State of the Art: Acute Pain

Felicia Cox FRCN MSc RN

Nurse Consultant, Pain Management

@FeliciaJCox f.cox@rbht.nhs.uk

Disclosures

Speaker and advisor for;

Grünenthal UK

Pfizer

Napp Pharmaceuticals Ltd

Kyowa Kirin

Overview

- Provide an update on perioperative analgesia
- Risk factors for postoperative pain
- Revisit physiology and mechanisms of pain
- Reduce risk with opioids
- Explore functional pain assessment
- Case studies

Where do you work?

Four Decades Later: Revision of the IASP Definition of Pain and Notes

The currently accepted definition of pain was originally adopted in 1979 by the International Association for the Study of Pain (IASP)

1979 Definition of Pain

An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage

2020 Revised Definition of Pain

An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage

In 2018, IASP constituted a 14-member multi-national task force with expertise in clinical and basic science related to pain, which sought input from multiple stakeholders to determine:

"Does the progress in our knowledge of pain over the years warrant a re-evaluation of the definition?"

Expert consultants

IASP council

The public

2020 Revised Definition of Pain Notes

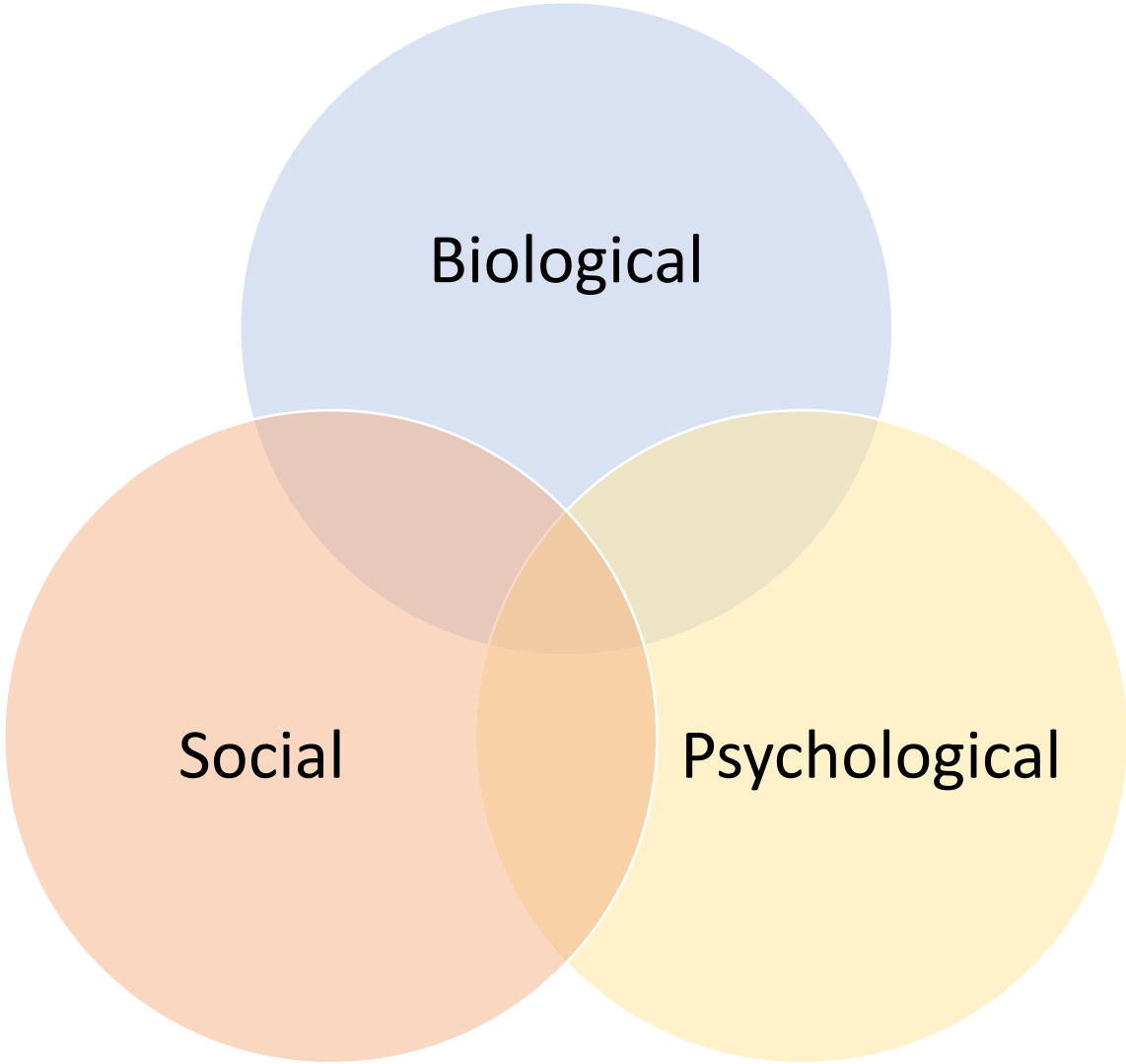
- Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors
- Pain and nociception are different phenomena. Pain cannot be inferred solely from activity in sensory neurons
- Through their life experiences, individuals learn the concept of pain
- A person's report of an experience as pain should be respected
- Although pain usually serves an adaptive role, it may have adverse effects on function and social and psychological well-being
- Verbal description is only one of several behaviors to express pain; inability to communicate does not negate the possibility that a human or a nonhuman animal experiences pain

