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PP001

Acute Pain

Delayed onset of morphine antinociceptive tolerance in rats treated chronically with glycine transporter-1 inhibitors

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BACKGROUND: Opioid analgesics are used to manage mild-severe pain; however, their long-term use is hampered by the development of central and peripheral side effects. These include analgesic tolerance, addiction, respiratory depression, constipation, and sedation. Recent data reveal that glycine transporter-1 (GlyT-1) inhibitors could show anti-allodynic effects in animal-developed neuropathic pain. Since there is an overlap between the spinal mechanisms involved in the development of neuropathic pain and opioid tolerance these inhibitors might provide novel therapeutic possibilities to prevent or at least delay the development of opioid analgesic tolerance.

AIMS: To elucidate the impact of GlyT-1 inhibitors on opioid antinociceptive tolerance developed following repeated morphine administration in male rats.

METHODS: Thermal pain model, the rat tail-flick assay was carried out on male Wistar rats (180-250g) to assess the antinociceptive effects of test compounds and combinations after acute and chronic administrations. The antinociceptive effect of morphine hydrochloride (10 mg/kg) alone or in combination with the GlyT-1 inhibitor NFPS was determined acutely at the initiation of the treatment and after 10 days of chronic treatment. Morphine was administered twice daily, whereas NFPS was administered once daily on days 1 to 9 and then once in the morning on day 10. The antinociceptive effect of morphine, NFPS or its combination with morphine was determined at 30, 60, 120, and 180 min after subcutaneous administration. As control, 10% DMSO or saline was used. In addition, cerebrospinal fluid (CSF) was collected from treated animals at the end of the treatment period, and glycine levels were measured by capillary electrophoresis. Rat motor coordination and balance were also measured by the rotarod test on the 1st and 10th day. Area under curve (AUC) values of the antinociceptive time-effect course were obtained from individual animals, and the significance level between treatment groups was determined by One-way ANOVA followed by Newman-Keuls multiple comparison test. Similarly, CSF samples' significance level was determined between the groups by One-way ANOVA followed by Newman-Keuls multiple comparison test.

RESULTS: Acute treatment with systemic 10 mg/kg morphine produced significant antinociceptive effects. To assess whether acute GlyT-1 inhibition might be able to reduce acute thermal pain, we also determined its antinociceptive effectiveness following the administration of NFPS separately or in combination with morphine. Only the combination of morphine with NFPS showed significant antinociception similarly to morphine when administered alone. Furthermore, to characterize whether chronic GlyT-1 inhibition is able to produce antinociception when administered alone or simultaneously with morphine. In rats treated chronically with morphine, on the 10th day morphine alone failed to produce antinociceptive effect, indicating the development of antinociceptive tolerance. On the other hand, rats treated chronically with the combination of morphine and 0.6 mg/kg NFPS showed significant antinociception, whereas the other treated animal groups similar to vehicle-treated groups did not show antinociceptive response on day 10. Next, capillary electrophoresis results showed significant increase in the 0.3 mg/kg or 0.6 mg/kg NFPS alone or in combination-treated groups as compared with vehicle-treated groups. Finally, chronic treatment with 0.3 mg/kg NFPS did not show any effect on the motor function of the animals at the tested time points.

CONCLUSIONS: GlyT-1 inhibition proved to be effective to delay the development of morphine antinociceptive tolerance by augmenting the spinal glycinergic system. The observed effect may be a result of the activation of the post-synaptic glycinergic receptors or receptors on glial cells which have been reported to be implicated in opioid analgesic tolerance.

Keywords: opioid tolerance, glycine transporter-1 inhibitors

PP002

Acute Pain

Temporal trends and prescribing patterns of initial opioid prescriptions following colectomy, 2010-2019: a cross-sectional study from England

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BACKGROUND: Opioids remain essential for pain management in the post-surgical setting, but appropriate prescribing practices are crucial to avoid harm, including persistent use, physical dependence, and opioid diversion. Guidelines on pain management after surgery recommend against using long-acting and transdermal opioid formulations because their slow onset hinders safe titration and dose adjustment. However, research studies conducted outside the UK have reported variable patterns in opioid prescribing. Despite the extensive international literature, opioid prescribing following colectomy within a population from England is not well characterised. Also, patterns and trends in opioid utilisation over time remain unexplored.

AIMS: To report changes over time in the proportion of people who were issued initial opioid prescriptions following colectomy discharge. Also, to report trends and patterns in prescription characteristics in terms of analgesics, potency and formulation choices.

METHODS: This cross-sectional analysis included people undergoing colectomy between 2010 and 2019 using primary (Clinical Practice Research Datalink) and linked secondary care (Hospital Episode Statistics) data. The proportion of people having an initial opioid prescription in primary care issued within 90 days of surgical discharge was calculated. Also, prescription characteristics in opioid potency, analgesics and formulation were described. Opioids were categorised as weak opioids (codeine, dihydrocodeine, tramadol, meptazinol, pentazocine) and strong opioids (morphine, oxycodone, fentanyl, buprenorphine, tapentadol, hydromophone). Trend analysis over the years was performed using the Cochran Armitage test, and percentage change between 2010 and 2019 was tested using univariate logistic regression.

RESULTS: Of the 95,155 individuals undergoing colectomy within the study period, 15,503 (16.3%) received opioid prescriptions. There was a downward trend in the proportion of opioid naïve people (no prior opioid) who had a post-discharge opioid prescription ($P < 0.001$), with a decrease from 11.4% in 2010 to 6.7% in 2019 (-41.3%, $p < 0.001$). Whereas the proportions remained stable for patients prescribed opioids prior to surgery ($p = 0.637$). The prescribing prevalence of weak opioids decreased from 82.3% in 2010 to 69.7% in 2019 (percent change -15.3%, ($p < 0.001$)) but, there was an increase in prescribing of strong opioids (13.2% in 2010 to 25.6% in 2019, (percent change +94% ($p < 0.001$)). Codeine represented 44.5 % of all prescriptions and prescribing increased by 14.5% between 2010 and 2019. Also, prescriptions for morphine and oxycodone rose significantly by 76.6% and 131%, respectively, while tramadol prescribing dropped by 48%. During the study period, the most commonly prescribed opioid formulation was immediate release (83.9%), followed by modified release (5.8%) and transdermal formulations (3.15%). However, there was a modest decrease in the prescribing of immediate-release formulations from 86% in 2010 to 82% in 2019.

CONCLUSIONS: This study identified a changing pattern of opioid prescribing following colectomy, with a decrease in the proportion of opioid naïve people prescribed post-discharge opioids. In addition, there were decreased tramadol and Immediate release formulation prescribing but a shift toward increasing codeine, oxycodone and morphine prescriptions.

Keywords: opioids, post-discharge, colectomy, prescriptions

PP003

Acute Pain

Clinical hypnosis for Procedural Pain and Distress in Children: A Scoping Review

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BACKGROUND: Children undergoing medical procedures commonly experience pain and distress, that, if inadequately treated, expose them to acute and chronic biopsychosocial impairments. Clinical hypnosis is promising to address children's procedural pain and distress based on evidence of effectiveness and potential superiority to other psychological interventions. However, systematic reviews of clinical hypnosis for children's procedural pain and distress have been predominantly conducted in children undergoing oncology and needle procedures and are lacking in broader paediatric contexts.

AIMS: This scoping review maps the evidence of clinical hypnosis for children's procedural pain and distress across broad paediatric contexts, while highlighting knowledge gaps and areas requiring further investigation.

METHODS: Published databases (PubMed, Cochrane Library, PsycINFO, Embase, CINAHL, Scopus, and Web of Science) and grey literature were searched in addition to hand-searching reference lists and key journals (up to May 2022). Articles were included if they involved a clinical hypnosis intervention comprising an induction followed by therapeutic suggestions for pain and distress in children undergoing medical procedures.

RESULTS: A total of 38 eligible studies involving 2,205 children were included after 4,775 articles were screened. Research on clinical hypnosis for children's procedural pain and distress was marked by a

lack of fidelity measures and qualitative data, inadequate intervention reporting, and high attrition rates. Evidence was also limited regarding the safety of clinical hypnosis, pain unpleasantness outcomes, factors influencing outcomes, as well as barriers and facilitators to implementing hypnosis and study procedures. Superiority of clinical hypnosis to control conditions and nonpharmacological interventions (e.g., distraction, acupressure) was reported in 76% of included studies with moderate to large effect sizes. However, heterogeneous interventions, contexts, study designs, and populations were identified, and the certainty of the evidence was not evaluated.

CONCLUSIONS: The review suggests potential benefits of clinical hypnosis for children's procedural pain and distress, and thus provides a precursor for further systematic reviews and trials investigating the effectiveness of clinical hypnosis. The review also indicates the need to further explore the feasibility, acceptability, implementation, and safety of clinical hypnosis in children undergoing painful procedures. Based on the review, researchers implementing clinical hypnosis should adequately report interventions, follow recommended research guidelines, and assess the fidelity of intervention delivery to promote replicating and comparing interventions. The review highlights common methodological shortcomings of published trials to avoid, such as the lack of implementation frameworks, small sample sizes, inadequate reporting of standard care or control conditions, and limited evidence on pain unpleasantness outcomes.

Keywords: Procedural Pain, Distress, Clinical Hypnosis, Children, Scoping Review

PP005

Acute Pain

Liposomal bupivacaine for peripheral nerve block in total knee arthroplasty: functional outcomes

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BACKGROUND: Liposomal bupivacaine (LB) may provide analgesia up to 96 hours following single shot injection. Its role in peri-operative pain management regimens is still emerging. A key improvement area in the 'Getting It Right First Time' (GIRFT) 2020 Elective Hip or Knee Replacement Pathway is 'Enhanced Patient Experience', which may be facilitated with improved analgesia.

AIMS: We aimed to audit our use of LB in peripheral nerve blocks (PNB) for knee arthroplasty patients, looking specifically at functional recovery at 48 hours.

METHODS: We followed up all patients undergoing knee arthroplasty who received LB in pre-operative nerve blocks in a one-week period. The wider enhanced recovery protocol included regular simple analgesics, regular codeine or tramadol, early Cryo-cuff application, and as-required oral morphine. Functional recovery was assessed using the Quality of Recovery-15 (QoR-15) score performed pre-operatively and at 48 hours post-operatively. Selected components of the Barthel index (a performance scale for activities of daily living) were also assessed at 48 hours.

RESULTS: 37 patients underwent knee arthroplasty and received PNB with LB (27 of which were total knee arthroplasty, TKA). Adductor canal block was performed in 100%, genicular block 75.7%, iPACK 16.2% and nerve to vastus intermedius 13.5%.

Mean (standard deviation, SD) pre- and post-operative QoR-15 scores were 127.7 (9.7) and 121.3 (14.5) for patients undergoing all types of knee arthroplasty. Looking specifically at patients undergoing TKA, they were 127 (9.7) and 119.3 (14.2). The 'Minimal Clinically Important Difference' (MICD) in QoR-15 score is 8. The differences we observed were lower than this, at 6.4 and 7.7 for all arthroplasty patients and TKA-only patients respectively. Mean (SD) Barthel index score for transfer (maximum 3), mobility (maximum 3), and stairs (maximum 2) for all patients was 2.7 (0.5), 3 (0), and 1.6 (0.5) respectively. For TKA patients specifically, they were 2.7 (0.6), 3 (0), and 1.6 (0.5).

CONCLUSIONS: When incorporated into a multimodal analgesia programme, the use of LB in PNB appears to facilitate good functional outcomes in patients undergoing knee arthroplasty, a notoriously painful procedure.

LB may therefore improve patient outcomes when used in PNBs alongside a multi-modal analgesic regimen for patients undergoing knee arthroplasty. Formal clinical trials are needed to establish the true contribution of LB.

Keywords: Liposomal bupivacaine, knee arthroplasty, functional recovery

PP006

Acute Pain

Improving length of stay and reducing reliance on intrathecal opioids using liposomal bupivacaine for total knee arthroplasty

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BACKGROUND: Intrathecal (IT) opioids provide effective analgesia for total knee arthroplasty (TKA) but risk post-operative nausea and vomiting (PONV). A key improvement area in the 'Getting It Right First Time' (GIRFT) 2020 Elective Hip or Knee Replacement Pathway is 'Enhanced Patient Experience', which may be affected by PONV. The risk of urinary retention and delayed mobilisation and discharge due to urinary catheterisation also remains a concern.

Liposomal bupivacaine (LB) use in peripheral nerve block (PNB) may improve analgesia and thus reduce reliance on IT opioids. As part of an on-going quality improvement (QI) project for TKA patients, we introduced LB in PNBs within a wider enhanced recovery programme (ERP).

AIMS: We aimed to assess the use of LB within our enhanced recovery programme for TKA patients, looking specifically at hospital length of stay and reliance on IT opioids.

METHODS: Retrospective review of notes for all patients undergoing TKA in the two-week period preceding, and one-week period following launch of the ERP. Hospital length of stay (LoS) and intrathecal opioid use were assessed.

RESULTS: The mean (SD) baseline hospital LoS for patients undergoing TKA immediately preceding the introduction of the ERP was 3.2 (2.6) days (24 patients). 70.1% of patients received IT opioids. Following the ERP launch, including the use of LB, the mean (SD) LoS reduced to 1.9 (1.1) days, with only 6.9% of patients receiving IT opioids (29 patients).

CONCLUSIONS: LB was one facet of an overall ERP which also included regular simple analgesics, regular codeine or tramadol, early Cryo-cuff application, and as-required oral morphine. The precise role of LB within this overall package is unclear but a dramatic reduction in hospital LoS was observed even when IT opioids were largely avoided.

LB, when used within a wider multimodal analgesic regimen, may help to promote a shorter length of stay and reduce reliance on IT opioid use.

Keywords: Liposomal bupivacaine, knee arthroplasty, enhanced recovery

PP008

Acute Pain

Liposomal bupivacaine for total knee arthroplasty: A case series

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BACKGROUND: Total knee arthroplasty (TKA) is a notoriously painful procedure for which regional anaesthetic techniques are often employed. Liposomal bupivacaine (LB) may provide analgesia for up to 96 hours following a single shot peripheral nerve block (PNB), although its role peri-operatively is still emerging.

AIMS: We aimed to audit our use of LB in PNB for patients undergoing total knee arthroplasty (TKA), via both prospective patient follow up and retrospective case note analysis.

METHODS: All patients receiving LB in pre-operative nerve blocks for TKA over a one-week period were followed up for 72 hours post-operatively. Numerical pain score (0 – 100) was assessed both at rest and on movement on day 0 to day 3. Case notes were then retrospectively reviewed for opioid consumption prior to discharge.

RESULTS: 27 patients underwent TKA and received peripheral nerve block with LB. Adductor canal block was performed in 100%, genicular block in 77.8%, iPACK in 18.5%, and nerve to vastus intermedius in 14.8%. All patients had spinal anaesthesia, with only 7.4% receiving intrathecal opioids.

Mean (standard deviation, SD) pain scores at rest and on movement were 23.6 (21.5) and 42.5 (23.6) at day 0, 18.0 (24.1) and 41.6 (32.6) at day 1, 28.8 (23.3) and 47.5 (27.2) at day 2, and 24.2 (19.0) and 38.4 (25.1) at day 3 respectively. Mean (SD) total opioid use on day 0 and day 1 was 19.4 (15.6), and 19.3 (21.1) mg of oral morphine equivalents respectively. Due to patient discharge the numbers available for retrospective analysis of notes for opioid consumption dropped significantly from day 2 and is therefore not reported. One patient presented to the emergency department for pain within 7 days. No patient was precluded from engaging in physiotherapy solely due to pain.

CONCLUSIONS: When used as part of a multimodal analgesic regimen, LB in PNB appears to provide good analgesia for patients undergoing TKR, even in the absence of intrathecal opioids. Our results are limited to a case series. However, the establishment of quantitative pain scores will provide the basis for future research in this area.

Extending single-shot PNB with LB is an exciting prospect. Our results demonstrate its potential role within an enhanced recovery programme for patients undergoing TKA. Future work needs to focus on formal research to establish the best way to utilise this therapy.

Keywords: Liposomal bupivacaine, total knee arthroplasty

PP009

Acute Pain

Bilateral interscalene brachial plexus nerve block for shoulder reposition in ICU

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BACKGROUND: Peripheral nerve blocks are commonly employed for acute pain in the preoperative and postoperative settings, less commonly in the emergency rooms or intensive care units. The patient with a dislocated shoulder is usually managed in the emergency room, most frequently in intravenous analgesia and sedation or with intraarticular local analgesic injection. Posterior shoulder displacements account for 2 - 5% of all shoulder dislocations and may occur in tonic-clonic seizures, anterior-directed shoulder trauma, or electric shock. Shoulder displacements are associated with severe pain and spasm. The nerves of the brachial plexus and vessels between the first rib and clavicle may be prone to injury. The neurovascular injury is less common in posterior shoulder displacement.

AIMS: We report a case of a patient with bilateral posterior shoulder displacement admitted to ICU after an epileptic attack with tonic-clonic seizures which caused bilateral shoulder displacement and humeral fractures. The male patient, 35 yrs, BMI 26.7, with arterial hypertension and no previous history of epilepsy was confused at the admittance, complaining of severe pain in both shoulders, more intense in the left one. The initial radiologic diagnostic was done before admittance to the ICU (brain MR, X-ray of both shoulders). The patient had a surgical neck fracture of the left humerus and fracture of the anteromedial portion of the right humeral head (reverse Hill-Sacks) and no focal brain lesions. The laboratory findings revealed elevated liver function tests and thrombocytopenia. The patient admitted to alcohol abuse. Levetiracetam was introduced to the therapy. The X-ray findings with bilateral fractures changed our initial plan for i.v. sedation with propofol and fentanyl for the intervention. The pain management included interscalene brachial plexus block for the intervention and post-procedural pain.

METHODS: While waiting for the surgeon to arrive for shoulder reposition we performed ultrasound guided bilateral interscalene block in an aseptic technique, with 10 ml of 0.125% levobupivacaine and 10 ml 0.25% respectively. The higher concentration was applied to the side with the surgical neck fracture.The patient was monitored with standard ICU monitors and received paracetamol and nonsteroidal anti-inflammatory drug i.v. before the procedure. The blocks were performed quickly and uneventfully. The surgeon performed repositioning with no additional analgesia or anesthesia required.

RESULTS: The interscalene nerve block performed on a patient with bilateral posterior shoulder displacement caused by epileptic seizure allowed for interventional and post-procedural pain relief. The

patient was pain-free for the subsequent 12 hours and managed with nonopioid analgesics further on.

CONCLUSIONS: Ultrasound guided interscalene brachial plexus nerve block with low concentration of local anaesthetic may be an alternative to procedural sedation and opiate use for shoulder dislocation. It may be used where appropriate out of perioperative settings.

Keywords: interscalene brachial plexus nerve block, posterior shoulder displacement, shoulder reposition

PP010

Acute Pain

Effects of Rimegepant 75 mg on Monthly Migraine Days: a 52-Week, Open-Label Extension Study

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BACKGROUND: Rimegepant is an orally-administered small molecule calcitonin-gene related peptide receptor antagonist indicated for the acute treatment of migraine and preventive treatment of episodic migraine.

In a previous 1-year open-label study, as-needed (PRN) acute treatment with rimegepant led to reductions in monthly migraine days (MMDs) over time.

A 12-week double-blind study (NCT03732638) demonstrated that scheduled every other day (EOD) dosing of rimegepant significantly reduced monthly migraine days (MMDs).

Responder rates, such as the percentage of participants with ≥50% reduction in moderate or severe MMDs from baseline, are recommended as secondary efficacy endpoints.

AIMS: To assess the effects of rimegepant 75mg on MMDs through 52 weeks of open-label treatment when dosed EOD plus PRN on non-scheduled dosing days.

Exploratory objectives were to evaluate:

1) Changes from the observation period in MMDs overtime,
2) Responder rates over time during the open-label extension phase.

METHODS: Study Design:This was an open-label extension phase of a 12-week, phase 2/3, randomized, double-blind, placebo-controlled study (NCT03732638) of rimegepant 75 mg EOD for preventive treatment of migraine.

Participants:

- Adults aged ≥18 years with ≥1-year history of migraine, 4-18 moderate to severe monthly migraine attacks in the 3 months prior to screening, and ≥6 migraine days and ≤18 headache days in the 28-day observation period.
- If using preventive medication, the dose had to be stable for ≥3 months.
- The use of triptan medications was prohibited during the open-label extension phase.

Endpoints:

- Key outcomes were the mean change from the observational period in MMDs and the percentages of participants with ≥50%, ≥75%, or 100% reductions from the observational period in moderate to severe MMDs
- Months were defined as 4-week intervals.

RESULTS: Of the 741 participants treated with study drug in the double-blind treatment phase, 603 (81.4% [rimegepant n = 302, placebo n = 301]) were treated with rimegepant in the open-label extension phase, 580 (rimegepant n = 288, placebo n = 292) were included in the mITT population, and 428 (rimegepant n = 209, placebo n = 219) completed the open-label extension phase.

Participants:

- The open-label treated population had a mean (SD) age of 42.6 (13.10) years and was 82.3% female, with a mean (SD) history of 7.9 (2.74) moderate to severe attacks per month.
- Subjects took a mean (SD) of 14.6 (2.45) rimegepant tablets per month; 81.4% of participants took ≤16 rimegepant tablets per month.
- During the open-label extension, 10.9% of participants were using concomitant non-study preventive migraine medication.

Efficacy:

- Mean (SD) MMDs during the observation period prior to double-blind treatment were 10.3 (3.2) for participants randomized to rimegepant and 9.9 (3.0) for participants randomized to placebo.
- Through 52 weeks of open-label rimegepant, the frequency of MMDs consistently declined.
- Mean 95% (confidence interval) changes from the observation period in MMDs were −5.1 (−5.49, −4.74) during Weeks 1 to 4 and −6.9 (−7.31, −6.56) during Weeks 49 to 52.

Responder rates:

- 80.9% of rimegepant-treated participants had a ≥50% reduction in moderate or severe MMDs at weeks 49-52 from the observation period.
- 65.8% of rimegepant-treated patients had a ≥75% reduction in moderate or severe MMDs at weeks 49-52 from the observation period.
- 49.3% of rimegepant-treated participants had a 100% reduction in moderate or severe MMDs at weeks 49-52 weeks from the observation period.

CONCLUSIONS: After 12 weeks of double-blind treatment, long-term preventive and acute treatment with oral rimegepant 75 mg dosed every other day (EOD) + as needed (PRN) was associated with consistent and sustained reductions in MMDs.

Over the course of the study, more than 80% of participants experienced ≥50% reduction in moderate or severe MMDs and approximately 50% experienced a 100% reduction.

Keywords: Migraine, CGRP, Rimegepant, Prevention,

PP011

Acute Pain

Rimegepant for the acute treatment of migraine: Subgroup analysis from 3 phase 3 clinical trials by triptan treatment experience

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BACKGROUND: Sumatriptan and other serotonin 5-HT1B/1D receptor agonists (triptans) have been among the most widely prescribed medications in the United Kingdom for the acute treatment of migraine for decades.

While many of those who receive a prescription for a triptan obtain sufficient relief, others may not, or may experience adverse events (AEs).

Rimegepant, is an orally administered small molecule calcitonin gene-related peptide receptor antagonist indicated for the acute treatment of migraine and preventive treatment of episodic migraine.

Because rimegepant acts as an antagonist at calcitonin gene-related peptide receptors and triptans act as agonists at serotonin receptors, we hypothesised that the efficacy of rimegepant would be consistent regardless of history of triptan insufficient response or current triptan use.

AIMS: To assess the efficacy of rimegepant in subjects with and without a history of insufficient response to triptans based on the results of three clinical trials of rimegepant for the acute treatment of migraine, each of which was prospectively registered at clinicaltrials.gov (NCT03235479, NCT03237845, NCT03461757).

METHODS: This analysis was based on pooled data from three methodologically similar, double-blind, randomized, multicentre phase 3 trials comparing the safety and efficacy of a single 75 mg dose of rimegepant with placebo in the acute treatment of a single migraine attack of moderate to severe pain intensity.

A history of insufficient response to triptans was defined as a self-reported history of discontinuation of any medication in the triptan class for any reason, including lack of efficacy and/or tolerability.

Participants were assigned to one of four subgroups based on triptan treatment experience:

- Insufficient response to 1 triptan
- Insufficient response to ≥2 triptans
- Current triptan users
- Triptan-naïve participants

Coprimary Endpoints (at 2 hours postdose):

- Pain freedom
- Freedom from the most bothersome symptom (MBS)

RESULTS: Of the 3507 participants in the three trials (rimegepant n = 1749, placebo n = 1758), 910 (25.9%) had a history of insufficient response to 1 triptan, and 325 (9.3%) had a history of insufficient response to ≥ 2 triptans. The remaining 2272 (64.8%) participants had no history of triptan insufficient response; 595(17.0%) were current triptan users, and 1677 (47.8%) were triptan-naïve.

Demographics and baseline characteristics of the triptan insufficient response subgroups were generally consistent with those of current triptan users.

Efficacy:

- Rimegepant was more effective than placebo at two hours postdose among participants with a history of insufficient response to 1 triptan and ≥ 2 triptans for pain freedom (1 triptan: 20.7% vs 12.4%, $p < 0.001$; ≥ 2 triptans: 20.0% vs 10.2%, $p = 0.013$) and MBS freedom (1 triptan: 36.2% vs 24.4%, $p < 0.001$ ≥2 triptans: 43.0% vs 21.5%, $p < 0.001$).
- Rimegepant was also more effective than placebo among current triptan users for pain freedom (20.4.% vs 6.8%, $p < 0.001$) and MBS freedom (37.2% vs 22.2%, $p < 0.001$) at two hours postdose.
- Among triptan naïve participants, rimegepant was more effective than placebo for two-hour pain freedom (19.6% vs 14.7%, $p = 0.007$) and not significantly different than placebo for two-hour MBS freedom (35.0% vs 30.7%, $p = 0.06$).

CONCLUSIONS: Oral rimegepant 75 mg was effective for the acute treatment of migraine among participants with a history of triptan insufficient response and in current triptan users.

- The efficacy of rimegepant was consistent among those with insufficient response to 1 or ≥2 triptans and those who were triptan-naïve or currently using triptans.
- This study, along with previously published observational data, challenges the rationale for requiring that patients with migraine endure insufficient response to multiple triptans before considering alternative treatments.

Keywords: Migraine, Triptan, Rimegepant, Acute

PP012

Acute Pain

Pridinol in muscle spasm associated with low back pain, neck pain and sciatica

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BACKGROUND: Pridinol is a non-selective anti-muscarinic substance, which acts on the alpha motor neurone in the spine. It acts on both smooth and striated muscles. Pridinol can be used for the treatment of skeletal muscle tension of central and peripheral origin by preventing increased excitation in the spinal cord from being transmitted to the muscle, and subsequently reducing muscle spasms and pain.

A significant proportion of patients with back pain develop muscle spasms. There is experimental evidence that pain can cause muscle spasm and that muscular activity can be painful. Muscle spasm results in hypo-perfusion and reduced oxygen supply to the muscle, which further irritates the muscles and the nerves, subsequently causing more pain.[1]

A larger real/world study of Uberall et al. in 2022 with 1133 patients showed a reduction in pain, physical function and overall wellbeing when treated with Pridinol. Treatment was generally well tolerated and most patients reduced other medications.[2]

The number needed to treat for the global outcome with Pridinol vs. Placebo was calculated as 4.1 in a recent publication.[3]

AIMS: The primary aim of the presented audit was to investigate the effect of Pridinol on pain and muscle spasms in acute and acute on chronic pain presentations. The secondary aim was to assess the reduction of other medications in patients on Pridinol and its side effect profile.

METHODS: 41 Patients with low back pain, neck pain and sciatica-type pain were included in our prospective audit and the following data were collected before and after commencing Pridinol: pain (VAS 0/10), muscle spasms (Yes / No), reduction of other medication following Pridinol and side effects of Pridinol.

All patients received a course of 1.5 – 3mg Pridinol up to three times per day for up to 10 days. Patients were followed up after the treatment course either face-to-face or by telephone.

RESULTS: 31 patients presented with low back pain +/- leg pain (76%), 5 patients with neck pain (12%) and 5 patients with predominantly sciatica symptoms. Unfortunately, a few outcome data were missing.

28 out of 37 patients reported a reduction in muscle spasms (76%), 23 out of 32 patients had reduced pain (72%). 28 out of 41 patients had reduced medication documented (at least 68%), including Diazepam, Opioids, Baclofen and Methocarbamol. 7 out of 30 patients had side effects documented (23%), which were mostly mild (nausea, headaches, confusion, restlessness), two patients experienced urinary retention and one patient numbness in the whole body.

CONCLUSIONS: In summary, Pridinol has been shown to demonstrate a clinically significant reduction of muscle spasm and pain in over 70% of patients for each symptom in the neck, lower back and legs. At least 68% of patients were able to reduce other harmful medication, including benzodiazepines and opioids. Pridinol had a good side effect profile with 23% of patients having some side effects, whereas the incidence of more severe side effects was less than 10% (in 3 out of 41 patients).

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Keywords: Muscle spasm, antispasmodic, muscle relaxant, low back pain, neck pain

PP014

Assessment & Measurement

Using Real-Time Mobile Health Data to Characterise Pain Flares in Rheumatoid Arthritis

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BACKGROUND: Pain flares in rheumatoid arthritis (RA), often described as episodes of increased pain severity accompanied by pain impact, can be unpredictable and challenging to manage since triggers and duration vary from person to person. Patient-generated data, collected via mobile health (mHealth) devices such as smartphones and wearables, could provide real-time information about the onset and duration of pain flares and their triggers. However, there are no agreed pain flare classification criteria.

AIMS: To characterise pain flares and pre-flare exposures using real-time mHealth data from patients with RA.

METHODS: Our 30-day mHealth study collected daily reports of pain severity and impact via a smartphone app (all scales range 1-5, higher scores are worse). Three pain flare types, defined using pain severity scores, were *above average* (pain severity is greater than personal median score); *significant change* (pain severity increases by two-points from yesterday); or *absolute impact* (pain severity is greater than three following a two-point increase from yesterday). All pain flare types end when pain severity returns to the personal median score or lower. Exposures prior to pain flare onset were self-rated sleep quality, mood, anxiety and fatigue using the same study app, and passively recorded total time asleep (hours), sleep efficiency (%), sleep latency (minutes) and physical activity (minutes) via a wrist-worn accelerometer. We report the 30-day monthly pain flare rate, the average duration of pain flares and summarise average exposures one-day and three-day before pain flare onset.

RESULTS: We analysed 253 of 266 participants (81.8% females; mean age = 59.9, average years with RA = 12.1) after excluding those who did not complete the required questionnaires (n = 5) or contributed less than seven days of data (n = 8). A total of 6,244 days of data were included in the analysis. The number of pain flares decreased when applying more complex definitions (above average = 788, significant change = 171, absolute impact = 116). 89% of participants (224/253) had at least one *above average* pain flare with an average of four (SD = 2.2) episodes per month, and 43% of participants (108/253) had at least one *significant change* pain flare with an average of two episodes per month (SD = 1.1). Even under the most stringent definition of *absolute impact*, 31% of participants (78/253) had more than one pain flare with an average of two episodes per month (SD = 1.1). Across all pain flare types, 75% lasted two days (median = 1, IQR = 1-2) but could persist up to 11 days. Scores on self-rated exposures did not differ between pain flare types and were similar one-day and three-days before pain flare onset. Similarly, objective exposures did not differ between pain flares or preceding periods.

CONCLUSIONS: Our findings from mHealth data showed that around one-third of RA patients experienced two episodes of pain flare per month. Pain flare occurrence was common and could persist up to 11 days based on self-reported pain severity. Real-time patient-generated data offers promise for identifying pain flare patterns and triggers. Future analysis should examine the role of pain impact and compare within-person exposures during pre-flare periods with non-flare periods.

Keywords: Chronic pain, Pain flares, Rheumatoid arthritis, Mobile health

PP015

Assessment & Measurement

EEG as a measure of pain: an experimental study

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BACKGROUND: Theoretical perspectives outline pain is a modulatory experience which, works across a neuromatrix, influenced by the pain experience on a physical, psychological and individual level. For example, even acute, experimental pain has been evidenced to potentially operate on different cortical pathways (somatic and ischemic). Electroencephalography (EEG) is an affordable and portable method of assessing cortical activity and it could have great potential as an objective measurement for pain, where self-report is unreliable or impossible (e.g., pre-verbal children; people with cognitive impairments) which could result in undertreatment. Research is promising regarding the potential of EEG for the assessment of pain, but has several limitations that limit our ability to consider EEG as a reliable measure across pain experiences.

AIMS: The aims of this research were to examine the potential of EEG in the assessment of pain by studying its reliability to measure pain across two acute pain experiences (somatic, induced with a cold pressor; and ischemic, induced utilising a submaximum effort tourniquet technique/SETT) controlling for individual variability between the two pain experiences.

METHODS: Cold/somatic and exercise/ischemic methods of pain induction were applied in healthy participants (n = 30), while EEG was continuously recorded using the Biosemi (64 channel). Pain ratings were recorded using a numerical rating scale (NRS/0-10) during pain experiences and the McGill Pain Questionnaire (SF-MPQ; Melzack, 1975/0-45). Cortical areas active during pain were examined using Brainstorm in MATLAB, applying source localization techniques to study differences between a baseline and the two pain types for Delta (2-4Hz), Theta (5-7Hz), Alpha (8-12Hz), and Beta (13-29Hz). Average frequency power for each frequency was computed and the relationship between EEG frequencies and pain rating was assessed using regression and correlations.

RESULTS: Correlations of subjective pain ratings (SF-MPQ) with EEG frequencies found large significant correlations with Alpha power (r = .53, p = .001) for cold/somatic pain only. No other reliable associations were observed. However, significant differences between both pain conditions compared to the baseline was seen for all four frequencies in primarily the central, parietal, and frontal regions.

CONCLUSIONS: Overall, results suggest some promise for EEG as an objective pain measure, specifically Alpha activity, with a stronger effect size found (.53) compared to those reported in observational measures, where more moderate effect sizes have previously been identified (Labus et al., 2003; Zhai et al., 2020).

Keywords: experimental pain, EEG

PP017

Assessment & Measurement

What do people living with musculoskeletal pain conditions describe about their pain? An exploratory analysis of electronic free text pain diaries

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BACKGROUND: People living with musculoskeletal pain conditions prefer pain self-reporting for better pain management. In a recent feasibility study, 104 people living with musculoskeletal pain conditions completed daily pain manikin reports, along with an optional free text pain diary using their own smartphone. People shared their motivation to daily self-report their pain if that could improve their self-management. There is a potential of electronic pain diaries to improve pain management, while it is unknown what people would describe in an optional pain diary to improve their pain management.

AIMS: The objective was to explore what people have described in their free text electronic pain diaries, which could be useful for improving their pain management.

METHODS: In a recent study, we assessed the feasibility of daily pain self-reports for 30 days. A daily pain self-report included a single overall pain intensity question, a two-sided two-dimensional pain diagram, and a free text pain diary. For the latter, people could provide additional information in response to the question: Is there anything you would like to share about your pain diagram?

We conducted a secondary thematic content analysis of the free text pain diary entries and identified key domains and ideas described by people. We presented themes descriptively.

RESULTS: Out of 104 people, 94 completed 957 unique pain diary entries. We have presented key domains, ideas and illustrative quotes.

People described how medication and self-management practices (e.g., heat therapy, physical activity) helped them in managing their pain. They also described different aspects of their pain, including pain descriptors (e.g., pain location, quality, radiation), perceived causes (e.g., physical activity, cold weather) and consequences of pain (e.g., limited mobility, lack of sleep). People perceived some factors, such as medication, and level of physical activity, as both cause and consequence of their pain.

Key domains and ideas captured in free text electronic pain diaries

Domains captured in pain diaries Key ideas Illustrative quotes

1 Descriptions of pain [Pain location, Quality of pain (e.g., numbness), Depth of pain, Radiation]

Illustrative quote: Crumbling pain in my back and numbness down right leg.

2 Factors associated with (self)management of pain [Medication, Resting, Physical activity, Heat therapy, Warm weather or clothing]

Illustrative quote: Again my medication is keeping the pain at bay. Because it has been very hot today, I have experienced very little pain today.

3 Perceived cause of pain or factors influencing pain [Lack of physical activity, Active day before, Stress, Weather conditions, Delay or no medication, Lack of sleep, Comorbidity]

Illustrative quote: Had a very active day before, so in higher pain today.

4 Consequences of pain [Functional limitations (e.g., mobility), Change in medication, Lack of sleep, Longer sleeps]

Illustrative quote: The leg pain in restricting my daily movement.

