FACULTY OF PAIN MEDICINE
AUSTRALIAN AND NEW ZEALAND COLLEGE OF ANAESTHETISTS
ABN 82 055 042 852

EXAMINATION HELD ON 23rd to 25th NOVEMBER 2012

at Starship Children's Health and Auckland City Hospital
Auckland, New Zealand

THIS REPORT IS PREPARED TO PROVIDE CANDIDATES AND SUPERVISORS OF TRAINING WITH INFORMATION ABOUT THIS EXAMINATION AND TO ASSIST WITH PREPARATION FOR FUTURE EXAMINATIONS. THE EDUCATIONAL RESOURCE CONCERNING EACH WRITTEN QUESTION IN APPENDIX A IS NOT A MODEL ANSWER FOR THE QUESTION. THE INFORMATION CONTAINED IN EACH WILL BE MORE INFORMATION THAN COULD BE COVERED IN THE FIFTEEN MINUTES. THE INFORMATION PROVIDED IS CONSIDERED CURRENT AND EVIDENCE-BASED, BUT MAY BE SUBJECT TO CHANGE IN THE FUTURE.

CANDIDATES SHOULD DISCUSS THE REPORT WITH THEIR TUTORS SO THAT THEY MAY PREPARE APPROPRIATELY FOR FUTURE EXAMINATIONS.

The Examination is an integral part of the Pain Medicine Training Program, leading to the award of Fellowship of the Faculty of Pain Medicine.

The Objectives of Training guide the range of content which may be assessed.

The Examination consists of written and oral sections and covers the theory and practice of Pain Medicine.

There were some minor changes in the format of the examination this year in response to some organisational concerns regarding the duration of candidate quarantine time and the arrangements for patients. As a result the short cases were moved to Saturday afternoon and the Structured Vivas to Sunday. Additional patients and Structured Vivas were also used.

EXAMINATION **PASS RATE** **78.6%**

This year, 28 candidates presented for the examination and 22 were successful.

WRITTEN SECTION **PASS RATE 19/28** **67.9%**

See Appendix A for the educational resources regarding each question.

General information:
Always, candidates need to:

1. *Answer the question.*
2. Plan the answer in a logical fashion and demonstrate an organised approach.
3. Give succinct answers and avoid repetition.
4. Use headings and dot points if asked to list or discuss briefly.
5. Give definitions of specialist terms (e.g. neuropathic pain, placebo response or breakthrough analgesia). Examiners are unable to assume understanding or meaning of a particular term without clear definition. Similarly for abbreviations.
6. Start answer with "I would do…" if asked to "outline your approach to…"

Candidates were required to answer ten out of fifteen questions. The first five questions were compulsory and five questions were selected from the ten non-compulsory questions.

General comments from the Examiners:
Many answers lacked the sophistication of specialist pain medicine physicians.
Many used a generic template to answer questions and were not specific to task.
Some questions had more than one section. All sections must be answered in order to pass that question.
There was concern about the lack of knowledge in some key and basic areas given the candidates are supposed to be specialists in the area and know more than the referrer.

Question 1 – Compulsory **PASS RATE 25/28 89.3%**

A high profile report of an increasing number of inadvertent deaths from prescribed opioids was published in the media recently. On hearing this report, the local network of general practitioners has invited you, as the local specialist pain medicine physician, to talk for 15 minutes on "harm minimisation when prescribing opioids".

Outline what you will tell them.

Examiners' comments;

This question was reasonably well done.

Key points to cover in answering this question included

- Answering the question using a structure indicative of an outline for an actual presentation on the subject
- Outline key data regarding exponential growth in opioid prescribing, opioid dose equivalents and interactions
- Discussion of the three areas of "Harm Minimisation" (ACE)
- Summary emphasising seriousness of situation, references, contact information and willingness to return for further discussion

Question 2 - Compulsory **PASS RATE 16/28 57.1%**

Outline the principles underlying drug therapy for breakthrough pain in cancer patients and incident pain for patients with non-cancer pain.

Examiners' comments:

The primary aim of this question was to elicit principles of prescribing for breakthrough pain and the controversy surrounding short-acting opioids for chronic non-cancer pain.

The fundamental underlying principles do not differ greatly between cancer and non-cancer pain. The risk of opioid addiction and tolerance becomes higher with nonspecific diagnoses,

younger patients and prolonged use. All of these are more common in chronic non-cancer pain.

The principles of disease-specific treatment, titrating multi-modal analgesia, regular review and planned pre-emptive dosing of short-acting preparations are valid. The need for attention to side-effects, co-morbidities, rapid-onset pharmacokinetics and drug interactions are also important.

If candidates attempted to list all the options for acute pain management or detailed the WHO ladder for cancer pain, they ran out of time.

Key points to cover in answering this question included

- Recognition of the non-cancer versus cancer pain dilemma
- Definitions of break through pain and incident pain
- Principles of non-medical therapy to prevent breakthrough
- Discussion of the key points in the appropriate use of medications for managing break-through pain (opioids and adjuvants, the prescription, allergies, medical co-morbidities)

Question 3 – Compulsory **PASS RATE 22/28 78.6%**

Mrs B has questioned the necessity to complete several rating scales prior to her initial assessment in a multidisciplinary pain centre for management of her work related chronic back pain.

Outline your explanation regarding the use of rating scales, with reference to those you recommend (if any) considering

- **Advantages and disadvantages**
- **Appropriate use**
- **Their place in relation to other methods of assessment.**

Examiners' comments:

The final wording of this question allowed for several different interpretations which were reasonable. Marking was adjusted to take this into account.

Good answers addressed specific and general issues in use, in individual patient cases, and broader use in the discipline of pain medicine- audit and planning of services, funding and research. They referred also to the advantage of comparing rating scale responses with other aspects of assessment, developing an understanding of each individual's predicament. Few answers included the advantage of standardisation of questions to increase reliability.

Common errors included reference to

- "validity" as a general statement without clarification
- "objective" which is not correct

- Limited accuracy, willingness to provide information (people are less likely to provide information in face to face reports)
- Poor organisation of written answer despite headings being offered
- Provision of information not relevant to the question

Key points to cover in answering this question included

- Outline recommended rating scales or, if not recommending any, provide justification for not
- List advantages (including use in clinical care, standardization of questions, comparisons over time and with normative population, benchmarking, reporting to third parties, triage) and disadvantages (time required to complete, cost, literacy, influence of effort, attention and intention, limited diagnostic reliability, care with individual interpretation)
- Discuss appropriate use
- Comment on the place of rating scales in relation to other methods of assessment

Question 4 - Compulsory **PASS RATE 17/28 60.7%**

Describe the indications for diagnostic imaging of patients with low back pain, including the advantages and limitations of each option.

Examiners' comments:

This was a repeat question so a higher pass rate had been expected.

Key points to cover in answering this question included

- Cover investigations for acute, sub-acute and chronic LBP
- Question lends itself to a tabular form or "diagnostic pathway"
- Describe modalities of imaging i.e. X-ray, CT, MRI, PET, bone scan
- Outline pros and cons of each modality
- Outline concept of "red flags" (provide examples)
- Comment about general outcomes/issues e.g. further referral, surgery and other procedures with little benefit, community costs etc. for each modality

Question 5 – Compulsory **PASS RATE 28/28 100%**

A 39 year old woman underwent a posterior fossa craniotomy for removal of a 1.5 cm acoustic neuroma. She reports persisting intense headache which commenced in the early post-operative period and has continued for over eight months from the time of the operation.

a) Describe the characteristics and predisposing factors for post craniotomy headache

b) **Outline an appropriate management strategy.**

Examiners' comments:

This question was very well done.

Key points to cover in answering this question included

- Indicate incidence
- Define chronic post-craniotomy headache- CPCH (according to IHS – 4 criteria)
- Outline causes, risk factors (surgical site, patient factors)
- Outline the important points regarding the diagnosis and management (or lack thereof) of acute post-craniotomy headache (i.e. differential diagnosis, prolonged inflammatory pain leading to central sensitisation, medications that might be used, immediate precautions)
- Methods to minimise evolution of CPCH
- Methods to treat established CPCH (medications, surgical, psychological)

Question 6 - Non Compulsory **PASS RATE 12/28 42.9%**

You have decided to prescribe a tricyclic antidepressant (TCA) for a patient aged 75 years who complains of pain and sleep disturbance following the onset of unilateral thoracic herpes zoster (shingles) eight weeks ago.

a) **What were the clinical features that you took into consideration in reaching your decision?**
b) **What information would you provide to the patient when starting therapy?**

Examiners' comments:

Key points to cover in answering this question include

- Identification of the type of pain expected in post-herpetic neuralgia (PHN)
- Outline of the current recommendations for the management of neuropathic pain in general and specifically for PHN
- Discussion of the place of tricyclic antidepressants (TCAs) in the treatment of PHN, including specifics of which one you would use and why, considering contraindications in this patient
- Outline of the important issues to consider prior to prescribing TCAs (patient assessment, ensure safety prescribing the TCA)
- Outline of the key points of the discussion with the patient regarding commencement of treatment with a TCA (outline nature of condition in lay terms, mechanism of TCA action in treatment of pain, dose titration, side effects, tolerance)

Question 7 – Non Compulsory **PASS RATE 1/6 16.6%**

A 22 year old sales clerk is referred to you by a neurologist with "medically unexplained' pain, weakness and numbness of the entire left "hemi-body" after a

minor motor vehicle accident two years ago. She is wheelchair bound and holds her left hand in a claw-like posture.

Describe your approach to assessment and management of this patient.

Examiners' comments:

This question was poorly done overall.

Many candidates spoke about treatment with generic "pain management programmes" with CBT and physiotherapy which would be inadequate for this challenging case.

Few gave a prognosis (poor prognosis). Few gave a diagnosis or discussed the significance of the diagnoses of "medically unexplained" or "somatoform pain disorder" despite the high prevalence in a chronic pain population.

Few gave guidance specifically about the nature of rehabilitation and interventions which are explained in detail in the Appendix to this report.

Key points to cover in answering this question include

- Definitions (conversion Disorder, Pain Disorder with Psychological Factors, Somatoform Disorders) classification according to DSM-IV-TR or ICD-10
- Outline assessment , including review and confirmation of physical status to ensure organic cause for symptoms not overlooked, differential diagnosis
- Discuss management, including prognosis, multi-disciplinary team, rehabilitation approach, use of psychological techniques, role of medications (wary of opioids, especially high-dose)
- Avoid confrontation, work with family to achieve independence and reduce reinforcement of illness

Question 8 – Non Compulsory PASS RATE 2/10 20%

A 24 year old farmer is referred to you for advice regarding management of Complex Regional Pain Syndrome (CRPS) of his dominant arm. He has been researching the topic and has read about "mirror box" therapy on the Internet.

Outline how you would explain to him the rationale of Mirror Box Therapy.

Examiners' comments:

Knowledge of this pain management modality, increasingly being used by physiotherapists in particular, was generally limited. Diagnostic criteria for CRPS were not required.

Key points to cover in answering this question include

- Identification of which patients graded motor imagery (GMI) may be suitable for

- Briefly explain the theory of GMI - underlying pathology being in primary motor cortex in CRPS 1, hence focus on normalising motor representation using GMI approach
- Outline the 3 phases of GMI
- Comment of research results compared with clinical experience, including expected pain reduction and NNTs for pain and function

Question 9 - Non Compulsory **PASS RATE 2/10 20%**

A 32 year old woman with insulin-dependent diabetes and a history of depression is now 8 weeks pregnant. The pain of her diabetic peripheral neuropathy has been well managed with duloxetine 90mg daily and gabapentin 600mg tds.

a) **Discuss her current medication regimen in view of the pregnancy and outline your plan for management of her peripheral neuropathy pain during the pregnancy.**
b) **What advice would you give her regarding medication for pain while breastfeeding?**

Examiners' comments:

Overall, this question was very poorly done.

There was little in the literature apart from the product information. The quality of the answers raised the question of whether candidates read the product information concerning the medications they prescribe or rely on other articles. Some of the concepts were general, and answers appeared to rely on the candidate's experience, and perhaps thinking laterally. There was a high incidence of not reading the question properly, relying on a table of drugs toxic during pregnancy (which was not part of the question).

Key points to cover in answering this question include

- Very briefly outline reasons for concern regarding continued use of medication during pregnancy (hence the ADEC guidelines)
- Identify specific safety issues for continuing use of duloxetine (B3) and gabapentin (B1)during pregnancy i.e. benefit vs. risk (noting that extrapolation of data from the use of anti-convulsants in epilepsy to their use in neuropathic pain may not be valid)
- Explain recommendations for use of these medications during breast feeding
- Outline advice regarding pain management if decision is to breast-feed (generic advice plus attention to diabetes control, liaison with other medical specialists)
- Outline expectations and recommendations for pain management if these medications are ceased
- Focus recommendations i.e. for this patient

Question 10 – Non Compulsory **PASS RATE 10/13 76.9%**

Discuss the clinical relevance of placebo research.

Examiners' comments:

This was a repeat question. The knowledge in this area has evolved over 3 exams. The candidates who had read the most recent literature on this topic generally did well.

Key points to cover in answering this question include

- Definitions of relevant terms (placebo, placebo response and nocebo)
- Outline the mechanisms (psychological and neurobiological) specific to placebo response
- Outline the role of the psychosocial context
- Discussion of clinical relevance, both generally and specific clinical applications

Question 11 - Non Compulsory PASS RATE 18/22 81.8%

Five years ago, a 75 year old man underwent radical prostatectomy for prostate cancer followed by regular anti-androgenic implants. Three months ago, he underwent radiation therapy for a pathological fracture of his right femur. Bony metastases were discovered in his ribs, pelvis and vertebrae. He rates his pain intensity between 7 and 9 on a verbal rating scale.