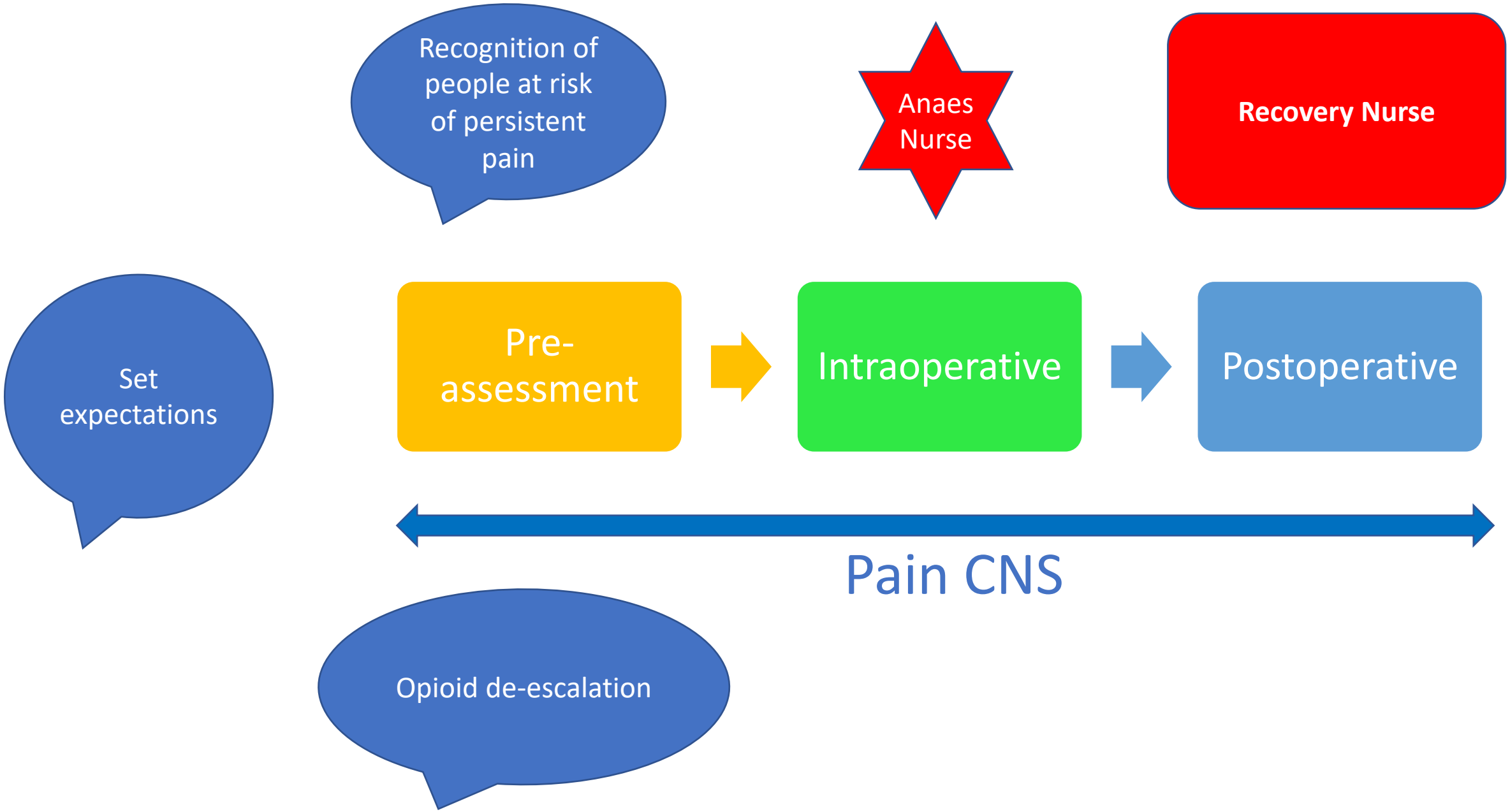
The revised IASP definition of pain: concepts, challenges, and compromises
Raja *et al*. (2020) | Pain
DOI: 10.1097/j.pain.0000000000001939