CONCLUSIONS: Electronic free text pain diaries provide useful information about people's pain management practices. However, how best to track pain and self-management practices for effective pain management requires research.

Keywords: Pain self-report, electronic diary, self-management, longitudinal

PP018

Audit and Service Evaluation

Establishment of a Transitional Pain Service in a District General Hospital

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BACKGROUND: The 'Surgery and Opioids- best practice guideline 2021' has provided a structure for which to examine opioid prescribing in the perioperative period. This created an opportunity to proactively address modifiable risk factors associated with persistent post-operative pain, including high dose opioid prescribing. This audit looks at the prescribing outcomes associated with the first twelve months of a newly developed Transitional Pain Service.

AIMS: To review the prescribing outcomes of interventions from a multidisciplinary team addressing opioid prescribing and other modifiable persistent post-surgical pain risk factors in the perioperative period.

METHODS: Patients are referred by surgical teams, at the preoperative clinic or post-operatively by inpatient pain nurse or ward teams. Patients are identified by referral criteria including opioid dose and risk factors. Based on complexity of issues and doses of medications patients are reviewed either at preoperative clinic or referred to a dedicated outpatient pain clinic. Patients have information provided about the risk factors they have for developing post-operative persistent pain and are given support to address these. The pre-operative intervention ranges from a discussion and plan for opioid reduction at preoperative clinic to multiple appointments with the pain outpatient multi-disciplinary team. Post-operatively, if patients have ongoing pain issues they have expedited access to the outpatient pain service to address issues early, maintain function and avoid inappropriate prescribing.

RESULTS: 63 patients were seen by the service. 70% of patients were orthopaedic with 59% undergoing arthroplasty surgery. 57% required intervention from pharmacist and anaesthetist preoperatively and post-operative in-patient pain nurse support. These patients have significant opioid reduction which has continued after discharge. 3545.5 mg oral morphine equivalent in 24 hrs reduced to 750.5 mg oral morphine equivalent. More complex patients (43%) with multiple pain and prescribing issues have required further input from a multidisciplinary team over a greater number of interactions on average 2 appointments per person with one outlier at 8. Overall reduction in opioid prescribing has occurred in these patients, but to a lesser extent; 2631mg oral morphine equivalent reduced to 989.5 mg.

CONCLUSIONS: The tiered interventions offered by the Transitional Pain Service has a lasting impact on reducing opioid prescribing within our health board in the surgical population. A discussion at a pre-operative clinic highlighting the issues related to high dose opioids and making an opioid reduction plan has a significant impact on pre and post-operative opioid prescribing as many patients were unaware of the side effects and harm relating to this. Having amultidisciplinary team available for the more complex patients is invaluable. Further education to surgical, anaesthetic and primary care colleagues is needed to highlight the benefits of this service to encourage earlier referral and review of patients prior to planned surgery. This patient cohort should be followed up for a number of years to record future development of post-operative persistent pain.

Keywords: post surgical persistent pain, opioid reduction, pre-operative assessment

PP019

Audit and Service Evaluation

Audit of rapid access epidural pathway for acute severe sciatica

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BACKGROUND: Nice Guidance 59 on low back pain and sciatica in over 16s recommends considering epidural injections of local anaesthetic and steroid in patients with acute and severe sciatica.

Post COVID the waiting time has increased for an appointment with the MSK (musculoskeletal) team who often are also referrer to the pain team. Similarly, the waiting time from referral to face to face consultation with a pain consultant has significantly increased nationally, hence missing the window of opportunity where effective treatment can be provided. This causes chronic persistent pain in many cases, increasing the suffering and socioeconomic burden of persistent pain on the society.

AIMS: To design an accelerated pathway to provide epidural steroid injection to patients with acute severe sciatica as recommended by NICE and to audit this new service.

METHODS: Rapid Access Epidural pathway was designed by the North West Anglia NHS Foundation Trust (NWAFT) in collaboration with the local MSK team. A referral proforma was created based on Nice Guidance. The inclusion criteria included sciatica caused by acute disc bulge confirmed on MRI scan. The patients not responding to the conservative management were included. The criteria was modified to include the onset of pain within six months instead of three months due to longer waiting times for MSK consultation. The contraindications included patients on anticoagulants, immunosuppressants or significant Psychological comorbidities.

Patients with acute severe sciatica who met the referral criteria were urgently referred by the MSK team, via NHS e-referral system, for rapid access epidural steroid injection. The referrals were virtually triaged by a NWAFT Pain Consultant after reviewing the referral letter and MRI scan. If the referral was accepted the patients would go into the consultant pool for injection and be listed without face to face consultation directly on one of the Consultants' theatre list for injection. After injection the patients were followed up by specialist nurses and discharged back to MSK. This pilot project was carried out from October 2021 until March 2022. The rolling audit was started in April 2022 and is ongoing.

RESULTS: We received 36 referrals, of which 4 procedures were cancelled on the day of the procedure (one patient was on anticoagulant, one had very high blood sugar and two of the patients on clinical assessment did not have radicular symptoms so did not need the epidural). 2 other patients though triaged, were not listed for other reasons.

30 patients received the epidural of which 27 received single level transforaminal, 2 received two level transforaminal epidural steroid injection and 1 patient received caudal epidural. 2 of the patients who received the epidural were lost to follow up.

For 27 out of the 28 patient's injection was carried out within 35 days. Initial follow up from the day of injection was between 6 to 60 days, but some of the cases where data was missing were contacted later. One of these patients needed a repeat procedure which provided a more lasting benefit and two of these patients with poor outcome following the epidural needed surgery.

Out of 28 patients who were followed up, 6 (21%) patients received 80 to 100% pain relief, 5 (18%) received 60 to 80% pain relief, 7 (25%) received 40 to 60%, 1 (4%) received 20 to 40% and 9 (32%) received 0 to 20% pain relief.

CONCLUSIONS: Despite the NICE guidance based on robust evidence we are not providing our patients epidural steroid injection for acute sever sciatica in timely manner. This pathway has shown that it can be done and in the small cohort of patients where it was done it has shown a good outcome.

Keywords: Rapid, access, epidural, sciatica

PP020

Audit and Service Evaluation

Online Pain Education Sessions With and Without Dedicated Pain Medication and Collation of GP Appointments for Chronic Pain Pre and Post Online Group

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NHS Borders

BACKGROUND: In 2021 we completed 2 x 4 session programmes delivering MDT online pain education to primary care patients. Some participants that they had reduced their pain medication, after the programmes, though there was no specific session on pain medication.

We received Scottish Government 'Modernising Patient Pathway Programme (MPPP) funding to repeat the project, but with a dedicated 5th session on medication. We also collated pre and post GP appointments for the 2021 cohort and 2022 cohort.

AIMS: People living with chronic pain can often present multiple medications of uncertain benefit. We aimed to assess the difference in pain medication prescribed before and after pain education. We delivered an online pain education programme with a dedicated session on pain medication and compared to one without.

It is estimated 1 in 5 GP appointments are related to chronic pain. We aimed to assess if pain education lead to a reduced number of GP appointments.

METHODS: Delivered 2 x 5 Pain Education sessions between March and June 2022 and collated prescribing date pre and post group. Retrospectively collated prescribing data for the 2021 group without dedicated medication session. Prescribing data pooled using Defined Daily Dosage (DDD))

Collated number of GP appointments pre and post group. Pain Self Efficacy Questionnaire compare pre and post group - including question 7 'I can cope with my pain without medication'

RESULTS: 2021 – No medication education session n = 6
Pre and during group:

Pregabalin = 0.4
Codydramol/cocodamol = 0.4
NSAIDs = 0.18

Post group – 6/12

Pregabalin = 0.18
Cocodamol/codydramol = 0.4
NSAIDs = 0.18

2022 – with medication education (cohort 4 longer term post group results)
n = 3
Pre and during group
Oxycodone = 0.66
Amitryptiline = 2.05
Lidocaine patch = 0.46
Paracetamol = 0.86
Ibuprofen = 0.33
Post group (3/12):
Oxycodone = 0
Amitryptiline = 1.2
Lidocaine = 0
Paracetamol = 1.5
Ibuprofen = 0

Average GP appointments in 3/12 before programme = 1.8
Average GP appointments in 3/12 post programme = 0

Pain Self Efficacy Questionnaire: 6 returned from 11 sent.
Question 7: 'I can cope with my pain without medication'
2021 (no pain medication education)
Q7 (mean) pre = 2 post 3.6
Change = 1.6 points
2022 (with pain medication education)
Q7 (mean) pre = 0.6 post = 3
Change = 2.4
50% improvement in pain self efficacy for using analgesia 2022 v 2021

CONCLUSIONS: Long term pain medication use can lead to tolerance, reduced effectiveness and increased side effects. Educating patients on pain medication can allow them to make informed choices about choosing to trial reductions, if they choose.

Online pain education programmes appear to reduce both analgesia use and GP appointments. There was little difference between the 2021 (no pain medication education) and 2022 (with pain medication education).

Pain education appears to lead to reduced GP appointments post group.

The biggest change is in self efficacy in coping with pain without medication. This is perhaps the value of adding pain education into the online pain education programme. It might lead us to think that self efficacy, or confidence in having other ways/skills of self managing pain may need to be raised first before reduction of medication is considered, if required. And this can take a long time for patients. It may be speculated that too quick a reduction may be counter-productive in engaging in pain self management.

Keywords: Pain, self-management, analgesia, deprescribing

PP021

Audit and Service Evaluation

Persistent post-operative opioid use and opioid stewardship in Aberdeen: a cohort study

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BACKGROUND: Persistent post-operative opioid use (PPOU) is an important health concern with significant impact on post-operative recovery and morbidity (1). Having opioids prescribed at time of discharge is a well-known risk factor for PPOU, with reported PPOU rates of 2.3-3.9% in opioid-naïve and 27.2% in opioid-non-naïve patients (2) (3). In high-risk populations, opioid stewardship is increasingly recognised as a tool to limit PPOU through a multidisciplinary process including pre-operative risk assessment, perioperative analgesia optimisation and post-operative follow-up (1).

AIMS: Our primary aim was to quantify the magnitude of PPOU in our cohort. Secondary aims included evaluation of risk factors for PPOU and the impact of our Acute Pain Service (APS) on PPOU rates with a view to evaluate the service and identify areas for improvement.

METHODS: We undertook a retrospective cohort study between 01/01/2018 and 31/12/2021 of in-patients in Aberdeen Royal Infirmary and Aberdeen Woodend Hospital who were referred to the APS and discharged with new strong opioids prescribed. Datapoints gathered included patient demographics, Scottish Index of Multiple Deprivation, pre-operative psychiatric history, pre-operative opioid use, admission specialty and type of surgery as well as PPOU defined as per American Society For Enhanced Recovery and Peri-operative Quality Initiative-4 Joint Consensus Statement (1). Ethical approval was granted in line with UK Policy Framework for Health and Social Care Research and Caldicott principles. Statistical analysis was undertaken using SPSS. Data are presented as percentages with odds ratios (OR) and 95% confidence intervals [95%CI].

RESULTS: Over the 3-year period, we identified 311 patients who were referred to the APS and discharged with new strong opioids prescribed. Of these, 75 (24%) developed PPOU and 236 (76%) did not. Risk factors (OR, [95%CI], p value) for PPOU included female sex (1.89, [1.11-3.22], $p = 0.019$), pre-operative psychiatric history (2.85, [1.64-4.95], $p < 0.001$) and pre-operative opioid use (1.79, [1.03-3.11], $p = 0.04$). 249 (80%, [76-84]) patients who consented to APS follow-up were contacted after discharge. Of these, 194 (78%, [73-83]) stopped using opioids and 55 (22%, [17-26]) continued using opioids. Among the 62 (20%, [16-24]) patients not followed up by the APS, 35 (57%, [47-67]) stopped using opioids and 20 (32%, [23-41]) continued using opioids. 7 (11%, [1-13]) patients were lost to follow-up. There was considerable variation in prescribed opioid regimens; most prescriptions consisted of combined immediate-release and modified-release opioid preparations.

CONCLUSIONS: In conclusion, 24% of in-patients who were referred to the APS and prescribed strong opioids on discharge developed PPOU. The rate in patients with pre-operative opioid use was 32%, in line with similar series. The rate in opioid-naïve patients was 21%, higher than reported in similar series (2) (3). Identified risk factors for PPOU in our cohort reflect those described in current literature (1). Trends in post-discharge opioid use support the opioid stewardship role of the APS. Proposed areas for improvement include increasing awareness of opioid stewardship and development of structured follow-up pathways in collaboration with primary care. Importantly, identified risk factors make a strong argument for implementation of opioid stewardship early in a patient's journeys for example as part of pre-operative assessment.

Our study had several limitations. Described PPOU rates apply to in-patients who were referred to the APS and discharged with new opioids prescribed however additional datapoints for example patients not referred to the APS or discharged out-of-hours with new opioids prescribed may have been missed. Furthermore, described PPOU rates may have been affected by the COVID-19 pandemic during which there was a reduction in number of surgeries performed and APS input. Ongoing monitoring will be important to ascertain the move away from modified-release opioid preparations to reflect newest standards of care in the management of acute post-operative pain.

Keywords: persistent, post-operative, opioid, stewardship, pain

PP022

Audit and Service Evaluation

Surgery and Opioids: Streamlining the Elective Patient Surgical Journey, A Service Improvement Project

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BACKGROUND: The Royal College of Anaesthetists Faculty of Pain Medicine 'Surgery and Opioids: Best Practice Guidelines 2021' makes recommendations for the perioperative management of opioids. The peri-operative period has been identified as a key point for opioid stewardship. Specific recommendations include: patients taking opioids should be identified before surgery the Inpatient Pain Service (IPS) should be involved in the post-surgical care of the opioid tolerant patient.

AIMS: Our main aim was to ensure that elective surgical patients on regular strong opioids in community were identified in the Pre-Operative Assessment Clinic (POA) and referred to the IPS. This allowed the IPS to review these patients post-operatively to ensure optimisation of analgesia and limit long term opioid dependence and misuse (opioid stewardship), which has been shown to improve outcomes for patients.

METHODS: All patients identified as being on regular strong opioids by the POA clinic and referred to the IPS between 01/02/21 and 20/12/21 were retrospectively audited to assess whether they had been reviewed by the IPS post-operatively. Following the introduction of a new system for identifying when patients were admitted for surgery, a retrospective reaudit was carried out of patients referred between 21/12/21 and 21/04/22.

RESULTS: During the first audit period, 103 patients were identified. The IPS was aware of admission for 14% of patients, a further 19% were picked up coincidentally. Of those who had been admitted for their surgery, 33% were reviewed face to face by the IPS, 67% were not reviewed. The low review rate was due to limitations in the referral system, which meant the IPS was not notified of admission for surgery.

During the second audit period, a total of 43 patients were identified. The IPS was aware of admission for 96% of patients, all of whom were reviewed electronically. Of those who had been admitted for their surgery, 71% were reviewed face to face by the IPS, 29% did not require face to face review.

CONCLUSIONS: The initial audit clearly demonstrated that our existing system for identification of referred patients was not effective, resulting in missed reviews.

The IPS undertook a series of improvements to address this. It was important to raise awareness around opioid stewardship in the context of surgery - teaching was provided to the POA and Recovery nurses. To ensure patients using regular strong opioids in community were being identified and referred to the IPS a visual reference poster was created for POA nurses.

In collaboration with Trust IT Services a new system was developed utilising existing Trust IT programmes to automatically notify the IPS of any referred patients admitted to the hospital. The number of patients identified on admission increased from 14% to 96%.

We are continuing to work with the IT Change Team to streamline the current referral process and integrate it into our existing referral systems to prevent any further patients being missed.

Through this service improvement project the IPS has been able to raise awareness of the importance of opioid stewardship with staff at multiple points in the patient elective surgical pathway. The IPS has dramatically improved the number of patients already established on opiates prior to surgery who were identified on admission. As a result, the percentages of referred patients who received electronic and face to face reviews significantly increased, in line with the 'Surgery and Opioids: Best Practice Guidelines 2021'. This has enabled the IPS to improve the care we provide to elective surgical patients, with a goal of enhanced opioid stewardship and better patient outcomes

Keywords: opioid stewardship, elective surgery, service improvement, pre-op assessment

PP024

Audit and Service Evaluation

Goldilocks and the three patient information leaflets; how much information do patients think is 'just right'?

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BACKGROUND: Best practice guidelines suggest that we should give patients written information about their medical care so that they are better placed to make informed decisions.

Our trust information leaflet "pain control after surgery" needed up dating and we had written a new,slightly longer version. Soon after the British Pain Society (BPS) published a new patient information leaflet "managing pain after surgery". These leaflets varied considerably in length and paper copies have a financial and environmental cost.

AIMS: -which of the 3 information leaflets did patients prefer

-how would patients prefer to access this information

METHODS: 45 elective adult surgical patients were asked

a) to read one of the three leaflets (15 in each group) and were then asked a series of questions about content,length, easy of understanding and layout of the leaflet.

b) how they could access information and their preferred method; QR code, emailed leaflet, printed leaflet.

Leaflet A; original,3 sides A5, word count of 594

Leaflet B; updated version, 6 sides A5, word count 1206

Leaflet C; BPS "managing pain after surgery",15 sides A5, word count 1842

RESULTS: Across all 3 groups;age (range and median),male to female ratio, pre & postoperative assessment were similar.

Age range 25-86 years, median age 65 years. Female 48%,male 52%.Interviewed Pre op 47%,Post op 53%.

Leaflet A;100% of patients felt it gave enough information,100% that it was 'about right' in length. Easy to understand,with a good layout.

Leaflet B;98% of patients felt it gave enough information,67% that it was 'about right' & 27% 'too long'. Easy to understand,with a good layout.

Leaflet C;100% of patients felt it gave enough information, 80% that it was 'about right' in length,20% 'too long'. Easy to understand with a good layout.

71% of patients understood what a QR code was and 81% of those would be happy to access patient information in this way.

Almost all patients had access to email (91%) but only 48% of those that did wanted patient information emailed to them.

67% of patients wanted a printed copy of the information leaflet;10% wanted both emailed and printed copies.

CONCLUSIONS: There seems to be a discrepancy between what clinicians and patients feel is adequate information about managing pain post operatively. As a clinical team we felt that the original leaflet A was too brief and that the BPS leaflet too long. Patients however seemed happy with which ever leaflet they had been given; in fact, the shorter the better.

Perhaps the amount of information you needed as a patient can only be judged in retrospect;if you had problems managing post operative pain at home,had you been given enough information to manage this? So, a follow up would be to repeat the questionnaires a week after their discharge home.

The majority of patients can access information electronically either as QR code or emailed.Depsite this in our study 67% still preferred to have a paper copy on discharge. There is both an environmental and financial cost to printing information and perhaps an opportunity to encourage patients to receive information in a different way.

Keywords: Post-operative, pain, patient, information.

PP025

Audit and Service Evaluation

One Stop Multi-speciality Chronic Postoperative Inguinal Pain Clinic – Implementation Outcomes.

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BACKGROUND: The Chronic Persistent Inguinal Pain (CPIP) clinic was established in 2021 as a multidisciplinary one stop clinic that accepts tertiary referrals from across the UK. It consists of specialist Pain Physiotherapists, Pain Consultants and Upper Gastrointestinal Surgeons with a special interest in abdominal wall surgery. It was established to provide cohesive advice and treatment for Chronic hernia pain which affects an estimated 5-10% of patients post hernia repair and can have a significant impact on their quality of life.

AIMS: To analyse patients' feedback and outcomes following individualised assessment and treatment plan development in the CPIP clinic. The identified primary endpoint was quality of life and pain improvement 3 months after this intervention.

METHODS: All patients reviewed in the multidisciplinary one stop CPIP clinic in the Comprehensive Hernia Centre between July 2021 and July 2022 were included in the study. Patients feedback as well as MDT individualised treatment plans were assessed. The outcomes, Visual Analogue Scale (VAS) and modified Activity Assessment Scale (mAAS) 3 months post intervention have been audited against data collected prior to intervention.

RESULTS: We received 57 referrals during the investigated period. 40 of these patients underwent MDT assessment with 55% (22 patients) receiving treatment and entering the follow-up stage.

Within this treatment group 26% proceeded to further surgery while 35% received invasive non-surgical treatment (local injections and radiofrequency ablation). A further 39% were offered pharmacological treatment, together with physiotherapy and psychological support. Follow up data was collected for 19 of these 22 patients.

All patients had reported moderate to significant pain (VAS 4-10) on initial assessment and a significant reduction in pain (> 50% improvement in VAS) after treatment. Mean baseline mAAS score was 20.3 ± 7.3 (range 8 to 40). Mean change was - 10.6 ± 2.6 with all patients reporting significant improvement (>50%).

Moreover, on a scale from 0 to 5, the average satisfaction score was 4.5.

CONCLUSIONS: Developing a multidisciplinary one stop clinic to assess and treat patients presenting with CPIP improved both patient experience and outcome. This provides further evidence for shared specialist working to enhance patient-centred care.

Keywords: Chronic pain, persistent post hernia pain, one stop clinic, multidisciplinary team

PP026

Audit and Service Evaluation

Management of acute pain in Ghana compared to the UK

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BACKGROUND: All anaesthetists are involved in the assessment and practise of managing peri-operative pain. In November 2022 a team of anaesthetists from Glasgow Royal Infirmary spent a week in Korle Bu Teaching Hospital, Accra, Ghana; anaesthetising, teaching and exploring the different practise in the management of acute pain.

AIMS: Administering analgesia is common practise to all anaesthetists. We wanted to identify if there was a difference in the analgesia prescribed and if antiemetics and laxative were routinely used to prevent side effects compared our practise in Glasgow. We hoped to share our knowledge on acute pain.

METHODS: We collected data in Accra from a number of anaesthetists ranging from one to over ten years of experience. Enquiring what analgesia were used and if antiemetics and laxatives were routinely co-prescribed. A presentation was delivered to raise awareness of potential problems co-morbidities, poly pharmacy and new surgical techniques, as well as guidelines on morphine and ketamine in addition to regional techniques for acute pain. We then asked for feedback to assess relevance and development on the education session. We further asked anaesthetists at our own hospital the same questions for comparison.

RESULTS: In Accra, seven anaesthetists and two medical officers completed the questionnaire and ten in Glasgow. All staff worked in theatres on a regular basis and prescribed analgesia daily or weekly. 78% and 100% of Accra and Glasgow doctors respectively, had previously received formal teaching on acute pain management.

In both locations all doctors used paracetamol with non-steroidal anti inflammatories being prescribed by 67% of Accra doctors and 90% of those in Glasgow. The most common strong opioid prescribed in both areas was morphine followed by fentanyl in Accra and oxycodone in Glasgow. Weak opioids such as tramadol and dihydrocodine were prescribed by a third of Ghanaians and all UK doctors. Ketamine was more frequently used in Accra by 89% compared to 30% in Glasgow.

Antiemetics were routinely prescribed by both in 67% and 100% and laxatives 44% and 60% in Accra and Glasgow respectively. In Accra the most common antiemetic used was dexamethasone followed by metoclopramide and in Glasgow all anaesthetists prescribed ondansetron and then cyclizine most often.

When asked Ghanaian staff rated the teaching as very relevant to their practise with 60% felt their knowledge had improved and as such were now more confident in applying it to future practise.

CONCLUSIONS: There are similarities in practise between the two countries in the use of paracetamol and morphine; however it did highlight a number of differences. In Accra, it appears to be uncommon to prescribe weak opioids with more of a tendency to use ketamine. Whilst in Glasgow all anaesthetists prescribe weak opioids and a prevalent use of oxycodone which was not mentioned by any doctor in Accra. A possible explanation to these differences may be a supply or availability of the drugs at each site or a difference in education and training. It should be noted that the majority of the doctors in the study in Accra had 1-3 years experience in anaesthetics compared to Glasgow, were most participants had more than 10 years experience. This potentially could account for difference in practise. The fact that all of the doctors in Accra rated the lectures highly was very rewarding. We would hope to return to Accra to continue to develop our relationship and understanding of each others practise and in doing so, could perhaps explore further why these variations in practise including the routine use of antiemetics and laxatives occur.

Keywords: acute, pain

PP027

Audit and Service Evaluation

The Use of Healthcare Apps in the Modern Pain Clinic

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BACKGROUND: In 2021, 88% of the adult population of the UK owned a smartphone, a significant increase from the 17% of adults who owned one in 2008. The normalisation of the use of this modern technology has changed the way that people record, store and consume information. In line with this, the number of health-related apps available via smart phones has exploded in recent years. Patients seen in the pain clinics in 2023 can utilise apps to track their pain, mood and associated symptoms and apps can provide self-management techniques, physiotherapy programmes and a wellbeing service. With all the potential benefits of utilising apps, we aim to investigate how apps are currently being used and how healthcare providers select the apps they use.

AIMS: Our aim is to assess the current use of apps in the modern chronic pain clinic setting, evaluate how healthcare professionals utilise them and choose the apps which they use.

METHODS: An eight-question snapshot survey was designed and distributed to doctors, physiotherapists, occupational therapists and clinical psychologists working in pain clinics in and around the East of England. Responses were collected over a 5-day period. The following factors were evaluated: use of smartphone apps for personal education, for the patient-healthcare provider interaction, for patients to use at home and how respondents came across and evaluated the apps they used.

RESULTS: A total of 24 participants were surveyed, consisting of 16 doctors and 8 allied professionals. 25% used apps in their practice to help with patient interactions, most of these were to aid with explanation of pathological processes or proposed interventions or to help with communication. 45% of respondents did recommend apps for patients to use at home. 83% of these respondents suggested wellbeing apps and 25% suggested pain diary apps for patients to use. 82% of respondents did not know who produced or who was responsible for the apps that they used or suggested to patients.

CONCLUSIONS: Within the scope of this snapshot survey there is clear variability between healthcare professionals in the use of healthcare apps in the setting of the chronic pain clinic. Though some apps may simply serve to facilitate patients to log and store data pertinent to their ongoing pain management (pain diaries, food trackers etc), others provide guidance about managing various aspects chronic pain. Respondents obtained knowledge of the apps they used mostly from colleagues and patients, with many other sources listed. The large portion of healthcare professionals who didn't know who had designed or production responsibility for the apps that they used or offered to patients to use highlights the difficulty with validating these everchanging resources. At present, the responsibility lies with the individual clinician to assess these apps for their usefulness and appropriateness in a modern pain clinic. Further evaluation of the impact that apps can have from a patient's perspective are needed to understand better if embracing this evolving technology will benefit chronic pain patients and pave the way for standardising their use.

Keywords: Healthcare apps, Chronic pain clinic

PP028

Cancer Pain

Does Intrathecal Drug Delivery for Cancer Pain Reduce Pain Scores and Overall Analgesic Requirements at Three Months

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BACKGROUND: Delivering preservative free morphine (PFM) and local anaesthetic (LA) intrathecally can reduce pain in cancer patients. This can facilitate less requirement for oral analgesia which can reduce drug related side effects, improve patient function and improve quality of life. The Beatson West of Scotland Cancer Centre (BWOSCC) has been providing Intrathecal Drug Delivery Systems (IDDS) since 2008. Patients are referred and assessed by a multiprofessional team and if suitable, undergo a trial period with IDDS. If pain and function improve, patients will progress to have a permanent pump inserted requiring refilled every two weeks until end of life.

AIMS: To establish if delivering PFM and LA intrathecally continues to be beneficial in reducing pain scores and standard analgesia requirements three months after commencing intrathecal drug.

METHODS: The Interventional Cancer Pain Service based at the BWoSCC became a Regional Service in 2015. A retrospective analysis, over a 52 month period (May 2015 – August 2019), of all patients who received intrathecal drug delivery via a permanent pump at the Beatson West of Scotland Cancer Centre.

Data collection is regularly gathered on an electronic database from referral of a patient to the service until point of discharge or death. Data collection is approved by Caldicott guardian within NHS Scotland. This data collection includes patient demographics, pain scores, analgesic use and functional pain scores.

Two data collection points were agreed within the patient journey and used for comparison,

1. Initial assessment

2. Refill date at approximately 3 month period

RESULTS: In the time frame thirty nine patients underwent ITDD trial, twenty seven of these patients proceeded to have a permanent pump inserted.

The results are based on the 19 patients who survived three months after receiving intrathecal drug delivery. 1 patient has yet to reach 3 month stage. The average age of patients in this group was 61.5 years, (range 51-72). This group consisted of 7 males and 12 females.

Pain Scores

Pain interference scores decreased from 7.7, at assessment to 4.0 at 3 month post implantation.

Pain intensity scores decreased from 6.6, at assessment to 4.2 at 3 month post implantation.

Analgesia

Subjects were on an average daily OME of 424 milligrams. Three months post implantation this was 89 milligrams. This equates to a 79 per cent reduction in OME.

17/19 (89.5%) patients were on gabapentanoids at initial assessment. 11/19 were on pregablin and 6/19 on gabapentin.

At 3 months this reduced to 10/19 patients being on gabapentanoids. 9/19 being on pregablin and 1 on gabapentin 15/19 patients were on benzodiazepines (clonazepam) reducing to 7/19 at 3 months

CONCLUSIONS: Our results indicate that delivering preservative free morphine and local anaesthetic intrathecally reduces pain scores and adjuvant analgesia, 3 months after commencing intrathecal drug delivery, in patients with uncontrolled cancer pain.

Of the surviving 19/27 patients who had a permanent pump in place, our results indicate several positive changes.

The reduction in pain scores observed, both pain intensity and interference is shown to be clinically significant. This combined with a reduction in oral morphine equivalent and a decrease in adjuvants is a positive step. By improving pain and decreasing the side effects of any medication, the result should be an improved quality of life.

A larger study over a longer time period would be required to strengthen these findings. Further analysis of the data looking at quality of life and individual functional changes would illustrate if this improves as we hope.

Keywords: IDDS, Cancer, Pain, opioids

PP030

Epidemiology

Multi-site chronic pain and cognitive function: a cross-sectional study of UK Biobank

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BACKGROUND: Cognitive difficulties, such as problems with concentration and memory, are commonly reported by patients with chronic pain. Population-based studies suggest an association between chronic pain and poor cognition.

Previous studies have examined the presence or absence of chronic pain, or specific chronic pain conditions. However, it is not certain if cognition displays a dose-response relationship with the number of chronic pain sites. Multi-site chronic pain may reflect a nociplastic pain phenotype. Furthermore, multi-site pain in UK Biobank shares many genetic risk factors, suggesting a common underlying mechanism.

Furthermore, many factors associated with pain, such as socio-demographics, lifestyle, and health may play a role in confounding this relationship which has not been fully accounted for in previous studies.

AIMS: To investigate whether multi-site chronic pain is associated with poor cognition whilst accounting for a wide range of confounding variables of demographics and lifestyle factors.

METHODS: A population-based cross-sectional study of adults aged 40-69 years participating in UK Biobank. Participants without a neurological condition who attended the baseline visit between 2006 and 2010 and completed a self-report questionnaire and the cognitive assessment were included.

Participants were asked about self-reported chronic (>3 months) pain at seven body sites, with an additional question about pain all over the body. This was analysed as a continuous exposure ranging from 0 (no pain) to 8 (pain all over the body).

The outcome was a single latent factor for general cognitive ability with higher scores indicating poorer cognition. This was constructed using confirmatory factor analysis of four cognitive tasks comprising processing speed, verbal and numeric reasoning, visual declarative memory, and working memory. It was centred on a mean of 0 and standard devation of one. This has previously been shown to correlate with a similar measure estimated from gold-standard neuropsychological assessments.

Four linear regression models examined the association between multi-site chronic pain and cognition whilst cumulatively adjusting for sets of confounding variables: unadjusted (model 1); age and sex (model 2); socio-demographics (ethnicity, marital status, education, geographical deprivation (model 3); lifestyle factors (body mass index, alcohol use, tobacco use (model 4).

RESULTS: There were 474,438 (94%) eligible patients included in the analysis. The mean age was 57 (SD 8.1) years, and 55% were female. At baseline, the mean number of pain sites was 0.86 (SD 1.38), and 207,491 (43.7%) reported chronic pain in at least one site. Increasing number of pain sites was associated with a higher prevalence of females, deprivation, tobacco consumption and BMI.

Unadjusted linear regression showed a relationship between higher number of chronic pain sites and poorer cognition (average change in cognition per pain site: 0.049; 95%CI 0.047, 0.051). Adjusting for age and sex did not affect this association. However additional adjustment for socio-demographic confounders (model 3) did attenuate the association but it remained statistically significant (average change in cognition per pain site: 0.020; 95%CI 0.018, 0.023). Further adjustment for lifestyle confounders did not provide additional attenuation.

CONCLUSIONS: This large population-based study of UK middle-aged adults demonstrates a dose-response relationship between the number of body sites affected by chronic pain and poor cognition. This association persisted when accounting for a wide range of confounding variables. This adds to existing literature by demonstrating that the number of pain sites is inversely associated with cognitive performance.

Chronic pain is a common cause of morbidity, and the associated cognitive disturbance may be an important consequence, particularly for those with more widespread pain.

Further research is needed to replicate these findings within a longitudinal cohort and to explore the role of other potential mediators such as psychological symptoms and medication use. This may identify potential treatment targets for this aspect of pain.

Keywords: chronic pain, cognition, epidemiology, nociplastic pain, multisite pain

PP031

Epidemiology

Adverse childhood experiences and adult pain: opportunities and limitations of existing cohort data

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BACKGROUND: Adverse childhood experiences (ACEs), such as abuse, neglect or deprivation, are associated with poor health outcomes. Evidence from predominantly cross-sectional and retrospective studies suggest adults with pain report more ACEs than controls. Meanwhile, prospective cohorts which have collected data on ACEs offer opportunities for analyses where data on exposure is collected before outcome data.

AIMS: CAPE (the Consortium Against Pain InEquality) will research if ACEs increase the risk of chronic pain in adulthood or affect analgesic response, investigating potential contextual, moderating and mediating factors. Therefore, we identified the availability of population-based prospective cohort studies which had collected (exposure) data on ACEs prior to (outcome) data on chronic pain in adulthood. Here we consider the challenges presented by these data.

METHODS: We searched cohort registries (such as the UK Research and Innovation Cohort directory), cohort profiles in journals, Ovid MEDLINE (1996-2022) and review citations for prospective cohorts that were population-based, had >2000 participants at recruitment, sharable data in English, and included measures of traumatic experiences during childhood. We distinguished those cohorts that collected data on chronic pain and prescribing in adulthood. Inclusion criteria, including which experiences represent ACEs, were developed in collaboration with our Chronic Pain Advisory Group with lived experiences of ACEs.

RESULTS: We identified 49 cohorts with ACE data and describe here 30 which also had data on chronic pain in adulthood. The cohorts were conducted in 10 countries across 4 continents, recruiting between 2,000 and 500,000 participants. Years of recruitment ranged from 1946 to 2009.

ACE data varied substantially; the number and type of ACEs included were inconsistent across cohorts. Eleven employed existing tools for ACE data collection (such as the WHO ACE-IQ). 14 studies recruited adult participants, with only retrospective measurement of ACEs; 16 recruited in childhood (10 from birth), with contemporaneous records of ACEs, of which 6 had also administered retrospective tools in adulthood. While most cohorts had collected data on physical, sexual and/or psychological/emotional abuse, some ACEs were seldom captured: caring responsibilities, discrimination, community violence or violence by authorities, seeking asylum or being evacuated, and child labour. A small number of cohorts captured further details about ACEs such as age at which the event occurred (5), duration (3) and self-rated severity (5). Eight cohorts included questions or linked data on pain medication/prescription use. We identified two key challenges: inconsistency in exposure definition and the timing of data collection. Consensus about how to measure ACE exposure is lacking. Similar experiences are reported as traumatic by some but not others. A dichotomous measurement of ACEs (or a 'score' of these) ignores potentially important dimensions (such as timing) or contextual factors (such as social support) which may be important to the concept of adversity. Ignoring these could result in poor reproducibility and/or misclassification.

ACEs pose a particular challenge in timing of data capture: interpretation of past events may be affected by health outcomes (recall bias), and there may be reluctance to disclose contemporaneous experiences due to feared consequences. At best, researchers must employ an ambispective design, where some data on ACEs are collected retrospectively (in adulthood) in an otherwise prospective design. This is conceptually challenging where the outcome of interest – chronic pain – could present before ACE data measurement.

CONCLUSIONS: Longitudinal cohort data are available to pain researchers interested in early life events. Pain researchers will be familiar with issues of bias and confounding, but should be cognisant of the particular challenges posed by existing ACEs data. CAPE will consider these by analysing several data sets, capitalising on each cohort's unique data features. CAPE will also develop tools for the consistent, safe and meaningful collection of ACE data.