His general practitioner has prescribed slow-release morphine 60mg twice daily with immediate-release morphine 10mg when needed for breakthrough pain and amitriptyline 30mg at night.

Describe your management plan for this patient.

Examiners' comments:

On the whole, this question was done reasonably well. There was a lot to consider in general. Those candidates who tailored their remarks to this specific patient performed well.

Key points to cover in answering this question include

- Identification of the two types of bony metastases and importance of knowing this
- Goals of therapy
- Brief discussion of treatment modalities available (pharmacological, interventional, radiation therapy, non-pharmacological) in general terms
- Outline possible prognosis and, therefore, which treatment/s you would recommend for this patient

Question 12 - Non Compulsory **PASS RATE 20/21 95.2%**

a) **How do you respond to your patient who says they have "fibromyalgia"?**

b) **Outline your management plan for this patient.**

Examiners' comments:

This was a repeat question. It was reasonably well answered although depth was limited.

Key points to cover in answering this question include

- Identification of when and who made the diagnosis, the criteria used and what other diagnoses were considered
- Outline the information you would collect from the patient, including possible "red flags", investigations, treatments and response to them
- Mention of the patient's understanding of fibromyalgia, meaning for them and expectations
- Outline key treatment points (empathetic approach, explanation, CBT, pharmacology, exercise, sleep, pacing, address specific somatic symptoms)

Question 13 – Non Compulsory **PASS RATE 1/4 25%**

a) Outline the long-term effects of repeated painful procedures in a baby born at less than 32 weeks gestational age.

b) **What techniques are available to reduce procedural pain in a neonatal intensive care unit?**

Examiners' comments:

On the whole, this question was poorly answered. Although it could be seen as a sub-specialty area, the level of general knowledge regarding developmental neurobiology in particular displayed in the answers was disappointing.

There was little clear detail on the different pain and nociceptive processing of neonates, particularly those born at less than 32 weeks (immature nervous system, neuro-immune system, endocrine stress response, immature and still developing brain, immature DNIC, effects of "nociceptive barrage" on these developing systems (especially cortical) and increased nociceptive/pain resulting in reduced brain volume (on MRI) and decreased body weight). There was little discussion of neonatal pain causing altered pain responses in childhood, the effects on parents (potentially resulting in solicitous behaviour later in life), the adverse effects of pain treatments on the neonate (e.g. opioids, NSAIDs, ketamine) nor hospital systems reform (development of pain management protocols).

Key points to cover in answering this question include

- Recognise the significance of 32 weeks gestational age in terms of developmental neurobiology of nociception and pathways involved in pain

- List examples of the nociceptive insults that an extremely pre-term neonate might experience in a NICU
- Outline key maturational points in the CNS in the development of “pain” pathways and potential alterations to nervous system development in response to nociception at critical stages that persist long term
- Outline key points in establishing pain management programs for neonates including routine assessment (noting influence of differences between term and preterm infant responses in choice of pain assessment tools) and pain management protocols
- Outline appropriate treatment modalities for procedural pain management in NICU including non-pharmacological and pharmacological (including limitations, off-label use)

Question 14 - Non Compulsory **PASS RATE 6/17** **35.3%**

Compare and contrast transdermal fentanyl and buprenorphine.

Examiners’ comments:

Assessment of knowledge such as this should remain a key part of the exams.

The pharmacology of medications used in pain medicine is essential knowledge for specialist pain medicine physicians. The answers to this question showed a general lack of knowledge of pharmacology of these two commonly used medications. The question suited a tabular format for ease of presentation.

Key points to cover in answering this question include

- Brief outline of key elements of transdermal delivery systems (why used, who for and prerequisites for an opioid to be used in this system)
- Detailed comparison of the two medications should include points about indications and contraindications, patch properties and medication properties (pharmacokinetics and pharmacodynamics)
- Comparison of important side effects of each medication (include comment on reversibility)

Question 15 – Non Compulsory **PASS RATE 3/9** **33.3%**

A 63 year old diabetic patient with Ischaemic Heart Disease-related intractable chest pain is referred to you for pain management. He has a past history of Coronary Artery Bypass Grafting (CABG) on two occasions and is now on maximal medical therapy.

a) **Outline your approach to the management of this patient.**

b) **Briefly describe what information might be included in your letter to the referring cardiologist.**

Examiners' comments:

Not a lot of detail was provided in the answers to this question. It was not well done overall even by those who passed.

Key points to cover in answering this question include

- Definition of refractory angina pectoris
- Outline of general treatment principles (review management of medical co-morbidities, multi-disciplinary approach) and areas of controversy
- Describe goal-directed management plan addressing acute pain situations and on-going management
- Outline summary points to be made in letter to cardiologist (broad approach, recommendations for acute pain, ongoing management plan, need for collaboration and planned follow-up)

General comments on written paper:

Candidates are reminded to read the question carefully.
There was a degree of generic answering and some repetitiveness in answers.
Abbreviations always, and specific medical terms generally, require definition when used for the first time.

LONG CASES **PASS RATE 21/28 75%**

General comments:

The Long Case is an important part of the Examination because it aims to mirror a first consultation undertaken by a Specialist Pain Medicine Physician. This section remains a key part of the assessment process.

Candidates are advised to access the Trainee Support Kit and previous Examination Reports for the general instructions regarding the conduct of this section of the examination process.

This year, the cases were excellent and there were some outstanding candidates. Generally, the candidates were careful and respectful of their patients.

Examiners' comments:

Yet again, the patients were nice people who were cooperative and helpful without exception. Candidates should use this to their advantage, and follow up on any clues given.

Timing of history and examination parts remains problematic.

History:

Key points that were omitted in the history included patient demographics (income, living alone, type of house from functional aspect etc.), background history and mental state examination, especially in the elderly patient with memory problems.

Candidates are advised to refer to the outline of "How to take a Pain History" available in *Acute Pain Management: Scientific Evidence.* 3rd Edition, 2010 Macintyre et al., (Eds), ANZCA available at http://www.fpm.anzca.edu.au/resources/books-and-publications as a starting point for learning the elements of a pain history then practice under exam conditions as time management is essential.

Physical Examination:

Candidates are reminded to bring their own stethoscope. All other equipment required is available and standardised.

Poor hand hygiene remains of concern with very few hand washes/application of hand gel before or after handling patients. Candidates **must** adhere to accepted standards of infection control at all times when interacting with the patients.

The standard of the physical examination, although improved over the years, is not as high as would be expected for a specialist pain medicine physician. Candidates are directed to start near the presenting complaint. However, they should avoid using the toothpick as a dagger or retouching the painful part multiple times, especially when the patient exhibits signs of pain.

Neurological examination, in particular, was inadequate in a number of cases. The importance of carrying out a careful neurological examination cannot be stressed enough. Many candidates exhibited poor technique in the performance of the neurological examination of the limbs especially. Testing vibration and position sense were done particularly badly.

A general neurological examination should precede detailed sensory examination. Salient features are:

- Note history given
- Compare sides
- AVOID CAUSING PAIN
- Inspect first. This includes adequate exposure of the limbs and trunk/spine (both for upper and lower limbs). Look for wasting/asymmetry/posture/skin colour/ fasciculation.
- Screen movements and power before "hands on". For example
    - Upper limbs: arms above head/behind back
    - Lower limbs: observe gait/heel stand/stand on balls of feet +/- squat/ single leg stand and squat
- Assess tone, feel sweatiness and temperature at same time
- Assess power of whole of limb
- Have good technique for reflexes (practice shows)
- Coordination
- Then sensation
    - Look for numbness first
    - Identify area of altered sensation (?symmetrical/ ?dermatomal)
    - If time allows and information gleaned indicates, consider more refined pain oriented sensory examination

Leaving time too short to perform an adequate physical examination led to minimal or absent respiratory or cardiovascular examination.

Presentation:

The candidate should aim to demonstrate that they have the ability to be the leader of the Multi-disciplinary Pain Team, and can manage the long case as if the patient were their own.

This year, errors in the Presentation included making assumptions about information that had not been elicited or assuming an answer to a question that had not been asked.

The presentation should include a structured formulation and an objective discussion. There needs to be an emphasis on an **all-round approach** to assessment, diagnosis, formulation, management and prognosis. It should occupy less than **seven** minutes of the total 30 minutes allowed for the viva voce section.

Viva:

Topics relevant to the patient's pain condition, identified by the Examiners from the observed history and examination, form the basis of the viva.

Candidates are encouraged to critically appraise the patient's current management and outline what they may recommend that is different from the plan the patient has described.

Questions may include some of the following:

- The main pathophysiological processes
- What to do if pain progresses.
- Key management issues.
- Indications for medication use, mechanisms of action and complications.
- Expectations and treatment outcomes for modalities previously used or recommended.

***This year's long case patients included*:-**

- 69yr old woman with upper limb CRPS Type 1.
- 56yr old man with meralgia paraesthetica and chronic neck/shoulder pain.
- 56yr old man with (L) hand pain post-C5-T1 brachial plexus avulsion.
- 45yr old man with chronic low back pain and L5/S1 radicular pain.
- 54yr old man with scleroderma/Sjogren's and widespread musculoskeletal pain.
- 36yr old woman with neck pain post-whiplash injury.
- 49yr old man with undifferentiated connective tissue disorder and lymphoma. Chronic low back pain and thigh pain.
- 65yr old woman with neuropathic (L) heel pain, pemphigous, and psoriasis.

- 62yr old man with chronic upper limb pain and cervical radiculopathy.
- 30yr old man with chronic headaches following posterior fossa decompression and multiple shunts. High functioning cerebral palsy.
- 58yr old woman with upper limb CRPS post-cardiac surgery.
- 57yr old woman with trigeminal neuralgia and multiple sclerosis.
- 51yr old woman with syringomyelia.
- 67yr old woman with psoriatic arthritis and widespread musculoskeletal pain.
- 58yr old man with central pain related to toxoplasmosis.

STRUCTURED VIVA SECTION **PASS RATE 26/28 92.9%**

The viva section consists of three structured vivas and the investigation station. For the first time, two rounds of scenarios and investigations were examined so that quarantine times for candidates could be kept to a minimum.

General information:

- Issues that were covered in one or both vivas included:
  - Patient assessment.
  - Nature of the lesion.
  - Anatomy.
  - Investigations to confirm the diagnosis.
  - Possible therapies for current pain.
  - Crisis management.

The introductions to the structured vivas were as follows:

Acute scenarios **PASS RATE 22/28 78.6%**

Introductory scenario 1:

You are called by a colleague for phone advice about pain management in a 50 year old male patient he has been asked to see in the medical wards.

- The patient has long-term chronic back pain but this has increased over the previous 3 days leading to his presentation to hospital; he is also febrile
- The patient says he normally takes methadone 80 mg a day for chronic back pain
- The patient's physicians plan to keep him in hospital for 2 days with PCA for pain relief so that the dose of oxycodone he will need at discharge can be determined

Your colleague asks for advice about appropriate PCA doses.

Question 1: What would be your response?

Introductory scenario 2:

You are asked to see a 38 year old woman diagnosed 3 months ago with carcinoma of the right breast. She already has poorly controlled pain and is concerned about:

- pain management following a planned right mastectomy and axillary clearance.

She is having a tissue expander placed at the time of surgery for future reconstructive surgery. She has 3 primary school-aged children, a husband who is frequently overseas for work and fears about her future.

Question 1: How would you develop a plan for this patient with respect to pain management for her surgery?

Comments from the Examiners included the following:

Both scenarios were very relevant to the curriculum and of a complexity that one would expect would be part of the practice of a Specialist Pain Medicine Physician. The two scenarios were based on real patient situations.

The integration of appropriate imaging was relevant although the candidates seemed to struggle with this.

Chronic scenarios **PASS RATE 21/28 75.0%**

***Introductory scenario 1*:**

A 17 year old girl with chronic widespread pain presents 1 year after viral illness. Initial complaints of pain included generalised myalgia and headache. 1 year later, she complains of back pain, extreme lethargy, and headache.

Question 1: How would you approach assessment of this patient?

***Introductory scenario 2*:**

You have been asked to see a 40-year-old woman with chronic pain, present since birth of her daughter 8 years previously but worse recently. The main sites of complaint are the pectoral girdle, arms and fingers (described as “crushed”), back of thighs and calves. She complains also of fatigue, compromised endurance for activity, difficulty concentrating, labile mood, disturbed sleep and weight gain.

Question 1: How would you approach the assessment of this patient?

Comments from the Examiners included the following:

The vivas were structured so that the candidate was expected to steer the conversation by asking the right questions to demonstrate they recognised important issues for the ‘hypothetical patient’. However, it did not seem to draw this out as much as expected except for a few candidates.

Cancer scenarios **PASS RATE 23/28 82.1%**

Introductory scenario 1:

A rural GP contacts you regarding a 58 year old woman with a pelvic mass (recurrent carcinoma of the colon) who had an *intrathecal (IT) catheter with subcutaneous injection port* inserted by your clinic 1 month ago.

An external pump infuses IT morphine at 5 mg/day and bupivacaine at 20mg/day.

She is expected to live another 6 months.

- *Over the past 5 days, the patient complains of severe pelvic and back pain, headaches, rigors, nausea and vomiting.*

Question 1: *What are some possible causes for her symptoms?*

Introductory scenario 2

A rural GP contacts you regarding a 46-year-old man with pancreatic cancer who had a coeliac plexus block by your clinic 1 month before. Patient complains of severe pain and dizziness.

The patient lives alone.

His current medications are oral sustained release hydromorphone 32mg mane and venlafaxine 150mg mane.

Question 1: What are the possible causes for the increased pain?

Investigation Stations **PASS RATE 22/28 78.6%**

A brief scenario was presented to put each investigation into a context. If there was an obvious diagnosis, candidates could mention it as soon as possible and move to the next investigation. If the diagnosis was not immediately clear, candidates were able to explain the key features they were looking for and, hence, draw a conclusion.