PAIN®

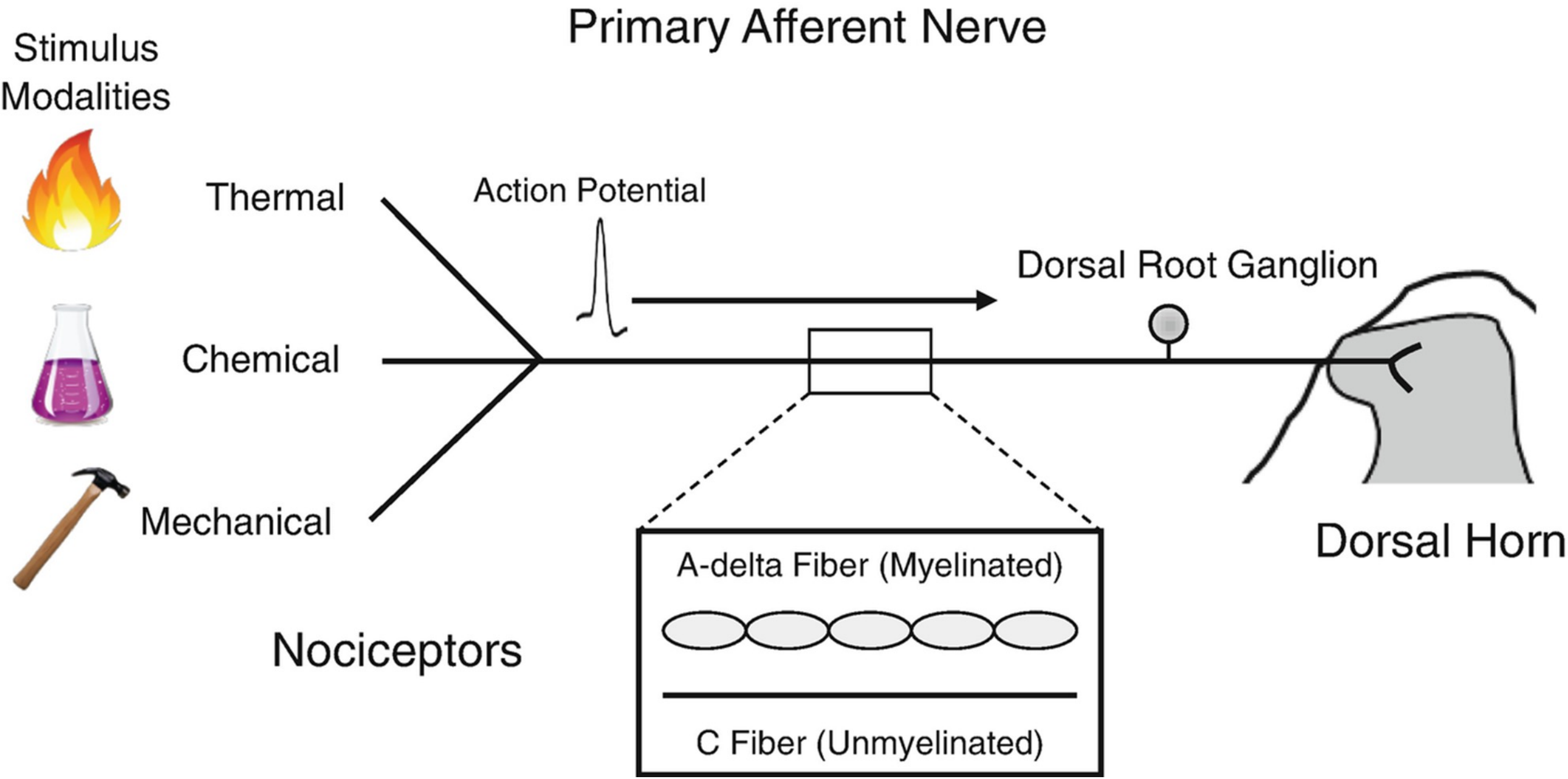
WHY TREAT PAIN?

