructed.

-Understanding Back Pain Participants viewed back pain as a symptom with many causes and they consider it their role to identify those with serious pathology. Gaps in training were filled through peer knowledge exchange.

-EMS can be a legitimate choice for patients. Participants recognised that patients may be worried or in pain. Patients appreciate that EMS takes it time to listen to them. EMS can provide the back stop when patients cannot access other services.

-Benign or Sinister? Participants recognised that back pain was a common presentation, however non-specific aetiology was less common than expected. The role of emergency care is to identify serious pathology using red flags and refer cases to the appropriate care.

-Treatment Options Many of the treatments provided by EMS are not advocated in current guidelines. Entonox is used by ambulance clinicians to help patients mobilise but is of limited used in the emergency department. Despite a lack of specific guidelines participants felt supported.

CONCLUSIONS: Across the range of emergency settings, clinicians have a nuanced understanding of back pain and its presentations. Clinicians were generally sympathetic to patients experiencing back pain recognising how distressing it could be. They were confident in their management of these patients but felt that national guidelines were less relevant to the emergency setting. Due to limited formal education or emergency care specific guidelines on back pain, clinicians shared their experiences through stories, frequently of patients who had serious pathology despite a benign appearance. The understanding of participants, expressed during the study, fits with the emergency medicine paradigm which starts with sinister diagnoses and works its way towards the more benign. Participants suggested that lack of availability of primary care was a driver of demand of EMS by patients with primary care appropriate back pain. Clinicians offered little criticism of patients' decision making, recognising that patients were often distressed, and the system can be difficult to navigate. Emergency care focused guidelines, which include the management of acute exacerbations that impact on mobility, could contribute to managing EMS demand and provide better care for patients experiencing back pain.

Keywords: Emergency, Back Pain, Qualitative

P-07

Acute Pain

OPIOID FREE ANAESTHESIA FOR COMPLEX MAJOR GENERAL SURGERY IN A PATIENT WITH INTOLERANCE TO ALL OPIOIDS

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BACKGROUND: Benefits of opioid free anaesthesia (OFA) in general.

AIMS:- Why an OFA plan necessary for this particular case

- Literature review of OFA in major surgery.

METHODS: This was an interesting case of a patient with chronic mixed nociceptive and neuropathic abdominal pain, severe opioid intolerance, scheduled for elective perineal proctectomy with bilateral gracilis-flap reconstruction and pelvic clearance - necessitating a

bespoke perioperative OFA plan. She had profound sensitivity to opioids, with history of opioid induced ventilatory impairment (OIVI) persisting for hours after opioid administration, and had also needed intubation and ventilation for OIVI and prolonged apnoea after previous surgeries. Preoperative preparation included studying similar case studies, making a multimodal OFA plan, patient education about plan, and review by chronic pain team. Intraoperatively, multimodal analgesia instituted with a mix of intravenous analgesics and opioid-free epidural. Postoperatively she had <1 day ICU stay as level-2 patient and in-hospital stay 8 days total, with analgesia managed under inpatient pain team and including regional (epidural) and subcutaneous ketamine infusion, in addition to oral and intravenous OFA. Planned follow-up post discharge, with chronic pain team.

RESULTS: -Very effective perioperative analgesia - mild to moderate pain scores but no functional impairment due to pain.

-Daily pain scoring and side effect monitoring by pain team, with minor problems with epidural management in ITU.

-Excellent patient satisfaction at hospital discharge.

CONCLUSIONS: Perioperative opioid free analgesia, as demonstrated in this complex patient, has great scope of use in post-surgical pain, with potential for expanding to other cases of chronic pain too.

Keywords: Opioid free, Acute post-surgical pain

P-132

Acute Pain

Managing Opioids and Antineuropathics After Neurosurgery

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BACKGROUND: The Royal College of Anaesthetists and the British Pain Society have set standards for the rationalization of opioids and antineuropathics, aimed at ensuring safe and appropriate use for perioperative analgesia while minimizing complications related their misuse in the community. Recommendations include identifying patients on preoperative opioids, optimizing analgesia prior to discharge and plan for post discharge medicines review and dose reduction.

AIMS: To audit the local practice of opioid and antineuropathic drug prescription in the perioperative period in neurosurgery and review our local practice against recommendations set in national guidelines.

METHODS: Retrospectively reviewed electronic records of all patients who underwent neurosurgical procedure s over 1 week period. Analysis excluded those who died during in patient stay and had ongoing inpatient care at the time of data analysis. Oral morphine equivalence (OME) of opioids on admission, consumed 24 hours before discharge and prescribed on discharge was calculated in milligrams (mg) for each patient. Perioperative changes to antineuropathics and the presence of an opioid and/or antineuropathic weaning plan on discharge was also surveyed.

RESULTS: Data for 66 patients showed 12.12% (n=8) were on preoperative opioids. During their admission 37.87% (n=25) received opioids in the 24hrs prior to discharge, and 33.33% (n=22) were discharged with opioids. Surgical complexity was categorized as: minor (n=19), intermediate (n=22), major (n=21), and complex (n=4). Comparison of average OME consumption (in mg per 24 hours) on admission versus 24 hours before discharge, based on surgical category was:

- Minor: 44.6 (min 31- max 72) v 9 (4-16)
- Intermediate: 45.5 (31-60) v 14 (3-20)
- Major: 31 v18.5 (4-45)
- Complex: 31 v 51 (10-113).

Average discharge 24 hour OME for each group was: minor 35mg (18-90), intermediate 68.7 mg (18-135), major 20.5 (mg 18-31), complex 179.6 mg (80-315). On discharge: 75.75% patients had no perioperative prescription of antineuropathics, 7.57% had new prescriptions which were to be continued, 1.51% had their prescriptions stopped postoperatively and 5.15% had no change in prescription. 53.03% (n=35) of patients were not prescribed opioids or antineuropathics on discharge (minor 57.89%, intermediate 81.81%, major 66.66%, complex 25%). Therefore, they did not have a weaning plan. Of the remaining 31 patients discharged on either opioids or/and antineuropathics, only 32.25% had a weaning plan. Sub-analysis of complex patients showed 66.66% with discharge opioids/ antineuropathics had a weaning plan. For patients following major surgery this was 50%.

CONCLUSIONS: As expected, patients following complex surgery consumed the most opiates 24 hours before discharge and required more on discharge. Patients after minor, moderate and major surgeries had a reduction in their opioid 24 hours pre discharge compared with admission, which indicates effective opioid weaning strategies are part of acute inpatient pain management. A significant proportion of these patients were discharged with no TTA opiates at all. Complex neurosurgery recovery time is longer and requires more gradual opioid weaning. Hence only 25% were discharged without TTA opiates. This is significant considering the extent of surgery and expected pain levels. 50% of complex patients had a detailed weaning plan for opiate and /or antineuropathic reduction in their discharge summaries. Ideally this should occur in 80 – 90% of cases. Reduction plans occurred less after minor and intermediate surgery, since most of those patients where not discharged with any TTA opiates. At present, our institution provides acute pain management service during weekdSays. Improvement of current opioid and antineuropathic management would require a 7-day service or more training for junior Doctors and Pharmacists directly involved in patient discharge planning and prescribing. We aim is to provide more teaching and training on current standards for rationalization of opioids and antineuropathics to ensure safe and appropriate prescribing of postoperative opiates and antineuropathics.

Keywords: opioids, anti neuropathic, weaning, reduction, neurosurgery

P-08

Assessment & Measurement

Sensecheq: Leaping Out of the Lab to the Home Environment for Patient-Centred Quantitative Sensory Testing

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BACKGROUND: Peripheral neuropathies often have an insidious onset meaning that irreversible damage occurs before preventative strategies are deployed – commonly resulting in chronic pain. Chemotherapy-induced peripheral neuropathy is one example where the disease is often recognised late during/after cancer treatment. Quantitative Sensory Testing (QST) is employed as a research method to assess sensory nerve function, and thus may make early detection of neuropathy feasible. However, QST currently is lab / clinic based, uses complex equipment and requires a skilled practitioner to conduct the standardised tests. Although simplified bedside QST protocols exist these still require a skilled practitioner to conduct and take time. Regular longitudinal QST testing is important for early neuropathy detection because within subject data granularity is required to identify the early stages of neuropathy.

AIMS: To create an easy-to-use QST kit (SenseCheQ) to test A- and C- fibre sensory nerve function (warm, cold and vibration detection thresholds) with a simple user interface suitable for home use by patients. A further objective was to embed enough flexibility in protocol design that it could be a useful tool within lab or routine clinical settings.

METHODS: We developed SenseCheQ through iterative engineering with feedback validation from lab-based and healthy volunteer testing, with PPIE embedded in the team. To keep build costs low, SenseCheQ is constructed using off-the-shelf electronic componentry. Warming and cooling is provided via well-established PID-driven Peltier technology, whilst vibration stimulation is provided via a high-fidelity haptic device. The standard SenseCheQ home test protocol has been optimised to take less than 15 minutes to complete. The interface consists of two buttons for start and stop of each test and simple instruction set on a display screen contained within a single enclosure, whilst the lab and clinical version has the option of running custom test protocols.

RESULTS: SenseCheQ is more than capable of reliably delivering 0.5°C.s-1 ramp rates, to cool (Meanrate = 0.49° [0.48-0.50]) or heat (0.52° [0.51 -0.53]) by up to 10°C from a stabilised clamped baseline skin temperature (target 32°C vs actual = 31.97° [31.95-31.98]). Thermal detection thresholds from SenseCheQ are comparable to those collected using commercial QST devices. SenseCheQ is better at defining vibration detection thresholds than the current clinical "gold standard" Rydel-Seiffer calibrated tuning fork, due to the combination of providing ascending vibrational ramps (reducing accommodation) and having better resolution in the low-amplitude range. The tuning fork suffers from a known floor effect, whereby considerable sensory loss must occur before a change in the detection threshold is identifiable. In contrast SenseCheQ can be driven at amplitudes below the detection limit of healthy participants. The floor effect is illustrated using lidocaine block of the superficial peroneal nerve where the numbness is easily detected with SenseCheQ (large effect of time since nerve block on thresholds $F(5, 55)=12.66$, $p<.001$, $\eta p2=.54$) but not with the tuning fork ($F(5, 55)=1.95$, $p=.101$, $\eta p2=.15$). SenseCheQ demonstrates the loss in vibration sensitivity between younger (21.8 years) and older participants (58.4 years) ($t(19.42)=2.96$, $p=.018$, $d=0.85$) which was not detectable with the tuning fork ($t(41)=0.432$, $p=.668$, $d=0.13$).

CONCLUSIONS: We have developed a simple-to-use QST kit which allows patients to self-test their nerve function at home, on a much more granular basis than is currently possible. Wider deployment of QST could be advantageous for patients at risk of developing peripheral neuropathy. SenseCheQ has also been designed with academic and clinical flexibility in mind and provides a low-cost option for QST.

Keywords: Assessment & Measurement, Cancer, Neuropathy, CIPN

AuthorToEditor: If possible, it would be great to have a way to demonstrate the SenseCheQ kit to other attendees, maybe at a desk along with a poster presentation? Many thanks Johannes Gausden.

P-09

Audit and Service Evaluation

A Service Evaluation of a Novel Persistent Perioperative Pain Pathway at St Bartholomew's Hospital

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BACKGROUND: Chronic post-surgical pain (CPSP) has a prevalence of 20-30% with much higher values following incisions on the chest. A so-called "transitional pain service" (TPS) is a multidisciplinary perioperative approach to bridge the gap between inpatient pain services and outpatient chronic pain pathways. The primary goal is to improve recovery trajectories for patients with the hope of preventing the transition from acute to chronic pain states.

AIMS: This study represents a service evaluation of the first such "TPS" in the UK: at St Bartholomew's Hospital, a specialist centre for cardiothoracic surgery. Our objectives were to describe patient demographics for those treated by the dedicated Persistent Perioperative Pain (PPP) team at Barts and understand referral processes for this service. Additionally, we aimed to identify any potential risk factors for CPSP among these patients. Our follow-up tracked patients from hospital discharge to postoperative clinic reviews, with a specific focus on assessing opioid use and the incidence of neuropathic pain.

METHODS: A service evaluation was conducted of all patients seen by the PPP team from its inception in March 2022 over a 20 month period until October 2023.

RESULTS: A total of 46 patients were studied of whom 41% were male, with a mean age of 50. Surgical categories were as follows: 63% thoracic surgery, 28% cardiac surgery, and 9% cardiology interventions. Specific surgical incisions included: 30% sternotomy, 20% robotic-assisted thoracoscopy, 17% video-assisted thoracoscopy, 13% open thoracotomy, and 9% Nuss bar procedure for pectus excavatum. The primary reason for referral to the pain team was postoperative acute severe pain (70%), with a much smaller percentage (9%) referred early during the preoperative period. 13% of patients had a history of prior cardiac or thoracic surgery, 46% had a history of chronic pain, and 43% had a history of mental health disorders. Preoperatively, 30% were on psychiatric medication, 24% on weak opioids, 24% on anti-neuropathic agents, and 15% on strong opioids. Upon discharge, 96% of patients were on opioids, with 37% initiated on new long-acting strong opioids. In terms of clinic encounters with the PPP service, 65% of patients were reviewed on a single occasion only. Opioid stewardship was noted for all patients discharged from hospital on opioids. Neuropathic pain was documented in 35% of patients upon discharge and 30% were started on, or had an up-titration of long-term anti-neuropathic medications. At follow-up by the PPP service, 30% of patients reported ongoing neuropathic symptoms.

CONCLUSIONS: The PPP service at Barts attempts to establish a connection between inpatient and outpatient pain management services for individuals recovering from surgery. The clinical trajectory of 46 patients undergoing this novel approach has been documented. Our findings show that patients are predominantly referred to the this service postoperatively and due to acute severe pain. These patients are more likely to have a history of chronic pain, opioid tolerance, or mental health conditions compared to the broader surgical population. The existing literature suggests these factors pose an increased risk for the development of CPSP. Future work could be directed toward pre-emptively identifying such patients early during the preoperative period. This project lays the foundation for developing the PPP service with the goal of improving access to pain management services for surgical patients in a timely manner and during their entire perioperative journey.

Keywords: Persistent Perioperative Pain, Transitional pain services

P-10

Audit and Service Evaluation

A Painless Transition? Evaluation of a New Analgesic Regimen Following Elective Hip and Knee Arthroplasty

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BACKGROUND: Guidelines for elective hip and knee arthroplasty in Cwm Taf Morgannwg University Health Board (CTMUHB) were due to be updated in 2022. This followed an international consensus statement and Royal College guidance on the use of peri-operative opioids[1] [2]. Also an update to Enhanced Recovery After Surgery (ERAS) Society recommendations[3]. To improve post-operative pain management and analgesic stewardship, a move away from modified-release (MR) opioids is advocated[1] [2]. For years, MR opioids have been part of ERAS regimens in orthopaedic surgery and concern was expressed by clinical staff about stopping them. There was worry using standard release opioids would increase pressure on ward staff and reduce analgesia for patients, with a knock-on effect to rehabilitation and discharge. The new guidelines remove modified-release opioid preparations and stipulate morphine as first-line opioid, rather than oxycodone as had been standard. During admission, regular and as required oral morphine solution is used, dose banded by age. A tapering regimen of orodispersible morphine tablets are prescribed for patients receiving oral morphine at discharge.

AIMS: • To assess the effectiveness of a newly introduced analgesic regimen and patients' satisfaction with it.

• Gauge the impact on ward staff due to the changes in analgesic administration.

METHODS: All patients undergoing elective hip or knee arthroplasty surgery in the Royal Glamorgan Hospital for 16 weeks, from 12 June 2023 when the new guidelines were introduced, were included. A proforma was developed, trialed and adjusted for data collection at 3 points in care: pre-operative clerking, during admission and 4 to 6 weeks after discharge. The nurse practitioner undertook data collection, using nursing, medical and anaesthetic records and patient report via telephone consultation. Data were recorded on the Health Board digital audit collection platform (AMaT) and analysed using Microsoft Excel and the AMaT software.

RESULTS: The first 2 evaluations included 102 patients and 100 were available for telephone follow-up. Fifty-two (51%) of patients were aged 70 years or over. Pain for at least 3 years prior to surgery was reported by 85 (83.3%), with 63 (61.8%) reporting it as moderate to severe. Post-operatively, all patients received regular oral paracetamol. Sixty-one (60%) patients received non-steroidal anti-inflammatory drug (NSAID). Ninety-one (89%, n=102) received regular age-banded doses of oral morphine sulfate solution (10mg/5mL) as per guideline. Pain scores consistently reflected the majority of patients reporting mild or no pain. Discharge protocol was followed for 77 (75%) patients. Ninety-four (92%, n = 102) patients during admission and 86 (n=100) patients after discharge were very or extremely satisfied with the analgesia. Ninety-six percent (n=100) of patients at follow-up said pain was well managed at home and 99% reported having returned to their previous or greater levels of function. Seventy-one (n=100) people were taking less analgesia at follow-up than pre-admission. Ward colleagues declared the regimen less time consuming, due to single nurse administration. They reported fewer delays and less pressure on staff. There were no concerns the changes negatively impacted pain relief or mobilisation. Staff reported patients being more engaged in their recovery after the changes.

CONCLUSIONS: Despite a lack of comparative data, the new elective arthroplasty guideline has been deemed a success. There are high levels of satisfaction from patients and staff. Further analysis is required on the influence of different anaesthetic and surgical interventions and how that corresponds with patient experience. Since sharing with the regional orthopaedic board, another Health Board has adopted the same regimen and a third has it under consideration. Patient reported outcomes continue to be monitored. Adjustments to reduce the duration of opioid analgesia post-operatively, in-line with other developments of the wider pathway also need to be considered.

Keywords: Evaluation, post-operative, arthroplasty, analgesia, opioids

P-11

Audit and Service Evaluation

PREVALENCE OF CHRONIC PAIN, MENTAL HEALTH FACTORS AND SUBSTANCE MISUSE IN LONDON HOSPITALS, INPATIENT ADMISSIONS

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BACKGROUND: As the population gets older, the incidence of chronic conditions increases with age, hence the incidence of patient with chronic pain problems also increases. Rates of cancer survivors are also on the rise with side effects from their treatment. There are known links between psychological factors and pain experience, but this is rarely recognised in inpatient populations (King's Fund 2012, 2016). Pain specialist nurses regularly receive patient pain referrals. As part of their systematic triaging of the referral, the nurses are responsible for carrying out a thorough review of the patient's records and carry out a holistic assessment using a biopsychosocial approach. Knowledge of acute and chronic pain conditions is essential for a valuable patient interaction, however, in-depth understanding of the links between psychological factors in pain presentations contributes to skilled pain management plans. Often there is unidentified mental health disorder which is disclosed during assessment of the patient.

AIMS: To identify the challenges inpatient pain services face when receiving inpatient referrals. To identify the prevalence of in- patients with challenging co-morbidities referred to the inpatient pain services. To see the link between psychological factors contributing to pain referrals.

METHODS: The pain specialist nurses looked at the inpatient referrals from two London hospitals, one major trauma centre (MTC) and one elective specialist hospital. The data collection took place between 2022 to 2023. The major trauma centre had 174 new patient referrals, the elective hospital received 84 new patient referrals.

RESULTS: Major Trauma Centre had 174 new referrals in the three-month period where they collected the data. The elective hospital collected 84 patients in the same time frame. Both sites received referrals for acute on chronic pain management and chronic pain management, requiring the specialist advice from the inpatient pain team. This is in addition to acute/post-op pain management referrals which are generally expected of inpatient pain services. Mental health disorders and substance abuse were found to be common co-morbidities of the referrals received. We suggest that these factors prompt many referrals to our inpatient pain services, this reflects the complexity of patients seen.

CONCLUSIONS: Identification of co-morbidities is essential in highlighting and appropriately addressing patient care, however this is only possible with relevant clinical knowledge and experience gained from education and clinical experience. More education on mental health disorders and identification of these is essential as part of specialist pain management. Our results support the FPM Core Standards statement that all pain specialist nurses must have exposure and experience in chronic pain management. Furthermore, pain specialist nurses must have exposure in the management of complex medical histories including concurrent mental health, substance misuse, and other long-term conditions. Failure to equip inpatient pain services with this knowledge could contribute to poor pain management approaches, prolonged hospital admissions, poor healthcare outcomes and poor patient engagement.

Keywords: pain, complexities

P-12

Audit and Service Evaluation

The Majority of Young Women With Chronic Pelvic Pain Are Happy to Take Part in a Multi Disciplinary Pain-Focused Approach After Appropriate Education

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BACKGROUND: Chronic pelvic pain (CPP) is common, affecting around 24% of the female population, and accounts for 10% of gynaecology consultations. CPP can be associated with underlying pathology such as endometriosis and adenomyosis, however, in 40 - 55% no pathology is found. It is estimated that 40% of laparoscopies are performed to investigate CPP, with associated surgical and anaesthetic risks. Many women undergo repeated surgical procedures with a focus on the need to identify pathology prior to treating pain. Moreover, waiting for surgical procedures, particularly with the additional delays post-COVID-19, increases the time women continue to suffer with pain. We are increasingly aware that CPP shares many similarities with other chronic pain conditions and that a multidisciplinary (MDT) approach to management will be needed for many. We were interested to explore whether young women would opt for a MDT approach after education about chronic pain.

AIMS: We aimed to determine what proportion of young women would opt for 1) an MDT approach and 2) surgical or other investigations, after an initial telephone consultation with a gynaecologist.

METHODS: The Adolescent CPP Clinic in Oxford sees 14-25 year olds, assigned female at birth, who experience any form of pelvic pain for 3 months or longer. Referrals are from primary and secondary care and all patients have an ultrasound scan prior to referral. The COVID-19 pandemic necessitated a change of pathway such that the initial appointment was by telephone. A standardised appointment schedule was designed that included pain education and a discussion of the various diagnostic and management approaches. We audited the outcome of the first year's activity of this new pathway. All appointments were carried out by the same consultant gynaecologist with a special interest in pain. Documentation of the consultation was on a template letter on the trust's electronic notes system (EPR) and data was extracted into an excel spreadsheet prior to analysis.

RESULTS: Between 20/4/20 – 9/4/21, 82 patients scheduled for an appointment with the adolescent CPP clinic were contactable by telephone. Their age ranged from 14-25 years old (mean 20; median 21). On average calls lasted less than half an hour (mean 27 minutes; median 25 minutes) with just over a quarter of an hour additional administrative time (ordering investigations, writing the letters etc) (mean 17 minutes; median 16 minutes). Thus the total patient episode was approximately three quarters of an hour (mean 44 minutes; median 42 minutes). There was no correlation between the duration of the appointment and the number of patients who had already been seen on the pathway suggesting it was not possible to reduce the consultation time with experience. After the initial consultation 8% (n=7) opted for a surgical investigation and a further 6% (n=5) other investigations (3 of whom subsequently opted for surgery after these investigations were complete). Thus 15% chose some form of investigation. 38% (n=31) opted to attend an MDT appointment. 5% (n=4) were discharged as their symptoms had either resolved or were considered outside the remit of a CPP service. The remainder (33%) opted for medical treatment (either hormonal or analgesia) or lifestyle changes with further telephone follow-up in 3 months.

CONCLUSIONS: There is a continued focus within medical education and the media/social media on the association of CPP with gynaecological pathologies such as endometriosis and adenomyosis. We have shown, however, that allowing adequate time for full history taking and to deliver brief pain education is sufficient that the majority of younger women will opt for a conservative or MDT approach to

managing their pain. We have continued to run our CPP service with this model, justifying additional consultation time with reduced conversion to surgery rates.

Keywords: adolescent, pelvic pain, pathway, MDT

P-13

Audit and Service Evaluation

20 Years Experience of Ziconotide Therapy in Leeds, UK

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BACKGROUND: Ziconotide is an analgesic agent for neuropathic and nociceptive pain, delivered intrathecally. It has benefits over intrathecal opioids and local anaesthetic agents, including lack of tolerance, or risk of withdrawal; less logistical issues due to it not being a controlled drug; it is a licensed drug with a secure supply chain. However, there are few large studies and lack of experience in UK pain centres of long-term use of this agent, due to restriction of use. Despite recent relaxation of these restrictions, there can be reluctance to adopt this therapy due to lack of familiarity or guidance on dosing schedules.

AIMS: We share our centre's experience in patient selection, commencement and adjustment of dosing, side-effects and stability of therapy. As this data spans 20 years, it includes the experience of the current team, and that of our predecessors.

METHODS: Electronic hospital records, local clinic databases and pharmaceutical records were searched to identify those who received ziconotide injection or infusion via intrathecal pump. Local commissioning records were analysed to identify patients who had individual funding request (IFR) for ziconotide therapy accepted or rejected.

RESULTS: In total, 19 patients received ziconotide therapy in our service during 2004-2024. Indications included a variety of pain conditions: post-surgical back pain, CRPS, pelvic pain, post-stroke central neuropathic pain, spinal cord injury, spinal trauma/infection, lumbar spondylosis, myeloma, bowel cancer, osteogenesis imperfecta, post spinal/pelvic trauma, acoustic neuroma. Sixteen patients had intrathecal pump implanted, of which ten had ziconotide first in the pump. Six were switched over from combinations of hydromorphone/diamorphine, bupivacaine and clonidine. Five patients had a single-shot test of 2.5mcg before decision to implant the pump. Initial starting doses ranged from 1.2-2.5mcg per day, except for one patient who we inherited into our service already established on a dose of 8mcg/day. Doses were titrated up as tolerated, with the commonest limitation being neurological side effects such as slurred speech and dizziness. Maintenance doses ranged from 1.6mcg per day to 17.7 mcg per day, mean dose 9.14mcg per day. Twelve patients had successful therapy, of which six continue the therapy to the current day. Five patients died whilst benefitting from ziconotide infusion, duration of therapy ranging from 8 months to 9 years. One patient received infusion for 7 years before it was discontinued on balance of side effects compared with pain relief. Four patients commenced but did not continue the therapy, duration ranging from 2 months to 1 year. All suffered neurological side effects including headache, dizziness, depression and confusion. Four patients only had a single-shot trial injection of ziconotide, of 2.5mcg, of which two patients had poor response to the drug; one had good response but opted for spinal cord stimulation instead; one had good response but IFR was denied. Five patients commenced ziconotide from 2004-2008. From 2009 onwards, IFR was required to commence ziconotide therapy. During 2009-2014, 13 IFR's were requested of which 12 were granted. Following NHS England change to "not for routine commissioning" from 2014-2017 four applications IFR requests were made directly to NHS England though none were granted on basis of lack of exceptionality and need for clinical psychology input. We currently have 6 ziconotide patients, 4 male, 2 female. The longest duration of therapy is 20 years, since 2004. Average duration for therapy is 14.5 years. Five patients are extremely stable on their maintenance dose. One patient requires adjustment of dose according to mental health issues which pre-date the start of ziconotide, achieving a balance of pain relief against risk of psychotic symptoms.

CONCLUSIONS: We demonstrate the safe and effective use of ziconotide in 19 patients over a 20 year period.

Keywords: Ziconotide, commissioning, Intrathecal, stability, neuropsychiatric

P-14

Audit and Service Evaluation

Comparative Evaluation of Effectiveness of Cannabis in Management of Pain in CRPS Versus Non-CRPS Pain at Two National Pain Services

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BACKGROUND: The current evidence for efficacy of cannabis-based products for medicinal use (CBPMs) for pain is underdeveloped. Meta-analyses of heterogeneous pain cohorts have not supported the often very positive anecdotal evidence. Clinicians working in 2 national referral centers for residential pain rehabilitation noticed a difference in reported benefits from cannabis use. Patients with a diagnosis of Complex Regional Pain Syndrome (CRPS) seemed to report more emphatic reductions in pain severity, where patients with non-CRPS pain seemed to describe less pain relief, but other benefits regarding mood and sleep.

AIMS: We decided to audit patient-reported effects of prescribed and non-prescribed cannabis on pain, and other pain-related symptoms, comparing effects between CRPS and non-CRPS cohorts.

METHODS: We conducted a retrospective audit of patients attending 2 UK national pain services: the National Complex Regional Pain Syndrome (CRPS) Service, and Bath Centre for Pain Services (BCPS). Notes were reviewed for patients attending the CRPS Service assessment clinic over an 18-month period (Jan 2022-June 2023). Only patients with a confirmed diagnosis of CRPS by a pain medicine consultant according to Budapest Criteria were included. These were matched with the same number of patients attending BCPS assessment clinic with disabling non-CRPS pain. Cannabis use, beneficial effects and side effects were noted and compared.

RESULTS: In the CRPS cohort, 88 patients were identified (Male 23, Female 65, mean age 43.4 years; range 19-79 years). These were matched with 88 patients in the non-CRPS cohort (Male 28, Female

60, mean age 45.0 years; range 18-74 years). Cannabis was reportedly used by 9 (10.2%) and 10 (11.4%) of the patients in CRPS and non-CRPS groups respectively. Cannabis use was more common in male patients (Male = 6 and 6, Female = 3 and 4, in CRPS and non-CRPS cohorts respectively). Smoking cannabis was the most common route (smoked: 8 and 6; vaped: 0 and 1; sublingual oil: 3 and 1; ingested pollen 0 and 1, in CRPS and non-CRPS groups respectively). 8 out of 9 (89%) patients in the CRPS group and 9 out of 10 (90%) patients in the non-CRPS group reported overall benefit from cannabis use. 8 out of 9 (89%) patients in the CRPS group and 5 out of 10 (50%) patients in the non-CRPS group reported reduced pain as a benefit from cannabis use. Improved sleep was reported by 3/9 (30%) of CRPS patients and 1/10 (10%) of non-CRPS patients. One non-CRPS patient reported reduction in muscular spasms.

CONCLUSIONS: The data supported our perception that patients with CRPS pain were more likely to report pain relief as a benefit of cannabis, compared to patients with non-CRPS pain. Patients with non-CRPS pain were more likely to report mood-related benefits. The data lead us to speculate that CRPS pain may be mediated by pathways with higher concentrations of cannabinoid receptor type 1 (CB1) compared with other pain types. To date, research into the efficacy of CBPMs on chronic pain have included heterogeneous cohorts, with multiple pain syndromes being accepted as subjects. We fear this may dilute the evidence for CBPMs' effect on CRPS pain. Randomised controlled trials into the effect of CBPMs specifically on CRPS pain are warranted. We hope that more targeted future research will bring us closer to the goal of effective pain treatments for people with CRPS.

Keywords: Cannabis, Pain, CRPS

P-17

Audit and Service Evaluation

Are We Opioid Aware?

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BACKGROUND: Opioids aware is an invaluable resource available for patients and healthcare professionals to support prescribing of opioid medicines for pain. There is some information available around opioid prescribing in primary care[1]. There are some media reports and possible perceptions about opioid prescribing from pain clinics[2] but there is lack of studied data.

AIMS: The aim of this audit was to establish what proportion of patients that were referred to the Pain Clinic in a West Yorkshire hospital were commenced on opioids. We also wanted to see if our clinical documentation is in line with opioid aware recommendations.3

METHODS: Retrospective data was collected over 12 months on the number of prescriptions for opioids that were prescribed from hospital Pain Clinic. The notes of each of these patients were reviewed to ascertain clinical documentation.

RESULTS: Of the 2183 patients seen in year 2022/2023, only 29 (1.32%) were given a prescription for opioids. The opioids prescribed were Buprenorphine patch (56.7%), Tapentadol (23.3%), Codeine (13.3%), Methadone & Tramadol (3.3% each). The opioid prescribing appeared similar in both, new (1.25%) as well as follow up (1.41%) group of patients. All clinical records included relevant clinical findings that support the decision to prescribe opioids, the choice of drug, formulation, dose and duration of treatment. Ninety (90%) of patients had arrangements for follow up documented while only 56.7% patient notes had evidence of information given to patients. We were unable to clearly identify documented evidence of agreed outcomes of opioid therapy or the circumstances under which opioid therapy should be discontinued.

CONCLUSIONS: This audit demonstrated that a very low proportion of patients seen in the Pain Clinic were prescribed opioids in the year 2022/2023. We hope that the results of this audit will change any misconceptions that colleagues in Primary Care or patients may have about opioid prescribing practice from pain clinics. There is room for improving our documentation to include agreed outcomes of opioid treatment, advice on discontinuation of opioids and information leaflets given to the patients.

Keywords: Opioids, recommendations

AuthorToEditor: If permitted, I would be happy to provide results in pie chart/bar diagram format for final poster presentation.

P-16

Audit and Service Evaluation

The Impact of Opioid Prescribing on Nursing Workload

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BACKGROUND: Nursing time is a precious and undervalued resource. Increasing staff shortages, use of agency staff, acuity of patient caseload and ever-increasing scope of nursing practice place greater demands on a nurse's time than ever. It has been demonstrated that as nursing workload increases, the risk of adverse events also increase.In addition to this, the Faculty of Pain Medicine recommends Immediate release (IR) opioids in preference to Modified release (MR) opioids, siting that MR opioids can cause harm. The opioid recommended as first line is oral morphine solution 10mg in 5ml. Many hospitals, including the trust studied here, continue to treat the solution as a schedule 2 CD. During acute pain ward rounds the researcher has noted patients reporting long waits for as needed (PRN) opioids and delayed administration of MR opioids. Better understanding of the process of control drug (CD) administration is required. The length of time taken to properly administer CDs may illustrate the demands that CD prescribing place on the nursing workload.

AIMS: To establish the nursing time spent at the drug cupboard administering CDs. To consider the impact of CD prescribing trends on nursing time.

METHODS: A 'snapshot' audit was taken on a single day of a 27 bedded trauma and orthopaedic ward at a London Major Trauma Centre was sampled to establish the number of episodes of analgesic CD administration over 24 hours. The researcher then spent time observing CD administration. Time was taken from the moment two nurses entered the clinical room with the CD keys, to the moment the patient received the drug. The researcher witnessed episodes where the correct policy for administration were not followed, these episodes were not included and were feedback to the ward team. The data was used to model the time taken to administer opioids on an average day on this ward.

RESULTS: During the study period, 22/27 (81%) patients had active prescriptions for strong opioids, ketamine or methadone. 65 episodes of CD administration occurred on the ward. 20 of these

were for MR opioids. 10 episodes of CD administration were observed over three days to take a sample of timing. On average, nurses were observed to spend 368 seconds preparing and administering CDs. This equates to 6.64 hours over 65 episodes in the course of 24 hours. Each episode requires two nurses hence CD administration accounts for 13.2 hours of nursing time. This equates to 91 hours per week, or 2.42 full time nurses (assuming a 37.5 hour working week). MR opioid administration accounted for 2 hours of this time (20 episodes). Had these prescriptions been for IR strong opioids as per FPM guidance, this administration time would double.

CONCLUSIONS: A significant number of nursing hours are spent on administration of CDs on a busy trauma and orthopaedic ward. This also has a large cost implication. The time taken to sign out CDs could be a barrier to all patients on a ward receiving their drugs in a safe and timely fashion. It may also impact on prioritisation of other nursing tasks. It could be argued that effective analgesic prescribing should also consider the ability for staff to effectively administer the prescribed drugs. Although guidance states that IR opioids are preferable in post-operative pain, this increases administration time significantly. This project raises questions with regards to ward staffing, policy compliance as well as controlled drug prescribing practices. It highlights a need for further audit of policy compliance locally and investigation of perceived barriers to good practice.

Keywords: nursing, prescribing

P-18

Audit and Service Evaluation

Provision of Intravenous Lidocaine for Chronic Pain. A Survey of Current Practice Across Pain Services in the United Kingdom

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BACKGROUND: Lidocaine Hydrochloride is an amide local anaesthetic which predominantly exerts effects on the nervous system through blockade of membrane sodium channels and N-methyl-D-aspartate receptors. It has been used intravenously, off label, in the United Kingdom (UK) for some patients with chronic pain for many years. Despite some anecdotal evidence of benefit, the lack of good-quality, published evidence for efficacy has resulted in recommendations against routine use in patients with chronic primary pain[1] and also those with neuropathic pain[2].

AIMS: The aim of this survey was to qualify the provision of intravenous lidocaine nationally, including: the indications for use, dosing protocols, outcome measures used to evaluate treatment efficacy, and duration of treatment. In services where lidocaine is not currently offered, the survey aimed to clarify the reasons for this.

METHODS: A link to an online survey was sent via the British Pain Society (BPS) to a mailing list of Chronic Pain service across the UK. The invitation was re-enforced via social media, an online pain consultant forum, nursing networks, and through the BPS newsletter.

RESULTS: After removal of empty/duplicate entries; responses from 81 pain management services were analysed, spanning across England, Northern Ireland, Scotland and Wales. 67% (n=54) services were offering intravenous lidocaine to patients with: neuropathic pain (40/54), for opioid reduction (21/54); widespread pain (21/54); or 'any chronic pain' (6/54). The main reason cited by the services not offering infusions was a perceived lack of evidence and/or funding. There was considerable variation in dosing (range from 0.9 to 7mg/kg), duration of infusions (range from 30 to 180min), and in choice of outcome measures. Some clinicians felt the treatment was probably 'under-utilised', while other felt strongly that current evidence did not justify off-label use of the drug. 100% of respondents felt further research was necessary in order to establish the role of Intravenous Lidocaine in chronic pain management.

CONCLUSIONS: According to our survey around 2/3 pain services in the UK offer Intravenous Lidocaine, but optimal dosing protocols, outcome measures and duration of treatment are not clear. Further research in this field is needed.

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Keywords: Lidocaine, intravenous lidocaine, pharmacotherapy, chronic pain, antineuropathic

P-19

Audit and Service Evaluation

To Assess Compliance With the Diagnostic Block Evaluation Sheet and Follow-Up Pathway for Lower Back Pain

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BACKGROUND: Low back pain is a common condition that most people will experience at some point in their lifetime. Among the common causes of chronic lower back pain are degenerative discs, facet joint arthropathy, and sacroiliac joint pathology. However, it can be difficult to diagnose these conditions accurately through history, physical examination, and radiological evidence alone. Therefore, medial branch blocks and sacroiliac joint injections are used as a diagnostic tool. A reduction in pain of more than 50% after the injection is considered to be a positive response. In our trust, we follow a pathway for diagnostic blocks, and patients are given an evaluation sheet on admission by the ward nurses. Patients self-report their pain scores using a numerical rating scale before and after the procedure for two hours. Those who show a positive response are listed for radiofrequency denervation on the same day after discussing the risks. On the other hand, patients with negative responses are followed up by the Nurse Specialist in 6-8 weeks.

AIMS: To assess compliance with the diagnostic block evaluation sheet and the follow-up pathway for lower back pain.

METHODS: The data for this study was randomly collected from 90 patients who underwent diagnostic injections for cervical, thoracic, and lumbar medial branches, as well as sacroiliac joints, between April 2021 to March 2022. The injections were administered under fluoroscopy guidance using a mixture of 0.5 ml - 1 ml of 1% lignocaine and steroid. The patients completed a diagnostic block evaluation sheet, and their numerical rating scale pain scores were recorded before and after the procedure.

RESULTS: Out of a total of 90 patients, 65 (72%) completed the evaluation sheet, while 25 (28%) did not. Among the 65 patients, 47

(72%) had a positive response from diagnostic blocks and were offered Radiofrequency denervation within the agreed timeframe. Five patients from the positive response group did not have radiofrequency denervation. This was either because they did not respond when contacted by the administrative team for listing, were offered surgery instead, or refused the procedure. Out of the 25 patients who did not complete the evaluation sheet, 17 (68%) were followed up by the Nurse specialist and had a positive response. They underwent Radiofrequency denervation, but the procedure was significantly delayed compared to the other group.

CONCLUSIONS: Adhering to a specific pathway improves patient experience, reduces waiting times, and avoids duplication of work, resulting in cost-effective treatment and preventing delays.

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Keywords: compliance, diagnostic, block, pathway

P-24

Audit and Service Evaluation

Finding Practical Solutions to Bring Digital Technology into Everyday Healthcare: Evaluation of a Virtual Reality (VR) Programme for Chronic Pain

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BACKGROUND: As a pain rehabilitation team, we are taking digital therapeutic treatments from proof of concept to business as usual in everyday clinical practice. This brings with it, a regular pursuit to find practical solutions to NHS IT infrastructure, infection control, information governance, estates, booking systems, and health and safety dilemmas. Clinically we need to ask the question: is it worth the effort? Multiple studies have shown that Virtual Reality (VR)-based therapy significantly improves cognitive function: attention, spatial perception, and memory. The CUREO therapy system offers therapeutic exercises in VR. Our perception of our own body and the world around us is based on sensory inputs, e.g. visual, auditory, tactile, and on feedback from motor activities. Using immersive tasks, low-latency feedback and clever cognitive techniques, the nervous system is stimulated, and neural pattern formation is activated. The CUREO VR programme allows people to interact with multiple engaging and immersive environments that can be modified and tailored to suit individual needs. The aim of the programme is to use these exciting and interactive surroundings to enhance motivation and improve movement patterns alongside chronic pain.

AIMS: (1) To track the range of operational challenges and dilemmas that arise with the implementation of novel digital technology as it transitions into everyday clinical use.

(2) To explore the experiences of NHS staff as they work together to find solutions.

(3) To assess user acceptance of the CUREosity VR equipment (motion sickness, novelty and comfort of the headset) and to capture patient feedback during each session. Comparison of pre and post standardised self-report questionnaires, will determine whether there is any residualised change in pain intensity, impact, mood, and chronic pain acceptance.