The investigations included:

- Radiology including plain X-rays, CT, MR and PET scans
- Neurophysiology findings
- Abnormal biochemical profiles
- ECGs
- Blood drug levels

Examiners' Comments:

The range of investigations was good in both vivas. Overall, the investigations station was done reasonably well.

SHORT CASES: **PASS RATE 20/28 71.4%**

General Information:

The Short Case section involved each candidate having a brief exposure to 3 patients with acute, chronic and cancer pain plus the Communication station. This section is a test of physical examination techniques or communication skills.

- The duration of each station was 10 minutes.
- Information was provided outside each door regarding the station.
- For each short case, candidates were directed to a specific area to examine then present their findings and answer questions concerning that patient.

This year's cases included:

ACUTE

- 32yr old man with acute cervical myelopathy.
- 32yr old man with foot drop and neuropathic pain post-compartment syndrome following ORIF fractured femur.
- 31yr old woman with acute upper limb CRPS.
- 49yr old woman with neuropathic arm pain post-ulna nerve decompression.
- 36yr old man with left arm neuropraxia following prolonged immobilisation due to recreational drug overdose.

CHRONIC

- 53yr old man with chronic lower limb CRPS and post-BKA stump pain.
- 18yr old woman with chronic bilateral upper limb CRPS.
- 43yr old man with right brachial plexus injury C7-T1.
- 33yr old man with right pan-plexus injury.
- 70yr old man with neuropathic pain right lower limb following lipoma resection.

CANCER

- 72 yr old woman with chronic chest wall pain post-T1 meningioma excision.
- 65yr old woman with left post-mastectomy pain.
- 51yr old man with right-sided trigeminal neuralgia post-meningioma excision.
- 54yr old man with malignant cauda equina.
- 42yr old man with right post-thoracotomy pain following Ivor-Lewis oesophago-gastrectomy.

Examiners' comments:

A significant number of candidates did not seem to have ever been observed doing these tasks. Candidates should focus on reading the instructions carefully and addressing the specific issues raised.

Candidates need to be particularly cognisant of some patients having incompletely settled pain and examine the patients accordingly, especially if examining the patient after several

previous candidates. Examiners may modify the instructions regarding the examination if a patient becomes distressed.

Similar points were made as for the long case, including the following:

- Inspection is an important element of examination. Appropriate disrobing is important.
- Proper examination rarely requires the patient to remain seated throughout. Candidates are reminded that assessment of gait is often required and patients can be moved from chair to bed.
- When examining limbs, comparison with the other side must be made.
- No need to repeatedly perform the same examination task.
- Case of breast cancer required examination of both breasts and the axillae. Required appropriate examination in an appropriate position

Communication Station: **OVERALL PASS RATE 21/28 75.0%**

General information:

- This station involves an actor and addresses communication skills.
- The aim of this station is to encourage a generalised discussion of why suggested options are preferable. Informed consent may be required. Details of the history, and the treatment plans are not necessary.
- This year, two scenarios were used. The details were as follows:

Scenario 1 details:

Interview with Mrs Magda Smith regarding her use of medication for pain management.

Door information:

Dear Doctor,

Re: Mrs Magda Smith
Aged 52

Please advise Mrs Smith about her medication regime.

She has been a manual worker for several decades, and is currently working full time on the assembly line preparing meals for Qantas.

She has

- chronic low back pain, not suitable for surgery
- completed investigation revealing only degenerative lumbar disease
- enrolled in a Pain Management Education Program, early 2013
- ceased physiotherapy after no continuing benefit.

She has a stable marriage with 3 teenage sons.

Her current medication includes:

- Morphine Slow Release 100mgs bd
- Morphine (Immediate release) prn
- Fentanyl patch 25 micrograms
- Celecoxib 100 mgs bd
- Amitriptyline 10mg nocte and prn
- Diazepam 5mg prn

Mrs Smith attends frequently, and asks for more medication.

Please advise Mrs Smith about her medication management.

Yours sincerely

Dr Tom Roberts

Scenario 2 details:

An Interview with a General Practitioner regarding new prescriptions of opioid medications provided to patients on discharge from hospital.

Door information:

Dr Smith is waiting to talk with you.

She is representing her General Practitioner colleagues to discuss the difficulties of having patients discharged from hospital request repeat opioid prescriptions.

The opioid medications have been commenced during admission for treatment of a wide variety of medical and surgical conditions.

OVERALL EXAMINATION COMMENTS:

This examination followed the structure of previous examinations with wide-ranging sampling of the pain medicine curriculum along with multiple opportunities of various styles of examination for candidates to display their knowledge. Once again, successful candidates can be very proud of their achievement.

This year, the pass rate of the written paper was higher than last year. However, the questions on tricyclic antidepressant prescription and opioid pharmacology, two classes of medication used extensively in pain medicine as well as medically unexplained pain and developmental neurobiology related to neonatal pain management were particularly poorly done. Assessment of knowledge concerning medications used in pain medicine will be undertaken in every examination. Appropriate prescribing and understanding of potential complications related to medication use is essential for patient safety and a very high standard is expected of Specialist Pain Medicine Physicians.

Once again, candidates performed the history taking section in the long cases very well but a significant number did not conduct an adequate physical examination. Practice of an organised approach to physical examination is essential both for success in the examination but more importantly for clinical practice. We would also encourage practice formulating the case and presenting it in an organised fashion as well as talking about a wide range of relevant topics to improve overall performance in the viva.

Special thanks must be given to Dr Kieran Davis, Dr Jane Thomas and the staff at the Starship Children's Hospital and Auckland City Hospital for their assistance in organising the patients and the exam venue. Once again, the cohort of 28 candidates added an extra layer of complexity in the organisation with the need to identify and coordinate the approximately 40 patients required for an examination of this size as well as the examiners and Faculty staff.

The Court of Examiners gratefully acknowledges all of the patients who willingly and enthusiastically participated in the Examinations despite their pain.

The Court of Examiners also acknowledges the Observers for 2012. Two Observers were new Examiners in training and the third was an interested Fellow of the Faculty, all of whom provided valuable reflection on the examination processes.

THE BARBARA WALKER PRIZE

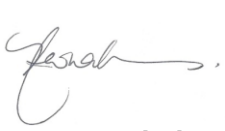
The Barbara Walker prize was awarded to Dr Meena Mittal from Victoria.

A Merit Certificate was awarded to Dr Laurent Wallace from New South Wales.

MEREDITH CRAIGIE

Chairman
Court of Examiners

NEWMAN HARRIS



Deputy Chair

December 2012

Distribution:

Faculty Board	Supervisors of Training	Examination Committee
Court of Examiners	Registered Trainees	ANZCA Director of Education

APPENDIX A

Question 1 – Compulsory

A high profile report of an increasing number of inadvertent deaths from prescribed opioids was published in the media recently.

On hearing this report, the local network of general practitioners has invited you, as the local specialist pain medicine physician, to talk for 15 minutes on "harm minimisation when prescribing opioids".

Outline what you will tell them.

A suggested outline for this talk could follow this format. The key points are identified.

Topic	**Description**
Introduction	• Thanks for invitation to speak • 15 min can't do justice to topic and suggest returning to give more detailed talk

Overview	• Data
	• Three areas of 'Harm Minimization' - (ACE)
	  o Avoidance
	  o Contract
	  o Exit when needed

Data	• Existing data of exponential growth in opioid prescribing and related deaths • Opioid dose equivalents and interactions

Avoidance	• Avoid if possible starting long-term opioids
	• Employ non-opioid and non-pharmacological strategies
	• Especially avoid in:
	  o Young people
	  o History of dependence or substance abuse
	  o Unclear diagnosis
	• Check local and national data registries for Doctor shopping behaviour
	• If all other measures fail, conduct a time-limited opioid trial based on functional outcomes

Contract	• Establish an opioid contract • Patient and Doctor to sign • Copy given to patient • Ongoing efficacy determined by functional outcome • May involve random urine testing • Avoid progressive dose escalation • Avoid immediate release agents • Avoid parenteral route • Use regular sustained release oral or transdermal preparations • Notify patient to local opioid registration authority
Exit	• Refer to Pain Medicine Specialist if dose escalation to high dose has occurred • Wean and cease opioid if: o Significant breach of opioid contract

	○ Aberrant drug taking behaviour ○ Diversion of prescribed opioid ○ Excessive adverse effects ○ Poor efficacy
Summary	• Emphasize seriousness of situation • Provide references for further information including books, review articles and links to useful online resources • Provide contact information • Show willingness to return again

Question 2 – Compulsory

Outline the principles underlying drug therapy for breakthrough pain in cancer patients and incident pain for patients with non-cancer pain.

The principles underlying this discussion should result in the following answers for the prescriber
1 Should a drug be used in this setting?
2 Which drug or drugs
3 What dose, frequency and route of administration

The underlying principles include:

1) Definition of what breakthrough pain is.

- **Definition** of breakthrough pain " A transitory severe or excruciating pain , which last seconds to hours and is superimposed on a baseline pain controlled to a moderate or better intensity by an opioid regimen"
Also is typically from cancer but may be any cause that is more severe than usually experienced on any given treatment regime in any 24 hour period. Usually it is in the context of longer term slow release opioid administration due to incident pain, end of dose failure, tolerance, disease progression and any of a number of causes. It can also occur during re-titration of slow release preparations and poor compliance periods for example.

2) Assessment

Having a complete understanding of the individual's situation and the limited data on treatment.
- For example we need to understand the time course of the patient's overall pain condition and physical and psychological co-morbidities. This is to improve analgesic response and to avoid tolerance and addiction issues as much as possible particularly in chronic non cancer pain. In chronic headaches there are particular issues with medication overuse headache being induced by opioid use and short acting drugs in general. Drugs should remain part of an overall treatment plan aimed at preventing breakthrough pain with, for example, disease specific treatments, nursing care, aids and regular review of slow release opioids and adjuvant drug doses. For longer term cases in non cancer pain a less medicalised approach may be indicated with a multidisciplinary programme using physiotherapy and psychological strategies as the mainstay of treatment. Breakthrough pain is generally viewed as a "flare up" in this treatment approach.

3) Disease specific treatments. - Preventing the breakthrough pain as much as possible by use of disease specific treatments. For example reviewing diagnosis regularly and using radiotherapy of surgical stabilisation of fractures if detected

4) Non pharmacological strategies - Breakthrough pain is difficult to treat in many cases and efficacy should be maximised by use of non pharmacologic flare up plans including physical (eg TENS, heat, cold, splinting) and psychological (eg relaxation, thought challenging , desensitisation) treatments.
5) Titrating long acting drug as high as tolerated – this reduces breakthrough pain in cancer patients but is less acceptable in longer term situations especially non cancer pain where it is increasingly recognised that the exclusive use of long acting opioids may in fact cause increasing tolerance and dose escalation.
6) Prescribing breakthrough medications- with respect to speed of onset and efficacy, offset, individual variation and toxicity and side effects.

Minimise opioid use by use of co-analgesics for breakthrough pain – eg paracetamol and NSAIDS Opioids should be chosen with the following requirements in mind. One essential principle is to acknowledge the lack of evidence in this area and tailor the approach to the individual. For example oral physeptone may be suitable for baseline treatment and breakthrough dosing in some individuals . In others the need for rapid acting preparation will necessitate fentanyl transmucosal or parenteral dosing with morphine because the dose of long acting preparation has already reached side effect level.

a) rapid acting

This may relate to lipid solubility eg Fentanyl is has an earlier peak effect than morphine , or route of administration – intravenous being more rapid than oral. Some drugs are only available by certain routes because oral bioavailability (fentanyl) or transmucosal (morphine) availability is poor.

b) minimal side effects

There are marked individual variations in side effect profile of different opioids . Keeping with the existing long acting drug is preferred but probably not essential. In fact there may be situations where this traditional view is wrong.

c) route of administration

This may dictate speed of action (eg needing parenteral opioids for rapid effect) but may also be mandated by the patient's condition eg being unable to tolerate oral medications Novel administration routes (eg transpulmonary) have been investigated to assist with this

d) Appropriate dosage

This is generally unpredictable but is usually estimated by using a sixth of the 24 hour long acting dose and then varying the dose . There is evidence that this approach is appropriate for morphine but dose of rapid acting preparations of fentanyl has been shown to have no relationship to long acting dose and so must be titrated from low doses.

e) regard to contraindications

Eg morphine is frequently avoided in renal failure in favour of other opioids eg oxycodone to avoid accumulation of toxic metabolites (morphine -3 glucuronide).

Methadone has rapid onset and can be used for breakthrough pain but long half life may be a contraindication in renal failure for example

Question 3 – Compulsory

Mrs B has questioned the necessity to complete several rating scales prior to her initial assessment in a multidisciplinary pain centre for management of her work related chronic back pain.

Outline your explanation regarding the use of rating scales, with reference to those you recommend (if any) considering

- **Advantages and disadvantages**
- **Appropriate use**
- **Their place in relation to other methods of assessment**

Advantages.

- To provide information for use in clinical care of the individual
- Standardisation of the questions and the order of questions
- Comparison of a patient with a normative population
- Compare a patient at different points of time in progress of condition
- Compare the performance of unit with others: “benchmarking”
- Reporting to third parties, for performance reporting
- Assist triage of patients to appropriate forms of assessment and care.

Disadvantages include

- Time required
- Literacy requirements
- Influence of goodwill, effort, attention, and intention
- Limitations of comparative populations
- Rating scales developed for research, populations, rather than individuals.
- Individual circumstances not accounted for in interpretations

Rating scales offer the ability to quickly obtain significant amounts of information in a reliable structured fashion, although it is very appropriate to accept the limitations of accurately interpreting the information provided. People interpret questions differently, and other circumstances than the studied condition influence outcomes.