Keywords: Adverse childhood experiences, cohort studies, chronic pain, review

PP032

Epidemiology

Epidemiology of chronic shoulder pain in people aged 40 or older – a systematic review and meta-analysis of observational studies

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BACKGROUND: Chronic shoulder pain (CSP) is a common musculoskeletal complaint. However, variations exist in reported prevalence and populations and reported risk factors. It affects between 5% and 47% of the adult population annually worldwide. In the United Kingdom (UK), it is estimated that 2.4% of people aged between 18 and 60 years old consulted their general practitioners (GPs) for shoulder pain in 2005. In Finland, the prevalence of shoulder pain was approximately 17% among adults aged between 40-64 years.

AIMS: (1) Determine the pooled prevalence and incidence of CSP in people aged > 40 years; (2) explore the risk factors and comorbidities associated with CSP; and (3) examine the prevalence of CSP according to specific populations and specific diagnoses of shoulder pain.

METHODS: Medline (OVID), Scopus and CINAHL (EBSCO) and Google Scholar were searched from their inception to Sep 2021 for observational studies of adults aged 40 or more with chronic shoulder pain. Quality was assessed using the Newcastle Ottawa Scale (NOS). Data were extracted on prevalence and incidence. The secondary outcome included potential risk factors and associated comorbidities. Meta-analysis was conducted using random-effects model where sufficient data was available, and effect sizes and

variances were calculated accordingly. Heterogeneity was examined using I2 test and potential reasons explored.

RESULTS: Of 5203 studies retrieved, 27 met the inclusion criteria. Studies consisted of 19 cross-sectional, 4 case-control, and 4 cohort studies (2 retrospective and 2 prospective cohort studies). The quality analysis was conducted by a single reviewer and validated by a second reviewer. Of the 27 studies, 24 had a high quality, and 3 had moderate quality.

Overall the pooled prevalence of CSP was 27% (95% Confidence interval (CI) 19, 34). The prevalence in the general population was (19%, 95%CI 13, 25). and was higher in people with diabetes (35%, 95%CI 0, 85), and those with physically demanding jobs (34%, 95% CI 22, 46). Common risk factors identified were age (odds ratio (OR) 2.34, 95%CI 1.27, 4.30), female sex (OR 2.10, 95%CI 1.16, 3.80), lower educational level (OR 1.80, 95%CI 1.35, 2.38), and manual work (OR 3.55, 95%CI 1.68, 7.49), and pain in other joints was also significantly associated (OR 2.73, 95%CI 1.73, 4.30).

CONCLUSIONS: Over a quarter of people aged 40 years old or more have chronic shoulder pain worldwide. The major risk factors include age, female sex, lower education, manual worker and pain elsewhere. The results are main derived from cross-sectional/case control studies. There are limited prospective studies and they are quite small. Therefore larger prospective cohort studies are needed in the future to examine risk factors and comorbidities associated with shoulder pain.

This systematic review will help us understand the burden of chronic shoulder pain, and the population at risk, in order to inform the planning of effective management of shoulder pain in primary care

Keywords: shoulder pain, prevalence, incidence, risk factors, associations

PP034

Experimental (Basic) Science

A Racially Diverse Set of Facial Expressions of Pain Demonstrated by Youth

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BACKGROUND: Evidence indicates that racial disparities exist in pediatric pain care, such that the pain of youth belonging to racial minorities, compared to the majority, tends to be underestimated and undertreated. In recent years, researchers have begun to investigate the mechanisms underlying these disparities. Until present, however, these endeavors have only produced a paucity of research, and no study has examined the potentially contributing role of racial differences in how facial expressions of pain are assessed by others. Facial expressions of pain are particularly relevant in this regard as they are viewed as reliable and salient nonverbal indicators of pain experiences which are often drawn upon to assess and treat the pain of others.

AIMS: To facilitate research on the extent to which potential racial differences in observers' perceptions of facial expressions of pain may account for racial disparities in pediatric pain care, this study aims to develop and validate the Racially Diverse Youth Pain Database (RD-YPD). The RD-YPD will consist of static (i.e., photographs) and dynamic (i.e., videos) images of facial expressions of various levels of pain demonstrated by Black/Brown and White youth. We selected these racial groups based on emerging evidence that Black/Brown children tend to receive suboptimal pain care compared to their White counterparts, in countries where the racial majority is White.

METHODS: Photographs and videos (i.e., 1 second clips) were created of 76 children and adolescents (age range = 8 and 17 years) who self-identified as White (N = 68.42%) or Black/Brown (N = 31.56%). These photographs and videos reflected posed and genuine facial expressions of various levels of pain. To capture various levels of posed facial expressions of pain, participants were first asked to demonstrate a neutral facial expression and then facial expressions of low and high pain in response to imagined pain. Various levels of genuine facial expressions of pain were recorded while participants completed the Cold Pressure Task. All photographs and videos of facial expressions were coded via FaceReader, a scientifically validated facial expression analysis software, to determine the intensity of expressed pain.

In the next phase of this study (i.e., the validation phase), independent observers (N = approximately 300) will rate the level of pain intensity and emotions that they perceive in the photographs and videos. Additionally, observers will rate each child and adolescent in terms of social dimensions (e.g., attractiveness, dominance) and socio-demographics features (e.g., age, gender, race).

RESULTS: The RD-YPD will provide a collection of validated images depicting various levels of facial expressions of pain as well as ratings of perceived emotions, social dimensions, and socio-demographic characteristics.

CONCLUSIONS: The RD-YPD is the first database comprising various levels of facial expressions of pain demonstrated by Black/Brown and White youth. This database will not only facilitate empirical inquiries into the role of potential racial differences in observers' perceptions of facial expressions of pain in accounting for racial disparities in pediatric pain care, but also promote racial diversity in pain research.

Keywords: Facial expressions, pain, racial disparities, pain care

PP035

Experimental (Basic) Science

Do individuals with chronic pain display interpretation and memory (recall and recognition) biases for pain-related information?

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BACKGROUND: Cognitive-affective models posit that cognitive biases contribute to the development and maintenance of chronic pain (Eccleston & Crombez, 1999; Van Ryckeghem et al., 2016). These biases encapsulate interpretation bias (IB) and memory bias (MB). That is, evidence suggests that individuals with chronic pain exhibit a tendency to interpret ambiguous information as pain and/or illness-related (Heathcote et al., 2015, 2016; Khatibi et al., 2015) and selectively retrieve pain and/or illness-related information from memory (Pincus et al., 1993). Given research exploring multiple

cognitive biases within the context of a single study is scarce, the role, nature and interaction of these biases remains poorly understood.

AIMS: The aim of this study was to investigate interpretation and memory biases in a sample of chronic pain (CP) participants as compared to non-pain controls (NPC).

METHODS: 153 adult comprising 77 CP and 76 NPC were invited to take part in the online research. The study involved participants completing three tasks to measure IB and MB. These were an ambiguous scenarios task (IB), free recall task (MB) and recognition (MB) task respectively. The 'free-response' ambiguous scenarios task was used to investigate IB. Here, 18 scenarios that could be interpreted in a pain/pain-illness or non-pain/non-pain illness related fashion were presented. To control for demand characteristics 18 filler scenarios were also included. To measure short-term MB a surprise free recall task was used immediately post the IB task. Here, participants were given three minutes to recall solutions they generated for the 36 ambiguous scenarios. To measure longer-term MB, one-month later, participants took part in an online recognition task. This involved the presentation of participant's original (i.e., old) IB ambiguous scenario solutions and 36 researcher-generated solutions (i.e., new). Participants were asked to indicate whether they recognised each solution using the 'yes-no' recognition paradigm.

RESULTS: Results revealed no between-group differences in the number of ambiguous scenarios interpreted in a pain/pain-illness or non-pain/non-pain illness manner. Similarly, no between-groups differences were observed with respect to the number of pain/pain-illness solutions or non-pain/non-pain illness solutions correctly recalled in the surprise free recall task. However, analyses pertaining to the recognition data, revealed that the NPC group obtained a higher percentage of pain correct and lower percentage of pain incorrect responses compared to their CP counterparts. Moreover, d-prime for the pain recognition data was significantly higher for the NPC than the CP group. Lastly, cross-bias correlations revealed that for both the CP and NPC groups as the number of pain/pain-illness solutions increased in the IB task, the number of pain/pain-illness solutions correctly recalled increased. Exclusive to the NPC group was the finding that as the number of non-pain/non-pain illness solutions generated in the IB task increased, so too did the number of non-pain/non-pain solutions correctly recalled.

CONCLUSIONS: The findings of the present study provide no evidence to suggest that adults with CP display a tendency to interpret ambiguous information as pain/pain-illness related or subsequently recall their pain/pain-illness solutions from memory. Thus, there was no evidence of an interpretation or recall bias for pain/pain-illness information in individuals with CP. However, the recognition analyses indicated that NPCs compared to their CP counterparts, possessed better discrimination ability and superior overall recognition performance. Hence, being in chronic pain impaired memory, perhaps because on-going personal pain experienced by the CP group captures attentional and memory resources impairing long-term memory retrieval via recognition. However, cross-bias correlations also indicated that the CP group process scenarios interpreted in a pain/pain-illness manner differently than those interpreted in a non-pain/non-pain illness manner, perhaps because the pain scenarios and solutions were more relevant to the CP group than the non-pain scenarios and solutions, which then affected subsequent processing (i.e., recall memory).

Keywords: Cognitive Biases, Interpretation, Recall, Recognition, Chronic Pain.

PP036

Experimental (Basic) Science

Expression of the humanised chemogenetic tool PSAM4-GlyR regulates sensory neuron excitability and neuropathic pain

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BACKGROUND: Hyperexcitability in sensory neurons is known to underlie many of the maladaptive changes associated with neuropathic pain. Chemogenetic tools have proved effective to supress ectopic activity in sensory neurons, yet chemogenetic approaches suitable for human applications are needed. PSAM4-GlyR is a chloride-permeable channel, based on the combination of human α7 nicotinic acetylcholine and glycine receptors, which responds to inert chemical ligands and the clinically-approved drug, varenicline.

AIMS: We investigated whether suppression of sensory neuron excitability by activation of PSAM4-GlyR regulates pain in mice. We also explored the translational potential of this channel to modulate activity of human induced pluripotent stem cell-derived sensory neurons.

METHODS: We obtained whole-cell patch-clamp recordings from dissociated mouse sensory neurons to measure the impact of PSAM4-GlyR activation on neuronal excitability. We also virally-delivered PSAM4-GlyR to test the effect of channel activation on thermal and mechanical sensitivity in awake behaving animals. In vivo activation of the channel also enabled the assessment of mechanical sensitivity in a spared nerve injury model of neuropathic pain. Finally, we investigated the result of PSAM4-GlyR activation on evoked and spontaneous activity recorded from human-derived sensory neurons.

RESULTS: We found that activation of PSAM4-GlyR produced large shunting conductances upon agonist administration in both mouse and human-sensory neurons, which decrease neuronal excitability. In awake behaving animals, PSAM4-GlyR activation led to reduced sensitivity to noxious thermal and mechanical stimuli, which was reversible upon agonist washout. Activation of the channel also reduced mechanical pain related hypersensitivity generated by nerve injury. These findings in rodent were paralleled in a cellular model of clinical pain, as PSAM4-GlyR decreased spontaneous activity in human-derived sensory neurons from inherited erythromelalgia.

CONCLUSIONS: Our results demonstrate the efficacy of this channel in silencing sensory neurons and the potential application of chemogenetics to the treatment of neuropathic pain.

Keywords: chemogenetics, sensory neurons, hyperexcitability, neuropathic pain, chloride channel

PP037

Experimental (Basic) Science

Relieving chronic pain through inhibition of PICK1

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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. It is of great importance to explore new potent targets for effective pain treatment with fewer side effects and without addiction liability. An emerging strategy is modulation of receptor trafficking by targeting specific scaffold proteins1-3. The scaffold protein, PICK1, has emerged as a promising target in pain treatment due to its role in central synaptic plasticity4-5 through regulation of the subcellular localization of its interaction partners, including the GluA2 subunit of AMPA receptors4.

AIMS: In this project, we aimed to test if mPD5 (a novel PICK1 inhibitor) can alleviate evoked and spontaneous hypersensitivity of rodents with neuropathic or inflammatory pain without noteworthy side effects.

METHODS: Rodent models of neuropathic (SNI, STZ) and inflammatory (CFA) pain was used to assess the efficacy of mPD5 on mechanical (von Frey) and thermal (Hargraves) hypersensitivity. Anxio-depressive behaviour (MBT, EPM) following pain relief with mPD5, and the initial perception of mPD5 was assessed in naïve as well as CFA mice in a single exposure place preference setup.

RESULTS: In mice, mPD5 relieved mechanical, ongoing, and thermal hypersensitivity as well as anxio-depressive symptoms following subcutaneous administration in the inflammatory pain model. In the same model, mPD5 induced place preference for the treatment-paired compartment of animals in pain, whereas naïve animals showed no treatment-induced preference change. Further, mPD5 dose-dependently relieved pain in two neuropathic pain models without affecting motor behaviour. Neuropathic pain was relieved far into the chronic phase (18 weeks post model induction), and whereas a single administration of mPD5 relieved neuropathic pain for only a few hours, repeated administration prolonged the effects up to 20 hours post last injection.

CONCLUSIONS: In conclusion, we developed and tested a high-affinity inhibitor (mPD5) for treatment of chronic pain. mPD5 alleviates evoked pain (thermal and mechanic) by different routes of administration (i.t. and s.c.), in inflammatory and neuropathic pain models (CFA, SNI, STZ) of transient and chronic pain, while also reducing anxio-depressive behaviour (MBT, EPM) and inducing place preference for the treatment-paired compartment of animals in pain making it an interesting peptide to potently alleviate neuropathic pain. These features suggest mPD5 as a strong candidate for future clinical trials, and hopefully treatment of chronic pain.

Abbreviations: AMPA (α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid), ASICs (acid-sensing ion channels), CFA (complete Freund's adjuvant), EPM (elevated plus maze), i.t. (intrathecal), MBT (marble burying test), PICK1 (Protein Interacting with C Kinase-1), s.c. (subcutaneous), sePP (single exposure place preference), SNI (spared nerve injury, STZ (streptozotocin).

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Keywords: PICK1 peptide inhibitor, diabetic neuropathy treatment, spontaneous pain treatment, neuropathic pain treatment, pain treatment.

PP039

Experimental (Basic) Science

Mechanisms contributing to the impact of early life adversity on morphine tolerance and mechanical hypersensitivity in mice

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BACKGROUND: Exposure to multiple adversities during childhood is associated with poor health outcomes in later life including persistent pain and problematic drug use. However, the mechanisms governing these health inequalities are unclear.

AIMS: We aimed to establish the impact of limited bedding, a well characterised model of early life stress in rodents, on mechanical and thermal nociception, inflammatory hypersensitivity and responses to morphine.

METHODS: We used the limited bedding paradigm between postnatal day (PD) 2 and 9 in male and female wild type (WT) and transgenic (δ-/- or β-arrestin2-/-) C57BL/6J mice to examine the impact of fragmented maternal care (FC) on mechanical and thermal nociception, inflammatory hypersensitivity and responses to morphine. We explored the expression of opioid receptor and opioid peptide genes in key regions of the brain and spinal cord of WT mice exposed to FC using quantitative PCR.

RESULTS: FC reduced thermal and mechanical nociception in WT mice of both sexes. Additionally, morphine had reduced potency following exposure to FC and these mice also developed tolerance to morphine at an accelerated rate. Although initial inflammatory hypersensitivity caused by administration of complete Freund's adjuvant (CFA) into one hind paw of WT mice was not affected by FC, mechanical hypersensitivity recurred from day 11 in FC mice whereas recovery was sustained for the entire 30-day testing period in control mice. Our qPCR revealed that FC caused age and tissue-dependent changes in the expression of genes encoding opioid peptide precursors and their receptors. The expression of δ-receptor mRNAs consistently increased in the spinal cord of juvenile (PD 13-21) and adult (PD 60) mice following FC. Interestingly, exposure to FC did not alter nociception or CFA-evoked mechanical hypersensitivity nor did FC lead

to reinstatement of morphine tolerance in either δ-/- or β-arrestin2-/- mice.

CONCLUSIONS: These findings suggest that FC enhances morphine tolerance and hypersensitivity by upregulating endogenous opioid tone mediated by δ receptors and β-arrestin2.

Keywords: Pain, analgesia, Opioid, Adversity, Stress

PP040

Experimental (Basic) Science

The effects of healthy ageing upon spinal somatosensory networks in rats

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BACKGROUND: Pain perception changes across the life-course in humans, with reduced mechanical sensitivity in old age, but increased incidence and severity of pain. However, the vast majority of preclinical pain research utilises only young adult animals, meaning the effects of healthy ageing on somatosensory signalling remain largely unknown. Given the massive clinical burden of pain and the growing size of the ageing population, this represents a significant knowledge gap.

The spinal cord dorsal horn (DH) is a key pain processing hub, integrating peripheral input and descending modulation to set the intensity of nociceptive signalling. The DH somatosensory network is delineated into anatomically and functionally distinct laminae, but this complexity is missed by traditional electrophysiology approaches which extrapolate whole network activity from single cell recordings. We have recently developed in vivo multi-electrode array (MEA) recordings in rats, enabling simultaneous detection of neuronal activity across the whole DH.

AIMS: To determine the effects of healthy ageing on spinal somatosensory signalling, we assessed basal pain thresholds in aged and young adult rats, then utilised in vivo MEA recordings to compare DH sensory network activity in response to mechanical and electrical stimulation of the hindpaw.

METHODS: 50% paw withdrawal thresholds (PWT) were determined via application of von Frey filaments (vFH; 2-26g) in aged adult (AA; 18-20 months) and young adult (YA; 2 months) male Sprague Dawley rats. In vivo spinal recordings of neuronal activity across the whole DH were obtained via 16-electrode MEAs (NeuroNexus) under anaesthesia. The L4/5 lumbar spinal cord was exposed via laminectomy, and whole DH responses to a range of mechanical (2-26g) and electrical (0.01-5mA) stimulations of the hindpaw were recorded. Threshold crossings (spiking events) at each electrode were sorted by response latency (Aβ = 3-11ms, Aδ = 11-90ms, C = 90-300ms), and region (superficial, intermediate, & deep DH), then compared between age groups.

RESULTS: Aged rats had significantly lower average behavioural pain thresholds than young adult animals (Median 50% PWT; AA = 7.3g; YA = 14.5g, $p < 0.0001$). Whole DH neuronal activity in response to peripheral noxious mechanical stimuli was significantly lower in aged rats (whole array threshold crossings; 15g: -71%, 26g: -63%, % change AA vs YA, $p < 0.01$), with firing notably less sustained during stimulation. In young adult rats, DH responses to a range of vFH were graded, with greater activity detected in response to higher forces, whereas responses in aged adult rats were more homogenous. Responses to innocuous electrical stimuli (0.5mA) in the Aβ latency band (3-11ms) were significantly smaller across the whole DH in aged rats (-41%, $p < 0.05$), most prominently in the intermediate region where Aβ fibres terminate (-51%, $p < 0.001$). Noxious electrical stimuli (5mA) evoked significantly less whole DH activity in the C fibre latency band (-52%, $p = 0.05$) in aged rats, most markedly in the intermediate (-70%, $p < 0.01$) and deep (-61%, $p < 0.01$) regions.

CONCLUSIONS: We observed smaller A & C-fibre latency responses in aged rat DH, in line with previous reports of reduced A-fibre myelination and conduction velocity in aged rodents, & reduced C-fibre responses in aged rodents & humans. Reduced spinal network activity likely contributes to altered somatosensation with healthy ageing. Smaller DH network responses could potentially reflect reduced intrinsic inhibition, leading to greater behavioural pain sensitivity. Ongoing studies investigating the underlying anatomical correlates will shed further light on how healthy ageing alters sensory processing in the spinal cord dorsal horn.

Acknowledgements: The authors thank Eli Lilly for supplying aged rats. This work was supported by Versus Arthritis (grants 18769, 20777).

Keywords: Ageing, spinal cord, electrophysiology

PP041

Experimental (Basic) Science

Intravenous lidocaine infusion reduces central sensitisation in patients with Fibromyalgia

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BACKGROUND: Fibromyalgia (FM) 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 sensitization (CS).

Standard treatments for FM include physical exercise, psychology and medications. Anti-depressants remain the treatment of choice, however high incidence of side effects and lack of efficacy have led the search for novel treatment modalities. Lidocaine is an alternative drug which can achieve both central and peripheral analgesic effects with relatively few side-effects.

AIMS: We investigated the effect of a single intervention, intravenous infusions of lidocaine 2-4mg/kg body weight, using QST measurements in patients with fibromyalgia.

METHODS: Nine 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: CS, as defined by the presence of both enhanced temporal summation (TS) and inefficient/reduced conditioned pain modulation (CPM) was present in all patients before the lidocaine infusion. Patients reverted to an efficient CPM response (107 kPa vs 152.0 kPa cuff inflated) and a 29% reduction in TS within 21-42 days following intravenous lidocaine.

CONCLUSIONS: This is the first reported observation highlighting the effects on central sensitisation following lidocaine infusion as measured by QST.

A consistent and sustained improvement in CPM and reduced TS was observed. Normalisation of the CPM and reduced TS response following lidocaine infusion indicates that the treatment may reduce central sensitization in the treatment of fibromyalgia.

Keywords: Fibromyalgia, quantitative sensory testing, central sensitisation, conditioned pain modulation, temporal summation

PP042

Education

Promoting Chronic Pain Management Education to patient while waiting for an intervention procedure or to be seen in an outpatient pain clinic

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BACKGROUND: To deliver patient-centred care, patients' education on their pain condition and its management is vital. It is known that education increases knowledge, provides accountability and helps them self-manage (1). The effectiveness of education is seen in the population with cancer and CRPS. (2,3)

AIMS: 1) To identify if patients attending the pain clinic are interested in learning more about the service and their pain condition

2) To determine the preferred method of communication and type of content the patients would like to know.

METHODS: We devised a questionnaire and got the patients who attended the outpatient and intervention pain service to fill in while they were waiting. Patients were allowed to indicate one or more choices.

RESULTS: A total of 54 patients completed the survey. 65% of the patients think it will be helpful to provide information on pain management while waiting to be seen.

Of those who wanted more information on pain management, 74% would like a short video clip about pain management; 63% would like a short video clip regarding how we assess pain before and after the procedure; 49% would like a short video clip on medicines used in pain management; 57% would like a short video clip on what happens when they have an injection in theatre; 37% would like pop up screen shots on pain management topics on TV screen; 49% would like to be provided leaflet available on the desk; 49% would like a video clip on information to be given on discharge following the injection.

Of the 54 patients who completed the survey. 28% would rather watch a TV programme instead of information about pain management and 17% would rather watch / listen to a radio programme instead of information about pain management.

CONCLUSIONS: The results showed that majority of patients who attended the outpatient and intervention procedure would like more information on pain management which is encouraging. Presenting the information in an audio-visual format was preferred by most patients. A short video clip about pain management and how we assess pain before and after the procedure were most popular.

Patient education is a vital tool to improve pain management outcomes. The educational material produce has to be relevant to all types of pain conditions and appropriate to all social background, culture and literacy levels. Patients' involvement in the process of preparing such information is important. We suggest that when pain management departments are considering preparing patient education information they should involve patients locally to make the information provided relevant to local needs.

Keywords: Patient education, pain management

PP043

Education

Developing the Postgraduate Certificate Course in Neuromodulation and Pain Management (PGCert) – the University Accreditation in Neuromodulation

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BACKGROUND: Since its inception in 1967, spinal cord stimulation (SCS) has become a widely recognized intervention for not just chronic neuropathic pain but a host of other neurological, cardiac, and gastrointestinal disorders. In 2019, it was estimated that 50,000 SCS devices are being implanted annually, with an approximate market size of USD 2.8 billion. Despite the exponential increase in demand and advances in technology, the provision for structured education in this field has lagged. We propose a portfolio of neuromodulation education that has university accreditation and that is also free of industry bias.

AIMS: Establishing a standard of education in neuromodulation and pain management by offering university-accredited courses to doctors, nurses, allied healthcare professionals, and field clinical engineers who would like a career in this field. This follows the development of a portfolio of high quality programs which are both clinically and financially sustainable, allowing us to deliver an excellent education and exceptional experience for candidates.

METHODS: Through Key Opinion Leader (KOL) engagement (Australia, India, Europe, UK and US) across the globe during the pandemic, the following fully online, University based neuromodulation education portfolio has been proposed.

RESULTS: *Executive Education Program in Neuromodulation (EEPIN)*; through Queen Mary University London (2 programs in 2021) has generated 87 students (UK – 62, India – 12, Ireland – 5, Australia – 2, Poland – 2, Czech Republic – 1, Netherlands – 1, Norway – 1, Singapore – 1). The anonymous feedback suggested that 75% of candidates would recommend (5/5 on a Likert scale) and 24% would recommend (4/5 on a Likert scale) the EEPIN to other colleagues. 80% (5/5 on a Likert scale) and 20% of students (4/5 on a Likert scale) also displayed interested in having a hands on course.

The first postgraduate certification in neuromodulation (PG Cert); the program's first session (2022-23) consists of 4 modules worth 60 credits in total, delivered over the course of 2 semesters. The PG Cert is currently the only accreditation in the area and will be the benchmark for any credential in the field of neuromodulation across the globe; generating studentship, nurturing collaborations and

creating standards in neuromodulation education. Each of the 4 modules is assessed via a 2500-word assignment; after which candidates are provided with feedback to ensure successful student engagement on the program.

The first intake of the PGCert consisted of 34 applicants, 21 of which were successful in being offered a place – resulting in 17 candidates undertaking the qualification (UK 11, India 3, Belgium 2, Ireland 1). The modules are on 'Anatomy and Neurophysiology', 'Patient care and Procedurals skills', 'Devices and available technology', and 'Intrathecal drug delivery for cancer and non-cancer pain'; with each module including a graded assessment. The modular nature of the program is designed to fit around the needs of students in full-time employment. Modules will be taught online in three-day blocks approximately every four to six weeks to allow achievement of a qualification in one academic year through part-time study.

CONCLUSIONS: We aim to provide structured education in the field of neuromodulation so that it sets and reviews standards and competencies for best practice, based on educational content. The executive KOL board aims to provide leadership and direction to education program to ensure an effective and integrated educational portfolio in neuromodulation education.

Keywords: Education, neuromodulation, postgraduate

PP044

Interventional Pain Management

Four-Year Effectiveness of Restorative Neurostimulation in Patients with Non-Surgical Chronic Mechanical Low Back Pain

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BACKGROUND: Mechanical chronic low back pain (mCLBP) is often associated with impaired neuromuscular control of the lumbar multifidus muscles, the most important stabilizers of the lumbar spine. If physical therapy fails to (re)activate the multifidus, a dedicated implantable restorative neurostimulation system can override underlying inhibition and facilitate restoration of neuromuscular control by bilateral stimulation of the L2 medial branches. The randomized sham-controlled ReActiv8-B pivotal trial provided evidence of safety, effectiveness and durability of this therapy (clinicaltrials.gov/show/NCT02577354).1–3

AIMS: Although all implantable neurostimulation systems aim to provide long-term therapy, few prospective studies have reported outcomes beyond 2 years. Here we report 4-year effectiveness and safety data in patients with mCLBP associated with multifidus muscle dysfunction and no indications for spine surgery.

METHODS: Data were obtained from 204 patients enrolled at 26 multidisciplinary centers in the pivotal trial. Eligible patients had activity limiting mCLBP (VAS ≥6cm; Oswestry Disability Index (ODI) ≥21 points) on at least half the days in the year prior to enrolment. They were refractory to medical management, which included at least pain medications and physical therapy, had no indications for spine surgery and a positive prone instability test consistent with impaired neuromuscular control of the multifidus muscle.

All participants were implanted with a restorative neurostimulation system (ReActiv8® by Mainstay Medical) and during the open-label phase of the trial self-administered up to two 30-minute therapeutic stimulation sessions per day.

Outcome measures were assessed and compared to baseline at six months and annually thereafter. Ongoing safety reporting included serious device- or procedure-related adverse events, which were actively solicited and documented at each visit.

RESULTS: At baseline (N = 204), participants were 47 ± 9 years of age, had history of backpain for 14 ± 11 years, had an average low back pain VAS of 7.3 ± 0.7 cm, ODI of 39 ± 10, EQ-5D of 0.585 ± 0.174 points and had pain on 97 ± 8% of days in the year prior to enrollment.

At 4 years (N = 115), average VAS improved by 5.0 ± 2.4 cm, ODI by 23.6 ± 13.3 points and EQ-5D by 0.236 ± 0.211 ($P < 0.0001$ for all outcome measures); 73% of participants had a ≥50% VAS improvement; 64% reported LBP-Resolution (VAS≤2.5 cm); 63% had a ≥20-point ODI improvement and 91% of participants were "definitely satisfied" with the treatment. Pain intensity and disability are interdependent symptoms and treatment success is determined by composite improvements in ODI and VAS: 79% had a substantial improvement of ≥50% in VAS and/or ≥20 points in ODI. Of participants using opioids at baseline, 70% had voluntarily discontinued or decreased consumption. Attenuation of effectiveness between the completed-case and imputed (N = 204) analyses was small and maintained statistical significance and clinical relevance.

The overall safety profile is favorable compared to other neurostimulation systems and no lead migrations were observed.

CONCLUSIONS: Over a follow-up duration of 4 years, restorative neurostimulation has proved effective, durable, and safe. It provides specialists with a reversible treatment option targeting impaired neuromuscular control of lumbar spine stability in patients with refractory mCLBP and no indications for surgery.

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Keywords: Non-surgical Chronic Low Back Pain, Multifidus dysfunction, Restorative Neurostimulation, Functional Instability

PP045

Interventional Pain Management

Restorative Neurostimulation for Chronic Mechanical Low Back Pain – What is the Ideal Patient Profile?

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BACKGROUND: The effectiveness and durability of restorative neurostimulation for mechanical Chronic Low Back Pain (mCLBP) associated with impaired neuromuscular control of the lumbar multifidus muscles has been demonstrated in several published clinical trials1–5 and results have shown to be reproducible in routine clinical practice in the UK and elsewhere.6,7 Based on the available evidence, National Institute for Health and Care Excellence (NICE) has issued a recommendation that Restorative Neurostimulation can be used in the National Health Service in the U.K., with special arrangements for clinical governance, consent, and audit or research.

The deep multifidus muscles are the most important stabilizers of the lumbar spine. If physical therapy for Chronic Low Back Pain associated with multifidus dysfunction fails to (re)activate the multifidus, a dedicated implantable restorative neurostimulation system can override underlying inhibition to cause strong, repetitive contractions that activate the proprioceptors and facilitate restoration of neuromuscular control by bilateral stimulation of the multifidus motor nerves in the L2 medial branches.

Restorative neurostimulation is indicated for patients with refractory mechanical CLBP secondary to multifidus muscle dysfunction, and no indications for spine surgery. Patients must have failed conventional medical management, which includes at least physical therapy and medication for LBP. Many patients may have undergone one or more interventional procedures, or are chronic opioid users. Published studies on this condition consistently report that these patients very rarely experience spontaneous, substantial improvements in their pain and disability.8–14

AIMS: This therapy is now available to patients in the NHS, we provide detailed patient selection guidance with the objective to replicate the published success rates in clinical practice.

METHODS: Review evidence based selection criteria, MRI observations, physical tests to identify multifidus dysfunction and degeneration, red flags, patient expectation management, and compliance commitment.

RESULTS: Middle age patients with nociceptive mechanical chronic low back pain of more than 1 year duration with Oswestry Disability Index of >21 and less than 60, refractory to physiotherapy and other conservative measures with evidence of multifidus muscle dysfunction on clinical examination are ideal patients for ReActiv8 therapy. Multifidus Lift Test demonstrates multifidus muscle dysfunction whilst Prone Instability Test (PIT) demonstrates lumbo-pelvic instability. Multifidus muscle dysfunction is associated varying degree of atrophy and fatty infiltration of the multifidus muscle on axial views of the MRI. One needs to wait for one year before ReActiv8 implant in patients with prior radiofrequency procedure at lumbar medial branches. Patients who have had previous lumbar spine fusion surgery or patients with neuropathic / radicular pain / SI joint pain / having current surgical indications for spinal stenosis or significant mechanical instability may not be suitable for this therapy. Patients with greater than grade 1 spondylolisthesis and patients with moderate to severe spinal deformity are contraindications for ReActiv8.

CONCLUSIONS: Over a follow-up duration of 4 years, restorative neurostimulation has proved effective, durable, and safe. It provides specialists with a reversible treatment option targeting impaired neuromuscular control of lumbar spine stability in carefully selected patients with refractory mCLBP and no indications for surgery.

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Keywords: Non-surgical Chronic Low Back Pain, Multifidus dysfunction, Functional Stabilization, Restorative Neurostimulation

PP046

Interventional Pain Management

Effectiveness of Restorative Neurostimulation in Patients with Chronic Low Back Pain and Low Grade Non-Surgical Degenerative Spine Pathologies

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BACKGROUND: Mechanical chronic low back pain (mCLBP) is often a symptom of impaired neuromuscular control and inhibition of the multifidus muscles, the most important stabilizers of the lumbar spine. To halt the degenerative consequences of this functional instability, the primary treatment objective is to restore multifidus motor control. If patients are refractory to medical management, including physical therapy with targeted motor control exercises, an implantable Restorative Neurostimulation system which stimulates the medial branches of the L2 dorsal rami bilaterally to override

underlying multifidus inhibition, facilitates motor control restoration.1–3 A randomized sham-controlled pivotal trial provided evidence of safety and durable clinical benefit of this therapy (clinicaltrials.gov/show/NCT02577354).

AIMS: Investigate the prognostic value of non-surgical spine pathologies on treatment effectiveness.

METHODS: Data were obtained from 204 patients enrolled at 26 multidisciplinary centers in the pivotal trial. Eligible participants had refractory mCLBP, evidence of impaired multifidus neuromuscular control and no indication for spine surgery. One expert MRI reviewer applied a standardized protocol to identify and grade spinal pathologies (i.e., stable spondylo-/retrolisthesis grade 1, disc protrusion, degenerative disk disease, facet arthropathy, annular tears, modic changes, fatty infiltration, or scoliosis (Cobb angle < 25°)). All participants were implanted with a restorative neurostimulation system (ReActiv8® by Mainstay Medical) and during the long-term follow-up phase self-administered up to 60-minutes of stimulation per day and were followed up at 1, 2 and 3 years. The study was performed under an investigational device exemption (IDE), the investigational plan was approved by the institutional review boards (IRB) and informed consents were obtained from all participants.

RESULTS: Sub-analysis of cohorts with non-surgical spine pathologies demonstrates that improvements in pain (VAS), disability (ODI) and quality of life (EQ-5D) are equally substantial and durable as in the overall study population. Participants with an MRI-based diagnosis of stable grade-1 listhetic segments at baseline (n = 36/204) showed more rapid and substantial improvements than those without this diagnosis. At 1 year, these differences were statistically significant and clinically relevant for pain (VAS; p = 0.004), disability (ODI; p = 0.03) and quality of life (EQ-5D; p = 0.01).

CONCLUSIONS: Restorative Neurostimulation is an effective, durable, and safe treatment for patients with refractory mCLBP secondary to impaired multifidus neuromuscular control. Patients with degenerative spine pathologies which are not indicated for surgery do equally well as the overall study population. The early and vigorous response in the sub-cohort with low-grade, stable listhetic segments is consistent with treatment-induced functional stabilization and is hypothesis generating for future studies in this specific subpopulation.

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Keywords: Non-surgical Chronic Low Back Pain, Multifidus dysfunction, Functional Stabilization, Restorative Neurostimulation

PP047

Interventional Pain Management

Comparing SCS and Conventional Medical Management in Patients with No Prior Back Surgery (SOLIS RCT)

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BACKGROUND: Spinal Cord Stimulation (SCS) as a treatment for chronic pain has been historically designated for patients who have had at least one prior spinal surgery. Considering the opioid drug crisis, and the often-mixed clinical success of conservative treatment approaches and invasive back surgery procedures, there is growing interest in utilizing SCS in chronic pain patients who have not yet undergone previous surgical intervention. Recent SCS devices offer substantially more novel technological capabilities and neurostimulative approaches than older-generational SCS systems. Correspondingly, interventional treatment approaches capable of multimodal therapeutic strategies are now actively recommended by pain care advocates.

AIMS: Here, we describe our clinical assessment of SCS in those with no prior history of surgery (non-surgical back pain, NSBP) implanted with a multimodal device capable of customizable programming that enables engagement with multiple mechanisms of action in a

prospective, multicenter, randomized controlled trial (RCT) compared with those using Conventional Medical Management (CMM) alone.