METHODS: A data log of incidents will be reviewed, and NHS staff experiences of these challenges and finding solutions will be sought. Participants will be recruited via the pain rehabilitation team. They will complete a telephone triage and a VR screening tool. Participants will be interviewed 1-2 weeks post completing the programme. The session will be recorded, and a transcript generated. Participant characteristics and chronicity of pain will be noted. Themes will be generated, and connections will be sought. Standardised questionnaires Brief Pain Inventory (BPI), Patient Health Questionnaire (PHQ4) and Chronic Pain Acceptance Questionnaire (CPAQ8) will be used pre and post treatment intervention.

RESULTS: Working together and bridging the gap across IT, digital innovation, operational management, and clinical specialities is essential. Participants report improvements in mood, pain reduction and a willingness to work differently with their pain. They describe the immersive experience of Virtual reality as providing them a safe and engaging way to move despite pain. Willingness to pursue values-based goals between sessions is increased.

CONCLUSIONS: Setting up a new, innovative digital clinical service will have some teething issues (!) Methods that are novel to VR, such as enriched environments and immersive gamification, have shown exciting results when used as part of a rehabilitation programme. More rigorous service evaluation and longitudinal research is needed to optimise everyday delivery.

Keywords: chronic pain, Virtual reality (VR), CUREO

P-25

Basic Science

The Effect of Postnatal Morphine Exposure on Pain Processing in Adulthood

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BACKGROUND: Neonates display altered responses to noxious stimuli compared to adults, with lower behavioural pain thresholds and exaggerated responses to nociceptive stimuli (Andrews et al., 2002; Waldenström et al., 2003). The 4th postnatal week represents a key epoch in the maturation of endogenous pain control pathways in rodents, equivalent to preadolescence in humans. This period is critical in the maturation of descending spinal projections from the rostral ventral medulla. Endogenous opioid peptides are crucial mediators of this maturational process (Hathway et al., 2012). Despite this, exogenous opioid analgesics are routinely used in adolescent surgical procedures, peri- and post-operatively. Although

surgery at this age is a risk factor for developing chronic pain in later life (Kristensen et al., 2010), the potential impact of opioid analgesia remains unknown.

AIMS: To advance understanding of the effects of early postnatal morphine exposure on pain and anxiety responses in adulthood and endogenous pain control systems.

METHODS: All procedures were performed in accordance with the Animals (Scientific Procedures) Act 1986/2012 and were licensed by the UK Home Office. Sprague Dawley rat pups (5 ♂, 5♀) were treated with morphine (s.c., 3mg/kg, twice daily, n=5) or saline (3mL/kg, n=5) for 7 days from postnatal day (P) 21 until 28. Nociceptive thresholds (via application of von Frey filaments), locomotor activity, and anxiety scores (elevated plus maze) were then assessed from P29 to P40. From P42, a subset of rats were anaesthetised (n=4) and a laminectomy performed to expose the L4/5 spinal cord for *in vivo* multi-electrode array (MEA) recordings across all laminae of the dorsal horn (DH). Whole DH responses to a range of mechanical (2-26g) and electrical (0.5-5mA) stimulations of the hindpaw were recorded at baseline, and 30mins after 2 successive systemic cumulative administrations of morphine (0.5, 2.5mg/kg, s.c.), followed by the mu opioid receptor antagonist naloxone (1mg/kg, s.c.).

RESULTS: A significant increase in nociceptive thresholds was observed with age ($F(3,24) = 2.171$, $p<0.001$), corroborating previous literature (Andrews et al., 2002; Waldenström et al., 2003). Morphine exposure in the 4th postnatal week had a sex-specific effect on mechanical nociceptive thresholds in adulthood (P40+). Morphine-exposed males had significantly higher nociceptive thresholds relative to both saline-exposed males ($F(1, 6) = 11.67$, $p= 0.0074$) and female morphine-exposed rats ($p= 0.0102$). There was also a trend towards sex-specific effects of morphine exposure on locomotion and anxiety-like behaviour. In male rats, postnatal morphine was associated with lower activity and a reduced anxiety-like behaviour, relative to controls. In contrast, female morphine-exposed rats showed the opposite phenotype, with greater activity and anxiety compared to saline-treated controls. A replication study will be undertaken. Ongoing MEA recordings are investigating the neuronal basis for these differences in nociceptive thresholds and whether the endogenous opioid system is dysregulated.

CONCLUSIONS: Ultimately, the data presented here indicate that morphine exposure during this critical preadolescent period alters normal maturation of pain pathways in rodents. These findings have important implications for how early life experience can shape pain processing in adulthood.

Keywords: Opioid, Development, Anxiety, Electrophysiology

P-26

Basic Science

Probing Soluble Epoxide Hydrolase Expression and Activity in Painful Osteoarthritis Synovium and Cell Based Assays

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BACKGROUND: Osteoarthritis (OA) affects ~10million adults in the UK, damaging multiple inter-connecting joint tissues. Inflammation of the joint lining (synovium), which contains nerves that detect painful signals, involves substances which promote swelling and pain, and other substances which inhibit these processes to allow healing. Our research is focused on a group of molecules (EETs) that reduce inflammation and pain. We have previously showed that people with lower levels of EETs and higher levels of the inactive metabolites (DHETs) have more severe OA pain and greater progression of OA joint damage. EETs are metabolised by the enzyme soluble epoxide hydrolase (sEH) into their corresponding DHETs.

AIMS: To quantify sEH expression in the OA synovium and potential relationships with OA pain, and to optimise assays to measure sEH activity.

METHODS: Ex vivo human synovial lysates were collected from post-mortem samples with no histological joint damage (non-OA), with histological evidence of OA joint damage but no record of OA pain (pm-OA), and total knee arthroplasty for painful OA (TKA-OA), n=10 per group. Levels of sEH expression in synovium were measured using a nanobody based immunoassay. sEH activity was measured in human synovial tissues using a commercially available fluorumetric substrate (EF7) and the selective inhibitor 1-Trifluoromethoxyphenyl-3-(1-propionylpiperidin-4-yl) urea (TPPU).

RESULTS: We demonstrated higher levels of sEH protein in painful OA synovium, compared to non-painful controls, which will likely increase the catabolism of EETs in the knee joint in people with painful OA. Similarly, we report higher sEH activity in pm-OA and TKA-OA synovium, compared to non-OA controls, further supporting our hypothesis that sEH activity may play a key role in OA. Analysis of open access synovium single cell transcriptomic data identified the synovial subintimal and intimal fibroblasts as the highest sEH expressing cell type in OA synovium, and therefore likely to play an important role in the metabolism of EETs. Genetic association analysis of UK Biobank 450K WES data identified a novel genome-wide significant musculoskeletal pain associated variant of sEH K406R, chr8:27536830:A:G (GRCh38) and the most prevalent missense variant R287Q, chr8:27516348:G:A (rs751141), which we then confirmed to have functional activity in HEK293 cells. Designed catalytic mutations within the active site (D335N, Y466F, H524L) significantly reduced sEH activity but other mutants such as K406R, R103C and R287Q did not under our conditions.

CONCLUSIONS: These data demonstrate that expression of sEH is significantly higher in the synovium of people with painful OA, with fibroblasts expressing higher levels of sHE, compared to other cell types. Genetic polymorphisms of sEH identified through analysis of UK Biobank data, show associations with pain and have confirmed functional activity in HEK293 cells. Acknowledgements: Parts of this research has been conducted using data from UK BioBank, a major biomedical database under project ID 64765. We would like to thank all participants of the UK BioBank cohort who have provided necessary genetic and phenotypic information.

Keywords: chronic pain, osteoarthritis, soluble epoxide hydrolase

P-28

Basic Science

Pick1 Inhibitors Relieve Ongoing and Evoked Hypersensitivity in Multiple Mouse Models of Pain in Female and Male Mice With Cross-Laboratory Validation

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BACKGROUND: Chronic pain is a complex health problem impacting one in five adults worldwide, with a large fraction of patients experiencing inadequate treatment.An emerging strategy to develop more effective, non-addictive therapeutics for chronic pain is through modulation of receptor trafficking by targeting specific scaffold proteins. Due to its role in central synaptic plasticity, we have specifically targeted the scaffold protein PICK1, which exerts its effects through its regulation of the subcellular localization of its interaction partners, including the GluA2 subunit of AMPA receptors. We have developed and assessed peptide inhibitors of PICK1 for their efficacy in reducing pain-like behaviors in rodents under a wide variety of pain models and behavioral assays.

AIMS: Most drugs demonstrating preclinical efficacy fail clinical testing. We have tried to reduce such risk of future clinical failure by going beyond the use of standard preclinical pain measures.

METHODS: We have previously shown efficacy of our inhibitors in relieving evoked allodynia in both inflammatory (complete Freund's adjuvant, CFA) and neuropathic (sciatic nerve injury (SNI) and streptozocin (STZ)) pain models in male mice, following both mechanical and thermal evoked hypersensitivity (von Frey and Hargreaves) across three different laboratories. The efficacy has later been confirmed in the SNI and CFA model of female mice. Here, we explore several measures of ongoing hypersensitivity, anxio-depressive behaviour, and general well-being of the mice (ultrasonic vocalizations (USV), conditioned place preference (CPP), marble burying test (MBT), elevated plus maze (EPM), locomotion). Current treatment used in the clinic is compromised by dose-limiting side effects including high abuse liability, loss of ability to function socially and professionally, fatigue, drowsiness, and apathy. Because of the involvement of PICK1 in i.e. central sensitization, we hypothesized that the PICK1 peptide-inhibitors would relieve chronic pain only, while retaining acute nociceptive and mechanical sensation. This would be a great benefit of patients, relieving their chronic pain without limiting their sensitivity to potential harmful stimuli of everyday life, unlike ie. morphine. We have explored the efficacy of our compounds in two measures of acute nociception (Tail immersion (49.5°C) and Capsaicin Paw-lick), both revealing no effect of our peptide inhibitors.

RESULTS: In the CFA model, we used a combination of EPM and MBT as anxio-depressive measures comparing naïve animals to CFA animals with or without treatment. The significant difference between naïve animals and untreated CFA animals in time spent in the open arms as well as marbles buried, was reverted in the group of CFA animals treated with the peptide inhibitors. A single exposure CPP was used to estimate the initial perception of the drug as a measure of the relief of ongoing pain. For naïve animals, the peptide inhibitors did not influence their place preference, but the CFA animals treated with peptide inhibitors spent significantly more time in the drug-paired compartment compared to saline-treated animals. In the SNI model, the significant difference in USVs and marbles buried of the untreated SNI mice compared to naïve animals, was reverted in the group of SNI animals treated with the peptide inhibitors. In addition, we see a significant difference between naïve animals pre-treated with saline vs morphine when it comes to time spent paw licking following capsaicin application and time to withdraw tail from warm water. This difference was not observed for the animals pre-treated with the peptide-inhibitors, revealing no effect of the inhibitors on acute nociception.

CONCLUSIONS: In conclusion, our high-affinity PICK1 inhibitors revert pain-like phenotypes induced by mouse models of inflammatory and neuropathic pain without affecting the acute nociception of the animals.

Keywords: peptide inhibitor, PICK1 inhibitor, ongoing pain

P-29

Basic Science

Differential Modulation of Spinal Somatosensory-Evoked Potentials/Wide Dynamic Range Neuronal Activity by Lacosamide, Pregabalin and Tapentadol

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BACKGROUND: Efforts to develop novel treatments for chronic pain have been hindered by the lack of successful translation of compounds from preclinical models. To address this, it is necessary to develop new approaches to preclinical drug development to better link the human and rodent assays.

AIMS: We sought to achieve this aim through the validation of functional pain biomarkers as indicators of clinical target engagement. One of these biomarkers is the human spinal somatosensory-evoked potential (SEP). The spinal SEP is thought to be generated by the post-synaptic activation of wide-dynamic range (WDR) neurons in the spinal dorsal horn (SDH) following low-intensity electrical stimulation to activate Aβ-fibre afferents (low threshold). Capsaicin-induced central sensitisation increases the human spinal SEP and this effect attenuated by pregabalin. This suggests spinal SEPs could provide a measure of the activation of the nociceptive system and how it interacts with standard-of-care painkillers without the need to activate nociceptors (so it would be tolerable as an assay), but it is yet to be shown if WDR neurons are the generator of the SEP and the site of action of the analgesic modulation.

METHODS: We investigated the effects of pregabalin (a ligand of voltage-dependent calcium channels α2δ subunits), lacosamide (a non-selective sodium channel modulator) and tapentadol (a mu-opioid receptor agonist and noradrenaline reuptake inhibitor) on the amplitude of spinal SEPs in a dose-dependent manner. Adult male Wistar rats (n=60, 250-375g) were anaesthetised with isoflurane. Following a spinal laminectomy over L3-4, a linear multi-electrode silicon probe (64 channel, Cambridge Neurotech) was inserted into the dorsal horn. Electrical stimuli (4Hz x 250s low-intensity electrical stimuli and 3x higher intensity stimulus ramps) were delivered to the sciatic nerve in each 10min block, with recordings consisting of a 30min baseline period and up to 90min post-dose. Drugs were administered in a blinded manner following a block-randomised design (vehicle, 3, 10 and 30mg/Kg i.p).

RESULTS: Low-intensity SEPs within the spinal dorsal horn have a characteristic depth profile (peak amplitude in lamina IV/V). The

principle negative peak (N1 potential) of the SEP is consistent with peripheral conduction via Aβ-fibres. Waveform and multi-unit activity analyses of the higher intensity stimuli revealed graded recruitment of primary afferent fibres classes (A/C-fibres), each exhibiting distinct dorsoventral distribution patterns within the dorsal horn. Injection of 30mg/Kg lacosamide significantly reduced the amplitude of the N1 potential (two-way RM ANOVA, time x drug, P= 0.0003; primary endpoint). Injection of 10mg/Kg tapentadol also significantly reduced the amplitude of the N1 potential (two-way RM ANOVA, time x drug, P=0.0002; primary endpoint). Pregabalin did not show any significant effect on the N1 potential. The tapentadol-induced reduction of the N1 potential was shown to be maintained following spinal perfusion of tapentadol and this effect was reversible by spinal perfusion of 100uM naloxone. Analysis of isolated single unit activity (clustered in Kilosort2 and Phy2) revealed a population of neurons that were activated by Aβ, Aδ and C-fibres. These neurons were further functionally identified using naturalistic stimulation (brush, pinch, von Frey), supporting a WDR neuronal generator of the rodent SEP. The stimulus-evoked activity was reversibly inhibited by tapentadol.

CONCLUSIONS: Together, these findings support the application of spinal SEPs in drug development to provide proof of interaction with the nociceptive system in an adaptable and translatable rodent<->human assay.

Keywords: Translatable, Biomarker, Analgesics, Preclinical trial

P-30

Basic Science

Mechanistic Studies of Morphine-Induced Exacerbation of Chronic Osteoarthritic (OA) Pain in Female Rats

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BACKGROUND: Opioids provide effective, short-term analgesia, but with limited long-term benefits and often severe adverse effects. However, opioid prescription for chronic pain conditions, including osteoarthritis (OA), remains high. Mounting evidence suggests that prior opioid-exposure worsens responses to subsequent painful injury, but the underlying mechanisms remain unknown. The clinical impact of pain is greatest in females. Women are more likely to report chronic pain, and are also prescribed more opiate analgesics than men. Despite this, most of our experimental knowledge of chronic pain and opioid receptor mechanisms is derived from studies in male rodents.

AIMS: 1) Develop a model of opioid pre-exposure and exacerbated OA pain in female rats.

2) Probe the underlying mechanisms using *in vivo* spinal electrophysiology and *ex vivo* molecular and anatomical approaches.

METHODS: The monosodium iodoacetate (MIA) model of OA-like pain was adapted for female Sprague-Dawley rats (~8 weeks old). Rats received bidaily systemic saline (1mL/kg) or morphine HCl (3mg/kg, s.c) for 7 days, prior to a single intra-articular injection of saline (50μL) or MIA (2mg), creating 4 experimental groups (n=12/group) 1. Saline/saline – opioid naïve, pain-free 2. Saline/MIA – opioid naïve, with OA-like pain 3. Morphine saline – sustained opioid exposure, pain-free 4. Morphine/MIA - sustained opioid exposure, with OA-like pain Pain behaviour was assessed via paw withdrawal thresholds (PWT) and weight-bearing asymmetry, and saline or morphine treatment continued for a further 3 weeks. Dorsal horn sensory network activity in response to a wide range of mechanical and electrical stimuli was then assessed via multi-electrode array recordings (MEA) in anesthetised rats (n=6/group). At the end of recordings, fixed spinal cord tissue was then collected to probe underlying anatomical changes via immunohistochemistry. In a subset of animals (n=6/group), ipsilateral spinal cord dorsal horn tissue was collected for analysis of altered protein expression via Western blot. Knee joint damage was scored via macroscopic analysis of cartilage damage and microscopic analysis of cartilage, synovitis, and proteoglycan loss. Studies were approved by the University of Nottingham's Animal Welfare and Ethical Review Board (AWERB) in accordance with the UK Home Office Animals Scientific Procedures Act (1986) and the International Association for the Study of Pain guidelines.

RESULTS: Morphine exacerbated OA-like pain in female rats, producing greater weight-bearing asymmetry and lowering of PWTs compared to MIA alone. Macroscopic analyses of cartilage damage showed no differences in pathology with morphine treatment, potentially indicating a central mechanism. In support of this, spinal astrogliosis and increased expression of NMDAR2B were also observed via Western blotting. MEA analyses revealed a significant increase in C fibre latency responses in the intermediate dorsal horn following sustained morphine exposure, suggesting a regionally specific alteration of sensory network activity.

CONCLUSIONS: Sustained morphine exposure exacerbated OA pain behaviour in female rats, mimicking the clinical situation. Elucidation of underlying mechanisms is ongoing via physiological (in vivo spinal recordings) and anatomical (immunohistochemistry & super-resolution microscopy) approaches. This work was supported by funding from the MRC (grant MR/W019663/1).

Keywords: Osteoarthritis, opioids, spinal cord, sex, animal models

P-31

Basic Science

Analysis of Changes in Axonal Mrna Transcriptomes and Activity of Drg Primary Neurons After PGE2-Driven Sensitisation

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BACKGROUND: Nociceptive sensory neurones of the dorsal root ganglia (DRG) transmit noxious information from the periphery to the central nervous system. Neuroplastic properties allow sensory neurones to adapt to the changing local environment. During inflammation, and in chronic pain states, they can become sensitised, characterised by the lowering of activation thresholds and increased frequency of action potential firing. The various mechanisms that produce this sensitisation can differ significantly at peripheral and central nervous terminals. Inflammatory mediators, such as prostaglandin E2 (PGE2), are known to act directly on nociceptors to induce this sensitised state and may be reliant on local translation which, thereby, drives changes to proteomes and neuronal function.

AIMS: The aim of this work was to develop an in vitro model of mouse peripheral nociceptor sensitisation, to investigate the role of PGE2 in inducing functional sensitisation locally and to characterise changes to the sensory neurone transcriptome at the subcellular level following PGE2.

METHODS: Primary embryonic (E16.5) mouse DRG neurones were cultured in compartmentalised microfluidic chambers to interrogate subcellular domains (soma versus axonal terminals). Axonal compartments were exposed to 10μM stabilised PGE2 for 24-hours prior to calcium imaging. Increased intracellular soma calcium levels, in response to 200nM capsaicin added to axonal- or soma-enriched compartments, were used as an indicator of neuronal excitability. E16.5 and adult DRG neurones were also cultured within Boyden chambers to allow for RNA extraction from separate subcellular environments; qPCR was employed to quantify mRNA levels, and RNA-Seq to investigate changes in whole-cell versus axonal transcriptomes induced by PGE2.

RESULTS: Following PGE2 exposure in the axon, functional sensitisation was observed when stimulating both the axon terminal ($p = 0.0024$, t-test) and the cell soma ($p = 0.0435$, t-test) with capsaicin, despite only incubating the axonal-enriched compartment with PGE2. qPCR revealed a significant increase in Ngf mRNA expression within the cell body of PGE2-sensitised DRG neurones, confirming neuroplastic pain pathway activation. RNA-Seq divulged a considerable overlap in expression within the axonal transcriptome between embryonic and adult control cultures. Subsequent bioinformatic analysis linked key pathways associated with local translation. Significant alterations to the local axonal transcriptome were observed in PGE2-sensitised cultures, relative to controls, in embryonic and adult cultures.

CONCLUSIONS: The significant overlap between adult and embryonic transcriptomes, and their response to PGE2, provides interesting insights into the DRG in vitro neuronal models, supporting the use of early-stage neurones to model nociception in microfluidic culture systems. Our compartmentalised subcellular approach demonstrates how axonally driven mechanisms, triggered by local PGE2 stimulation, can promote sensitisation of DRGs via retrograde communication. We have shown that PGE2-induced sensitisation has the capacity to alter the local axonal transcriptome in both adult and embryonic cultures. Current work therefore aims to prevent these local changes in specific transcripts to, in turn, prevent PGE2-induced sensitisation. The identification of local pathological mechanisms at peripheral level, and of thus accessible therapeutic targets, can provide critical support for the development of successful RNA therapies.

Keywords: Sensitisation, sensory neurones, mRNA, compartmentalised chambers, in vitro

P-32

Basic Science

From Behaviour to Pain Signalling: Capitalising on Simpler Model Organisms to Study Inflammation-Induced Sensitization

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BACKGROUND: Nociception, the body's ability to sense and perceive noxious stimuli, first evolved more than ~500 million years ago (Walters, 2018), and the genetic architecture of this detect-and-protect process has been conserved through evolution from insect-like Drosophila to humans (Neely, Hess et al. 2010). In Drosophila, the main nociceptive sensory neurons (C4da) extensively innervate the larval barrier epidermis, which is the transparent counterpart of human skin. They express several evolutionarily-conserved ion channels, including transient receptor potential A (TrpA). Notably, Drosophila TrpA1 shares conserved sensory functions with its mammalian ortholog. It is activated by heat, mechanical stimuli, and irritant chemicals (Tracey, Wilson et al. 2003, Hwang, Zhong et al. 2007, Im and Galko 2012). In response to these stimuli, Drosophila exhibit a stereotypic rolling behaviour, where the larvae rotate around the long body axis in a corkscrew-like motion. Importantly, the signalling mechanisms driving the transition from acute nociception to nociceptive hypersensitivity are also conserved. In particular, inflammatory mediators like Tachykinin and Tumor Necrosis Factor, induce hypersensitivity in both mammals and in Drosophila (Babcock, et al. 2009, Im, et al. 2015), where hypersensitivity leads to change in rolling responses.

AIMS: Our aim is to establish an invertebrate alternative to more challenging rodent and simian models for studying the mechanisms underlying inflammation-induced sensitisation. Specifically, we seek to measure how sensitisation changes the spatio-temporal dynamics that mediate noxious signal transduction, and to monitor the resulting behaviour.

METHODS: Experiments were conducted using male Drosophila larvae. To observe Ca2+ spatiotemporal dynamics associated with nociception, we selectively expressed a genetically encoded Ca2+ indicator (GCaMP6m) in the C4da nociceptive neurons. Larvae were dissected, placed in a recording chamber, and subjected to epifluorescence imaging. Agonists were applied to the bath using a pipette, and calcium levels were recorded in real time at the endings of individual sensory neurons. Additionally, to trigger mechanical or chemical nocifensive rolling behaviour noxious mechanical pressure, delivered by a fabricated von Frey-like filaments, and a noxious chemical (cinnamaldehyde (CA)) were applied to the tail of the intact larva. Behavioural responses were recorded. These experiments were conducted in both naïve and primed larvae (treated with 10 μM bradykinin for 12-48 hours) to assess acute and hypersensitive nociception in an inflammatory context.

RESULTS: We report that CA, a classic agonist of mammalian TRPA1, can activate Drosophila TRPA1 homologs expressed on these sensory neurons, inducing a robust intracellular Ca2+ response (EC50 = 4.123 x 10-5 M). The CA-induced Ca2+ response was reproducible and was pharmacologically inhibited by 20 uM AM0902. Stimulation with CA in naïve larvae did not result in a noxious response (no rolling), while bradykinin priming induced hypersensitivity- measured as a significant increase in the aversive rolling response. A similar hypersensitivity was observed following a mechanical stimulus primed with bradykinin. Our ability to measure within subcellular compartments may provide invaluable insights into the encoding of stimuli in the periphery and the integration of these signals in second-order neurons.

CONCLUSIONS: We have established a signalling and behavioural assays to monitor nocifensive behaviour and signalling triggered by chemical and mechanical noxious stimuli in naïve and bradykinin-primed larvae. Our findings support the adoption of this invertebrate model into pain research programmes to maximise the opportunities of Drosophila genetics, which is currently under-utilised. Incorporating this non-mammalian, invertebrate system to streamline the analgesic discovery pipeline will de-risk and increase the probability of experimental success in rodent models. Thus, reducing the cost of experimentation and complying with the 3Rs (replacement, reduction, and refinement).

Keywords: Drosophila, Calcium, Nociception, hypersensitivity, behaviour

P-33

Basic Science

Central Sensitisation Response Following Occipital Nerve Stimulation: 10-Year Follow-Up

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BACKGROUND: Central sensitization and impaired conditioned pain modulation (CPM) response has been reported to contribute to migraine progression. Migraine patients can present with allodynia possibly attributed to increased sensitivity of peripheral ends of nociceptors with both peripheral and central sensitization. Occipital nerve stimulation (ONS) is an established neuromodulation procedure for selected patients with medically intractable chronic cluster headache and migraine with autonomic symptoms. Although clinically effective, there has been no long-term outcome data on its effect on central sensitisation. Efficacy outcomes for ONS typically employ standardised headache questionnaire measures but objective tests of endogenous pain mechanisms such as Quantitative Sensory Testing (QST) are yet to be utilised to measure efficacy of ONS. Our group has published one- year outcomes in central sensitisation following ONS. (Wodehouse et al., 2020).

AIMS: The aim of this prospective study was to evaluate whether QST detects a change in pain in chronic migraine and provide more long-term outcome data in patients receiving ONS.

METHODS: Six patients, 3 chronic migraine, 2 new persistent daily headache and 1 chronic cluster headache were implanted between 2014-2015 with percutaneous leads, placed bilaterally parallel to the greater occipital nerve, IPG (Genesis/ Prodigy St Jude Medical, Plano, TX,USA)/Medtronic ONS). Baseline QST and questionnaires were completed, and they were monitored up to a 12-month period and then annual review for 10 years.

RESULTS: Patients with intractable migraine demonstrated reduced CPM in five out of six patients prior to ONS; reverting to "normal' CPM response following ONS implant at 12 months and at ten years. In contrast pressure pain thresholds remained low throughout this period.

CONCLUSIONS: This is first long term follow up in our knowledge investigating the effect of central sensitisation following ONS. Responders showed substantial reductions in headache-related disability and improvements in conditioned pain modulation over 10-year duration.

Keywords: quantitative sensory testing, occipital nerve stimulation, conditioned pain modulation

P-20

Chronic Pain

Restorative Neurostimulation Provides Meaningful and Durable Outcomes: 5-Year Longitudinal Follow-Up of Reactiv8-B Clinical Trial

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BACKGROUND: Mechanical nociceptive chronic low back pain (CLBP) can be caused by impaired neuromuscular control of lumbar spine stability. Underlying this lack of stability lies dysfunction of the multifidus, the strongest stabilizer of the lumbar spine.[1] The ReActiv8-B randomized sham-controlled pivotal trial (clinicaltrials.gov identifier: NCT02577354) utilized an implantable restorative neurostimulation system which bilaterally stimulated the medial branches of the L2 dorsal rami for up to 30 minutes twice daily to override underlying lumbar multifidus muscle inhibition and facilitate neuromuscular control restoration. The ReActiv8-B trial provided evidence of safety, effectiveness, and durability of this therapy over five years.[2,3] Few if any prospective neuromodulation trials have shared efficacy, safety, and participant accountability outcomes beyond two years.

AIMS: Evaluate and report the five-year results from the ReActiv8-B trial.

METHODS: Eligible patients had activity-limiting mechanical CLBP (visual analog scale (VAS) ≥6cm; Oswestry Disability Index (ODI) ≥21 points) despite medical management, which included at least pain medications and physical therapy. Participants also had evidence of impaired multifidus motor control (positive prone instability test) and no indications for spine surgery. Following institutional review board approval, all consented patients were implanted with a restorative neurostimulation system (ReActiv8, Mainstay Medical, Inc., Ireland).

RESULTS: Participants (N=204) at baseline were age 47±9 years, had CLBP for 14±11 years, rated low back pain VAS at 7.3±0.7 cm, ODI at 39±10, quality of life (measured by Euroqol EQ-5D) at 0.585±0.174 points, and had pain on 97±8% of days in the year prior to enrollment. Out of the 204, 100% had failed medications with 37% on opioids at baseline. At 5-year follow-up, 126 complete cases presented with an improved average VAS by 4.9±2.5 cm (67.5±3.1% improvement), ODI by 22.6±15.4 (22.7±1.4% improvement), and EQ-5D by 0.230±0.203 ($P<0.0001$ for all outcomes); 71.8% of participants had ≥50% VAS improvement; 66.9% reported LBP resolution (VAS≤2.5 cm); 61.1% had ≥20-point ODI improvement and 88% of participants were "definitely satisfied" with treatment. Pain intensity and disability are interdependent symptoms, therefore, treatment success was determined by composite improvements in ODI and VAS: 78.2% had substantial improvements of ≥50% in VAS and/or ≥20 points in ODI. Of participants using opioids at baseline, 69% had either discontinued (46%) or decreased (23%) consumption. Overall safety profile was favorable including no lead migrations. Through five years, 18/204 (9%) participants had requested device removal after resolution of pain and 27/204 (13%) citing inadequate pain response.

CONCLUSIONS: Over a follow-up duration of five years, restorative neurostimulation has proven effective, durable, and safe. In patients severely affected by mechanical nociceptive CLBP there are few, if any, options that provide similar evidence of safety, durability, and efficacy. In these particular patients, long-duration motor stimulation of the L2 medial branch should be standard of care.

Keywords: mechanical chronic low back pain, multifidus dysfunction, five-year outcomes

P-27

Chronic Pain

Identification of Genes Pathways in Circulating Monocyte Associated with Levels of Resolvin Molecules in People with Osteoarthritis Pain

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BACKGROUND: Osteoarthritis (OA) is the fastest growing cause of chronic pain globally, and is associated with synovial inflammation. Specialised pro-resolution molecules (SPMs) include the D- and E-series resolvins (RvD and RvE) are produced by multiple cell types from the omega-3 polyunsaturated fatty acids (PUFAs). The SPMs curtail inflammation via multiple mechanisms and a failure in this process may contribute to the aetiology of inflammatory diseases, including OA. Plasma levels of the D-series resolvin precursor, 17-hydroxydocosahexaenoic acid (17-HDHA) are associated with pain thresholds in healthy volunteers and lower levels of 17-HDHA are associated with greater OA pain.

AIMS: To probe the potential genetic basis for the association between levels of 17-HDHA and OA pain.

METHODS: Blood samples were provided by 30 participants from the iBEAT-OA (Trial Registration number: NCT03545048) study. Ethical approval was obtained from the Research Ethics Committee (ref: 18/EM/0154) and the Health Research Authority (protocol no: 18021). Participants enrolled in the study had a numerical rating scale (NRS) score for knee pain of ≥3 out of 10, and a Kellgren-Lawrence radiographic grade of ≥1. Whole blood (12ml) was collected from these participants for lipidomic analysis by liquid chromatography tandem mass spectrometry (LC-MS/MS), and for RNA sequencing. Targeted LC-MS/MS analysis of plasma was carried out using published methods for the analysis of 33 bioactive lipids including 17-HDHA. Intermediate (CD14++/CD16+/CD66b-/HLA-DR+) and classical (CD14++/CD16-/CD66b-/HLA-DR+) monocytes were sorted by fluorescence-activated cell sorting (FACS).

Participants were stratified into 4 groups based upon their pain (Low pain <5.9 as assessed by NRS, High pain >6 as assessed by NRS), and plasma concentrations of 17-HDHA ("Low 17-HDHA" <0.49 nmol, "High 17-HDHA" >0.5nmol); low 17-HDHA & low pain, low 17-HDHA & high pain, high 17-HDHA & low pain, and high 17-HDHA, high pain.

RNA was extracted from the monocyte populations for RNA-sequencing. Differentially expressed genes (DEGs) were categorized as genes with adjusted p-value < 0.05 and absolute log2 fold change > 1. The Wald test was used to generate p-values and log2 fold-changes. All genes with measurable counts in at least one participant group, according to the normalisation carried out by Genewiz, were uploaded to Qiagen Ingenuity Pathway Analysis (IPA) with data for log2 fold change, p-value and adjusted p-value. Cut-offs for IPA analysis were log2 fold change +/-1 and p-value<0.05 for an exploratory pathway analysis.

RESULTS: An unbiased analysis of differentially expressed genes using the DESeq2 pipeline identified differentially expressed genes between the groups with high 17-HDHA plus low pain versus low 17-HDHA plus high pain. Ranking of pathways for this comparison for the classical monocytes identified EIF2 and eIF4 signalling as the top two ranked pathways. These pathways were not associated with either 17-HDHA or OA pain separately.

CONCLUSIONS: In the present study, key signalling molecules of EIF2-signalling and eIF4- and P70S6K-signalling were differentially expressed in classical monocytes from patients with high pain and low 17-HDHA, compared to patients with low pain and high 17-HDHA. EIF2 signalling plays a known role in nociception, specifically through phosphorylation of eIF2, and the expression of eIF4 and P70S6K in the peripheral nervous system has been associated with chronic pain. These data provide new insight into biological pathways which may contribute to the association between 17-HDHA and chronic OA pain, and may provide novel analgesic strategies.

Keywords: Osteoarthritis, Pain, Inflammation

P-37

Chronic Pain

The Effectiveness of an Aerobic Exercise on Patients With Chronic Neck Pain During a Short and Long-Term Follow Up: A Randomized Control Trail

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BACKGROUND: chronic Nonspecific neck pain is a prevalent musculoskeletal disorder among the general population, with a lifetime incidence rate of 12%–70%. Aerobic exercise (AE) has been proven beneficial for chronic low back pain, and for many of the functional disorders, such as chronic fatigue, fibromyalgia, and many other diseases. However, there is not much evidence in relation to neck pain to support AEas an effective intervention.

AIMS: To examine the effect of adding AE to neck-specific exercise treatment for patients with neck pain (NP) in reducing pain and disability.

METHODS: This was a multicenter prospective randomized controlled double-blind trial with follow-up assessments at six weeks and three and six months. In a setting comprising 9 physiotherapy outpatient clinics, participants experiencing non-specific NP were involved in the study. Participants were randomly assigned to either a six-week program of neck-specific exercises or a combination of neck-specific exercises with AE. Primary outcomes were assessed using the Global Rating of Change, while secondary measures—Visual Analog Scale (VAS), Neck Disability Index (NDI), Fear Avoidance Beliefs Questionnaire (FABQ), and cervicogenic headache—were evaluated at both six weeks and six months follow-ups.

RESULTS: A total of 139 patients were recruited (n=69 AE, n=70 control), mean age: 54.6±10.5 years. Response rates was 87.7% (n=122) at 6-month follow-up. A significant (group X time) interaction was obtained for success rate from six-weeks to six-months in favour of the AE group. Final success rate in the AE group was 77.4% vs 40% in the control group (P<.001). Significant changes were also obtained from baseline to follow-up in favor of the AE group for pain intensity VAS, NDI, and FABQ (Final scores in the AE group: VAS 1.89±1.37, NDI 7.78±4.78, FABQ 20.94±8.41; vs final scores in the control group VAS 3.32±1.82, NDI 11.09±5.64, FABQ 26.83±10.79; P<.001). Reduction in cervicogenic-headache from baseline to six-month was higher in the AE group (~42%) than in the control group (~17%) (P=.003).

CONCLUSIONS: After the six-week intervention, over half of all patients in the study had achieved a successful outcome with no significant differences between groups. At the six-month follow-up, a successful outcome was achieved by the aerobic exercise group

compared with the control group that included a significant reduction in cervicogenic headaches.

Keywords: Neck pain, physical therapy, aerobic exercise, exercise, headache

P-38

Chronic Pain

Pro-Inflammatory Dietary Intake Relates to Pain Sensitivity in Chronic Non-Specific Low Back Pain: A Case-Control Study

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BACKGROUND: Despite the unclear underlying mechanisms, growing evidence highlights the importance of nutrition as a major modifiable lifestyle factor in chronic pain management. Non-specific chronic low back pain (nCLBP) has been associated with nutrition. The underlying mechanism between nutritional factors and pain has been mainly attributed to the potential anti- and pro-inflammatory characteristics of the diet and its impacts on the neuroimmune system. However, the association between nutritional intake and pain has not been investigated thoroughly in nCLBP patients.

AIMS: The aim of the present study was to investigate differences in diet quality and dietary intake levels between nCLBP patients and healthy controls (HCs) and to explore the association between nutritional factors and pain sensitivity in nCLBP.

METHODS: In this case-control study, 106 participants (i.e., n=53 nCLBP and n=53 HCs) were recruited and completed a 3-day food diary to assess their dietary intake, which allowed to generate individual diet quality scores, (i.e., the healthy eating index-2015 and dietary inflammatory index). Additionally, each participant underwent an experimental pain assessment (quantitative sensory testing) and filled out self-reported pain questionnaires.

RESULTS: Compared to HCs, the nCLBP group showed significantly lower diet quality, higher inflammatory scores, and a lower intake of total protein, total fat, dietary fibre, omega-3 fatty acids, vitamin B6, vitamin A, beta-carotene, vitamin E, and magnesium. Pain sensitivity mainly showed a negative correlation with nutritional intakes known for anti-inflammatory properties (i.e., vitamins E, D, A, B6, B12, and zinc). Interestingly, total fat, cholesterol, saturated, and monounsaturated fat intakes were found to be inversely associated with pain sensitivity.

CONCLUSIONS: Overall, patients with nCLBP have a lower diet quality, eat more pro-inflammatory, have less intake of nutrients known for their anti-inflammatory and anti-oxidative properties, and drink less water compared to HCs. Accordingly, pain sensitivity was mainly found to be positively associated with pro-inflammatory dietary intake. This study emphasizes the association between a pro-inflammatory diet and nCLBP. Among nCLBP patients, positive association between increased pain sensitivity and the pro-inflammatory potential of a diet, highlighting the potential for individualized pain management strategies and leading to the development of novel therapeutic methods.

Keywords: Chronic low back pain, Pain Sensitivity, Diet, Diet Quality, Inflammation

P-39

Chronic Pain

Predictors for Quality of Life in Patients With Chronic Pain: A Longitudinal Study Using Regression and Mixed Effect Modelling

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BACKGROUND: Chronic pain is one of the most debilitating conditions affecting millions of people worldwide. The impact of chronic pain extends beyond physical discomfort, significantly influencing various aspects of individuals' lives, including their psychological well-being and overall quality of life (QoL). Understanding the predictors that contribute to the variability in QoL among patients with chronic pain is important for developing targeted interventions and improving patient outcomes. While numerous studies have explored the impact of chronic pain on various aspects of individuals' lives, including psychological well-being and overall QoL, there remains a need for more extensive investigations into the longitudinal factors influencing QoL. Many studies focus on cross-sectional assessments or have small sample sizes.

AIMS: To examine predictors for quality of life in people with chronic pain.

METHODS: Participants completed an online screening and self-report questionnaires as part of the Warwick Study of Mental defeat in Chronic pain, assessing sociodemographics, psychological variables,

and other variables including QoL at 0, 6 and 12 months. QoL was assessed by the EuroQol-5 Dimension (EQ-5D-5L mapped to EQ-5D-3L value sets according to NICE guidelines and utility score normed to UK values). Linear multiple regression analysis with stepwise selection was conducted to examine which factors at baseline predict quality of life at 12 months. The following 23 factors were taken into consideration as potential predictor: Age, sex, body mass index, employment status, education, smoking, alcohol use, medication use, pain duration, mental defeat, pain interference, pain severity, number of pain sites, pain vigilance and awareness, activity patterns (avoiding, overdoing and pacing), insomnia severity, perceived stress, kinesiophobia, anxiety symptoms, depression symptoms, and amount of social activity. Linear mixed-effects modeling (with random intercept) was used to investigate which factors are associated with QOL and whether this relation changes over time by examining interaction effects with time.

RESULTS: In total 527 people with chronic pain participated. Data of 342 participants could be used for the linear regression analysis. Pain interference with daily activities (standardized regression coefficient [b]=-.173; p=.012), insomnia severity (b=-.204; p=<.001), symptoms of depression (b=-.225; p<.001), Body-map index score (b=-.089; p=.05), Employment status (b=-.120; p=.004), pain duration (b=-.095; p=.023), pain severity (b=-.128; p=.033), medication quantification scale score (b=-.086; p=.047) at baseline were significant predictors for QoL 12 months later. The regression model explained about 46.9% of the total variance in QoL. The linear mixed model revealed that, independent of the time, the following baseline factors predict QoL (fixed effects): Employment status (employed) (unstandardized estimate [B]=.060; p<.001), pain severity (B=-.037; p<.001), pain interference (B=-.019; p<.001), medication quantification scale score (B=-.005; p<.001), insomnia severity (B=-.006; p<.001) and depressive symptoms (B=-.015; p<.001). No interaction effect with time was included in the best-fitting model. There was very little change in QoL over time, with mean scores indicating a moderate health state at baseline (Mean:.536, Standard deviation [SD]:.271), at 6 months follow-up (Mean:.537, SD:.264), and at 12 months follow-up (Mean:.538, SD:.284).