When the same questions are asked of a patient during a clinical interview, the interviewer has available an abundance of additional information such as history, current social and personal context, manner, ‘non-verbal communication’ mood, gesture, variability to assist interpretation.

Completion or lack thereof provides some indication of degree of motivation, interest and engagement in the assessment.

Rating scales are very useful in studying populations, inexpensively and to provide consistency in the way the information is collected. The patient’s willingness to provide this information can considerably progress understanding and development of clinical care for other people with similar predicaments.

On an individual basis, information provided in the rating scales can be used to guide an interview, but it is appropriate to use this information after considering it in the context of the person’s individual predicament within the interview. It is inappropriate to make very confident judgements regarding the patient’s predicament when not considered in the individual’s personal context.

Questionnaire responses can provide the clinician with indicators of areas which warrant closer enquiry. Other forms of assessment include

- Symptoms, signs
    - Pain intensity
    - Neuro-vegetative function (sleep, appetite, weight).
- Medication Health care use
- Function
    - personal care,
    - domestic activity
    - recreational activity
    - social
    - activity
    - vocational activity (including return to work)
- Mood, Suffering
- Acceptance / Adjustment
- Patient satisfaction

These might be assessed by

- Self report
- Observation (family, associates, work colleagues, other health practitioners – team members, nursing staff, General Practitioner
- Rating scales
- Health care utilisation parameters – medication uses, hospital visit, health practitioner visits, financial expenses and health care, “up and down time”.

Question 4 – Compulsory

Describe the indications for diagnostic imaging of patients with low back pain, including the advantages and limitations of each option.

This modification would include plain radiographs, CT scans, MRI scans, nuclear medicine scans, but would/should excluded invasive diagnostic procedures under imaging control such as epidural, medial and lateral branch blocks and facet joint injections. As the role of ultrasound and fMRI in the diagnosis of spinal disorders is uncertain, I have not included these modalities in the discussion.

It is also noted that the question is inclusive of investigations for acute, sub-acute and chronic low back pain.

An excellent detailed review of this topic has been published recently. I recommend that those interested read Chou R, Deyo RA, Jarvik JG. Appropriate use of lumber imaging in the evaluation of low back pain. Radiol Clin N Am 2012; 50:569-585. In fact, the monograph, Radiologic Clinics of North America 2012; 50(5) is dedicated to the imaging of the variety of pathological complaints that may affect the spine and limbs. It provides an excellent and up-to-date reference on these topics.

This question will require the candidates to be particularly well organized as there is considerable information required. The question lends itself well to a tabular format or perhaps even better a "diagnostic pathway" as appears in the "Acute Low Back Pain" diagnostic pathway disseminated by the W.A. Dept of Health at www.imagingpathways.health.wa.gov.au

Indications for imaging in low back pain:

There is poor correlation between the presence or absence of acute or chronic low back pain and abnormalities on diagnostic images, with respect to diagnosis (Kalichman L et al Spine J 2010;10:200-208), causation or prognosis (Carragee E Spine 2006; 31:2942-2949).

There is no indication for routine diagnostic imaging (or other investigations) in acute or subacute low back pain in the absence of "red flags" (recent significant trauma or milder trauma at age older than 50 years, unexplained weight loss, unexplained fever, immunosuppression, history of cancer, intravenous drug use, prolonged use of corticosteroids or osteoporosis, age older than 70 years, focal neurologic deficit with progressive or disabling symptoms, duration longer than 6 weeks). (NICE Guidelines 2009, European Guidelines, New Zealand Guidelines, ACP/APS Guidelines 2007, 2011, eg Chou R et al Ann Intern Med. 2011;154:181-189)

Diagnostic imaging should only be performed in selected, higher-risk patients who have serious or progressive neurological deficits or are suspected of having a serious or specific underlying cause for low back pain (Guidelines as above).

In the absence of red flags, there is strong evidence that routine imaging is not associated with clinically meaningful improvements in outcomes relating to pain, function, quality of life or mental health and may increase the likelihood of disability and its duration (Graves IM et al 2012; 37:1617-1627).

In the absence of red flags, unnecessary imaging exposes patients to preventable harms including radiation exposure, labeling effects (catastrophising, stigmatisation), further

unnecessary investigations and unnecessary surgery. with significant financial costs and potential risks associated with it

In the absence of red flags, unnecessary imaging results in wasted resources (time, personnel, cost)(Chou R et al Radiol Clin N Am 2012;50:569-585)

CT and MRI scans should be reserved for patients with a suspected serious underlying condition or neurological deficits, or who are candidates for invasive interventions.

Diagnostic imaging may increase diagnostic confidence but has minimal influence on diagnostic or therapeutic decisions in patients with low back pain(Gillan MG Radiology 2001; 220:393-399).

Decisions about repeated imaging should be based on the development of new symptoms or changes in current symptoms.

Patients with low back pain both expect investigations and report increased satisfaction following investigations (Kendrick D et al BMJ 2001; 322:400-405). Patient education strategies should be used to manage expectations by informing patients about current and effective standards of care (Chou R et al Radiol Clin N Am 2012;50:569-585).

Available imaging modalities:

Plain Xrays:

Pros – readily available, individual exams cheaper than CT, MRI, nuclear medicine, excellent for imaging cortical bone, assessing bony alignment, useful for detecting congenital anomalies, fractures, tumours, can be performed whilst weight bearing

Cons – provide views in one plane only, hence at least two orthogonal views are required to assess 3 dimensional structures, poor definition of soft tissues (but good for detecting subcutaneous emphysema), poor at detecting early bone loss or early infection, use ionizing radiation hence concerns regarding increased cancer risk, cataracts with dose accumulation. On a global scale, although individual xrays are relatively inexpensive, they represent the greatest number of unnecessary images performed and hence contribute most to the burden of cost.

CT scans:

Pros – readily available, cheaper than MRI scans, cost-effective for imaging spinal trauma, particularly in obtunded patients, axial/helical scans can be reformatted into sagittal, coronal and 3 dimensional images, excellent definition of bony architecture, able to image some spinal soft tissues (discs, ligamentum flavum, thecal sac, nerves), can be used, including with contrast, (CT myelography) when MRI scans are contra-indicated.

Cons – more expensive than plain Xrays, greater radiation dose, poor visualization of some spinal soft tissues (anterior/posterior longitudinal, interspinous ligaments), unable to distinguish between recurrent/persistent disc prolapse and epidural scar, generally cannot be performed weight-bearing, can miss dynamic spinal instability, high rates of positive findings in asymptomatic patients, hence poor specificity, images are degraded by spinal implants.
CT myelography can be associated with complications associated with lumbar puncture in particular post-dural puncture headaches, paraesthesiae, meningitis rarely epidural haematoma or abscess and reports of exacerbating neurological deficits exist.

MRI scans:

Pros – axial/helical scans can be reformatted into sagittal, coronal and 3 dimensional images diagnostic, modality of choice for imaging bone marrow, ligaments and neural structures, no ionizing radiation, can be used with contrast in post-operative spine to distinguish recurrent disc prolapse from epidural scar.

Cons – less readily available and more expensive than plain xrays, CT scans, long image acquisition times increase risk of movement artefact, generally unable to provide weight bearing or dynamic imaging, high rates of positive findings in asymptomatic patients, hence poor specificity contra-indicated in patients with pacemakers, spinal cord stimulators etc, images are degraded by spinal implants

Radionuclide/PET scans

Pros – image tissue metabolism, rather than structure, can image entire body. Tc-99m scans detect increased bone turnover with high sensitivity and specificity, hence, both positive and negative scans are useful in the investigation of fractures, tumours and infections, sensitivity improved by using SPECT. Indium 111- labeled white blood cell scan is the diagnostic modality of choice in detecting infection in the post-operative spine as there is no accumulation at fractures or implant sites in the absence of infection.
FDG-PET positive in tumours with increased glucose metabolism, particularly sarcomas, and considered diagnostic modality of choice for distinguishing benign and malignant primary bone tumours in spine.

Cons – less readily available, expensive, time consuming, radiation dose, need correlation with other imaging modalities to improve spatial resolution.

Question 5 – Compulsory

A 39-year-old woman underwent a posterior fossa craniotomy for removal of a 1.5 cm acoustic neuroma. She reports persisting intense headache which commenced in the early post-operative period and has continued for over eight months from the time of operation.

a) **Describe the characteristics and predisposing factors for post craniotomy headache**
b) **Outline an appropriate management strategy.**

Acute post-craniotomy headache:
80% in early post-operative period
Must differentiate from:

- Intracranial haemorrhage
- Raised intracranial pressure
- Infection
- Systemic illness

Prolonged inflammatory pain – inadequately treated may lead to central sensitisation. Effective management of acute post craniotomy pain may reduce the incidence of chronic post craniotomy headache.

Early Post-Operative Management:

- Adequate analgesia – IV paracetamol
- Dexamethasone
- NSAID (? Evidence)
- Local anaesthetic
- Gabapentin
- ? Ketamine
-

Chronic post craniotomy headache

Definition – varies according to source.

- IHS has defined CPCH according to four criteria :
  - Craniotomy performed for a reason other than trauma
  - Headache onset within seven days after craniotomy
  - Headache persisting > three months after craniotomy
  - Headache of variable intensity maximal in the area of the craniotomy
  - Several studies have distinguished chronic from acute post craniotomy pain by duration greater than 2 months
  - Some definitions require greater than 3 months.
  - Agreement that the headache onset must occur in relation to the surgical procedure.
  - Cognitive, behavioural and somatic manifestations often accompany post craniotomy headache.
  - They usually manifest as a type of chronic tension type headache or occasionally as intermittent migraine-like attacks.
  - Rebound headaches can also occur due to overuse of analgesic medications.
  - Co-morbid psychiatric problems such as stress disorder, insomnia, depression, drug and alcohol abuse may also complicate management.

Incidence

- ranges from 10 to 50% following non-neurosurgical procedures
- The incidence of post craniotomy headache has been reported anywhere from 0 to 65%
- The wide range of reported incidences may be due to varying definitions, preoperative diagnosis and surgical approach.
- incidence after acoustic neuroma resection has been reported as 33–44% whereas the incidence after supratentorial craniotomy has been reported as 17.5–29.3% .
- Recently, Batoz *et al.* documented a 56 and 25% incidence of chronic headache and neuropathic pain, respectively, 2 months after craniotomy. Their broader definition, which included daily headache or abnormal sensation or pain during daily activities, may account for a high incidence.
- incidence of chronic headache after neurosurgery consistently falls over time
- The majority of early-craniotomy headaches are described as incisional (55–79%),
- Many patients describe new bilateral postoperative headaches (36–55%)
- Often characterized as throbbing and pressing
- May present as 'attacks' precipitated by physical and emotional stress, position or coughing.
- Neuropathic features described in a quarter of patients.
- Severe in just over half of patients with CPCH after acoustic neuroma surgery.

Mechanisms and causes

- Pericranial muscle retraction and trauma,
- Reduced cerebrospinal fluid (csf) pressure,
- Dural irritation
- Meningitis (chronic)
- Aseptic meningitis
- Persistent tension headache and neck muscle spasm likely result from surgical positioning of the head.
- Chronic headache after acoustic neuroma resection -- histopathological studies have suggested adherence of the dura to overlying muscles may be responsible for persistent pain.
- ? Use of fibrin glue – may cause aseptic meningitis

Risk factors:

Although no studies to date have directly compared the development of CPCH following supratentorial and infratentorial craniotomies, currently available literature suggests that the incidence is lower with supratentorial procedures.

Surgical site.

- Translabyrinthine approach to resection of acoustic neuromas has been associated with less chronic postoperative headache than the retrosigmoid approach
- Posterior fossa and skull base procedures are associated with increased acute postsurgical pain compared with supratentorial procedures
- The amount of muscle damage from resection of the temporalis and posterior cervical muscles may also influence the degree of postoperative pain experienced

Patient factors:

- Female sex,
- Anxiety and depression.
- Headache after acoustic neuroma surgery found that female sex, lack of preoperative headache and small tumour size were independent predictors of chronic postoperative headache

    - This study also found an incidence of depression in 24% of patients with new post craniotomy headache as compared to a 9% incidence in patients without headache.
- Opioid induced hyperalgesia and opiate tolerance – related to choice of intraoperative analgesia and post-operative analgesic practice.

Management:

Modes of minimising evolution of headache posted craniotomy:

- replacement of bone flap particularly in retro-sigmoid post to foster surgery
- ? Fat grafting during dural closure
- surgical technique to minimise muscle injury
- local anaesthetic to minimise wound pain (numerous studies show significant reduction in persistent pain – 56 versus 8%)
- it perioperative gabapentin – promising but further studies required

Once established:

- NSAIDs were used most frequently and were reported to be effective in 79% of patients with the pain completely resolved in 35% of patients.
- No studies to date have rigorously investigated the best pharmaceutical and non-pharmaceutical therapies for CPCH.
- Lignocaine (subcutaneous or topical patch)
- However, medications included acetaminophen, coxibs, tramadol, antiepileptics (gabapentin, sodium valproate), tricyclic antidepressants and muscle relaxants have all been tried.
- Greater occipital nerve blocks and nerve stimulation has been tried with varying success
- Botox
- Triptan (demonstrated to be effective for headache after acoustic neuroma)

Non-pharmacological Treatments:

- TENS
- Physiotherapy
- Acupuncture [70, 81]
- Cognitive behaviour therapy
- Adjunctive stress management techniques (relaxation)
- Supportive neck collars and manual neck traction
- Radio frequency nerve ablation or cryoablation

Conclusion:

Headache following craniotomy is common and under-recognized.

Pain can be severe in many patients and factors such as sex, preoperative diagnosis and surgical approach can influence the severity.

Current evidence suggests analgesia after neurosurgery is best achieved using a multimodal approach of acetaminophen, opioids, anticonvulsants and possibly NSAIDs such as COX-2 inhibitors.