METHODS: This is a prospective, multicenter randomized, controlled study (SOLIS) that compares the therapeutic effectiveness of SCS versus CMM only in patients with chronic low back and/or leg pain with no prior spinal surgery (Clinicaltrials.gov: NCT04676022). As such, enrolled NSBP patients who meet inclusion criteria are randomized to SCS combined with CMM (SCS + CMM arm) or a CMM-only arm. Those selected to receive SCS are implanted with a multimodal SCS system capable of engaging multiple mechanisms of action (Wavewriter Systems, Boston Scientific). Key inclusion criteria include diagnosis of chronic low back pain, with or without leg pain, for ≥6 months, and documented care of chronic pain for ≥90 days. The primary endpoint is responder rate (≥ 50% reduction in pain) with no increase in baseline opioid medications to treat pain at 3-months following treatment activation. Other secondary and/or exploratory measures include Percent Pain Relief, Quality-of-Life (SF-36; EQ-5D-5L), Treatment Satisfaction (TSQM-9m), Disability (Oswestry Disability Index, ODI), and Safety Outcomes.

RESULTS: Sixty treatment-activated study participants were randomized (24-subjects to the SCS + CMM arm and 36 subjects to the CMM-only arm). Primary endpoint analysis demonstrated that multimodal SCS combined with CMM was superior to CMM alone ($p < 0.0001$) in treating NSBP patients at 3-months follow-up on the basis of obtained responder rates (SCS + CMM: 88% versus CMM: 8%). Assessment of disability in those randomized to the multimodal SCS + CMM arm indicated a 27-point reduction in ODI score in comparison to a 6-point reduction in those randomized to CMM only. Ninety-two percent of those selected to receive multimodal SCS reported treatment satisfaction (i.e., much, or very much improved) at 3-months versus only 6% in those selected to receive CMM only.

CONCLUSIONS: The data obtained in this RCT demonstrates that utilization of multimodal SCS provides for superior outcomes when compared to use of CMM alone for treatment of NSBP. Given the prevalence of non-surgical, refractory back pain and the increasing economic and societal burden it poses, providing SCS as an additional tool within the therapeutic armamentarium for chronic pain represents a key opportunity to address a clinically important need.

Keywords: spinal cord stimulation, SCS, chronic pain, non-surgical refractory back pain, randomized controlled trial

PP048

Interventional Pain Management

Real-World Outcomes in Patients Using SCS for Treatment of Painful Diabetic Peripheral Neuropathy (DPN)

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BACKGROUND: Incidence of type 2 diabetes mellitus is a disorder that has been increasing on a global scale. Within this patient population, there exists a substantial segment that experience Diabetic Peripheral Neuropathy (DPN). Consequently, a growing proportion of this sub-population (thought to occur in up to ~26%) will likely experience painful DPN (Schreiber AK, et al World J Diabetes 2015 Apr15; 6[3]: 432-444). Recent advances in Spinal Cord Stimulation (SCS) device (e.g., waveform options, programming capabilities, hardware designs) have fueled interest in re-assessing various indications for which SCS might be beneficial.

AIMS: We sought to examine outcomes for the use of SCS in treatment pain associated with DPN as part of two ongoing real-world studies.

METHODS: Real-world data with the use of a commercially-available Boston Scientific Spinal Cord Stimulation (SCS) system in the treatment of pain were collected from the following: 1) prospective, multicenter registry (Clinicaltrials.gov: NCT01719055); 2) retrospective, observational case series (ClinicalTrials.gov Identifier: NCT01550575). A sub-set of patients included in both of these studies with a diagnosis of painful diabetic peripheral neuropathy were assessed for pain relief (e.g., NRS) and other relevant clinical measures, per standard of care.

RESULTS: A total of 58 real-world participants were identified (38 from the prospective, multicenter registry and 20 from the retrospective, observational case-series). Responder rates (i.e., proportion with 50% or greater pain relief) were determined from 38 registry participants at 1-year (83%), 2-years (81%), and 3-years (75%) follow-up. Assessment at these timepoints for treatment satisfaction indicated that 88%, 94%, and 92% reported being much or very much improved at 1-year, 2-years, and 3-years, respectfully. Mean overall pain score at last follow-up visit of 20 patients, as part of the retrospective, observational case-series, demonstrated a mean 4.6-point reduction in NRS pain score (7.5 at baseline to 3.0). Fifty-five percent of these patients (11/20) reported an NRS pain score of ≤2.

CONCLUSIONS: Results from these two real world, multicenter, observational studies demonstrate long-term, sustained clinically significant improvement in pain among patients receiving SCS for treatment of pain associated with Diabetic Peripheral Neuropathy (DPN). Given the technological developments made in recent years with regard to the design and implementation of SCS devices and therapy, there is renewed interest as to whether the treatment of painful DPN can now be improved upon using contemporary neuromodulation systems capable of more advanced and highly customized approaches to therapeutic neurostimulation.

Keywords: spinal cord stimulation, SCS, diabetic peripheral neuropathy, chronic pain, DPN

PP049

Interventional Pain Management

Protective multimodal analgesia with Etoricoxib and spinal anesthesia in inguinal hernia repair: a randomized controlled trial

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BACKGROUND: Inguinal hernia repair represents a common operation; however, consensus about the optimal management of postoperative pain is lacking.

Postoperative pain is a major determinant of discomfort in this group of patients. Several methods for pain control are used, unfortunately, no definite superiority was found and available evidence is of moderate-to-low quality.

AIMS: This study investigates the analgesic combination effect of the protective multimodal regimen together with the preoperative Etoricoxib.

METHODS: Sixty adult patients undergoing open inguinal hernia repair participated in a single-center, randomized, double-blinded, placebo-controlled trial in a general academic medical center. The intervention group (n = 30) received 120 mg of oral Etoricoxib 1 h preoperatively, and 10–12 mg bupivacaine with 25 μg fentanyl as spinal anesthesia. The control group (n = 30) received oral placebo 1 h preoperatively, and spinal anesthesia as above. Postoperative Visual Analog Scale pain scores at rest and on active straight leg raise were recorded and analyzed.

RESULTS: Resting pain scores were significantly lower in the intervention arm than the control group at 16 h, 24 h, and on discharge (3.00 vs. 4.35; 1.57 vs. 4.00; 1.24 vs. 3.76, respectively; $p < 0.05$). Pain scores on active straight leg raise were significantly lower in the intervention than the control group at 16 h, 24 h, and on discharge (3.85 vs. 5.59, $p < 0.01$; 2.84 vs. 4.90, $p < 0.05$; 3.55 vs. 5.32, $p < 0.05$, respectively).

CONCLUSIONS: The addition of Etoricoxib to spinal anesthesia as a multimodal protective regimen can improve pain control after inguinal hernia repair. The optimal dose and applicability to other operations remains to be established.

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Keywords: Etoricoxib, Spinal anesthesia, Multimodal protective analgesia, Hernia repair

PP050

Interventional Pain Management

Protective Analgesia in Caesarean Section Using Intravenous Paracetamol: A Prospective Randomized Controlled Trial

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BACKGROUND: Cesarean section (CS) is a common procedure among parturients, as an elective or emergency operation. It can be performed under spinal anesthesia. Although adequate analgesia is crucial to postoperative recovery, the optimal protective analgesic regimen remains to be established. (1) AIMS: To investigate the effects of preoperative intravenous paracetamol combined with spinal anesthesia within a protective multimodal analgesic regimen aimed at pain control following cesarean section. Main outcome measures: Postoperative pain scores estimated by Visual Analog Scale (VAS) immediately and at 2,4,8,12 and 24 hours after CS. Mean opioids consumption during 24 hours after CS. Postoperative time to first analgesia dose.

METHODS: Randomized, double-blinded, placebo-controlled trial.

Setting: General academic medical center

Patients: Fifty eight parturients undergoing first elective CS.

Interventions: The intervention group (n = 29) received 1 gr paracetamol provided in 100 ml normal saline in a single intravenous dose in a double-blinded mode, 15 minutes prior to spinal analgesia. The control/ Placebo group (n = 29) received 100 ml normal saline, medication free, 15 minutes prior to spinal analgesia.

Postoperative time to first analgesia dose (TTA) was also recorded and analyzed.

RESULTS: Intergroup correlation between postoperative VAS pain score with opioids consumptions throughout the first postoperative 24 hours between both groups showed significance immediately and at 2 and 4 hours ($p < 0.001$, $p = 0.004$, $p = 0.05$, respectively). While no significant statistical differences were detected between both groups at 8,12, 24 hours. The mean opioids consumption was significantly lower in the intervention vs. the control group ($p < 0.001$). The mean TTA was significantly longer in the intervention vs. the control group ($p < 0.001$).

CONCLUSIONS: Following CS, in the early postoperative period of 4-6 hours, the combined IV paracetamol with spinal anesthesia, as a multimodal protective regimen illustrated a significantly better pain control. It also presented an advantage in reducing opioids consumption, and prolonged time to first analgesic dose after CS.(2)

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Keywords: Intravenous paracetamol, Spinal anesthesia, Multimodal protective, analgesia, Cesarean Section

PP052

Interventional Pain Management

Medial branch blocks - variation in process, variation in outcome

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BACKGROUND: Facet joint back pain has many areas of controversy – prevalence, symptoms and signs, diagnostic techniques and treatment. Facet joint steroid injection has mostly been superseded by medial branch blocks (MBBs) and subsequent radiofrequency ablation (RFA). There is little consensus about what constitutes a positive block, or about how many should be done before ablation. Back pain in our community is seen by a team of specialist physiotherapists, who refer complex cases for review by spinal surgeons or pain clinic. They directly refer patients meeting NICE criteria for injection without other assessment in pain clinic. This is a widely used service and MBB is a common procedure. Given rising waiting lists, it is important to assess whether we have optimal usage of this process to ensure optimal outcomes.

AIMS: To audit variation in process and outcome within the MBB/ RFA pathway for facet joint back pain in our hospital.

METHODS: Retrospective audit of notes and online systems for all patients having diagnostic MBBs between 1st June 2021 and 30th June 2022. Collected demographic data, referrer and injector, process variables (uni/bilateral, number of injections, type and volume of injectate), outcomes, quality of documentation of outcomes,

progression to RFA and outcome of RFA in those who have had it. Outcomes were analysed in total, and by referrer and injector.

RESULTS: Our department performed diagnostic MBBs in 79 patients in this period (29 male, 50 female). 28 were unilateral, 51 bilateral. 22 (79%) unilateral patients had 3 injections, 6 (21%) had 2 injections. 36 (71%) bilateral patients had 6 injections, 13 (25%) had 4 injections, 2 (4%) had 2 injections. 19 patients used lidocaine 2%, 4 at 1ml/injection, 15 at 0.7ml/injection. 60 patients used levobupivacaine 0.5%, 29 at 1ml/injection, 31 at 1.25ml/injection.

43 patients (54%) recorded positive response to MBB. 26 of these were listed for denervation. 10 had atypical response with prolonged analgesia. Remainder were lost to follow-up or not medically fit for RFA. Range of positive MBB response varied by referrer (0% to 71%), and by injector (33% to 75%). 63% patients from one referrer had an atypical prolonged response to LA. Documentation of outcomes was poor in 25% patients. 8 out of 17 (47%) patients who had been followed up after RFA had good outcome at 3 months. There was no standardised follow-up for RF patients beyond this point.

CONCLUSIONS: There is wide variation in the process of care offered by our team, and wide variation in outcomes. Aggregation of marginal differences between clinicians makes overall service improvement tricky.

Keywords: facet, medial branch blocks

PP053

Interventional Pain Management

Real-World Outcomes Using Spinal Cord Stimulation for Treatment of Chronic Back Pain with No Prior Back Surgery

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BACKGROUND: Chronic intractable low back pain (i.e., back pain persisting for at least 6-months) refractory to treatment is complex and dynamic. A recent meta-analysis of 96 randomized trials involving over 26,000 subjects with chronic pain demonstrated that use of opioid drugs was not associated with significant improvements in pain and physical function, nor associated with outcomes that were significantly better than that achieved using conventional treatments (i.e., antidepressants, nonsteroidal anti-inflammatory drugs, anticonvulsants, cannabinoids, or usual care). Hence, an approach that includes non-opioid therapies such as neuromodulation for the management of pain has been recommended (HHS 2019 Best Practices report and 2022 CDC guidelines). Previously published studies support the use of Spinal Cord Stimulation (SCS), a reversible treatment option, prior to back surgery. However, these studies have not yet evaluated SCS systems that can provide multiple neurostimulative approaches that can be selectively used per patient.

AIMS: Here, we report outcomes in real-world patients with no prior back surgery who used various SCS systems capable of customizable neuromodulatory approaches.

METHODS: Real-world data with the use of a commercially-available Boston Scientific Spinal Cord Stimulation (SCS) system in the treatment of pain were collected from the following: 1) prospective, multicenter registry (Clinicaltrials.gov: NCT01719055); 2) retrospective, observational case series (ClinicalTrials.gov Identifier: NCT01550575). A sub-set of non-surgical back pain patients included in both of these studies were assessed for pain relief (e.g., NRS) and other relevant clinical measures, per standard of care.

RESULTS: A total of 262 real-world participants were identified (108 from the prospective, multicenter registry and 154 from the retrospective, observational case-series). Responder rates (i.e., proportion with 50% or greater pain relief) were determined from 108 registry participants at 1-year (86%), 2-years (79%), and 3-years (75%) follow-up. Assessment at these timepoints for treatment satisfaction indicated that 93%, 86%, and 85% reported being much or very much improved at 1-year, 2-years, and 3-years, respectfully. Mean overall pain score at last follow-up visit (375.6 days) of 154 patients, as part of the retrospective, observational case-series, demonstrated a mean 3.4-point reduction in NRS pain score (7.4 at baseline to 4.1). Forty-seven percent of these patients reported an NRS pain score of ≤3.

CONCLUSIONS: Results from two ongoing, real-world, multicenter, studies (consecutive patients) demonstrate a durable and significant improvement in pain and satisfaction suggesting that SCS may be an option for chronic pain in patients with no history of prior back surgery. Additional studies of chronic pain patients with no history of prior back surgery who are implanted with SCS systems equipped with advanced, technological capabilities are now needed.

Keywords: Spinal Cord Stimulation, SCS, chronic pain, non-surgical back pain, virgin back

PP055

Interventional Pain Management

Restorative Neurostimulation for Chronic Mechanical Low Back Pain – Three Year Results from the United Kingdom Post Market Clinical Follow-up Registry

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BACKGROUND: The global burden of low back pain is among the leading causes of years lived with disability in both high- and low-income countries alike.1 The pathophysiology of chronic low back pain (CLBP) is complex and often a result of multiple overlapping mechanisms including modifications to motor control, reflex inhibition and inflammatory mechanisms. Motor control dysfunction is of particular interest as it broadly describes a variety of changes in paraspinal muscle function. The past decade has seen the development of restorative neurostimulation as a modality for the treatment for this specific subset of chronic nociceptive low back pain patients. Clinical evidence in from both prospective and randomised clinical trials to date has demonstrated substantial improvements in clinical outcomes such as pain, disability, and health related quality of life.[12–14].

AIMS: Here we demonstrate the generalizability, durability and safety of these clinical effects by reporting the three-year outcomes from the United Kingdom post market ReActiv8-A PMCF registry.

METHODS: Patients were consented to participate in an open label five-year prospective follow-up for the treatment of chronic mechanical low back pain of nociceptive origin with restorative neurostimulation using the ReActiv8 (Mainstay Medical, Dublin, Ireland) device between September 2017 and September 2018. Data was collected at five sites across the UK (ClinicalTrials.gov Identifier: NCT01985230). Outcomes were collected at 45, 90, and 180 days, and 1, 2 and 3 years after the activation visit, with annual visits planned to continue to 5 years post-activation. Patients completed

assessments for pain (numerical rating scale - NRS), disability (Oswestry Disability Index - ODI), and health related quality of life (EuroQol 5 Dimension 5 Level - EQ-5D-5L).

RESULTS: Forty-two patients were implanted with the device, and 33 (79%) were available at the 3-year appointment. Over the intervening time 5 patients were explanted with inadequate pain relief, 3 patients were lost to follow-up and 1 patient died from an unrelated illness. Patients in this cohort presented with severe chronic low back pain (NRS = 7.0 ± 0.2) and severe disability (ODI 46.6 ± 12.0). The health-related quality of life was also severely impacted at baseline (EQ-5D 0.426 ± 0.061).

Changes in pain, disability, and quality of life at three-year follow-up demonstrated a statistically significant improvement between baseline and 1, 2 and 3 years. After 3 years of therapy, average NRS scores had reduced to 2.7 ± 0.3 and mean ODI score to 26.0 ± 3.1 while EQ-5D-5L index improved to 0.707 ± 0.036. Imputation for missing data increased these values marginally but improvements remained both substantial and statistically significant. Longitudinal analysis showed that the improvements between 1 and 3 years were statistically significant, which is consistent with the restorative mechanism of action.

CONCLUSIONS: The ongoing follow-up of this post market cohort continues to demonstrate that restorative neurostimulation provides a statistically significant, clinically meaningful, and durable response across pain, disability, and quality-of life scores for patients suffering chronic mechanical low back pain that has been refractory to conventional management. Under conventional management strategies these patients accrue significant healthcare costs over the long course of their symptoms. Therapeutic options that provide durable relief by restoring function rather than palliating or masking pain perception should be considered when the right patient can be identified.

Keywords: Chronic back pain, restorative neurostimulation, multifidus muscle dysfunction, three year follow-up

PP056

Interventional Pain Management

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

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BACKGROUND: Spinal Cord Stimulation (SCS) programming customized to the individual needs of each patient is thought to be important for elucidation of the most effective clinical outcomes when using SCS for management of chronic pain. This is in part supported by the fact that the experience of chronic pain itself is inherently dynamic and highly subjective in nature. 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 (Kallewaard JW, et al. J Clin Med 2021).

AIMS: Here, we report the real-world outcomes of patient implanted with an SCS device, as part of a multi-center observational study, who preferred to use combination therapy 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 are being collected for all patients. In addition, Numeric Rating Scale (NRS) scores, Percent Pain relief (PPR) and other functional outcomes as available are being collected as part of the chart review.

RESULTS: To date, 131 patients have been assessed with a mean (SD) Baseline pain score (NRS) of 7.8 (1.5). Mean follow-up duration was 347 (262) days. A mean 4.7 ± 2.8-point improvement ($p < 0.0001$) in overall pain was determined at last follow-up (7.8 ⇒ 3.1). At last follow-up,62% (81 of 131) had a pain score of 3 or less. Additionally, evaluation of quality of life (EQ-5D-5L) in 70 patients (for whom data was available) indicated a substantial improvement from baseline measurement (34.1) out to last follow-up (71.8). Data collection is currently on-going and updated results will be reported.

CONCLUSIONS: Preliminary data from this multicenter, real-world, observational, case-series demonstrate significant improvement of chronic pain and quality of life in patients who utilize combination therapy programming. 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.

Keywords: spinal cord stimulation, SCS, multimodal therapy, combination therapy, chronic pain

PP057

Interventional Pain Management

ECAP-Based SCS for the Treatment of Chronic Pain: Evoke Study 36-Month Outcomes

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BACKGROUND: INTRODUCTION: Utilization of objective neurophysiological measures to guide clinicians in providing optimal

spinal cord stimulation (SCS) for chronic pain patients is a novel concept to neuromodulation. This clear and transparent mechanistic approach provides a better understanding to clinicians, patients, and payors allowing for proper evaluation of clinical outcomes. A novel SCS system delivers evoked-compound action potentials (ECAPs)-based therapy to 1) Guide programming and confirm activation of the intended target (i.e., ECAP-guided programming); and 2) Deliver closed-loop therapy to maintain accurate and consistent neural activation on every stimulus (i.e., ECAP-controlled closed-loop SCS).

AIMS: This therapy has now been studied in a 24-month double-blind randomized controlled trial (RCT) with self-selected crossover through 36 months. ECAP-based therapy enables real-time collection of continuous, objective, in-vivo neurophysiological data. This provides proper evaluation of the therapy and interpretation of the clinical outcomes, resulting in a level of evidence unmatched in neuromodulation.

METHODS: The EVOKE RCT was designed to evaluate the safety and efficacy of ECAP-based therapy to treat chronic back and leg pain (NCT02924129)1. Patients were randomized to open-loop (OL) or ECAP-controlled closed-loop (CL) stimulation; both treatment groups received ECAP-guided programming. Following the 24-month visit1, patients were allowed to participate in a self-selected crossover phase which continued through the 36-month visit. Overall, back and leg pain (VAS), opioid usage, and other patient-reported clinical outcomes including physical (ODI) / emotional (POMS) functioning, sleep quality (PSQI), and quality of life (EQ-5D) were collected. Additionally, objective neurophysiological data, including spinal cord activation were measured.

RESULTS: Following the 24-month visit, 62% OL vs. 32% CL blinded patients voluntarily crossed-over to the other stimulation mode. At the end of the crossover, 89% of patients who were exposed to CL, remained in CL. In this presentation, 36-month outcomes of Evoke study will be premiered in Europe. Durability of ECAP-based therapy, including the safety profile, holistic treatment response, consistency/accuracy of delivered neural activation, crossover results, and associated neurophysiology will be presented.

CONCLUSIONS: Data from the EVOKE study demonstrates that ECAP-guided programming and ECAP-controlled closed-loop neural activation resulted in sustained, durable pain relief and holistic treatment response at 36 months. ECAP-based therapy provides a transparent, objective approach to SCS by which therapy can be monitored and adjusted to improve patients' lives.

Keywords: Spinal cord stimulation, randomised controlled trial, double blind, evoked compound action potentials, persistent spinal pain syndrome type 2

PP058

Interventional Pain Management

Spinal Cord Stimulation for Treatment of Bladder Pain Syndrome: A Case Report

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BACKGROUND: Interstitial cystitis/ Bladder Pain Syndrome is a painful condition associated with pain and troublesome urinary symptoms. This may result in disruption of sleep, anxiety, depression, loss of job which affects physical, psychological health and quality of life. Neuromodulation may be offered in such cases although the evidence is limited.

AIMS: Case Report

METHODS: CASE: A 42-year-old female, bus driver, with intractable suprapubic and perineal neuropathic pain (NRS 9/10), urgency and frequency (10-12/ night) underwent spinal cord stimulation with dual infinion lead covering T9-12 with on table testing. After 2-week positive trial (NRS>80%) Alpha waver-writer IPG (BSCR) was implanted. Pre-implant urodynamic studies demonstrated detrusor overactivity during feeling of urgency and voiding. [1,2] RESULTS: Patient demonstrated improvement at 1, 3 and 6 months with persistent improvement in pain scores and improved urinary frequency (3-4/ night) and minimal urgency at 6 months. Urodynamic study at 8 months demonstrated no detrusor overactivity during urgency while only some overactivity just prior to voiding. She had no more painful bladder spasms and was able to resume her 12 hour shift pattern job.

DISCUSSION: Sensory afferents from the bladder innervate via the pelvic, hypogastric/splanchnic nerves and synapse within the dorsal horn of the lumbosacral (L5-S1) and thoracolumbar (T10-L2) spinal cord [1]. The sympathetic preganglionic input to pelvic ganglia is also carried out through hypogastric nerves [1,2]. Use of SCS in experimental rat model was found be effective in decreasing detrussor overactivity and reduce bladder hyperalgesia. [3] A case report mentioned relief in bladder pain as byproduct where SCS implant was done for back and leg pain. [4] We report a clinical scenario where meaningful benefit was demonstrated using SCS for intractable bladder pain

CONCLUSIONS: We report objective improvement in pain and bladder functions following SCS with validated outcome measures and urodynamic studies. This suggests possible role of SCS in managing such neuropathic pain conditions

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Keywords: Bladder Pain Syndrome, Spinal Cord Stimulation, Neuromodulation

PP059

Neuropathic Pain

Pre-emptive use of Lidocaine patches following Spinal cord stimulation implant to prevent Chronic Post-Surgical Pain and hypersensitivity

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BACKGROUND: Although intrinsically safe, device and surgery-related complications have been reported in literature (Deer and Stewart 2008; Kumar, Hunter, and Demeria 2006; Labaran et al. 2020). The device related complications reported in spinal cord stimulation (SCS) such as electrode displacement, electrode fracture, hardware malfunction and surgical complications such as infection and bleeding are widely recognised, local pain at the IPG site (12%) may also result in poor patient satisfaction and limited compliance of therapy. (Eldabe et al).

Due to the inherent issue of slow healing of gluteal IPG site, the pain can become persistent with neuropathic characteristics. The IPG site pain can be treated by conservative measures such as lidocaine patches, injections of neuroma or cushioning of hardware sites. If the problem persists, a revision or even explanting the SCS system may be considered. However it is important to note that repeated procedures expose patients to further disability and expensive healthcare costs. Baranidharan et al. reported, 7 % of SCS patients had revision or explants due to IPG site pain.

AIMS: We aim to investigate the effects of pre-emptive use of lidocaine patches in a prospective single centre pilot study to evaluate the efficacy and usefulness in the prevention of IPG site pain.

METHODS: The clinical effectiveness project was approved by the trust local committee (March 2022). Patients implanted with SCS from February 2022 were reviewed at their 14 day wound check follow-up. Dressings were removed and after ensuring no signs of infection, they were provided with lidocaine patches for 12 weeks to apply on the IPG site with due instructions. Data was collected at 3 and 6 months through validated pain questionnaires.

RESULTS: This study is still ongoing and we will report interim data of our study. Thirty-Five patients were prescribed lidocaine patches following SCS, at their 14 day wound check appointment. NRS score ≥3 and the presence of neuropathic features (burning, tingling, hyperalgesia and hyperesthesia) were considered the signs and symptoms of treatment failure. Till date 35 and 24 patients have completed 3 and 6 months f/u respectively with almost all having pain score of <3. Only 3 and 2 patients reported NRS >3 at 3 and 6 moths respectively. No patients reported any neuropathic features at 3 and 6 months respectively.

CONCLUSIONS: We report that pre-emptive application of Lidocaine patches may be an effective therapeutic measure in reducing the IPG site complication rate. The final outcome data will be presented at BPS.

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Keywords: IPG site pain, Chronic post-surgical pain,Lidocaine plasters

PP060

Neuropathic Pain

Simultaneous oral administration of tolperisone and pregabalin acutely reduces neuropathic pain in rats

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BACKGROUND: So far neuropathic pain treatment has not been fully managed either by individual drugs or drug combinations. Therefore, large efforts are being done to develop new drugs or repurpose existing medications. Tolperisone is a centrally acting skeletal muscle relaxant that blocks voltage-gated sodium channels, sharing the same target with antiepileptic and local anaesthetic agents that are being used to manage neuropathic pain. This pharmacodynamic action raises the possibility of repurposing tolperisone as future medication to alleviate neuropathic pain.

AIMS: To assess the acute antiallodynic effect of tolperisone and pregabalin or their combination in rats with neuropathic pain. Next, to examine the impact of treatments on rat motor coordination. Finally, to examine the change in glutamate level of cerebrospinal fluid (CSF).

METHODS: Wistar rats, weighing 100-150g anaesthetised with pentobarbital underwent sciatic nerve ligation or sham operation on the right hind paw as described earlier (Seltzer et al., 1990). Next, on the 7th and 14th days following the operation, nociceptive behaviours were measured by rat paw pressure thresholds (PPTs) or paw withdrawal thresholds (PWTs) using Randall–Selitto or dynamic plantar aesthesiometer (DPA) assay, respectively. On the 14th day, rats (170-250g) that developed allodynia (decreased pain threshold) were treated with oral 25, 50, and 100mg/kg tolperisone or pregabalin. In another set of experiments, rats were treated with the fixed combination of oral 25 mg/kg tolperisone and 25 mg/kg pregabalin and its effect was recorded by DPA. The effects of test compounds or vehicles were measured 1, 2, and 3h after administration. Motor coordination was measured in rats (170-250g) by the rotarod test.

CSF samples were taken from rats treated with tolperisone, pregabalin, and vehicles and analysed for their glutamate content by capillary electrophoresis-laser induced fluorescence detection method. All data were presented as mean ± S.E.M. and analysed by one-way ANOVA followed by Newman–Keuls post hoc test for multiple comparisons.

RESULTS: Tolperisone administered acutely in all tested doses and at all-time points restored the developed allodynia measured by Randall–Selitto assay. Pregabalin as a positive control only at higher tested doses (50 and 100 mg/kg) showed a consistent antiallodynic effect in this assay. On the other hand, both tolperisone and pregabalin administered acutely failed to exert antiallodynic effect in DPA. Interestingly, the combination of fixed small doses of tolperisone and pregabalin produced antiallodynic effect after acute administration in DPA assay. With respect to CSF glutamate level, rats with neuropathic pain manifested by allodynia showed a significant increase in glutamate content compared to sham-operated ones. Treatments with tolperisone or pregabalin decreased the glutamate content significantly. Contrary to pregabalin, tolperisone alone and their low dose combination did not induce significant motor dysfunction measured by rotarod test.

CONCLUSIONS: Tolperisone or pregabalin has antiallodynic effect when given separately in neuropathic pain evoked by sciatic nerve damage. However, this effect largely depends on the pain assay being used. The combination of small doses of these drugs effectively alleviated allodynia and were devoid of motor dysfunction, thus opening a future strategy to manage neuropathic pain that, to our best knowledge had never been explored before.

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Keywords: Neuropathic pain, Tolperisone, Tolperisone-Pregabalin combination

PP061

Neuropathic Pain

Role of Spinal Cord Stimulator (SCS) in the management of neuropathic pain 52 years following brachial plexus avulsion injury

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BACKGROUND: Our patient suffered a traumatic right brachial plexus injury in 1964 following a road traffic accident and developed neuropathic pain in the right upper limb. He presented in 2002 with increasing pain managed with antineuropathics (gabapentin, duloxetine), opioids, non-pharmacological methods - mirror therapy, TENS and psychological approaches. He was discharged and re-referred in 2014 for inadequate pain control. In 2016 he was implanted with an SCS following a successful trial.

The patient described a severe sharp, burning, 'flame like' pain, above the right elbow with radiation to his right hand and fingers and a flail limb. The pain felt like "someone has chopped his arm off or torn the arm apart." Pain on numerical rating scale pre SCS 10/10, impact on: general activity 7/10, work 8/10, mood 10/10, sleep 10/10. On the EQ5D5L scored as: In extreme pain and discomfort; Not anxious or depressed. His past medical history includes atrial fibrillation, hypertension, non-metastatic prostate cancer (radical prostatectomy and radiotherapy 2007). Nerve conduction and electromyography studies showed post ganglionic right C6, C7, C8 lesions with substantial denervation of the right thenar and hypothenar muscles. The patient required an upright MRI due to inability to lie still due to pain. The results showed anterior fusion between C5-7 with some degenerative changes.

AIMS: To demonstrate the efficacy of SCS in the management of severe neuropathic pain, 52 years after brachial plexus avulsion injury

METHODS: The patient had a series of questionnaires pre and post implantation to ascertain the SCS implant's effectiveness and efficacy.

He had an implant trial SCS on the 13/1/2016. He went on to have a permanent, non-MRI compatible SCS implant on the 27/1/2016. There were no complications intra and post procedure.

RESULTS: Post SCS implant, the patient had >90% coverage of his targeted pain area with excellent pain relief.

2 year follow-up: SCS is switched on 24 hours a day. He has made excellent progress scoring zero on the Brief Pain Inventory (BPI), Pain Disability Index (PDI), and stable outcome on Hospital anxiety and depression scale (HADS). His EQ5DL was 100 and Self-efficacy questionnaire 100. The Neuropathic Pain Symptom Inventory (NPSI) is 1/100. From the Global impression of change questionnaire, he only suffers mild pain, and his pain is very much improved.

3 year follow-up: Patient manages to drive with his SCS off and the rest of the time it is switched on. His average pain in the past month is 2/10. NPSI score is 8/100, with 2/10 for burning pain; 1.3/10 for evoked pain; 1/100 for dysesthesia. His EQ5DL is 90/100. His mood is unaffected as his HADS remains stable. The Self-efficacy questionnaire is 100, BPI, PDI is 0.

We have completed 7 years post implant and the patient reports switching his SCS on only a few times in 2021-22. In the last 12 months 2022-2023, the patient has not had to use the spinal cord stimulator. His right arm pain has significantly reduced, and he does not need any pain management.

CONCLUSIONS: According to NICE guidance (TA159), SCS is recommended for this patient as he has chronic neuropathic pain poorly managed with medical and other conservative treatments.

The timing of SCS is important and ideally considered early in the patients' management following unsuccessful first-line treatment, not as a last resort. Literature also supports early implantation to improve outcomes.

For this patient, he was implanted 52 years from his original injury, having unsuccessfully managed his pain by other means. This case demonstrates, and adds to the literature, that successful SCS treatment can happen in patients whose original injury occurred decades ago. It appears that patient selection is key, following guidance.

Keywords: SCS, brachial, plexus, avulsion

PP062

Neuropathic Pain

Characteristics, treatment, and healthcare resource utilisation in patients diagnosed with chronic pain in a United Kingdom Primary Care database

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BACKGROUND: Chronic pain represents a major clinical, social, and economic burden on the National Health Service (NHS). Large variation in patient characteristics and underlying aetiologies make managing chronic pain conditions challenging. In the United Kingdom (UK), the ongoing COVID-19 pandemic has placed substantial demands on the NHS, with pain services across the country facing new challenges in terms of patient volume and care pathway optimisation.

AIMS: This study aimed to understand patient characteristics, treatments, healthcare resource utilisation (HCRU), and associated costs in patients diagnosed with chronic pain, including painful diabetic peripheral neuropathy (pDPN), other peripheral neuropathic pain, trigeminal neuralgia (TN), or chronic intractable pain, and treated as part of routine UK primary care.

METHODS: We conducted a retrospective observational study in the Optimum Patient Care Research Database including adult patients with selected codes for specific chronic pain first appearing (index) between 01/01/2017-31/12/2021. We followed these patients for treatment and HCRU from index to date of death, deregistration from the database, or end of study observation, whichever came earliest, and described patients by chronic pain type and diagnosis before or after the start of the COVID-19 pandemic (2017-2019 vs. 2020-2021). HCRU costs were calculated using Personal Social Services Research Unit reference costs and NHS tariffs. To obtain estimates generalisable to the population of interest, the post-stratification method was used to adjust sampling weights by age, gender, and region using NHS national data.

RESULTS: 83,307 patients were included (pDPN: 12,665 [15.2%]; peripheral neuropathic pain: 23,465 [28.2%]; TN: 9,936 [11.9%]; chronic intractable pain: 37,241 [44.7%]). Mean (SD) age at diagnosis was 58.4 (18.7) years; 59.7% of patients were female. Patients with pDPN and chronic intractable pain had the highest and lowest mean [SD] age (65.7 [SD 14.1] years, 53.9 [21] years), respectively. TN and pDPN were the most frequent pain type in female (70.7%) and male (57.8%) patients, respectively. Patients diagnosed during the COVID-19 pandemic (69.8%) were slightly older (mean [SD]: 59.6 [19] years) vs. patients in the pre-COVID-19 period (30.2%) (57.8 [18.6] years).

At least one prescription of antidepressant medication was observed in 22.5% of patients, anticonvulsants in 23%, opioids in 28.5%, lidocaine in 3.2%, and capsaicin in 2.6%. The proportion of patients who received a medication was higher in women vs. men and post-COVID-19 vs. pre-COVID-19. Patients with pDPN were frequently prescribed antidepressants (34.4%) and opioids (36.1%). The anticonvulsants prescription rate was highest in patients with TN (62%). Median (interquartile range [IQR]) prescriptions per patient-year of antidepressant, opioid, and anticonvulsants were 4 (1-10), 3 (1-11), and 5 (2-12), respectively, in the total cohort, and increased to 6 (2-13), 5 (2-12), and 9 (3-14) in patients with pDPN. Injection of a therapeutic substance around the spinal cord or joints was recorded in 0.9% of patients, ranging from 1% pre-COVID-19 to 0.5% post-COVID-19 period.

4.2% and 0.3% of patients had HCRU related to fall/fracture and diabetes complications, respectively, with the highest proportion in patients with pDPN (6.2%, 1.5%) and in patients in the post-COVID-19 period (5.2%, 0.4%). Approximately half of patients (47.8%) were referred to secondary care, with the highest proportion for pDPN (54%). Median (IQR) costs of HCRU related to fall/fracture or diabetes complications were £39.2 (39.2-78.5) and did not differ by gender, pre-/post-COVID-19 period, or pain type, with the exception of the cost related to diabetes complications for chronic intractable pain (£78.5 [39.2-156.9]).

CONCLUSIONS: Chronic pain is often caused by neuropathic pain (43.4%). Although only 15.2% of the patients had pDPN, such patients have considerable HCRU. Of patients with pDPN, more than half (54%) were referred to secondary care and a significant proportion (36.1%) treated with opioids.