CONCLUSIONS: The strongest predictors for QoL 12 months later in people with chronic pain are pain interference with activities, insomnia severity, and depressive symptoms. Other weaker, but still significant predictors, are the amount of pain body sites, employment status (unemployed), pain duration, pain severity and medication use. Independent of time, pain interference with activities, insomnia severity, depressive symptoms, pain severity, employment status, and medication use are predictors for QoL. However, there is quite some overlap between some predictors (pain interference, pain severity, and depressive symptoms) and the QoL outcome (including the dimensions mobility, self-care, usual activities, pain/discomfort, and anxiety/depression). Nevertheless, these factors could be attention points and potential prevention/treatment targets in people with chronic pain.

Keywords: Chronic pain, Predictors, Quality of Life

P-40

Chronic Pain

Emerging Adults, Emerging Themes: A Decade of Pain Management with Young Adults

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BACKGROUND: Approximately 18% of Young Adults (YAs) experience chronic pain and this developmental stage of emerging adulthood can present new and additional challenges (Arnett, 2014). The existing literature suggests particular themes related to this age group including: separation from peers, societal expectations, a sense of loss and missed opportunity (e.g. in work, relationships, and education), perceived invalidation and dismissal due to age and high parental dependency (Twiddy et al., 2017). Our service identified the need for a Specialist YA Pain Management Programme (PMP) to specifically target age-relevant themes and adapt the content and delivery whilst also providing peer support.

AIMS: We analysed 10 years of patient outcome data, since the Specialist YA PMP started in 2014, including both online and face-to-face (F2F) formats. We aimed to determine programme efficacy and present an overview of patient reported experiences following their attendance.

METHODS: A total of 227 YA patients, aged 16 to 31 years (female: male=201:26), were offered a PMP by the multidisciplinary team assessment post assessment, with average pain duration of 76.6 months. Between 2014 and 2023, our service has offered F2F and/or online YAPMPs, including during the pandemic. Data was collected at pre-treatment, post-treatment and at 6-month follow-up. Self-reported outcomes comprised pain intensity and distress, pain catastrophising, depression, pain-self-efficacy, acceptance, physical functioning and occupational therapy (OT) goal measures. Anonymised patient feedback was collected at reassessment and follow-up.

RESULTS: Those with complete data sets (n=103) at reassessment were analysed using paired sample t-tests. Significant improvements (p=>0.001) post-PMP were reported across all outcomes for the F2F programme and maintained at 6month follow up. Pain catastrophising, self-efficacy and OT self-rated goal scores significantly improved post-treatment for the online group. There was a slight decline in these scores from post-PMP to follow up, although there was still a significant overall improvement from baseline. Compared to our other PMPs (average age = 48.30 years), this YA cohort (average age = 21.52 years) had a 7% increased need for individual preparation sessions and 21% required additional 1:1 support during the programme.

Patient feedback suggests that YAs find it useful to be in a group with similar aged peers at similar life stages. Feedback also showed that 83% were likely or extremely likely to recommend the programme. Physiotherapy gym (47%), OT pacing (25%), and psychology sessions (22%) were rated as most helpful. The consultant led medical (11%) and physiotherapy education sessions (14%) were rated least helpful. Some YA patients (36%) reported a preference for a more individualised approach.

CONCLUSIONS: This is the first known published analysis comprising 10 years of outcome data for a YA PMP. Overall, the outcomes suggest that the YAPMP, which targets age specific content and has adapted its approach to best support this cohort and the unique challenges faced, has led to significant improvements in physical and psychological functioning and long-term pain coping.

Keywords: PMP, young adults, emerging adulthood

P-41

Chronic Pain

Medical Cannabis for Chronic Pain in the UK: An 18-Month Longitudinal Observational Study of 1993 Individuals Enrolled in Project Twenty21

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BACKGROUND: There is substantial theoretical, anecdotal, and preclinical evidence to support the potential efficacy of cannabinoids for the treatment of pain. However, randomized controlled trials (RCT) have yielded conflicting evidence regarding cannabis-based products for medicinal use (CBPMs) in chronic pain. To some extent, these trials have been hampered by heterogeneity in treatments and participants, in common with much of pain research. There are also the pragmatic challenges of maintaining consistency when investigating a complex, organic product. For these reasons there have been calls to consider real-world data (RWD) in the belief that it may offer some insights into the role of CBPMs in pain management that are lost within the constraints of an RCT.

AIMS: To investigate real-world outcomes of individuals using CBPMs for chronic pain in the United Kingdom, including assessing for differences in response rates between pain phenotypes.

METHODS: Project Twenty21 is a UK initiative collecting RWD, incentivising participation via discounted access to certain CBPMs. We present 18-month outcomes from the 1993 individuals with chronic pain, enrolled in the registry as of November 2023. We grouped individuals by pain phenotype and categorized CBPMs according to substrate and by Δ9-tetrahydrocannabinol (THC) content. Comparing baseline with follow-up, we investigated changes in brief pain inventory severity (BPI-S), interference (BPI-I), quality of life (EQ5D index), sleep score, and opioid use. We investigated between-phenotype variability in treatment response (>30% improvement in either BPI-S or BPI-I scores). We then built logistic regression models to identify participant and CBPM factors that were predictive of treatment response at 3-months. Individual 18-month longitudinal trajectories were plotted at 3-monthly intervals. All analyses were performed in R version 4.2.3.

RESULTS: The median age was 43, and 59% were male. 58% reported already using cannabis to manage their condition prior to enrolment, 25% had prior experience with cannabis but no current use, and 16% were cannabis-naïve. THC-dominant flower was the most prescribed treatment, followed by balanced oils. 1385 participants had at least one follow-up. Average BPI-S, BPI-I, sleep score, and quality of life were improved at all time-points vs baseline ($p<0.05$), with scores plateauing after 6-months. 43% participants with 3-month data were responders. Optimised logistic regression models suggested participants with fibromyalgia had a lower likelihood of response versus undifferentiated chronic pain (odds ratio 0.38, 95% confidence interval 0.23-0.63, $p=0.0002$). Among responders, improvements in average pain scores were sustained at 18-months. Prescription opioid use, but not paracetamol use, was less prevalent during follow-up versus baseline, amounting to a 13.1% relative (6.9% absolute) reduction at 18-months ($p=0.007$). Drop-out was similar between those who were using opioids at baseline versus those who were not (log-rank p-value >0.05). At odds with the wider cohort, 67% of cannabis-naïve participants were female. Among this group, balanced oils were the most commonly prescribed, and 38% responded at 3-months.

CONCLUSIONS: We performed the largest ever UK-based observational study of CBPM use for chronic pain. Our data corroborates that, for a subset of chronic pain patients, access to medicinal cannabis is accompanied by meaningful and sustained reductions in pain intensity. We found some indications that 6-months may be the optimal trial duration to assess response to CBPMs. Another important finding was that while over 20% of participants with fibromyalgia met criteria for treatment response, they were less likely to achieve response than those with other causes of pain. Our findings are limited in their generalizability due to bias from participant self-selection, and open-label study design. Nonetheless, our data complement those from RCTs, shedding further light on inter-individual variability in treatment response and the potential opioid-sparing effects of CBPMs.

Keywords: Medical cannabis, Cannabinoids, Chronic pain, Pain phenotypes, Observational study

P-42

Chronic Pain

National Survey of British Public on Experiences of Living With Persistent Pain: A Co-Production Between Patient Representatives and Professionals

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BACKGROUND: The Patient Voice Committee (TPVC) of the British Pain Society (BPS) is comprised of people affected by persistent pain (primary or secondary) and a small number of healthcare professionals from the BPS Council. Its mission statement includes supporting people with persistent pain, healthcare professionals (HCPs) and the public in managing pain, offering BPS members access to the lived experience of persistent pain, and to maintain an overview of pain services and options for self-management. As the UK emerged from the impact of the COVID-19 pandemic, TPVC decided to learn more about the experience of people with persistent pain across UK, by conducting a national survey, conducted by the BPS and disseminated via social media.

AIMS: 1. To build a picture of how persistent pain affects the spectrum of British population.

2. To understand the issues confronting people with persistent pain in accessing help and services in primary and secondary sectors.

3. To learn how self-management formed part of peoples' approach to living with pain.

METHODS: A questionnaire was co-designed and piloted by lay and professional members of TPVC, with other member of BPS Council and several changes were made over many months. Questions covered: demographics; type of pain condition; sources of information and help; referral pathways; experiences of pain clinics/pain management programmes (PMPs)/ community services/ out of hours services; effects of the pandemic. Open-ended questions asked how

services and pain experiences could be improved, including prioritising helpful resources. The survey was anonymous – no names, postcodes or medically identifiable data were asked. Email addresses were only requested if participants wished to be contacted again. Because we did not obtain any identifiers and patients had a completely free choice to participate, we did not require formal ethical approval. The final version was disseminated via the website and the BPS' social media – twitter, Facebook. The survey was open for 2 months. The dataset of responses was shared between BPS professional members who conducted descriptive analyses on the quantitative data; and a narrative and thematic analysis on free-text responses.

RESULTS: There were 825 respondents, 97% completing the survey themselves. 74% were aged from 36-65 years. Three quarters lived in England, the rest from each UK country. 79% identified as female. 89% were White-British. The commonest pain conditions were fibromyalgia (chronic widespread pain) 47%; MSK pain 40%; neuropathic pain 33%; complex regional pain syndrome 29%; headache 16%; visceral pain 6%; cancer-related pain 1%. Commonest sources of help were from GPs 88%; physiotherapists 66%; rheumatologists 42%. 70% of respondents had been referred to pain clinics, mostly by GPs. 30% had waited over 5 years from onset of pain to referral. A third of patients had waited over a year to be seen. Travelling distance was a common issue. 35% reported being referred to a self-management support programme or Pain Management Programme (PMP), most by their GPs. With respect to pain services in the community, only 9.5% responded 'Yes'. On the other hand, 95% reported using self-management approaches, with 76% learning self-management skills without professional help. Most learning of self-management came from the internet (62%). Extensive free-text responses amplified the quantitative data and reveal many harrowing experiences but also positive comments on how these could be improved.

CONCLUSIONS: BPS TPVC's survey is the first co-produced British survey of how persistent pain affects the lives of people with this condition. It shows that seeking views via social media and the BPS website is a valuable resource to improve the work of BPS. A follow-on survey is currently open on the respondents' experiences of pain medicines. TPVC acknowedges the contribution of Dr Helen Bolter, who died during this work.

Keywords: Persistent pain; national survey; patient involvement; pain services; self-management

AuthorToEditor: This abstract results from the co-production of a national survey led by patient representatives of the BPS. If it is accepted for presentation, ideally at least one or two lay members of TPVC should be allowed to attend. The main presenter (SH Ahmedzai) is attending anyway. Please note that we wished to add another co-author - Dr Helen Bolter who was a patient/carer member of TPVC. She contributed a lot to the design of the survey but died after it was closed and as we were conducting the analysis. Unfortunately the abstract submission system only allow for 10 contributors, so I have added a brief acknowledgement at the end of the abstract.

P-43

Chronic Pain

Chronic Pain and Health-Related Quality of Life After Whiplash Injury in Iceland

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BACKGROUND: Neck pain is a highly prevalent condition and one of the many complaints of whiplash-associated disorders (WAD), which are common injuries associated with car accidents where one car crashes into another, usually from the rear end. A whiplash injury is a global health problem and a significant financial burden for both health care systems and insurance systems. WAD is a source of disability that can lead to limited workability, chronic pain and a decrease in health-related quality of life (HRQoL). About 45% of patients with WAD present mild initial symptoms, which mostly regress within two months. The symptoms can persist for years. The onset of discomfort (WAD) may be delayed for up to 12-15 hours with complaints such as neck pain, thoracic and lumbar spine pain, upper limb paresthesiae, headache, and balanced disturbances (e.g. dizziness). Early intervention has been shown to be more effective in reducing pain-related disability.

AIMS: To describe the pain severity, pain interference and HRQoL among those who have had whiplash injury for more than 12 months compared to those who responded to the ICEPAIN nationwide study having chronic pain but not whiplash. METHODS:This is a cross-sectional study, and the data was collected as a part of the ICEPAIN nationwide study through a web-based platform where 12.400 individuals aged 18-80 years were invited to participate. Information was collected on pain severity (0-10), pain interference (0-10), HRQoL (physical component scores (PCS) and mental component scores (MCS)), as well as access to and use of pain-related health care services. Response from those who had whiplash more than 12 months ago were compared to those without whiplash.

RESULTS: Five thousand five hundred fifty-seven responded, whereas 929 had whiplash over 12 months ago. Women were more likely to have had whiplash than men. The most common body location with pain was the head and shoulder region for those with WAD (78.1%), followed by the lower extremities with 66% and around 47% had pain in the lower back, the hip region, and the upper extremities. The mean age (52.5 years) of those who had whiplash was significantly lower than those without whiplash (55.3 years). Individuals with whiplash also had a significantly higher Body Mass Index (29.2 vs 28.5), pain interference (3.4 vs 2.6) and pain severity (4.1 vs 3.3) ($p<0.001$). When comparing the physical and mental component scores between those groups, those with whiplash had significantly lower scores, whereas the PCS was 44.7 vs 49 and the MCS was 46.7 vs 49.3. Persons with whiplash injuries were also more likely to have chronic pain (≥3 months), with an odds ratio of 2.46, or 58.5% vs. 36,4%. Comparing the need, access, and use of pain-related health care services among participants with pain in the study, 27.2% of those with WAD had much or very much need for health care services compared to 20.4% of others with pain. The proportion of those with pain that had used health care services in the last six months was significantly higher among those with WAD or 66.4% vs 54.5%, and a higher proportion of those with WAD (19%) had insufficient or no access to health care services compared to 14.5% of others with pain.

CONCLUSIONS: These results indicate that those with whiplash injuries are experiencing more pain, and their pain interferes more with their daily activities and negatively affects their HRQoL compared to others with chronic pain. More attention and intervention from the health care services is needed in the early stages for those who have whiplash.

Keywords: Chronic pain, Health related quality of life, Whiplash

P-45

Chronic Pain

Activation of μ Receptors by SR-17018 Occurs through a Mechanism that is Distinct from Other Agonists

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BACKGROUND: Agonists at μ opioid receptors relieve acute pain through G protein mediated cellular signalling pathways, which involve inhibition of adenylyl cyclase, activation of inwardly rectifying K+ channels and inhibition of voltage-activated Ca2+ channels. However, their long-term use is limited by side effects including tolerance and hyperalgesia, which involve signalling mechanisms mediated by a protein called β-arrestin2. Agonists biased against β-arrestin2 recruitment to the μ receptor may therefore be advantageous, particularly for treating chronic pain. However, the current classification of agonist bias has been compromised by non-physiological assays utilising overexpressed μ receptors in heterologous cell lines which overestimate the efficacy for G-protein activation compared to β-arrestin2 recruitment. Assays of the impact of G protein signalling are generally indirect often assessing inhibition of the enzyme adenylyl cyclase by measuring intracellular cAMP. The combination of receptor over expression and signalling amplification has led to the erroneous classification of biased agonists.

AIMS: There is a need to re-evaluate the pharmacology of agonists in the cAMP assay with restricted μ receptor availability to determine their true efficacies. These can then be correlated with their efficacies in the β-arrestin2 recruitment assay. Identification of truly G protein biased agonists may be transformational for improving the long-term treatment of chronic pain.

METHODS: Receptor availability was depleted in PathHunter CHO cells (grown in 96 well plates), which stably over-express μ receptors. This was achieved by pre-applying the irreversible antagonist, β-funaltrexamine (β-FNA), and comparing efficacies and apparent potencies of twelve μ receptor agonists, including several previously reported as biased, in β-arrestin2 recruitment and cAMP assays. Control cells had full receptor availability. G protein signalling was measured in cells transiently transfected with pGloSensor-22F cDNA (Promega) enabling luminescent measurement of intracellular cAMP. Recruitment of β-arrestin2 was established using the DiscoverX protein complementation assay. See Singleton et al., Br J Pharmacol. 2021,178:1855-1868 for full methods. RESULTS:In control cells with full receptor availability all agonists had partial efficacy for stimulating β-arrestin2 recruitment relative to DAMGO, while only TRV130 and buprenorphine were partial agonists as inhibitors of cAMP accumulation. Limiting receptor availability by prior exposure to β-FNA (100 nM) revealed morphine, oxycodone, PZM21, herkinorin, U47700, tianeptine and U47931e are also partial agonists in the cAMP assay. The efficacies of all agonists, except SR-17018, correlated between β-arrestin2 recruitment and cAMP assays, with depleted receptor availability in the latter. Furthermore, naloxone and cyprodime exhibited non-competitive and only limited competitive antagonism of SR-17018 in cAMP and β-arrestin2 recruitment assays, respectively. SR-17018 only negligibly diminished β-arrestin2 recruitment stimulated by DAMGO (1 μM), whereas fentanyl, morphine and TRV130 all exhibited the anticipated competitive inhibition.

CONCLUSIONS: SR-17018 achieves bias against β-arrestin2 recruitment through interactions with μ receptors outside the orthosteric agonist site. The efficacies of all opioid agonists tested, except SR-17018, in cAMP and β-arrestin2 recruitment assays strongly correlated when receptor availability was restricted in the former. Our findings agree with other recent studies concluding that, instead of being biased, as reported elsewhere, herkinorin, PZM21, TRV130 and buprenorphine are simply low efficacy agonists. Additional pharmacological analysis of SR-17018 revealed that it achieves bias against β-arrestin2 recruitment through interactions with μ receptors outside the orthosteric agonist site. This study establishes approaches for identification of truly G protein biased agonists that may be transformational in the future for improving the long-term treatment of chronic pain.

Keywords: Opiate, analgesic, dependence, drug discovery, side effects

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Chronic Pain

Chronic Pain, Lifestyle, Adverse Life Experiences and Health-Related Quality of Life, a First Step in a Longitudinal Population Study – Icepain Study

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BACKGROUND: Pain is a complex and subjective experience, a vital warning signal to the body's protective system comprising biological, psychological, and social aspects. When pain persists over longer periods it usually loses its purpose and turns into a chronic and often limiting health problem with a profound impact on individuals and society. Chronic pain often arises from a series or combination of multiple events and health-related behaviours as well as life experiences, and their outcomes are important factors in the genesis and impact of chronic pain.

The ICEPAIN study project entails multiple studies of pain in a sample of the Icelandic general adult population (18-80 years) where pain of various types (acute, subacute, chronic) is investigated in relation to variables such as Health-Related Quality of Life (HRQoL), lifestyle factors and adverse life experiences, aimed to investigate complex relationships between these variables.

AIMS: The ICEPAIN project's overall aims are to 1) create a database including extensive data about self-rated pain, lifestyle, adverse life experiences, and HRQoL in a general population; 2) describe the characteristics of pain and investigate the complex inter-relationships between pain, lifestyle and HRQoL, and how people utilize health care service for their pain; 3) investigate the multifaceted and complex inter-relationships between pain and diverse psychosocial factors and life experiences and stages.

METHODS: This is a cross-sectional study, but at the same time the beginning of a longitudinal project where participants will be

contacted again after 5 and 10 years. Data was collected through a web-based platform using a randomly selected sample of 12,400, aged 18-80 years from a population panel. To secure a proportional sample of men and women, in all age groups and people from all regions of the country, the sample was stratified in relation to gender, age, and residence. The instruments consisted of questionnaires on pain, lifestyle factors, adverse life experiences, HRQoL, experiences of chronic illnesses as well as need for, access to and use of health care services. Participants were asked for permission to be contacted again for similar data collection after 5 and 10 years.

RESULTS: The response rate was 45% (N=5,557) and a vast majority (81%) accepted to be contacted again for further participation in later data collections. Half of the participants (50.3%) had experienced some kind of pain the previous week and 40% had chronic pain (≥ 3 months). The most common causes of pain were 'wear and tear', osteoarthritis, and earlier injuries. The most common pain locations were shoulders (46%), low-back (40%), and knee (43%). Of those with chronic pain, 57% had consulted health care for their pain in the previous 6 months. The prevalence of chronic pain was inversely related to educational level and household income and positively related to body mass index. A statistically significant correlation was found between chronic pain and several lifestyle variables such as physical activity, smoking habits, and sleep, as well as adverse life experiences e.g. accidental injuries, abuse, or interpersonal violence.

CONCLUSIONS: These results indicate a complex relationship between chronic pain, lifestyle, and adverse life experiences. The longitudinal design will provide further information on long-term development between these variables.

Keywords: Chronic pain, lifestyle, adverse life experiences

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Chronic Pain

One Year Outcomes of 18FDG-PET-CT Assessment of Multifidus Activity and Radiomics Based Heterogeneity Analysis during Restorative Neurostimulation

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BACKGROUND: Restorative neurostimulation for chronic mechanical low back pain relies on stimulation of the L2 medial branch of the dorsal ramus to elicit episodic tetanic contractions of the lumbar multifidus muscle in order to restore neuromuscular control of the lumbar spine. Quantification of metabolic activity, heterogeneity using PET uptake measurements and radiomic based texture analysis on 18F FDG-PET/CT provide a unique opportunity to visualize and quantify changes in the segmental and entire lumbo-sacral length of the multifidus and paraspinal muscles along with activity in brain pain matrices in response to restorative neurostimulation therapy.

AIMS: This is first prospective study performing radiomic based CT and PET texture analysis and FDG uptake of multifidus muscle to quantify changes in muscle heterogeneity and uptake in patients with chronic back pain stimulated with Reactiv8 neurostimulation system.

METHODS: This single center study (Clin Trials Gov NCT04327817 and Rec 20/LO/0740) recruited 8 patients to undergo three 18F FDG-PET/CT at baseline, 6 months and 1 year following multifidus stimulator implant. 18F-FDG-PET CT was acquired on GE-Discovery 710 PET system with a 128 slice CT (approx. 250 MBq i.v). Baseline scans were performed with patients at rest while the six-months scan were obtained immediately after a 30 minute multifidus stimulation session. Metabolic activity within the brain and multifidus was quantified using maximum standardized uptake value (SUVmax). Low dose CT texture analysis (CTTA) of the multifidus muscle was performed to examine changes in heterogeneity within the multifidus muscles (using entropy as a parameter reflecting irregularity at pixel resolution).

RESULTS: Analysis of regions of interest in the superficial and deep multifidus showed a statistically significant increase in PET-FDG uptake (SUVmax) at L3, L4 and L5 levels when comparing baseline uptake (n=8) vs uptake at 6 months post-implant (n=8). Analysis showed that there was also a statistically significant increase in SUVmax in the superficial multifidus when comparing baseline to 1 year post implant at the L3, L4 and L5 levels - in the case of the deep multifidus muscle there was a statistically significant increase in SUVmax when comparing baseline to 1 year post implant at the L3 and L4 levels. CTTA (entropy) ($p<0.001$ and $p=0.004$) between post-stimulation at 6 and 12 months with baseline scans within the deep multifidus muscle from L1 to L5 level. Increased metabolic activity and heterogeneity below the stimulated spinal level, suggests that there is extensive muscle activation in the lumbar region, consistent with the electrophysiological findings1.

1. Kang YM, Choi WS, Pickar JG. Electrophysiologic evidence for an intersegmental reflex pathway between lumbar paraspinal tissues. Spine 2002;27:56–63.

CONCLUSIONS: This is the first human study elucidating the mechanism of action for multifidus stimulation using 18FDG-PET/CT uptake and texture analysis. Although the stimulation target is L2 Dorsal ramus, first time in humans a significant increase in PET-FDG uptake (SUVmax has been demonstrated in L3-L5 suggesting the muscle activation. We hypothesize that these changes may be attributable to specific aspects of the restorative mechanism.

Keywords: Chronic low back pain, Restorative Neurostimulation, FDG-PET, Textural Analysis, Multifidus

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Chronic Pain

2 Year Long-Term Outcomes for Spinal Cord Stimulation for Persistent Spinal Pain Syndrome Type 1 – A Prospective Single Arm Tertiary Care Centre Study

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BACKGROUND: Spinal cord stimulation (SCS) is a successful treatment in patients with intractable neuropathic pain. Traditionally the therapy is used in patients who have chronic neuropathic pain following failed back surgery syndrome (FBSS). There is emerging evidence of SCS being used in patients with intractable neuropathic back pain who have not undergone previous spinal surgery (PSPS Type 1).[1,2,3] The aim of this study is to investigate the effect of SCS on functionality, quality of life and adverse events in the patients comprising the study population.

AIMS: The primary objective of this study is to investigate the clinical response following implantation of the Boston Scientific Wavewriter with 1KHz neurostimulation in patients who suffer from chronic neuropathic pain and have not undergone any spinal surgery (PSPS Type 1). The secondary objective will be to investigate the effect of other suitable frequency (FAST/microburst) on pain, functionality, quality of life, medication reduction and adverse events in the study population.

METHODS: This study is a single-centre pilot study. Patients with intractable neuropathic pain (n=30) due to undergo SCS with Boston Scientific Wavewriter as part of their standard treatment were recruited. Pain scores (NRS) and data from self-report questionnaires – Oswestry Disability Index (ODI), Pain and Sleep Questionnaire (PSQ), EQ-5D-5L and economical resource questionnaire; was collected pre-implant and at 1 month, 3 months, 6 months, 12 months and 24 months post-implant.

RESULTS: Mean NRS for back, leg and overall decreased from 7.77, 7.23 and 7.46 respectively at baseline (n=30) to 4.18, 3.47 and 4.03 respectively at 12 months ($p = 0.0011$, $p < 0.0001$ and $p < 0.0001$) (n=19) and 3.5, 3.00 and 3.25 respectively at 24 months ($p = 0.0319$, $p = 0.0044$ and $p = 0.0096$) (n=8). Mean ODI score improved from 55.1 at baseline (n=30) to 42.5 at 12 months ($p = 0.0218$) (n=17) and 27.2 at 24 months ($p = 0.1259$) (n=7). There was also an improvement in mean EQ-5D-5L index from 0.35 at baseline (n=30) to 0.66 at 12 months ($p = 0.0008$) (n=17) and 0.85 at 24 months ($p < 0.0001$) (n=7). There was also a significant improvement in mean EQ-5D-5L VAS and PSQ-3 scores. MQS III (Medication Quantification Score) calculated for pain medicines fell from 17.48 at baseline (n=30) to 10.74 at 12 months ($p = 0.0404$) (n=19).

11 patients in total were withdrawn (3 lead migration, 4 high impedance, 3 loss of therapy, 1 personal circumstances).

CONCLUSIONS: This single centre pilot study demonstrates marked improvements in pain severity, sleep, self-efficacy and quality of life parameters in PSPS type-1 patient population that were shown to be maintained at 24 months post implant. In line with previous studies, SCS can be an advance spine-surgery sparing pain management option for this group of patients where surgery would not be appropriate based on pathology or risk/benefit.[1,2,3]

Keywords: chronic pain, neuropathic pain, lower back pain, spinal cord stimulation, Persistent Spinal Pain Syndrome - Type 1

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Chronic Pain

A Twelve-Month Retrospective Survey of Inpatient Acute on Chronic Pain Referrals Made To Acute Pain Services, in a UK Tertiary Hospital

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BACKGROUND: Patients admitted to hospital with acute on chronic pain are usually managed by the admitting team, who may be unfamiliar medication and interventions used by chronic pain services. During the acute admission, the approach to manage pain is often reactive with temporary short-term solutions. These patients may end up being discharged on high doses of opioids, with no clear plan regarding pain management or de-escalation; more analgesics than baseline and the added issue of increased side effects of high dosage; with a long-term risk of relapsing from managed chronic pain and leading to a poor quality of life.

AIMS: • Review chronic pain patients referred to acute pain services in last 12 months.

• Assess what support was provided by pain services and if there were any limitations.

• Provide recommendations to current service provider.

METHODS: Referrals made between October 2022-october 2023 to pain services were identified using a filter on the hospital referral system and manually reviewed by two independent Doctors. Data was collected on reasons for referral, number of medications, advice sort and advice given. Any factors of vulnerability or number of medications, repeat referrals or admissions. Those identified as relapse of managed chronic pain due to parent team stopping medication and if adequate provisions were put in place.

RESULTS: 981 patients were referred to the pain services, of which 200 were chronic pain patients with acute pain issues. All 200 of the patients referred due to poor pain control, requiring specialist support. The common factors found for poor patient management included abrupt discontinuation of long-term medication, support required regarding dose titration of neuropathic medication and associated side effects, clarity regarding interventions used by chronic pain services and if this could be offered during pain relapse, especially to prevent high dosage alternative medication. The acute pain nurses highlighted no further support could be offered to 102 of the chronic patients referred, supporting the plan made by the admitting team, however 84 was identified as needing more advice from chronic pain services, to better support the patient and team managing the patient. However, over this time-period only 4 patients were seen or discussed with the chronic pain services as an inpatient. More than half the patients reviewed required two or more inpatient admissions, to assist in pain management and 37.5% were discharged on higher doses of opioids with no clear de-escalation plan.

CONCLUSIONS: Improvement is required in the current pain services to manage patients with chronic pain. Transitional pain services with input from chronic pain team has the potential to improve patient experience and acute on chronic pain management. This would also help to avoid repeated admissions, prevent long hospital stays, empower patients in managing this acute state, returning baseline pain control and enhance their quality of life.

Keywords: Acute on Chronic pain, Transitional pain service, Chronic pain, Inpatient pain, Service review

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Chronic Pain

Barriers and Facilitators of Self-Management in Patients with Low Back Pain: A Systematic Review of Qualitative Literature

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BACKGROUND: Low back pain (LBP) is a common condition affecting over half-a-billion people worldwide and is the largest cause of disability, resulting in a significant global economic burden, the national guidelines recommend self-management alongside other interventions for individuals with LBP. Self-management refers to one's ability to manage their LBP, treatments, physical and

psychosocial consequences, and lifestyle changes inherent in living with LBP. Evidence suggest positive effects of self-management on health-related outcomes and economically as fewer patients sought hospital care, reducing costs.

AIMS: This updated systematic review of qualitative studies aimed to identify and synthesise the barriers and facilitators by considering all forms of self-management in adults (over 16 years) with LBP pain from the narratives of patients and healthcare professionals.

METHODS: Three databases (MEDLINE, CINAHL and AMED) were systematically searched from 2012 to 2022. The search strategy followed the three-phase process of the Joanna Briggs Institute (JBI) manual. Peer-reviewed qualitative research reports, published in English language, exploring and reporting barriers and facilitators of self-management in patients with LBP were included. For data synthesis, inductive thematic analysis was used.

RESULTS: 28 papers were identified. Four key themes emerged: (1) patient mindset and personal traits; (2) environmental factors and circumstances; (3) knowledge and competency; and (4) feeling supported by healthcare professionals. 32 sub-themes were identified including 19 barriers and 13 facilitators to LBP self-management reported from patient and healthcare professional perspectives.

CONCLUSIONS: This systematic review found barriers and facilitators of self-management in patients with LBP using qualitative data from the perspectives of patients and healthcare professionals. Patient-specific factors were the main barriers and facilitators to self-mange low back pain alongside non-patient factors such as culture, the surrounding environment, and circumstances. The ability to self-manage LBP was also influenced by healthcare professional-related factors such as the clinician's competence in facilitating patients with self-management. The clinical implications of this systematic review could be viewed on two levels, a patient level and a healthcare professional level. On a patient level, having an awareness of factors that deter and encourage patients from engaging with self-management, modifications can be made to enhance the uptake of self-management. Similarly, on a healthcare professional level, knowing the factors preventing clinicians from offering self-management can facilitate change in the clinical environment.

Keywords: Back pain, self-management, barriers, facilitators

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Chronic Pain

How Do Psychosocial Aspects of Everyday Life Influence Chronic Pain Transitions?

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BACKGROUND: Chronic pain poses considerable personal and economic burden on society, affecting a substantial portion of the UK population, around 28 million adults. Following the IASP Classification of Chronic Pain for the International Classification of Diseases (ICD-11) we define chronic pain as pain that persists or recurs for longer than three months. Despite wide recognition of the psychosocial aspects of pain, we know little about the ways in which social and individual circumstances may relate to transition into or out of chronic pain.

AIMS: The aim of this research is to characterise the role of individual, social and community contexts on transition into and out of chronic pain.

METHODS: Using ethnographic approaches drawn from social science, we are spending a period of 12 months with people who live with chronic pain. To date, 13 participants with pain have been identified through Avon Longitudinal Study of Parents and Children, all of whom are around 30 years old. Data collection has comprised of interviews and periods of shadowing (observations) with participants and members of their immediate social circles in homes and local communities. Data comprises field notes, audio-recorded interviews and visual materials, including photographs. Using inductive thematic analysis we have worked to identify key ways that people make sense of their pain transitions in relation to everyday lives.

RESULTS: Early analysis indicates that pain transitions are interconnected with social phenomenon. What we mean by social phenomenon, are such things as the quality of relationships with friends, family and employers, lifestyles, hobbies and activity within the daily routine of everyday life. Pain transitions tend to be influenced by a collection of social phenomena that change together. As such, alterations in close relationships or lifestyle are not isolated events and play a considerable and important role in the onset, maintenance or reduction in chronic pain.

CONCLUSIONS: Interventions that focus on improving the quality of these relationships may provide an additional way to support people with chronic pain alongside existing interventions and approaches. This study highlights the importance of addressing the broader social context in which individuals navigate their lives.

Keywords: Chronic pain, psychosocial, transitions, ethnography, interviews

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Chronic Pain

Middle Cluneal Nerve Injury: A Predictable Cause of Transient Buttock Paraesthesia After Sacroiliac Joint Radiofrequency Neurotomy

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BACKGROUND: Sacroiliac joint radiofrequency neurotomy is a safe and effective treatment for posterior sacroiliac joint pain, with a reported adverse event incidence of 0.02% [1]. Transient buttock paraesthesia is one of these rare adverse events [2].

AIMS: We present a case report of a patient with transient buttock paraesthesia following sacroiliac joint radiofrequency neurotomy, in keeping with the skin distribution of the middle cluneal nerves and wish to suggest the anatomical mechanism behind this complication.

METHODS: The principal goal of sacroiliac joint radiofrequency neurotomy is to anaesthetise the lateral branches of the sacral dorsal rami from S1 to S3 and the fifth lumbar dorsal ramus [3]. The lateral branches of each sacral dorsal ramus anastomose with each other forming the posterior sacrococcygeal plexus, between the posterior sacral foramina and the lateral sacral crest [4].

The middle cluneal nerves are also formed from branches of the sacral dorsal rami via the posterior sacrococcygeal plexus, meaning that the middle cluneal nerves and the posterior sacroiliac joint have a shared sensory origin and so branches of the middle cluneal nerves are at risk of intentional injury during successful sacroiliac joint radiofrequency neurotomy [5].

RESULTS: The posterior sacrococcygeal plexus merges into medial and lateral trunks before forming mature middle cluneal nerve fibres, caudal to the posterior superior iliac spine and lateral to the long posterior sacroiliac ligament, with nerves traversing above and below the ligament [5,6]. We postulate that lesioning of the larger trunks and fibres is likely to cause larger, more discrete and concentrated injuries. The likelihood of this type of injury is therefore greater with more lateral probe placements, either on or near to the lateral sacral crest.

CONCLUSIONS: Some or all the middle cluneal nerve fibres may be injured during successful sacroiliac joint radiofrequency neurotomy. This adverse event is predictable, although the clinical effect is reportedly extremely rare, and so could be mentioned as a possible complication during procedural consent. We caution against using the lateral sacral crest as a landmark for the procedure because this is likely to be associated with more severe injuries.

Keywords: Radiofrequency neurotomy, buttock paraesthesia, middle cluneal nerve

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Chronic Pain

A 4-Year Retrospective Observational Clinical Study of Nerve Root Block and Utilisation in the Management of Radiculopathy – NHS Grampian

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BACKGROUND: Nerve Root Injections (NRI) is one of the many existing treatment methods used extensively in the management of degenerative radicular pain in the lumbar and cervical regions. NRI are aimed at patients with positive radiographic degenerative spine changes, providing a varying degree of symptomatic relief from short (3 weeks) to long term (12 months) and even having the potential to avert the need for surgical intervention. (1) When combined, steroids and local anesthetics provide radicular pain relief by blocking two main pathways; 1) prevention of pain propagation through the nerves by the local anesthetic and 2) averting the inflammation cascade around the nerve root by the steroids. Surgical intervention is usually preserved for patients who have failed both the conservative management and nerve root injection however it must be noted that recent Randomized Controlled Trial (RCT) has found no difference between microdiscectomy and transforaminal NRI in managing functional disability caused by persistent radicular pain in patients with prolapsed intervertebral discs. (2) The cost-effectiveness of NRI when compared to surgical intervention, cannot also be underestimated.

AIMS: The Aim of this project is to assess the overall effectiveness of nerve root injections as a treatment option for patients with MRI positive degenerative changes and radiculopathy in NHS Grampian.

METHODS: Study design / Setting: Clinical auditA total of 346 patients who have undergone at least one NRI and no prior surgical intervention between January 2018 to July 2023 within NHS Grampian were isolated; 25% were excluded during data collection as they had previous surgery prior to any NRIs. Trackcare (Grampian electronic records) and PACS imaging were reviewed to assess the number, the effectiveness of NRI and progression to surgical intervention. Outcomes obtained from clinical notes include effectiveness in terms of duration of pain control, number of repeat injections and after how long, number of patients that go on to have surgical intervention.

RESULTS: A total of 724 NRI were done for 346 patients. On presentation, 25%, 50% and 70% of patients reported a symptom duration of 1,2 and 5 years, respectively, and only 25% had symptom duration of more than 5 years. Mean duration between the first and second, second and third and third and fourth injections were 23.43, 38.01 and 17.88 months, respectively. A total of 346 patients had a first NRI and 45% reported more than 50% pain relief. A total of 169 patients received a second NRI and 32% had significant pain relief. A total of 80 and 40 had a third and a fourth NRI respectively and 41% and 60% of patients reported significant pain relief. Fifty-two (15%) patients progressed to have surgery and there was no statistically significant difference in the mean number of NRIs between the group that had surgery vs the group that did not. Of those, 21 patients (40%) came back for further NRIs.

CONCLUSIONS: Nerve root injections are a good management option for patients with radiculopathy in the presence of radiographically positive compromise. Surgical intervention does not completely deter further use of NRI. NRIs are more cost effective to surgical management.

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Keywords: Nerve Root Injections (NRI), Sciatica, Prolapsed intervertebral disc, Microdiscectomy

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Chronic Pain

Real World Experience of CBD in Fibromyalgia – A Rheumatology Outpatient Survey

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BACKGROUND: Cannabidiol (CBD) is now widely available off prescription and is commonly enquired about by chronic pain patients. The evidence for its effectiveness in fibromyalgia is weak, though there remains much patient and media interest. Similarly, in Europe, over the past decade, self-reported use of cannabis within one month has increased by roughly 25% in people aged 15-34 years and almost 80% in people who are 55-64 years.

AIMS: To assess the frequency of CBD products use among fibromyalgia patients and the effectiveness of these products.

METHODS: Patients diagnosed with fibromyalgia referred as new patients to a rheumatology clinic over one year were asked about CBD use alongside routine medication history. An Excel spreadsheet was used to record the qualitative data. The postcodes of the patients were used to generate the indices of multiple deprivation (IMD). IMD datasets provide small area measures of relative deprivation across the constituent nations of the United Kingdom. Each nation ranks areas

from the most deprived (score 1) to the least deprived (score 10). While each nation has its own data portal, they measure deprivation slightly differently. However, common themes include income, employment, education, health, crime, barriers to housing and services, and the living environment.

RESULTS: Data was available on 37 patients. The mean age was 40 years. 34 patients were female; 3 patients were male. Mean duration of fibromyalgia symptoms was 10.4 years. Mean deprivation index was 7.6 for the whole group. 5 patients, all female, reported current or previous CBD use to manage their pain. Mean age of CBD users was 27 years. Mean deprivation index among CBD users was 8.2 compared to 7.6 for the whole group. Only one CBD user reported a benefit. 8 patients reported being smokers and 2 patients consuming alcohol over the recommended units per week in the survey in the whole group. 16 patients reported no alcohol consumption. Analysing the data revealed, 1 patient used CBD along with neuropathic pain drugs for their management of pain. 6 patients used neuropathic pain drugs without CBD products. 1 patient used opioids along with CBD products. 10 patients used opioids without CBD products. 0 patients used antidepressants along with CBD products. 18 patients used antidepressants without CBD products. 3 patients used neither neuropathic pain drugs, opioids and antidepressants but used CBD products. 8 patients used neither CBD products, neuropathic pain drugs, opioids and antidepressants.

CONCLUSIONS: This small but real world study shows a perhaps surprisingly low ever use (13%) of CBD among patients referred to secondary care. Use seems to be more common among younger patients, as might be expected. Our patient group as a whole showed relatively low deprivation. Despite only one out of five users benefitting this might be seen as leaving CBD as an option in patients for whom other drugs often have limited efficacy, and significant potential side effects. One issue is cost, which is likely to be an issue for a group of patients from relatively deprived backgrounds. The cheapest CBD product from Holland and Barrett costs £14.99. Relatively low alcohol intake was reported overall. Conversely, relatively high use of antidepressants, opioids and neuropathic drugs was seen in the group as a whole, reflecting perhaps more severe symptoms of longer duration, and the need to find safer and more effective treatments for this common and disabling condition.