Local anaesthesia with nerve blocks has not been shown to consistently reduce acute postoperative pain beyond the first postoperative hours, though it has recently been demonstrated to dramatically reduce the incidence of chronic pain.

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A	Headache of variable intensity, maximum in the area of the craniotomy, fulfilling criteria C and D
B	Craniotomy performed for a reason other than head trauma
C	Headache develops within 7 days after craniotomy
D	Headache persists for >3 months after craniotomy

Reproduced with permission from [61].

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Question 6 – Non compulsory

You have decided to prescribe a tricyclic antidepressant (TCA) for a patient aged 75 years who complains of pain and sleep disturbance following the onset of unilateral thoracic herpes zoster (shingles) eight weeks ago.

a) What were the clinical features that you took into consideration in reaching your decision?

b) What information would you provide to the patient when starting therapy?

In deciding on the most appropriate medication for this patient, I took into consideration the published evidence in relation to the most effective pharmacological agents for treatment of this condition as well as factors concerning the patient.

- This patient has neuropathic pain. The current recommendations for the management of neuropathic pain in general, and pain due to PHN in particular, state that the most effective medications are anticonvulsants and TCAs. RCTs have examined the effectiveness of antidepressants, anticonvulsants, and opioids.

- Tricyclic antidepressants are the most effective of the antidepressants studies in the treatment of PHN. Other antidepressants such as venlafaxine, duloxetine, SSRIs and mianserin have been shown to be not as effective as TCAs and have been associated with more marked side effects.

- Low dose amitriptyline is the treatment of choice for PHN associated with insomnia, provided that there are no contraindications: prostatomegaly in a male patient, glaucoma, heart failure, arrhythmia, recent myocardial infarction, prolonged QTc interval. TCAs are contraindicated if the patient is taking warfarin, tramadol, SSRIs or MAOI.

In prescribing a TCA as the first-line of treatment it is necessary to exclude clinically significant depression and the risk of overdose. The patient's social setting needs to be considered, and psychosocial support might be important in addition to specific non-pharmacological pain management techniques.

When starting therapy, I would explain to the patient the nature of the condition and the mechanism by which PHN causes pain – the extent of the information would depend on my assessment of the patient's ability to understand the current explanation of the abnormalities caused by the HZ virus and the way that it injures the nervous system:

damage in affected dorsal root ganglia
loss of nerve fibres
nociceptor hyperactivity
central sensitisation).

I would also explain, in simple terms, the mechanism by which the TCA acts to relieve pain, by decreasing the hyperactivity of the affected nerve fibres through 'blocking' sodium channels.

I would next explain to the patient that the starting dose of the TCA was very low (say amitriptyline 10mg or 25mg at night, or another TCA such as nortriptyline or desipramine), and that depending on the effectiveness and lack of side effects it would be increased very gradually (dose titration).

I would then describe the common side effects and reassure the patient that in most instances the side effects are transient. The side effects that I would mention include:

- constipation
- dizziness

- dry mouth
- sedation
- blurred vision
- postural hypotension
- urinary hesitancy

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Question 7 – Non compulsory

A 22 year old sales clerk is referred to you by a neurologist with "medically unexplained'' pain, weakness and numbness of the entire left "hemi -body'' after a minor motor vehicle accident two years ago. She is wheelchair bound and holds her left hand in a claw-like posture.

Describe your approach to assessment and management of this patient.

This patient has symptoms additional to pain, namely weakness and numbness affecting the left side of the body, is wheelchair-bound, and holds her left hand in a claw-like posture. In this particular patient, in the absence of an objectively demonstrable organic cause for the various symptoms, as well as the presence of "medically unexplained pain", the diagnosis is Conversion Disorder.

If the patient presented only with medically unexplained pain, the diagnosis would have been Pain Disorder Associated With Psychological Factors (DSM-IV-TR). "Medically unexplained pain" (MUP) is not an uncommon scenario, with up to 30% of chronic pain patients exhibiting medically unexplained symptoms.

The presence of additional physical symptoms and loss of function, without an organic cause, indicates that the diagnosis of Conversion Disorder is appropriate. Both Conversion Disorder and Pain Disorder are included among the Somatoform Disorders according to both DSM-IV-TR and ICD-10. This diagnosis assumes that the symptoms and signs are not intentionally produced or feigned (as in Factitious Disorder or Malingering respectively).

Somatoform Disorders are those where symptoms suggest a medical condition but no underlying physical disorder can be found. Specific disorders in this group include Hypochondriasis, Body Dysmorphic Disorder and Somatization Disorder, in addition to Conversion Disorder and Pain Disorder.

In Conversion Disorders symptoms could include deficits in motor or sensory function.

Conversion Disorder with sensory deficit has also been referred to as Non-Dermatomal Somatosensory Deficits (NDSDs) (with reduced sensory response) described as "unexplainable hypoaesthesia not conforming to the distribution of peripheral nerves". NDSDs are reportedly common and present in up to 40% of chronic pain patients.

Assessment and Differential Diagnosis

Review and confirm physical status to ensure that an organic cause for symptoms has not been overlooked and no physical diagnosis is missed:

- It is important to review history and investigations, confirm nature of accident, treatment, do a full physical examination, take a comprehensive history, including psychological history, school/ work history, social history, review radiology.
- Had there been acute onset of "CRPS" in one limb that has extended? (although CRPS typically has sensory "gain"/ allodynia rather than sensory deficit. Claw hand can follow severe CRPS

Assess psychosocial factors:

- Assess mood, support persons, consider secondary gain, tertiary gain.

Management

Management is likely to be challenging, and given the presence of symptoms for two years, change might not be achievable.

Enlist the help of a skilled rehabilitation team that includes a psychologist, physiotherapist, occupational therapist.

A period of inpatient rehab might be required initially.

Psychological techniques are central to successful management of conversion disorders and include:

- avoid confronting the patient or trivialising symptoms,
- avoid reinforcement,
- provide benign explanatory model of symptoms, review tests results, create an expectation of recovery,
- evaluate patient's emotional adjustment, consider psychotherapy.

The use of behaviour therapy might be helpful, and "behavioural modification and shaping techniques" are useful in the physical therapy management. Abnormal movement patterns are ignored, and correct movement patterns reinforced using feedback and praise. The patient should be advanced through a progressively more difficult therapy programme based on treatment approaches used with analogous neurological conditions.

Create a structured graduated programme of activity with achievable goals.

- For example: is independent ambulation achievable?
- Is the hand able to be treated or should patient be looking to adaptive one handed independence?

Some might suggest the use of interventional management to activate the claw like hand such as analgesic blocks, with stretching and strengthening – consider management as per dystonia, and with adjuvant medications for pain including baclofen, anticonvulsant drugs, and antidepressants (either TCA or SNRI).

Graded motor imagery might be useful, again with skilled therapy and structured approach (might include mirror box therapy)

Be wary of using opioids, particularly avoid high doses.

Use reward and subtle reinforcement of gains made.

Work closely with the family to achieve independence, reduce reinforcement of illness.

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Question 8 – Non compulsory

A 24 year old farmer is referred to you for advice regarding management of Complex Regional Pain Syndrome (CRPS) of his dominant arm.

He has been researching the topic and has read about "mirror box" therapy on the Internet.

Outline how you would explain to him the rationale of Mirror Box Therapy.

Mirror box therapy is usually a late step in a treatment program aiming to reduce pain and improve function in a patient with pain – eg CRPS.

Phantom pain and CRPS type 1 are characterised by changes in cortical processing and organisation, perceptual disturbance and poor response to conventional treatments.

Because patients with CRPS have been shown to have problems in the primary motor cortex, treatments that focus on normalising motor representation have been explored.

Graded Motor Imagery may be effective in a subset of patients with CRPS 1. The theory is that pain can be reduced by training the brain to better recognise, then imagine and then move the affected limb.

Delivered in an intense program over about 6 weeks, GMI aims to activate cortical networks involved in sensorimotor processing in three progressive phases.

1. Left –right judgement task. Recognition of laterality. During the first 2 weeks the patient undergoes a limb laterality recognition stage. Photos of a hand matched to gender in various positions and alignments. The patient is asked to "recognise" whether it was R or L hand. Patients with CRPS had a delayed response and hand recognition which can improve with training.
2. The next 2 weeks is an imagined movement phase. Patients were shown photos and advised to "imagine" moving their hand to the posture shown. They were advised to imagine actually performing the movement.
3. Next 2 weeks is the mirror box therapy phase. This involves using a mirror box, or a stand-alone mirror to create a reflection of the normal hand such that the patients believe they are looking at the affected limb.

Results:
Although the clinical trials appear encouraging about 50% patients were excluded so whether it will be effective for the wider CRPS population is not known. (1)

There is good evidence from studies conducted in a single-centre research setting for the efficacy of GMI treatment to reduce pain in CRPS.
Moseley reports GMI reduces pain and disability in patients with chronic CRPS and mirror box therapy alone has shown efficacy for those with acute CRPS.(1)
NNT (50% reduction pain) post program 3 (2-6)
NNT (4 point increase in function) 4(2-11)
6 months later NNT (decrease in pain) is 2.

Other trials have suggested the 6 week program offers better symptomatic and functional gains than GP managed care alone.

But the evidence in clinical practice is not established. A recent article in the European Journal of Pain came to the conclusion that it has failed to translate into the real world setting. Some of the issues are the intensity of treatment required and the commitment and perseverance of both the practitioner and the patient. [(2)]

For the individual it may be worthwhile option. However currently there are not many practitioners who are properly trained and skilled in the treatment process.

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Question 9 – Non compulsory

A 32-year-old woman with insulin-dependent diabetes and a history of depression is now 8 weeks pregnant.

The pain of her diabetic peripheral neuropathy has been well managed with duloxetine 90 mg daily and gabapentin 600 mg tds.

a) Discuss her current medication regimen in view of the pregnancy and outline your plan for management of her neuropathic pain during the pregnancy.

b) What advice would you give her regarding medication for pain while breastfeeding?

Part A - Management during pregnancy

- General comments
  - avoid medications especially in the first trimester because of potential foetal abnormalities
  - trials of medications are usually not performed in:
    - pregnant women
    - lactating women
    - neonates

Duloxetine

- The PI for duloxetine states that no genotoxic potential has been demonstrated in a variety of tests including assays for gene mutation, chromosomal effects, unscheduled DNA synthesis and sister hromatid exchange.
- Duloxetine and its metabolites cross the placenta in rats.
- In Australia duloxetine is categorised as B3; that is, the drug has not been studied in pregnant women and therefore should not be used unless the benefit to the mother clearly outweigh any risk to the foetus.
- Seems to be relatively safe if given in the first two trimesters (? data)
- Should be ceased in the third trimester, as neonates who were exposed to serotinergic agents late in the third trimester have been reported - uncommonly – to develop a variety of respiratory and systemic problems.

Gabapentin

- In Australia gabapentin is categorised as B1; that is, the drug has been taken by only a small number pregnant women or women of child-bearing age, without an increaase in the frequency of malformation or other direct or indirect harmful efferts on the human foetus having been observed. Studies in animals have not shown evidence of increased risk of foetal damage.
- The PI states that *in epilepsy* the risk of having an abnormal child as a result of gabapentin is outweighed by the dangers to the mother and foetus of uncontrolled epilepsy. Extrapolation to neuropathic pain may not be valid.
- Gabapentin PI (in context of epilepsy and therefore the possible use of other anti-epileptic drugs) recommends folic acid supplementation before (4 weeks) and during (12 weeks) pregnancy.

In this patient

- Ideally she should have been counselled before conception (if pregnancy was planned) or beforehand in general terms (if pregnancy was a risk)
- Diabetes itself carries risks for mothers and foetuses: reinforces the need for counselling regarding contraception as well as conception.

- Duloxetine 90 mg per day is a high dose: it would be prudent to withdraw the drug during pregnancy, certainly by the third trimester.
- In such a circumstance
    - Worsening (neuropathic) pain *might* be managed by increasing the gabapentin dose
    - Persistence with gabapentin (once duloxetine is withdrawn) can be defended *but* withdrawal is probably optimal.
    - Use of other analgesics, including opioids, can be defended.
- AND
    - Plan for managing mood change, especially worsening depression, due to worsening pain and/or lessening of any anti-depressant effect and/or diabetic complications
    - Use of amitriptyline or nortriptyline – for antidepressant effect - could be considered (to be checked)
    - ? other comments
- Role of folic acid supplementation (as general advice)

Overall, the advice is to cease medication according to the balance of benefit vs risk and therefore frequent reassessment of pain and depression is likely to be necessary.

Close liaison with endocrinologist and obstetrician.

Part B - Management during lactation

- Duloxetine and gabapentin are excreted in breast milk.
    - Adminstration of duloxetine to lactating mothers is not recommended.
    - Decision regarding gabapentin turns on risk-benefit analysis – in context of epilepsy. Extrapolation to neuropathic pain may not be valid.

Major decision is whether to breast-feed or not; ideally to be discussed early.
If the decision is to breast-feed, then the advice regarding pain management is generic:

- Attention to:
    - exercise
    - diet
    - adjunctive behavioural treatments (e.g. CBT, hypnosis)
    - analgesic medications

Plus

- Advice on non medication aspects of diabetes control - there is some evidence to suggest that better control results in less neuropathic pain.
- Close liasion with psychiatrist and paediatrician

Question 10 – Non compulsory

Discuss the clinical relevance of placebo research.

Key words/phrases
Placebo research
Clinical relevance
Discuss = to consider or examine by argument (from: dictionary.reference.com/browse/discuss)

Past short answer questions on placebo
Exam 1999, compulsory - FIRST QUESTION, IN FIRST EXAM!
One of the difficulties in the study of the analgesic effects of medications is the placebo effect. Briefly describe what you understand to be the placebo effect, and describe the explanations for this phenomenon (Pass 50%).