Keywords: peripheral neuropathic pain, trigeminal neuralgia, healthcare utilisation, opioids

PP064

Neuropathic Pain

The treatment effects of amitriptyline on pain symptoms, quality of life and heart rate variability in burning mouth syndrome patients

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BACKGROUND: Primary burning mouth syndrome (BMS) is an idiopathic chronic pain disorder that can be characterized by a burning sensation of the oral cavity without identifiable disease. Although pharmacological and non-pharmacological treatments have been used to manage primary BMS, a complete resolution of chronic pain symptoms in BMS is not common. The chronicity of pain can impair patient's quality of life (QoL). The altered autonomic activities were also reported in patient with chronic pain.

AIMS: The objectives of this research project were 1) To evaluate the effectiveness of amitriptyline therapy on improving pain and the oral health-related quality of life (OHRQoL) in BMS patients when compared to palliative topical therapies (sodium bicarbonate mouthwash). 2) To determine the association between therapy of amitriptyline and heart rate variability (HRV) parameters.

METHODS: Four females already taking amitriptyline or sodium bicarbonate mouthwash were recruited into a pilot prospective study to evaluate changes on pain, OHRQoL, Patient Global Impression of Improvement (PGI-C) and HRV between baseline, 3-month and 6-month follow-up visits.

RESULTS: Our study demonstrated decreasing in pain intensity from baseline to 3-month follow-up in sodium bicarbonate group, while pain intensity in amitriptyline group increased from baseline to 3 months. Comparable OHRQoL at baseline and 6-month follow-up was reported in both sodium bicarbonate and amitriptyline groups. PGI-C in sodium bicarbonate group improved from baseline to 3-month and 3-month to 6-month follow-up visit, while it was not changed in amitriptyline group. HRV parameters in the amitriptyline group were higher than those of subjects in sodium bicarbonate

group. This is a pilot prospective study and must be interpreted with caution because of the limited sample size. Future investigations should be performed to confirm our findings with a randomized controlled clinical trial and also to determine the number of primary BMS patients that need to be treated (NNT) to have a clinical impact.

CONCLUSIONS: Pain intensity in the sodium bicarbonate group was decreased from baseline to 3 months, while it increased in amitriptyline group. OHRQoL in sodium bicarbonate group and amitriptyline group were comparable at baseline and 6 months. HRV parameters in the amitriptyline group were higher than subjects in sodium bicarbonate group. The application of these instruments while managing primary BMS patients may help the clinician understand how each patient perceives treatment as a patient-centered approach

Keywords: Burning mouth syndrome, Amitriptyline

PP070

Neuropathic Pain

Painful small fibre neuropathy following COVID-19 infection: clinical characteristics and skin biopsy signature.

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BACKGROUND: Viral infections, including COVID-19, may lead to the development of painful small fibre peripheral neuropathy. Objective assessments are required to establish a diagnosis, including in patients with some symptoms considered as "long COVID".

AIMS: To assess patients with chronic sensory symptoms following COVID-19 infection, using quantitative sensory testing (QST) and leg skin biopsies to aid their diagnosis and management, and provide insights into pathophysiological mechanisms.

METHODS: 20 patients with COVID-19 infection confirmed by testing who developed persistent sensory symptoms suggestive of a small fibre neuropathy were assessed. Other potential causes of neuropathy were excluded. The specialized tests were QST and 3 mm skin punch biopsies from the distal calf. Immunohistochemistry was used to assess the density of intra-epidermal (IENF) and sub-epidermal (SENF) nerve fibres with a range of markers, including the pan-neuronal marker protein gene product 9.5 (PGP9.5), regenerating fibres with growth-associated protein 43 (GAP43), and dermal blood vessels with von Willebrand factor (vWF).

RESULTS: Mean age of patients was 48 y (range 25–72 y). The duration of symptoms before the assessment was 5 months (range 1-13 months). The onset of symptoms was within days to weeks after the infection. Patients reported burning sensation (35%), tingling/pins and needles (20%), pain (20%), numbness (10%), and other sensory symptoms including fatigue.

Clinical examination was unremarkable other than limb sensory tests. With QST, cool and warm perception thresholds were elevated in the feet in 35% and hands in 10% of patients. Cold pain hypersensitivity was present in the feet of 25% and hands in 20% of patients. Heat pain hypersensitivity was present in the feet of 25% and hands in 45% of patients. Monofilament perception threshold was elevated in the feet in 5% of patients, and none had dynamic allodynia (with the Somedic yellow brush). The vibration perception threshold was elevated in the feet of 20% and hands in 5% of patients. Nerve Conduction Studies available showed minor abnormalities in 3/13 patients.

The density of the pan-neuronal marker PGP9.5-positive fibres was significantly decreased for intra-epidermal nerve fibres, IENF (post-COVID: -40%, ***p = 0.0002, n = 20), similar to our findings in patients with painful small fibre neuropathy associated with Sarcoidosis: (-42%) or Sjogren's syndrome (-32%). Sub-epidermal nerve fibre density (SENF) was also reduced post-COVID (-43%), comparable with Sarcoidosis (-48%) and Sjogren's (-57%).

In contrast, the density of regenerating nerve fibres with GAP43 showed a marked and highly significant increase in the sub-epidermal region, more so than in Sarcoidosis, or Sjogren's (post-COVID: +242%, ***p < 0.0001, n = 20, Sarcoidosis: +12%, and Sjogren's: (+100%). The ratio of GAP43 to PGP9.5 nerve fibres confirmed the largest increase in post-COVID (+453%, ***p < 0.0001), compared to Sarcoidosis (+54%) and Sjogren's (+60%).

Highly significant increases in the sub-epidermal blood vessel density were observed with vWF post-COVID (+58%, ***p < 0.0001, n = 20), and Sarcoidosis: (+76%) and Sjogren's (+75%).

CONCLUSIONS: Quantitative sensory testing and skin biopsies show a distinct pattern in patients with chronic COVID-19-related pain and sensory symptoms, which may help with diagnosis and treatment. Our results reveal similarities with immune-mediated and neuro-inflammatory conditions, with overall decrease of intra-epidermal and sub-epidermal nerve fibres, but increased sub-epidermal regenerating nerve fibres and vasculature. The latter may result from hypoxaemia in these conditions. The findings support the use of disease-modifying immune treatments, in addition to symptomatic treatment for neuropathic pain.

Keywords: COVID19, Pain, Neuropathy, Skin biopsy

PP071

Neuropathic Pain

Twelve-Month Real-world Outcomes of EVOKE Closed-Loop Stimulation

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BACKGROUND: Spinal cord stimulation (SCS) has proven to be an effective therapy for chronic pain [1],[2]. A randomized-controlled-trial (RCT) and a long-term open label multi-center-study indicate that Evoked Compound Action Potential (ECAP)-controlled closed-loop SCS demonstrated more consistent activation of the spinal cord and correspondingly superior pain relief in patients as compared to traditional 'open-loop' SCS [3],[5]. Results from RCT studies are sometimes hard to repeat in real world.

AIMS: Here, interim real-world results of the multi-center data collection study (Data Release) from seven centers in the Netherlands are presented (Netherlands Trial Register, ID: NL7889).

METHODS: Included are patients with intractable chronic pain (PSPS type 2, CRPS and Polyneuropathy). Besides the collection of real-world patients reported outcomes for pain relief (VNRS) and satisfaction, additionally, electrophysiological data (ECAPs) and patient usage (time therapy is active) data were collected during standard-of-care visits for patients treated with an ECAP-controlled closed-loop SCS system in a real-world setting under normal clinical use in Europe, interim data for 12-months are presented.

RESULTS: At 12-months in this real-world, post-approval experience, 87% of patients had at least 50% pain relief (overall responder) with 58% being classified as high-responders (≥80% pain relief). 89% of the patient's report being very-, quite-, or satisfied after 12-months with the ECAP-controlled closed-loop therapy. Comparison of overall pain relief to the AVALON and the EVOKE studies (81% and 89% overall responder rate, respectively [3], [5]) demonstrated consistent outcomes at 12-months.

Median total SCS therapy utilization (time therapy is active) was 97% at 12-months. Median neural activation level was above perception threshold (Mode: 13.5 μV).

CONCLUSIONS: Although we just present preliminary data, the results strongly suggest that ECAP-controlled closed-loop SCS can lead to a high degree of pain relief and patient satisfaction 12-months post-implantation, which is comparable to results from the AVALON multi-center-study [5] and the EVOKE RCT [3] in pain relief outcomes, spinal cord activation, therapy use and therapy delivery consistency and accuracy [4],[6]. Interim results from real-world ECAP-controlled closed-loop SCS demonstrate prominent levels of pain reduction in the first 12-months of therapy. Real-world data closely matches the results in more controlled studies.

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Keywords: spinal cord stimulation, ECAP-controlled closed-loop, real-world

PP072

Neuropathic Pain

Case report: Efficacy of lidocaine intravenous infusions in treating spinal cord injury (SCI) related central neuropathic pain

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BACKGROUND: SCI related central neuropathic pain occurs at or below the level of injury with a prevalence of 35-40% though both types may be present in some patients. It is widely acknowledged as one of the most challenging neuropathic pain conditions to manage. There is clinical evidence to suggest that systemic lidocaine can be used as a treatment option in the management of neuropathic pain syndromes through the inhibition of voltage-gated sodium channels, thereby modulating ectopic neuronal discharges.

AIMS: The aim of this case report is to describe the use of lidocaine intravenous infusions in the management of spinal cord injury (SCI) related central neuropathic pain, highlighting its potential therapeutic benefits and impact on the patient's overall function and quality of life.

METHODS: We present a case of below level central neuropathic pain in a 52-year-old male who sustained a L2 burst fracture and T10 – L1 incomplete spinal cord injury after a paragliding accident rendering him paraplegic at the age of 32. Seven years post injury, he developed a constant severe burning sensation in both thighs to feet. Pain was worse with increased daily activity, and at times associated pins and needles. He suffered from low mood, poor concentration and sleep and gained very limited benefit from conventional pain medication including tramadol, gabapentinoids and morphine.

RESULTS: The patient reported 15% reduction after the first lidocaine infusion at a dose of 4 mg/Kg (280mg of 0.5% lidocaine) over 1hour in 2013. With continued 4-monthly infusions, this was increased to a 20% pain reduction, as well as a reduction in the use of Targinact by 50%, Amitriptyline by 80%, and Diazepam by 93%. Most importantly, this treatment has enabled the patient to continue working.

CONCLUSIONS: The concept of using lidocaine for pain management was first reported by two anaesthetists Bartlett and Hutaserani in 1961, who observed effective post-operative pain relief with intravenous lidocaine infusion. Later, Attal et al. demonstrated the efficacy of lidocaine in spinal cord injury patients suggesting the involvement of sodium channel in central pain states. In pain medicine, 50% reduction in pain is often considered an effective treatment goal. However, in this case report, while the patient experienced a 15-20% reduction in pain with lidocaine infusion, it allowed for reduction of other medications and improved function and quality of life, such as the ability to continue working. This emphasizes the importance of focusing on overall function and quality of life as treatment outcomes, rather than solely relying on percentage of pain relief. Future prospects in treating central neuropathic pain syndromes might include drugs that block specific

sodium channel subtypes, as well as gene therapy targeting sodium channel transcription or transport.

Keywords: central neuropathic pain, lidocaine infusion

PP074

Neuropathic Pain

Topline Results from RELIEF-PHN 1: A Phase 2, Double-blind, Placebo-controlled Trial of LX9211 in the Treatment of Postherpetic Neuralgia Pain

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BACKGROUND: Postherpetic neuralgia (PHN) is a neuropathic pain syndrome. Neuropathic pain is caused by a lesion or disease of the somatosensory nervous system such as herpes infection and diabetes, which can led to chronic pain syndromes such as PHN and diabetic peripheral neuropathic pain (DPNP). It is a common complication of shingles, generally affecting up to 18% of older adults, that can last for months to years after the herpes zoster skin rash resolves. Despite availability of approved medications, many patients experience inadequate pain relief. Additionally, many of these medications have undesirable side effects including dizziness, somnolence and peripheral edema.

Adaptor-associated protein kinase 1 (AAK1) is a novel, non-opioid, therapeutic target for the treatment of neuropathic pain. LX9211 is a potent, orally administered, small molecule inhibitor of AAK1. In a recent, proof-of-concept Phase 2 clinical trial in patients with diabetic peripheral neuropathy (RELIEF-DPN 1), once-daily administration of LX9211 significantly reduced neuropathic pain in these patients.

AIMS: The objectives of this study were to evaluate the efficacy of LX9211 in reducing pain related to PHN and to assess other effects and patient reported outcomes of LX9211 versus placebo during and following the Week 6 Treatment Period.

METHODS: A multicenter, Phase 2, double-blind, randomized, placebo-controlled, parallel-group study was conducted to evaluate the efficacy and safety of LX9211 in the treatment of postherpetic neuralgia (RELIEF-PHN 1, NCT04662281). Adults ≥18 years of age with prior herpes zoster skin rash and PHN pain persisting for ≥3 months after healing of the herpes zoster skin rash, who met all inclusion and no exclusion criteria, were eligible for enrollment. In this study, 79 patients were randomized in a 1:1 ratio to receive placebo or LX9211 200 mg/20 mg (200 mg Day 1, 20 mg thereafter), once daily for 6 weeks. This double-blinded treatment period was followed by a 5-week blinded safety follow-up period during which all subjects received placebo once daily.

The primary outcome was change from baseline in Average Daily Pain Score (ADPS), as measured by the 11-point numerical rating scale (0,no pain, to 10, worst imaginable pain).

RESULTS: In topline results, the LX9211 200 mg/20 mg arm demonstrated a reduction of 0.8 in ADPS compared to placebo at Week 6 which did not achieve statistical significance ($p = 0.12$), but in the post-hoc analysis, the average effect over time was significant (LS Mean = -0.7990, $p = 0.0318$). The separation in ADPS for the LX9211 arm from placebo was noted in Week 1 and was maintained for the duration of treatment.

The most frequent adverse events reported in the LX9211 arm were dizziness, headache, and nausea. No treatment-related serious adverse events or deaths were reported.

CONCLUSIONS: This study supports the further clinical evaluation of LX9211 as a novel, non-opioid treatment option for PHN.

Keywords: Neuropathic pain, LX9211, AAKI, RELIEF-PHN 1, PHN

PP075

Neuropathic Pain

Amputation in patients with CRPS in the lower limb – Experience from West Midlands

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BACKGROUND: Complex regional pain syndrome (CRPS) is a chronic neurologic condition with multiple disabling symptoms - severe neuropathic pain, vasomotor dysfunction, skin ulceration, and infection and autonomic instability. Treatment modalities include medication, physical therapy, psychological therapy, and neuromodulation but it is very difficult to treat, and outcomes are usually unsatisfactory.

Amputation is often requested by patients in refractory cases but there are concerns of recurrence of CRPS, residual/phantom pain and worsening disability. The chances of with functional ambulation with prosthesis as well as the success with pain relief seem to be limited. Hence, many believe that amputation for CRPS is unlikely to have a better outcome.

Recent RCP guidelines suggest amputation may be considered in a selected group of patients following a thorough multidisciplinary assessment and evaluation of all risk factors. Amputation of the diseased segment of the limb offers the patient the unique prospect to turn around the natural history. It may put an end to the recurrent intractable infections and septicemia. Patient can regain functional ability including ambulation and quality of life though it does not guarantee with pain relief. It is crucial to have a pre-amputation consultation with the multidisciplinary amputation rehabilitation team to have an open discussion of the caveats and risks associated with amputation and set realistic functional goals and a clear plan for rehabilitation from the start. West Midlands Rehabilitation centre is a regional tertiary Prosthetic and Amputee Rehabilitation Centre which provides complex rehabilitation to people with amputation including those with CRPS.

AIMS: The aim is to evaluate outcomes of our patient cohort at West Midlands Rehabilitation Centre and establish references for future consultations.

METHODS: It is a retrospective study. Electronic and paper medical records were reviewed. Inclusion criteria – Patient with formal diagnosis of CRPS who had undergone lower limb amputation and were referred to WMRC and its satellite clinics during February 2016 – March 2022.

RESULTS: We reviewed 12 patients – Age (19 - 65 years), Gender (Male = 5 Female = 7), Level of amputation (transfemoral = 5, through knee = 2, transtibial = 5) and sides (unilateral = 10, bilateral = 1). The event leading to CRPS varied from surgeries, crush injury to nerve damage.

8 had pre-amputation consultation with us. Primary goals for amputation were wound complications = 4, pain relief = 3, specific

physical activities = 2, walking = 2 and dystonia = 1. 11 out of 12 achieved primary goals. 2 from 5 wheelchair bound patients progressed to prosthetic walking. Those who were walking before amputation either improved or maintained ambulation, but one chose to be a non-limb wearer. Pain at 1 year after amputation was phantom (3), and stump (3).

CONCLUSIONS: Most people with CRPS who have undergone lower limb amputation achieved their primary goal of having amputation. The keys to this achievement are setting realistic functional goals other than just pain relief, and frank discussion at comprehensive pre-amputation consultation with MDT support through the different stages of rehabilitation.

Amputation is a life changing surgery and should be considered as a positive intervention in selected cases of refractory CRPS.

Keywords: CRPS, phantom, Amputation, Rehabilitation

PP076

Neuropathic Pain

Repeated treatment with high concentration capsaicin cutaneous patch: a retrospective chart review focussing on pain intensity and co-medication use

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BACKGROUND: The high-concentration capsaicin patch (HCCP) [Qutenza® 179 mg cutaneous patch; Grünenthal GmbH, Aachen, Germany] is a treatment option for patients suffering from peripheral neuropathic pain. Latest data demonstrated that two or three applications may be necessary in some patients before they respond to therapy (Freynhagen R, et al. Pain Med. 2021;22(10):2324-2336).

AIMS: There is only limited data available on effectiveness in patients with repeated HCCP applications in a real-world setting in Germany. We therefore aimed at analysing patient characteristics, pain intensity, and concomitant medication taken for peripheral neuropathic pain of patients with at least two applications in real-world clinical practice.

METHODS: We did a monocentric, retrospective cohort study including patients with at least two HCCP applications treated between January 1, 2011 to July 7, 2022 at the pain practice Wiesbaden (Germany). Patient characteristics, pain etiology and concomitant pain medication (e.g., opioids, antiepileptics, antidepressants) were collected from the electronic medical records. Pain intensity was assessed independently by the treating physician and a medical assistant based on information from patient records and following the behavioural observation scale 3 (BOS-3). The study received approval from the responsible ethics committee (ethics committee of the 'Landesärztekammer Hessen').

RESULTS: 97 patients were treated with at least two HCCP applications (64 female patients; Ø-age: 54.6 years). 38 of 97 patients (39%) were treated with two, 59 of 97 patients (61%) with more than two HCCP applications. On average, patients were 1.7 years on HCCP treatment, received 5.9 repeated treatments and 1.2 patches per application. The most frequent indications were neuropathic back pain (33%), followed by postoperative or posttraumatic neuropathic pain (25%) and postherpetic neuropathic pain (14%). 52 (54%), 57 (59%), and 61 (63%) received a concomitant treatment with opioids, antiepileptics, or antidepressants, respectively. The average daily dose of morphine equivalent was 88 mg at the beginning of the HCCP treatment and was significantly reduced by 5 mg compared to the average daily dose received within two years of treatment ($p = 0.0446$). There was no statistical significant change of the average daily doses of pregabalin ($p = 0.4304$)or gabapentin ($p = 0.0977$), although the average daily dose of gabapentin was reduced by 446 mg. The documentation did not allow to analyse the change of daily dose of antidepressants. Pain intensity was evaluated to be high or very high in 81 patients (84%) at the beginning of therapy and was assessed to be improved or highly improved at the last treatment in 63 of 97 patients (65%). Importantly, 50 of 59 patients (85%) with at least three applications had a high or very high improvement of pain intensity compared to 13 of 38 patients (34%) with two applications.

CONCLUSIONS: Patient characteristics of our cohort such as age and gender are comparable with international literature. Patients with at least two HCCP applications had a statistically significant reduction of concomitant opioid medication. The improvement of pain intensity was evaluated to be high especially in patients with three or more applications compared to patients with exactly two. The results of our real-world study show that it might be reasonable to HCCP therapy in patients with no or low response after first or second application.

Keywords: Peripheral neuropathic pain, high-concentration capsaicin patch, topical treatment, progressive response, concomitant opioid medication

PP077

Neuropathic Pain

Effect of Korean Medicine Treatment in Patients with Postherpetic Neuralgia: A Retrospective Chart Review

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BACKGROUND: Postherpetic neuralgia (PHN) is a neuropathic pain disease that seriously affects the quality of life of patients along with anxiety, depression, insomnia, and fatigue as well as pain. Many patients do not respond to conventional treatments, and several adverse events have been reported. There is considerable clinical evidence that Korean medicine treatment (KMT), including acupuncture, pharmacopuncture, and herbal medicine, improves chronic pain. Integrative KMT is frequently used to treat complex symptoms of PHN in a clinical setting in Korea.

AIMS: This study aimed to identify the effect of integrative KMT on patients with PHN by retrospectively reviewing electronic medical records.

METHODS: We retrospectively analyzed the electronic medical records of PHN patients receiving KMT at Kyung Hee University Korean Medicine Hospital between August 2021 and July 2022. This study was approved by the Institutional Review Board of Kyung Hee University Korean Medicine Hospital (KOMCIRB 2022-07-003). The primary outcome was measured by Numerical Rating Scale (NRS) for worst and average pain over the past 7 days. The secondary

outcomes were measured by Short Form-McGill Pain Questionnaire (SF-MPQ) for sensory and affective dimension of pain, Hospital Anxiety and Depression Scale-Anxiety (HADS-A) for anxiety, Hospital Anxiety and Depression Scale-Depression (HADS-D) for depression, Daily Sleep Interference Scale (DSIS) for sleep disorder, Fatigue severity scale (FSS) for fatigue, and EuroQol-5D (EQ-5D) for quality of life. The subgroups were analyzed by dividing into the group affected on the trunk and the group affected on the face. Also, according to the session of treatment for the first 4 weeks, it was analyzed by dividing into the group receiving treatment more than twice a week and the group receiving treatment below twice a week.

RESULTS: Thirteen patients with PHN were included in the study. The NRS for worst pain decreased from 6.54 ± 0.64 at baseline to 3.85 ± 0.63 at 8 weeks ($p < 0.01$). The NRS for average pain decreased from 4.93 ± 0.67 at baseline to 3.08 ± 0.46 at 8 weeks ($p < 0.01$). From baseline to 8 weeks, there was a decrease from 33.85 ± 10.18 to 26.08 ± 8.15 in SF-MPQ ($p < 0.01$), 8 ± 6.42 to 2.62 ± 2.22 in HADS-A ($p < 0.01$), 7.77 ± 5.36 to 5.54 ± 3.2 in HADS-D ($p > 0.05$), 3.38 ± 2.72 to 2 ± 2.13 in DSIS ($p > 0.05$), 3.7 ± 1.63 to 2.16 ± 1.38 in FSS ($p < 0.01$), and 5.31 ± 3.1 to 3.15 ± 1.72 in EQ-5D ($p < 0.05$). After 8 weeks of KMT, pain reduction tended to be great in the group affected on the trunk than the group affected on the face. Furthermore, in the group receiving KMT more than twice a week for the first 4 weeks, pain reduction tended to be great than in the group receiving KMT below twice a week. During this period, no adverse events related to KMT were reported.

CONCLUSIONS: KMT might be an effective and safe therapy to reduce pain and improve anxiety, depression, sleep disorder, fatigue, and quality of life in patients with PHN.

Keywords: Postherpetic neuralgia, Korean medical treatment, pain intensity, chart review

PP078

Non-Pharmacological Pain Management

Efficacy and safety of an infrared technology-based patch for treatment of acute to moderate low back pain: A phase 3 randomized clinical trial

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BACKGROUND: Global prevalence of low back pain (LBP) is estimated to be 7.5% affecting 577 million people and remains the most common musculoskeletal (MSK) problem globally. Non-pharmacological therapies are recommended as first-line treatment for MSK pain. Clinicians utilize multimodal therapies to promote self-healing and restore haemostasis and equilibrium to the body network. FIRTECH is a non-pharmacological patch containing infrared emitting minerals dispersed in the adhesive and supported by synthetic fibres. These bioceramic particles absorb the body's natural heat to re-emit the infrared (IR) energy back to the body. Infrared energy can penetrate the skin and induce anti-oxidative, anti-inflammatory, and local vasodilatation effects.

AIMS: This trial determined the efficacy and safety of the IR therapy patch (ITP), FIRTECH, in treating acute mild to moderate LBP. Here, we report results of the primary and secondary outcomes of our study.

METHODS: This open-label, randomized, clinical trial (NCT05137041) compared the FIRTECH patch with no-patch control arm in subjects with acute LBP (lumbar back pain), aged ≥18 to <65 years). Subjects with intensity ≤6 on 0-10 Numerical Rating Scale (NRS) were eligible to participate in the study. Baseline assessments, e-diary activation and patch application on LBP site were completed on site at Day 1 and final evaluations with patch removal were performed on Day 5 with an additional follow-up day. Primary endpoint was NRS responders at Day 5 (visit 2) (≥30% decrease from baseline of the instantaneous pain and no rescue medication needed). Key secondary endpoints are Normalized Sum of Pain Intensity Difference over 5 days (SPID0-5), percentage change in Roland-Morris Disability Questionnaire (RMDQ) score and change in mobility evaluation (Schober's Test) from baseline to day 5; and time to reach acceptable pain. Descriptive and inferential analyses were conducted for the secondary outcomes.

RESULTS: Among the 221 randomised subjects (FIRTECH, n = 113; no patch, n = 108), 54.8% were female and mean (SD) age of the subjects was 45.2 (12.97) years. The primary objective was met: a medically relevant and statistically significant effect was demonstrated (data reported elsewhere). A significant decrease in normalised SPID0-5 was demonstrated in the FIRTECH patch group (LSM difference [95% CI]: −0.5 [−0.817, −1.137]; p = 0.015). Similarly, mobility evaluation was improved by Day 5 in the FIRTECH patch group vs no-patch group (LS mean: 0.9 vs -0.1; LSM difference [95% CI]: 1.0 [0.511, 1.581]; $p < 0.001$). At Day 5, RMDQ scores improved from baseline in FIRTECH group vs no-patch group, although the difference was not significant (LSM −32.2% vs −16.3%; p = 0.103). Similarly, no significant difference was observed in median time to reach acceptable pain among both the study groups (9.62 h vs 8.65 h, respectively). Treatment emergent adverse events (TEAEs) were reported in 19 of 114 subjects (16.7%) in FIRTECH patch vs 7 of 107 subjects (6.5%) in no-patch groups. Device related TEAEs were reported in 12 subjects (10.5%) in FIRTECH patch group; of which the most frequent ones were application site pruritus (n = 7, 6.1%), followed by application site pain and erythema (both n = 2, 1.8%).

CONCLUSIONS: This is the first phase 3 trial data demonstrating the efficacy of the FIRTECH drug-free patch in subjects with LBP for pain relief up to 5 days with improved pain and mobility. Moreover, FIRTECH patch showed a favourable safety profile and was well tolerated by all participants.

Keywords: infrared, musculoskeletal pain, low back pain, non-pharmacological, drug-free patch

PP079

Non-Pharmacological Pain Management

How individuals living with persistent pain helped support planning and relaunch of NHS Ayrshire and Arran Pain Management Programme

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BACKGROUND: NHS Ayrshire and Arran Pain Management Programme (PMP) has been paused since 2018 due to staffing levels and subsequent COVID-19 disruptions. The Pain Management Service has recently invested in additional multidisciplinary team (MDT) members. This included additional Clinical Psychology and Physiotherapy input, the introduction of an Advanced Clinical Nurse Specialist and an Occupational Therapist. The focus of this investment was to relaunch the Pain Management Programme; which is the treatment of choice for people living with persistent pain in line with current evidence-based guidelines. Lived experience of those with persistent pain is key to collaborative working in delivery of pain services in line with local and national drivers.

Staff recognised the recent restrictions and challenges within healthcare settings and for individual experiences following COVID-19 pandemic would impact on traditional delivery of PMP.

The relaunch of the PMP allowed for a full review of the topics to be delivered, length of the group based programme and method of delivery.

AIMS: To involve current and previous service users at all stages of planning and delivery of the pain management programme to ensure the content was both evidence based and person centred.

METHODS: Members of the MDT involved with PMP planning and delivery considered recent guidelines for PMP delivery as well as experience of staff in delivering programmes. Patients attending pain services currently, and those with experience of PMPs were invited to several online focus groups to explore:

- which topics they considered to be essential to the programme,
- their opinions on whether the groups should be in person or virtual,
- how information is best shared, and
- who should be involved in delivering the information.

The questions asked were provided to all participants before the focus groups, and those who could not attend were kind enough to answer the questions via email.

RESULTS: The main themes were that participants were keen that family and friends be supported to improve their understanding and ability to be able to support people living with persistent pain. Attendance of a person with lived experience, who had previously completed a PMP themselves, was identified as vital to embed benefits of the programme from those who had experienced this.

The other topics they all felt were essential in the delivery of a PMP were:

- communication skills when speaking about their pain condition to health professionals and peers,
- goal setting,
- sleep and
- pain medications.

The information from the focus group participants along with the guidelines were combined to plan a full and holistic programme that fully supports self-management of long term pain conditions. In order to deliver the topics in a meaningful way, it was decided the group will be delivered over 13 consecutive weeks. There was consensus that there should be an option of in person and virtual delivery, to be inclusive to all. Follow up information after planning of the PMP was shared to all participants to let them know how the data collected influenced planning. Feedback was again encouraged and considered.

CONCLUSIONS: The focus groups provided invaluable information for relaunching NHS Ayrshire and Arran's PMP. The option of in-person and virtual groups will now be offered to meet the needs of service users. All topics highlighted by the focus groups are covered within the delivery of the Pain Management Programme and focus group attendees gave positive feedback on the programme plan. Involving individuals with lived experience follows person-centred guidance as outlined in best practice guidelines.

Keywords: person-centred, collaborative, pain management programme, evidence based, service relaunch

PP080

Non-Pharmacological Pain Management

Testing the Acceptability and Safety of Virtual Reality for Pre-Operative Patients

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BACKGROUND: We report the results from a collaborative feasibility test-bed study between NHS Highland and Healthy Minds Incorporated (https://healthymind.fr/en/accueil-english/). The study aimed to evaluate the acceptability and safety of introducing a virtual reality headset patient experience in a preoperative environment at a large general hospital. Virtual Reality (VR) is a computer technology aims to focus the brain's attention away from the anxiety to elsewhere (distraction and immersion). The prevalence of pre-operative anxiety is between 11-80%. Presence of pre-operative anxiety results in increased analgesia requirements post-operatively, accentuates the stress response to surgery, impairs wound healing, and delays recovery with increased length of stay and healthcare costs [1]. Evidence to the efficacy of VR to reduce anxiety in health settings is developing [2,3,4]. The VR test bed study results are reported here. This is a prelude to considering a future pilot randomised controlled study to test the therapeutic value of VR on perioperative anxiety, pain and surgical outcomes.

AIMS: To evaluate the acceptability, safety and experience of healthcare staff implementing a VR headset experience with patients prior to their operation; and ascertain patient responses to their VR experience.

METHODS: A two phase implementation plan facilitated (1) training and simulation of the VR device with staff and a patient recruitment plan (2) testing the device clinically in preoperative settings. Qualitative and quantitative methods were used. The staff and patients participating were invited to complete a paper questionnaire about their experience and share reflections. The questionnaires primarily measured the 'happiness' levels of participants' experiences as users and reflections of elements of the device using a quantitative rating system. Questionnaires were short and simple due to the busy clinical operative environment. Staff also provided qualitative data about their experience by email. The data was collated and analysed using excel. Qualitative responses were coded and organised according to themes.

RESULTS: Overall, staff and patients rated the VR device and the VR experience positively. Comments were constructive with suggestions made to improve the visual and audio experience and the comfort of using the device. Several comments indicated its potential in preoperative and other healthcare environments. Although the majority found the device reliable some technical problems were experienced. The patient recruitment process did present some challenges due to pressures in surgical current

surgical waiting lists. Feedback from patients using the VR set prior to surgery was very positive.

CONCLUSIONS: This test bed study provided opportunity to test a technical VR device in a clinical environment to assess what preparation is required to implement the VR device safely. The VR device and experience was acceptable to both staff and patients. There were no serious safety incidents. The feedback received has been discussed with the research team and will be incorporated into the design of a future pilot RCT on the role of VR in very anxious surgical patients.

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Keywords: Virtual Reality, Pre-operative

PP081

Non-Pharmacological Pain Management

Flippin' Ayrshire: A Public Health approach to Persistent Pain

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BACKGROUND: A collaborative event was run with NHS Ayrshire and Arran, and Flippin' Pain TM, to tackle the messaging around pain for communities living in Ayrshire and Arran. Due to the success of this event, funding was secured to support a national approach with three online seminars, to be delivered by Flippin' Pain TM in partnership with NHS Scotland and the Government.

AIMS: The events aimed to deliver the following outcomes:

- Help the significant number of people (18.1% Scottish adult population live with persistent pain who suffer from the debilitating effects of persistent pain, by introducing them to an evidence-based understanding of pain. This learning can positively shift beliefs about pain and increase pain health literacy
- Support people to better manage their pain and make informed choices about the health care they access, and help individuals with persistent pain to maintain and support an independent lifestyle.
- Address the significant levels of psychological and social difficulty associated with persistent pain and the current global pandemic
- Support patients to improve their understanding and expectations of pain treatments to reduce the negative impact on both primary and secondary care resources, through unnecessary and inappropriate investigations and treatments.
- Support education and self-management strategies for those on lengthy waiting lists, and support best management in line with evidence-based medicine, informed decision making and shared decision making.

METHODS: The seminars share information about understanding of pain that addresses some of the inaccurate information and beliefs which are unhelpful for those affected by chronic pain including empowering individuals to make more informed decisions about their own health care.

The webinar covers key messages around pain and a panel discussion with health care professionals and those living with persistent pain.

All participants were asked to complete an online survey prior to and following watching the live or recording webinars, evaluation of the webinar series looked across a number of outcomes.

RESULTS: 2268 people registered, 48% were people living with pain.

212 people living with chronic pain responded to the online survey.

- 50% of that cohort were also waiting for an appointment or treatment with an NHS service.
- 64% reported after watching the webinar they felt more hopeful about the future.
- 71% planned to try and increase or seek advice regarding ways to increase the amount of physical activity they do • 77% would recommend the webinar to someone else living with chronic pain.
- 60% feel more confident to discuss my pain management with a healthcare professional

Qualitative information was also captured:

"I could have used different approaches to help me cope rather than taking strong medication"

"Since I have listened to the first one I have managed to take myself off my medication with the help of my GP. I felt as if someone was finally listening"

CONCLUSIONS: The outcomes of this webinar series strengthen the requirement for access to early pain education for individuals and health care professionals. The ultimate aim would be to continue to drive activities to improve population understanding of pain as a long-term condition and promote self-management and enhance those people living with pain to thrive in our communities.

Although this was a funded development to support public health messaging and pain understanding, 86% of health care professionals attending indicated that they felt more confident in discussing pain and resources to support pain management following the webinar series. This highlights the power of educating health care professionals in improving confidence in delivering pain education.

Keywords: self-management, pain education

PP082

Non-Pharmacological Pain Management

Intervention study using photobiomodulation therapy (PBMT) for patients with low back pain. A pilot study (NEBULA study)

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BACKGROUND: Low back pain (LBP) is a leading cause of years lived with disability in the UK.[1] Several invasive treatments are available, but few are supported by evidence of effectiveness.[2,3] Non-

invasive techniques are increasingly being favoured over invasive techniques due to lowered cost and low potential for harm. PBMT, also known as low level laser therapy, is a NICE approved treatment for chemotherapy induced oral mucositis.[4] The therapy has been postulated to enhance tissue repair through induction of cell proliferation and enhancement of stem cell differentiation.[5-8] Its use in musculoskeletal pain has been extensively reported in the literature. A systematic review of the use of PBMT in chronic non-specific LBP patients concluded that there is moderate quality of evidence of PBMT for these patients in the short term.[9]

AIMS: The overarching aim is to obtain information to inform the planning of a subsequent larger definitive RCT - including estimates of compliance with the Photobiomodulation Therapy treatment and the variability in treatment effect for a selected cohort of participants with chronic non-specific low back pain.