Keywords: cannabidiol, CBD, fibromyalgia, chronic pain

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Chronic Pain

Longitudinal Study of an Embodied-Self-Concept & Its Potential Impact Upon Adjustment & Acceptance in Chronic Non-Specific Lower Back Pain in Females

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BACKGROUND: Analgesia and medical and surgical interventions have little impact in reducing the unpleasantness and intensity of chronic non-specific low(er) back pain (CLBP) and access to Pain Management Programmes is limited with inconsistent results. Undeniably, individuals need to learn to live with their pain; however, one's self (-concept), their relationship with/to their body (an embodied-self-concept) and their relationship to their pain may change over time potentially impacting upon pain adjustment/acceptance and is not yet fully understood. Chronic pain (CP) research within the counselling literature is conspicuous by its absence particularly when one considers that CP prevents the pain sufferer from maintaining their pre-pain-self. This can initiate the search and construction of a new identity (Hellström, 2001) which suggests that self-perception changes throughout the pain journey and is implicated in (non-) adjustment in CP. How one alters their self and contributory factors have not yet been fully explored.

AIMS: This study explores how one's embodied-self-concept and might influence an individual's perceived ability to accept/adjust to their CLBP and if this changes over time. Receiving support may influence adjustment/acceptance of CLBP, and this study seeks understanding of what those with CLBP want/need when their pain is self-managed outside of specialist pain services as these are currently unknown. Acceptance of CLBP is associated with improved life quality and a new dynamic model of change in CP which can accommodate the changing embodied-self and allow for movement between CP-acceptance/adjustment, non-acceptance/non-adjustment and anti-acceptance/non-adjustment over time is required to inform psychological practice.

METHODS: A longitudinal multiple-case-series over 19 months using mixed-methods triangulation convergence/corroboration of three female participants explored the (potentially) changing embodied-self, from the pre-pain self to the present. Each meeting at approximately 9-monthly intervals consisted of semi-structured interviews and two measures: one explored CP-acceptance (Chronic Pain Acceptance Questionnaire: CPAQ) the other, dissonance between self-aspects (Possible Selves Measure in Chronic Pain: PSM-CP). The semi-structured interviews looked at backwards in time i.e., Interview1 explored pre-pain to 6 months into pain, Interview2 explored 6-12 months into pain and Interview3 12-24 months and all interviews also looked at today (the time of interview).

RESULTS: Changes in the embodied-self-concept and related behaviours (e.g., task-persistence) were motivated by participants' self-concept goals in growthfull and not-for-growth directions, thus self-acceptance and CP-acceptance are inextricably linked. The participants' painful body part was placed 'outside' of the self as a separate entity demanding care and attention, often leading to de-selfing (a phrase borrowed from Lerner, 2004) and impacted upon intimate relationships as a 'third person'. The participants were often fearful and experienced shame, blame and two experienced suicidal ideation. However, counselling was not advocated by GPs and was not a consideration by participants. Self re-evaluations occurred at choice-junctions influencing behavioural goals/motivations mediated by psychological agility and psychological rigidity.

CONCLUSIONS: Counsellors working in private practice and primary care with the necessary skills and knowledge are well placed to work with CP. Cultural and societal shifts in a non-dualistic understanding of CP and its treatment/management may make counselling a more acceptable adjunct. A new model of change in CP has been developed highlighting the role of psychological agility, choice junctions and self-re-evaluation as key components to/in change in both growthfull and non-growthfull directions. Behaviours are motivated by self-dissonance/congruency, an embodied-self-concept and a search for life meaning/purpose, a sense of social responsibility and the avoidance of social pain. Positive/adaptive change is possible outside of specialist pain services, highlighting the role of the organismic valuing process's actualising tendency (Rogers, 1959; 1961) and/or 'psychological agility'. These place the embodied-self and other's perceptions of self central to acceptance/adjustment in CP. The wholesale adoption of the Buddhist-informed definition of CP-acceptance has been challenged.

Keywords: chronic pain, female, non-specific lower back pain, acceptance, self-concept

AuthorToEditor: This was submitted as a thesis to the University of Chester as part of a Professional Doctorate in Counselling & Psychotherapy (Psychological trauma).

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Chronic Pain

Validation of a Questionnaire for Central Nervous System Aspects of Joint Pain: The Cap Questionnaire

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BACKGROUND: Chronic joint pain is associated with dysfunctional pain pathways within the central nervous system. Our previous research has examined these pathways in people with knee pain, and developed a questionnaire called CAP-Knee which measured a `Central Aspects of Pain' factor (CAPf).

AIMS: In this study, we aimed to expand the target population, and we developed and validated the Central Aspects of Pain questionnaire (CAP) to measure CAPf in people with all types of joint pain.

METHODS: CAP-Knee was modified slightly to derive the CAP questionnaire. 4 items were modified, usually to include "joint" instead of "knee" and the lead question was altered to ask about all joint pain. 4 items remained unaltered from the original questionnaire. CAP used 7 Likert scale questions (items) asking about depression, anxiety, sleep problems, catastrophising, fatigue and cognition; additionally, participants marked painful areas on a body pain manikin/diagram.

The CAP questionnaire was completed by people in the Investigating Musculoskeletal Health and Wellbeing survey. Data were analysed for all people with joint pain, plus also 3 subgroups with osteoarthritis, back pain or fibromyalgia.

Correlation coefficients were used to examine the classification of the painful areas on the manikin, and to test CAPf against pain scores. Different rules for dealing with 1 or 2 missing CAP items (mean imputation) were examined using Bland-Altman plots to assess whether they biased the outcomes. Confirmatory factor analysis (CFA) assessed the validity of CAPf for measurement. Repeatability was determined in 200 people who completed the questionnaire on paper forms and electronically, and was analysed using Intraclass Correlation Coefficients (ICC).

RESULTS: Data were used from 3579 people (58% female, median (IQR) age; 71 (66 to 77) years. Diagnoses were OA (n=1158), back pain (n=1292) and fibromyalgia (n=177). Across the 3 diagnostic groups, correlation analyses showed that ≥10/26 painful area on the manikin could be used to score people with widespread pain. High repeatability of CAP was found between paper and electronic administration (ICC= 0.89 (95% CI: 0.84-0.92). Imputation of one missing item closely approximated to the true CAPf and did not appear to bias the CAP score. Questionnaire scores showed good fit indices within the CFA. As expected, higher CAP scores were associated with worse joint pain severity and higher scores on the subscales of the McGill Pain Questionnaire.

CONCLUSIONS: The CAP questionnaire appears to be a reliable instrument for use in epidemiological studies involving self-report. The Central Aspects of Pain factor (CAPf) was originally derived for people with knee pain, but these findings show that it can be examined when pain is at other joints (single or multiple). Further research could determine which specific pain mechanisms the CAP questionnaire could be used to measure, as CAP is a candidate instrument for assessing nociplastic pain.

Keywords: osteoarthritis, central sensitisation, back pain, fibromyalgia, nociplastic pain

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Chronic Pain

The Experiences of People Living with Obesity and Chronic Pain: A Qualitative Evidence Synthesis (QES)

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BACKGROUND: There is a substantial and progressive association between chronic pain (CP) and living with overweight or obesity. The relationship between obesity and CP is intricate and complex, with obesity being associated with increased pain-related disability, pain intensity, reduction in physical functioning and poorer psychological well-being. A Qualitative Evidence Synthesis (QES) provides an opportunity to better understand and reveal key areas within the patient experience of these complex interactions to inform best practice and future intervention design.

AIMS: The aim of this QES is to methodically and systematically review and synthesise the qualitative literature reporting on the personal experiences of people who are both living with obesity (PwO) and chronic pain.

METHODS: The phenomenon of interest of this QES is the lived experiences of PwO and CP. The following research question was developed using a modified Population, Intervention, Comparison,

Outcome and Study type (PICOS) framework: "What are the lived experiences of people living with obesity and chronic pain?"

A systematic search was conducted of five peer-review databases, resulting in 18,953 results which were then screened independently by two authors. Ten papers met the inclusion criteria and were included in the final synthesis using the synthesis methodology as previously described by Thomas and Harden, 2008. The methodological quality of included studies was assessed using the Critical Appraisal Skills Programme (CASP) and confidence in each of the findings was assessed using the Grading of Recommendations Assessment, Development and Evaluation Confidence in Evidence from Reviews of Qualitative Research (GRADE-CER-Qual) approach.

RESULTS: Line-by-line coding of each included study resulted in 250 unique codes which were developed into 37 descriptive themes. Descriptive themes were iteratively synthesised into five main themes. These themes were as follows: i. Primarily biomechanical ('wear and tear') understanding of pain as a foundation for a cluster of related beliefs; ii. The psychosocial impact and role of mood in pain amplification; iii. Altered food responses to pain; iv. Frustration with treatment approaches and healthcare professionals; iv. The role of self-efficacy while managing the burden of both chronic pain and living with obesity.

CONCLUSIONS: The disease burden of pain and obesity has been well-documented. This QES adds new depth to existing knowledge around the complex interaction between obesity and pain and the burden that PwO and CP experience. Addressing the comorbid pain of obesity is essential since people living with obesity tend to respond less well to pain treatments and management compared to people who do not have obesity. Health care professionals, policy makers, and funders need to consider the provision of services that address the holistic needs of PwO and CP. These holistic needs include addressing role of psychosocial factors, including depression, and moving away from a focus solely on weight loss towards a focus on health gains.

Ethics and dissemination: Ethical approval is not required to conduct this review. PROSPERO registration number: CRD42023361391

Keywords: Pain, chronic pain, QES, qualitative

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Chronic Pain

Breaking the Silence: Examining the Crisis of Evidence for Antidepressants in Chronic Pain Management

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BACKGROUND: Antidepressants are commonly prescribed for pain management and included in several national guidelines, including NICE guidelines for chronic primary pain and neuropathic pain. However, their efficacy and safety across pain conditions is unknown; a critical issue given their ubiquity in clinical practice.

AIMS: To examine the efficacy and safety of all types of antidepressants for all types of chronic pain.

METHODS: We undertook a systematic review with network meta-analyses (NMAs) to synthesize all randomised controlled trial evidence for any antidepressant, for any pain condition in adults. Primary outcomes were substantial (50% pain relief), pain intensity, mood, and adverse events.

RESULTS: The review and NMAs included 176 studies with a total of 28,664 participants. The most common pain conditions examined were fibromyalgia (59 studies); neuropathic pain (49 studies) and musculoskeletal pain (40 studies). The average length of studies was 10 weeks. The majority of studies measured short -term outcomes only and excluded people with low mood and other mental health conditions.

Across efficacy outcomes, duloxetine was consistently the highest -ranked antidepressant with moderate- to high-certainty evidence. In duloxetine studies, standard dose was equally efficacious as high dose for the majority of outcomes. Milnacipran was often ranked as the next most efficacious antidepressant, although the certainty of evidence was lower than that of duloxetine. There was insufficient evidence to draw robust conclusions for the efficacy and safety of any other antidepressant for chronic pain.

CONCLUSIONS: There are several important conclusions to draw:

- Duloxetine was the only antidepressant where there is certainty in its effectiveness

- A 60mg dose of duloxetine is equally as effective as a 120mg dose

- All evidence for amitriptyline was very low certainty

In light of this, it is essential that guidelines are updated to reflect these findings. Where multiple antidepressants are referenced, a standard dose of duloxetine should be recommended as the first course of action. Caution should be taken in using other antidepressants (particularly amitriptyline, citalopram, fluoxetine, paroxetine, and sertraline). Further research is critical in assessing the efficacy of other antidepressants in comparison to duloxetine, particularly amitriptyline.

Furthermore, randomised controlled trials of antidepressants for chronic pain are not representative of real clinical practice; participants with comorbidities, mental health conditions, and those taking other medications were commonly excluded. Very few studies collected data over more than three months. Further evidence embedded in real clinical practice is essential in establishing the true efficacy and safety of these drugs.

Keywords: antidepressants, chronic pain, NICE guidelines, amitriptyline, duloxetine

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Chronic Pain

National Survey of British Public on Experiences of Living with Persistent Pain: Follow-On Survey on Medicines Prescribed for Pain

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BACKGROUND: In late 2022, The Patient Voice Committee (TPVC) of the British Pain Society (BPS) undertook a national survey of experiences of people in UK living with persistent pain. This focused mainly on access to and patients' experiences with pain services. The results are presented at BPS ASM 2024 as a poster.

AIMS: In late 2023, a follow-on survey was undertaken to explore the same survey respondents' experiences with pain medicines.

METHODS: The new survey followed a similar structure Questions included: types of prescribed pain medicines; length of time prescribed; benefits and side-effects; information given on longterm use and sources of information. Most questions included a free text box for respondents to give more information.

Quantitative data are presented as numbers and percentages. Preliminary analysis of free text responses are grouped thematically.

RESULTS: 433 of the original 898 survey responders agreed to take part in further surveys. From the 405 follow-up emails sent, we received 225 responses (56% response rate).

87% of respondents were aged 36-75 years; 80% were female. Replies came from across England with smaller numbers from the other UK countries. 94% of respondents were White British. 87% identified as heterosexual. 39% reported being unemployed because of illness, disability or being a veteran; 26% were employed and 26% were retired.

Pain conditions were musculoskeletal (56%); fibromyalgia 52%; neuropathic pain (48%); CRPS 29%; headache and orofacial 19%; pelvic 10%; visceral 7%; cancer-related pain 1%.

87% of respondents took prescribed pain medicines. A minority (n=29) took no pain medication - of these, 35% had been stopped by the respondent; 17% stopped by a doctor. Free text responses indicated that medicines were being stopped by patients themselves because they no longer worked.

Commonest types of medicines prescribed for pain were opioids (60%); antidepressants (47%); NSAIDs (42%); oral anti-epileptics (34%); anti-migraine medicines (10%). 86% of respondents had taken medicines for over 2 years. 77% had experienced benefit from pain medicines; 13% had not. 67% had experienced side-effects from pain medicines; 29% had not. Free text responses yielded themes ranging from 'Significant benefit', to 'Some benefit from pain medicines or 'takes the edge off'. Some respondents were taking multiple medicines, eg "I take 26 different medications today and the number of tablets is 41. How could I differentiate about the worth of one?".

25% had received specific information about risks of taking pain medicines for longer than 3 months, but the majority (69%) had not. Information about risks of taking pain medicines long term came mainly from doctors (31%), from pharmacists (11%) or from another health professional (10%). Only 41% of respondents had been offered a pain review in the last 12 months.

The majority of respondents had also purchased over the counter (OTC) pain remedies or complementary therapies: 69% had bought pain treatments such as tablets or creams; 28% purchased herbal medicines; 42% had bought OTC cannabis based products.

CONCLUSIONS: This survey adds valuable additional insights into the use of pain medicines. It is of concern that many patients are using longterm analgesics without receiving information on potential risks and many report ongoing side-effects. The TPVC will continue to aid the BPS in championing for better delivered services.

ACKNOWLEDGEMENTS: We thank BPS President Professor Roger Knaggs and members of BPS Council for their support and advice in the co-production of the survey. We also thank Ester Zoroa and Louise Gorringe from Kenes for their assistance in uploading and testing the Survey Monkey questionnaire. We are also grateful to Christa Michaels and Catherine Jones of ITN News, for their early support of this survey; and for featuring some of these results in a Channel 5 News programme.

Keywords: Persistent pain, national survey, pain medicines, patient involvement

P-35

Cancer Related Pain

Improving Experiences of Those Living With Chronic Pain After Cancer Treatment: The Development of Clinical Recommendations

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BACKGROUND: Chronic pain is a common side effect of cancer treatment. Pain is frequently cited as a top concern and unmet need for cancer survivors. A series of studies sought to identify experiences of cancer survivors' living with chronic pain after cancer treatment and consider how their experiences can be improved.

AIMS: To identify the experiences of cancer survivors living with chronic pain after cancer treatment and consider how their experiences can be improved METHODS:Three sequent PhD research studies were conducted to understand support needs of cancer survivors living with chronic pain after cancer treatment: a qualitative evidence synthesis, a qualitative interview study with cancer survivors living with chronic pain and a quantitative survey with healthcare professionals. Findings from each study informed the development of the next study and clinical recommendations to improve experiences were drafted. These were discussed and refined in expert review panels and final clinical recommendations were produced.

RESULTS: A qualitative evidence synthesis found a paucity of studies (n-4), all of which focused solely on women with breast cancer. Pain sensations evoked memories of cancer diagnoses, treatment and subsequent threats to mortality and indicated this made pain harder to manage. Qualitative interviews with cancer survivors (n-19) identified difficult and frustrating interactions with healthcare services: survivors did not feel informed or prepared about ongoing pain, nor heard or believed. Support was hard to identify and access, and the responsibility of this was left to the survivor. They experienced being bounced between services, often slipping between the gaps in provision, and reported healthcare professionals had little knowledge about pain after cancer. However, validation of their pain by healthcare professionals was key to improving experiences. Healthcare professionals (n-135) acknowledged the significant

clinical burden of chronic pain but demonstrated mixed levels of understanding of its impact. Approximately a quarter reported they never, or rarely, talked, listened or signposted about chronic pain after cancer. Findings informed draft recommendations. These were reviewed and refined within expert review panels consisting of cancer survivors living with chronic pain after cancer and clinical, research and education experts (n-20). There was consensus that the recommendations reflected the PhD findings and the complexity of implementation was acknowledged.

CONCLUSIONS: Final recommendations include PAINS: - P: Prepare and inform people living with and beyond cancer about the risks of chronic pain after cancer treatment - A: Acknowledge and listen to experiences of living with chronic pain after cancer treatment - I: Increase healthcare professional knowledge about the risks, impact and management of chronic pain after cancer treatment - N: Name and diagnose chronic pain after cancer treatment to educate, inform and validate experiences - S: Supported self-management interventions are required to support those living with chronic pain after cancer treatment.

Keywords: chronic pain, cancer, experience, survivorship

P-36

Cancer Related Pain

How Do Tumour Derived EVS Interact With The Maturing Nervous System and Lead to Altered Pain Processing in Cancer Survivors?

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BACKGROUND: Childhood cancer-related pain and its treatment lack sufficient clinical attention due to limited understanding of the underlying mechanisms. While adult literature has extensively studied chemotherapy-induced peripheral neuropathic pain (CIPN), mechanisms in early life remain unexplored. In the CIPN literature there is a growing body of evidence for tumour derived factors altering pain processing.

AIMS: Our study aims to understand how tumour derived EVs interact with the developing nervous system and impact pain processing in childhood brain tumour survivors.

METHODS: We determined dose-response curves and IC50 values for several medulloblastoma (MB) cell lines using standard-of-care chemotherapy drugs: vincristine, etoposide, cisplatin, and lomustine. EVs were isolated via size exclusion chromatography and characterised through western blotting, flow cytometry and transmission electron microscopy (TEM). We quantified the effects of chemotherapy on EV release using ZetaView analysis. We then tested whether EVs from relevant MB cell lines could influence axon development in primary mouse embryonic day 16.5 dorsal root ganglion (DRG) neurons in vitro after pre-treatment with chemotherapy-treated EVs.

RESULTS: EVs from chemotherapy-treated and untreated cells exhibited similar size and shape. However, a combination of vincristine, etoposide, and cisplatin at low concentrations significantly increased EV secretion by MB cell lines. We are currently assessing the impact of these EVs on axonal length and growth in early-phase neuronal cultures of primary DRG neurons.

CONCLUSIONS: Standard chemotherapy drugs substantially enhanced EV release from MB cells, and co-culture of embryonic DRG neurons with chemotherapy exposed EVs resulted in neuronal death. Our next step is to investigate whether administering these selected EVs in healthy animals alters pain responses and pain maturation, and to study the biodistribution of these EVs within the nervous system and body, after infusion into the cerebrospinal fluid as well as how EV cargo is altered by chemotherapeutics.

Keywords: Extracellular vesicles, Medulloblastoma

P-49

Education

Post-Graduate Certification in Neuromodulation and Pain Management (PGCERT) – University Accreditation in Neuromodulation

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BACKGROUND: Education in neuromodulation has traditionally been a combination of isolated peer proctored teaching and industry funded cadaver workshops, resulting in limited exposure and unrecognised bias in techniques and subsequent therapy choice. There is a distinct need for unbiased, curriculum-based accreditation. NANS and INS have advocated a structured curriculum that maps the domains necessary for standardising education.

AIMS: We present a university accredited portfolio of neuromodulation education free of industry bias; aiming to establish a standard of education in neuromodulation and pain management by offering university accreditation and postgraduate qualification to

physicians, specialist nurses, field clinical-engineers and aspiring neuromodulation team members.

METHODS: An education board was created to define and oversee the curriculum, program development, assessments and standard setting methodology for all modules – ensuring alignment with the domains of neuromodulation practice. This followed the delivery of two pilot CEPD programs in 2021 (Executive Education in Neuromodulation) that were both academically deliverable and financially sustainable. University approval through Queen Mary University, London was obtained through a rigorous governance process. Our program has received approval from INS, NANS and NSUKI.

The program consists of 4 modules (60 credits, 80 hours of didactic teaching delivered over 2 semesters).

The program is comprised of online synchronous and asynchronous learning, designed to fit around students in full-time employment, allowing achievement of a qualification in one academic year through part-time study.

The modules are 'Anatomy and Neurophysiology', 'Patient Care and Procedurals Skills', 'Devices and Available Technology', and 'Intrathecal Drug Delivery for Cancer and Non-Cancer Pain'.

Each module is taught online over 3 days and assessed via 2500-word assignment.

Each module has 4 weeks of self-learning and 8 hours of mentorship to ensure successful engagement with the program.

The program awards PGCert (Neuromodulation and Pain Management) post-nominal.

RESULTS: The first ever university-accredited postgraduate qualification in neuromodulation was delivered in 2022-23.

The 2022-23 program had 34 applicants. 21 applicants were offered a place – 17 of these undertook the qualification (UK 11, India 3, Belgium 2, Ireland 1) – 13 candidates were physicians and 4 were field clinical engineers.

The 2022-23 cycle resulted in 12 candidates achieving distinctions, 2 candidates achieving merits, 2 candidates resitting their exams and 1 candidate deferring until the next PGCert cycle.

Lectures were delivered by the PGCert faculty which consists of 24 Key Opinion Leaders across Australia, Europe, Middle East, US and the UK.

CONCLUSIONS: The postgraduate certification in neuromodulation aims to deliver a structured education, while setting and reviewing standards and competencies for best practice with its diverse educational content, expert international faculty and strict university governance. The executive KOL board aims to provide leadership and direction to the program to ensure an effective and integrated neuromodulation education portfolio.

Keywords: Neuromodulation, Education, University, Postgraduate, Training

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Education

A Mobile App for Pain Management Guidelines: Effect on Prescribing Confidence Amongst Junior Doctors

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BACKGROUND: Effective management of pain in hospital is one of the basic pillars of inpatient care. Despite this, guidelines and best practice are inconsistently applied across University Hospital Southampton (UHS) for a variety of reasons. One possible explanation is that a large proportion of analgesia prescribing is performed by the least experienced doctors in the hospital. These doctors are hampered by a lack of experience and therefore lack of confidence with opioids, NSAIDs, neuropathic agents, and non-pharmacological options. We hypothesised that easier access to clear and concise trust guidelines may improve confidence in our doctors to manage pain more effectively.AIMS:Increase doctors' confidence with strategies for managing simple and complex pain by reducing barriers to accessing guidelines, in order to reduce the burden of uncontrolled inpatient pain at University Hospital Southampton.

METHODS: We updated and consolidated trust pain management guidelines into a new resource with a focus on accessibility, deployed on Microguide™. Microguide was originally developed at UHS and is now used by trusts across the country as a platform for accessing key clinical guidelines. It is downloadable as an app on personal mobile devices and offers a web viewer which is accessible on trust computers. This means the content is quickly available at the desk and at the bedside.

The app was advertised at foundation doctor teaching and with posters in doctors' offices throughout the hospital. Doctors in training were surveyed on their confidence levels in various aspects of pain management using a Likert scale, before and 1 year after deployment of this intervention. Unpaired two-tailed t-test analysis was used to measure any difference between these cohorts, with subgroup analysis of those who reported having actually used the Microguide Pain Management Guidelines. Further yes/no questions were asked about whether they knew where to find information on managing pain in special situations (eg. Pregnancy), analysed using Chi-squared tests.

RESULTS: We successfully surveyed a mix of doctors with a focus on those in their first two years of postgraduate training. The proportion of those surveyed in 2022 (n=43) vs 2023 (n=14) who were F1s (34.9% vs 35.7%) and F2s (34.9% vs 21.4%) suggest that the two cohorts were comparable. The surveys demonstrate a significant overall increase in confidence levels with prescribing analgesia from 2022 to 2023 (p=0.0008). The mean effect size was 0.47 (95% CI 0.20-0.74), which translates to about half a point on a 5 point Likert scale from "not confident" to "very confident". Similar results were found on subgroup analysis of doctors who have used the pain management app: 0.41 (95% CI 0.07-0.76, p=0.02). No significant differences were found in the yes/no questions about prescribing in special situations.

CONCLUSIONS: We are confident that doctor confidence in managing pain has significantly improved over the past year, which should reduce latency from identification of pain to administration of appropriate analgesia for our patients. Although we are unable to attribute causation, there are no other schemes with similar aims in UHS at present. It is encouraging that the effect size is sufficient that the difference is detectable across all doctors, not just those who have actually used the app. By surveying exactly one year apart we controlled for improved confidence levels over the course of the year. The Chi-squared analyses of supplementary yes/no questions were probably underpowered to detect differences. Future research will

focus on further publicising the app and finding out what strategies doctors found most effective. Our ambition is to more directly measure the impact of our intervention on patient reported satisfaction with pain management, although this will be difficult due to numerous confounders.

Keywords: App, Guidelines, Education, Pain, Confidence

AuthorToEditor: There is some controversy from statistical purists about whether Likert scales (as ordinal data) should be analysed using parametric tests as I have done here. Although there wasn't space in the abstract word limit to discuss this, please rest assured that I have done my research and that I can answer any questions about this. The full poster will have a section explaining our reasoning for and will have citations to demonstrate that this is currently felt on balance to be best practice when analysing Likert scales.

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Education

A Novel Epidural Analgesia E-Learning Module for Clinical Staff Training

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BACKGROUND: Epidural analgesia can be highly effective for managing acute pain after surgery. Effective epidural management requires patient education and a coordinated interdisciplinary approach. Clinical staff must be properly trained to manage epidural patients from the time of admittance to discharge. The advent of the COVID-19 pandemic caused a drastic shift in the way hospitals educate and train clinical staff. The subsequent growth and need for e-learning has prompted the development of online modules that offer improved accessibility and user engagement. Technology has also allowed for content that stimulates users more uniquely than traditional education allows. This includes interactive elements like situational scenarios, labeled graphics, and associated knowledge checks. These capabilities improve user retention of information.

AIMS: Through the development of an e-learning module for epidural analgesia tailored towards clinical staff, a successful platform can be built from which users become more confident in their ability to care for an epidural patient.

METHODS: The project was designed and executed over a three month period. Analysis of existing virtual epidural training material was done using educational videos developed by the hospital's pain management team. Next, in-depth interviews were conducted with a variety of nurses across the hospital who may have to care for an epidural patient. Using this data, the module's content and structure was curated. The hospital guidelines were also used extensively as a framework.

Within each of the module's eight lessons, interactive elements like toggle-menus and multiple-choice questions were embedded to engage the user. The final scenario-based knowledge check led users through an epidural patient's journey from recovery until discharge. Users answered questions regarding the best course of action along the way with instant feedback.

After initial development, nurses were invited to review and test the module in focus groups. Two focus groups were held, with nurses seated at a conference table to facilitate discussion. Before exposure to the module, confidence scores on a scale of 10 were taken across a variety of indicators regarding previous knowledge of epidurals. Nurses were then shown the module and encouraged to provide live feedback. After a walk-through of the module, confidence scores were taken again.

RESULTS: In all 17 indicators of epidural patient related knowledge measured, nurses' confidence increased. The average increase after module review was 3.4 points on a scale of 10. Enthusiastic verbal feedback regarding the module reflected positive reactions to the course. When asked to rank the biggest advantages of an online e-learning module, nurses indicated that it would be easy to refer back to content. Another major advantage indicated was the accessibility of the material. The nurses unanimously agreed that the module's ability to integrate interactive elements as well as scenarios better prepared them for the management of an epidural patient.

CONCLUSIONS: As medical education transitions to becoming available in online platforms, it is necessary that institutions consider the incorporation of e-learning to educate and certify clinical staff. The epidural e-learning module is to be incorporated into the hospital nurse training in replacement of the former annual epidural training day. This transition marks the first of many projects to make training content more accessible and uniform. Moreover, it represents an improvement to current medical education.

The nurse-centered study design allowed for integration of vital information regarding epidural patient care. Data collected from initial nurse interviews showed that many topics regarding epidurals are often overlooked by traditional training. The focus groups were another opportunity for nurses to provide unique input and voice their opinions. Overall, e-learning options are highly sought after by nursing staff as they drastically increase nurses' confidence in managing epidural patients through engaging, uniform, and easily accessible content.

Keywords: e-learning, epidural, education

P-61

Education

Prospective 12 Month Spinal Cord Stimulation Outcomes in Patients of Ethnic Minorities with Language Barriers

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BACKGROUND: Health inequality can be influenced by many factors including geography (i.e. access to healthcare services), language and communication barriers, patient preferences, health literacy, waiting times, perceived discrimination and physician bias. Patient ethnicity and language barrier are themes that can often underlie many of these factors.

The 2021 UK census showed that 7.1% of the population were proficient in English but did not use it as their main language. 1.5% of the population were unable to speak English well and a further 0.3% of the population were unable to speak English at all. There are certain areas of the UK where the percentage of people unable to speak English was even higher than this national figure (London, Leeds, Manchester, Birmingham – 1.0%, 3.0%, 3.7% and 5.2% respectively).[1]

AIMS: 34% of adults in the UK (Adult Chronic Pain Health Survey, 2017) suffer from some degree of chronic pain.[2] This burden

potentially has similar prevalence in the non-English speaking contingent of patients suitable for neuromodulation therapies; however this has not been reported before. This is the first quantification of outcomes in patients with a language barrier highlighting key issues around SCS efficacy in this population.

METHODS: After local approval, 494 chronic pain patients (May 2021 – June 2022) were referred to a neuromodulation service in a large tertiary inner-city hospital in the UK and reviewed. From this pool, 44 patients were identified (9%) whose native language was not English.

31 patients (70%) in this group were suitable for SCS. Data was analysed from 25 patients who underwent SCS and did not use English as their first language.

RESULTS: Of the 25 SCS patients that were initially implanted, 2 patients did not comply with questionnaires and additional 2 patients did not comply with health quality related data collection. 3 patients underwent revision and 2 patients were explanted, giving an explant rate of 8%, which is in higher than our centre's average explant rate of 4% across all types of neuromodulation devices.

The mean overall NRS decreased from 7.76 at baseline (n=23) to 4.18 at 12 months ($p < 0.0001$) (n=19) with mean EQ-5D-5L index scores increasing from 0.23 at baseline (n=21) to 0.75 at 12 months ($p = 0.0021$) (n=17).

CONCLUSIONS: The statistically significant improvement in NRS and EQ-5D-5L scores at 12 months validates the need for therapy in this vulnerable group and highlights the growing demand for healthcare to be delivered to patients who cannot communicate in the language of their resident country.

The explant rate (8%) and poor compliance with questionnaires (8%) in the ethnic minority population could potentially be attributed to lack of education or language barriers impeding effective dialogue with patients.

Despite cultural factors, language barriers and beliefs, as possible confounders, we report successful outcomes at 12 months highlighting the need for ethnic inclusivity in the context of SCS therapy.

Keywords: Ethnic minority, spinal cord stimulation, language barrier, neuromodulation, chronic pain

P-63

Epidemiology

Population-Level Association between Physical Activity and High Impact Chronic Pain 10 Years Later

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BACKGROUND: High-impact chronic pain (HICP) is a major public health issue. Research shows that being physical active can improve chronic pain outcomes. Less is known about how a population-level approach to increasing physical activity might affect chronic pain. In observational studies, associations between modifiable lifestyle factors, such as physical activity, and health outcomes can be expressed as changes in population-level prevalence under varying hypothetical scenarios. Previous studies found that there are some people who stay active after being part of an exercise intervention involving six-months gym membership with personalised instruction. Our study uses UK Biobank data to assess how increasing physical activity through such a national program might affect the number of people with HICP at the population level and within specific subgroups.

AIMS: To evaluate the impact of a hypothetical nationwide physical activity intervention on the prevalence of high-impact chronic pain (HICP) at a population level, and to identify variation in effects across different subgroups.

METHODS: In the UK Biobank, activity data were collected via touchscreen questionnaires at initial assessment, while pain outcomes were gathered through online questionnaires about ten years later. Physical activity was assessed by weekly frequencies of walking, moderate and vigorous activities. HICP was identified based on pain lasting three months and low quality-of-life scores (EQ-5D-5L below 0.81). Hypothetical intervention-induced activity changes were modelled based on outcomes from a previous trial of exercise for chronic widespread pain (the MUSICIAN study). The exercise component of the trial involved a gym-based program delivered by fitness instructor. Measures of physical activity in MUSICIAN and UK Biobank were harmonised. Our approach estimated physical activity after an intervention and its association with HICP, adjusted for demographics, including income, education, and employment. Subgroup analyses explored potential changes in HICP prevalence by gender, age, and deprivation.

RESULTS: Complete data on physical activity at initial assessment, follow-up information on chronic pain, and all adjusting variables were available for 127,699 participants. The follow-up prevalence of high-impact chronic pain was 18.0%. The follow-up prevalence after a hypothetical intervention was estimated to be 17.0%, a reduction of 1.0% from the actual value (bootstrapped 99.9% confidence interval: 0.7% to 1.3%).

Subgroup analyses indicated variable reductions in HICP associated with the hypothetical intervention:

- Men: 0.8% vs. Women: 1.1%.
- Age at baseline: 40-45 (0.9%), 45-50 (0.9%), 50-55 (1.0%), 55-60 (1.1%), 60-65 (1.1%), 65-70 (0.8%).
- Deprivation Index: Lowest (0.9%), 2nd quintile (0.9%), 3rd quintile (0.9%), 4th quintile (1.0%), Highest (1.1%).

CONCLUSIONS: Our analysis suggests that a hypothetical nationwide physical activity intervention could be associated with a reduction in prevalence of severe chronic pain (high-impact chronic pain), and that its impact could vary among different groups of people. The most pronounced associations were observed among females, individuals aged 55 to 65 years old, and those in more deprived areas. While our methods adjust for observed confounding, the findings should not be interpreted as causal effects. The associations should be understood within the context of an observational study design but could help us identify potential areas for public health focus.

Though based on speculative counterfactual scenarios, this research indirectly informs policymakers and public health officials. It offers insights into the potential upper limits of physical activity interventions at the population level, such as providing free gym passes and fitness instruction to older adults. If implemented, such interventions could reduce chronic pain impact, alleviating pressure on national health systems, freeing resources for other health issues, and potentially improving quality of life for those prone to chronic pain.

Keywords: chronic pain, physical activity, public health intervention, high impact chronic pain, epidemiology

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Epidemiology

Childhood Maltreatment Increases Risk of Chronic Pain All over: Counterfactual Analysis of UK Biobank

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BACKGROUND: Adverse childhood experiences (ACEs), including maltreatment (abuse and neglect), have consistently been associated with chronic pain, but the evidence base is largely cross-sectional. Existing evidence is limited in its exploration of the potential mechanisms and mediators described by theoretical models, as well as being subject to recall bias. With its considerable size, the UK Biobank enabled us to investigate multiple mediators. The data also include a suitable negative control exposure (NCE) - childhood sunburn - with which to assess the potential influence of recall bias.

AIMS: Using causal counterfactual methods (g-methods), we aimed to estimate the following.

1. the causal effect on the risk of chronic pain all over of reporting childhood maltreatment.

2. the indirect effect mediated by deprivation in adulthood, depression/anxiety, social support and sleep problems.

3. the joint interactive effect of reporting both childhood maltreatment and recent trauma.

METHODS: We used the UK Biobank (application 1144, https://www.ukbiobank.ac.uk/), a database of 500,000 people aged 40-69 recruited 2006-2010, some of whom were invited to complete questionnaires in 2016 (including 5 questions from the Childhood Trauma Screener) and 2019 (including pain items). Participants reported if they were "troubled by pain or discomfort, either all the time or on and off, that has been present for more than 3 months" and if this was "all over the body". A directed acyclic graph identified key variables. Doubly-robust models, stratified by sex, estimated risk differences using inverse probability weights (IPW) and the teffects commands in Stata. IPW included ethnicity and age on leaving education as a proxy for childhood socioeconomic status. To estimate the joint interactive effect, we derived a 4-category combined exposure variable. We looked at mediation by depression/anxiety, sleep issues, deprivation and social support, with inverse odds weighting (IOW) in a generalized linear model.

RESULTS: Of 118,347 participants, 41.8% reported childhood maltreatment, and 5.2% reported chronic pain all over (males 3.4%; females 6.6%). The risk of chronic pain all over was higher with exposure to childhood maltreatment, both in men (3.9% vs 1.3%; absolute risk difference 2.6% (95% CI 2.4%, 2.8%)) and women (8.1% vs 5.0%; absolute risk difference 3.0% (95% CI 2.6%, 3.5%)). One third of the risk increase was mediated by the included variables. There were independent (and similar) effects of childhood maltreatment and adult stressful life events, with an additive interaction between the two exposures. A small risk difference was found for women (1.1%, 95% CI 0.3%, 1.9%) but not men using the NCE. Analyses on imputed data were confirmatory.

CONCLUSIONS: In counterfactual analyses, exposure to childhood maltreatment increased the risk of chronic pain all over by 2-3%. This conclusion is based on a set of assumptions, including that the IPW adequately captured confounding. There was a small effect of the NCE (childhood sunburn) in women only, suggesting that the observed risk difference on exposure to childhood maltreatment is not (wholly) attributable to differential recall. Trauma in adulthood may also have a causal role in the development of chronic widespread pain, and appeared to exacerbate the influence of childhood trauma on risk.

Understanding more about the mechanisms linking childhood adversity to chronic pain enables us to tailor care to those at risk of poor outcomes. We found that about a third of the increased risk was indirect, largely through depression/anxiety. Successfully identifying and treating psychological disorders in survivors of maltreatment could thus help to prevent some cases of chronic pain. Furthermore, stressful life events through adulthood may represent important timepoints in which to intervene.

Keywords: Adverse childhood experiences, chronic pain, g-methods, UK Biobank

P-130

Evidence Based Guidelines

Good Practice Guidelines for Psychological Assessment And Intervention for Neuromodulation Services for Pain

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BACKGROUND: Psychologists in Pain Neuromodulation (PiPiN) is a network of clinical psychologists working in UK neuromodulation services. The group meets regularly to discuss developments in the field of neuromodulation, psychological aspects of surgical care and to share good practice. A multidisciplinary assessment, including a psychological assessment, is recommended for all patients under consideration for neuromodulation yet there are no existing guidelines to inform these assessments. Furthermore, access to psychological intervention prior to or after surgery can be variable.

AIMS: This paper makes recommendations for good practice when conducting pre-operative assessments, planning pre or postsurgical psychological intervention and considers some of the professional challenges for psychologists working in neuromodulation services.

METHODS: In light of the lack of standardised criteria for psychologists working in neuromodulation, one of the goals of the guideline development group was to map the arrangements for delivering psychological input within UK neuromodulation services. The mapping exercise was conducted using a short survey circulated to the PIPIN email distribution list. A systematic review of the literature was also conducted to establish the existing evidence regarding psychological predictors of outcome from neuromodulation for pain. Extensive discussion within the professional network was undertaken to differentiate between factors that were amenable to treatment/intervention and could therefore be considered cautions for neuromodulation, and those that should be exclusions for the same.

RESULTS: With regards to the survey, by November 2020, twenty-five out of thirty centres had responded. Nineteen confirmed that psychologists were routinely, directly involved in clinical preoperative assessment, whilst six had ad-hoc or variable provision. Thirteen of the centres reported routinely including psychological input within

their prehabilitation programmes for example via a SCS Pain Management Programme or one-to-one work-up. With regard to postoperative psychological input, the results were sparser. Nine centres reported routinely providing psychological follow up of patients after surgery, whilst others offered no routine follow up or had ad-hoc or variable provision. This data shows the significant variability across the UK, in terms of psychological input and wider aspects of the neuromodulation pathway. This means there is huge variability in patient experience and this is an area that warrants further attention.

The systematic review highlighted a range of psychological factors that are associated with poorer outcome from neuromodulation. A traffic light system was established that can aid clinical decision making with regards to the psychological appropriateness of neuromodulation. The wider role of psychologists in contributing to the neuromodulation team is also outlined.

CONCLUSIONS: These guidelines provide a consensus agreement on the role of psychology within neuromodulation services for new and existing services in the UK and beyond.

Keywords: psychological, neuromodulation, guidelines, spinal cord

AuthorToEditor: These guidelines have been endorsed by NSUKI (Neuromodulation Society of UK and Ireland) and are currently under consultation via the BPS membership with the hope that they may have endorsement by the time of the conference.