Exam 2003, non-compulsory:
Write brief notes on the placebo effect: consider definition, features, mechanisms and implications for Pain Medicine (Pass 86%, 7 attempted).

ANSWER RESOURCE

Candidates are expected to
- Provide a brief overview of placebo research
- and indicate clinical relevance

Information about the placebo effect alone is not adequate to achieve a mark of 5 or above.

Introductory comments
Our understanding of placebo has changed in recent years. Current research emphasises the importance of the **context** of a placebo intervention. Research also suggests that the placebo effect is a **psychobiological event** (i.e. due to both psychological and neurobiological mechanisms). Placebo research has provided a scientific explanation for the way psychological factors influence the outcome of medical treatments [1].

Definitions

Term	*Traditional definition [2]*	*Current thinking (emphasised context) [2]*
Placebo	An inert substance or procedure	Simulated treatment and the surrounding clinical context
Placebo response (or effect)	The response to administration of a placebo	Response to the simulation of a therapy
Nocebo		Negative responses to placebo intervention [3]

Psychosocial context		Intervention		Response
Individual patient & clinician factors ↕ Interaction between patient, clinician & treatment environment	+	Specific treatment	=	Response from specific treatment + psychosocial context
		Placebo	=	Response from psychosocial context

Figure 1: Overall response to an intervention [2]

Mechanisms of placebo [2]
Placebo and nocebo effects result from the psychosocial context (therapeutic environment) on the patient's mind, brain and body [3]. There are many mechanisms that have been identified. They are basically divided into psychological and neurobiological.

Psychological (* = best established)	Neurobiological (Research examples)
*Expectations of response *Conditioning (classical) Learning Memory Motivation Somatic focus Reward Anxiety reduction Meaning	• Pain - opioid (placebo), cholecystokinin/deactivation dopamine (nocebo or negative placebo) • Parkinson's - changes in brain dopamine and neuronal response • Depression - electrical and metabolic changes in brain regions • Anxiety - changes in regional brain activity, genetic variations in neurotransmitters and transporters • Addiction - changes in regional brain activity • Autonomic responses to brain stimulation - changes in neuronal excitability limbic regions • Cardiovascular system - reduction β-adrenergic activity heart • Respiratory system - conditioning opioid receptors in respiratory centres • Immune - conditioning immune mediators • Endocrine - conditioning of some hormones (e.g. Growth Hormone, cortisol) • Physical performance - activation endogenous opioids and increased muscle work • Alzheimer's disease - prefrontal executive control and functional connectivity

Adapted from [2]

Psychosocial context [2]
Context is influenced by an interaction between (see figure 1):
1. Individual patient & clinician factors
   e.g. beliefs, expectations, desires for symptom change, past experiences
2. Interaction between patient, clinician and treatment environment.
   a. Clinician-patient relationship (i.e. "bedside manner" e.g. communication, empathy etc)
   b. Treatment environment (i.e. the specific nature of treatment and the way it is delivered)

Clinical relevance (general comments)

- It is important to realise that placebo and nocebo responses **occur in clinical practice** even when placebos are not administered [3].
- Placebo research has shown that the **overall response** of any intervention is markedly **influenced by context**.
- In order to obtain the **best outcomes** it is therefore important to **consider and control** psychosocial context where possible [1].

Clinical application of placebo research
An understanding of placebo research will therefore enable a clinician to influence the overall response to an intervention in an ethical manner by:

1. Addressing individual factors

Clinician	• Awareness of personal experiences & beliefs and how these influence communication. • Use empathy and patient cooperation/involvement in decision making. These both enhance placebo [1].
Patient	• Identifying through interview past experiences, expectations etc E.g. exposure to effective treatments may induce long-lasting placebos and conversely past negative experiences may enhance nocebo.

2. Addressing interactions between patient, clinician and environment

Clinician & Patient	• Optimise communication and information provided. Enhance knowledge about therapy • Work with expectations. • The manner in which adverse events are provided can markedly influence outcomes i.e. *nocebo effects*. Information needs to therefore be presented in a nondeceptive, yet reassuring way [3].
Environment	Be aware of the effect of procedure and method of delivery (on both patient and clinician)

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Question 11 – Non compulsory

Five years ago, a 75-year old man underwent radical prostatectomy for prostate cancer followed by regular anti-androgenic implants. Three months ago, he underwent radiation therapy for a pathological fracture of his right femur. Bony metastases were discovered in his ribs, pelvis, and vertebrae. He rates his pain intensity between 7 and 9 on a verbal rating scale.

His general practitioner has prescribed slow-release morphine 60 mg twice daily with immediate-release morphine 10 mg when needed for breakthrough pain and amitriptyline 30 mg at night

Describe your management plan for this patient.

Background

Metastatic bone disease is a common cause of pain in cancer patients; it has a gradual onset, becoming progressively more severe; it is usually localized and often felt at night or on weight bearing. The vast majority of bone metastases originate from cancers of the breast, lung, prostate, thyroid, and kidney. Most bone metastases are localized to the red marrow, thus the proclivity for the axial skeleton. (1)The most common sites of spread in the skeleton include the spine, pelvis, ribs, skull, upper arm, and leg long bones. Even though multilevel involvement occurs in about 80% of metastases to the vertebral bodies, they tend to be more frequently encountered in the thoracic region of the spine, followed by the lumbosacral and cervical regions. (2) Bone metastases are generally classified as osteoblastic (increased formation of bony matrix), osteolytic (increased destruction), or mixed. (1)

A multidisciplinary approach to treatment is often necessary because simplified analgesic regimens may fail due to complex pain generators, such as those involved in the genesis of neuropathic pain. (2)

Assessment

History

Onset, radiation, triggering and relieving factors, patient's report of pain intensity (Numerical Rating Scale, Visual Analogue Scale, the Iowa Pain Thermometer Scale, Faces Pain Scale).

The solitary vertebral lesion presents with pain (typically nocturnal and somatic due to periosteal invasion) as the most common and earliest symptom. Neuropathic pain may follow when epidural extension, compression fracture, or spinal cord compression occurs. The average time frame from initial pain presentation to complications is 7 months. (3)

Physical examination (detailed)

Pointers (2)

Pain located in the occipital or nuchal region radiating to the posterior skull and exacerbated by neck flexion could be related to atlas (C1) bone destruction.

Pain referred to the interscapular region could be related to C7–T1 syndrome from tumour invasion of these vertebrae.

Pain in the iliac crest or sacroiliac joint could originate at T12 or L1 level, whereas pain in the buttock or posterior thigh that increases when lying down and relieved when standing could be a referred pain from sacral segments.

Pain with a rapid crescendo and radiating in a band-like fashion around the chest or abdomen could indicate an epidural compression that represents an oncologic/ neurologic

emergency. Spinal cord compression is usually accompanied by sensory loss, abnormal reflexes, weakness, and autonomic dysfunction.
Pain in the groin or knee could originate in the hip.

Character of pain
The character of the pain in bone metastasis can be somatic (musculoskeletal), neuropathic (caused by nerve irritation or damage by the invading tumour) or mixed (more common).

Appropriate imaging studies
Magnetic resonance imaging (MRI) is the most accurate imaging modality in detecting very early skeletal metastases.
Computed tomography (CT) scanning can be used for patients who are not candidates for MRI (with metal implants or a spinal cord stimulator).
Radionuclide bone scan identifies extent of bone lesions throughout the body.

Biopsy
A bone biopsy is frequently considered at different stages to ensure an accurate pathological diagnosis (important for prognosis and patient survival). (2)

Non-pharmacological Management (2)
Cutaneous Stimulation (should not be applied over tissues exposed to and damaged by radiation therapy)
Use the application of superficial heat (local hot packs, hot water bottles, electric heating pads, immersion in warm water.
Cold (cryotherapy) uses ice packs, towels soaked in ice water, or commercially prepared chemical gel packs.

Transcutaneous electrical stimulation (TENS)
A Cochrane review showed that there is insufficient evidence to determine the effectiveness of TENS in treating cancer-related pain. (4)

Massage Therapy
Massage therapy can help ease general aches and pains, especially in patients who are bed-bound or who have limited mobility.

Exercise
Patients should generally be encouraged to remain active; prolonged immobilisation leads to decreased musculoskeletal endurance and psychosocial regress.
Hydrotherapy - provides a reduced-gravity environment, decreases pain with movement, facilitates muscle relaxation, and improve overall emotional state.
If immobilisation is required to prevent or stabilize fractures, exercise should be limited to a self-administered range of motion.
Caregivers need to be educated on the proper application of orthotic devices and assistance with exercises that would not significantly increase pain. Chiropractic or osteopathic manipulative techniques is not recommended.

Psychotherapeutic Management
Relaxation Techniques
Relaxation techniques - include simple focused-breathing exercises, progressive muscle relaxation, pleasant imagery, meditation, and music or art-assisted relaxation. They help reduce fatigue and nausea, improve mood, sleep, and quality of life.

Mindfulness-Based Stress Reduction
This improves not only cancer pain, but also a patient's mood and level of stress.

Hypnosis
This can be used in palliative cancer care mainly to control anticipatory nausea related to chemotherapy, to increase the pain threshold (by reducing attention given to the pain), and to improve both overall and mental well-being. Only a few small randomized controlled trials have explored the effects of hypnosis on the pain associated with cancer. (5)

Psychotherapy
This is offered to patients with psychiatric illness, depression, or addiction.

Radiation Therapy
Conventional external-beam radiotherapy (XRT) is the mainstay treatment of painful skeletal metastases. (6) It is effective in controlling pain, preventing fracture, maintaining patient quality of life and independence, and preventing or stabilizing tumour progression. (7) Delivery of an ablative radiotherapeutic dose with emerging technology such as image-guided stereotactic body radiation therapy (SBRT) may allow a higher biologically effective dose to be delivered for better pain relief and potential local tumour control. Stereotactic radiosurgery may offer several advantages such as increased radiation dose to the target area with reduced incidence of radiation toxicity and treatment in 1 or 2 day, and improved disease-free and overall survival. (7) Re-irradiation may be safe and potentially more effective with spinal SBRT. (7) Radiosurgical decompression of spinal cord compression using SBRT should offer inoperable patients an option to prevent or stabilize progressive neurological complications secondary to tumour compression of the spinal cord.

Medical Management
Calcitonin
It acts by inhibiting sodium and calcium resorption by the renal tubule and by reducing osteoclastic bone resorption. It is limited by its short duration of action and rapid development of tachyphylaxis. Two double-blind clinical trials of patients with metastatic bone pain treated with calcitonin showed that it provided some relief of neuropathic pain; there was no evidence that calcitonin controlled complications due to bone metastases, improved quality of life, or prolonged patient survival. (8)

Bisphosphonates
Bisphosphonates bind to the bone surface, have a direct apoptotic effect on osteoclasts, impair osteoclast-mediated bone resorption, and reduce the tumour-associated osteolysis initiated by skeletal metastases. (2) Their role in pain relief for bone metastases remains uncertain; they provide therapy for hypercalcemia of malignancy. There are two classes: non-nitrogen containing (etidronate, clodronate, tiludronate); and nitrogen containing (pamidronate, alendronate, ibandronate, risedronate, zoledronic acid), which are more potent osteoclast inhibitors.

A Cochrane review of 30 RCTs showed insufficient evidence to recommend bisphosphonates for an immediate effect as first-line therapy for painful bone metastases. (9) Bisphosphonates combined with palliative radiotherapy seemed to have no additive effects on pain palliation in the management of painful bone metastases. (10)

In contrast two studies have shown zoledronic acid to be the only bisphosphonate that has demonstrated statistically significant, long-term clinical benefits through the prevention and delay of skeletal-related events (SREs) in patients with metastatic lung cancer and prostate/renal cancer, respectively. (11,12) It was suggested that the longer a patient receives zoledronic acid, the better its effect on survival and time to progression.

Denosumab

Denosumab is a monoclonal antibody with affinity for receptor activator of nuclear factor κB ligand (RANKL) that is secreted by osteoblasts. By binding to RANKL, denosumab prevents osteoclast formation, leading to decreased bone resorption and increased bone mass, and preventing SREs. (2) Denosumab has been found to be superior to zoledronic acid in preventing SREs. (13) One study showed that denosumab was trending to superiority compared to zoledronic acid in preventing or delaying first SRE.(14)

Corticosteroids

The mechanism of action of corticosteroids is blocking the synthesis of cytokines that contribute to both nociception and inflammation. When spinal cord compression is suspected, patients should be treated with corticosteroids and evaluated with whole spine MRI or myelography within 24 hours. Radiotherapy or surgical decompression should be initiated within 24 hours. One study indicated that 8 mg dexamethasone given just before palliative radiotherapy significantly decreases the incidence of pain flare during the first 2 days after radiotherapy. (15)

Analgesics

The World Health Organization (WHO) analgesic ladder is the most widely used validated guideline for the medical treatment of cancer pain. (2) Step 1 consists of non-opioid analgesics when pain is mild. These include NSAIDs/COX-2 inhibitors (caution in elderly), paracetamol, gabapentin, pregabalin, tricyclic antidepressants (amitriptyline, nortriptyline), and topical analgesics. Step 2 introduces weak opioids such as hydrocodone, codeine, and low-dose oxycodone for pain that is mild to moderate. Other μ receptor agonists with dual mechanisms of action include tramadol and tapentadol, and have added effects on neuropathic pain. Step 3 consists of stronger opioids such as morphine, hydromorphone, fentanyl, high-dose oxycodone, pethidine, and methadone.