METHODS: This is a single centre, non-randomised pilot study, which has recruited 52 patients with chronic non-specific LBP over 12 months. Primary endpoint is pain score with a one-week participant recall. Secondary endpoints are function (EQ-5D-5L), disability (ODI), patient impression of change (PGIC), satisfaction (Likert scale) and healthcare resource utilisation. Participants received PBMT as three-minute sessions, three sessions per week, for four weeks with 12 sessions total. Participants are followed up until three months.

Photobiomodulation therapy was administered with an 810 nm (80 x 200mW) "Giant laser cluster probe" at midline over the spine (covering L3-S2) and bilaterally over SI joints. Treatment time 1 minute / area (total of 3 minutes). The specification for each laser diode was as follows: 810 nm, 200 mW, approximately 5 W/cm^2. The energy delivered in 60 seconds per laser was 12 Joules and the fluence was 300 J/cm^2. The average irradiance over whole surface area ~160mW/cm2 therefore the average fluence (dose) over whole surface area was 9.6 J/cm2. The pulse repetition rate was 2.5 Hz.

RESULTS: Along with data collection at baseline and weekly NRS scores (taken prior to therapy administration), data was collected at the final therapy visit for the one-month visit and a telephone call at three months. Data will be analysed using a linear mixed model with restricted maximum likelihood, with time as a fixed effect and a random subject intercept. Mean differences versus baseline will be presented together with 95% confidence intervals for descriptive purposes only. Results of the economic evaluation will be presented as a cost-consequence analysis and estimates of cost-effectiveness presented as incremental cost-effective ratios (ICERs). Fifty-two participants have been recruited and received full treatment; six participants are awaiting follow-up which will be completed by 12 February 2023. Full results will be presented at the conference.

CONCLUSIONS: If successful, PBMT may be one of the first line treatments given to patients in the pain clinic which can be administered by nurses. This may help to reduce appointment waiting lists, give treatment quicker to patients and help relieve pain whilst waiting for other treatments.

Keywords: Photobiomodulation, low back pain, non-invasive therapy

PP083 Non-Pharmacological Pain Management

Distinct Neural Signatures of Multimodal Resizing Illusions: Implications for Chronic Pain Treatment

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BACKGROUND: With chronic pain affecting around 1 in 6 people in the UK (NHS, 2018), and current pharmaceutical and surgical interventions often being minimally effective at best (Dworkin et al., 2010; Corriger et al., 2022; Beswick et al., 2012), there is a need to find non-pharmaceutical based therapies that can be offered to chronic pain patients. One such potential therapy could be illusory body resizing, which typically uses multisensory integration and augmented reality apparatus to change the perceived size of a body part. It is thought that in chronic pain conditions, the neural representation of the painful body part is distorted, and that resizing illusions can modulate these distorted representations. Evidence supporting this comes from previous use of resizing illusions, which have been found to reduce pain in hand and knee-based osteoarthritis (Preston & Newport, 2011; Preston et al., 2020; Stanton et al., 2018). However, we currently lack understanding of what happens in the brain during such illusions, and therefore, a comprehensive understanding of this non-pharmaceutical intervention for chronic pain treatment.

AIMS: This study aimed to uncover neural signatures of the previously used multisensory resizing illusion and a unimodal-visual version of the illusion in healthy participants, to give a basis for looking at the neural signatures in a chronic pain population at a later date. The benefit of a unimodal-visual version of the illusion, is that this can be implemented as a treatment option without the need for the presence of a researcher delivering the illusion, therefore being a far more accessible treatment option for patients.

METHODS: This preregistered study (n = 48) used electroencephalography (EEG) in addition to subjective illusory experience questionnaires to assess the neural underpinnings and personal experience of multisensory (visuo-tactile) and uni-modal visual illusions of the index finger stretching and shrinking, in addition to asynchronous illusions (where tactile and visual inputs were incongruent with the stretching or shrinking of the finger, and were not anticipated to induce an illusory effect) and a baseline condition with no manipulation. Time frequency analysis was completed for EEG data, and data were grouped into frequency bands (theta = 5-7Hz, gamma = 30-60Hz), before changes in magnitude were assessed using non-parametric cluster-based permutation analysis. Subjective questionnaire data were analysed using Friedman tests, with Conover post hoc tests were appropriate.

RESULTS: Our results found increased parietal gamma activity, likely reflecting multisensory integration, when comparing multisensory to unimodal visual conditions, and we found increased parietal theta activity, likely reflecting additional cognitive load requirement, when comparing asynchronous to non-illusion conditions. Results also demonstrated that 27% of participants experienced the illusion with visual-only stimuli, and further analysis suggested that those who experience visual-only illusions exhibit a different neural signature to those who do not, showing slightly decreased gamma activity at an earlier phase of experimental manipulation.

CONCLUSIONS: Our results support the importance of multisensory integration for illusory changes in perceived body size. However, importantly, we also suggest that visual-only illusions can influence cortical body representations for a significant proportion of participants, which could have implications for the development of accessible visual-only chronic pain treatments, such as a need to include susceptibility measures prior to offering unimodal-visual resizing illusions as a non-pharmacological treatment option.

Keywords: Chronic Pain, EEG, Multisensory Resizing Illusions

PP084

Non-Pharmacological Pain Management

The Opioid-Sparing Effect of Acupuncture after Abdominal Surgery: A Systematic Review and Meta-Analysis

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BACKGROUND: In the era of the opioid epidemic, various interventions were developed to reduce opioid overuse. One of the non-pharmacological interventions, acupuncture, has been researched for pain management after a surgical procedure. Especially some researches reported that acupuncture had an opioid-sparing effect, reducing opioid consumption and side effects.

AIMS: The objective of the systematic review is to evaluate the effectiveness of acupuncture on opioid-sparing effect and the safety of acupuncture after abdominal surgery.

METHODS: We searched eleven databases, including English-language databases (Ovid, CENTRAL, EMBASE, CINAHL), Korean databases, Chinese databases, and Japanese databases from inception to November 28, 2021. We included randomized controlled trials with patients undergoing abdominal surgery, which reported a cumulative opioid consumption and used acupuncture as an intervention compared to no treatment, sham acupuncture, and conventional treatments. Additionally, the number of cumulative opioid analgesia demands/requests, the time to initial opioid analgesic usage, postoperative pain, opioid-related side effects, and adverse events were analyzed for secondary outcomes.

RESULTS: Fourteen studies met the inclusion criteria and compared acupuncture with sham acupuncture or non-sham groups. Acupuncture reduced cumulative opioid consumption during 24 hours compared to sham (mean difference (MD): –7.74 mg; 95% confidence interval (CI) –9.54 to –5.93; $P < 0.01$, $I^2 = 24\%$, moderate certainty of evidence) and non-sham groups respectively (MD: – 8.87 mg; 95% CI –12.13 to –5.60; $P < 0.01$, $I^2 = 76\%$, low certainty of evidence). Similarly, acupuncture reduced cumulative opioid consumption compared to sham acupuncture and non-sham groups for 8 hours. Acupuncture reduced postoperative pain at 24 hours compared to sham (MD: –8.75; 95% CI –15.02 to –2.48; $P < 0.05$, $I^2 = 58\%$, low certainty of evidence) and non-sham groups (MD: –13.14; 95% CI –20.78 to –5.50; $P < 0.05$, $I^2 = 82\%$, very low certainty of evidence). Furthermore, the meta-analysis results for the number of cumulative opioid analgesia demands/requests and the opioid-related side effects in 24 hours showed significant differences compared to the sham acupuncture and non-sham groups, respectively. Only one study reported skin irritation as an adverse event of acupuncture.

CONCLUSIONS: Acupuncture showed an opioid-sparing effect after abdominal surgery by reducing cumulative opioid consumption, analgesic demand, postoperative pain, and opioid-related side effects with a low risk of adverse events. Acupuncture could be a multimodal opioid-sparing strategy in the perioperative period.

Keywords: Acupuncture, Abdominal surgery, Postoperative opioid consumption, Opioid-sparing effect, Meta-analysis

PP085

Non-Pharmacological Pain Management

The synergistic effect of sensory stimulation and therapist's support on pain and the physical and mental health of the older adults

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BACKGROUND: Life expectancy is extending and accordingly there is a high demand for hospitalization in nursing homes. Older adults living in nursing homes may face chronic physical and mental health conditions, chronic pain, or reduced well-being. In addition to the medical treatments that patients receive to maintain their health, there is a great need for non-pharmacological approaches for managing physical and emotional health, pain, and discomfort.

Recently, sensory stimulation (SS) showed a promising ability to improve physical and mental conditions. In addition, interventions with a focus on social support and the relationship between the therapist and the patient also have favorable therapeutic effects. Indeed, therapist support (TS) is a well-established common factor in psychotherapy and can be easily triggered even in groups with reduced cognitive abilities. However, the synergistic therapeutic interrelations of SS and TS have never been tested.

AIMS: to investigate the solo and synergistic effect of SS and TS on the physical and mental health and pain levels, of older adults living in nursing homes.

METHODS: Ninety-six patients, age range between 65 and 99 living in the Ahuzat Hazafon nursing home, located in northern Israel, were randomly assigned to one of three groups: (1) SS, (2) TS, and (3) combined SS +TS interventions. SS was implemented using a multi-sensory Snoezelen room controlled by trained instructors. Pain levels, blood pressure, heart rate, blood oxygen saturation, and hand grip strength were evaluated before and after each of the four weekly 20-minute sessions by the nurse. In addition, life satisfaction and anxiety were evaluated before and after the whole intervention. Mixed model analysis was used for testing the relative efficacy of the three interventions. Study rational and analytical plans were preregistered.

RESULTS: The combined intervention of SS+TS vs. SS and TS separately resulted in reduced pain levels, ($p = 0.017$), systolic blood pressure ($p < 0.001$), and increased grip strength ($p = 0.04$). In addition, SS+TS intervention demonstrated stronger improvement in symptoms of general anxiety disorder significantly ($p < 0.0001$) and life satisfaction ($p = 0.04$) compared to SS and TS alone. No differences between the interventions were shown for blood oxygen saturation ($p = 0.06$), diastolic blood pressure ($p = 0.35$), and heart pulse ($p = 0.23$).

CONCLUSIONS: A synergy of SS and TS demonstrated promising therapeutic ability for pain management and maintenance of the physical and mental health of elderly patients, providing a base for understanding the mechanism of the intervention. The proposed intervention can be easily scaled and used to boost the well-being of older adult patients and to optimize nursing home therapeutic sources.

Keywords: SS - sensory stimulation, TS - theapist's suport, SS+TS - sensory stimulation and therapist's support

PP086

Non-Pharmacological Pain Management

Chronic pain Choir – benefits of group singing in patients with chronic pain.

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BACKGROUND: Singing has well-documented benefits for emotional well-being[1], improved breathing and lung function[2], posture and body control, relaxation and stress relief, and physical activity and energy[3,4] improving cardiovascular[5] and immune systems[6]. Similarly to principles involved in pain management programs, group singing promotes acceptance and behavioural change and improves self-efficacy[7].

AIMS: We sought to start a group choir in our chronic pain patient population in an effort to bring the physical, emotional and mental health benefits of group singing in parallel with medical therapies.

METHODS: The chronic pain choir was advertised to all tertiary and community chronic pain patients. The choir ran for 6 consecutive weeks for one hour, led by experienced singing tutor. Warm-up activities focused the mind and regulated breathing, followed by singing of familiar songs with emphasis on breath control and visualisation using techniques from yoga disciplines.

Participants who volunteered to join the choir were approached towards the end of the 6 sessions and asked to complete a short questionnaire on their perceived benefits from having attended the choir. They were invited to participate in qualitative research semi-structured interviews. Interviews were based around patients experiences of having attended the choir and its perceived impact on their psychological well-being. The semi-structured interviews were focused around themes of: physical improvements, emotional impact, personal growth, interpersonal relationships and living well with pain.

RESULTS: 9 participants attended the choir (all female), consisting of 6 patients with chronic pain, alongside staff from the chronic pain service.

4 participants completed a questionnaire providing feedback on their experience of the choir. All agreed that the choir made them more active (2 strongly agree, 2 agree); all strongly agreed that their mood was better after the choir; all agreed that the choir made them feel less isolated (2 strongly agree, 2 agree); 2 participants agreed the choir helped them manage their pain (1 strongly agreed).

Participants were asked to describe the choir in 3 words, and responded with the following:

Togetherness, enjoyment, fulfilling, social, release, enjoyable, fun, joyful, sociable.

Semi-structured interviews are currently being completed, and will be available at the time of the BPS conference.

CONCLUSIONS: Singing brings significant health benefits to patients suffering chronic pain, improving quality of life, and can aid in pain management alongside conventional therapies for chronic pain management.

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Keywords: Choir, Chronic pain, Group singing, Breathing, Well-being

PP087

Non-Pharmacological Pain Management

Beliefs in a trial of treatment for pain

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BACKGROUND: Beliefs about treatments in unblinded randomised controlled trials can influence treatment effectiveness, and ideally should be measured. Beliefs may affect compliance, which is necessary for effectiveness, and can in turn be affected by having experience of a treatment.

AIMS: To understand the role of treatment beliefs in a trial of telephone-delivered cognitive behavioural therapy (tCBT) to prevent chronic widespread pain (CWP). Specifically, to test if beliefs differed between treatment arms, at the start of treatment and in changes post-allocation, and if they were associated with outcome.

METHODS: The MAmMOTH study was a trial of tCBT for prevention of CWP in people at high risk. Patients with a number of risk factors for developing CWP were identified by survey of those registered at GP practices in Scotland. Potential participants were sent a short version of the Treatment Beliefs Questionnaire (TBQ) with the study invitation, to measure beliefs about trial treatments – tCBT (referred to as "talking therapy") and usual care (UC). The short TBQ consists of four statements

with a 5-point response scale (Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree) scored (1-5) such that high scores represent positive beliefs about treatment. Participants were randomly allocated tCBT or UC. Those allocated tCBT had initial assessment with a therapist by telephone followed by six weekly-sessions, with booster sessions at 3 and 6 months. Participants were considered to have completed treatment if they attended the initial assessment and at least two of any sessions. Those allocated UC received no additional intervention. Questionnaires at 3, 12 and 24 months recorded health, pain status, and the long version TBQ. For this analysis a positive outcome was defined as a report of 'much' or 'very much better' change in global impression of health on a 7-item Likert scale.

Scores of the short TBQ were calculated for each time point. Positivity towards each treatment was compared between those in each treatment arm using regression models adjusted for age, gender, number of CWP risk factors, GP practice, and, at follow-up, baseline TBQ. In the tCBT arm, positivity toward tCBT was compared at each timepoint between completers and non-completers. Logistic regression models assessed whether baseline TBQ for allocated treatment was associated with outcome, and whether concurrent attitudes towards allocated treatment were associated with outcome at each time point, after adjustment.

RESULTS: Baseline TBQ was available for 364 participants in each treatment arm. Positivity towards UC did not differ at any timepoint between those allocated tCBT and UC. Positivity toward talking therapy did not differ between treatment arms at baseline (3.29 in tCBT vs 3.26 in UC, adjusted mean difference 0.03, 95% confidence interval -0.07–0.13) but did at 3 months (3.60 vs 3.18, 0.39, 0.29-0.49), 12 months (3.56 vs 3.12, 0.40, 0.30-0.51) and 24 months (3.53 vs 3.13, 0.36, 0.24-0.48). In tCBT, completers (n = 247) differed from non-completers (n = 119) in positive beliefs towards tCBT at all timepoints: at baseline 3.37 in completers vs 3.11 in non-completers (adjusted mean difference 0.24, 0.09-0.38), at 3 months 3.70 vs 3.10 (0.48, 0.28-0.67), at 12 months, 3.73 vs 2.90 (0.69, 0.49-0.90), and at 24 months, 3.64 vs 2.99 (0.48, 0.24-0.71). Baseline positivity towards allocated treatment was not associated with positive outcomes. Concurrent positivity towards allocated treatment was associated with outcomes at each timepoint for tCBT, odds ratios 3.56 (2.11-6.01), 2.59 (1.71-3.92), and 3.33 (1.89-5.88), and at 3 months for UC 1.99 (1.22-3.22).

CONCLUSIONS: Experiencing tCBT was associated with an increase in positivity towards it, and positive beliefs are associated with treatment compliance and better outcomes. These findings are important for patients with pain as they show that having experience of tCBT might improve positivity toward it.

Keywords: beliefs, cognitive behavioural therapy, randomised controlled trials, treatment compliance, expectation

PP088

Non-Pharmacological Pain Management

Comparing characteristics and outcomes of individuals who participated in a trial versus those who did not

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BACKGROUND: Participants in trials of pain treatments may differ from those who are not recruited. It is important to understand how non-recruited patients, and their outcomes, differ from participants.

AIMS: To compare participants in a randomised controlled trial (RCT) of telephone-delivered cognitive behavioural therapy (tCBT) to prevent chronic widespread pain (CWP) with those who did not participate, at screening and outcome.

METHODS: The MAmMOTH Study was an RCT of tCBT for prevention of CWP in those at risk. To recruit, screening questionnaires were mailed to patients registered at GP practices in Scotland. Respondents were considered at risk if they had pain that was not CWP and met at least two of three risk factors: illness behaviour score of at least 4 (range 0-24); somatic symptoms score of at least 2 (0-5); sleep problems score of at least 5 (0-20). Eligible respondents consenting to contact were sent invitation letters. Those recruited were randomly allocated to tCBT or usual care (UC). TCBT consisted of assessment with a therapist by telephone, followed by six weekly-sessions, and boosters at three and six months. Those allocated UC received no further intervention. Follow-ups were at 3, 12, and 24 months. CWP at 12 months was the primary outcome. High-risk patients returning screening questionnaires who were not recruited but consented to contact about future studies, were sent a questionnaire at a time matched to the 12-month follow-up measuring pain, risk factors, and global change in health.

Differences at screening were expressed as difference in medians, percentages, or mean differences as appropriate, with 95% confidence intervals (CIs). Outcomes at 12 months were compared between those not recruited and those in the two trial arms using linear, binary, and ordinal logistic regression models adjusted for age, gender, GP practice, number of risk factors, and baseline outcome scores, to match analyses in the published trial paper. Mean differences and adjusted odd ratios (aOR) were reported comparing those in tCBT and those in UC to those not recruited as the reference group.

RESULTS: Of 18035 completed screening questionnaires, 4435 met criteria for being high-risk, and 996 were recruited. Compared to those not recruited, participants were older (median 59.1 vs 54.8 years, difference 4.2, 95% CI 2.7-5.6), and more likely to be female (41.5% vs 35.8%, 5.7%, 2.2-9.2%). Participants had higher risk factor scores than those not recruited – illness behaviour score 9.83 vs 8.34 (mean difference 1.49, 1.26-1.72), 19.4% with 2 to 5 somatic symptoms vs 16.1% (3.2%, 0.5-6.0%), sleep problems score 10.18 vs 9.70 (0.48, 0.15-0.81).

Follow-ups were available for 827 of those not recruited and 825 participants - 441 in UC, 384 in tCBT. CWP was not significantly different between those not recruited and either those in tCBT or those in UC, and neither were illness behaviour scores or somatic symptoms. Participants reported greater global improvements in health compared to those not recruited (in UC, aOR of 1 point increase in global impression of change score indicating worsening health 0.75, 0.60-0.93, in tCBT, 0.38, 0.30-0.48). Those in tCBT had lower sleep problem scores, but not those in UC, compared to those not recruited (8.20 in tCBT vs 9.31 in those not recruited, -1.13, -1.83 to -0.42).

CONCLUSIONS: Trial participants differed from those not recruited in age and pain risk factors. At follow-up, those in tCBT reported better sleep than those not recruited confirming the main trial results. Those in both trial arms reported better health at follow-up compared to those not recruited, perhaps due to participation effects. Using unrecruited participants as a comparison group confirms tCBT as effective for some pain risk factors, i.e., sleep problems, and this is important for people with pain.

Keywords: randomised controlled trials, chronic widespread pain, cognitive behaviour therapy, participation effects

PP089

Reviews

The relationship between the experience of poor sleep and pain in fibromyalgia: A qualitative meta-synthesis

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BACKGROUND: Fibromyalgia is a chronic condition characterised by widespread pain and sleep disturbance. Disturbed sleep has been associated with increased pain intensity, poor physical and cognitive functioning, low mood, and poor quality of life. Conversely, restorative sleep has been found to predict the successful resolution of chronic widespread pain. It is, therefore, important to understand the role of sleep in fibromyalgia.

AIMS: To evaluate how people diagnosed with fibromyalgia experience and manage poor sleep.

METHODS: An update of a published qualitative meta-synthesis of qualitative or mixed methods studies exploring the experience and/or management of sleep problems in children and/or adults diagnosed with fibromyalgia. We searched four relevant electronic bibliographic databases for all years up to November 2021 without applying any language restriction. We conducted a thematic analysis identifying the main recurrent 'descriptive' themes in the included studies and developed higher-level 'analytical' themes to capture the phenomena described across the identified literature, looking for areas of reciprocity and divergence. Finally, we mapped the relationships between analytical themes to the 'symptom experience' and 'symptom management strategies' domains of the Symptom Management Theory conceptual framework. This meta-synthesis forms part of a broader health technology assessment evaluating interventions for the management of poor sleep quality in people with fibromyalgia.

RESULTS: Nine reports from eight studies were identified as eligible for inclusion. These were combined with the studies identified in the earlier meta-synthesis to provide a total of 26 reports from 25 studies published between 2000 and 2021. The studies reported data for the perspectives of 565 people with fibromyalgia. All studies included only adult participants. The majority (90.4%) were women and were white (80.5%). The reported mean ages of the participants ranged from 41 years to 61 years. Other demographic characteristics (e.g., sociodemographic status) were often not reported. Results were organized into two overarching themes: experience of poor sleep in fibromyalgia and poor sleep quality management strategies in fibromyalgia. Four emergent sub-themes were identified: (1) evaluation of poor sleep, (2) response to poor sleep, (3) management strategies to encourage sleep, and (4) managing the consequences of a sleepless night. Poor sleep was described as one of the worst symptoms of fibromyalgia. Our analysis confirmed the previous findings regarding the bidirectional relationship between poor sleep and pain. Insufficient sleep was reported to increase pain intensity, which led to a state of fatigue that prevented good sleep at night and impacted on activities of daily living. Participants further explained that poor sleep prevented joints and muscles from resting properly and the presence of pain made it difficult to find a comfortable sleeping position to the extent that some of them were unable to share a bed with their partner. Conversely, some participants felt that getting a good night's sleep increased their pain due to being physically immobile while they were asleep. Poor sleep was also described as having a negative impact on cognitive functioning, mental health, and fibromyalgia symptom 'flare-ups'. Strategies to manage the consequences of a sleepless night included trying to rest and relax during the day and taking medication, although some participants felt that medication was ineffective for improving their sleep and/or caused unpleasant side effects. CONCLUSIONS: Our findings demonstrate that poor sleep is a common and profoundly disabling aspect of living with fibromyalgia. It is also a core component of fibromyalgia with negative consequences on pain, general health, and wellbeing.

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Keywords: fibromyalgia, pain, sleep, qualitative, metasynthesis

PP090

Reviews

Do virtual reality interventions improve preoperative anxiety and perioperative outcomes in adult patients undergoing elective surgery?

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BACKGROUND: It is very common for people undergoing elective surgery to experience preoperative anxiety (Powell et al., 2016). Patients' psychological state before surgery can have significant implications for surgical outcomes, including pain. Psychological intervention can help to alleviate the effects of preoperative anxiety on perioperative outcomes. Virtual reality (VR), as computer-based technology which creates "an all-inclusive, sensory illusion of being present in another environment" (Radianti et al., 2020), is one type of intervention which has been studied more recently in this context (Lambert et al., 2020), and may be a promising intervention for reducing preoperative anxiety and improving post-surgical outcomes such as pain in adult patients undergoing elective surgery. AIMS: This systematic review aims to evaluate the efficacy of VR interventions for reducing anxiety in adults undergoing elective surgery.

METHODS: Searches were conducted in the Cochrane Database, PsycINFO, Web of Science, PubMed, Embase and Cinahl. The search strategy was built from initial PICO (Participants, Intervention, Comparison, Outcomes) terms such as "surgery", "virtual reality", "anxiety" and "pain". Randomised controlled trials (RCTs) were eligible for inclusion if they were published between 2017 and 2022 and investigated the effects of VR on perioperative anxiety and perioperative pain (primary outcomes), as well as postoperative opioid use, length of stay in hospital, and complications (secondary outcomes). Details about the type of VR used and delivery of the intervention were also recorded. Two independent reviewers screened the abstracts and full texts, in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), to identify studies to include in the review. Conflicts were discussed and resolved with a third reviewer.

RESULTS: 12 studies, with a total of 875 participants, were identified through the screening process as being eligible for inclusion in the review. Types of surgical procedure covered by the studies included knee surgery ($n = 3$), and craniotomy or spinal surgery ($n = 2$). There was also variation in the type of VR technology used as well as the content of the VR. The most used VR headsets were Samsung Gear ($n = 4$), Oculus ($n = 3$), and Oncomfort ($n = 2$). Type of VR content included immersion in sceneries from typically calming environments (e.g. a tropical beach) ($n = 4$), and enactment of the day of surgery ($n = 3$). 75% (9/12) of the studies found VR intervention to significantly reduce preoperative anxiety. 33.3% (4/12) of the studies reported on pain outcomes, and of these none found perioperative pain to be significantly reduced.

CONCLUSIONS: The evidence demonstrates that virtual reality can be a useful tool for reducing anxiety in patients undergoing surgery. However, the current review found that VR did not significantly affect pain outcomes. Further investigation is needed to explore how VR can be used in clinical settings to improve patients' experience of pain as well as surgery-related anxiety. Postoperative pain can significantly impact patient quality of life in areas such as sleep, mental health and activities of daily living (ADLs). Prolonged pain can also delay recovery, result in longer use of opioid medication, and lead to higher healthcare costs. Virtual reality is a useful and effective tool for preoperative anxiety reduction, but whether VR can also positively influence postoperative pain requires further exploration.

Keywords: Virtual Reality, Preoperative Anxiety, Pain

PP091

Reviews

A systematic review and meta-analysis of fMRI BOLD signal in chronic pain patients during ongoing and provoked pain

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BACKGROUND: Functional neuroimaging allows for insights into neural structures and activities concomitant to pain experience. Nonetheless, research remains inconsistent regarding pain-specific BOLD responses in chronic pain (CP) populations.

AIMS: Our work aims to provide a quantitative synthesis of functional magnetic resonance imaging data spatial convergence differences in two classifications of CP (i.e., chronic primary and chronic secondary pain) and controls (C) in different pain modalities.

METHODS: We used activated likelihood estimation to conduct coordinate-based analysis. Our methodology aims to enhance precision and sensitivity by applying advanced hierarchical mixed-effects models while reducing false positive rates by combining a priori contrasts with family-wise error corrections. Importantly, we will compare cluster-level and voxel-level error corrections to better assess the specificity of the identified neural activations. For the first stage of the (pilot) meta-analysis, we identified 9 articles consisted of 17 experiments (222 patients and 103 controls).

RESULTS: A whole brain meta-analysis assessed the differences in spatial convergence between-groups to noxious stimuli. A preregistered lenient statistical threshold cluster-level $p < .05$, reveals no significant difference between-groups at preregistered statistical threshold. The analysis of behavioural data for the pain rating average across studies suggests variability across studies, but an overall positive effect size with CP. Overall, CP reported more pain than C. In addition, moderator analysis did not reveal any significant impact of demographics, relevant personality traits and methodological differences.

CONCLUSIONS: We propose to meta-analyse more studies since a rigorous cluster forming threshold will produce sufficient power that is generalisable and less impacted by heterogeneity across studies, whilst addressing problems such as p-hacking.

Keywords: Pain, Biomarker, BOLD, ALE, Registered Report

PP092

Reviews

Peri-operative intravenous lidocaine effect on acute and chronic pain after breast cancer surgery: a systematic review and meta-analysis

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BACKGROUND: Intravenous lidocaine infusion is known to have a positive impact on acute and chronic postoperative pain and on the recovery of patients undergoing abdominal surgery. However, the efficacy of IV lidocaine infusion in breast cancer surgery is not well known.

AIMS: To assess the effect of perioperative lidocaine administration in breast cancer surgery.

METHODS: PubMed, Scopus and Cochrane database were searched for randomized controlled trials that compared intravenous lidocaine infusion to placebo and reported the outcomes of (1) post-operative chronic pain after 6 and 3 months; (2) analgesia request 24 h post-operative; (3) Morphine consumption 24 hours post-operative; (4) post-operative nausea and (5) post-operative pain 24 hours after surgery at rest and at moviment. Heterogeneity was examined with I2 statistics. A random-effects model was used for outcomes with high heterogeneity.

RESULTS: We included 11 RCTs with 757 patients, of whom 379 (50.1%) underwent IV lidocaine infusion. Mean follow-up ranged from 24 hours to 6 months. Post-operative chronic pain after 6 months (OR 0.48; 95% CI 0.27-0.86; $p < 0.01$) was significantly less common in patients treated with IV lidocaine peri-operative compared to pacebo. Post-operative chronic pain after 3 months (OR

0.67; 95% CI 0.38-1.17; p = 0.16), analgesia request 24 h post-operative (OR 0.81; 95% CI 0.45-1.47; p = 0.5), Morphine consumption 24 hours post-operative (OR -0.18; 95% CI -0.39-0.04; p = 0.98), post-operative nausea (OR 0.65; 95% CI 0.39-1.08; p = 0.09) and post-operative pain 24 hours after surgery at rest (OR -0.22; 95% CI -0.74-0.30; p = 0.40) and at moviment (OR 0.18; 95% CI -0.24-0.61; p = 0.40) were not significantly different between groups.

CONCLUSIONS: These findings suggest that peri-operative IV lidocaine has superior efficacy to placebo as an chronic pain prevention strategy in patients undergoing breast cancer surgery. Nevertheless, this intervention is not efficient concerning acute pain and the quality of recovery of patients.

Keywords: Lidocaine, Meta-analysis, Pain management, Breast cancer surgery.

PP093

Reviews

Harms associated with Suprascapular Nerve Block Interventions in the non-surgical management of acute and chronic shoulder pain: a systematic review

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BACKGROUND: A significant and increasing proportion of the global population experience shoulder pain daily, yearly, and throughout a lifetime. Historically, patients who have exhausted standard care for persistent shoulder pain, or their co-morbidities precluded them, may be offered a suprascapular nerve block (SSNB) or ablation. The utility of the suprascapular nerve block (SSNB) continues to be explored in the non surgical management of acute and chronic shoulder pain, whilst the risks and physical harms have not. This review aims to address that gap to improve the shared decision making process.

AIMS: To undertake a systematic review of the physical harms associated with suprascapular nerve block (SSNB) interventions in the non-surgical management of acute and chronic shoulder pain.

METHODS: Protocol registered (PROSPERO CRD42022335268) and review reported in line with PRISMA Statement and PRISMA Harms checklist.

Search: EBSCO, MEDLINE, EMBASE, CINAHL, AMED, Cochrane Library, Scopus, Web of Science, and PubMed were searched from inception to 22nd December 2022. A pragmatic grey literature search was conducted.

Study Selection: Case reports, case series, randomised and non-randomised trials reporting physical harms with the use of guided/ unguided, SSNB injection/ pulsed radiofrequency/ablation for the non-surgical management of acute or chronic shoulder pain were included. Cadaveric, animal and experimental studies were excluded as well as in-situ catheter, continuous SSNB, and SSNB for peri, intra, or post-surgical intervention.

Data extraction and data synthesis: Two authors independently extracted data. The McMaster Quality Assessment of Harms tool was used to assess the quality of harms assessment and reporting. A narrative synthesis was undertaken.

RESULTS: Within the 111 included studies, Ultrasound guided in-plane SSNB injection was the most common intervention (44 studies). Forty papers across a breadth of shoulder pathology reported 165 physical harms in 5,004 participants. Harm severity ranged from minor post injection pain (n = 37) to pneumothorax (n = 5). One hundred and eighty papers failed to report the assessment or reporting of harm. Overall, the quality of harms assessment and reporting across studies was poor.

CONCLUSIONS: Assessment and reporting of harms was poor. It is unclear if the absence of reported harm in the excluded studies was due to a failure to assess, report, or if none occurred. Based on the data available SSNB is a low-risk intervention. Future studies should assess and report harms systematically to improve data for the shared decision making process.

Keywords: Suprascapular, Shoulder, pain, harm, adverse effect

PP094

Reviews

Efficacy and Safety of Low Dose Naltrexone (LDN) as a Treatment for Patients with Fibromyalgia

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BACKGROUND: Fibromyalgia (FM) is a debilitating persistent pain disorder characterised by widespread pain, fatigue, sleep disturbance and cognitive problems and has a significant impact not only on the patient but also the wider population. The current evidence-based recommendations for the management of Fibromyalgia advocates the use of exercise and non-pharmacological measures as first-line treatment whilst the use of pharmacological therapy is suggested as a second-line option because the evidence base is weak.

AIMS: To undertake a comprehensive critical literature review to evaluate the scientific evidence for both the clinical effectiveness and risk of adverse events for low dose Naltrexone (LDN) as a treatment for Fibromyalgia (FM). METHODS: The search strategy involved searching 11 academic research databases for the terms Naltrexone, low dose Naltrexone, LDN & Fibromyalgia. No limits were placed on the publication date, however, only articles published in the English language involving humans were included.

While systematic reviews, meta-analyses and randomised trials were prioritised other data sources, such as clinical reviews and unpublished grey literature (e.g., conference proceedings & presentations) were also included.

The strength of the evidence was graded using Harbour and Miller's hierarchy of evidence.

The searches were run in May and June 2021 and subsequently repeated in September 2021.

RESULTS: From a possible 333 records, 14 studies were identified as meeting the search criteria, of which 4 were systematic reviews, 10 clinical trials and 2 case reports. These had all been published between 2009 & 2021.

Low Dose Naltrexone (LDN) reduced pain and improved overall symptom severity associated with Fibromyalgia (low quality evidence). However, the effects on specific Fibromyalgia symptoms, including fatigue, mood, anxiety and sleep quality, were inconsistent.

No increased risk, compared to placebo, were found for serious adverse events at any dose (good quality evidence). There was insufficient good quality evidence to prove that (non-serious) adverse events were more likely than placebo.

Further research is warranted to evaluate the benefits of LDN in larger cohorts of patients.

CONCLUSIONS: In Fibromyalgia, LDN may have a significant impact on pain and reduces symptom severity without increasing the risk of serious harm. A dose of 4.5mg each day was determined to be a reasonable test dose for Naltrexone with 28 days needed as a minimum period to demonstrate a reduction in pain and symptom severity.

Keywords: Fibromyalgia, Naltrexone, Low Dose Naltrexone (LDN), Chronic Pain.

PP095

Reviews

Intramuscular injections in management of orofacial pain and myofascial pain in temporomandibular disorders - current focus.

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BACKGROUND: Orofacial pain is an important cause of disability among the whole population and it is a common symptom of temporomandibular disorders. It may result from intraarticular derangements and inflammatory diseases as well as masticatory muscles disorders. The myofascial pain is caused by excessive muscle effort, leading to muscle damage. Muscles and fascia suffer from aseptic inflammation, algogenic substances stimulate the sensory nerve endings and inflammatory edema causes tissue compression. High muscle activity is associated with bruxism, parafunctional activities within the masticatory system or increased emotional tension related to severe stress or depression. The initial contracture of the sarcomeres leads to decreased capillary blood circulation and increased anerobic metabolism. Emerging symptoms are painful myofascial trigger points within the muscles and functional disorders. The trigger points may be a cause of referred pain in the head, neck and back areas. Unless treated, myofascial pain often leads to development of hyperalgesia and pain sensitization. Prolonged perception of pain, causing the personal experience of suffering results in pain behavior. Further consequences are sleep disorders, low quality of sleep, susceptibility to poor inadequate diet, which again may intensify mood disorders, disturb tissue regeneration, keeping the patient in a vicious cycle of pain. Apart from the therapies aimed at the causes of masticatory muscles hyperactivity, local interventions, such as needling, allowing the muscle tissue relaxation and regeneration are available.

AIMS: The aim was to summarize the established approaches implemented in needling therapies of masticatory muscles and evaluate the direction of further research.

METHODS: The studies were based on PICOS methodology and PRISMA protocol. Medical databases covered by PubMed search engine were systematically searched for articles regarding needling the masticatory muscles and ACM Digital, Embase, PubMed, Scopus and Web of Science were used to search for cadaveric studies investigating the techniques of needling the lateral pterygoid muscle. The selection procedure resulted in inclusion of 28 and 4 papers, respectively.