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Interventional Pain Management

Art26.12, A Novel Fatty Acid-Binding Protein 5 Inhibitor, Shows Efficacy in Breast Cancer-Induced Bone Pain

Saoirse Elizabeth Osullivan, George Warren, Myles Osborn, Andrew Yates

Artelo Biosciences Limited

BACKGROUND: Inhibitors of fatty acid binding protein 5 (FABP5) are effective in multiple models of pain, inhibited by antagonists of CB1, TRPV1 and PPARα. The potent (Ki 0.77 ± 0.08 μM) and selective FABP5 inhibitor ART26.12 is under development at Artelo Biosciences under a licence agreement with Stony Brook University (Warren et al., 2024).

AIMS: The aim of the present study was to establish a potential role for ART26.12 in an as yet untested neuropathy; cancer-induced bone pain.

METHODS: On day 0, murine breast cancer cells were injected into the tibial bone cavity of female Sprague Dawley Rats. On day 15, rats were randomly assigned to groups (n=10/group) using a computer-generated randomization procedure based on body weight and baseline Von Frey (VF) measurement (pain behavior assay). Animals were treated orally with ART26.12 (25 and 100 mg/kg BID) for seven days. VF measurements were taken 1 and 4 h post-dosing on days 1, 3, 5 and 7 of drug treatment.

RESULTS: On day 14, all groups animals had reduced VF values, indicating the induction of neuropathy (see Fig 1). On the first day of test drug treatment, pain behaviour was significantly improved by oral treatment with ART26.12 at 100 mg/kg at 1 and 4 h post-dosing (Fig 1B). On day 3, pain behaviour was significantly improved by ART26.12 (25 and 100 mg/kg) at 1 h post-dosing. On days 5 and 7, pain behaviour was significantly improved by 25 mg/kg at 1 and 4 h post-dosing; however, the 100 mg/kg dose was no longer effective. Terminal plasma samples taken 2 h post-dosing show a mean ART26.12 plasma level of 13.5 ± 1.5 μM and 46.3 ± 8.1 μM in the 25 and 100 mg/kg groups respectively. Bone mineral density was not affected by drug treatment.

CONCLUSIONS: In a model of breast cancer induced bone pain, ART26.12 reduces pain behaviours. At the higher dose, the effect is rapid, but reduces over time. At 25 mg/kg, an analgesic effect is apparent on day 3 and persists through the 7-day treatment. This study continues to support the ongoing development of ART26.12 as a novel, non-opioid, non-steroidal analgesic effective in multiple models of pain, now including chemotherapy-induced neuropathy (oxaliplatin or paclitaxel), diabetic neuropathy, and cancer-induced neuropathy, in male and female rodents.

Keywords: cancer, pain, fatty acid, cannabinoid

P-65

Interventional Pain Management

The Effects of the Fatty Acid Binding Protein 5 Inhibitor ART26.12 in a Rat Model of Diabetic Neuropathy

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BACKGROUND: Stony Brook University (SBU) developed a series of inhibitors of fatty acid binding protein 5 (FABP5) effective in pain, cancer and inflammatory models, which were licensed by Artelo Biosciences (ART). The analgesic effects of these compounds involve reduced degradation of endocannabinoids (FABP5 delivers endocannabinoids to fatty acid amide hydrolase (FAAH) for metabolism) and can inhibited by antagonists of CB1, TRPV1 and PPARα. The potent and selective FABP5 inhibitor ART26.12 is under development with Artelo Biosciences, with successful data in oxaliplatin-induced peripheral neuropathy.

AIMS: The aim of the present study was to examine the potential of ART26.12 in another peripheral neuropathy; the streptozotocin (STZ)-induced model of painful diabetic neuropathy.

METHODS: Male Wistar rats were treated with STZ which selectively ablates insulin-producing β cells in the pancreas (55mg/kg IP) on day 0. By day 9-11 (neuropathic baseline, NeuP), animals had developed neuropathy as assessed by measurement of withdrawal threshold using calibrated von-Frey monofilaments applied to the plantar surface of the hindpaw, and diabetes (measured via blood glucose levels, ~30 mmol/L). Animals were treated orally with ART26.12 (25 or 100 mg/kg, BID) from day 15 for seven days, with von Frey measurements on day 15, 17 and 21, approximately 2 h after dosing. Duloxetine was given on test days as an example of standard care.

RESULTS: On day 15 (D15), after the first dose of ART26.12, withdrawal thresholds were significantly higher than neuropathic baseline levels with the higher dose of 100 mg/kg, suggesting reduced mechanical allodynia. On the third (D17) and seventh days (D21) of dosing, both 25 and 100 mg/kg ART26.12, and duloxetine, significantly increased withdrawal thresholds to similar levels. Blood glucose levels were not different between groups on day 21. Additionally, animals treated with ART26.12 lost less weight than Duloxetine-treated ones.

CONCLUSIONS: We have shown that ART26.12 reduces mechanical allodynia in an established rat model of diabetic neuropathy. DMPK and toxicological studies continue to show a desirable drug profile for ART26.12. These data support the further development of ART26.12 as a novel non-steroidal, non-opioid agent in peripheral neuropathies.

Keywords: diabetic neuropathy, pain, cannabinoid, fatty acid

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Interventional Pain Management

Pre-Emptive Analgesia in a Pediatric Dental Setting

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BACKGROUND: Efficacy of pre-emptive analgesia compared to preventive regimen and managing postoperative pain is still controversial.

AIMS: Evaluating the efficacy of intravenous (IV) paracetamol as pre-emptive analgesia compared to preventive post-treatment administration in pediatric dental setting.

METHODS: After the approval of the local institute ethics committee and obtaining the singed parental consent, a prospective trial was conducted, 60 noncooperative children of ASA I, II aged 3-10 years who underwent dental rehabilitation under general anesthesia were randomly divided into two groups. Pre-emptive group (n = 30) received 15 mg/kg of IV paracetamol before the start of treatment. Preventive group (n = 30) received 15 mg/kg of paracetamol at the end of treatment. Analgesic efficacy was measured by visual analog scale.

RESULTS: The VASOF results in the pre-emptive group were significantly lower compared to the preventive group at 4, 8, 12, and 24 h (P Value=0.0146, 0.0188, 0.0085, and 0.0001, respectively). Less children in the pre-emptive group received supplemental fentanyl postoperatively compared to the preventive group (27.6%, 58.6%, respectively, P = 0.0170). Time to first rescue dose of fentanyl postoperatively in the pre-emptive group was later than in the preventive group (P = 0.0432).

CONCLUSIONS: Administration of IV paracetamol pre-emptively provides lower pain scores, and a decreased percentage of children required pain relief and less amount of postoperative opioids, compared to preventive administration.

Keywords: Pre-emptive analgesia, Pediatric population, Dental setting

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Interventional Pain Management

AI-Based Video Companions for Pain Reduction

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BACKGROUND: Chronic pain significantly challenges individuals' well-being and quality of life. Without a cure, ongoing pain management is offered to the patients, which burdens patients and the healthcare system. Digital interventions offer the potential to achieve scalability of pain management interventions.

AIMS: The present proof of concept study investigates the viability of a smartphone program that utilizes artificial intelligence (AI) video conversation to improve mindfulness to achieve greater well-being in people with and without chronic pain.

METHODS: Twenty-three volunteers (9 with chronic pain) were invited to use the study smartphone app for two weeks, which provided conversations with an AI-avatar and text notifications in between the conversations. Before and after the program, participants' pain intensity (Jensen et al., 1996), pain-related disability (Tait et al., 1990), and interoceptive awareness (short version of the Multidimensional assessment of interoceptive awareness (Mehling et al., 2012)) were assessed.

RESULTS: Out of 23 participants, 20 completed the program and the follow-up survey, with 88.9% expressing a will to continue the practice or another similar practice. Three of the nine chronic pain participants demonstrated a more than 1-point reduction in pain intensity.

CONCLUSIONS: This study shows high retention of the AI-video conversation-supported smartphone program for mindfulness and a promise of positive outcomes on chronic pain intensity. These findings have significant implications for the future development and implementation of AI-driven mindfulness interventions for chronic pain and healthy populations. Future studies are needed to establish the clinical efficacy of the intervention.

Keywords: Chronic pain, mindfulness, artificial intelligence (AI), video conversation.

AuthorToEditor: Dear Editorial Team In our study the AI-based conversational avatar program demonstrated a high retention rate and showed promise in teaching mindfulness techniques to both chronic pain and healthy individuals. The observed reductions in pain intensity and interference among chronic-pain participants suggest a potential for improved pain management. These findings contribute to the growing body of research on AI-driven interventions for mindfulness and highlight the significance of accessible and engaging platforms in promoting well-being and managing chronic pain. We believe the BPS meeting would be a great platform for discussion on this frontear topic. BW OH

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Interventional Pain Management

Botulinum Toxin Type A for Management of Local Thermal Discomfort Reaction in Prosthesis-Induced Hyperhidrosis and Pain in Lower Limb Amputees

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BACKGROUND: In England, the prevalence of amputation stands at 26.3 per 100,000, with arterial disease accounting for over 90% of the 5000 major leg amputations per year.[1] A significant number of lower limb amputees fitted with prostheses experience excess sweating and thermal discomfort. One study indicated that up to 70% of amputees report high perspiration, while another estimated that between 32% and 74% suffer at least one skin complication.[2] The causes for skin overheating potentially may be an outcome of physical activity and environmental conditions possibly amplified by low thermally conductive prosthetic liners and sockets. Despite the advancement in prosthetic biomechanics, management of Local Thermal Discomfort Reaction (LTDR) remains a challenge. Botulinum toxin type A (BoNT), a potent acetylcholine inhibitor at neuromuscular junctions, has recently emerged as a potential treatment option for chronic pain. Here we present our early data on the efficacy of BoNT in managing LTDR.

AIMS: 1. Understand the pathophysiology of Local Thermal Discomfort Reaction (LTDR) and prosthesis induced hyperhydrosis in amputees and its impact on their quality of life.

2. Explore Botulinum toxin A as a treatment modality for LTDR and prosthesis-induced hyperhydrosis, discussing its efficacy, safety profile, and mechanism of action.

3. Understand implications for the synthesis of non-paralyzing botulinum molecules for treating chronic neuropathic pain.

METHODS: Over the last four years, we analysed the effectiveness of BoNT injections in the management of LTDR within our small patient cohort (n=8). We focused on five key metrics: perspiration, frequency of prosthesis removal, functional rehabilitation, local irritation, pain and incidences of infection. Patients' Global Impression of Change (PGIC) scale was used to gauge overall patient response.

RESULTS: Between 2019 and 2023, a cohort of 8 amputees experiencing LTDR received BoNT injections; two received injections every six months, four had annual injections, and two received a single injection. Disruptions from the COVID-19 pandemic unfortunately led to delays and potential missed opportunities. Of the cohort, 6 patients reported a 70% or greater reduction in overall pain over residual limb, and all 8 patients experienced clinically significant reduction in hyperhidrosis and pain following injection of BoNT.

CONCLUSIONS: The potential of BoNT to reduce pain, secondary hyperhidrosis and thermal discomfort on the residual limb is evident from our study. This also addresses challenges associated with donning and doffing prostheses, making it easier for amputees wear and adjust their prosthetic devices, thereby not only improving prosthetic fit but also overall function, pain and quality of life. Questions remain, however, concerning the appropriate BoNT dosage, duration of effect, and its overall impact on chronic pain such as stump and neuropathic pain. Furthermore, achieving greater efficacy in reduction of pain and hyperhidrosis without paralytic side-effects is one priority and pertinently, a recent preclinical study suggested a newly engineered non-paralysing botulinum neurotoxin construct, el-iBoNT, as a potential treatment option.[3,4]

The primary goal in the rehabilitation of amputees is to achieve optimal function where prosthetic fitting is a key component. However, with prosthesis satisfaction rates languishing at 43% among lower limb amputees, it's evident that persistent issues such as LTDR, hyperhydrosis and pain still plague patients, detrimentally affecting their rehabilitation and quality of life.[5] Our study highlights the potential of BoNT as a viable solution.

Keywords: Local Thermal Discomfort Reaction (LTDR), Botulinum Toxin Type A (BoNT)

AuthorToEditor: Dear BPS Scientific committee Thank you for your considering our work for poster presentation. I could not find a section to add references therefore I have attached them here. We extend our gratitude to all the committee their valuable time. Yours sincerely, Paul Kim Advance Pain Fellow, Royal National Orthopaedic Hospital.

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Interventional Pain Management

Use of Electrical Stimulation Therapy to Reduce Pain Associated with Hard to Heal Wounds and Reduce Reliance on Pharmacological Analgesics

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BACKGROUND: For many people with hard to heal leg ulcers, chronic wound pain is a debilitating complication, which can limit mobility, affect sleep and reduce quality of life. Despite widespread use of analgesics, wound pain often remains unresolved, representing a major unmet need. Electrical stimulation therapy (EST) has been widely shown to improve the rate of healing of hard to heal wounds and thus confers clinical benefit. Although a reduction in wound-related pain has also been observed following initiation of EST, to date, no substantive studies have focused on this outcome.

AIMS: The objectives of the study were to assess the effect of EST on pain from hard to heal wounds and to assess the effect of EST* on quantity and type of analgesic needed to manage wound pain. A secondary objective was to monitor the rate of wound healing during and following treatment.

METHODS: Twenty patients with painful leg ulcers that were not progressing towards healing were treated with an EST device, Accel-Heal Solo,* a single-use, pre-programmed, microcurrent electrical

stimulation therapy device designed to stimulate healing and reduce wound pain. Daily pain scores (numerical ratings scale 0-10) and analgesic consumption were recorded via a patient diary for 7 days prior to application of EST. The EST device was then applied for 24 days (two consecutive 12-day applications) alongside standard wound care. Pain scores and analgesic consumption was captured daily for 4-weeks after initiation of therapy. Changes in wound dimensions were also summarised weekly up to 4-weeks after initiation of therapy.

RESULTS: Median wound duration was 12 months (range 1.5 to 72 months). Most wounds were venous leg ulcers. At baseline, analgesics were being taken by 95% of patients (19/20); controlled analgesics (including gabapentin, pregabalin, codeine, morphine, tramadol) were being taken by 45% (9/20). Despite this, during the 7-day run-in, wound pain was unresolved in all patients, with mean pain scores of 5.8/10 (range 4-8) with severe/moderate pain reported by 15% and 85% of patients, respectively. Within 4-weeks of treatment with EST*, mean wound pain reduced to 3.6/10 with no/mild pain reported by 7/20 (35%) of patients, reducing further to 2.8/10 (no/mild in 14/20, 70%) by 5-weeks. 4 weeks after initiation of treatment, reduced analgesic dose was observed in 12/20 (60%); 4/20 (20%) patients no longer needed any pain medication. Median reductions in dose between baseline and 4-weeks after starting treatment, were observed for codeine (median 100% reduction, 32mg/day to 0mg/day, n=5), gabapentin (60%, 750mg/day to 450 mg/day, n=4), ibuprofen (100%, 600mg/day to 0mg/day, n=4) and paracetamol (62.5%, 4000mg/day to 1500mg/day, n=14). In the two patients taking morphine, no change in dose was observed. After initiation of EST, wound size reduced on average by 46% over 4-weeks, representing an 11.5% wound reduction per week.

CONCLUSIONS: As well as kick-starting the healing process, EST may provide a valid adjunct to oral medication in the attempt to address persistent wound pain in people with long-standing hard to heal wounds. Treatment with EST resulted in a meaningful reduction in wound pain that enabled a corresponding reduction in pain medication, including the complete cessation of some controlled analgesics in some cases. Cessation of controlled analgesics in people with hard to heal wounds, typically elderly and medically compromised individuals, is important because side-effects from these medications can lead to an increased risk of falling and other treatment-related adverse events. As well as the positive pain-related outcomes, weekly wound healing rates greater than 10% per week represented good progress towards healing, overall. *Accel-Heal Solo, Accel-Heal Technologies Limited, Kent, UK.

Keywords: Analgesic, Electrical Stimulation Therapy, venous leg ulcer, wound pain

P-71

Interventional Pain Management

Developing a Locally-Led Spinal Cord Stimulator Reprogramming Service Using Telemedicine at a Rural Implantation Centre in the South West of England

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BACKGROUND: Patients with implanted spinal cord stimulators need regular and accessible troubleshooting and optimisation through device interrogation and reprogramming. This has previously required direct attendance at the bedside by company representatives. Reducing carbon use through unnecessary travel, and need for timely appointments for increasing patient numbers in geographically dispersed locations, with increasing use of telemedicine driven by the recent pandemic, provides opportunity for a new service using local nurses for reprogramming, with distant, real-time rep support via telemedicine. We were the first UK hospital to implement this.

AIMS: We used implementation science methods to analyse this service development from the point of view of staff and patients.

METHODS: An 18-question survey for specialist nurses assessed barriers and enablers towards the new telemedicine service using the Theoretical Domains Framework. Each domain had at least one question. Responses coded by domain then summarised into overarching belief statements. Results of this informed further patient questionnaire to assess their beliefs about the new service.

RESULTS: 2/2 responses were received from specialist nurses. Enablers included: Pre-existing experience, with device-specific training to give appropriate knowledge and skills and confidence, with decision-making facilitated by user guides, intentions to increase telemedicine clinics due to a strong belief in multiple positive consequences outweighing negatives, optimism and positive impact on job satisfaction, wider departmental and company support, beliefs that this enhances the nursing role and the therapeutic nursing-patient relationship, perception of wider environmental benefits of reducing need for rep travel, and easier and more timely troubleshooting appointments with less wait for patients. Barriers included a need for good hospital internet, sufficient charge on the telemedicine link dongle, and patients who were slightly more fatigued after longer appointments. 4/4 responses were received from patients. All reported that a therapeutic relationship with the programmer was very important, with free text comments about the importance of continuity of care. Most reported that timely appointments were very important. All preferred to have a face to face interaction. Half reported that reducing environmental impact was important.

CONCLUSIONS: Setting up a successful telemedicine-supported local-led SCS re-programming service is possible within a well-supported and well-planned service, with just small environmental barriers to negotiate. The main benefit perceived by both nurses and patients is an improved therapeutic relationship, which is vital to both.

Keywords: telemedicine, spinal cord stimulator, rural, nursing

P-73

Neuropathic Pain

UK Biobank Participants Carrying SCN9A RARE Variants Implicated in Inherited Neuropathic Pain Show No Increase in Pain Or Analgesic Prescriptions

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BACKGROUND: The voltage-gated sodium channel NaV1.7, encoded by the *SCN9A* gene, is integral to nociceptor excitability and pain sensation. Loss-of-function *SCN9A* variants cause congenital insensitivity to pain in an autosomal recessive manner. Multiple gain-of-function *SCN9A* variants (>50 to date) have been reported to cause autosomal dominant channelopathies, including primary erythromelalgia and paroxysmal extreme pain disorder (PEPD), and they are associated with painful small fibre neuropathies (SFN). The

prevalence and impact on carriers of these high penetrance gain-of-function variants in large population cohorts has yet to be explored.

AIMS: To investigate the prevalence of *SCN9A* rare variants reported to cause gain-of-function channelopathies and assess their association with pain and medication use in the UK BioBank cohort.

METHODS: A literature search was performed to identify all pathogenic *SCN9A* variants reported in primary erythromelalgia and PEPD patients. We also included *SCN9A* variants that were associated with SFN and familial epilepsy and had gain-of-function in vitro electrophysiological evidence. Carriers of these variants were identified within the UK BioBank (UKB) 470K whole-exome sequencing dataset. Participants who carried >1 pathogenic variant identified from the literature search were excluded from the analysis.

Logistic regression, adjusting for age and sex, was used to examine pathogenic variant carriers for associations with chronic pain (any pain >3 months at recruitment), neuropathic pain (self-reported DN4 ≥3 in the Experience of Pain Questionnaire), and analgesic (strong opioid, weak opioid) or anti-neuropathic (gabapentinoid, NaV blocker, tricyclic antidepressant) drug prescription. An FDR-adjusted P value threshold of 0.05 was used, adjusting for the 7 binary phenotypes examined.

RESULTS: 59 putative pathogenic gain-of-function variants in SCN9A were identified, of which 20 have heterozygous carriers within the UKB. The 20 variants were associated with SFN (9), primary erythromelalgia (8), epilepsy (2), and PEPD (1). 18/20 variants had electrophysiological gain-of-function confirmed in vitro. We selected 13/20 variants which had >50 heterozygous carriers for logistic regression analysis. These corresponded to 12 NaV1.7 missense mutations R185H, I228M, P610T, K655R, W719C (caused by 2 variants), I720K, I739V, V810M, M932L, V991L, L1267V, and W1538R.

Carriers of the NaV1.7 mutations did not have an increased risk of chronic or neuropathic pain. Additionally, we did not find any increase in prescriptions for opioid analgesics or anti-neuropathic medications. The only exception was related to the familial epilepsy mutation K655R, which was significantly associated with increased NaV blocker prescription. We note that the reported minor allele frequencies (MAF) of these variants in gnomAD are more common than the expected frequency for pathogenicity or the prevalence of their associated diseases (median MAF of 0.23%, range = 0.01-2.75%).

CONCLUSIONS: Single gain-of-function mutations in *SCN9A* have been reported to cause inherited neuropathic pain. However, there are cumulatively over 150k participants who are heterozygous carriers of these putative pathogenic mutations in the UKB that have no evidence of an associated pain phenotype or increased prescription of pain medications.

Our findings suggest that many *SCN9A* variants, previously reported in the literature to be pathogenic, appear more likely to be benign. We conclude that the in vitro gain-of-function does not necessarily translate into nociceptor hyperexcitability that causes pain. We note that we were able to detect an impact of other variants on pain and analgesic consumption within UKB using the same analysis pipeline.

This study challenges the previously assumed high penetrance of *SCN9A* gain-of-function variants for pain. The targeted sequencing of *SCN9A* alone to identify candidate pathogenic variants appears to be insufficient for reliably identifying the cause of a monogenic pain phenotype. It has likely resulted in some *SCN9A* variants being misinterpreted as pathogenic. Whole-exome/genome sequencing should be used in future to investigate the architecture of disease in monogenic pain patients.

Keywords: Voltage-gated sodium channels, Channelopathy, Neuropathic pain, Pain genetics, UK BioBank

P-74

Neuropathic Pain

Development of Type-1 Diabetes Changes in Evoked & Non-Evoked Neuropathic Pain Endpoints And Reversal With Pregabalin in the Rat Streptozotocin Model

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BACKGROUND: Current treatments for neuropathic pain have limited efficacy combined with extensive side effects leading to a <50% success rate in managing patient's pain. A potential contributor to the lack of forward translation of new treatments for neuropathic pain is the mismatch between preclinical pain assessment using evoked, subjective measures such as von Frey testing compared with non-evoked pain rating scales used clinically. Diabetes is a leading cause of neuropathic pain and with cases of diabetes expected to continue to rise so will neuropathic pain and the number of people with unmanaged pain. Therefore, development of objective, non-evoked endpoints such as burrowing may improve the translatability of preclinical neuropathic pain drug testing.

AIMS: To compare the development of type-1 diabetes induced neuropathic pain changes on von Frey withdrawal threshold (evoked) and burrowing (non-evoked) and attempt to reverse any changes with gold standard treatment pregabalin.

Single housing (current practice) versus paired housing (refined practice) on von Frey evoked thresholds was also evaluated to determine if pair housing achieves the same results, in line with the 3Rs.

METHODS: Male Wistar rats (total n = 30, 300-450g at time of dosing) were administered 55mg/kg streptozotocin (anomer equilibrated i.p, n=18) or 20mM citrate buffer pH 4.0-4.5 (control, n=12). Von Frey paw withdrawal threshold using Dixon "up-down" method and amount of 2.5kg pea shingle burrowed over 2 hours was measured prior to and up to twice weekly following streptozotocin administration to monitor neuropathic pain induced changes over 46 days. Reversal of neuropathy induced von Frey (evoked) and burrowing (non-evoked) induced changes was assessed between day 25-43 following 3, 10 or 30mg pregabalin (p.o) in a crossover design.

RESULTS: Streptozotocin administration induced a pronounced type-1 diabetes phenotype, polyphagia, polydipsia and hyperglycaemia (>16mmol/L blood glucose) by day 7 (>90% of animals) that was maintained throughout the study. Rats that developed hyperglycaemia (termed diabetic) also presented with a marked mechanical allodynia as measured by a decrease in von Frey paw withdrawal threshold from day 7 until the end of the study at day 46. Mechanical allodynia was successfully dose-dependently reversed by administration of 10 and 30 but not 3mg/kg pregabalin. Changes in diabetic rats individual burrowing levels took longer to develop with the amount of burrowing decreasing below baseline levels from day 18 onwards. In contrast to von Frey withdrawal thresholds burrowing

levels were not restored after treatment with any dose of pregabalin. Pair housing did not alter von Frey withdrawal thresholds in sham and diabetic rats compared with single housing.

CONCLUSIONS: The development of evoked mechanical allodynia and decreased non-evoked burrowing conducted by diabetic rats do not follow the same time course and were not both reversed by pregabalin (10-30mgkg). This implies that non-evoked spontaneous burrowing may not measure neuropathic pain directly but instead may be a measure of overall animal wellbeing as it was still decreased following the development of a diabetic phenotype and compared to sham animals. Additionally, pair housing rats for von Frey testing does not impact paw withdrawal results and therefore could be used as a method of welfare enrichment by avoiding short-term separation of animals for evoked pain assessment testing.

Keywords: Neuropathic pain, burrowing, streptozotocin, mechanical allodynia

P-75

Neuropathic Pain

Systemic Low-Grade Inflammatory Markers Are Associated with Proximal Spread of Neuropathic Symptoms

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BACKGROUND: Neuropathic pain is a highly prevalent condition associated with persistent disability. The most common type of neuropathic pain is caused by focal nerve injuries and includes conditions such as carpal tunnel syndrome (CTS), painful radiculopathy or traumatic nerve injuries. A substantial proportion of patients with neuropathic symptoms experience extraterritorial spread outside the affected nerve territory. These patients report more severe sensory symptoms and greater disability than patients without symptom spread, yet the mechanisms behind such symptom radiation are not fully understood.

AIMS: We used pre-surgical carpal tunnel syndrome (CTS) as a human model system of neuropathic pain to identify differences in the concentration of serologic inflammatory mediators between patients with CTS with territorial symptoms and those with proximal symptom spread to either the elbow or shoulder/neck.

METHODS: We performed a post-hoc analysis, comparing levels of 20 serologic inflammatory mediators in a discovery cohort among three symptoms spread profiles (n=55; n=25 no spread, n=21 spread to elbow, n=9 spread to shoulder/neck). We then de-novo analysed the significantly dysregulated mediators in an independent validation cohort (n=72; n=34 no spread, n=16 spread to elbow, n=22 spread to shoulder/neck).

RESULTS: The discovery cohort revealed higher serum concentrations of C-reactive protein (CRP) and interleukin-6 in patients with any symptom spread proximal to the wrist; interferon-γ was higher in patients with symptom spread to the elbow compared to those without proximal spread. The validation study replicated the association of higher CRP concentrations in patients with proximal spread to the elbow (no spread: median [IQR] 2.5 [5.4]; spread to elbow 6.2 [4.6]; spread to shoulder/neck 2.6 [3.7], p=0.006). No other markers replicated in the validation cohort.

CONCLUSIONS: Using CTS as a model system and carefully validating our findings in an independent patient cohort, we identified elevated levels of CRP to be associated with proximal spread of symptoms to the elbow. These results suggest that low-grade systemic inflammation might play a role in extra-territorial symptom spread in people with peripheral nerve injuries and neuropathic pain. Future studies need to examine whether symptom localisation is a useful tool to stratify management.

Keywords: Neuropathic pain, extraterritorial symptom spread, inflammation, carpal tunnel syndrome

P-76

Neuropathic Pain

Cross-Talk Mechanisms between Neurons and Synovial Fibroblasts of Patient-Reported Joint Pain in Osteoarthritis

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BACKGROUND: Osteoarthritis (OA) is a painful chronic disease of synovial joints. People with knee OA have poor quality of life due to loss of mobility. OA is characterised by cartilage destruction, tissue damage and synovitis. Due to the limitations of the treatment available, it is important to understand the local mechanisms driving OA pain.

Inflammation of the synovial joint lining tissue (synovitis) is associated with OA pain. Within the knee joint, the synovial joint lining is innervated by sensory nerve endings, and locally released inflammatory mediators can activate nociceptors and promote axonal sprouting. Activation and release of neurotrophins such as NGF and neuropeptides (CGRP) promote hyperexcitability of joint nociceptors, leading to peripheral sensitization associated with OA.

Based on the above context, the hypothesis to be tested is that the pathotype of pain associated synovial fibroblasts promote/exacerbate sensory neuronal excitability, which in turn drives joint pain. The mechanisms underlying these processes may provide target (s) for the development of more selective treatments for OA pain.

AIMS: The aim of our current study is to map the relationship and cellular crosstalk mechanisms between synovial fibroblasts and neurons responsible for nociceptor excitability which may contribute to the sensation of pain.

METHODS: To investigate the influence of sensory nerve terminal environment in OA synovium, we cultured mouse DRG primary neurons in compartmentalised microfluidic chambers, which allow the fluidic isolation and the compartmentalisations of the axons and somas. DRGs were isolated from mouse embryos at E16.5 and cultured in the laminin coated chambers to allow axonal growth into the adjacent channel. Primary cultures of DRG neurons were grown for ~8 days in the microfluidic chambers with connective microgrooves (150μm long) separating the cell body and axon channels.

On Day 6 of culture, sensory neuron terminals were exposed for 48hr to conditioned media from cultured synovial fibroblasts isolated from synovium tissue collected from knee OA patient-reported painful and non-painful anatomical sites. Following stimulation with KCl (25 mM) in the axon compartment, we measured Ca2+ transients in the cell body as an indication of axonally transmitted neuron excitability. In addition, DRG neurons within the chambers were immunolabelled with an axonal marker mouse acetylated β-tubulin and putative pain mediators NGF and Trka (receptor for NGF), involved in nociceptive pain during OA.

Following transcriptomic analysis of synovial fibroblasts from painful vs non-painful sites, 5 differentially expressed genes were selected (namely NRN1, CXCL14, INHBA, DNAJB1 and HTRA) for functional studies in our in vitro experimental set-up. For this, siRNAs that target these genes were added to the peripheral axonal terminals (48 hr), before stimulation to evaluate their capacity to mitigate sensory DRG neuron excitability and potentially reduce pain sensitization in OA.

RESULTS: Exposure of sensory neuron terminals to conditioned media derived from OA synovial fibroblasts led to a sensitization to stimulation with KCl, compared to exposure to conditioned media from synovial fibroblasts from non-painful regions, and control media. There was a significant difference in the KCl-evoked calcium response in the neurons following exposure to pain associated conditioned media (41% increase), compared to the non pain associated conditioned media (13% increase). We have reported increased expression of pain genes (NRN1, CXCL14, INHBA, DNAJB1 and HTRA) in OA pain associated synovial fibroblasts. Application of siRNA that targets NRN1 to sensory terminals in the DRG cultures reduced neuronal hyperexcitability. Future work will use siRNAs to target these pain genes in OA synovial fibroblasts subsets to validate their efficacy in disrupting fibroblasts neuronal crosstalk.

CONCLUSIONS: Our data demonstrates that the use of the compartmentalised microfluidic chamber will advance our knowledge of the peripheral pain mechanisms and gene targets during OA pain, which will aid the development of new therapeutics.

Keywords: DRG, microfluidic chamber, nerve growth factor (NGF) and osteoarthritis pain.

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Neuropathic Pain

Chemogenetic Suppression of Dorsal Horn Astrogliosis Prevents Microvasculature Disturbance and the Development Type II Diabetic Neuropathic Pain

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BACKGROUND: Pain perception is modulated by the somatosensory nervous system that relies heavily upon not only neurons, but also the interplay of a heterogenous cell population including endothelial cells and astrocytes. We have identified in rodent models of diabetic (type 1 and type 2) neuropathic pain that the microvasculature is damaged. A pathological hallmark of chronic pain is astrogliosis, a hub that acts as a potent source of inflammatory response, impacting upon vessel integrity and sensory neuronal activity. To date it remains unclear how diabetic neuropathic pain develops and how microvessels are damaged.

AIMS: Here we elucidate using chemogenetic modulation the role of astrogliosis in the modulation of the dorsal horn capillary network and the development of diabetic neuropathic pain.

METHODS: All Experiments were designed in accordance with UK Home Office legislation, Animals (Scientific Procedures) Act 1986 and local institutional ethical review. Mice were provided with either experimental diet (high fat 60% cal fat) or standard chow. Chemogenetic astrocyte modulation was delivered via intrathecal injection of AAV5 GFAP-hM4D(Gi)-mCherry in C57/Bl6J male mice. Clozopine-N-Oxide (CNO) or vehicle (PBS) was delivered via intraperitoneal injection 2 weeks later. Animals body weight, blood glucose and nociceptive behavioural withdrawals (including von Frey hair, Hargreaves test, Open field arena) were tested prior to introduction of experimental diet and regular intervals post dietary intervention (weekly). Nociceptive behaviour was performed prior to and 30 minutes post-CNO/vehicle delivery. 24hrs later a further CNO injection was administered and spinal cords were harvested. Integrity and activation state of the endothelium (CD31) and astrogliosis in the dorsal horn was evaluated using immunofluorescence and Imaris quantification, as well as Nanostring GeoMX DSP spatial proteomic and transcriptomic of lumbar dorsal horn evaluation.

RESULTS: Hyperglycaemia was established over a 7 week period following introduction of HFD diet (60% by kcal), which developed alongside a diminished capillary network (reduced CD31) in the dorsal horn and a pronounced heat hyperalgesia compared against normal mice (standard chow fed). Selected regions of CD31 positive endothelium was enriched for prominent astrocyte (S100 and GFAP) activation determined by spatial proteomic and transcriptomic mapping of the dorsal horn in HFD versus lean age matched control. Chemogenetic suppression of astrocyte activity prevented HFD induced degeneration of the dorsal horn endothelium and heat hyperalgesia.

CONCLUSIONS: This data indicates that at the level of the dorsal horn, HFD induces astrogliosis to establish diabetic neuropathic pain via an enhanced astrocyte-endothelium interaction resulting in diminished capillary density of the dorsal horn.

Keywords: Diabetes, neuropathic pain, astrocyte, DREADD, spinal cord

P-78

Neuropathic Pain

Evaluation of 8% Capsaicin (179MG) Patches in Subjects with Focal Neuropathic Pain

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BACKGROUND: \Neuropathic pain (NP)is one of the most challenging pain conditions to manage. Management of NP with combinations of medicines can result in increased side effects, inconvenience, risk of drug-drug interactions and cost. Typically, ≤50% of patients with NP experience satisfactory pain relief.

A treatment for focal NP is the application of 8% Capsaicin patch. It is a localised treatment, is associated with few systemic side effects, provides extended periods of pain relief from a single application. needs no dose adjustments in patients with renal or hepatic impairment and has no known drug-drug interaction.

AIMS: The aim of this project was to evaluate the efficacy of Capsaicin 8% for treatment of focal nerve pain, assessing relative change from baseline to week 12 in pain, quality of life, and patient satisfaction with the treatment. The service evaluation was approved by South Tees Hospitals.

METHODS: Patients suitable for capsaicin 8% treatment were informed of the service evaluation and invited to complete the questionnaires before treatment, at one month and 3 months post treatment. A capsaicin 8% patch was applied, left in-situ for between 30 and 60 minutes, then removed. Patients were followed-up by telephone. Data was collected regarding medication use, pain score (NRS), DN-4, quality of life (QoL) EQ-5D-5L, and patient global impression of change. Any pain site size reduction was also noted.

RESULTS: 21 participants were willing to provide data for the service evaluation. Duration of initial application varied between 30 and 60 minutes. From baseline to latest follow-up (where 3 month was not available, 4-week score was used), mean (SD) pain scores were 7.39 (1.61) and 5.28 (2.38) n=18 respectively. Only one patient reported an increase in pain score, ten reported a decrease, and seven reported unchanged pain scores.

Quality of life (EQ-5D-5L) median (IQR) scores were 0.556 (0.671 to 0.158) at baseline and 0.628 (0.710 to 0.239) at last follow up (n=18). Twelve patients reported an improved QoL, only four patients reported a decrease in EQ-5D score, two had no change.

Neuropathic pain was assessed using the DN4 assessment. Mean (SD) scores at baseline were 4.76 (2.61, N=21), at 4 weeks post treatment it was 4.75 (2.52, n=16), and at 3 months it was 4.93 (2.12, n=15).

For patient global impression of change, at 4 weeks 4/16 reported improvement and at 3 months only 2/15 reported improvement; for these two participants pain site size reduced by 60% and 20%, all other participants reported 0% improvement.

The data indicate that capsaicin patches may be beneficial for people with long term NP as evidenced by a clear improvement in the QoL at last follow-up. This finding is not consistent with the reported patient satisfaction but is consistent with some patients' clinical letters. Our data, however, has many limitations; not all participants completed the 3-month follow-up, a small number of participants had previously had capsaicin patch treatment, and some participants may also have been told that if the treatment was ineffective then further treatments such as spinal cord stimulation would be an option, therefore compromising the validity of the reported outcomes.

The data represents a real-life scenario, where patients continued with concomitant treatments, and other pain conditions which may have impacted on these treatment findings.

CONCLUSIONS: The findings of this service evaluation were that from baseline to last follow-up, the majority of participants reported a reduction in NRS, and an improved quality of life, despite most patients expressing dissatisfaction with the treatment. However, subjective responses may have been impacted by the offer of alternative treatments.

Keywords: Neuropathic pain, capsaicin

P-79

Neuropathic Pain

Activation of KV7 Channels with Fluriptine and ML213 Alleviates Neuropathic Pain Behavior in the Streptozotocin Rat Model of Diabetic Neuropathy

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BACKGROUND: Chronic peripheral neuropathic pain (PNP), pain arising as a direct consequence of a lesion or disease affecting the peripheral nervous system, is associated with many types of injury/diseases, including diabetes mellitus that affects hundreds of millions of people worldwide. Up to 50% of patients with longstanding diabetes develop PNP known as diabetic PNP (DPNP). DPNP is extremely debilitating, and patients with DPNP usually experience a range of unpleasant symptoms including pain hypersensitivity. Despite its clinical importance, the underlying ionic and molecular mechanisms of DPNP are poorly understood. However, Kv7 channels that have been implicated in the pathogenesis of various types of chronic pain are likely to be involved. Indeed, we have previously shown that activation of these channels with the anti-convulsant retigabine alleviates neuropathic pain behavior in the streptozotocin (STZ) rat model of diabetic neuropathy [1]. However, retigabine does not show selectivity for any particular neuronal Kv7 channel subtypes (Kv7.2-5) and shows unspecific effects on other targets like GABA receptors [2]. In this study, we examined in the same STZ model of DPNP, the ability of Fluriptine and ML213 (the more selective Kv7 channel openers) to attenuate pain hypersensitivity.

AIMS: To examine, in the STZ model of DPNP, whether activating Kv7 channels with Fluriptine and ML213 (the more selective Kv7 channel openers) would reverse/attenuate behavioral signs of DPNP.

METHODS: Male Sprague Dawley rats (250-300 g) were used, and the experimental protocols were approved by University of Qatar Ethical review committee. The STZ model involved a single injection of STZ (60 mg/kg, i.p.), Four groups of rats were used: (1) vehicle (control) group (n=10); (2) Fluriptine group (6 mg/kg, i.p, n=10) and (3) ML213 group (5 mg/kg, i.p, n=8) and Gabapentin (positive) group (n=10). Behavioral testing for mechanical and heat hypersensitivity was performed using a dynamic plantar aesthesiometer touch stimulator, and Hargreaves analgesiometer, respectively [1]. Data are presented as the mean ± SEM, and One-way ANOVA with post hoc tests was used.

RESULTS: STZ rats exhibited behavioral signs of mechanical and heat hypersensitivity as indicated by significant decreases ($P<0.001$) in the mean paw withdrawal threshold (PWT) and mean paw withdrawal latency (PWL) respectively at 35 days post treatment. Single injections of Fluriptine and ML213 caused significant ($P<0.05$) increases in the mean PWT, but not PWL, indicating attenuation of mechanical, but not heat hypersensitivity. Interestingly, both Fluriptine and ML213 were as effective as the positive control gabapentin.

CONCLUSIONS: The findings suggest that Kv7 channels are involved in the mechanisms of mechanical but not heat hypersensitivity associated with DPNP, and that their activation with Fluriptine and ML213 may prove to be effective in treating DPNP in humans.

Keywords: Neuropathic pain, K+ channels, Pain behaviour, Kv7 channel modulators, Chronic pain

P-80

Neuropathic Pain

Invistigating Diabetes-Induced Anatomical Changes in Pain-Sensory Neurons in Dorsal Root Ganglion

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BACKGROUND: Diabetic peripheral Neuropathy (DPN) is characterised by the degeneration of peripheral sensory neurons in the Dorsal Root Ganglia (DRG) of long axons. 50% of all diabetic patients will suffer from painful DPN symptoms which might be sudden and severe. DRG is susceptible to damage by cancer, inflammation, and diabetes. The mechanism of pain still unclear, however, painful sensation has been reported to be linked to the sprouting of sympathetic nerves into the DRG in non-diabetic models of pain.