For patients with chronic cancer pain, a combination of long- and short-acting opioids is recommended. The long-acting opioids, whether they are pharmacologically long-acting (methadone, levorphanol) or pharmaceutically long-acting (slow-release morphine, oxycodone, oxymorphone, hydromorphone), are used for the chronic baseline cancer pain. (2)

The short acting opioids that require repetitive dosing are used for the acute pain. Breakthrough pain has been reported to occur in 50-70% of cancer patients (especially if in spine and pelvis).(16) Regarding breakthrough pain (abrupt, short-lived, intense acute pain), 27 there is a trend in some first world countries to use transmucosal lipophilic drugs (oral transmucosal fentanyl citrate, fentanyl buccal tablets, sublingual fentanyl, intranasal fentanyl spray, fentanyl pectin nasal spray, fentanyl buccal soluble film); this is due to their rapid effect observable 10-15 minutes after administration. (17,18)

Ketamine, an N-methyl D-aspartate (NMDA) receptor antagonist, is effective in treating intractable severe pain caused by metastases. It is effective even when intravenous, epidural, or oral opioids prove ineffective or with opioid tolerance. (2)

Hormonal Therapy

Hormonal-dependent tumours such as prostate bony metastases are associated with slower disease progression and longer survival. Hormonal therapy allows long-lasting and effective control of cancer-related symptoms in advanced stages. (2) Hormonal therapy for prostatic cancer consists of androgen depletion through chemical or surgical castration, in addition to treatment with antiandrogens.

LHRH agonists remain the ‘standard of care’ in hormonal therapy. They avoid the physical and psychological discomfort associated with orchidectomy and the high cardiovascular risk associated with diethylstilboestrol. (19) Antagonists to pituitary GnRH receptors (abarelix,

degarelix) result in the rapid reduction in luteinizing hormone, FSH and testosterone, without flare. However, in almost all patients with metastatic prostatic cancer the disease will progress when it becomes castration-resistant (CRPC). (20) The endothelin-A receptor antagonist zibotentan, the tyrosine kinase inhibitors dasatinib, sorafenib and cabozantinib, the anti-angiogenic agent aflibercept, and the clusterin inhibitor custirsen, are all currently being tested for efficacy in metastatic CRPC.(21)

Chemotherapy

Chemotherapy with docetaxel combined with prednisone is the first-line treatment of choice. (20) Cabazitaxel and abiraterone have been found to be effective as second-line treatment, increasing survival by 2–4 months and reducing the risk of death by 30–35%. (20)

Interventional approach

This is used when systemic analgesia was unsuccessful, due to either uncontrolled pain and/or unacceptable side effects (the fourth step of the ladder). (The WHO ladder consistently fails to provide sufficient relief in 10-20% of patients). (22,23) Pain of neuropathic origin, is poorly responsive to opioids. Opioid-induced hyperalgesia leads to increased pain perception and a reduced ability to cope. (24) With the increasing number of cancer survivors earlier use of interventional techniques is proposed. The prevalence of substance abuse problems in the cancer patient, although lower than the general population, remains a cause for concern. (25) The appearance of secondary malignant disease in the bone signals progression to systemic disease, and local control and palliation become priorities. Metastatic bone disease can be focal, multifocal, or generalized, and so will the procedural approach. A combination of several interventional therapies may be needed for each individual.

Surgery

The goals of operative intervention in patients with metastatic spinal tumours include the restoration and preservation of neurologic function, stabilization of the vertebral column, and pain relief. (26) Current surgical treatment of metastatic spinal tumours incorporates interventions ranging from limited decompression or percutaneous cement injection to a radical resection of the tumour with complex reconstruction and stabilization.

Percutaneous vertebral augmentation procedures

For patients with painful pathological vertebral compression fractures but no neurological compromise, percutaneous vertebral augmentation procedures (vertebroplasty, kyphoplasty) are an option. Bone cement (polymethylmethacrylate) is injected in a disrupted vertebral body via a cannula placed in the vertebral body. This provides structural support and minimises mechanical pain (although residual pain averages 23%). The cement may have intrinsic analgesic and antitumor properties. In kyphoplasty the injection of the bone cement occurs after creation of a cavity in the vertebral body by balloon. This will allow a low-pressure injection, thus minimizing complications from extravasation. (27) The safety and efficacy of these procedures have been acclaimed in some large, multicentre, RCTs (such as the FREE study), (28) and challenged in others. (29) It can be combined with EBRT and radiofrequency ablation (RFA). Combination radiosurgery and kyphoplasty has also been used. Intraoperative radiotherapy during kyphoplasty is another approach. When localised metastatic disease in other bones respond poorly to XRT, injection of bone cement can give excellent results. (30) Combination cementoplasty and RFA has also been described with good results. (31)

Peripheral, Plexus, and Neuraxial Use of Local Anaesthetics

Interventional procedures such as facet joint injections, trigger point injections, intercostal nerve blocks, and sacroiliac joint injections have been successfully employed for further relief of painful symptoms. (32,33,34)

Selective diagnostic nerve blocks that offer short term analgesia are used to determine efficacy of possible ablative procedures. The placement of a temporary catheter for the continuous infusion of local anaesthetic (regional analgesia) is a reliable, safe, and feasible option, particularly in end-of-life care. Tunnelling these catheters under the skin reduces infection risk (which is rare), reduces migration, and prolongs site duration. Femoral/sciatic nerve and brachial plexus as well as epidural catheters have been used successfully. (35,36,37) Epidural local anaesthetic and steroids have been used successfully to break radicular pain.

Epidural Opioids
Hydrophilic epidural opioids (morphine, hydromorphone) can provide segmental analgesia; they continue to have a place in the care of intractable pain in cancer patients at the end of life via externally disposable or subcutaneously implanted pumps. (2)

Intrathecal (IT) Opioid Infusions
These may provide analgesia virtually anywhere in the body. When optimized systemic analgesia fails, intrathecal infusions might be considered. The potency of intrathecal opioids is multiplied compared to oral administration resulting in minimising opioid side effects. Opioids can be combined with drugs that are approved only for IT administration (ziconotide that selectively blocks N-type voltage calcium channels at presynaptic terminals of the dorsal horn), or that are more effective through this route (clonidine). In terminal cancer patients with a short life expectancy, the use of IT ketamine is another valid alternative. (38) A multicentre RCT that compared IT opioid infusions with comprehensive medical management in refractory cancer pain, showed significant efficacy and improved survival. (39) IT infusions can be administered through tunnelled percutaneous catheters or implantable drug delivery systems (IDDSs) with computerized programmable features (including patient-controlled dosing). IDDS insertion is recommended when the patient's life expectancy is longer than three months. (40)

Ablative procedures (for long-term analgesia)
These include RFA, cryoablation, and phenol and alcohol neurolysis. RFA is the preferred neurolytic technique, given its ability to control the size of the lesion by tissue temperature feedback control. (41-45) Neuroablative procedures have the ability to achieve selective C and Aδ fibre neurolysis in a given nerve, preserving to a higher or lesser degree the anatomical integrity of the peri-, epi-, and endo-neurium (to allow future re-inervation and sensory and motor fibre function). Examples include intercostal nerve-mediated pain from rib metastases or post-thoracotomy and post amputation pain. Particular attention has been given to pulsed radiofrequency of the dorsal root ganglion and nerve roots.

Radionuclides
Bone-seeking radionuclides are safe and effective agents to relieve pain in patients with osteoblastic bone metastases from solid tumours. (1) The use of these agents for palliation of bone pain is supported by a recent update of a Cochrane systematic review, (43) albeit with the risk of transient myelosuppression. Good candidates are those with multiple sites of symptomatic disease visualized on a nuclear medicine bone scan, with adequate baseline blood counts and pain not well controlled with analgesics. They are used for hormone-insensitive disease such as metastatic prostate cancer.

Samarium-153 (153Sm) chelated to ethylene diamine tetramethylene phosphonate (EDTMP), 153Sm-EDTMP and Strontium-89 (89Sr) are two FDA-approved agents used in the United States. (1) Both have been shown to be safe and effective with repeat dosing. They offer additional promise in combination with cytotoxic chemotherapy. The most promising investigational agent is 223Ra, an alpha-emitting bone-seeking radionuclide, which led to superior overall survival in a recently reported placebo-controlled randomized clinical trial. (1)

Neuromodulation for Neuropathic Pain

Spinal cord and peripheral nerve stimulation have unique mechanisms of action and can be used in the treatment of neuropathic pain when all other therapeutic interventions have failed. Electrical stimulation of the dorsal column has a neuromodulatory effect on the activity of the ascending pain pathways. Successful use of neurostimulation in cancer patients has been documented in the literature.(46,47,48) The setting of a critical or often terminal illness must, however, be carefully considered.

Conclusion

Optimal management of skeletal metastases requires an individualized decision tailored to the unique clinical status of each patient. The overriding goal is to maintain our patients' quality of life. Options available to effectively control pain resulting from focal, multifocal, or generalized metastatic bone cancer include non-pharmacologic, psychotherapeutic, and interventional management approaches. Treatment is best in an interdisciplinary (oncologists, radiation
oncologists, surgeons, radiologists, pain specialists) setting as well as in a multidisciplinary pain management setting; this allows patients to control their pain and maintain quality of life.

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Question 12 - Non-compulsory

a. How do you respond to your patient who says they have "fibromyalgia"?

b. Outline your management plan for this patient.

a. The following information needs to be obtained from the patient:

1. Symptoms at time of onset, looking at method of onset, gradual or post traumatic, pattern of pain and distribution, associated somatic symptoms, fatigue, sleep disturbance, cognitive symptoms. Was the history suggestive of other diagnoses and any history that raises "red flag" conditions?

2. Who made the initial diagnosis of fibromyalgia and were any other diagnoses considered at that time? GP/physician/Rheumatologist.

3. The criteria used for diagnosis, was it the 1990 ACR criteria with a tender point examination or was it more in keeping with the 2010 "Preliminary Diagnostic Criteria" which assesses widespread pain, index and symptom severity scale.

4. Investigations undertaken. What was the patient aware of being done and the results?

5. What has been the treatment utilised, pharmacologically and non-pharmacologically and the response to treatment.

6. What is the patient's understanding of fibromyalgia and what it means to them, what are their expectations of what can be achieved?

b. Treatment would include:

1. Empathic approach is vital, engender trust.

2. Explanation. Not life threatening but can cause significant disability. Aetiology is still unknown, but factors include genetic predisposition, central sensitisation/abnormalities of descending inhibitory pain pathways, changes in neurotransmitters and neuroendocrine factors, particularly the hypothalamic pituitary adrenal axis. Education involves patient and family members. Treatment is aimed at symptom reduction and reduction of disability. Motivational interviewing techniques important.

3. Cognitive behavioural therapy. Patients' belief systems are very important and negative beliefs need to be challenged and changed. Active participation is required. Identification of catastrophisation and addressing this is vitally important. Use of baseline psychology questionaires eg BPI, PSEQ and catastrphising scales to assist with prognosis.

4. Aerobic exercise.

5. Sleep hygiene.

6. Pacing.

7. Pharmacology evidence for Duloxetine, Pregabalin and TCAs.

8. Address specific somatic symptoms such as anxiety, depression, irritable bowel syndrome, chronic fatigue dysmenorrhoea, interstitial cystitis which are common accompanying symptoms.

9. Address cognitive symptoms.

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Question 13 - Non-compulsory

a. **Outline the long-term effects of repeated painful procedures in a baby born at less than 32 weeks gestational age.**

b. **What techniques are available to reduce procedural pain in a neonatal intensive care unit?**

a. Outline the long-term effects of repeated painful procedures in a baby born at less than 32 weeks gestational age.

- **Key message** (Macintyre PM et al. 2010).

  "Significant reorganisation of synaptic connections occurs in the postnatal period. Activity within sensory pathways is required for normal development, but abnormal or excessive activity related to pain and injury during the neonatal period may alter normal development and produce persistent changes in sensitivity that outlasts the injury (Fitzgerald & Walker, 2009)."

- **'**Painful' procedures performed on pre-term neonates include surgery, intubation/mechanical ventilation/ETTsuction, line placements, heel prick/lance, venepuncture, lumbar puncture, supra-pubic urine sampling, ophthalmic exams.

- **Neonates do experience *'unpleasant sensations and emotions'* (pain**) and not just *reflex responses* to nociception (e.g. withdrawal responses to heel prick are sometimes accompanied by delayed cry and grimace- full *A*-delta fibre myelination has not yet occurred). There is evidence for *foetal stress response* at 20-28 weeks gestation (e.g. foetal intrauterine surgery and measured cortisol change).

- **Nociception ('pain') and related 'stress responses' may adversely affect the still developing neonate;** particularly development of their *nervous system* (synaptic plasticity & growth, especially of the cortex); possibly the immune, autonomic and endocrine and motor systems

- **Procedural pain in very pre-term neonates (24-32 weeks) is associated with *reduced (sub-cortical) grey and white matter volumes* on MRI** (Brummelte S et al. Ann Neuro 2012).

- **Procedural pain in very pre-term neonates was associated with *reduced weight gain and head circumference*** (Vinall J et al. Pain 2012).

- **Nociception produces *central (spinal cord) sensitisation* in neonates** (based on rat pup models; cutaneous hypersensitivity reduced by EMLA use for infant heel lancing Fitzgerald M Pain 1989).

- **Pre-term neonates demonstrate *increased 'pain cortex' responses* (fMRI) and increased sensitivity to experimental pain stimuli** (reflecting a lack of 'habituation') (Hohmeister J et al. Pain 2010 & Pain 2006). Neonates likely have poorly developed *descending inhibitory systems* (DNIC).

- The neuro-biological changes outlined above could **predispose the pre-term neonates to *increased pain responses later in life*** (eg. exaggerated responses to

immunisation, or experimental pain testing in school children) (Hohmeister J et al. Pain 2006 & Eur J Pain 2009) (response to immunization in infant boys aged 6-8 months following earlier neonatal circumcision with and without EMLA, versus no circumcision, versus infant girls Taddio A Lancet 1997 and 1995).