RESULTS: Clinicians manage myofascial pain with injections and dry needling. Needling directly within the myofascial trigger points is the most common approach. In more than a half cases the injected substance was botulinum toxin (53,1%). Other common methods were application of local anesthetics or dry needling. Additionally, since 2018, new substances such as platelet-rich plasma (PRP) or collagen have been introduced. PRP administration reduces the regeneration time and improves functional recovery of the skeletal muscles. Collagen supports development of the myocytes and coordinates cell behavior and communication. It contributes to decreasing apoptosis and increasing myoblasts proliferation. Collagen also participates in nerve myelination.

The masseter muscles were the target of the needling in 65% of the cases, temporal muscles in 27%, while for lateral and medial pterygoid muscles it was 8% and 1%, respectively. Trigger points in lateral pterygoid muscles can be a sole cause of movement limitations and persistent pain, often referred to maxillary sinuses or temporomandibular joint. They can also cause recurrent throat and neck soreness, burning sensation in the throat, difficulty swallowing, nasal obstruction, ear pain and clogging, increased or decreased sound sensitivity, and tinnitus.

CONCLUSIONS: The well-established method of injecting botulinum toxin into masseter and temporalis, which carry the main contraction force, is an effective way of treating the myofascial orofacial pain. In some cases, the therapy may be more efficient when directed towards lateral and medial pterygoid muscles. Needling provides satisfactory effects while being a simple, safe and accessible procedure. According to the most current research, it would be beneficial to put stronger focus on non-botox curatives that allow tissue regeneration that is of a key importance for long term treatment effect.

Keywords: orofacial pain, myofascial pain, temporomandibular disorders, intramuscular injections

PP096

Older People

Associations between serum oxylipin levels with clinical measures of pain and radiographic osteoarthritis in people with knee pain

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BACKGROUND: Osteoarthritis (OA) is the fastest growing cause of chronic pain worldwide, and the leading cause of disability in the middle-aged and older population. Currently there are no approved treatments that halt or reverse the progression of joint pathology in OA, and current analgesics, which treat the associated pain, are not suitable for long-term use and can have adverse side effects. Identifying molecules that can predict the course of OA pain and/or pathology may aid both the development of new treatments and the appropriate early management of pain progression. The oxylipins are bioactive lipid mediators derived from omega-6 and omega-3 polyunsaturated fatty acids (PUFAs). The oxylipins exert both pro- and anti-inflammatory effects, which support tissue repair and regulate pain signalling. Due to the biological role of the oxylipins, their potential as biomarkers and/or therapeutic targets for OA and chronic pain is worth exploring further.

AIMS: In this study, it was investigated whether circulating levels of pro- or anti-inflammatory oxylipins were associated with current measures of pain and radiographic OA, and whether baseline levels of oxylipins were able to predict the progression of knee pain over a 3 year time period.

METHODS: Serum samples were collected from participants (n = 154) recruited to the Knee Pain in the Community (KPIC) cohort who were clinically assessed at baseline and 3 years follow-up for pain phenotype. Radiographic knee OA scores (Kellgren-Lawrence (KL) score); self-reported pain scores (numerical rating scale (NRS), and painDETECT questionnaire (PDQ)); and pressure pain detection thresholds (PPT)) were collected on the same visit as the serum samples. Follow-up NRS, PDQ, and PPT scores were also collected 3 years later. Serum levels of oxylipins were quantified using a targeted LC-MS/MS method. Analyses were performed to identify relationships between serum levels of oxylipins with current knee pain and radiographic OA scores, and with pain scores at 3 years follow-up. For some analyses, participants were stratified based on pain and KL scores into two groups: No OA-lower pain (n = 56; KL ≤1 & VAS ≤5); and OA-higher pain (n = 45; KL≥2 & VAS ≥6).

RESULTS: Linear regression analyses revealed that higher levels of 9-, and 15-HETE, 8,9-EET:DHET ratio and 14-HDHA were significantly associated with more advanced radiographic knee OA. Higher levels of 8,9- and 14,15-DHET, 12-HpETE, and AEA were associated with higher NRS pain scores. AEA was also associated with higher PDQ scores. To study potential differences in the levels of oxylipins in participants at the extreme ends of the clinical phenotype of OA, participants were stratified based on pain and KL scores into two groups: No OA-lower pain, and OA-higher pain. Comparison of these groups found that levels of HETEs, EETs, EET:DHET ratios, and 14- & 17-HDHA were significantly higher in the OA-higher pain group compared to the No OA-lower pain group. Analyses investigating whether baseline levels could predict pain at 3 years revealed that higher levels of 8,9-EET and 5-HETE were associated with higher self-reported pain scores, and higher 5,6-DHET levels were associated with lower PPT (more sensitive). Combining the levels of 8,9-EET and 5-HETE strengthened the association with all 3 items on the NRS scale.

CONCLUSIONS: This study has highlighted the potential involvement of omega-3 and -6 PUFA derived oxylipins in both OA joint pathology and the associated pain phenotype. The EET/DHET associations with OA and pain are consistent with previous studies and other chronic pain states – adding further evidence to support targeting this pathway to treat pain. The ability to predict future pain using a small subset of oxylipins could have significant benefit to people at high risk of OA pain, who could be identified at an earlier stage of disease and receive appropriate intervention.

Keywords: Knee pain, osteoarthritis, lipidomics, biomarkers

PP097

Older People

What is the evidence for use of immersive technologies for chronic pain management in an ageing population? A critical review

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BACKGROUND: The increasingly aged UK population poses a major public health challenge. As highlighted by the recent COVID 19 pandemic, amongst rural, remote and distant communities there is a need to find complementary or alternative modes of engaging with older service users who may be less able to travel due to logistical or financial constraints. Supported self-management of chronic pain is increasingly an important aspect of effective care, and the requirement for social distancing has affected many aspects of health care provision, including support for the management of chronic disease.

AIMS: To conduct a critical review of the literature regarding the evidence for effectiveness of remotely supported chronic pain management using immersive technologies in an ageing population

- identify current practice for remote chronic pain management in ageing populations.
- consider evidence for immersive technologies compared to current best practice

METHODS: A systematic literature search for studies published in English was conducted in the following electronic databases including MEDLINE (via EBSCO), CINAHL (via EBSCO), PsycINFO (via EBSCO), EMBASE, ASSIA (via ProQuest), Cochrane Central Register of Controlled Trials (CENTRAL) and additional grey literature sources. The protocol was registered with PROSPERO (CRD42021265355) and reporting followed the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) statement (Moher et al 2010). Key words included pain, virtual reality, immersion therapy, reality testing and MESH alternatives.

RESULTS: From the search 178 primary research papers were identified and abstracts read. Digital health studies focused exclusively on people over 65 related to pain management are scarce and the available evidence base lacks high-quality RCT findings. Only nine full text papers, met the criteria for inclusion. The articles reviewed variously focused on use of virtual exposure to nature, video games, reminiscence, modes of delivery in hospital, long term care and the community and benefits for those living with dementia. Studies were mainly qualitative non-randomised design studies.

CONCLUSIONS: Older people are receptive to the use of new technologies, but we need more data. Virtual reality / immersive technologies have huge potential to complement existing care provision. An individualised approach should be adopted including considerations of risk for nausea or vertigo. Potential benefits include reduction in pain experience and medication use, increased mobility, reduced anxiety and social isolation. Age differences should be considered within existing data sets and prospectively for future research in this area.

Keywords: chronic pain, older people, immersive technology

PP098

Other (Research)

Willingness, Motivators and Barriers to using Anxiety-focused Apps in People with and without Chronic Pain: A Questionnaire Study.

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BACKGROUND: Research shows that chronic pain is rarely seen in isolation; it often occurs alongside other conditions, such as depression and anxiety. The co-occurrence of chronic pain and anxiety has been shown to have a negative impact on a patient's outcomes and quality of life. A growing area of interest for supporting people with anxiety is the use of apps. However, despite widespread willingness to use such apps, an understanding of what motivates and acts as barriers to people using anxiety-focused apps is lacking. There is also a gap in knowledge surrounding what effects the presence of chronic pain has on people's views about anxiety-focused apps.

AIMS: This study aimed to determine the willingness, motivators, and barriers of UK anxiety sufferers in using an anxiety-focused app and identify what demographic factors affected views, including looking at the differences in views between those who experience anxiety alone and those who experience anxiety and chronic pain.

METHODS: A digital questionnaire was shared online between June and December 2021. It was completed by adults currently living in the UK who experienced anxiety, with a subset also experiencing chronic pain. The questionnaire gathered demographic information include age, gender, self or professionally diagnosed anxiety (and chronic pain if relevant), length of time experiencing anxiety (and chronic pain if relevant), and areas of the body affected by chronic pain. The questionnaire then asked how strongly participants agreed or disagreed to 31 statements which focused on willingness, motivators, and barriers to using anxiety-focused apps. There were also opportunities for participants to provide free text responses if they felt that the options provided did not articulate their views. The responses to the 31 statements were analysed using descriptive statistics, the qualitative data was analysed using the Braun and Clarke six-phase thematic analysis, and comparisons between subsets of participants was analysed using binomial regression, focusing on effect size (odds-ratio) and confidence interval.

RESULTS: The 187 completed, usable, questionnaires showed participants had a high level of willingness to use anxiety-focused apps, with 72.7% (n = 136) liking the idea of using an app to help with their anxiety. Respondents were particularly motivated to use anxiety-focused apps if they had strong scientific backing (75.4%, n = 141), helped them quickly (69.0%, n = 129), included relevant information to the user's situation (83.4%, n = 156), and allowed for independent use (89.3%, n = 167). Barriers to use included the app being hard to use (68.4%, n = 128), and not being "private and confidential". Comparisons between responses from participants with anxiety alone, and those with anxiety and chronic pain did not show any significant differences. Comparisons between all other demographic factors showed only age had an impact on two motivator statements: older participants were less motivated by being told that other people are finding that app useful, and by having used an app for a long time.

CONCLUSIONS: This study supports existing literature in that there is widespread willingness among UK adults who experience anxiety to use anxiety-focused apps. It also highlights which motivating and barriers factors affect a person's decision to use an anxiety-focused app. These findings align with the James Lind Alliance research priority for digital technology for mental health by investigating how anxiety affects how people engage with technology. Furthermore, this study begins to address the gap in knowledge concerning views on anxiety-focused apps of people with anxiety and chronic pain. This study found no strong evidence that views differ between those with anxiety alone and those with anxiety and chronic pain. This suggests that conclusions drawn about views on anxiety focused apps from people with anxiety can be applied to people with anxiety and chronic pain, at least in the areas covered.

Keywords: Anxiety, Apps

PP099

Other (Research)

Exploring the treatment burden experienced by people living with persistent pain and multiple long-term conditions

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BACKGROUND: Multiple long-term conditions (MLTCs) are common in people living with chronic pain. MLTCs are associated with significant treatment burden, that is the work that people do to manage their health conditions. There is often an imbalance in the *work* required and the *capacity* or ability to undertake such work tasks. How patients with chronic pain and MLTCs view their capacity to manage their conditions and how health care professionals (HCPs) view themselves and the health system's capacity to provide clinical care for these patients has not been explored.

AIMS: This study aimed to produce a taxonomy of factors, using Burden of Treatment Theory (BOTT), that 1) affect the capacity of those living with persistent pain or rheumatoid arthritis (RA) to self-

manage their conditions and; 2) increase or decrease a HCP's capacity to treat patients with persistent pain or RA and MLTCs.

METHODS: This study was conducted across two health boards in Scotland (NHS Greater Glasgow & Clyde and NHS Lanarkshire). Semi-structured interviews were conducted to explore experience of pain and MLTCs with 80 patients living with persistent pain/RA with and without additional MLTCs; and 40 HCPs working in primary care and secondary RA or chronic pain clinics; participants included: GPs, Rheumatology Consultants, Pain Consultants, Practice Nurses, Psychologists and Specialist Pain Nurses. Interview data was analysed using a conceptual framework underpinned by BOTT. BOTT has been used to understand patient perspectives but is a novel approach to understand HCP views. Interviews were transcribed and coded independently to BOTT and reviewed as a group in coding clinics to check for coding discrepancies. Any discrepancies were resolved by discussion.

RESULTS: Across patient groups, there were reports of a lack of communication between specialities and a lack of knowledge of their wider health issues by specialists, which caused frustration. Personal attributes and skills, having supportive personal and professional networks, access to appropriate local services and financial resources, were all factors that increased capacity to manage the workload associated with their pain and MLTCs. Factors reported by patient's that decreased their capacity were: a lack of understanding of chronic pain as an 'invisible' condition by HCPs and family/friends/colleagues; life workload, particularly caring responsibilities; and financial constraints.

Many of the factors identified by HCPs that impacted on their capacity to manage patients with pain and MLTCs were related to relational and communication domains of BOTT. Well-defined routes for primary-secondary care communication; close spatial setting (e.g. shared primary care clinics between GPs and physiotherapists, allowing personal relationships to develop); facilitating informal interaction between HCPs; personal relationships facilitating interaction; greater knowledge of the patient, professional confidence and ability to act as patient advocate; greater personal tenacity, were considered as factors that increased HCP and system capacity for this patient group. Ill-defined communication routes; poor quality referral letters; newer HCPs lacking professional confidence, with fewer contacts and limited system knowledge, were seen as barriers to capacity. Limited treatment options for this patient group was also considered as a major factor that impacts negatively on HCP capacity, for both non-pharmacological and pharmacological options, but particularly in relation to a raised risk of adverse drug reactions in polypharmacy.

CONCLUSIONS: Providing care for patients with persistent pain and MLTCs requires effective interaction with and between HCPs. Our work highlights how multiple interacting conditions and medications further restrict already limited treatment options. Our taxonomy of factors identifies points for intervention and recommendations to inform research, practice, and policy for this patient group that deserve urgent attention.

Keywords: persistent pain, multimorbidity, treatment burden, capacity, qualitative

PP100

Other (Research)

The Alleviate Advanced Pain Discovery Platform Data Hub: a national resource for accessing and sharing pain data

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BACKGROUND: There are many clinical and non-clinical datasets investigating pain that have been collected by researchers over many years, however, finding and getting access to them is challenging. The data are siloed in hard-to-reach places, in non-standard formats, and it is not possible to assess how relevant they are before getting access. This is a barrier to the pain research community and results in duplication of effort. It does not have to be this way and there are alternative solutions available. Alleviate is an HDR UK Data Hub for the federated querying and secure sharing of UK pain data to researchers, analysts and clinicians at a national and international level. Alleviate is the Data Hub for the Advanced Pain Discovery Platform (APDP), a £24 million research initiative to break through the complexity of pain and reveal potential new treatment approaches to address a wide spectrum of chronic and debilitating clinical conditions.

AIMS: The aims of the Alleviate Pain Data Hub are to 1) provide a central data resource for the pain community, 2) support data owners in sharing their data via a common standard, 3) enable approved researchers to query Alleviate datasets in real time, 4) facilitate data extraction to enable further research within a Trusted Research Environment. METHODS: Right from the start of Alleviate, people with lived experience of pain have been embedded in the project to inform and guide the team. Alleviate is built within an established Scottish safe haven and continues the success of CO-CONNECT where our team created a set of open-source tools for curating large and small datasets. The tools transform data to a common standard using the Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM). Once the data are mapped to a CDM it is possible to bring together disparate pain data sets for re-use and analysis utilising streamlined access to enable collaboration across pain data sets.

RESULTS: Alleviate has established a hybrid model of working with data partners where data can be queried in one of two ways: federated model, or centralised model. Regardless of the model the data controller mains in control of their data at all times. The immediate benefit of these models is to make the data sets available for federated querying via the HDR UK Cohort Discovery Tool (CDT). At the time of writing there were >5 million records from 18 data providers available for querying within the CDT creating a portal for researchers to quickly find the most appropriate pain-related data to answer their research questions. Currently the data are primarily electronic healthcare records and Alleviate is designed to encompass more data types such as genomics, imaging, and patient surveys.

Alleviate has established PPIE as a core function of the hub by developing a panel of people with lived experience for generating input and helping with outputs.

CONCLUSIONS: Alleviate Pain Data Hub has established a federated model, centred around the OMOP CDM, providing an efficient, safe and secure environment for approved researchers to find and data controllers to share in real-time. This has accelerated data discovery and enabled combination of different datasets for greater

sensitivity or the ability to work with rarer conditions. Pain researchers, data scientists and people living with pain have worked together to create a Pain Data Hub that will benefit the pain community and facilitate vital research. Alleviate will continually work with the pain community to grow and develop data capabilities in the Data Hub in collaboration with the APDP, HDR UK and international partners.

Keywords: data discovery, data federation, OMOP, patient participation, trusted research environment

PP101

Other (Research)

Dancers in pain: developing a model for agency with chronic pain

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BACKGROUND: Dancers are reported to have a high prevalence of pain connected to occupational physical strain, dance culture and attitudes to pain (Lampe et al 2018). Research exists on prevention of injury and acute pain of dancers (Armstrong 2018, Ramel and Moritz 1994, 1998, 1999). However, there is little specific research that refers to chronic pain in dancers, and varying terminology is used to define pain that does not always consider the chronicity of symptoms. This poster examines the experiences of dance artists who live and work with chronic pain, specifically through the lens of agency. Braun et al (2018) define a 'sense of agency (SoA)' as 'the experience of initiating and controlling an action.' Lack of agency can be experienced by people living with chronic pain as 'weakening of his or her autonomy to affect the situation' (Hellström 2001, 89). Increasing agency is often described as self-efficacy in health literature, where an individual is confident to manage their own health and engage in daily life activities (Wenham et al 2018, 308). Further, Mermikides and Bouchard (2016, 11-12) suggest that performing arts can support patients moving away from being a passive patient who receives care and towards a sense of individual agency.

AIMS: This study aimed to:

- Increase qualitative understanding of dancers' experience of chronic pain and agency
- Focus on dance artists who specifically make artistic work with/about their chronic pain
- Examine if and how they utilise dance practices to enhance agency

METHODS: Literature searches were undertaken in dance studies (on dance and agency) and health-based chronic pain research (on agency with pain). Following this, a snowball approach was used to search for dance artists in the UK who make choreographic work with and about their own pain. This search was carried out via (1) sourcing artist websites, publicity, performances and writing; (2) via social media links; (3) via the Somatic Practice and Chronic Pain Network; and (4) participant dance artists. Qualitative, in depth semi-structured interviews with sx dance artists were conducted on Zoom between August 2021 and November 2021. The terminology from health-based research on chronic pain agency (self-efficacy, empowerment and advocacy) and dance research (autonomy, collectivity, and non-human factors) on agency were compared with the findings from the interview data.

RESULTS: While dance industry conventions posed barriers, dance artists resisted existing conditions through acceptance of pain and working with it as a form of individual agency. They highlighted how connecting with peers with chronic pain supports their agency (such as collaborating artists and audiences), in offering recognition, validation and advocacy. The dance artists developed working environments and conditions that supported management of their pain as a form of agency, e.g. having places to lie down in rehearsal and performance. The findings from this study present a holistic and integrated model of agency with chronic pain; this model is characterised by engaging individual autonomy, empowering environments, and collective advocacy. This integrated model has potential application beyond the dance context.

CONCLUSIONS: Although this study focused on the experiences of dance artists who live with chronic pain and make choreographic work about their pain, it highlights the importance of understanding agency in chronic pain research. A deeper understanding of agency can help identify pathways to autonomy, empowerment and advocacy for people self-managing chronic pain. Future research would need to consider the applicability of the integrated model of agency for people with chronic pain who are not dance artists.

Keywords: dance, chronic pain, agency, self-efficacy, empowerment

PP102

Other (Research)

Patient perspectives on the outcomes of pain management programmes: a qualitative study

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BACKGROUND: Pain management programmes (PMPs) are effective evidence-based interventions for the management of people with persistent musculoskeletal pain. A significant proportion of patients are not able to maintain the treatment benefits but the reasons for this remain unclear. The participants in this study had completed a three-week, residential, high-intensity PMP with two follow-ups, at three-months and one year post programme. Patients' recall of the principles of the programme, their views on whether it met their needs, their confidence in applying self-management techniques and their negative experiences of it were directly explored with them using qualitative research methodology.

This research will help healthcare professionals better understand the factors that lead to success or failure in maintaining their gains from PMPs in the long term. Ethical approval was received from East Midlands-Leicester Central Research Ethics Committee on 6 June 2016 (IRAS ID: 202089; REC Reference: 16/EM/0250).

AIMS: To explore the perspectives of people with persistent musculoskeletal pain who had completed a PMP on maintenance of self-management strategies, and the burdens associated with it.

METHODS: Potential participants were approached after completing a PMP in the host institution and sent an information sheet about the study. Those who returned the study consent form were invited to a 1:1 semi-structured telephone interview by a researcher from an academic institution who was independent of clinicians involved in the programme itself. The interviews were recorded and

transcribed. Data were analysed by three of the researchers independently using thematic analysis.

RESULTS: Fourteen participants (12 females, two males) were interviewed. The average length of the interviews was 40 minutes. We generated four themes from the data. Theme 1: Benefits and Burdens; encompassing personal expectations, perceived benefits, and burdens of accessing the treatment. Theme 2: PMP and Real Life; encompassing long term application of cognitive, behavioural and functional strategies introduced in the PMP, factors that could facilitate this, and barriers to using these strategies. Theme 3: Social Support; including personal support from peers, family and friends, and support structures in local communities and wider society. Theme 4: Healthcare Interventions; encompassing the role of healthcare professionals and their interventions for people who self-manage persistent pain.

CONCLUSIONS: While pain management programmes have an important role in helping people with persistent musculoskeletal pain to better manage their conditions, maintaining self-management is challenging and the use of these strategies often tapers off over time. Our results indicate that many people with persistent musculoskeletal pain would benefit from improved social support from family, friends and their community, as well as input from healthcare professionals, to maintain and enhance their self-management strategies. Ongoing research is needed to define the specific social and healthcare resources that can enable people with persistent musculoskeletal pain to continue with effective self-management.

Keywords: Pain management programme, persistent musculoskeletal pain, self-management

PP103

Other (Research)

Adverse drug reactions associated with the prescription of oral cannabis-based medicinal products: a post-marketing pharmacovigilance study.

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BACKGROUND: Similarly to the UK, several Latin American countries such as Colombia, Chile, Ecuador, Argentina, Paraguay and Peru, have authorized the prescription of cannabis-based medicinal products (CBMPs) for their therapeutical use as adjuvants in the clinical management of different chronic pathologies involving pain symptoms. To date, no clinical trials have been conducted with these CBMPs and the evidence on the safety of this type of specialties in post-marketing stages is null.

AIMS: The aim of this study is to characterize the safety profile of five oral cannabis-based formulations in a convenience cohort of Peruvian patients.

METHODS: In the present study, an analysis of case reports of adverse drug reactions (ADRs) collected by the pharmacovigilance system of a pharmaceutical establishment during the period between March and October 2022 was performed.

RESULTS: A total of 1060 patients who received treatment with CBMPs were included in the study and only 135 (12.7%) reported at least one adverse reaction. Women reported significantly more ADRs than men ($\chi 2 = 27.4$; $P < 0.001$) and most of the ADRs (77.8%) occurred in the first 4 weeks of treatment. The distribution of ADRs associated with each product was proportional to the frequency of prescription of the product and no higher incidence was found in MBeC containing Δ9-tetrahydrocannabinol (THC). The most frequently reported adverse reactions corresponded to nervous system disorders (47.2%) and gastrointestinal disorders (17.9%), the preferred terms were dizziness (17.9%), drowsiness (12.7%) and dry mouth (5.7%). Ninety-three percent were characterized as "mild" and 50.2% as "possible".

CONCLUSIONS: This study represents the first description of adverse reactions with CBMPs in a cohort of Peruvian patients in a real clinical setting and confirms the safety profile previously reported for this type of pharmaceutical preparations.

Keywords: Cannabis, oral extracts, pharmacovigilance, adverse drg reaction, safety

PP104

Other (Research)

The importance of being in a group for people with chronic non-malignant pain when tapering strong opioids: a process evaluation

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BACKGROUND: A randomised controlled trial (Improving the Wellbeing of People with Opioid Treated Chronic Pain I-WOTCH) delivered an intervention that was found to be effective in enabling people taking strong opioids for chronic non-malignant pain to taper or stop opioid use without any significant impact on pain related disability. This intervention was largely delivered in a group setting. We report from an embedded process evaluation on participants' experiences of being in a group.

AIMS: This part of the study aimed to explore in detail the experiences of being in a group when tapering opioids. METHODS: We recruited participants with chronic non-malignant pain who were aged 18 years or older from GP practices in England who had been using strong opioids for at least 3 months on most days in the preceding month. We report on the semi-structured interviews that addressed being in a group with 20 intervention participants and 18 facilitators who delivered the intervention. We analysed the data using framework analysis.

RESULTS: We found seven sub-themes emerged from "being in a group". These were: 1) a shared experience; 2) social comparisons; 3) support; 4) being committed to something; 5) numbers in a group; 6) perceptions about group facilitators, and 7) challenges to establishing group cohesion. Participants identified how others in the group were like them or not like them in terms of pain and opioid use. Participants particularly valued input from lay facilitators. Not all groups ran smoothly, especially if they included disruptive participants. The intervention facilitators reported that group cohesion was enhanced when participants shared their experiences and when supportive bonds were formed.

CONCLUSIONS: Having support and a shared experience in a group emerged as important to people tapering their strong opioids. It would be useful to consider using a facilitated group approach to support people who are tapering their opioids.

Keywords: chronic pain, tapering, opioids, process evaluation

PP105

Other (Research)

Lived Experiences of Debilitating Period Pain Management

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BACKGROUND: 5 to 10% of women experience period pains that disrupt their lives and in 40% of women who experience period pains, they also experience other premenstrual symptoms such as bloating and lack of concentration which can also effect their daily experiences if not taken into consideration (Women's Health Concern, 2019). In addition to this, a government study (2021) has shown that over 4 in 5 women stated that there have been instances where they don't believe they've listened to health care professionals regarding their pain. The results have caused a high emphasis in the national Women's Health strategy, which is timely for the time of conducting this research. AIMS: The aim of this research is to explore the experiences people who menstruate have when they approach the health care services when they experience debilitating pains, causing inconvenience to their daily actions of living. This allows the exploration of how their period pains impact the relationship they have with their body and with the medical team the sought help from.

METHODS: Semi structured interviews were conducted with 8 people who menstruate that were between the ages of 20-28. The semi-structured interview followed three sections of "the onset of period pains", "initial approach of health care services" and "where are you now with your period pains?". By using Smith and Osborne's (2015) concept of analysing lived experiences of pain using Interpretive Personal Analysis, I analysed the content of my interlocutors' interviews by identifying themes in the first interview's transcript, commenting on the emerging theses and connecting them together. By using these as a baseline for the rest of the transcripts I used the same method to see where there are similarities to allow "theoretical convergence" or "individual idiosyncrasy" between the interviews (Smith and Osborn 2015:70-75). RESULTS: A range of themes and ideas came to light that reflected their experiences with their bodies and being bodies of a medical system. Using the concept of the three bodies by Scheper-Hughes and Lock (1987), the importance of seeing my interlocutors' experiences through their physical, social and political bodies is crucial if we want to work towards a future where access to understanding dysmenorrhea and the validation of these experiences becomes the norm in medicine. The physical body showed my interlocutors relationship with their own and needing control. The social body showed how social concepts, the support network and comparing self impacted their experience with dysmenhorrea. The body politic showed their experiences of medicalisation, medical procedures and their relationship with the medical team.

CONCLUSIONS: This research showed how as a collective we must stop undermining period pains. From the andronormative perspective of medicine, the feminisation of pain is at the detriment of those who experience dysmenhorrea as our preconceived biases towards pain impact the way supportive management was either withheld or not directly provided to my interlocutors. Rather than searching for objective measures of pain to be able to support our claims for referals etc, we should start being acceptant of the subjective experiences of our patients.

Keywords: dysmenorrhea, pain management, body, medicalisation

PP106

Other (Research)

Microfluidic cell culture system to investigate localised subcellular processes underlying sensory neuron sensitisation by PGE2

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BACKGROUND: Dorsal root ganglion (DRG) sensory neurons adapt their physiological properties in response to changes in the local environment. During inflammation, mediators secreted from immune cells sensitise DRG neurons by modifying their intrinsic excitability and synaptic connectivity. Peripheral sensitisation is crucial for survival but can lead to the onset of central sensitisation and the establishment of chronic pain.

Prostaglandin E2, a potent inflammatory mediator, is produced by numerous cell types during inflammation and has been shown to potently sensitise neurons. The cognate prostaglandin E2 receptor 4 (EP4) and the regulation of its expression plays a significant role in the cellular processes that mediate inflammatory and neuropathic pain states, triggering the cAMP/PKA signalling pathway to sensitise neurons.

DRG neurons possess long pseudo-unipolar axons which emanate from their cell body in the dorsal root ganglia and extend to synapse with interneurons in the spine and innervate peripheral tissues that may be over 1 metre away in humans. Although it has long been recognised that the transport of proteins to the axon terminals of DRG neurons can be relatively slow, in recent times it has been widely recognised that DRG neuronal plasticity mechanisms may be driven by the local translation of mRNAs within the axon terminal itself. Current work by us, and others, attempts to define the molecular and cellular mechanisms regulating this process. Although *in vivo* systems are still heavily relied upon to model acute to chronic pain transitions, they lack molecular detail. Compartmentalised microfluidic chambers can provide a physiologically relevant experimental model to investigate separate micro-environments within DRG neurons (i.e., cell bodies vs axonal terminals), and present an accurate *in vitro* system to interrogate molecular and cellular processes driving neuronal sensitisation.

AIMS: We aimed to demonstrate an *in vitro* model of sensitisation within mouse DRG neurons using PGE2 stimulation. We investigate whether there are age-related differences in the molecular and cellular mechanisms underlying PGE2 mediated DRG neuron sensitisation between adult and embryonic sensory neurons.

METHODS: Primary mouse embryonic day 16.5 and adult DRG neurons were cultured *in vitro* in compartmentalised microfluidic chambers. The axonal compartment of the chamber was pre-treated with 100μM of PGE2 for 17-hours. Calcium imaging was performed in the cell body of DRG neurons, as a functional assessment of neuronal excitability, using either axonal and/or somal stimulations of capsaicin and potassium chloride (KCl). Immunocytochemistry was

conducted, using antibodies against acetylated tubulin and the EP4 receptor subtype or acetylated tubulin and TRPV1 receptor.

RESULTS: Axons displayed significant growth from the somal compartment to the axonal compartment over 6 days, with embryonic cells able to grow for longer than adult cultures. This compartmentalisation allowed us to treat axons alone, with PGE2, mimicking an inflammatory event at axon terminals. More embryonic cells fluoresced per chamber than adult, supporting the more extensive growth in these cultures.

Embryonic DRG neurons demonstrated a trend to sensitisation following PGE2 treatment, most evident after capsaicin stimulation in the somal compartment. Adult DRG neurons treated with PGE2, exhibited greater increases in somal intracellular calcium following both capsaicin and KCl application to the axonal compartment – 200nM capsaicin evoked greater fluorescence than 100nM. No potentiation was observed during somal stimulation. PGE2 treatment did not affect the number of cells responding to capsaicin or KCl in adult or embryonic cultures.

CONCLUSIONS: These data demonstrate the utility of microfluidic systems for the study of peripheral sensitisation and to elucidate processes at a molecular scale in subcellular compartments which are not possible with *in vivo*systems or with traditional cell culture approaches. These data also indicate that there are clear differences in PGE2 mediated sensitisation between immature and mature sensory neuron populations.

Keywords: PGE2, microfluidic chambers, DRG, sensitisation, in vitro

PP107

Other (Research)

Melatonin and sleep parameters in patients with chronic pain: per protocol results from the DREAM-CP trial

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BACKGROUND: Chronic pain remains a burden for both clinicians and patients and the prevalence of sleep disturbance is high in chronic pain patients. Administration of exogenous melatonin reduces sleep latency and other sleep measures in primary insomnia [1]. There have been some small trials of melatonin in patients with chronic pain, often in combination with other therapies (reviewed in [2]). Chronic pain is associated with sleep disturbance and melatonin may improve both sleep and pain [3].

AIMS: We undertook a double blind randomised controlled crossover trial of melatonin in patients with non-cancer severe chronic pain to determine the effects on sleep and pain.

METHODS: The trial was prospectively registered (ISRCTN12861060) and the protocol has been published [4]. After ethical approval, clinical trial authorisation and written informed consent, 60 adult patients (aged 31-79, 36 female, 24 male), with an average pain intensity score of 7 or more were randomised and 51 completed both treatment arms as per protocol. Participants received either melatonin (CircadinTM, Flynn Pharma) 2mg daily at night or placebo for 6 weeks, followed by a washout period, then a further 6 weeks of placebo or melatonin. The primary outcome measure was sleep disturbance measured using the Verran Snyder Halpern (VSH) sleep scale [3,4]. Secondary outcome measures included pain scores, sleep latency, efficiency and supplementation, plus Pittsburgh Sleep Quality Index (PSQI) and pain and sleep questionnaire-3 (PSQ-3) scores [3,4]. Crossover per protocol analysis was performed using mixed effects linear models with baselines as covariates for treatment, period and sequence effects using Stata 17 and NCSS 2020 with $P < 0.05$ (two-sided) taken as being significant.

RESULTS: The trial was prospectively registered (ISRCTN12861060) and the protocol has been published [4]. After ethical approval, clinical trial authorisation and written informed consent, 60 adult patients (aged 31-79, 36 female, 24 male), with an average pain intensity score of 7 or more were randomised and 51 completed both treatment arms as per protocol. Participants received either melatonin (CircadinTM, Flynn Pharma) 2mg daily at night or placebo for 6 weeks, followed by a washout period, then a further 6 weeks of placebo or melatonin. The primary outcome measure was sleep disturbance measured using the Verran Snyder Halpern (VSH) sleep scale [3,4]. Secondary outcome measures included pain scores, sleep latency, efficiency and supplementation, plus Pittsburgh Sleep Quality Index (PSQI) and pain and sleep questionnaire-3 (PSQ-3) scores [3,4]. Crossover per protocol analysis was performed using mixed effects linear models with baselines as covariates for treatment, period and sequence effects using Stata 17 and NCSS 2020 with $P < 0.05$ (two-sided) taken as being significant.

CONCLUSIONS: We showed that treatment with melatonin 2mg per night did not improve sleep disturbance but had transient beneficial effects on other sleep parameters. In addition, during trial participation, patients with chronic pain reported lower pain intensity scores. Further data analysis is underway.

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Keywords: Melatonin, chronic pain, sleep, clinical trial

PP109

Other (Research)

UK Medical Cannabis Registry: A Clinical Outcome Analysis Of Medical Cannabis Therapy In Chronic Pain Patients With And Without Sleep Impairment

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BACKGROUND: In the UK, chronic pain affects an estimated 35.0–51.3% of patients, of which 67–88% experience disruption to sleep. Evidence suggests poor sleep can exacerbate pain severity and its effects on health-related quality of life. Previous studies have demonstrated the therapeutic potential of cannabis-based medicinal products (CBMPs) in separately managing chronic pain and insomnia. However, there has been limited evaluation comparing the effects of CBMPs in those with chronic pain and co-morbid sleep disruption to those with normal sleep quality.

AIMS: This study therefore aims to assess changes in patient related outcome measures (PROMs) following CBMP treatment in chronic pain patients with and without sleep impairment.

METHODS: A cohort study of chronic pain patients from the UK Medical Cannabis Registry was performed. Primary outcomes included changes at 1, 3, 6, and 12 months from baseline using a repeated measures one way analysis of variance test and mean differences between the two arms using an independent t-test in the following PROMs: single-item sleep quality scale (SQS), General Anxiety Disorder-7 (GAD-7), EQ-5D-DL, Brief Pain Inventory (BPI), and McGill Pain Questionnaire-2 (MPQ-2). An alpha value <0.050 was statistically significant.

RESULTS: Chronic pain patients enrolled within the UK Medical Cannabis Registry for >12 months (n = 1139) were assigned to impaired sleep (n = 517) and unimpaired sleep (n = 622) cohorts. The mean baseline SQS score was 1.99 (95%CI: 1.90–2.09) in the sleep impaired cohort compared to 6.06 (95%CI: 5.92–6.19) in the sleep unimpaired group. After 12 months, an increase of 1.37 ± 2.20 ($p < 0.001$) and 0.15 ± 1.65 ($p = 0.257$) in the mean SQS scores was observed in each group respectively, with the sleep impaired arm showing a greater mean difference ($p < 0.001$). Both groups exhibited improvements in the GAD-7, ED-5D-5L index value, BPI, and MPQ-2 scores at all timepoints ($p < 0.010$), with the sleep impaired arm showing greater mean improvement in all but the MPQ-2 scores ($p < 0.010$). 22.2% (n = 253) of patients between both groups reported 2817 adverse events within 12 months of starting CBMP treatment, of which 84.4% (n = 2378) were mild or moderate in severity.