AIMS: Our aim is to investigate diabetes-induced anatomical changes to lumbar DRG in diabetic animal model.

METHODS: We examine the effect of diabetes on Tyrosine Hydroxylaselabelling in lumbar DRG of db/db mice using immunohistochemistry.A total of 25 mice (12 db/db and 13 lean) were used in the experiment.

RESULTS: we observe that, diabetes causes a single sympathetic sprouting of TH (+) fibre into a single DRG of 1 diabetic mouse. The percentage of neuronal cells labeled TH, N200, and PRPH show no significant changes. However, diabetes causes structural changes in 16% of large neuronal cells in the form of vacuoles in the cytoplasm ranging between 5-8 in number.

CONCLUSIONS: The impact of this study will assist in understanding the mechanism of DPN symptoms and establishing a treatment for targeting the specific population of peripheral sensory neurons.

Keywords: Diabetic neuropathy, DRG, Pain

P-131

Neuropathic Pain

Health-Related Quality of Life is Improved by Spinal Cord Cord Stimulation for Patients with Chronic Neuropathic Pain - UK National Registry Data

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BACKGROUND: Spinal cord stimulation (SCS) is a well-established treatment for chronic neuropathic pain and is supported by numerous studies. However, some recent articles have called its efficacy into question. We examine a cohort of over 1,800 SCS patients from the UK National Neuromodulation Registry.

AIMS: To provide a "real world" assessment of efficacy and compare its effects with other procedures performed for painful indications.

METHODS: Quality of life (QoL) data (EuroQoL 5 level, EQ5D) and demographic data were extracted from The National Neuromodulation Registry (NNR) for all patients (n=1811) that underwent spinal cord stimulation for chronic pain in 27 centres in the UK between February 2018 and July 2022. These were compared to data from the published literature for other commonly performed elective surgical procedures.

RESULTS: EQ5D utility index increased by a mean of 0.202 in the 1236 patients with paired pre- and post-operative utility scores. The median utility was 0.263 (IQR=0.384; n=1811) pre-operatively, while at 6 months post-operation it was 0.550 (IQR=0.396; n=1025), $p \ll 0.0001$, Wilcoxon rank sum test. The median utility score at 12 months post-operation was 0.548 (IQR=0.417; n=970). There was no difference in utility scores at 6 months and 12 months after surgery (p=0.15, Wilcoxon rank sum test). There was a significant improvement in quality of life in all 5 domains of the 5 level EQ5D tool at 6 months after baseline ($p<0.0001$, for all subcategories) and this was sustained at 1 year after surgery. The baseline utility was lower than in other patients undergoing elective surgery for pain, and the absolute (and proportionate) increase in utility following surgery is higher than in most other comparable series.

CONCLUSIONS: Spinal cord stimulation effectively increases the quality of life in patients requiring surgery for pain. Similar results were seen regardless of SCS indication. When comparing analogous databases, SCS produces a greater percentage improvement in EQ5D utility than many other elective surgical procedures for painful conditions, including spinal surgery and some joint replacements.

Keywords: chronic pain, neuropathic, SCS

AuthorToEditor: We would prefer an oral presentation to a poster presentation, though this option was not available at time of submission.

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Non-Pharmacological Pain Management

Clinical Outcomes Using New Fast-Acting Sub-Perception Therapy SCS for Chronic Pain: A European Observational Study

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BACKGROUND: Traditional Spinal Cord Stimulation (SCS) modalities that achieve sub-perception analgesia require patients to often wait hours or even days until pain relief is fully realized. A recent study however has demonstrated that quicker analgesic onset is possible using a new sub-threshold-based SCS modality called Fast-Acting Sub-Perception Therapy (FAST).[1] Achieving rapid onset of pain relief offers a substantial advantage for patients and providers alike when using FAST-SCS in the real-world clinical setting. 1. Metzger CS, Hammond MB, Paz Solis JF, Newton WJ, Thomson,SJ, Pei Y, Jain R, Moffitt M, Annecchino L, Doan Q A novel fast-acting sub perception spinal cord stimulation therapy enables rapid onset of analgesia in patients with chronic pain. Expert Rev Med Device s 2021 Mar 18(3) 299-306.

AIMS: Here we report real-world long-term outcomes from a subset of chronic pain patients who have been implanted with versatile SCS systems and have selected FAST as their preferred waveform. Our goal is to analyze clinical outcomes of this new sub-perception SCS modality in real-world conditions, and assess pain intensity, disability and quality of life.

METHODS: This is an international, multicenter, observational case-series of patients permanently implanted with a FAST-enabled SCS system (Boston Scientific, Marlborough, MA USA) to treat chronic pain as part of an ongoing assessment of real-world outcomes of SCS for chronic pain based on retrospective chart review (Clinicaltrials.gov identifier:NCT01550575). All analyzed patients were programmed using novel FAST (i.e., biphasic-symmetric waveform at 90 Hz; pulse width: 160-260 μs). Demographic information, pain location, surgical history, medical history were collected for all subjects. In addition, Numeric Rating Scale (NRS) scores, Disability (ODI) and Quality of Life (EQ5D), when documented per standard practice, were collected as part of the chart review.

RESULTS: To date, 143 patients have been assessed out to a mean follow-up duration of 531±450 days. Baseline mean NRS pain score in this current cohort was determined to be 7.9±1.2. A 5.0-point (n=76) and 5.8-point (n=40) improvement ($p<0.0001$) in overall pain was reported at 12- and 24-month respectively. Responder rate (≥50% pain relief) was 89% at last follow-up (average 1.5 years after implant). Significant improvement in disability ($\Delta = 27$, $p<0.0001$) and quality of life were reported with use of FAST-SCS at last follow-up.

CONCLUSIONS: Data from this multicenter, real world, observational, clinical case series demonstrate significant improvement of chronic pain in patients utilizing and who preferred FAST SCS up to mean last follow up of 1.5 years. Among the subset of patients with data available up to 2 years, a similar trend was noted. A methodology that allows for near-immediate pain relief following activation of FAST SCS treatment therefore represents an advancement that may further improve the management, outcomes and experience of patients who desire to use sub-perception-based SCS for relief of their chronic pain.

Keywords: spinal cord stimulation, sub-perception, fast-acting

P-22

Non-Pharmacological Pain Management

Preferred Waveforms and Outcomes of Spinal Cord Stimulation in CRPS Patients: A Multicenter Real-World Observational Study

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BACKGROUND: Spinal cord stimulation (SCS) is an established therapeutic option for patients with Complex Regional Pain Syndrome (CRPS) suffering from severe chronic pain. Recent SCS devices are versatile and offer multiple waveforms options with distinct mechanisms of action. One of them is a recently-developed fast-acting sub-perception therapy which acts on the surround inhibition mechanism and could be a valuable option for CRPS patients1,2

1. Loss of Surround Inhibition and After Sensation as Diagnostic Parameters of Complex Regional Pain Syndrome. Marie Wojcik Wolanin, Robert J. Schwartzman, Guillermo Alexander, John Grothusen. Neuroscience & Medicine, 2012, 3, 344-353.

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AIMS: Here we report real-world long-term outcomes from a subset of over 80 CRPS patients who have been implanted with versatile SCS systems since 2016 and analyze their outcomes and waveform preferences.

METHODS: This is a consecutive, observational, multicenter case-series based an on-going, real-world evaluation of SCS outcomes for

chronic pain (Clinicaltrials.gov: NCT01550575). All evaluated patients were implanted with an SCS device and documented data from their medical records were used to assess their condition at baseline and post-implant follow-up visits. Data collection includes diagnosis and medical history, pain scores, and preferred SCS settings. All data were collected by site personnel, as per standard practice and without sponsor involvement.

RESULTS: To date, the review of over 80 CRPS cases implanted with SCS has been performed, including 90% de novo patients. Patients had a baseline pain score of 8.0, and the average follow-up after SCS implant is 3.2 years. Patients have all been implanted with SCS systems with versatile programming capabilities (standard rate, high rate, burst, combination therapy), and for half of them, recent devices could offer a new fast-acting sub-perception therapy.

Overall outcomes at last follow-up (3.2 years after implant) show a reduction of pain scores by 3.7-point, and a large variety of waveform preferences: 30% of the patients preferred the fast-acting sub-perception therapy, followed by combination therapies (22%), standard rate SCS (18%) and high-rate modalities (15%).

In patients preferring fast-acting sub-perception therapy, pain scores decreased by 4.7-point (average follow-up 281 days). 65% of them had a profound response (76%), with pain scores reduction from 8.3 to 2.0 (-6.3 point, average follow-up 313 days).

CONCLUSIONS: Our results show a significant efficacy of various SCS waveforms in CRPS patients, with a profound pain relief (76%) in most patients using fast-acting sub-perception therapy. These outcomes suggest that this new modality may act on a specific mechanism that plays a role in CRPS condition (loss of surround inhibition).

Spinal cord stimulation is diverse and offers the possibility to use waveforms with different mechanisms of action. Such versatility could help personalize SCS therapy to specific pain conditions, and future research may help develop programming guidelines.

Keywords: CRPS, spinal cord stimulation, surround inhibition, waveforms

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Non-Pharmacological Pain Management

Real-World Outcomes of Single-Stage Spinal Cord Stimulation in Chronic Pain Patients: A Multicentre, European Case Series

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BACKGROUND: Spinal cord stimulation (SCS) is effective in treating chronic neuropathic pain. A screening trial is typically conducted prior to implantation to evaluate whether a patient is a good candidate for SCS. However, the need for a screening trial has been debated.

AIMS: We evaluated real-world clinical outcomes in patients who underwent a single-stage procedure to receive SCS therapy (i.e., no screening trial period) (SS-SCS).

METHODS: This observational, multicentre, real-world consecutive case series evaluated SS-SCS chronic pain patients.

Pain and other functional outcomes were collected as part of standard care by site personnel with no sponsor involvement. Assessments included Numerical rating scale (NRS), Percent Pain Relief (PPR) and EQ-5D-5L (EuroQol 5 Dimensions-5L), recorded prior to SCS and following implantation.

RESULTS: A total of 171 chronic pain patients (mean age: 59.4; 53.2% females) underwent a single-stage procedure (mean last follow-up, 408 days) and were included in the analysis. A 5.0 ± 2.1-point improvement in overall pain was reported at 3 months and sustained until the last follow-up post-implantation ($p < 0.0001$). At last follow-up, 50.3% (86/171) of patients reported an NRS pain score ≤ 3. Additionally, quality of life also improved (46.1-point change, from 70.2 to 25) at the last follow-up, based on EQ-5D-5L scores.

CONCLUSIONS: Our real-world evidence demonstrates that a single-stage implantation procedure for SCS, without a trial screening period, not only provides long-term pain relief and improves quality of life in patients with chronic pain, but also avoids delay in patient care and could reduce overall healthcare-related costs. Careful patient selection and the use of contemporary platforms that are safe and can readily adapt to the patient's dynamic pain situation of the patient will alleviate suffering, pain and associated functional impairments. A more flexible policy based on individual patient needs and preferences is needed.

Keywords: single-stage SCS, spinal cord stimulation, trial, patient selection, waveforms

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Non-Pharmacological Pain Management

The Impact of Non-Pharmacological Pain Management on Sleep in Patients with Fibromyalgia

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BACKGROUND: Sleep disturbance, including difficulties getting to sleep, frequent waking and waking unrefreshed, is a key presenting symptom of fibromyalgia. Poor sleep can lead to increased pain sensitivity, which in turn can lead to further problems with sleep continuity and efficiency. Multidisciplinary pain management is widely used in the non-pharmacological management of fibromyalgia, which may take different forms including group, individualised or exercise-based. However, there is little evidence of the impact of these treatments on sleep disturbance in fibromyalgia.

AIMS: To compare sleep disturbance in adults with fibromyalgia who have completed non-pharmacological pain management treatment to those who have not.

METHODS: An observational study of 187 adults with fibromyalgia recruited from outpatient services at Oxford University Hospitals NHS Foundation Trust between September 2020 to June 2023. All were referred to a specialist chronic pain management unit. The following patient reported outcome measures were collected at baseline prior to commencing treatment and at three months after the start of treatment: Insomnia Severity Index (ISI), Patient Health Questionnaire-9 (PHQ-9), General Anxiety Disorder-7 (GAD-7), plus symptom duration, alcohol, and tobacco use.

A paired t-test was performed to compare sleep disturbance at baseline and follow-up for the group as a whole, and stratified by treatment status. Mann Whitney U tests were performed to compare insomnia status for patients who completed treatment compared to those who did not.

Linear regression modelling was used to investigate the association between completing treatment and change in sleep disturbance at follow-up, adjusting for baseline sleep disturbance, mood, age, gender, symptom duration, smoking, and alcohol consumption.

Ethical approval was granted by South Central - Oxford B Research Ethics Committee (ethics reference: IRAS Project 252762).

RESULTS: We recruited 187 adults with fibromyalgia (mean [SD] age = 45 [12]; 90% female), of whom 87 (47%) completed specialist pain management treatment (either a group pain management programme [51%], individual pain management [36%] or a specialised exercise group [12%]).

For the group as a whole, sleep improved over the study period (mean [95%CI] change on ISI: -2.83 [-3.80 to -1.86]; p<0.001). The change in ISI was similar for both the group that did (mean [95%CI] change -2.86 [-4.06 to -1.66]; p<0.001) and did not (mean [95%CI] change -2.70 [-4.23 to -1.17]; p=0.008) complete treatment.

There was no difference in proportion in each insomnia category (none, subthreshold, moderate, and severe insomnia) of the ISI among patients who completed treatment compared to those who did not (p=0.205).

In linear regression analysis, completing pain treatment was not associated with a significant change in sleep disturbance at 3 months, after adjusting for baseline sleep disturbance, mood, age, gender, symptom duration, smoking, and alcohol consumption (Beta -0.56, 95%CI -2.9 to 1.8; p=0.60). The different forms of pain management were similarly not associated with a significant change in ISI at 3-months: group pain management programme (p=0.30); individual pain management (p=>0.9); specialist exercise group (p=0.30).

CONCLUSIONS: This study demonstrates a high level of treatment incompletion among patients with fibromyalgia referred to non-pharmacological pain management, which warrants further investigation in itself. There may be other characteristics amongst those who did not complete treatment, not captured in this observational analysis, which may affect this. Although sleep disturbance improved in all patients over time, on average patients are still classified as having subthreshold insomnia. This suggests that further treatment is necessary to address the sleep disturbance in fibromyalgia, such as cognitive behavioural therapy for insomnia. This is in fact a research recommendation in the 2021 NICE guidance for chronic primary pain (NG193), which asks for further research on CBT-I to inform treatment guidelines.

Keywords: Fibromyalgia, Sleep, Non-Pharmacological, Pain Management

P-83

Non-Pharmacological Pain Management

Rehabilitation Interventions for Adults with Complex Regional Pain Syndrome: A Scoping Review

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BACKGROUND: CRPS is a painful condition that often develops following trauma or surgery to a limb. CRPS's unremitting symptoms are associated with long-term disability, poor psychological health, decreased emotional and social well-being, and reduced quality of life. Effective treatment for persistent CRPS is notoriously difficult. Although rehabilitation interventions are often recommended for CRPS treatment, disparities occur between guidelines regarding the optimal rehabilitation interventions for CRPS treatment. Additionally, the neurophysiological basis of these interventions remains unclear, and the outcomes used to explore their effectiveness are inconsistent.

AIMS: This scoping review will explore the rehabilitation interventions used for the treatment of adults living with CRPS, describing their neurophysiological bases, and examining the outcomes used to test their effectiveness.

METHODS: This scoping review was carried out using the Joanna Briggs Institute (JBI) methodology. MEDLINE (PubMed), Embase, Scopus, APA PsycINFO (EBSCO), CINAHL, Cochrane, Scopus, OpenGrey Google, ProQuest Dissertations, and Theses Global ProQuest were searched for studies in English published between 2007-2023, coinciding with the development of the Budapest Criteria for CRPS diagnosis. Studies that described any form of rehabilitation delivered by a healthcare professional for adults with CRPS were included. Three independent reviewers in pairs of two screened the titles, abstracts, and full texts of the selected studies. Data collection

was performed using a data extraction tool developed by the researchers based on the standardized JBI tool. The results summarised the description of rehabilitation interventions, the neurophysiological bases of the interventions, and the outcomes to assess their effectiveness.

RESULTS: Database searches yielded 624 titles, of which 65 studies met the inclusion criteria. Reviews (17), experimental designs (26), observational designs (3), clinical and case series (12), surveys (1), clinical guidelines (2), qualitative studies (1), and opinion papers (3) were included. Rehabilitation interventions for adults with CRPS were grouped into: educational interventions (e.g., pain neuroscience education), physical exercise interventions (e.g., range of movement), psychological/brain interventions (e.g., mirror therapy), exposure-based therapies (e.g., pain exposure therapy), and passive therapies (e.g., transcutaneous electrical nerve stimulation). There was a limited reporting regarding the neurophysiological bases of these interventions. Pain and disability were the most common outcomes used to assess the effectiveness of CRPS rehabilitation interventions, although other outcome measures such as body perception disturbances, pain-related fear, or pain acceptance were used.

CONCLUSIONS: This review provides the current state of the art in rehabilitation interventions used in adults with CRPS. We found a large heterogeneity in the rehabilitation strategies used in adult CRPS rehabilitation, and a broad range of outcome measures, which complicates comparisons among studies. Mechanisms of CRPS rehabilitation interventions are often insufficiently described. To develop a "best practice" model of rehabilitation intervention in CRPS, a better understanding of the neuropsychological mechanisms underlying rehabilitation interventions is required. Besides, consistency regarding outcome measures used to investigate the effectiveness of these interventions is essential. Then, these "best practice" models can be tested against usual or minimal care.

Keywords: Complex Regional Pain Syndrome, Reflex Sympathetic Dystrophy Syndrome, Rehabilitation, Physiotherapy, Occupational therapy.

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Non-Pharmacological Pain Management

Utilization of Combination Therapy-Based SCS Programming in Chronic Pain Patients: A Real-World Observational European Study

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BACKGROUND: Multiple mechanisms are thought to govern the pain-relieving effects of paresthesia-based and sub-perception-based SCS.[2–4]

Published clinical studies demonstrate that different neurostimulative approaches likely induce pain relief in variable ways via distinct mechanisms.[5–7] Our recently published work has also shown that, when given the available option, a substantial proportion of patients using SCS for chronic pain prefer programming that combines neurostimulative modalities such as (but not limited to) the utilization of supra- and sub-perception-based approaches[1].

AIMS: To further examine this, we embarked on a clinical evaluation of patients implanted with an SCS device who chose to use combination therapy-based programming to treat their chronic pain.

METHODS: This is an observational case-series of patients permanently implanted with an SCS system (Boston Scientific, Marlborough, MA USA) to treat chronic pain. All analyzed patients utilized combination therapy programming consisting of at least two distinct modes of applied neurostimulation (e.g., supra-perception [e.g., standard rate, tonic] + sub-perception [e.g., high rate/burst/microburst]) delivered simultaneously. Demographic information, pain location, surgical history, medical history were collected for all patients. In addition, Numeric Rating Scale (NRS) scores, Percent Pain Relief (PPR) and other functional outcomes as available were collected as part of the chart review.

RESULTS: To date, 147 patients have been assessed with a mean (SD) Baseline pain score (NRS) of 7.7 (1.6). Mean follow-up duration was 398 (316) days. A mean 4.5±2.7-point improvement ($p<0.0001$) in overall pain was determined at last follow-up (7.7 ⇒ 3.2). At last follow-up, 60% (88 of 147) had a pain score of ≤3. Additionally, evaluation of quality of life (EQ-5D-5L) in 71 patients (for whom data was available) indicated a substantial improvement from baseline measurement (34.6) out to last follow-up (69.8).

CONCLUSIONS: Data from this multicenter, real-world, observational, European-based case-series demonstrate significant improvement of chronic pain and quality-of-life in patients utilizing SCS-based combination therapy. Given the different mechanisms of action that are thought to govern the various modes of neurostimulation now increasingly accessible as part of commercially available devices, it is postulated that a substantial proportion of patients are likely to achieve their best outcomes using programming approaches that provide SCS as a combination therapy.

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Keywords: spinal cord stimulation, waveforms, combination therapy

P-86

Non-Pharmacological Pain Management

Exploring the Vital Role for Arts in Chronic Pain Management

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BACKGROUND: Chronic pain impacts on physical and emotional well-being. Exploring innovative approaches is crucial in chronic pain management. Existing research hints at role of Arts in transcending physical discomfort by offering a unique avenue for emotional expression and relief. By investigating the role of arts in this context, we aim to contribute insights that may enrich holistic approaches to chronic pain care, fostering a deeper understanding of interplay between artistic engagement and well-being.

At the Royal Orthopaedic Hospital, Birmingham, we run Art Workshops for patients attending the Chronic Pain Service. The art activities are receptive, adapted to the needs of each group and individual. The emphasis is not on artistic competence, but on enjoying art and exploring art in a supportive environment.

AIMS: We wanted to assess the impact of arts on chronic pain management by measuring well-being scores of patients and recording patient feedback.

METHODS: This was an interventional study with a pre-post study design. Six "Art for Health" workshops were run over 2 months at the Royal Orthopaedic Hospital (ROH) from August to September 2023. 6 patients attended 3 pottery workshops over 3 weeks. 6 patients attended 3 painting workshops over 3 weeks. Short Warwick Edinburgh Mental Well-Being Scale (SWEMWBS) was used to evaluate improvement in Mental Well-Being.

• Inclusion criteria: Patients attending the Chronic Pain Service at the ROH.

• Exclusion criteria: Patients who had attended less than 2 sessions.

• Outcome measure: Mean improvement in SWEMWBS on metric scale.

RESULTS: 6 patients attended 3 sessions of pottery workshop. Mean baseline pre 1st session score for SWEMWBS on metric scale was 21.00. At the end of 3rd session this had improved to 24.13 giving an overall mean improvement of 3.13 on metric scale (14.90%).

Amongst the 6 patients in painting workshop, 5 attended 3 sessions, each one week apart, and 1 patient attended 2 sessions. Mean baseline pre 1st session score for SWEMWBS on metric scale was 22.34. At the end of 3rd session this had improved to 25.87 giving an overall mean improvement of 3.53 on metric scale (15.8%).

On a scale of 0 – 5 all the patients rated the "Art for Health" Workshop 5 for its value. All the patients said yes when asked if they would like to recommend "Art for Health" Workshop to others.

Patient feedback gave valuable insight into role of creative arts in pain management from patient perspective – "helps me deal with my pain better" "very therapeutic effect" "makes me forget my pain" "relaxing and good distraction from my pain" "helped my well-being and gave me more confidence".

CONCLUSIONS: Our study showed improvement in SWEMWBS in both groups who attended pottery and painting workshops over a short period. The main limitation of the study is the small number of patients. Studies with larger number of patients may help identify positive impact on chronic pain management, with statistical significance.

Keywords: Art, Chronic Pain, Well-being

P-87

Non-Pharmacological Pain Management

Virtual Reality Augmented Manual Therapy: Leveraging Contextual Factors in Therapeutic Encounters for Chronic MSK Patients

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BACKGROUND: A developing corpus of research increasingly suggests that how individuals experience chronic pain, is largely based on aberrant central pain processing mechanisms as opposed to structural or body focused lesions. Emerging evidence suggests that the mechanisms underlying perceptions of pain (and likely all sensory experience) may in part be dependent on brain processes dominated by prediction and that pain models (priors) together with precision judgements of the likelihood of experiencing pain can directly modulate pain itself as the brain attempts to reduce prediction errors.

Judgements concerning the likelihood of pain are highly influenced by multiple cognitive cues, contextual factors which are part of all health seeking and therapeutic experiences. Such factors can be broadly

categorised into elements that are associated with the therapeutic relationship, practitioner characteristics, patient characteristics, treatment characteristics and the clinical setting and maximising the impact of such factors can significantly reduce pain.

It is likely that conservative approaches to pain management such as Manual Therapy (MT) have significant contextual elements which are amenable to positive modulation. This is also likely the case for Virtual Reality (VR) which have been shown to be effective in treating chronic pain. Recently authors here have postulated that combining manual therapy with VR (MTVR) may generate unique and powerful contextual based impact on patients' prior models of pain and in doing so provide an innovative and novel approach to addressing such conditions.

AIMS: The project aims to develop and evaluate a novel clinical encounter (MTVR) using immersive VR in conjunction with MT approaches for chronic MSK pain sufferers.

METHODS: We have assembled an international team of experts within the health care/neurological sciences and the arts which includes expertise in creating immersive VR environments, VR research in pain, contextual factor expertise and manual therapeutic clinical provision. Having secured Research Innovation Funding, we are working with industry partners in the creative health industries in the SW of the UK who have provided recruitment sites for chronic MSK patients.

There will be a 3-phase approach.

Phase 1: This phase will include digital mapping of both the environment and the level of activity of chronic pain participants in 3 companies from different parts of the creative industries in SW UK.

Phase 2: We will use the data collected in Phase 1 to develop an individual avatar and a bespoke immersive digital environment that will be used within manual therapeutic clinical encounters. We will particularly focus on modifying patients 'priors' modelling of painful movements to mitigate kinesiophobia and thus reduction of pain.

Phase 3: Using a pilot randomised controlled trial we will explore the feasibility, usability, and initial effectiveness of the developed MTVR intervention to help to manage chronic pain.

RESULTS: We aim to generate initial results concerning the development of and clinical feasibility of an MT-VR approach by May 2024 and these will be presented in the conference should we be selected.

CONCLUSIONS: The combination of immersive VR within manual therapeutic encounters is a novel approach to managing chronic MSK pain. Advances in knowledge of the mechanisms of sensory and perceptual experiences, including predictive processing opens the possibility to explicitly leverage contextual cues in the therapeutic encounter that have been shown to impact the interpretation of meaning and subsequent expectations of treatment outcomes in patients in a positive direction. If effective, such novel approaches may be used to augment other interventions and clinical settings where chronic pain is managed.

Keywords: Chronic Pain, Predictive Processing, Virtual Reality, Contextual Factors

AuthorToEditor: We have only just received funding for this project (January 2024) and at the time of submission have not been bale to collect nay results. This is a time limited funding and we have everything in palce to have results ready for the conference if we were accepted. We are really keen to disseminate what we feel is novel approach underpinned as it is by contemporary predictive processing concepts as they relate to chronic pain.

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Non-Pharmacological Pain Management

Re-Inventing the Wheel: Creating A Hypermobility Specific Virtual Pain Management Programme

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BACKGROUND: There is much debate around the nature of Hypermobility Spectrum Disorder (HSD) and specifically hEDS (Hypermobile Ehlers Danlos Syndrome), with emerging literature furthering our understanding of the disorder and the challenges faced by those living with it. This population is thought to be poorly identified and supported, with time to diagnosis, approximately 11 years, being the initial 'wrong step' in what some have labelled 'The Heroes' journey' (Halverson et al, 2021). This group of disorders also presents significant challenge to clinicians working with people living with HSD. The impact of connective tissue anomalies on nociception has not been confirmed, meanwhile comorbid symptoms often associated with HSD/hEDS provide further challenges to wellbeing and function.

When conceiving the group programme, the authors were aware of limited literature considering pain management approaches for this patient population, with no agreed clinical guidelines for best practice. Bennet et al (2021) used patient interviews to investigate barriers to self-management of HSD. They recommended: patients with HSD be active partners in the co-design of behaviour change interventions, behaviour change interventions should target psychological support and patient education, interventions should include environmental restructuring and enablement; adaptations to participants' environment with input from Occupational Therapy, participants suggested opportunities for behavioural modelling; positive first-person modelling narratives, written by those with HSD, which addressed how they coped with the psychosocial impact of their condition. The Dorset Pain Management Service to introduce a bespoke virtual group programme, which was informed by relevant literature and refined by experts by experience.

AIMS: The project aimed to encourage peer to peer connection and improve pain interference, self-efficacy and daily function.

METHODS: Three cohorts completed an 8-week bespoke, group pain/condition management programme. 29 participants, all female, average age of 45.03 years (range 22 – 66 years) participated. Clients were signposted to the group programme after initial assessment within the service. The programme was structured as an 8-week programme of 2 and a half hours per week, facilitated consistently by one physiotherapist and one psychologist. Themes for the sessions included: unwinding the body, exploring the mind; creating physical and emotional balance; exploring the holistic meaning of stability. One session each was allotted to our Occupational Therapist for planning/pacing daily activities and our pharmacist for medicines information.

Outcome measures included the Pain Interference Scale, the Pain Self-Efficacy Questionnaire, the Bristol Impact of Hypermobility Scale, and a patient experience feedback questionnaire. Outcome

measures were given before the beginning of the programme, and 2 weeks after completion.

RESULTS: Results showed significant improvements in average Pain Interference Scale score (p=0.014) and Pain Self-Efficacy (p=0.002).

Participant experience feedback was extremely high with average scores of 9/10 for 'How well did the group meet your needs?', 8/10 for 'How useful did you find the programme in helping you manage your pain?' and 10/10 for 'Would you recommend this programme to other people?'.

CONCLUSIONS: The results showed that this novel, bespoke 8-week online programme led to improvements in pain interference and self-efficacy. Furthermore, participants were broadly in agreement that the group met their needs well, that the programme helped them manage their pain better, and that they would recommend this group to their peers.

Limitations to this study include the small sample size and lack of control group. The group needs further analysis, with larger cohorts to better assess the efficacy of the group.

The authors are encouraged that our increased awareness has led to other colleagues being aware of HSD, leading to an increase in referrals to our service. Future groups will need to need focus on meeting an increasing need and will need to be refined as further literature is developed.

Keywords: Hypermobility Spectrum Disorder, Hypermobile Ehlers Danlos Syndrome, HSD, hEDS

P-89

Other

The Use of Alfentanil Continuous Subcutaneous Infusions (CSCIS) in Hospital Inpatients with Significant Renal Impairment, in the Last Year of Life

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BACKGROUND: The drug Alfentanil has been used for some time as an analgesic in appropriate patient groups. In the North East it has become regionally accepted practice to use Alfentanil for pain management in patients with severe renal impairment (eGFR <30) under the care of the palliative care team, as supported by the regional 'Palliative and End of Life Care Symptom Control Guidelines for cancer & non-cancer patients'. Evidence is lacking in the use of Alfentanil CSCI outside of the critical care environment.

AIMS: To review the use of Alfentanil CSCI use within Newcastle upon Tyne Hospital Trust (NuTH) hospitals, in particular exploring which patients are prescribed Alfentanil CSCIs, starting doses, dose titrations, and pain & palliative care team involvement.

METHODS: A search was conducted for all patients prescribed an Alfentanil CSCI across NuTH hospitals. A case note review was conducted for 50 patients across a five month time-frame (January - May 2023).

Information was gathered around liver & renal function, starting doses & dose titrations, previous opioid prescriptions, and palliative & pain team involvement. The outcome of the patient was also noted.

RESULTS: The average age of patient was 76 years. The vast majority (98%, n=49) had renal impairment (taken as those with an eGFR <60ml/min). The remaining one patient had been switched onto Alfentanil having not tolerated Morphine and Oxycodone. All patients were felt to be likely in the last year of their life. CSCI starting doses were generally conservative, with a dose of 1mg/24hours being used in the majority of cases (68%). A lower dose of 0.5mg/24hours was used in a further 28%, often in those with severe renal impairment or opioid naivety. A dose of 8mg/24hours was prescribed in one patient, however this was a conversion from oral Oxycodone and, in actual fact, was a relative dose reduction. In the vast majority of cases (94%), Alfentanil CSCI was initiated by the inpatient palliative care team. The remaining 6% were then referred for ongoing palliative care support after Alfentanil CSCI initiation. All patients died within a year of Alfentanil CSCI usage.

CONCLUSIONS: The use of Alfentanil CSCIs in patients in the last year of life with significant renal impairment is safe and a helpful option in patients in whom traditionally there have been limited safe analgesic options. This practice is supported by the regional Palliative Care guidelines. This evaluation demonstrated appropriate starting doses and subsequent titrations. All patients had had their Alfentanil CSCI overseen by the inpatient palliative care team. Electronic prescribing infrastructure can be harnessed in ensuring notification to relevant teams when specific drugs are prescribed, thus ensuring appropriate monitoring.

Keywords: Syringe driver, infusion, subcutaneous.

AuthorToEditor: Thank you for taking the time to review my abstract.

P-90

Other

Self-Regulation: A Potential Barrier to Positive Health Behaviour Change in Psoriatic Arthritis

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BACKGROUND: Psoriatic Arthritis (PsA) is an autoimmune arthritis associated with high disease burden, high body mass index (BMI) and low levels of physical activity. However, maintaining a healthy BMI and taking part in physical activity may alleviate symptoms. Individuals with PsA may be susceptible to impaired self-regulation, reducing the ability to implement positive behaviour change. This study aimed to identify the prevalence of impaired self-regulation, evaluate readiness for behaviour change and suggest recommendations to support individuals with PsA.

AIMS: The specific objectives of this research are:

1) To explore the characteristics of adults with PsA including age, sex, BMI, exercise frequency and disease state.

2) To identify the prevalence of impaired self-regulation and readiness for behaviour change in the population.

3) To critically evaluate relationships between self-regulatory score and age, BMI, exercise frequency, disease state and readiness for behaviour change scores.

4) To formulate recommendations to support individuals with psoriatic arthritis to implement effective behaviour change.

METHODS: UK adults with PsA were invited to complete an anonymous online questionnaire. Using a quantitative, cross-sectional, retrospective design, data was collected via 5-point Likert scales measuring: disease state; including measures of pain, fatigue, functional capacity and coping (Psoriatic Arthritis Impact of Disease, PsAID), self-regulation defined as the ability to develop and maintain planned behaviour (The Spanish Short Self-Regulation Questionnaire, SSSRQ) and readiness for behaviour change for weight management and physical activity (University of Rhode Island Change Assessment, URICA). IBM SPSS was used for data analysis, using Spearman's Rho to test for relationships.

RESULTS: 66 participants completed the survey (95.5% female, 4.5% male). 6% had a healthy BMI (n=4), 24% were overweight (n=16), 44% were obese (n=29) and 26% were severely obese (n=17). 23% were not physically active (n=15) and 23% demonstrated impaired self-regulation (n=15). Participants demonstrated higher levels of readiness for behaviour change for physical activity (BCPA) than for weight management (BCWM), (33%, n=22 vs. 8%, n= 5). A small positive correlation was found between self-regulation and days physically active per week (rho =.270, n = 66, $p < 0.05$). There was a small significant positive correlation between self-regulation score and behaviour change for weight management (BCWM) (rho =.261, n = 66, $p < 0.05$); a medium significant positive correlation between self-regulation score and behaviour change for physical activity (BCPA) (rho =.329, n = 66, $p < 0.01$) and a medium significant negative correlation between self-regulation and disease state, (rho = -.355, n = 66, $p < 0.01$).

CONCLUSIONS: To the authors knowledge, this is the first study to focus on self-regulation as a potential barrier to positive health behaviour change in PsA. This research contributes the following:

1) Self-regulation score was significantly positively associated with days physically active per week, readiness for behaviour change for physical activity and weight management.

2) Self-regulation score was significantly negatively associated with disease state; including measures of pain, fatigue and coping.

These novel findings could form the basis of future research on self-regulatory ability and health behaviour in individuals with PsA. The reliability of these research findings may have been affected by the study design, recruitment methods and limited sample size.

Authors declare no conflicts of interest.

Keywords: Psoriatic arthritis, self-regulation, behaviour change, disease state

P-91

Other

Will Ageing Perception and Social Relationships Moderate the Influence of Health Stressors on Life Satisfaction of the Very Old Adults?

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BACKGROUND: Pain and mobility limitations are common health stressors, capable of significantly impacting the life satisfaction of the very old adults. Evidence of how social relationships and positive ageing perception interact with these stressors to influence life satisfaction in old age is scarce.

AIMS: This secondary data study investigated how positive ageing perception and social relationships moderate the influence of pain severity and mobility limitations on life satisfaction among very old adults (80+ years).

METHODS: Anonymised cross-sectional data extracted from waves 6 (n = 1063), 7 (n = 1071), 8 (n = 1149) and 9 (n = 1255) of the English Longitudinal Study of Ageing (ELSA) were analysed in R Lavaan using structural equations modelling with latent interactions. All instruments for data collection including satisfaction with life scale, mobility limitations and pain severity indicators, relationship with children, family and friends' scales, as well as ageing perception scale have robust psychometric properties. The full Information maximum likelihood (FIML) method was used to estimate both the measurement and the structural models. Model fit was assessed by using relative fit indices such as the robust comparative fit index, standardised root-mean-square residual, and robust root-mean-square of approximation.

RESULTS: As hypothesised, the result indicated that high mobility limitations and increased pain severity were related to low life satisfaction. Very old adult with high scores on positive perception of ageing reported high life satisfaction whether at high or low mobility limitations after sex, age, and marital status were controlled for. In wave 8, life satisfaction was high among those with high mobility limitations and Positive Relationship with Children (PRC) in contrast to those with high mobility limitations and less PRC. Life satisfaction was low, irrespective of pain severity levels among participants with less PRC in wave 8. In wave 7, we observed that very positive relationship with children significantly relates with increased life satisfaction regardless of the pain severity levels among the very old adults. But in wave 9, less positive relationship with friends and high pain severity significantly relates with lower life satisfaction among older adults.

CONCLUSIONS: This study demonstrates that having a positive perception of ageing may cushion the impact of mobility limitations (but not pain severity) on life satisfaction in advanced old age. However, while pain severity and mobility limitations could negatively influence life satisfaction in advanced old age, positive relationship with children could buffer such influence, and lead to increased life satisfaction of the individuals in advanced old age. Implication: This study has provided an empirical support for the significance of positive social relationships and positive ageing perception in advanced old age. Interventions aiming to increase life satisfaction at advanced old age characterised with mobility limitations and pain must target favourable views of ageing and maintaining social bonds with children specifically.

Keywords: Ageing-perception, Mobility-limitations, Pain, Life-satisfaction, Social-relationships

AuthorToEditor: This study is unique as it focuses on the marginalised and less research focused population as far as pain management and life satisfaction issues are concerned due to the assumption that pain and mobility limitations are to be expected in old age. The role of Social relationships and ageing perception have not been given serious attention. We hope that this study will stimulate further discussions on areas of psychological and social supports for individuals in advanced old age.

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Other

Pain Concern's Telephone Helpline Targeting Patients on a Pain Treatment Waiting List

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BACKGROUND: COVID-19 has caused unprecedented strain on the Scottish National Health Service (NHS) resulting in patients having to wait longer than usual for access to specialist pain services. In response to this Pain Concern received Scottish Government Funding to enhance the support options available to people with pain on waiting lists for these services. Pain Concern created a national telephone helpline with a dedicated telephone number for pain patients in Scotland. The helpline was manned by paid helpline operators, recruited out of Pain Concern's existing pool of trained volunteers, and they received bespoke training to support callers and evaluate the service. This small project showed that patients waiting on lists for specialist pain service can be helped by the skilled support and resources of a telephone helpline, and use of Pain Concern's Self-Management Navigator Tool. [2] However, it revealed that most regional health boards do not have a mechanism to communicate with patients on their 'pain' waiting lists. This project with NHS Forth Valley is an example of joint working with a territorial health board and the third sector. It continued Pain Concern's mission of supporting self-management and capitalised on Forth Valley NHS's capability of communicating regularly with pain waiting list patients.

AIMS: The aim of the project was to provide pain education and emotional support to pain patients waiting to see Pain Specialist services.

METHODS: Evaluation Support Scotland helped develop the recording system the call handlers used to collect data during calls. They also completed a record and documentation for each caller immediately after a call. In all, three methods of data collection were used to evaluate outcomes: a caller feedback form; the outcome measurement and indicators record; and observations of the call handlers.

RESULTS: When the project started NHS Forth Valley had a waiting list of 850 new and returning patients on the waiting list for Out-Patient Pain Management consultations, and pain management programmes.

One hundred and forty-seven (17%) of these contacted the helpline, five were escalated for urgent attention. The helpline received a total of 130 calls and 17 emails. All emails were answered and 66 of the calls resulted in the caller talking with a call handler making a total of 83 contacts over the course of the project. The remaining 64 were calls with no message requesting a call back and out policy was not to phone back under these circumstances.

Fifty-three of the callers were new patients on the pain waiting list; of which 15 had been waiting for over a year. Five callers consented to be referred to the Health Board because they were very distressed.

46 callers stated that they felt more positive after speaking to call handlers, 43 said they felt better prepared for their healthcare appointment.

CONCLUSIONS: Most callers stated that:

• they felt empowered to tackle the broader problems of daily living, and

• felt able via self-management advice to, and understand pain, and activity management [2] and

• deal with emotional distress to prevent further decline in function

• they would be better able to make best use of NHS pain services when seen.

The project reach extended beyond individual benefits with NHS Forth Valley becoming increasingly aware of Pain Concern's resources, and the latter more aware of primary and secondary care, and how services link up with local groups. An innovative research tool was developed to get helpline feedback from users.

Consistent messaging (by Pain Concern and Forth Valley pain services about each service) is now possible, and a long-term relationship has been established.