- **Neonatal pain and distress can affect the *parent*s, affecting their behaviour towards the child later in life** ('solicitous', poor coping, catastrophising) (Hohmeister J et al. Pain 2006 &; Eur J Pain 2009). Preterm infants subjected to multiple procedures are distressed with nappy change and normal handling. Issues around non-establishment of breast feeding and maternal-infant bond and potential for poor attachment/attachment disorder and reduced resilience in later life.

- **Possible long-term consequences of analgesia (especially opioids) given to pre term neonates:** The debate continues around early exposure to opioid analgesia and is it detrimental or *protective* e.g. less white matter changes, reduced intraventricular haemorrhages and modified stress response with analgesia, *versus* opioid induced hyperalgesia and effects on neonatal cortical development

- Consider the **adverse effects** of analgesia techniques in neonates which may have undesired long term effects: eg. Met Hb (EMLA); tramadol and seizure risk (ex-premature babies with cortical damage); NSAIDs- renal and cardiac effects (PDA); paracetamol and liver function/toxicity.

b) What techniques are available to reduce procedural pain in a neonatal intensive care unit?

"Analgesia at the time of the initial painful stimulus may modulate long-term effects. Male neonates circumcised without analgesia showed an increased behavioural pain response to immunisation several months later, but this was reduced if local anaesthetic was used prior to the procedure (Taddio et al, 1995 Level III-2). Infants who had undergone surgery in the neonatal period with perioperative morphine did not show any increase in later response to immunisation when compared with infants without significant previous pain experience (Peters, Koot, de Boer et al, 2003, Level III-2)". (Macintyre PM et al. 2010).

- **Recognise the problem of neonatal pain and the differences between term and preterm infant responses;** develop protocols, audits and research; reduce the incidence of pre-term birth (prevention).

- **Routinely assess 'pain' in neonates** (5th vital sign) (PIPP, CRIES, NFCS, FLACC) pre and post procedure.

- **Improve analgesia practice by reviewing the evidence;** eg. venepuncture instead of heel prick/lance (Cochrane 2011) (may be a practical problem-lack of veins in ex-premature babies who have had multiple IV cannulae/venepunctures); routine use of pre-procedural sucrose; analgesia before procedures; use multiple techniques (see below).

- **Reduce 'noxious' and 'stressor' load on the neonate;** minimise periods of handling, combine procedures where possible. Reduce noise. Promote sleep and rest periods. Address ambient lighting (mimic sunrise/day-night).

- **Utilise the parents;** encourage their presence, quiet talking and non-painful touch.

- **Routine sucrose 'analgesia'** (Level I). Discussion of similarity to breast feeding and superiority to sucking pacifier/dummy alone.

- **Breast feeding** (level I) & sucking; **comforting** (kangaroo care, coddling) (level I).

- **Multimodal analgesia techniques;** especially post-operatively: opioids, regional local anaesthetic techniques (caudal analgesia: single shot and threaded catheter, wound catheter, extrapleural and epidural catheters).

- **Local anaesthesia** (neonates are small, so ideally suited to LA)**;** EMLA or amethocaine 4% gel prior to venepuncture, heel prick/lance; LA drops prior to ophthalmic exam.

- Most analgesics are used **off-label in paediatrics**, particularly in neonates!
    a. Morphine boluses 0.01-0.05mg.kg IV; Fentanyl boluses 0.5-2mcg/kg IV
    b. IV paracetamol precaution in premature neonates with hyperbilirubinaemia- dosing 10mg/kg should be varied according to gestational age (Allegaert et al., 2011).
    c. Tramadol is used in neonates (post cardiac surgery, as an infusion- Allegaert K BJA 2005).
    d. **NSAIDs have no place in the neonatal unit** for analgesic use (licensed to >3mths now; previously >6mths in Australia; suggested greater than 12 months internationally). Cox-2 inhibitors are unlicensed and not used as share NSAID renal effects.

- It is still *unclear* if opioids are required during mechanical ventilation (Level I)?

- **Special consideration of palliative analgesia in neonatal care** (e.g. severe congenital abnormalities).

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Question 14 – Non compulsory

Compare and contrast transdermal fentanyl and buprenorphine.

The transdermal delivery system (TDS) is a non-invasive way of administering opioid analgesics. This is particularly effective for patients with chronic or cancer pain who have difficulty with other routes of administration. Prerequisites for an opioid to be delivered by a TDS are:

- Lipophilic
- Small molecular size
- Potent

Both fentanyl and buprenorphine carry these properties.

	Fentanyl	**Buprenorphine**
Indications	Chronic and cancer pain; contraindicated for acute pain management in many countries	Chronic and cancer pain. Not recommended for postoperative pain management
Patch properties		
Patch type	Now mainly drug-in-matrix. The original patches consisted of a reservoir system and rate-controlling membrane. In the newer system, which has the same bioequivalence, the fentanyl is dissolved in the adhesive matrix; the patient's stratum corneum and the characteristics of the drug-in-adhesive matrix control the rate of systemic delivery.	Drug-in-matrix
Available patch sizes	12, 25, 37, 50, 75 and 100 microgram/hr	5, 10 and 20 microgram/hr
Patch changes	Every 3 days	Every 7 days
Time to peak blood concentration	24-72 hours	48 hours approx
Time to steady state concentration	The end of the 2nd 72 hour application	By 72 hours
Half-life after patch removal	~ 12-24 hours after 24 hours of patch wearing; 22-27 hours after 72 hours	~ 10-24 hours
Drug properties		
Molecular weight (small)	336	467
Lipophilicity (heptane/ water coefficient compared with morphine 1.4)	816	2320
Potency	Potent	Potent
Potency and doses(c/w morphine)	100-150 times 25 microgram/hr (600	75-100 times 20 microgram/hr (480 microgram/24

	microgram/24 hrs) ~ 90 mg oral morphine (30 mg IV morphine)	hrs) ~ 36 mg oral morphine (12mg IV morphine)
Opioid receptor affinity	High	Very high; slow dissociation
Opioid receptor activity	Full μ-agonist	Often said to be a partial μ-agonist but acts as a full μ-agonist for analgesia in analgesic doses (i.e. no ceiling effect for analgesia) In animals as well as humans in low doses (ie transdermal buprenorphine), there also appears to be no antagonism of other concurrently administered μ-agonist opioids Competitive κ-antagonist
Metabolism/elimination	Metabolised almost exclusively in the liver (primarily by CYP3A4) to inactive metabolites including norfentanyl. Less than 10% of unmetabolised fentanyl is renally excreted and around 1% is excreted in faeces.	Two-thirds of the drug is excreted unchanged, mainly in faeces, while the remaining one-third is metabolised (by UGT1A1/1A3) predominantly in the liver and gut wall via glucuronidation to an inactive metabolite, buprenorphine-3-glucuronide, and via CYP3A4 to norbuprenorphine, which has 40 times less analgesic effect than buprenorphine. CYP3A4 is main enzyme in the liver but some other references also say CYP2D6.
Hyperalgesia	Can lead to hyperalgesia	Using experimental pain stimuli in humans has been shown to be antihyperalgesic (i.e. the area of hyperalgesia was reduced), which may be related in part to its κ-antagonist activity
Drug side effects		
Respiratory depression	Can lead to dose-related respiratory depression	Risk of respiratory depression less than with other opioids (has a ceiling effect) unless concurrent other CNS depressants used (e.g. sedatives, alcohol)
Reversibility by naloxone	Yes	Unpredictable. Should buprenorphine-induced respiratory depression occur, reversal is possible although higher-than-usual doses and a longer duration infusion of naloxone may be required.
Pruritus and skin reactions		More reports of local erythema and pruritus with buprenorphine patches (up to 20%)
Nausea and vomiting	Possibly more common	
Constipation	Constipation (less than morphine)	Constipation (less than morphine)

The great majority of evidence of efficacy is in cancer pain patients:
Comparisons are significantly limited as:

- There are very few head-to-head comparisons between the two patches (and no RCTs)

- Most trials are small scale and are considered low quality trials.
- More evidence existed for fentanyl as buprenorphine is relatively new.

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Question 15 – Non compulsory

A 63 year old diabetic patient with Ischaemic Heart Disease-related intractable chest pain is referred to you for pain management. He has a past history of Coronary Artery Bypass Grafting (CABG) on two occasions and is now on maximal medical therapy.

a) Outline your approach to the management of this patient.

b) Briefly describe what information might be included in your letter to the referring cardiologist.

Candidates are expected to

a) Provide ***THEIR*** approach to the management of intractable Angina Pectoris. A generic answer listing possible treatment options without contextualisation does not adequately address the question.
b) Communicate their recommendations with background reasoning to the referring specialist.

Introductory comments

This is a challenging persistent pain problem. There are many controversies regarding the possible treatment approaches and no consensus guidelines are available (*according to the author's knowledge*). Careful coordination will be required between treating teams including:

- Primary care (especially GP)
- Cardiologist
- Emergency department (if frequent ED presentations)

Definitions

Angina pectoris is considered refractory if constant myocardial ischaemia and pain occur despite optimal anti-anginal treatment with substantial stenosis of a significant coronary artery (75% in one or more main coronary artery) [1].

a) OUTLINE (i.e. *point form*) YOUR approach to the management of this patient.

(from [1]):

- Ensure adequate efforts have been undertaken to *exclude other non-cardiac causes* of chest pain (e.g. pulmonary, gastrointestinal, musculoskeletal, thoracic radicular pain, post herpetic neuralgia & panic disorder)
- That there is *ongoing therapy* to: control diabetes, hypertension, cholesterol and efforts have been undertaken to assist cessation of smoking
- That *ongoing medical management* continues aiming to
    - minimize oxygen demand (e.g. β-blockers, calcium channel blockers)
    - optimize oxygen supply (e.g. vasodilating drugs & revascularisation)
    - reduce platelet aggregation

Pain Assessment

Undertake a careful assessment to examine for psychological and social contributors to their pain, disability and distress. This would include a team review with a mental health professional (psychology $\pm$ psychiatry) and a physiotherapist. The involvement of other

health professionals would depend on this initial assessment however occupational therapy (e.g. home assessment), social work (e.g. home services) and palliative care services may be consulted.

Management
Consider a management plan for the acute episodes of pain and the longer-term management.

Plan	
Objectives	
	Goals would be developed with patient and may include: • Reduce emergency department presentation • Reduce frequency of pain episodes • Reduce medication use • Increase exercise tolerance
Acute episodes	
	• Develop an **emergency department treatment plan** (if frequent presenter) • **Rapid acting opioids** would be considered though evidence base poor and controversial [2]. I would undertake an Opioid risk assessment (dependency and abuse potential) as part of this prior to instigating. Ongoing assessment of benefit and misuse would be needed. • **Education**: address understanding of pain. Develop consensus with the patient and cardiologist about the meaning of the pain and that each episode does not necessarily indicate irreversible ischaemia or "mini-infarcts". • Through a Psychologist encourage the use of **self-calming techniques** and anxiety management.
Ongoing	
	• **Analgesics**: I would consider the use of ongoing long-acting opioids. This is controversial but based on case series publications may help to meet above objectives [3]. Once again this would be dependent on an Opioid risk assessment and outcomes/misuse would need monitoring. My preference would be morphine given the availability of 24 hour release preparations & its established use in this setting. • **Spinal cord stimulation** would also be considered in carefully selected patients. Either by myself or a colleague. The use of SCS is also controversial however has been supported by two RCTs and a number of case series reports [1]. The evidence has been criticised as being less relevant given the age of the studies (10-14 years) however remain the current best available evidence. Potential benefits include: o Reduced pain o Decreased medication use o Improved exercise tolerance • **Cognitive Behvioural Program** Has been shown to to improve chest pain and functional tolerance better than restenting and medication **Intraspinal opiates** **Has been used but evidence is lacking** • **Chronic disease program**: I would see whether the patient is linked into a government funded chronic diseases support program. These

	provide community resources, follow-up and encourage a self-management approach. • **Target** specific **psychological** (e.g. anxiety) or **social** (suitability of housing and support) through available local resources.

a) Briefly describe what information might be included in your letter to the referring cardiologist.

1. Thank the cardiologist for their referral
2. Indicate a broad approach (not just opioids or a SCS) is likely to provide the best outcome.
3. Indicate desire to speak directly to discuss their thoughts and the patient's prognosis/specific situation.
4. With regards to acute episodes of pain:
    a. Discuss the role of rapid onset, short acting opioids (pros and cons) for acute management. A trial and re-assessment after a defined period would be suggested. The importance of bowel care would be raised.
    b. Propose an emergency department treatment plan be agreed upon by key stake holders (i.e. patient, Pain Medicine Specialist, Cardiologist, Emergency Department Director and GP)
    c. Arousal reduction training would be suggested through available resources.
5. Ongoing management
    a. Discuss the role of longer-term, sustained release opioids.
    b. Discuss the role of SCS if patient felt suitable after simpler measures explored.
    c. Indicate the potential value of patient being involved in a self-management chronic diseases program
    d. Recommend the benefit of psychology and specialist physiotherapy input as part of treatment plan to broaden the patients non-drug pain management repertoire and activity tolerance.
6. Indicate willingness to review depending on patient's wishes
7. Indicate willingness to discuss recommendations
8. Designate follow-up plans and any immediate changes to management.

References

1. van Kleef M, Staats P, Mekhail N, Huygen F. Chronic refractory angina pectoris. Pain Practice. 2011;11(5):476-82.
2. Osborn H and Jefferson M. Intranasal alfentanil for intractable angina in inoperable coronary artery disease. Palliative Medicine. 2010;24(1):94-95.
3. Mouallem M, Schwartz E, Farfel Z. Prolonged oral morphine therapy for severe angina pectoris. Journal of Pain and Symptom Management. 2000;19(5):393-397.