CONCLUSIONS: Assessment of validated PROMs showed an associated improvement in pain, anxiety, and general health-related quality of life in chronic pain patients, although in those with co-morbid sleep impairment tended to experience larger improvements than those without sleep impairment in most domains. These findings suggest that the multimodal effects of CBMPs may lead to supplementary benefits in chronic pain patients with poor sleep quality, through disruption of the reciprocal effects pain and poor sleep quality have on one another.

Keywords: cannabis, cannabidiol, tetrahydrocannabinol

PP110

Other (Research)

Comparison of Cannabis-Based Medicinal Product Formulations For Chronic Pain: A Cohort Study

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BACKGROUND: Chronic pain is a complex condition that can negatively impact physical, emotional, and social well-being. However, there is a paucity of evidence on the effectiveness of currently utilised therapeutics used to treat chronic pain. Cannabinoids and cannabis-based medicinal products (CBMPs) have been suggested as a novel therapeutic class for chronic pain, however the applicability of many datasets are limited due to the heterogeneity of CBMPs evaluated.

AIMS: The aim of this study was to analyse the changes in the pain-specific and general patient reported outcome measures, as well as adverse events data in a homogenous treatment cohort with CBMPs.

METHODS: This cohort study enrolled patients with chronic pain treated with medium chain triglyceride oils, dried flower or both products (Adven® 20, 50 & EMT, Curaleaf International, Guernsey, UK), who had been enrolled in the UK Medical Cannabis Registry for a minimum of 12 months. Primary outcomes were changes in patient reported outcome measures from baseline, including pain Visual Analogue Scale (P-VAS), Brief Pain Inventory short-form (BPI), Short-form McGill Pain Questionnaire-2 (MPQ2), Single-Item Sleep Quality Scale (SQS), Generalised Anxiety Disorder-7 (GAD-7), EQ-5D-5L and Patient Global Impression of Change (PGIC) scales at 1, 3, 6, and 12 months. Adverse events in the course of treatment were recorded utilising the common terminology criteria for adverse events version 4.0. $p < 0.050$ was regarded as statistically significant.

RESULTS: A total number of 672 patients with chronic pain were included in this study. 334 (49.70%), 70 (10.42%) and 268 (39.88%) patients were treated with oil, dried flower or both preparations respectively. Improvements were observed in each group in GAD-7, SQS, EQ-5D-5L, BPI, MPQ2, at 1, 3, 6, and 12 months compared to baseline ($p < 0.001$). There was no statistically significant difference between oil (-0.49 ± 1.47), dried flower (-0.87 ± 1.82) and both preparations' (-0.75 ± 1.62; $p = 0.059$) mean change in BPI pain severity score at 12 months. However, the BPI interference score was lower in those prescribed both oils and dried flower (-1.10 ± 2.04) or dried flower alone (-1.36 ± 2.00) compared to oils (-0.71 ± 1.98; $p = 0.011$). A total of 1856 (276.60%) adverse events were reported by 166 patients (24.89%). The majority (n = 1604, 86.42%) were rated as mild or moderate in severity. Adverse events that occurred in over 100 cases were dizziness (n = 101, 5.44%), dry mouth (n = 125, 6.73%), fatigue (n = 150, 8.08%), headache (n = 106, 5.71%), lethargy (115, 6.20%), and somnolence (n = 132, 7.11%).

CONCLUSIONS: A positive association was identified between CBMP therapy and improvement in pain-specific and general patient reported outcome measures for chronic pain patients. There was no significant difference in outcomes according to pain severity between each formulation, however those treated with dried flower in isolation or in combination with oil products had greater reduction in pain interference. These results must be placed in the limitations of study

design, however, and further evaluation through randomised controlled trials is still required.

Keywords: cannabis, cannabidiol, tetrahydrocannabinol

PP111

Paediatric

Multi-electrode array analysis of the functional maturation of the spinal dorsal horn over postnatal development

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BACKGROUND: Somatosensory processing is immature at birth and significant changes occur during postnatal development throughout the neuroaxis leading to mature processing of these sensory modalities. There is increasing evidence that disruptions to normal development are associated with an increased risk of developing pain-related conditions in adulthood. As the spinal dorsal horn (DH) is the principle integrative centre in the somatosensory system, fully understanding how the processing of peripheral stimulation matures at this site is undoubtedly beneficial. Previous research into postnatal maturation of the physiological responses of the DH predominantly relied upon single-unit electrophysiology, and has demonstrated multiple critical periods of development over the first four postnatal weeks in rats. However the DH is incredibly heterogeneous, with distinct roles for each of the five constituent laminae which cannot be interrogated with traditional experimental approaches.

AIMS: We have employed multielectrode array (MEA) electrophysiology to concurrently measure neuronal activity in each DH lamina in postnatal rats from the second to sixth postnatal week to see how noxious and non-noxious somatosensory stimuli are processed differently.

METHODS: All procedures were performed in accordance with the Animals (Scientific Procedures) Act 1986/2012 and were licensed by the UK Home Office under the project licence PB3DA999F. Mixed sex Sprague-Dawley rats between postnatal day (P) 9 and 60 were used. Animals were anaesthetised and prepared for MEA electrophysiology via a laminectomy exposing lumbar spinal cord. A 16-channel linear MEA with 50 μm inter-electrode spacing (NeuroNexus) was used to record neuronal activity across the DH before, during, and after electrical, mechanical, or thermal stimulation of the ipsilateral hindpaw with bicuculline applied intrathecally to modify GABA-ergic neurotransmission.

RESULTS: Clear differences in evoked activity was observed between DH regions following peripheral stimulation, predominantly matching the expected response profiles. DH processing of A-fibre stimulation showed maturation over the first three postnatal weeks, with increased conduction velocities until adulthood. Although C-fibre processing was present by the second postnatal week DH responses continued to mature until adulthood. Similarly, wind-up of DH neurons, a physiological measure of synaptic plasticity, was also significantly different between postnatal rats (Postnatal day P9-30) and adults. Interestingly, GABAergic disinhibition produced differential effects throughout the life–course, suggesting that GABAergic inhibition is still not fully mature in the young adult DH (P42).

CONCLUSIONS: Ultimately, the data presented here indicate a longer duration of development in the processing of primary afferent fibre inputs, GABAergic activity, and wind-up in the DH, than previously thought. Full adult maturation may not occur until ages much older than often referred to in the literature. These findings are important for the appreciation of how nociceptive networks in the DH influence each other and mature at different rates after birth. The way in which drugs and endogenous processes, such as descending pain modulation from the brainstem or changing behaviour of glial cells, interact with these maturational processes are the subject of future work.

Keywords: Postnatal, Electrophysiology, Nociception

PP113

Primary Care

Living with persistent pain: A multi-method qualitative study of reducing opioids in the context of a pain review in primary care

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BACKGROUND: Opioids are often prescribed for persistent non-cancer pain ('persistent pain') although evidence of long-term effectiveness is limited with increased risk of harm. Patients with persistent pain taking opioids long-term should be regularly reviewed and supported in opioid reduction, where treatment goals are not met. Research suggests patients and healthcare professionals (HCPs) find discussing and reducing opioids challenging. Hence, there is a need to develop an evidence-based pain review that addresses patient and HCP barriers and harnesses facilitators to opioid tapering.

PROMPPT (Proactive clinical Review of patients taking Opioid Medicines long-term for persistent Pain led by clinical Pharmacists in primary care Teams) is a National Institute for Health and Care Research funded programme that aims to develop and test a pharmacist-led pain review for patients with persistent pain in primary care (PROMPPT review). This study formed part of an iterative process to develop the PROMPPT review.

AIMS: This study aimed to identify facilitators and barriers for: a) patients reducing opioids and b) delivery of the PROMPPT review to support opioid tapering.

METHODS: Semi-structured interviews were conducted with 15 adult patients, with experience of taking opioids long-term (≥6 months) for persistent pain, recruited from two general practices in the West Midlands, UK. A bespoke online discussion forum was used to broaden the geographical reach, and offer an alternative method for participation for people with persistent pain. Discussion forum participants were recruited via posters in GP practices, pain services, community pharmacies, social media (Twitter and Facebook), and via pain charity and support group webpages.

Semi-structured interviews (n = 13) and two focus groups (n = 16) were conducted with practice pharmacists who had experience of consulting with patients with persistent pain in primary care. Practice pharmacists were recruited through professional networks or via the programme's website (www.promppt.co.uk).

The Theoretical Domains Framework (TDF) was used as a framework for theoretical thematic analysis. The TDF consists of 14 domains drawn from 33 theories of behaviour change and provides a theoretical foundation for intervention development. Data was deductively coded to TDF domains by a multidisciplinary research team. Within-domain inductive analysis led to the development of specific facilitator and barrier themes. These themes were compared and contrasted across TDF domains to create overarching themes.

RESULTS: 19 barrier and facilitator themes for patients with persistent pain reducing opioids were identified across 11 TDF domains of knowledge, social/professional role and identity, beliefs about capabilities, beliefs about consequences, reinforcement, intentions, goals, environmental context and resources, social influences, emotion, and behavioural regulation. These themes combined into three overarching themes: learning to live with pain (6 domains, 6 themes), opioid reduction expectations (7 domains, 9 themes) and assuming a medical model for pain management (2 domains, 4 themes). For the delivery of a pain review to support opioid tapering, 42 barrier and facilitator themes were interpreted within the same 11 TDF domains as well as two further domains of skills and optimism. Across the domains, three overarching themes were developed: delivery of pain review (11 domains, 26 themes), pharmacist-patient relationship (1 domain, 2 themes) and patient engagement (7 domains, 14 themes).

CONCLUSIONS: This study identified important facilitators and barriers for a practice pharmacist led pain review (i.e., PROMPPT review) to support opioid reduction, where treatment goals are not met. This evidence was taken forward to identify appropriate behaviour change techniques (BCTs) to guide the development of a prototype PROMPPT review to target patient opioid reduction. BCTs were subsequently used to inform the co-design of intervention components with key stakeholder groups. This study also provides evidence for the generation of training resources to support pharmacist delivery of the PROMPPT review.

Keywords: opioids, primary care, practice pharmacist, qualitative

PP114

Primary Care

Proactive Review of patients taking Opioid Medicines for persistent Pain led by Pharmacists in primary care Teams (PROMPPT): A Feasibility Study

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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. Clinical pharmacists working in general practices ('practice pharmacists') play an increasing role in managing patients on long-term medicines in UK primary care and seem ideally placed to review patients on opioids. This study is part of a National Institute for Health and Care Research funded research programme to develop and test a practice pharmacist-led intervention (PROMPPT) to support patients with persistent pain to safely reduce opioids, where appropriate, without increasing pain/pain-related interference. The PROMPPT intervention and associated pharmacist training package were co-designed with stakeholders (patients and healthcare professionals) earlier in this research programme, using a person based approach combined with best practice guidance and theory.

AIMS: To investigate the acceptability, credibility and feasibility of delivering PROMPPT in practice and determine the modifications needed to the intervention and training to improve acceptability and deliverability.

METHODS: The study used a single arm, non-randomised design, with nested mixed methods process evaluation. Eligible patients, prescribed opioids for ≥6months, identified from electronic records in four general (GP) practices were invited to participate in the Management of Opioids and Persistent Pain (MOPP) study by completing self-reported questionnaires at baseline and 3-month follow-up. A sample of MOPP participants were invited for a PROMPPT review with the practice pharmacist. Follow-up was arranged according to clinical need. Participants scheduling a PROMPPT review who had consented to further contact were invited to consent to audio-recording of the consultation and, following the review, were sent an Acceptability Questionnaire and invited to participate in an interview. Practice pharmacists delivering the reviews and one GP per practice were also interviewed. Qualitative analysis used a framework approach, drawing on the Theoretical Framework of Acceptability.

RESULTS: Between November 2020 and May 2021, n = 1020 potentially eligible patients were mailed a consent-to-contact form and n = 178 were returned. Of 178 potential participants invited, 148 (15%) consented to participate in the MOPP study. N = 123 participants (83%) completed 3-month follow-up questionnaires. N = 88 participants were invited for a PROMPPT pain review, n = 80 (90.9%) attended, and n = 8 reviews were audio-recorded. N = 50 acceptability questionnaires were returned and 90% (n = 45) rated the review completely acceptable or acceptable. Interviews were conducted with n = 15 patients, n = 4 practice pharmacists and n = 4 GPs.

Overall, patients interviewed perceived the pain review as a good idea and recommended it to others. Practice pharmacists were perceived as appropriate to conduct these reviews because they were knowledgeable about medicines and doing so redistributed workload away from overstretched GPs. Prior to the pain review, participants reported mixed feelings. These included feeling 'pleased' to be invited and 'grateful' someone was taking an interest alongside concerns about what would happen at the review, including opioids being stopped and changes being detrimental. Following the review, most participants who had agreed changes to opioids were happy with suggestions made. Notably, participants with a clear plan for follow-up or access to the pharmacist felt reassured about making changes to their pain medicines, whereas some were not satisfied if the onus was put on them to arrange follow-up if needed, and some participants reported feeling confused about the plan. The COVID-19 pandemic meant most (n = 78) reviews were conducted by telephone, not face-to-face as intended. Patients and pharmacists expressed a strong preference for face-to-face consultations.

CONCLUSIONS: Practice pharmacist-led pain reviews were acceptable to patients, practice pharmacists and GPs. Uptake of PROMPPT reviews was high. Findings were used to refine the PROMPPT review invitation and patient information, to reduce uncertainty and anxiety about the review, and to revise the pharmacist training. A cluster randomised controlled trial evaluating the clinical and cost-effectiveness of PROMPPT is underway.

Keywords: opioids, primary care, practice pharmacist

PP115

Primary Care

Understanding Persistent Pain (UPP): a Decision Aid Tool to inform management of persistent pain in pharmacy

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BACKGROUND: In an era of personalised healthcare, it has become increasingly important to elicit individual-level preferences. While discrete choice experiments (DCEs) are widely used to measure patient preferences in the delivery of healthcare, their focus has been sample-level analysis. Using the DCE methodology, we developed a novel digital decision aid tool (DAT), named Understanding Persistent Pain (UPP). The UPP DAT, designed in discussion with pharmacists and people with experience of persistent pain, estimates individual preferences in real time to inform clinical consultation decisions in persistent pain management.

AIMS: This study examines the feasibility of using the UPP tool in consultations between pharmacists and adults with persistent pain. We assess usability, desirability, practical and technical issues relating to its deployment in clinical care and feasibility of conducting a larger randomised controlled trial of efficacy.

METHODS: UPP is based on a DCE where people choose between pain management plans described by different features (e.g., prescribed medicines, exercise, psychological strategies, etc.). The tool creates a personalised report which lists which, and by how much, different management strategy features users like and dislike. The report output is discussed during a pain management consultation with a pharmacist, enabling and supporting shared decision making.

Our digital UPP DAT was assessed using a feasibility randomised control trial, open label, with two parallel groups and a 2:1 (using UPP: not using UPP) randomisation. We aimed to recruit up to ten pharmacists, based in a community pharmacy or GP practice in NHS Grampian. Pharmacists were identified following promotion of the study to local networks seeking volunteers to take part. Each pharmacist aimed to recruit up to eight patients, inviting them to a consultation to discuss their pain and lifestyle. Patients were followed up six weeks later. Pharmacists were trained in use of the digital UPP DAT. We aimed to conduct semi-structured debriefing interviews with all pharmacists and patients in the intervention group. Complementing the feasibility trial, a half-day face to face event has been organised to test the usability of the DAT with people living with persistent pain, as well as the face validity of the DCE algorithms and usefulness of the report.

RESULTS: We recruited seven pharmacists, both GP-based and community, in a variety of catchment area settings. To date, eleven patients have been recruited, with seven using the tool. Recruitment is ongoing. Four pharmacists took part in the debriefing interviews and two pharmacists are still recruiting. Due to difficulties in contacting patients, to date no patients have completed the debriefing interview. Pharmacists cite busy workloads as a result of backlogs from Covid-19 as reasons for low patient recruitment and dropouts. They suggest the tool provides a valuable input to consultations, with ease of use and a conversation guider feature cited as its main strengths. Concern was expressed over length of time to complete and possible disenfranchisement amongst people with limited technology skills. It was suggested that there is scope to adapt the tool to be self-completed beforehand, reducing the time and resources needed for the consultation. The half-day face to face event will gather feedback from patients; results will be available by the presentation date.

CONCLUSIONS: Our digital UPP DAT has potential to facilitate shared decision making and promote personalised pain management. However, in its current form, the tool takes too long to complete and adds to pharmacists' workload. The tool may work best as an adjunct to self-management, with pharmacists and other health care professionals offering it to their patients. This will be the focus of future research.

Keywords: Persistent pain, decision aid tool, discrete choice experiment, shared decision

PP116

Primary Care

Acceptability of a prototype practice pharmacist-led proactive review for persistent pain in primary care (PROMPPT study)

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BACKGROUND: Best practice guidelines recommend that patients prescribed opioids for persistent non-cancer pain ('persistent pain') should be reviewed regularly. However, such reviews do not happen routinely in UK primary care and high general practitioner (GP) workload is an important factor. Increasingly, pharmacists working in GP practices ('practice pharmacists') review patients on long-term medicines. Their knowledge and skills around polypharmacy and complex medicines regimens seem well suited to reviewing and managing patients on long-term opioids.

A prototype practice pharmacist-led review of patients taking opioids for persistent pain was developed, using best practice guidance and theory, as part of a National Institute for Health and Care Research funded research programme called PROMPPT (Proactive Review of patients taking Opioid Medicines for persistent Pain led by Pharmacists in primary care Teams). Uptake of interventions by patients or implementation by health care practitioners is often influenced by perceptions of acceptability. However, until recently the construct of acceptability has been poorly defined and understood. A theory-informed approach by drawing on the Theoretical Framework of Acceptability (TFA) of health care interventions (7 constructs; affective attitude, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy) was used during the intervention development pathway.

AIMS: To explore the acceptability of a prototype practice pharmacist-led review of patients taking opioids for persistent pain in order to refine the intervention before formal feasibility testing.

METHODS: Three practice pharmacists from three General Practices in the West Midlands were recruited to deliver the prototype pain review ("in-practice testing") with adult patients, recruited from electronic practice records, who had been prescribed an opioid analgesic continuously for ≥6 months for persistent pain. Participating pharmacists took part in a half-day face-to-face training event, including simulated consultations, to practice delivering the prototype pain review.

The in-practice testing comprised of three iterative cycles of delivery, data collection, reflection, and revision of the pain review. Reviews were observed by two qualitative researchers. Patients and pharmacists were separately interviewed immediately following each review, by one of the observing researchers, using a topic guide informed by the TFA and spontaneous probes related to observing the review.

Interview data were deductively coded onto constructs of the TFA. Researcher observations and interview data from each cycle of in-practice testing were combined with researcher reflections to highlight aspects that worked well and identify areas needing revision. Continuous reflection across the three cycles using the TFA allowed mini-optimisations to be made to the intervention, that could be evaluated during the next cycle.

RESULTS: Patients (n = 13) with lived experience of persistent pain and practice pharmacists (n = 3) took part. Fifteen pain reviews (13 initial and 2 follow-up) were observed and n = 15 patient interviews and n = 15 pharmacist interviews undertaken.

The PROMPPT review was acceptable to both patients and pharmacists. Patient's felt that the longer appointment time was helpful to cover the important aspects of pain management for them and appreciated the collaborative approach taken during the review (affective attitude). Some patients hoped that by attending the review they would find an alternative pharmacological solution to their pain (intervention coherence).

Pharmacists felt they should be involved in delivering pain reviews as they are appropriately qualified and experienced (affective attitude). They experienced challenging discussions and recognised that the level of burden associated with delivering a pain review was dependent on the patient e.g. dose and strength of opioid (burden). Pharmacists recognised that the review needs to fit with the patients' priorities and agenda to enable engagement (opportunity costs).

CONCLUSIONS: Overall findings indicated the proposed PROMPPT review components were acceptable. Findings also pointed to areas that could be improved to enhance acceptability to patients and pharmacists and therefore improve uptake and deliverability.

Keywords: opioids, primary care, practice pharmacist, qualitative

PP117

Psychology

Self-Compassion in Chronic Pain: Evaluating the Self-Compassion Scale Short-Form and Exploring initial Relationships in Pain Outcomes

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BACKGROUND: Self-compassion is progressively being applied to the context of chronic pain (Malpus et al., 2022), as it can lead to increased pain acceptance, lower negative affect, fewer catastrophizing thoughts and decreased pain disability (Carvalho et al., 2020; Purdie & Morley, 2016; Wren et al., 2012). However the psychometric properties of one of the most common measures of self-compassion, the self-compassion scale short-form (SCS-SF), is yet to be validated in the context of chronic pain specifically.

AIMS: This study used exploratory structural equation modelling (ESEM) to evaluate the psychometric properties of the SCS-SF in a sample of people living with chronic pain. Based on these findings, we also aimed to explore the relationship between self-compassion and pain outcomes using univariate regression models to determine whether baseline scores predicted pain-related outcomes 6-months later.

METHODS: Individuals living with chronic pain (N = 297) completed an online questionnaire measuring self-compassion (SCS-SF) as well as measures of sociodemographic, psychological, and pain-related variables. Response rate was 80.8% at follow-up (N = 240).

ESEM was used to evaluate the psychometric properties of the SCS-SF. Univariate regressions were then applied to determine the predictive nature of self-compassion on key outcome variables (pain intensity, pain interference, anxiety, depression, pain-catastrophizing and pain-related self-efficacy) 6-months later ($p < .05$).

RESULTS: ESEM results showed the best fit for the SCS-SF in people living with chronic pain was for a two-factor model, which had acceptable fit with the maximum likelihood estimator (RMSEA & SRMR <.08, CFI & TLI >.90). As a result of this, we computed two scores (compassionate self-responding, CSR; comprising the positive items in the scale and uncompassionate self-responding, UCSR; comprising the negative items in the scale) and compared univariate linear regressions to predict pain-related outcomes 6-months later. CSR negatively predicted: pain intensity, [$F(1, 239) = 16.17$, $p < .001$], pain interference [$F(1, 239) = 19.17$, $p < .001$], anxiety [$F(1, 239) = 47.99$, $p < .001$] and depression [$F(1, 238) = 55.33$, $p < .001$] as well as positively predicted pain-related self-efficacy [$F(1, 239) = 35.94$, $p < .001$]. UCSR positively predicted anxiety [$F(1, 239) = 122.30$, $p < .001$], and depression [$F(1, 238) = 32.36$, $p < .001$] as well as negatively predicted pain-related self-efficacy [$F(1, 239) = 6.14$, $p = .01$]. UCSR did not predict pain intensity or interference, and neither CSR or UCSR predicted pain-catastrophizing 6-months later.

CONCLUSIONS: This study highlights implications for using and interpreting the SCS-SF in the context of chronic pain, where using two scores may explain certain pain-related outcomes more appropriately than one general SCS-SF score. However, further investigation into the predictive nature of CSR vs UCSR for pain-related outcomes is required.

Keywords: chronic pain, self-compassion, exploratory structural equation modelling, predictor

PP118

Psychology

Heightened Interoception in Adults with Fibromyalgia

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BACKGROUND: Previous research suggests that how we sense what is going on inside our bodies (interoception) affects how we experience pain. There is some evidence that people with fibromyalgia syndrome (FMS), which is a condition characterised by chronic pain and fatigue, may have altered interoceptive processing. However, previous studies have had mixed results, and some tests for measuring interoception have been questioned.

AIMS: We tried to address these problems by using a recently developed task called the Phase Adjustment Task to study interoception in adults with FMS.

METHODS: We examined: the tolerability and validity of the PAT in an FMS sample (N = 154); if there are differences in facets of interoception (PAT performance, PAT-related confidence, and scores on the Private Body Consciousness Scale) between an FMS sample and an age- and gender-matched pain-free control group (N = 94); and, if subgroups of participants with FMS could be identified according to interoceptive accuracy levels.

RESULTS: After including additional task breaks and a recommended hand posture, the PAT was both tolerable and valid in the FMS sample. The FMS sample were more likely to be classified as 'interoceptive' on the PAT, and had significantly higher sensibility compared to the pain-free sample. Within the FMS sample, participants who were classified as interoceptive on the PAT had significantly lower symptom impact than the unclassified participants. Conversely, interoceptive sensibility was positively correlated with FMS symptom severity and impact.

CONCLUSIONS: Present findings suggest that interoception may be an important factor to consider in understanding and managing FMS symptoms, and that the PAT is a useful tool for assessing interoception in this population. We recommend future longitudinal work to better understand associations between fluctuating FMS symptoms and interoceptive processing.

Keywords: Interoception, Cardioception, Fibromyalgia, Chronic Pain, Task Validation

PP119

Psychology

Prospective predictors of suicide risk in patients with chronic pain: An investigation into the role of mental defeat

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BACKGROUND: Individuals with chronic pain are at a greater risk of suicide than the general population (Campbell, Darke, Bruno, & Degenhardt, 2015; Cheatle, Wasser, Foster, Olugbodi, &

Bryan, 2014; Edwards, Smith, Kudel, & Haythornthwaite, 2006; Tang & Crane, 2006). Elevated levels of mental defeat have been linked to increased suicide risk at a cross-sectional level (Tang, Beckwith, & Ashworth, 2016), however, the prospective association remains unclear.

AIMS: This prospective cohort study examined suicide risk, predictors of suicide risk and predictors of distress and disability in patients with chronic pain. The main objective of this study was to test the predictive value of mental defeat on suicidality at 6- and 12 months follow-up and compare it with other known predictors.

METHODS: Patients with chronic pain (N = 524) completed a set of online questionnaires that include measures of suicide risk (SBQ-R), mental defeat (PSPS) as well as sociodemographic, psychological, pain, activity, and health variables, at baseline, 6- and 12-month follow-up. Respective response rates were 70.8% (N = 371) and 64.5% (N = 340) at 6 and 12 months. Weighted univariate and multivariate regression models were run with all aforementioned variables predicting SBQ-R at 6 and 12 months.

RESULTS: The clinical suicide risk cutoff of the SBQ-R (>7) was met by 38.55% of participants at baseline, 36.66% at 6 months, and 36.47% at 12 months. Multivariate logistic regression models revealed that baseline depression (HADS-D) (OR 1.14, 95% CI 1.04, 1.25), mental defeat (OR 1.02, 95% CI 1.00, 1.04), perceived stress (PSS) (OR 1.05, 95% CI 1.00, 1.11), pain location-head (OR 1.99, 95% CI 1.10, 3.58), and active smoking status (OR 1.94, 95% CI 1.00, 3.75) significantly increased the odds of reporting clinical suicide risk at 6 months. Older age reduced the odds (OR 0.97, 95% CI 0.95, 1.00). At 12 months, only mental defeat (OR 1.03, 95% CI 1.01, 1.05) and depression (HADS-D) (OR 1.13, 95% CI 1.03, 1.24) remained significant in increasing the odds of reporting clinical suicide risk. Receiver operating characteristic (ROC) analysis on the significant multivariate predictors indicated a cutoff score of 37 for PSPS with a 68% sensitivity and 73% specificity (area under the curve (AUC): 0.75 (95% CI: 0.70 to 0.81)) and 7 for HADS-D with an 81% sensitivity and 48% specificity (AUC: 0.73 (95% CI: 0.68 to 0.79)) was acceptable for predicting clinical suicide risk at 12 months.

CONCLUSIONS: The results of this prospective study provide further insight into the risk factors for suicide in chronic pain. Psychosocial risk factors, such as mental defeat, add to generic demographics and pain-specific risk factors in predicting clinical suicide risk and may offer a novel avenue for assessment and preventative intervention.

Keywords: Chronic pain, mental defeat, suicidality, predictor, prospective association

PP121

Service Management

Pain Concern's Telephone Helpline

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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. Pain Concern received Scottish Government funding to enhance the support for 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. The project ran from January to the end of March 2022.

AIMS: To enable waiting list pain patients to: 1.Feel empowered to tackle the broader problems of daily living; 2. Feel empowered via self-management advice, understanding pain, activity management and dealing with emotional distress to prevent further decline in function; and 3 Be better able to make the best use of NHS pain services when they are seen

METHODS: The Helpline Operators were experienced in taking calls from people in pain, and took a standardised approach to dealing with conversations; they provided emotional and practical support to callers explaining Pain Concern's Self-Management Navigator Tool, sending them a copy of the tool and directing them to other pain management resources. Evaluation Support Scotland helped design the evaluation plan resulting in contemporaneous data being collected by the Helpline Operators. Four different methods gained user feedback: a 'survey log' obtained 'service and user feedback' by collecting quotes from users, making 'observations during calls' and recording callers' comments, described as 'capturing casual moments'. The Helpline Operators were required to complete their record and documentation for each caller immediately after calls and data were summarised in an 'after contact' survey record. Thus specific indicators, behaviours and feelings of callers, were recorded plus comments relating to the outcomes of the project - immediate feedback was received from the users about the benefits of a helpline service to patients in pain. Pain Concern also carried out an 'evaluation survey' to the regional leading clinicians in order to obtain feedback about the service from healthcare professionals.

RESULTS: Telephone feedback comments provided qualitative and quantitative data about the experience of people on NHS pain waiting lists; 38 records were completed summarising the indicators outlined in the evaluation plan. Numerical information arose about whether callers were better prepared for their healthcare appointments. 17:38 service users said that they felt better / more positive having spoken to the Helpline Operators; a significant majority sounded more positive and hopeful, and had a noticeable improvement in their tone of voice by the end of the call (20:38). Callers expressed the struggle they had with healthcare appointments, the challenge around remaining focused on what they wanted to talk about. 17:38 callers felt better prepared for their healthcare appointments after speaking with Pain Concern: "I feel much more confident in how to discuss medication and treatment with both my GP and the care home" (and knowing resources were being sent to her to use).

CONCLUSIONS: 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. Additionally, feedback indicated that the Helpline Operators with their lived experience of pain management and insight into pain treatment provided added value to the service.

It revealed that most Regional Health Administrations (Health Boards) do not have a mechanism to communicate with patients on their 'pain' waiting lists. Pain Concern intends to explore what can be done in future to improve lines of communication.

Keywords: Covid-19, Helpline, Self-Management

PP122

Service Management

The impact of a pharmacist-led chronic pain clinic in opioid deprescribing for adults within a neuro-musculoskeletal pain service: Service Evaluation

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BACKGROUND: Opioids are a major contributor to medication related harm in people with chronic pain (Giummarra 2015). Overdose deaths related to opioids have continued to rise in the US, reaching over 100,000 in 2021 (CDC data No 2021), while emerging evidence increasingly demonstrates their lack of efficacy for treating this problem in most patients (NICE 2021). In the UK, many initiatives have launched to promote opioid de-prescribing to prevent harm.

At RNOH, pharmacist-led chronic pain clinics have been established to facilitate medicines optimisation. Opioid reduction is a major part of this clinic's workload. Most referrals are from chronic pain consultants, with some direct new patient referrals from primary care after triage by the service's clinical lead. Patients are closely supported, aiming to minimise the risk of withdrawal symptoms by maintaining regular contact. Appointments are telephone based and recommendations for dose change are made to the primary care prescriber.

AIMS: To ascertain the impact of pharmacist-led support in reducing strong opioid use (morphine, oxycodone, tramadol, tapentadol, buprenorphine, fentanyl).

To determine the incidence of withdrawal symptoms during planned opioid tapering and assess the difficulties in managing these.

METHODS: All medication dose changes were made within a shared decision-making framework. Dose changes were recommended to the opioid prescriber and the prescribing was not taken over by the clinic in any of the cases. Real-time data on patient progress was collected in successive appointments. This included quantitative data on the dose of all opioid types and qualitative data on withdrawal symptoms. All data collection was done by the pharmacist during the 30-minute clinical appointment time. This data was entered on an Excel spreadsheet and kept on a secure drive for analysis.

RESULTS: One hundred and seventy patients were referred for opioid reduction between May 2017 and the end of April 2022. Of these, 128 (age range 17-88 years, 2/3 identifying as female) have been discharged within this period. The majority were prescribed oxycodone or morphine. Whilst very similar numbers of patients were on these two medications, oxycodone represented a higher opioid burden than morphine when doses were calculated as oral morphine equivalent: oxycodone (38%) vs morphine (31%). In all cases the patient's general practitioner was the prescriber.

Fifty of the 128 patients discharged from the specialist pharmacist clinic stopped strong opioids completely, 16 achieved some reduction, 22 were not able to make any sustained change, 35 were discharged due to non-attendance and 5 were prescribed a greater opioid dose by their original prescriber.

Withdrawal symptoms were reported in 55% of patients. The commonest symptoms were sweating, gastrointestinal upset, tremor, and joint aches. The withdrawal symptoms were, in most cases, self-limiting and were managed non-pharmacologically (e.g., advice on hydration or muscle stretch). In a minority of patients, slower tapering, or advice on the use of over-the-counter medications (e.g., paracetamol, loperamide) was necessary. In one case an in-patient admission was arranged to help manage intense withdrawal symptoms but in this case the dose reduction achieved during the admission was not maintained after discharge.

CONCLUSIONS: Significant reduction in prescribed opioid use can be achieved through structured support provided by a chronic pain specialist pharmacist. Withdrawal symptoms can be managed effectively in this patient group within the same clinical setting.

Keywords: Opioids, medicines optimisation, pharmacist

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Service Management

A Review of the Appropriateness of Referrals for Chronic Pain Services at Epsom & St Helier NHS Trust

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BACKGROUND: Epsom & St Helier University Hospitals NHS Trust (ESTH) is a busy split site district general hospital that performs 7500 chronic pain consultations per year, across South London and the heart of Surrey.

Referrals to the ESTH pain management department traditionally come from primary care, specialist consultants and MSK physiotherapists.

Unfortunately, the current system does not utilise triage at the point of referral to filter patients that are inappropriate for pain review thereby contributing to longer waiting lists. A lack of work up and no analgesia/therapies instigated by primary care are also commonly encountered. Direct booking to interventional lists by non-pain consultants can be used to override referral criteria and make inappropriate requests for interventional treatments.

AIMS: This audit aimed to:

1. Identify the features of an appropriate referral,
2. Identify the magnitude of the problem with inappropriate referrals
3. Identify where improvements in the referral system can be made to utilise the service better

METHODS: A snapshot of all referrals to the pain management department at ESTH during August 2021 was used to find:

1. The total number of referrals
2. The proportion of referrals from primary care, direct consultant referrals and MSK physiotherapy.
3. Proportion of appropriate versus inappropriate referrals.

The appropriateness of referral and the information included in each was judged and scored using the 2015, Core Standards for Pain Management Services in the UK (CSPMS). The referral stipulations were divided into:

1. Essential (site of pain, history, evidence of clinical investigation and imaging),
2. Recommended (pain management history, analgesia, therapies initiated including physiotherapy, complimentary and psychological therapies)
3. Desirable (reason for referral and request for specific management strategies).

RESULTS: 204 patients were referred during August 2021. 130 patients were included in the service audit. 80% of referrals were from primary care, followed by direct consultant to consultant referrals (9%) and MSK Physiotherapy (9%).

Of these patients.

- 69% of referrals did not contain even essential information
- 31% of referrals included only essential criteria
- 10% of referrals included recommended criteria
- 12% included desirable criteria.

On further analysis, almost 40% of all referrals from primary care did not include essential information, with much higher quality of referrals from MSK physiotherapy and direct consultant referrals.

CONCLUSIONS: Following a literature search, no consensus could be found to what should be included for a referral to be deemed adequate. We created our own grading system based on the expectations set out in CSPMS 2015.

A new referral criteria and guideline has been created to help empower triaging clinicians to redirect patients that have not been appropriately investigated or treated prior to being reviewed by the department.

Primary care referral guidelines have been provisionally accepted by local Integrated Care Boards pending governance review, whilst a spinal multidisciplinary meeting has been organised to allow triage of spinal pain patients referred by Orthopaedics & MSK Physiotherapy allowing direct listing for intervention/specialist review as appropriate.

Since the audit was presented locally and implementation of the above policies, waiting times for chronic pain review have reduced from approximately 18 weeks to 7 weeks for a new patient assessment and 14 weeks to 6 weeks for interventions.

The current referral system enables clinicians to provide minimal information and/or to have instigated minimal treatment prior to referral to the department. This has a significant impact on the flow of patients through the service. We provided objective and quantifiable evidence of the magnitude of the problem and possible solutions to help streamline access to the department.

1. Faculty of Pain Medicine. (2015). Core Standards for Pain Management for Pain Management Services in the UK. Faculty of Pain Medicine Standards-Guidelines- Core Standards.

Keywords: Service Provision, Referrals