Keywords: Self Management, Waiting List, Helpline

P-92

Other

Opportunities for Enhancing Environmental Sustainability in a Chronic Pain Service

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BACKGROUND: Healthcare services in the UK contribute to 4-5% of the country's total carbon emissions, and the National Health Service itself makes up 40% of the sector's emissions [Tennison, The Lancet Planetary Health 2021]. Clinician engagement in reducing waste and carbon footprint in their practice is highly valuable and it is important to identify the strategies that can be implemented to promote sustainable healthcare [Wedmore, BMJ 2023]. To our knowledge this is the first study of waste and carbon foot print reduction in the context of a chronic pain service including outpatient clinics, pain procedures lists and the related administrative tasks and clinical communication that takes place mainly using e-mail.

AIMS: To identify the opportunities for enhancing environmental sustainability in a chronic pain service, including outpatient work, procedure lists and the related clinical administration.

METHODS: Two investigation methods were used: (1) Data were collected by observing 4 procedure lists (22 procedures) and 9 clinics (47 consultations) where the resources used, whether there was a more environmentally sustainable alternative and methods of waste disposal were assessed. (2) Focusing on e-mail as the commonest method of information exchange, a hospital-wide survey was done, consisting of 7 questions, particularly on wasteful e-mail activity.

RESULTS: (1) A number of material waste areas were identified. Mean values are reported. Per procedure list, 101 recyclable items were disposed of in domestic waste bags (e.g. paper or cardboard packaging) and 68 items were incorrectly disposed of in clinical waste bags that could have gone into domestic waste or been recycled (e.g. plastic packaging). Twenty four items per list were unnecessarily disposed of in sharps bins (e.g. needle covers, tourniquets). Nine items per list were opened without all of the material being utilised. These were mostly items within pre-prepared sterile packs that were not used although some were individually packaged items. (2) All gowns and drapes were disposable and in each list at least 4 sterile gowns and 6 sterile drapes were used. (3) There were a number of areas of wasted energy use. A consistent area of waste in outpatients was a one computer screen

left on but not utilised at all during the clinic. Of 31 consultations that were conducted face-to-face, 7 could have been remote and these patients had been driven to the appointment. The e-mail survey generated 237 survey responses. The proportion of responders who had over 500 e-mails stored in their deleted items and junk folders were 20% and 7% respectively. Ten percent of responders had over 500 unread e-mails in their inbox. Only 30% of users had a routine system to manage their e-mails including avoiding storage of unwanted messages.

CONCLUSIONS: Simple auditing of sustainability practices is a worthwhile exercise in chronic pain services. In our service useful data have been generated using a short e-mail survey and a 2 week observation period. We found that correct waste management during procedure lists is potentially the most effective and quick sustainability intervention that we should implement. In the longer term switching to reusable gowns and drapes will have the greatest impact on our carbon footprint. Routine management of electronically stored data including e-mail, is a small proportion of an individual's carbon footprint but creates a large footprint over time across an organisation and therefore should be encouraged. We would recommend similar simple audits in other services to identify the most effective local sustainability interventions.

Keywords: sustainability, carbon foot print, waste, reusable

P-34

Other (Research)

Intravenous Lidocaine Infusions and Changes in Dynamic Measures of Quantitative Sensory Testing in Patients with Fibromyalgia

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BACKGROUND: Fibromyalgia is a disorder characterized by widespread musculoskeletal pain accompanied by fatigue, sleep, memory and mood issues and is associated with dysfunctional pain modulation mechanisms, including central sensitisation. Experimental pain measurements, such as quantitative sensory testing may serve as a marker of central sensitisation.

Standard treatments for fibromyalgia include education, physical exercise, talking therapies such as cognitive behavioural therapy, and medications. Although anti-depressant medications are widely prescribed, the high incidence of side effects and lack of efficacy have stimulated a demand for additional treatment modalities. Lidocaine is an alternative drug which can achieve both central and peripheral analgesic effects with relatively few side-effects.

AIMS: In this study we investigated the effect of intravenous infusions of lidocaine using two dynamic quantitative sensory tests (QST) that measure key aspects in central pain processing and quality of life in patients with fibromyalgia.

METHODS: Twelve patients were included in the study, which consisted of baseline QST, intravenous lidocaine 2-4mg/kg and then follow up QST 21-42 days post treatment.

RESULTS: Patients with fibromyalgia showed differences in dynamic QST including impaired conditioned pain modulation (CPM) prior to lidocaine, reverting to an efficient CPM response within 21-42 days following intravenous lidocaine (mean 54.3kPa vs 152.0 kPa cuff inflated) and increased temporal summation at baseline returning to a normal response (mean NRS at baseline 5.33 reduced to 1.33 after lidocaine).

CONCLUSIONS: These results provide further evidence of the reduction in central sensitisation following lidocaine in patients with fibromyalgia, in support of previous work from our institution. A consistent and sustained improvement in dynamic QST measures was observed in contrast to pressure pain thresholds for which there was no difference. Normalisation of the temporal summation and conditioned pain modulation response following lidocaine infusion indicates that the treatment may reduce central sensitization in the FM population.

Keywords: Fibromyalgia, quantitative sensory testing, lidocaine

P-95

Other (Research)

How Lived Experience Can Inform and Direct Pain Projects: The Alleviate Pain Data Hub as a Case Study

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BACKGROUND: Chronic pain affects a large proportion of the general population – at least 34% of adults in the UK - and it has a huge impact on people's lives as well as the workplace and health services, accounting for more than 75% of the years lived with disability. Despite this, chronic pain is poorly captured in clinical data which makes it difficult to identify appropriate patient cohorts especially for retrospective observational studies. A different model for pain-related projects is to include the patient voice directly into the team with the addition of funded patient members. Here we present our positive experiences from within the Alleviate Pain Data Hub.

AIMS: To demonstrate how the patient voice is an intrinsic part of chronic pain research through the experience of the Alleviate Pain Data Hub and its pain community. To highlight the lived experience of people with chronic pain to inform the project and to respond to important issues.

METHODS: Throughout the lifetime of the Alleviate project two patient representatives have been included as part of the core project team. Using their input, alongside the input of a wider Chronic Pain Advisory Group, a continuous theme of outputs was generated to inform current and future research. For example, in 2023, a chronic pain survey based on a set of questions developed and used by

Chronic Pain Australia (CPA) in 2023 was adapted for the UK population. Ethics approval was gained by the University of Dundee, School of Medicine ethics committee.

The survey was open for a month between 16th November – 15th December 2023 and was shared via social media by the Alleviate Data Hub, the Advanced Pain Discovery Platform (APDP), Pain UK and HDR UK, plus direct contact was made with various large organisations, trade unions and charities. The survey was open to all adults across the UK.

RESULTS: The patient members of the team have been included throughout the project lifecycle and have been instrumental in delivering several of Alleviate's outputs. Together with a public/patient involvement and engagement (PPIE) coordinator the patient members developed a recruitment strategy for the Alleviate pain community which includes 336 individuals. From this pool we recruited a panel of pain forum members who join in regular project meetings, PPIE specific events and have contributed to the direction taken in Alleviate. This includes the initiation of a collaboration between Alleviate, APDP, Pain UK and CPA on the reuse of the Australian survey in the UK. The questions covered general demographics of the participants and covered topics around an individual's experience with pain and subsequent contact with health professionals, what research topics are important, and their emotional experiences relating to chronic pain research. 623 responses from across the UK four nations were received with a dominance of people living in England (71%), female (80%), with a median age of 53 and 9% from an ethnic minority background. Some key responses were that 75% of respondents felt ignored or dismissed by healthcare services and upto 44% were stigmatised by GPs or other health professionals. Further analysis will be presented covering aspects of the patient journey, management of their pain and views on most important research topics.

CONCLUSIONS: Being able to include the knowledge and experience of those living with pain and act on their needs and/or requests highlighted how impactful partner patient partners can be. The patient voice is a powerful director and motivator within Alleviate which has instigated several activities that would not have otherwise occurred: 1) raised the importance of chronic pain; 2) produced instructive materials for the public and researchers; and 3) instigated new collaborations.

Keywords: patient voice, PPIE, pain survey

P-93

Other (Research)

Cognitive Muscular Therapy for Knee Osteoarthritis: Is it Time for a Second Wave of Psychologically Informed Physiotherapy?"

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BACKGROUND: Knee osteoarthritis (KOA) is a chronic long-term condition which results in pain, disability and reduced quality of life. While current guidelines focus on the use of strengthening exercises combined with psychoeducation, there is clear evidence that people with KOA over activate their muscles during functional tasks. This overactivity will increase mechanical stress on the joint and surrounding structures, and may increase nociceptive input, triggering pain. This idea is supported by research which has demonstrated a link between muscle overactivity and pain and disease progression. Psychosocial factors have also been linked with pain and disability in KOA. For example, catastrophising and anxiety have been associated with pain intensity and kinesiophobia linked to physical function.

To address these issues, we have developed a novel psychologically informed physiotherapy intervention for KOA which we refer to as Cognitive Muscular TherapyTM (CMT). The primary aim of CMT is to reduce overactivity of the knee muscles by addressing maladaptive thoughts and muscular responses to pain. Patients are supported to understand postural drivers of muscle overactivity, and appreciate the link between muscular responses to pain and psychological factors. To facilitate understanding, CMT incorporates a range of animated instructional videos which are used to communicate concepts related to pain and biomechanical theory. Electromyography biofeedback is used throughout the intervention to visualise muscle activity, provide postural re-education and help patients understand their muscular responses to pain. Hands on physiotherapy such as guided diaphragmatic breathing is incorporated to provide the patient with experiential learning, enabling patients to reduce both postural muscle overactivity and knee muscle overactivity.

AIMS: The primary aim of this pilot study was to evaluate and compare the effects of CMT with standard care in managing both pain and function in individuals with KOA.

METHODS: A total of 78 patients were recruited from Musculoskeletal Clinical Assessment and Triage services (MSKCATS) in Greater Manchester. To be included, patients had to satisfy the American College of Rheumatology (ACR) criteria for KOA and not responded to previous physiotherapy. Participants were randomly allocated into two groups- an intervention group and a control group. Participants in the intervention group were offered a maximum of 7 sessions of CMT (one every two weeks). Participants in the control group were advised to maintain their current method of KOA management.

RESULTS: 30 patients in the intervention group and 27 patients in the control group completed 20-week outcomes. Mean (SD) age and BMI were 67 (7.8) years and 27.6 (3.0) Kg/m2 in the intervention group and 65 (8.0) years and 28.5 (2.6) Kg/m2 in the control group. There was no difference in the The Western Ontario and McMaster Universities Arthritis Index (WOMAC) or The Pain Catastrophizing Scale (PCS) at baseline between groups. At 20 weeks, WOMAC decreased by 47.4% in the intervention group and by 5.9% in the control group. This difference was significant ($p<0.001$). At 20 weeks, PCS decreased by 50.4% in the intervention group and by 6.4% in the control group. This difference was significant ($p<0.001$).

CONCLUSIONS: Current psychologically informed physiotherapy interventions typically deliver 25% reductions in pain, stiffness and function for people with KOA. Our data suggests that CMT may be able to deliver greater improvements in pain, stiffness and function and may also lead to reductions in pain catastrophising. These findings support the idea of a link between psychological factors and KOA symptoms and highlight the potential benefits of integrating psychological techniques with biofeedback training to reduce muscle overactivity. Despite the small sample size and the need for further research, CMT shows promise as a second wave psychologically informed physiotherapy intervention for individuals with KOA.

Keywords: Psychologically informed physiotherapy, Knee osteoarthritis, Chronic pain, Pain management

P-96

Other (Research)

Efficacy and Safety of Crisugabalin in Chinese Patients with Acute Herpetic Neuralgia: A Multi-Centre, Randomized, Double-Blind, Phase 2 Trial

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BACKGROUND: The major pharmacological treatment options for acute herpetic neuralgia (AHN) therapy are unsatisfactory, and there is a clinical need for new approaches. Crisugabalin was found to be a novel, potent voltage-gated calcium channel α2δ subunit inhibition for the treatment of AHN.

AIMS: This study aimed to assess the efficacy and safety of Crisugabalin for treatment of AHN in China.

METHODS: Adults (≥18 years) with AHN, visual analogue scale (VAS) ≥40 mm, numerical rating scale (NRS) ≥ 4 points at screening were eligible for study participation. Subjects were randomized (1:1:1) to Crisugabalin (20mg, bid), Crisugabalin (40mg, bid) and Pregabalin (150mg, bid) for 4 weeks. The primary endpoint was compared the change from baseline in NRS between Crisugabalin and Pregabalin at week 4. Key safety endpoints were treatment-emergent adverse events (TEAEs) monitored throughout the trial.

RESULTS: A total of 330 patients from 25 institutions were randomized to receive Crisugabalin (40mg/day: n=110; 80mg/day: n=110) or Pregabalin (n=110). In full analysis set, least squares mean differences in change in NRS from baseline to week 4 were -4.7 in Crisugabalin 40mg/day group, -5.1 in Crisugabalin 80mg/day group, and -5.0 in Pregabalin group, respectively (P=0.17, and 0.68 versus Pregabalin). No investigational drugs-related TEAEs CTCAE≥3 happened throughout the study, and the most frequent TEAEs in two Crisugabalin groups were dizziness and somnolence, which were always recovery without additional treatment.

CONCLUSIONS: The results suggest that Crisugabalin is non-inferior to Pregabalin in reducing peripheral neuropathic pain and is well tolerated in Chinese patients with AHN, which demonstrate that Crisugabalin may offer a new treatment option for AHN.

Keywords: Acute Herpetic Neuralgia, Crisugabalin, non-inferior, tolerated

P-97

Other (Research)

Pain, Cognition and Dementia: A Scoping Review

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BACKGROUND: A growing number of studies suggest that people with dementia suffer from problems in various cognitive domains that can be exacerbated by pain. Additionally, research has identified cultural differences in pain reports.

AIMS: This scoping review aims to contribute to the ongoing dialogue on pain by providing a broad perspective that considers the intricate interplay between cultural and cognitive factors. By synthesising existing literature, the review seeks to stimulate further inquiry and foster a more holistic understanding of pain experiences across diverse populations.

METHODS: A scoping review was conducted to better understand which components of cognition may be particularly affected by pain in dementia and what tools are used to explore this association, to highlight key gaps in knowledge. We retrieved 922 potentially eligible articles, 107 met the criteria for inclusion and 75 provided data for extraction.

RESULTS: There is evidence that in people with dementia, cognitive impairment can be exacerbated in the presence of pain, and that pain, cognition, and culture can impair people's communication skills.

CONCLUSIONS: While there is evidence that there is some correlation between pain and cognition in dementia, the reasons for this are unclear. There is a need for more research looking into the ways in which having a pain condition impacts on the cognitive aspects of pain communication and management in individuals with dementia.

Keywords: Chronic Pain, Cognitive Decline, Cultural Disparities, Health Care System, Pain Communication

AuthorToEditor: In this paper, we identify the characteristics, extent, and results of current research on the association between pain and cognition in dementia. This paper also investigates the relationship that culture has with pain communication. This is an important contribution to the field as there are very few studies to date which have made links for the interrelations between pain, cognition, culture, and dementia. Rather, small associations have been identified but have not been investigated further. This scoping review offers valuable insights for these interrelations which may also offer valuable implications for future research and policy.

P-99

Paediatric

Understanding the Relationship Between Chronic Pain and Suicidal Distress in Adolescence: A Mixed-Methods Approach

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BACKGROUND: Chronic pain (persistent/recurrent pain for ≥3 months) affects 11-38% of young people and is amongst the

leading causes of disability in adolescents worldwide. It often co-occurs with mental health problems and suicidality (self-harm thoughts and acts, irrespective of suicidal intent). As suicidality is a serious concern in adolescence, affecting between 10-30%, the early identification of suicidal risk and prevention is vital. Chronic pain may be a highly prevalent, easily identifiable, and manageable clinical target for suicide prevention efforts in adolescence. However, little is known about which aspects of the pain experience are associated with suicidal distress.

AIMS: This study aims to explore:

a) Whether adolescents with chronic pain report suicidal distress.

b) Which aspects of the pain experience are associated with suicidal distress.

METHODS: This mixed-methods, observational study focusses on the cross-sectional relationship between chronic pain and suicidal distress in 77 adolescents with chronic pain, recruited from the Oxford Centre for Children and Young People in Pain. Participants completed questionnaires on their pain experience and suicidal distress (perceived burdensomeness, hopelessness, and self-harm thoughts and acts), as one emotional distress pathway leading to suicidal outcomes. In an optional interview (n = 59), participants described their pain experience and how it affects their feelings. Data were analysed using descriptive statistics, regression models, and reflective thematic analyses.

RESULTS: Participants were aged 12-18 years (79% female, 90% White British/European) and most frequently reported persistent pain with pain attacks, often in multiple locations. Preliminary results suggest that feelings of perceived burdensomeness, hopelessness, and self-harm thoughts and acts are very common, which allows us to explore and discuss relationships between aspects of the pain experience and suicidal distress. In total, 88% participants took part in the qualitative interview, providing rich insights into their own experience of pain and distress and key domains where severe distress can emerge, including the diagnostic journey, lack of coping, unmet psychological needs, and living with a life-changing, long-term condition. Detailed results will be discussed once the analyses are finalised.

CONCLUSIONS: Findings show the extent to which adolescents with chronic pain report suicidal distress and which aspects of the pain experience might be associated with suicidal distress. By identifying vulnerable youth and key domains where risk can emerge, these findings may have direct clinical implications.

Keywords: Adolescence, chronic pain, self-harm, suicidal distress

AuthorToEditor: We are currently still in the process of data analysis, but will be in a position to present the final results at the scientific meeting. Thank you for taking the time to consider our conference abstract for presentation.

P-98

Paediatric

Effect of Caudal Block on Surgical Stress Response in Pediatric Population

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BACKGROUND: Caudal epidural nerve block has been used to provide effective intra- and postoperative analgesia. Stress response hormone levels can be used as an objective method to assess the analgesic efficacy of the anaesthetic techniques used in undergoing ilioinguinal herniorrhaphy surgery in children. In this study, we analysed catecholamine blood levels in children undergoing this anesthesia technique.

AIMS: The study comparing the effect of two anaesthetic/analgesic techniques on the catecholamine levels in children undergoing ilioinguinal herniorrhaphy.

METHODS: After the approval of the local institute ethics committee and obtaining the singed parental consent, forty male pediatric patients ASA class I were allocated randomly to one of two groups: the control group (n = 20) received general anaesthesia including intravenous fentanyl; and the caudal group (n = 20) received caudal anaesthesia with bupivacaine 0.25% 1 mL kg-1 combined with general anaesthesia but without opioids. Plasma adrenaline and noradrenaline concentrations were measured at induction, at the end of surgery and in the post-anaesthesia care unit (PACU).

RESULTS: In the caudal group, there were significant decreases in the adrenaline and noradrenaline concentrations at the end of surgery ($p=0.004$) and in the PACU compared with baseline concentrations ($P<0.001$). In the control group, there was a significant increase in PACU concentrations of adrenaline and noradrenaline ($P=0.019$) compared with baseline concentrations.

CONCLUSIONS: These findings suggest that the addition of a caudal block to general anaesthesia in children undergoing ilioinguinal herniorrhaphy decreases significantly the neurohormonal responses to surgery.

Keywords: Anesthesia, Analgesia, Caudal block, Stress response, Pediatric population

P-100

Paediatric

A Review of the Available Guidelines for the Assessment and Treatment of Pain in Children

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BACKGROUND: Given the subjectivity of the pain experience and the inability of young children to verbalise their pain, the assessment and treatment of children's pain is often not straightforward. Child and parent reporting of pain may not always align, as a child may report pain when the parent does not. Parents may often be confused about when they should administer parental reporting vs self-reporting of the child and when to begin treatment.

AIMS: This review sought to summarise the available guidelines for assessing and treating acute pain in children.

METHODS: Several searches were conducted:

- Websites of academic pain societies and national health organisations.
- Internet searches using terms such as 'management of acute pain', targeting specific societies and national bodies.
- A focused PubMed search: o Search string: "acute pain" AND (guidelines or management or recommendations)

o Date limit: 5 years

o Population: birth to 18 years

o English language only

♣ This produced 313 hits that were screened. 3 articles were considered appropriate for inclusion.

• An additional PubMed search was conducted to source any additional guidelines relating to the specific pain types included in the report: o Search string: "migraine" OR "menstruation" OR "tonsillectomy" OR "musculoskeletal" OR "dental" OR "surgery" OR "surgical" OR "operative" OR "arthritis" OR "abdominal" AND "pain"

o Date limit: 5 years

o Population: birth to 18 years

o English language only

o Guidelines only

♣ This produced 11 hits that were screened and all were considered appropriate for inclusion.

RESULTS: Recommendations for assessing paediatric pain: Fifteen guidelines identified included treatment recommendations, whereas only two were guided assessments. This is even though there are many published pain assessment tools specifically designed or adapted for use with children. Only some of these scales are fully validated, and determining which assessment tool is most appropriate is not always straightforward. The variations and revisions of specific assessment tools (e.g. FACES scale) also add to the excess of information a health care professional (HCP) needs to sift through to determine an appropriate scale. Most of the guidance on assessing acute pain is published in condition-specific guidelines, rather than by pain management specialists.

Recommendations for managing paediatric pain:

While more guidelines on managing acute pain in children are available, most of the guidance is found within condition-specific guidelines. Notably, in 10/15 of the guidelines, ibuprofen and paracetamol are the mainstay of treatment for mild-to-moderate pain in children and adolescents, including the National Institute for Health and Care Excellence (NICE) in the UK. Three guidelines highlight that the optimal use of paracetamol/ibuprofen can reduce the need for opioids. Appropriate use of analgesics is the primary focus for most of the guidelines reviewed; however, some note the usefulness of other techniques, such as the application of heat/ cold.

CONCLUSIONS: • Few guidelines exist on the assessment of acute pain in children.

• Despite the availability of multiple evidence-based methods/ scales of assessing children's pain, clear guidelines on which to use under which conditions seem to be lacking.

• Most recommendations for both evaluating and managing acute pain are published in condition-specific guidelines.

• In many of the management guidelines the appropriate use of analgesics is the primary focus, with 10/15 guidelines recommending that ibuprofen or paracetamol should be the mainstay of treatment for mild-to-moderate pain.

• Pain assessment in children may be hindered by a lack of familiarisation with the main pain scales and how to use them – this may apply to health care professionals (HCPs) as well as children and their parents, highlighting a need for both HCP and consumer education.

• Guidance on using assessment tools in conjunction with other behavioural assessments may provide a more holistic and accurate estimation of paediatric pain.

Keywords: pain, children, guidelines, assessment, treatment

P-101

Pain and Gender

See My Pain Year 2 – An Updated UK National Survey Revealing the Unconscious Bias toward Women's Pain

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BACKGROUND: Delays in diagnosis can cause negative impacts on patients' health, including emotional suffering, extended symptoms leading to reduced quality of life, and additional medical expenses[1]. Research showed that women's pain is often mistreated and are prescribed with antidepressants instead[2–8]. In 2022, Reckitt's first UK based survey revealed that over 1 in 2 women felt dismissed because of their gender[9]. Results from this real-life survey further reinforce the mentioned literature findings.

AIMS: To understand how this unconscious bias affects patients suffering from pain conditions, we conducted follow-up research in 2023.

METHODS: 5015 UK adults aged 18+ were recruited online to complete questionnaires in August 2023 without restriction on medical conditions, gender, age, or region. Data was analysed by Q Analysis and Microsoft Excel. Results were published in the 2023 Gender Pain Gap* (GPG) Index Report. [*Gender Pain Gap refers to the phenomenon in which pain in women is more poorly understood and more mistreated compared to pain in men due to systemic gaps and biases.

RESULTS: Results show the GPG widened from 7% (2022) to 11% (2023), meaning 11% more women than men surveyed felt their pain being ignored or dismissed. 30% of women vs 18% of men felt the reason it took time to receive a diagnosis was because their healthcare professionals (HCPs) did not take their pain seriously. This trend was also reflected across most UK regions (42-44%), except London and East of England (50-52%) and East Midlands (38%). Our survey also suggested 47% of women vs 66% of men received a diagnosis for their pain within 11 months. Disparities persist in specific pains including back pain (54% women vs 77% men), joint pain (58% vs 74%), stomach pain (50% vs 67%), migraines (69% vs 80%) and headaches (47% vs 58%). What's more, 14% vs 9% of men surveyed still did not have a diagnosis for their pain.

Although women experiencing pain in daily life were most comfortable speaking to HCPs (78%) regarding their conditions, most of them still hesitated to share, with 11% saying they chose self-care due to fear of not being believed by an HCP, vs 6% of men. Furthermore, 17% vs 10% of men chose self-care over consulting HCPs because they felt ignored by their healthcare provider on previous occasions. Results reflected the barriers which women faced when discussing pain, including feeling that they may be judged as complainer/ moaner. Because of this, 45% vs 35% of men felt uncomfortable sharing information about their pain.

CONCLUSIONS: Pain is a symptom that may signal a disease requiring diagnosis. The characteristics of pain can also offer clues regarding disease pathogenesis and therefore delayed diagnosis

can lead to worsening of conditions, leading to them potentially being chronic or untreatable. These survey outcomes were taken to an advisory board of HCPs with a special interest in pain. The discussion panel has left us a question to rethink: Is the current pain management effective for a prompt diagnosis of pain conditions? A panel member also mentioned that a gender health gap is posing a problem for women, HCPs, and society. They also suggested that 1 in 2 women feeling dismissed could be someone close in our families, implying how common this problem could be. Results indicate that the GPG still exists and is not limited to diagnosis and treatment but seen throughout the society. Addressing this unconscious bias is crucial as everyone's pain deserves to be seen and taken seriously regardless of their gender. We hope and are contributing to HCPs being provided with support and training to help guarantee early, fair, and unbiased pain diagnoses for every patient.

Keywords: See My Pain, Gender Pain Gap, Unconscious Gender Bias, Pain Management, Women's Pain

AuthorToEditor:

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P-103

Pain in Women

Dysmenorrhea and Chronic Pain at Midlife: Evidence from the UK National Child Development Study

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BACKGROUND: Females are disproportionately affected by chronic pain conditions (CP) throughout the life course. Dysmenorrhea is defined as the experience of painful menstruation and is a common gynaecological complaint associated with CP among people who menstruate, but whether the association is observed prospectively in midlife – a time characterised by the peri-menopause and other social and biological changes – remains unclear.

AIMS: This study explores the association between dysmenorrhea and CP in midlife - as a sensitive period for females when changes related to ageing, social context and peri-menopause may additionally prime for CP. In addition, we explore how dysmenorrhea associates with different pain phenotypes: generic CP, widespread CP, pelvic pain (PP) and dyspareunia.

METHODS: We used data from the National Child Development Study, the 1958 British birth cohort representative of the British population. Our predictor variable was self-reported dysmenorrhea at any point in the life course up to age 42; outcome variables were generic chronic pain and chronic widespread pain at age 44, and pelvic pain and dyspareunia at age 42. We used logistic regression to estimate the total and direct effect of dysmenorrhea on the different pain phenotypes. The analytic models used were based on the assumed relationships presented in a directed acyclic graph co-produced with experts. A sensitivity analysis was conducted replacing dysmenorrhea with endometriosis at age 42.

RESULTS: The total effects odds ratio (OR) of generic chronic pain in females with prior dysmenorrhea is 1.91 (CI 95% 1.57-2.32), 2.61 (95% CI 2.06-3.31) for chronic widespread pain, 10.60 (CI 95% 6.40-17.56) for pelvic pain and 5.45 (CI 95% 3.18-9.36) for dyspareunia. The direct effects analysis showed an OR of 1.32 (CO 95% 0.94-1.85) for generic chronic pain, 1.99 (CI 95% 1.30-3.05) for widespread chronic pain, 9.67)CI 95% 3.81-24.53) for pelvic pain and 2.70 (CI 95% 1.07-6.77) for dyspareunia.

CONCLUSIONS: Results show a large total effect of dysmenorrhea on all pain phenotypes, which remain significant in the direct effects analysis for CWP, pelvic pain and dyspareunia. If causal, our findings evidence the importance of coordination between pain and gynaecological services to a) prevent the risk of secondary pain conditions for people with dysmenorrhea and b) provide specialist gynaecological and pain management treatment for those who develop pain.

Keywords: dysmenorrhea, women's pain, chronic widespread pain, pelvic pain, dyspareunia

P-104

Pain in Women

Gynaecological Histories and Chronic Pain: Ethnographic Findings from a Study of Peri-Menopause

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BACKGROUND: Findings from epidemiological studies and clinical audits suggest a possible increase in chronic pain experiences during the peri-menopause years, raising questions about what factors in a woman's history – both social and biological - contribute to the emergence of pain int his group. Gynaecological experiences earlier in the life course – like dysmenorrhea – have been showed to be associated with chronic pain, yet it is unclear by what prospective pathways this happens or how hard-to-quantify factors like gender identity and personal narrative interact with gynaecological factors. In addition, it is unclear what value is attributed to pain by women during the different stages of the fertility arc.

AIMS: We outline common experiences of gynaecological events preceding chronic pain during the peri-menopause, and identify how

women contextualise these experiences from a gender-identity perspective and within their personal narrative. We answer the following questions: How are gynaecological events throughout the life-course (eg. pregnancy, menstruation, gynaecological disease) perceived to relate to chronic pain onset at peri-menopause? How does gender identity relate to the experience of gynaecological events and related pain?

METHODS: We used life-mapping data from semi-structured interviews and field notes part of the "Chronic pain during peri-menopause - an ethnographic study", a qualitative longitudinal study of the experiences of chronic pain during the peri-menopause years where participants were interviewed on three separate occasions – a life-mapping semi-structured interview investigating significant events across the life-course; a semi-structured interview centred around the joint experience of chronic pain and peri-menopause; and a go-along interview exploring the impact of pain and peri-menopause on their daily-life. Participants were recruited through advertisement on patient networks for chronic pain and peri-menopause in the UK and social media. All interviews were audio-recorded and transcribed verbatim. Interview transcripts and field notes were analysed thematically using NVivo software.

RESULTS: Twenty participants took part in the life-mapping semi-structured interview. Participants described pain during peri-menopause in a continuum with gynaecological events and earlier life experiences. While chronic pain was portrayed as either emerging as a rupture or as an amplification of previous pain, there was a consensus as to hormones affecting the pain experience either directly or indirectly.

Findings are summarised in the following themes:

Menstrual pain, pelvic pain and healthcare experiences: this theme is based on the experiences of …% of participants who reported dysmenorrhea and other pelvic pain of gynaecological origin, and how early healthcare experiences for its management engendered trust relationships with healthcare professionals and further pain problems; Sexual health, mental health and relationships: participants described the interaction between gynaecological and sexual health, and personal relationships in the context of shifting gender identities as they moved from adolescence to maturity; Fertility journeys and expected pain: this theme reflects on the expectations and attributed-value of physical and emotional pain during child-bearing experiences; Hormonal upheavals and the onset of peri-menopause: participants reflected on the peri-menopause as a gynaecological event, and on the interaction of hormones, symptoms and pain.

CONCLUSIONS: This analysis provides insight into how personal narratives encompassing social and gynaecological factors affect women's experience of chronic pain during the peri-menopause. Findings will be of interest to clinical service leads in different specialties, and suggest interventional research is required to inform chronic pain prevention strategies tailored to this group.

Keywords: chronic pain, peri-menopause, gynaecology

P-133

Pain in Women

A Smartphone App Review of Breast Health: Identifying the Information Available for the Public on Breast Pain as a Solitary Symptom

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BACKGROUND: With referrals exceeding the available clinical capacity, breast diagnostic units nationally are overwhelmed. Many patients are now waiting longer than necessary for an appointment.

Breast units are therefore adapting and creating new pathways for specific conditions such as breast pain, as there is increasing evidence suggesting breast pain is not a symptom that is related to breast cancer. Breast pain, however, is a common condition and is responsible for up to 20% of referrals into a breast unit. Breast pain is also thought in many cases to have an underlying musculoskeletal cause, rather than originating in the breast. Current national guidance states that in most cases breast pain is best managed in primary care.

Primary care facilities are also overwhelmed and with patients often finding access challenging. For this reason, patients may turn to the internet and digital applications for advice and guidance about their symptom.

AIMS: To identify the information available for the public on the solitary symptom of breast pain. Conclude whether there is a need to develop an APP to support this group of patients.

METHODS: A prospective smartphone APP review will identify how many digital applications relating to breast pain symptoms exist within the 5 major APP stores. The review will not look at the functionality of the APP, but instead focus on the purpose and content of the APP. Data will identify whether breast pain is featured within the body of the APP, if so, is an explanation about breast pain given, and is breast pain suggested to be a red flag for breast cancer.

RESULTS: Results so far show that through the Apple store alone, 448 digital applications were identified using 7 different search terms. 16/448 related specifically to breast health and all were aimed at the public. They featured advice about breast examination, breast symptoms and advise about what to do if a symptom was experienced. However, only 8/16 mentioned breast pain within the body of the APP and only 2/16 gave an explanation about breast pain. A list of red flag symptoms for breast cancer featured in 14/16 of the APPs with 6/16 suggesting pain was a red flag for breast cancer. The 2 APPs that gave some explanation about breast pain also had confirmed medical input but gave conflicting advice. The 1st APP suggested that breast pain is unlikely to be a sign of cancer, but also advised a patient to be checked by a specialist before they try the treatments commonly given for breast pain. The 2nd APP stated that if you have breast pain "you have found something suspicious," but then went on to state this is a symptom that is rarely associated with breast cancer.

CONCLUSIONS: A further review will be undertaken of the other major APP stores. However, based on the information available so far, it is evident that the information available to the public about breast pain is conflicting, inaccurate or in some cases not available at all. Development of an APP containing accurate and relevant information may support patients in managing their symptoms as well as supporting our primary care colleagues to direct patients to this much needed advice.

Keywords: mastalgia, breast pain, chest wall, primary care, APP

P-106

Pain Registries

Pain, Fatigue and Biomarkers of Disease Status in a Registry of Patients with Lyme Disease and Tick-Borne Infections (TBIS)

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BACKGROUND: Tick-borne infections (TBIs) cause immune dysfunction and dysregulated inflammation. Pain and Fatigue is predominant, in addition to neurocognitive and debilitating multi-system symptoms. Antibiotic therapy is a mainstay for management, and the safety profile is well noted. Migratory musculoskeletal pain in joints and muscles, indicates the development of a marked cellular and humoral immune response to the Lyme and/ or co-infection, hence setting up an immune-inflammatory response. Fatigue often accompanies the clinical picture. Once anaemia and thyroid issues have been ruled out, most patients are 'labelled' with a chronic fatigue syndrome diagnosis; often, with limited support in the primary care setting. These patients may find themselves referred to secondary and tertiary pain services.

AIMS: This study is a sub-analysis of a unique longitudinal treatment cohort of 301 patients with a clinical diagnosis of Lyme and tickborne infections. Specific emphasis was on assessing Pain and Fatigue scores and blood serology for biomarkers (CD3%, CD3 total, CD4%, CD8%, CD4 Helper cell count, Iron, Ferritin, Transferrin, Transferrin saturation, Creatinine Kinase, CRP and Rheumatoid Factor).

METHODS: The laboratory diagnosis of Lyme disease was based on an ELISA platform, used to assess IgM and IgG antibody responses to Borrelia spp (B. afzelii and B. garinii), Borrelia persister forms, Babesia, Bartonella, Ehrlichia, and Rickettsia using a modified two-tiered testing protocol. Serological testing was conducted using the TICKPLEX® test at ArminLabs GmbH in Augsburg, Germany. TICKPLEX® has the capability to assess IgM and IgG immune responses present in human serum samples against various species of Borrelia burgdorferi sensu lato in both spirochete and persistent forms, as well as against co-infections and opportunistic microbes. As diagnosed at baseline (T0); the patients were then able to have a personalised therapeutic management plan over a period of 18-24 months until the endpoint (T2).

RESULTS: Pain Scores: n= 176 patients

• Functional Pain Score at T0 and T2: Noted to have improved pain over time in terms of patient rating their pain a 6 or greater. At baseline (T0), 145 patients (81%) rated pain a 6 or greater and at T2, this number had reduced to 68 (39%) rating pain 6 or greater.

• Global pain in joints and muscles at T0 and T2: The Pain Score median at baseline T0 is 7, and the Median for T2 is 5. Overall, the pain level in joints and muscles improved as per the Mann-Whitney-U test following antibiotic treatment in patients with a clinical diagnosis of Lyme and TBIs. ($U = 6570.5$, $Z = 9.34187$, $p<0.0001$).

Fatigue: n=186 patients

• At baseline (T0), 169 patients (91%) reported fatigue, while towards the end of the treatment period (T2), 79 patients (42%) reported fatigue. The improvement seen between T0 and T2 statistically significant, shown by the Chi-square test with a p-value less than 0.001.

Biomarkers: n=186 patients

• There were more abnormal biomarkers outside lab ranges (predominantly, below reference range); for the baseline T0 when compared with T2. This was more notable for the patients presenting with fatigue.

• In particular, the CD3% was lowered in a noteworthy amount of the patients presenting with fatigue at baseline T0.

• Although majority of the patients presented with a within reference range CRP and Rheumatoid Factor, these individuals were noted to have the highest pain and fatigue scores.

CONCLUSIONS: Assessment of clinical symptoms, together with respective biomarkers of disease status forms the holistic assessment for patients with Lyme Disease and Tick-Borne Infections (TBIs). The synthesis of data from this unique cohort highlights improvements in the pain and fatigue scores and some serological biomarkers following a tailored therapeutic approach. Also, this research, highlights the appreciation of 'not to dismiss patients with a normal within-range biomarker findings.'

Keywords: Pain, Fatigue, Biomarkers, Lyme & Tick-borne Infections

AuthorToEditor: The bringing together of this registry has been a unique opportunity for a multi-disciplinary 'out of the box' approach to join the dots for these patients who often have experienced a missed/ delayed diagnosis of Lyme disease and co-infections. Many patients find themselves going from doctor to doctor, seeking answers to their complex health condition. Sincerely hope that these findings will menable fellow colleagues to appreciate these patterns and enable patient care as best possible. Thank you

P-108

Primary Care

The Association between Wanting to Reduce Opioids and Other Opioid Problems and Concerns: A Cross-Sectional Survey of Primary Care Patients in England

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BACKGROUND: Reducing inappropriate opioid prescribing is a key priority for the National Health Service (NHS) in England, United Kingdom (UK). An opioid prescribing comparators dashboard has been developed to support primary care general practices identify patients who are deemed to be at the greatest risk of harm, so they can be prioritised for a medication review.1 The proportion of patients prescribed opioids who may already want to reduce their opioid use, and any associations this may have with other opioid issues, is unexplored.

AIMS: To investigate the proportion of patients who have wanted to stop or reduce their use of prescribed opioids and the association between this and other opioid problems and concerns.

METHODS: A cross-sectional postal survey of adults prescribed an opioid medicine for non-cancer pain over a period of ≥3 months from ten general practices located within the East Midlands region of England,

UK. Survey items included an adapted version of the Prescribed Opioids Difficulties Scale (PODS)2 to examine problems and concerns that patients attributed to the use of opioids, including whether they have wanted to stop or reduce the amount used. Ethical approval was given by the UK Health Research Authority (ref 21/SC/0105). Questionnaires were mailed from the first practice in October 2021, with all practices completing mailings by June 2022. Questionnaire returns were accepted until 31st July 2022. Secondary analysis of the PODS data for this investigation involved cross-tabulation of responses by agreement/disagreement (excluding neutrals), followed by Chi-Square tests with Odds Ratio (OR), to determine the significance and strength of associations between wanting to reduce opioid use and the occurrence of other opioid problems and concerns.

RESULTS: From 3077 eligible patients, 619 questionnaires were returned (response rate = 20.1%). The median age of respondents was 64 years and 59.8% were female. Of those who completed the question, 31.1% (189/607) agreed or strongly agreed there had been times when they had wanted to stop their opioid pain medicines or cut down the amount used. High percentage agreement was observed between respondents who had wanted to stop or reduce and had felt slowed down, sluggish or sedated from opioids (76.8%), had worried about being dependent on, or addicted to, opioids (74.3%), and had needed to increase the dose of opioids to get the same effect (72.1%). Chi-Square tests indicated significant associations with all PODS items ($p<0.001$). The strongest association found the odds of a respondent wanting to stop or reduce were almost ten times higher if they had worried they might be dependent on, or addicted to, opioids than if they had not worried about these issues (OR 9.68, 95%CI 6.13-15.30).

CONCLUSIONS: A substantial group of patients prescribed opioids in this study who wanted to reduce their opioid use also had concerns about dependence or addiction. Identifying concerns about dependence may be helpful in supporting conversations about opioid reduction. Although a robust sampling frame was used, the generalisability of these results may be affected by limitations of sample size and potential recruitment bias towards patients who have experienced opioid problems and concerns.

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Keywords: opioid reduction, associations, survey, primary care

P-126

Primary Care

Practice Pharmacist-Led Review for Patients on Long-Term Opioids for Persistent Pain: The Prompppt Internal Pilot Trial

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BACKGROUND: Opioids are commonly prescribed for persistent non-cancer pain ('persistent pain') despite limited evidence of long-term effectiveness and important safety concerns. The National Institute for Health and Care Research funded PROMPPT trial aims to evaluate whether a practice pharmacist-led primary care intervention (PROMPPT review and pharmacist training package) reduces opioid use in patients with persistent pain, where appropriate, without increasing pain/pain-related interference. Acknowledging the potential challenges of recruiting to trials of opioid tapering interventions, an internal pilot was conducted.

AIMS: This internal pilot trial aimed to assess PROMPPT trial recruitment, intervention uptake and fidelity of intervention delivery against pre-specified progression criteria, and to evaluate retention at 3-month follow-up.

METHODS: GP practices and patients recruited during the first 6 months of the pragmatic multicentre PROMPPT cluster randomised controlled trial (ISRCTN 45616481) were included. Full ethical approval was obtained (Ref:22/NE/0044). GP practices ≥5000 list size with a practice pharmacist were recruited across three UK regions (West Midlands, East Midlands, Wessex). Before GP practice randomisation, potentially eligible patients were identified from electronic healthcare records and screened according to inclusion/exclusion criteria. Inclusions: Adults prescribed any opioid for ≥6 months. Exclusions: acute/cancer pain, terminal illness, vulnerable patients, current substance misuse treatment. GP practices invited eligible patients (by SMS or letter) to participate in the Management of Opioids and Persistent Pain (MOPP) questionnaire study. To avoid individual practices being overrepresented, invitations were capped at 250 per practice. Self-reported questionnaires (online or postal) collected data on opioid use, pain severity, pain interference, non-opioid pain-related medicines use, side-effects, depression, anxiety, pain self-efficacy, health-related quality of life, work and healthcare resource use. GP practices were randomised into two groups: the intervention group invited MOPP participants for a practice-pharmacist-led PROMPPT review (personalised, holistic 30-minute assessment with signposting and follow-up according to clinical need/patient preference), and the control group continued usual primary care for patients prescribed opioids for persistent pain. Intervention group pharmacists received PROMPPT training (e-learning plus two half-day remote workshops) including communication skills, conducting person-centred discussions about opioids/persistent pain, negotiating management plans and signposting to patient information resources about reducing opioids. Fidelity of review delivery was assessed from pharmacist-completed intervention delivery templates.

RESULTS: Between May and December 2022, n=14 GP practices with a total of n=200,109 registered patients were recruited, covering a range of socio-demographic areas. Electronic searches yielded n=5,380 eligible participants, of whom n=2,994 were invited to participate. Of these, n=400 consented and returned a baseline questionnaire, with n=388 confirmed eligible and included in the trial. Pre-specified progression criteria were met for practice

recruitment (target n=12) and patient recruitment (target ≥50/month). Patients recruited had a mean age of 63 years, 63% were female and 76% had lived with persistent pain for >5 years. Mean baseline opioid use, expressed as daily morphine equivalent dose (MED), was 34.5mg, but a small number had very high MED values and the median was lower at 20mg. Of 214 patient participants invited to schedule a PROMPPT review, 133 (62%) attended, which was slightly lower than the target (70%). The first practice had particularly low uptake (32%). Intervention delivery templates indicated that 89% of reviews were consistent with the training (target ≥ 80%). Of those participants with sufficient time to return the 3-month follow-up questionnaire, 106/174 (61%) had returned it, which was lower than our sample size assumption of 70% retention at 12-month follow-up.

CONCLUSIONS: The PROMPPT internal pilot successfully recruited eligible practices and patients, and pharmacists delivered PROMPPT reviews consistent with the training. Considering the findings, a range of amendments to the PROMPPT trial protocol were implemented, with the aim of improving retention at follow-up, and the research team has worked with practices to maximise review uptake.

Keywords: opioids, primary care, pharmacist, clinical trial, internal pilot

P-111

Psychology

Using Actigraphy-Derived Rest-Activity Patterns to Classify Clinical Insomnia among People with Chronic Pain

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BACKGROUND: Over half of the patients seen in pain clinics also report severe insomnia, which can exacerbate pain, reduce physical and social activity, impair work productivity, and negatively impact mental health. Detection of insomnia utilizing increasingly accessible wearable technologies can help identify and triage those who can benefit from early sleep intervention. Actigraphy is a non-invasive motion-sensing technique that measures individuals' physical activity (PA). Previous research has suggested an association between lower daytime PA durations and increased insomnia risk.

AIMS: The present study aimed to further investigate the use of machine learning (ML) models and to determine whether actigraphy-derived 24-hour rest-activity rhythm (RAR) features are better at classifying clinical insomnia (CI) in people with chronic pain (CP), compared with daytime-only or nighttime-only actigraphy features.

METHODS: A total of 195 people with CP participated in the study. The participants were asked to wear a research-grade actigraph on their non-dominant wrist, day and night, for 7 consecutive days in their natural sleep-wake environment. Participants' insomnia severity was assessed at baseline using the Insomnia Severity Index (ISI), with the validated cut-off score of 15 used to classify them into CI (15-24) and Non-CI (0-14) groups. Eight RAR features were derived from the 24-hour actigraphic data, using both parametric and non-parametric methods. These included MESOR (mean PA level), amplitude (difference between peak PA and MESOR), acrophase (timing of peak PA), interdaily stability (day-to-day consistency of RAR; IS), intradaily variability (disturbance of RAR; IV), M10, L5 (average PA intensity during the most active 10 hours and least active 5 hours respectively) and relative amplitude (robustness of RAR; RA). Six daytime features (mean, standard deviation, peak-to-peak amplitude, inter-quartile range, skewness and kurtosis) and seven nighttime features (total sleep time, sleep latency, wake after sleep onset, sleep-wake ratio, sleep efficiency, mean activity/epoch and fragmentation index) were computed for the comparison against the RAR features. Each of these three separate datasets were divided into training and testing subsets, with 90% allocated for training and the remaining 10% set aside for testing six supervised ML models, namely logistic regression, decision tree, random forest, support vector machine, K-nearest neighbours and Naïve Bayes. Model performance was measured using sensitivity, specificity and accuracy in predicting CI.

RESULTS: When RAR features were used, the Naïve Bayes algorithm achieved the highest overall classification performance (sensitivity: 71%; specificity: 85%; accuracy: 80%). The same algorithm also yielded the best performance when daytime features were used (sensitivity: 71%; specificity: 77%; accuracy: 75%). However, when nighttime features were used, the decision tree algorithm performed best (sensitivity: 71%; specificity: 62%; accuracy: 65%). Notably, while the level of sensitivity remained constant across these models, the specificity and accuracy were highest when RAR features were utilized for classifying CI. Subsequent logistic regression (LR) revealed that higher values of RAR features of MESOR, M10, amplitude, RA and IS were associated with lower odds of having CI, whereas higher IV was associated with higher odds of having CI. These suggest that RAR features indicative of higher average PA level and robustness (insensitivity to perturbations) of circadian rhythm were related to reduced odds of having CI, whereas higher IV, denoting more nighttime movements and daytime inactivity, was correlated with increased odds of having CI.

CONCLUSIONS: Findings from the ML analysis suggest that 24-hour RAR features, as opposed to daytime or nighttime actigraphic features, may be more effective in capturing the essence of CI. Findings from the LR analysis offer insights into how modifications of these RAR patterns may potentially ameliorate CI among CP patients, which may enhance pain management strategies.

Keywords: chronic pain, insomnia, actigraphy, rest-activity rhythm, machine learning

P-109

Psychology

The Effectiveness and Mediators of Cognitive Bias Modification for Interpretation in the Reduction of Negative Emotional Response to Pain

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BACKGROUND: Based on the premise that cognitive biases are implicated in the onset and maintenance of chronic pain, cognitive bias modification interventions aim to reduce pain-related cognitive biases and improve pain-related outcomes for individuals with chronic pain. Cognitive Bias Modification for Interpretation (CBM-I) is a promising approach within this field which trains participants to interpret ambiguous stimuli as neutral or benign rather than pain-related.

AIMS: This study investigated whether CBM-I could reduce negative emotional response to pain and to pain-related images, and

whether reductions in interpretation bias and fear of pain mediated this effect.

METHODS: The Ambiguous Situations Task was used to modify interpretation bias. Participants with chronic musculoskeletal pain (N = 41) were randomised to benign CBM-I or no CBM-I, and healthy participants (N = 41) were randomised to benign CBM-I or pain-related CBM-I. All interventions were delivered online. Primary outcomes were emotional response to exercise induced pain and emotional response to pain-related images. Secondary outcomes were fear of pain, anxiety, depression, emotional response to average clinical pain, pain severity, pain interference and interpretation bias index.

RESULTS: For participants with chronic pain, benign CBM-I did not significantly reduce emotional response to exercise induced pain or pain-related images, but did significantly reduce emotional response to the pain experienced due to their chronic pain condition. No significant difference was found between the benign CBM-I group and the control group in pain-related interpretation bias, although benign CBM-I was more effective for participants who had lower anxiety levels but less effective for participants with higher anxiety. For healthy participants, benign CBM-I was associated with significantly lower pain-related interpretation bias, as compared to pain-related CBM-I. Neither IB nor fear of pain mediated the effect of CBM-I on pain-related outcomes.

CONCLUSIONS: For participants with chronic pain, benign CBM-I decreased levels of pain-related interpretation bias for those with low anxiety but increased pain-related interpretation bias for those with high anxiety. Benign CBM-I with the Ambiguous Situations Task significantly decreased pain-related interpretation bias for healthy participants (i.e., fewer pain-related interpretations of ambiguous scenarios). This was the first study of pain-related CBM-I to be conducted online, which was shown to be feasible in individuals with and without chronic pain. Future research should explore whether decreasing anxiety prior to beginning CBM-I improves effectiveness for individuals with chronic pain.

Keywords: Chronic pain, Cognitive bias modification

P-110

Psychology

The Effect of Threat Expectancy on Cognitive Biases Towards Pain Related Information in Pain-Free Individuals

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BACKGROUND: Pain-related cognitive biases have been frequently explored in pain-free populations, with research suggesting heightened perceptions of pain-related threat may be associated with increased pain-related attentional biases. This is potentially important because perceptions of threat have been associated with the development and maintenance of chronic pain. No study to date however has explored combined cognitive biases of attention, interpretation and memory, threat, and experimental pain in the same study. The present study will also provide a thorough testing of the Threat Interpretation Model which predicts initial vigilance and sustained attention is increased towards stimuli interpreted as moderately threatening.

AIMS: This study investigated the effect of threat expectancy on attentional, interpretation and memory biases towards pain related information, and experimental pain thresholds, among pain-free individuals.

METHODS: Sixty-seven participants were recruited (54 female, 13 were male; mean age 19.54) who were randomised to receive either threatening (N = 34) or non-threatening (N = 33) information regarding an upcoming sensory pain threshold task. Participants first complete a series of questionnaires, collecting demographic information and measuring fear of pain, depression, anxiety, attachment, body vigilance and somatic symptoms. This was followed by three cognitive bias paradigms, including a visual probe task (assessing attentional bias), sentence generation task (assessing interpretation bias) and free recall task. Quantitative sensory testing was then performed via TAS II Neurosensory Analyser to assess hot and cold thermal thresholds and hot and cold detection thresholds (with participants indicating the first moment the thermal stimulus became painful). Primary outcomes were pain-related attentional, interpretation and memory bias indices, and pain thresholds. Secondary outcomes included fear of pain, depression, anxiety, body vigilance.

RESULTS: Preliminary analyses of the memory recall data found significantly higher recall for pain-related relative to neutral words across both groups. There was no significant effect of threat on the number of pain words recalled however, and no significant correlation was found between participants fear of pain and number of recalled pain-words. Additionally, no significant effect of threat upon pain thresholds emerged.

CONCLUSIONS: Pain-free individuals show a memory bias favouring pain-related information compared to neutral information. Further analyses of the attentional and interpretation biases data will be presented at the ASM.

Keywords: cognitive biases, threat, pain

P-127

Psychology

Supported Self-Management Strategy Outcomes

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BACKGROUND: Pain Association Scotland provides professionally-led supported self-management education and training in the communityproviding key coping strategies and helping people explore new ways forward leading to an improved quality of life.

AIMS: These monthly groups have enabled chronic pain sufferers to make changes to their everyday lives in a positive and practical way, resulting in improved levels of coping and well-being. We therefore wanted to measure and record outcomes from both an economic and quality of life perspective.

METHODS: People who had accessed the on-line monthly self-management group meetings were invited to complete a questionnaire via Survey-Monkey. We had 64 responses and the questions were based on the following categories:-

- Length of time they had the pain
- Benefits experienced
- The impact on their quality of life
- Coping mechanisms

RESULTS: Some of the key outcomes are:-

- 95% advised that attending the group helped them maintain their self-management skills.
- 82% felt more in control.
- 90% felt more able to cope on a daily basis.
- 60% had fewer visits to their GP as result of attending the groups.
- 43% have been living with chronic pain for over 10 years.
- The top 3 topics include: Pacing, Stress and Flare-ups.

CONCLUSIONS: The supported self-management programs do not claim to change pain levels but rather aims to reduce the suffering component and change maladaptive habits. As a result of understanding more and changing behaviours, some people do report a change in their pain levels or fewer flare-ups or reliance on medication, but most report a change in how they feel about their condition and their life.

Keywords: chronic pain, self-management

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Psychology

Assessing the Acceptability and Proof of Concept of a Patient-Centred Evidence-Based Intervention to Address Distress in Chronic MSK Pain

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BACKGROUND: People with chronic musculoskeletal (MSK) pain often report depressive symptoms. Distress and depression have been found to predict the transition to persistent pain states. Evidence suggests pain-related distress is qualitatively different from clinical depression, and current referral pathways and available interventions are sub-optimal for people with chronic pain who are distressed.

AIMS: To test the acceptability and proof of concept of an intervention to reduce pain-related distress in people with chronic MSK pain.

METHODS: Participants were identified through SNOMED codes in primary care practices and invited by post. Participants in the De-STRESS Pain intervention had access to 4-6 sessions with a social prescriber over 12 weeks, and access to a study website. The website had modules about self-kindness and the rationale behind increasing pleasant activities, and provided suggestions for activities participants might like to try. Social prescribers were recruited through Primary Care Networks (PCNs) and social prescribing charitable organisations. Participants were screened online and were eligible if they were experiencing distress due to their pain. Participants completed quantitative measures and qualitative semi-structured interviews at baseline and 12 weeks. Quantitative measures included questions about mood (DAPOS, WEMWBS, 4DSQ), pain chronicity, pain intensity and musculoskeletal health (MSK-HQ). Social prescribers were interviewed when they were finished delivering sessions. Interview transcripts were analysed using thematic analysis.

RESULTS: 17 participants consented to the De-STRESS Pain intervention which was delivered by 4 social prescribers (De-STRESS Coaches) across 3 primary care practices. Preliminary results suggest the intervention is beneficial, valuable, and acceptable to patients and clinicians. Participants believed in the concept of the study and the pain-mood relationship. Barriers to participation included money (cost of activities), and time (especially for those working and/or with young families). The interaction and relationships built with the De-STRESS Coach was the main facilitator. Participants felt supported, encouraged, and motivated due to their sessions.

CONCLUSIONS: The De-STRESS Pain intervention is acceptable to, and valued by, participants and clinicians. There are some areas for improvement and addressing the identified barriers would enhance the intervention, for example, tailoring suggested activities according to participants' individual requirements in terms of cost, travel, and time.

Keywords: distress, depression, social prescribers, primary care, musculoskeletal

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Reviews

A Scoping Review of the Utility of Quantitative Sensory Testing in the Early Detection of Chemotherapy-Induced Peripheral Neuropathy

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BACKGROUND: Chemotherapy has dramatically improved survival outcomes in cancer. However, many commonly used chemotherapy agents such as platinums, taxanes and vinca-alkaloids can cause neurotoxicity. Prevalence varies depending on chemotherapy agent, with up to 70% of people developing some symptoms during chemotherapy), with persistent CIPN on around a third of people. Symptoms of CIPN may include distal pain in limbs, numbness, weakness and impaired co-ordination. These symptoms can have severe effects on quality of life. Treatments for these symptoms are of limited benefit and there is no preventative strategy other than chemotherapy dose reduction / agent switching. CIPN is often detected late as the symptoms tend to be unusual, insidious, and often misinterpreted by patients. Therefore, many studies have focused on methods of more accurate detection. Considerable effort has been invested to determine whether Quantitative Sensory Testing (QST) can aid diagnosis of CIPN.

AIMS: This review focuses on longitudinal studies of patients having chemotherapy as key to determining whether QST has predictive utility in early CIPN diagnosis with the aim of identifying the current state of evidence and the remaining challenges.

METHODS: We performed a search for publications which included QST as part of CIPN research. The following criteria were applied: papers had to be published after 2006 (coinciding with QST standardization guidance from the German Research Network on Neuropathic Pain), and QST measurements had to occur on multiple occasions (prior, during and after treatment). Longitudinal tracking of changes in QST parameters relative to CIPN status is crucial in order to determine predictive utility.

RESULTS: Most of the included papers focused on Oxaliplatin induced neuropathy (7/10), one paper each focused on the effects of Bortezomib and Taxanes while one paper had a heterogeneous sample of chemotherapy agents. The median number of recruited participants per study was 48 (falling to 22 by study end). The total number of patients was 438 (45.6% female) with a mean age of 60.9. In order to assess the utility of QST as a predictor of CIPN the diagnosis or grouping of participants should be based on criteria independent of QST. Six papers assign CIPN and non-CIPN patients based on independent measures (the National Cancer Institute - Common Terminology Criteria for Adverse Event grading used in 4 papers). Their results show there is potential for QST parameters, particularly thermal and vibration detection thresholds, as useful indicators of the presence of established CIPN. It is less clear whether onset and early diagnosis can be identified by examining QST profiles.

CONCLUSIONS: This review has shown that there are too few longitudinal studies to make firm conclusions. Additionally, many of the analytical choices, combined with small sample sizes, mean that within-participant change of QST parameters is under-explored (only two studies attempt to incorporate these into their approach). There is potential for a meta-analysis into the utility of QST to predict Oxaliplatin-induced neuropathy provided the data is accessible (no study has open access data). It is not currently possible to advocate for or against the routine clinical use of QST as a diagnostic method to detect CIPN. However, this review has also resulted in clear proposals for future research. First, multi-centre studies would be helpful in order to reach adequate sample sizes to power statistical procedures required to determine predictive utility. Second, the use of agreed standards for testing and diagnosis of CIPN alongside the adoption of modern data reporting and FAIR sharing standards would help with data aggregation. Finally, the development of more accessible, easier to use QST equipment that could be deployed at scale would allow for more frequent observations within longitudinal designs.

Keywords: Chemotherapy-induced neuropathy, CIPN, Quantitative sensory testing, QST

P-113

Reviews

Interpersonal Mechanisms and Their Effect on Pain Over Time: A Scoping Review Between Clinicians and People with Pain

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BACKGROUND: There are many psychosocial influences on pain which are thought to influence the development, maintenance, and successful management of chronic pain. Healthcare consultations offer a valuable interface between clinicians and people with pain, with the effects potentially impacting on diagnosis, management, and the patient-practitioner relationship. Indeed, interpersonal factors between clinicians and people with pain are consistently identified as important, both through research and by people with pain. However, no review to date has examined the long-term effects of clinician interactions on pain.

AIMS: This study aimed to identify the range of interpersonal factors between clinicians and patients that effect the onset, maintenance, worsening, or recovery of chronic pain.

METHODS: A scoping review was undertaken. The search included key psychosocial interpersonal factors explored in any study with a timeline, any type of clinician, and any type of pain. The following databases were searched: Embase, MEDLINE, Web of Science Core Collection, and PsycINFO. Two authors completed screening and extraction. PPIE contributed to both the development of the search and interpretation of the findings. The full protocol is available on the Open Science Framework.

RESULTS: The search identified a total of 29709 records to be screened. After title and abstract and full-text screening, 28 studies were eligible for inclusion. For all psychosocial mechanisms, only small numbers of studies were found. Reassurance (three studies, n=2486), validation (two studies, n=551), empathy (four studies, n=3370) and motivational interviewing (three studies, n=2446) were all associated with small effects on pain and functioning. The quality of this evidence is mixed.

CONCLUSIONS: There is very little research exploring the effect of interpersonal factors between clinicians and patients on pain over time. Although some mechanisms have been identified as having effects on pain, the pathways by which this occurs is unknown.

Keywords: clinicians, dyadic, interpersonal, transitions, consultations

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Reviews

Interpersonal Mechanisms and Their Effect on Pain Over Time: A Scoping Review Between Family Members and People with Pain

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BACKGROUND: There are many psychosocial influences on pain which are thought to influence the development, maintenance, and successful management of chronic pain. Dyadic interpersonal factors are consistently identified as important both in research and by patients, particularly familial factors between partners, and parents and children. To date, no review has investigated the effect of interpersonal factors on pain transitions.

AIMS: To undertake a scoping review to identify the familial interpersonal factors that influence the onset, maintenance, worsening, or recovery of pain.

METHODS: A scoping review was undertaken. The search included key psychosocial interpersonal factors explored in any study with a timeline, partners/spouses, parents and children, and any type of pain. The following databases were searched: Embase, MEDLINE, Web of Science Core Collection, and PsycINFO. Two authors completed screening and extraction. Our work package development group formed of people living with chronic pain contributed to both the development of the search and interpretation of the findings. The full protocol is available on the Open Science Framework.

RESULTS: The search identified 14364 records to be screened. After title and abstract and full-text screening, 43 studies were eligible for inclusion. For partners, support type was the most common mechanism (nine studies, n=1657), with autonomous, protective, and emotional support associated with better pain outcomes. For parents and children, parental anxiety (but not depression) was consistently associated with worse child pain outcomes (10 studies, n=4942). Parent catastrophising was also strongly associated with worse pain outcomes and the development of chronic pain for children (seven studies, n=1684).

CONCLUSIONS: There is limited research on the effects of partner interpersonal mechanisms on a person's pain transitions. However, there is strong evidence for the effect of parent anxiety and catastrophising on the development of child chronic pain.

Keywords: transitions, development, interpersonal, parents, partner

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Reviews

Systematic Review and Meta-Analysis of Laboratory Studies Examining the Analgesic Effects of Music

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BACKGROUND: Studies have examined the effects of music on pain experienced from painful medical conditions and procedures over the past 60 years and systematic review findings of those clinical studies confirm that listening to music has significant though small effects on pain. Although these studies provide evidence of music's analgesic effects, they do not provide insight as to the mechanisms involved, or offer guidance on the optimum methods of using music as an analgesic. Such investigations are better achieved by laboratory study where variables can be controlled and manipulated more easily. Given the large corpus of laboratory research it is surprising that there are few systematic reviews and/or meta-analyses. Consequently, we undertook a systematic review with meta-analyses of the laboratory studies to elucidate the mechanisms involved and provide guidance regarding the optimal methods of using music as an analgesic.

AIMS: To establish

- What is the magnitude of music's analgesic effect on pain in the laboratory studies. - Does the magnitude of music's analgesic effect on pain differ by type of laboratory pain stimuli (e.g., cold pressor, heat thermode, electric shock, ischaemia, chemical)? - Does the magnitude of music's analgesic effect on pain differ by the quality of laboratory pain assessed (e.g., intensity, unpleasantness, threshold, tolerance).

METHODS: Electronic searches of major databases was conducted PsycInfo, ScienceDirect, Sage Journals, Excerpta Medica dataBASE (EMBASE), Web of Science, Allied And Complementary Medicine Database (AMED), Bielefeld Academic Search Engine (BASE). Studies were eligible if they reported the effects of listening to music on any or all the following assessments of pain: intensity, unpleasantness, tolerance, threshold, in a laboratory setting with healthy adult participants. As the focus of this analysis is on the analgesic effects of music, other audio experimental conditions were not included in the analysis. Eligible laboratory studies were required to have included an auditory or silent control condition. We limited control conditions to compare conditions using the same modality, i.e., audio stimuli. Studies involving active or live music therapies were excluded. Eligible studies were published in peer reviewed journals in English. Studies published up to the end of August 2023 were included. Quality assessments were conducted using National Heart, Lung, and Blood Institute quality assessment tool. Where possible published means and standard deviations were used to calculate a Cohen's d value. However, when necessary, measurements of bar charts in millimetres were converted to a Cohen's d value to produce a standard mean difference (SMD) using the Campbell collaboration effect size calculator to provide effect sizes for pain intensity, unpleasantness, tolerance, and threshold. Meta-Essentials software provide a pooled Hedges' g value for each assessment measure of pain for meta-analysis. Also, sub-group analyses were performed to investigate if participant or researcher chosen music influenced the analgesic effect. In addition, analysis was conducted to determine if music effects on pain differ by the type of noxious stimuli.

RESULTS: Thirty-four studies met the inclusion criteria and included in the meta-analysis. Pooled effect sizes for pain intensity were -0.25 Hedges'g, ($p = 0.00$), while pain unpleasantness was Hedges'g, -0.31 ($p = 0.00$).

CONCLUSIONS: Meta-analyses of thirty-four studies found music produced small but significant analgesic effects. When participants were given a restricted choice of music by the researcher this produced larger analgesic effects than when the participant had no choice. Future research examining psychological mechanisms including valence, and control are needed to illuminate the processes underpinning musically induced analgesia, as such research could further improve the analgesic effects of music in clinical settings.

Keywords: Music, Pain, Analgesia

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Reviews

Experiences and Perspectives of Adults on Using Opioids for Pain Management in the Postoperative Period: A Scoping Review

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BACKGROUND: Opioids have long been the primary choice for postoperative pain management, However, concerns regarding the opioid crisis, addiction, and side effects complicate their use. Inadequate perioperative pain control can lead to increased morbidity, persistent opioid use, diminished quality of life, and functional impairments. Chronic pain following surgery, lasting over three months, presents a formidable challenge. The opioid crisis carries significant implications, with the UK, particularly Scotland, facing high opioid consumption rates and substance use disorder. The enduring problem of opioid use is deeply concerning, contributing to 89% of all drug-related fatalities in Scotland. Opioid over-prescribing is of concern,

particularly among opioid-naive patients, that might result in long-term dependence. Despite the relevance of this issue, limited evidence exists regarding adults' experiences with opioids for postoperative pain management. This knowledge gap could significantly impact opioid prescribing practices and patients' pain management experiences.

AIMS: The review aims to synthesise evidence on adults' experiences of postoperative opioid use, investigate their opinions, and concerns, and identify gaps in the existing literature.

METHODS: The scoping review, registered with OSF, adhered to a structured methodology, encompassing comprehensive literature searches across six databases, including Ovid MEDLINE, PsycInfo, Embase, CINAHL (EBSCO), Cochrane Library, and Google Scholar. Eligibility criteria for inclusion encompassed all qualitative and mixed-method studies, conducted in English, employing a qualitative approach to explore adults' opinions or concerns about opioids and/or opioid reduction in the postoperative period. Additionally, studies addressing adults' experiences related to opioid use for postoperative pain control, including satisfaction and aspects of overall quality of life (adult's physical, mental, and social well-being), were considered.

RESULTS: The scoping review encompassed ten studies, with nine adopting a qualitative approach, and one employing mixed methods. We included all available evidence on adults' experiences and perceptions of opioid use for postoperative pain management, including both qualitative and mixed methods studies. These studies were predominantly conducted in Europe and North America. Key recurring concepts include opioid dependence, adverse effects, stigmatisation, gender roles, trust, and the dynamics of shared decision-making between healthcare providers and patients. Analysis using the Theoretical Domains Framework (TDF) identified eight domains—Knowledge, Emotion, Beliefs about consequences, beliefs about capabilities, self-confidence, Environmental Context and Resources, Social influences, and Decision Processes/Goals—that significantly influence individuals' perceptions and experiences with opioids in the perioperative context. Notably, adults exhibited diverse pain management goals, encompassing proactive and positive objectives for individualized pain management care, as well as avoidant goals aimed at mitigating issues such as addiction and opioid-related side effects.

CONCLUSIONS: Perioperative individual behavioural factors, external environmental and social factors influence adults' experiences and perspectives of using opioids for postoperative pain management. Participation and involvement in post-operative pain management decisions could significantly impact adults' experiences with opioid use, their satisfaction, patient-provider relationships, and communication. Importantly, there remains a paucity of research in this domain, particularly within the European context. Gaining deeper insights into the complexity of patients' perioperative opioid experiences, as outlined in the review, is of utmost importance. This knowledge empowers healthcare providers and policymakers to improve patient care and potentially refine future postoperative pain management guidelines, especially concerning the use of opioids.

Keywords: Opioids, Postoperative pain, Patient experiences, Theoretical Domains Framework, Patient-centred care

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Reviews

Pain Services in Scotland- An Exploration of UK Evidence for Multidisciplinary Practice

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BACKGROUND: National guidelines for the management of chronic pain recommend exercise, education, and psychological therapies yet service provision across Scotland varies considerably, leading to diverse patient experiences and inequality. Individual modes/aspects of pain management practice are evidenced and across the last decade there has been notable effort from pain services and national policy to improve chronic pain services (CPS) in Scotland as laid out in the 2022 Scottish Government Pain management implementation plan. This paper presents the initial documentary findings supporting a larger review of interdisciplinary and multidisciplinary approaches in the management of chronic pain.

AIMS: To undertake a realist review considering evidence and policies for supporting chronic pain services in Scotland and the UK.

METHODS: Informed by realist methods and following the four principles of evidence synthesis, Inclusion, Rigour, Transparency and Accessibility, empirical evidence and policy information were combined. An in initial literature search was undertaken 31.12.23 including the following databases: MEDLINE CINAHL (via EBSCO); PsycINFO, Pubmed & Cochrane Library and Google scholar (first 10 pages) was accessed. Current policies around chronic pain management from UK Government websites and national pain charities were also consulted. Key words and phrases were adapted and combined for each database/resource from the following chronic pain, pain management programmes, multidisciplinary care, chronic pain services, patient experiences and outcomes. Data extraction was undertaken by two authors using a table to document author, year, country, aim, study design, participant characteristics, outcome measures. Data from primary studies was analysed by the team using both a deductive and an inductive approach. Due to the heterogeneity of identified methods and measures statistical analysis was not approached. Findings are presented in configurations of contexts, mechanisms and outcomes (CMOs). Policy documents, national initiatives and UK reports were also considered to inform understanding of the current landscape for chronic pain provision in Scotland.

RESULTS: The database search identified 475 papers, following the removal of duplicates and exclusion of ineligible records 10 papers met the inclusion criteria for this review. Papers reported a range of mostly positive outcome measures relating clinical effect, physical improvement, and patient outcomes.

CONCLUSIONS: Evidence of effectiveness and acceptability of interdisciplinary pain management programmes, as informed by UK studies, is limited. There are also limited clinical guidelines that focus on the UK landscape of interdisciplinary chronic pain provision. Publications and data in this field are dominated by North American research and evaluative studies, the findings of which mostly do not translate to a UK population served by the NHS. If pain services are to continue in the UK, there is an urgent need for data to support current best practice and increasing provision where identified.

Keywords: chronic pain, pain management services, multidisciplinary, interdisciplinary, outpatient

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Reviews

The Effect of Psychological Interventions on Neck Pain and Disability in Patients with Whiplash. Systematic Review and Meta-Analysis

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BACKGROUND: Whiplash is a medical condition resulting from an acceleration-deceleration mechanism, manifests through a spectrum of musculoskeletal symptoms, profoundly impacting individuals' quality of life. Pain is the most prevalent symptom reported following a whiplash injury, and it involves a complex interaction of physiological and neurological processes. Whiplash-associated disorders (WAD) include a range of physical and psychological symptoms, including reduced range of motion, myofascial dysfunction, neck pain, headaches, balance issues, cognitive difficulties, and psychological challenges. The complexity of WAD is further linked by factors such as fatigue, disrupted sleep, and sensory disturbances, with the severity and duration of symptoms varying based on factors like the initial injury's extent, pain perception, and pre-existing health conditions. A comprehensive, personalized approach to diagnosis and management is crucial for optimizing recovery and enhancing the quality of life for individuals affected by WAD.

AIMS: The aim of this systematic review and meta-analysis is to investigate the effectiveness of psychological interventions on pain, disability, and psychological symptoms in patients with WAD.

METHODS: Randomized clinical trials (RCTs) that investigated the effectiveness of psychological interventions on pain, disability, depression, stress, anxiety, self-efficacy, and fear of movement in patients with WAD were included. Meta-analyses were performed by calculating the weight mean difference (WMD), 95% CI, and P value. The PEDro scale were used to determine the studies' quality of evidence.

RESULTS: Eleven RCTs (PEDro: 5–8) met the inclusion criteria for systematic review and meta-analyses. The pooled analysis results indicated significant improvements in pain intensity (WMD = 0.96; (95% CI = 0.02 to 1.89; P = 0.04), neck disability (WMD = 7.93; (95% CI = 0.68 to 15.18; P = 0.03), depression (WMD = 3.59; (95% CI = 1.64 to 5.53; P <0.0001), and fear (kinsiophobia) (WMD = 5.39 (95% CI = 1.39 to 9.39; P = 0.008). However, no significant enhancements were observed in pain catastrophizing, anxiety, stress, or self-efficacy.

CONCLUSIONS: The findings provide significant implications for individuals experiencing pain, particularly those with WAD. The effectiveness of psychological interventions in improving pain intensity, reducing neck disability, alleviating depression, and addressing non-excessive fear and phobia provides valuable insights for those individuals. This highlights the potential of psychological interventions as a valuable component of pain management strategies. Furthermore, the recommendation for future studies to explore the synergistic effects of combining psychological interventions with other therapeutic approaches highlights the need for comprehensive, integrative care, offering the possibility of enhanced outcomes and improved overall well-being for individuals coping with pain.

Keywords: Psychological Interventions, Pain, Disability, Whiplash

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Service Management

P-Plan: The Landscape of Paediatric Pain Training and Recruitment in the UK

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BACKGROUND: Nationally trainees have reported difficulty in accessing paediatric chronic pain training. Following a decrease in the number of doctors in our own department (mainly through retirement) we wanted an up-to-date 'snapshot' of the national paediatric pain workforce to help determine how to improve training opportunities and access and bolster the future workforce in this area.

AIMS: To estimate current consultant workforce, retention and recruitment trends over the next 5 years

- To describe difficulties in accessing paediatric chronic pain training.

- To gauge interest in training in paediatric chronic pain after advanced pain training.

- To obtain data that could support funding applications for fellowship placements in paediatric chronic pain and inform planning for a sustainable future workforce.

METHODS: Two surveys were conducted. The first was sent to consultants leading a paediatric chronic pain service, via a paediatric pain leads group email across the UK and the Paediatric Pain Travelling Club email to attempt to capture any unknown departments. Questions addressed physician characteristics and training and workforce planning for the department. The second survey was sent to recent and current advanced pain trainees via a WhatsApp group of consultants and trainees in pain medicine. Questions addressed access to paediatric practice during advanced pain training, desire to undertake a paediatric pain fellowship or work in paediatric pain at consultant level.

RESULTS: The leads survey received responses from 10 departments. Seven out of 10 paediatric chronic pain departments were in tertiary children's hospitals and covered large geographical areas. The number of medical consultants per department ranged from 0 - 4 and these consultants worked in a number of other services including adult chronic pain, anaesthesia, paediatric or adult acute pain and rheumatology. 60% (6/10) of departments had anticipated retirements over the coming 5 years, and in one 3 consultants had left in recent years. Only 2 departments of those surveyed had trainees attending their clinics. One clinic had rheumatology registrars attending regularly and another was training two in house consultants to ensure continuity of the department with the potential for training an adult pain consultant colleague depending on availability of funding. The trainee survey, which had 11 responses, showed 6 respondents (54.5%) experienced difficulty accessing paediatric pain training. Four (36%) expressed an interest in accessing a UK based paediatric pain fellowship post advanced pain training. Two (18%) were interested in having an element of paediatric chronic pain in their future consultant posts, with 6 (54%) 'maybe' interested. Barriers

to accessing further training included lack of exposure to the subspecialty, financial considerations and lack of structured fellowships in the UK.

CONCLUSIONS: The current state of the UK paediatric pain workforce and training risks future workforce shortages, leaving children with chronic pain conditions without accessible services. Measures to tackle this problem may include a more comprehensive or detailed overview of imminent workforce issues, a national approach to improved access to training during and/or after advanced pain training, funding and structure for UK based fellowships located according to demand, and provision and structures for training within a consultant post.

Keywords: Paediatric Pain, workforce, training

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Societal Impact of Pain

Quantifying Pain Impact in Two Longitudinal Cohort Studies: Alspac and Elsa

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BACKGROUND: There is a growing awareness in both clinical and research settings that the direct experience of pain (e.g. self-reported assessment of pain location, intensity, and duration) can be a less important outcome than the impact of pain on a person's life. Pain affects many areas of life: how should we best quantify its impact? The National Institutes of Health (NIH, 2022) suggest high impact chronic pain substantially restricts participation in work, social and self-care activities for six months or more.

AIMS: As part of the Consortium to Research Individual, Interpersonal and Social Influences in Pain (CRIISP) project, this study sought to apply the NIH definition to two existing longitudinal datasets that include people with pain. We retrofitted the concepts of high and low impact chronic pain onto two existing datasets, one focussed on young adults and the other middle to old age, in the domains of self-care, work and social activities.

METHODS: The Avon Longitudinal Study of Parents and Children (ALSPAC) is a UK local population-based longitudinal birth cohort study (N =13,988 infants alive at one years old). For pain impact we used items from the Short-Form 36 (SF-36) scales when child participants were 18 years old. The English Longitudinal Study of Aging (ELSA) is a UK population-based longitudinal household survey on the health, economic status, and overall well-being of people aged 50 or more (N=12,099 at its onset). For pain impact, we used items from Activities of Daily Living, Instrumental Activities of Daily Living, and other items on work and physical activity limitations related to current health status. We conducted exploratory factor analysis, confirmatory factor analysis and item response theory analysis. These analyses differed according to statistical properties of selected items. We evaluated content validity: how candidate items captured the domains of 'pain impact'. We then assessed the properties of the pain impact measurement models, how well they discriminated between different levels of impact, and their reliability.

RESULTS: In ALSPAC, we identified a unidimensional self-care latent construct along with 2 latent constructs representing limitations at work due to physical health and pain interference, and limitations at work and with social activities due to physical health and emotional problems. In ELSA, we identified a unidimensional measurement model of 11 items representing limitations to self-care activities, and work activities due to poor health, illness, or disability.

CONCLUSIONS: ALSPAC and ELSA are two large longitudinal datasets that were not originally designed to study pain or pain impact. Here we demonstrate an approach for identifying measurement models that represent pain impact, and importantly how we evaluated its validity in relation to a specific definition of high impact chronic pain. Measurement models for self-care performed particularly well in both datasets, having the best chance for wider applicability and reproducibility in other historical, real world datasets. Pragmatism is critical when using such datasets; transparency and decision making by consensus are both key to support (i) the content validity of the measurement models being studied, and (ii) an awareness on what can and cannot be captured with the items available.

Keywords: Pain impact, Psychology, Epidemiology, longitudinal cohort studies, factor analysis

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Societal Impact of Pain

The Unmet Needs of People with Long-Term Pain Conditions Who Use Online Forums: A Qualitative Study of the Perspectives of Forum Leads

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BACKGROUND: Living with chronic pain (CP) is a challenging experience, and people with CP can have frustrating clinical journeys and struggle to manage their pain despite input from NHS services. People who are unsatisfied with their clinical care often drop out of services and lose faith in their clinicians – preferring to look for help elsewhere. The voices of so-called 'therapy drop outs' are not well-represented in the scientific literature, leaving a gap in knowledge regarding their needs. The proliferation of digital platforms over the past few decades has opened up the opportunity for new spaces for people with long-term conditions to connect. These platforms may provide insight into the needs and resources of this sub-group, and the people who initiate and manage these spaces may offer insights to bridge the gap between what is known about people who attend NHS clinics and those who do not. Platform managers are exposed to discourses among patients that are unmediated by clinician or researcher interaction, which can offer unique perspectives on unmet needs and management strategies.

AIMS: This study collected the experiences of people who run online forums for those with long-term pain conditions, with the aim to outline the needs that lead to patient-led initiatives and online forums, the narratives that unfold within these, and lessons pertinent to clinicians and service leads.

METHODS: This was a qualitative study using semi-structured interview and a constructionist methodology. Participants were identified through a purposive sampling on persistent and chronic pain syndrome forums in the UK. Each participant took part in a single semi-structured online 30-60 minutes interview on UCL Microsoft Teams. Interview transcriptions were analysed using reflexive thematic analysis. The results were shared with the participants for comment.

RESULTS: In total, 26 organisations were approached, of which 15 responded and seven participants consented to take part in the study – for a response rate of 26.92%. We identified six themes: CP experience described by forum leads: evidencing the role of multiple symptoms, mental health and intersectionality; Healthcare service experience from the perspective of forum leads: turbulent patient journeys; Reasons for dropping out of NHS services; Reasons for starting the online platforms; Reasons for seeking help online; Wishes: hopes for reconciliation between CP patients and healthcare services. Overall, the results show that people with CP who use online forums have complex presentations and often have experienced unequal or ineffective care which has let do fraught relationships with clinicians and impacted their trust in NHS pain services. The online forums provide either an alternative to standard NHS care or complement it. However, they are commonly staffed by non-clinical volunteers and are often approached with requests for help to manage crises - which can lead to risk for both volunteers and users. Participants advocated for conversation between clinical services and online groups, while maintaining the importance of independent spaces of recognition free from judgement.

CONCLUSIONS: This study contributes to understanding why people with CP access online forums, and the opportunities of existing online communities. The results aim to influence the work of primary care services and pain management service commissioners with the hope to enhance healthcare experiences for people with.

Keywords: online forum, pain management services, patient networks