- Professional and ethical obligations
- Reduce complications
- Early discharge
- Avoid long impact
    - Persistent Pain
    - Reduced suffering
    - Depression, anxiety
- Better utilisation of healthcare resources

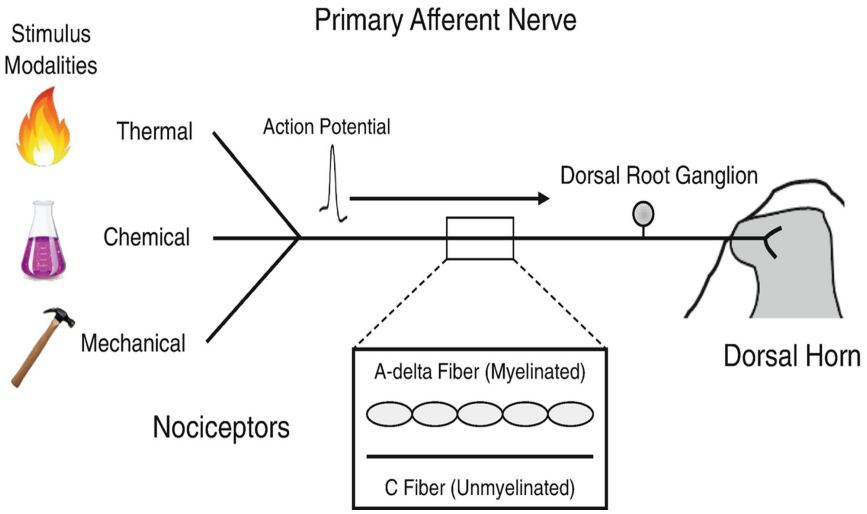

Biological
Social
Psychological


Recognition of people at risk of persistent pain
Anaes Nurse
Recovery Nurse
Set expectations
Pre-assessment
Intraoperative
Postoperative
Pain CNS
Opioid de-escalation

Primary Afferent Nerve



Nociception



Nociception involves 2 types nerve fibres:

Aδ myelinated (fast ~10-25ms^{-1}) (20%), &

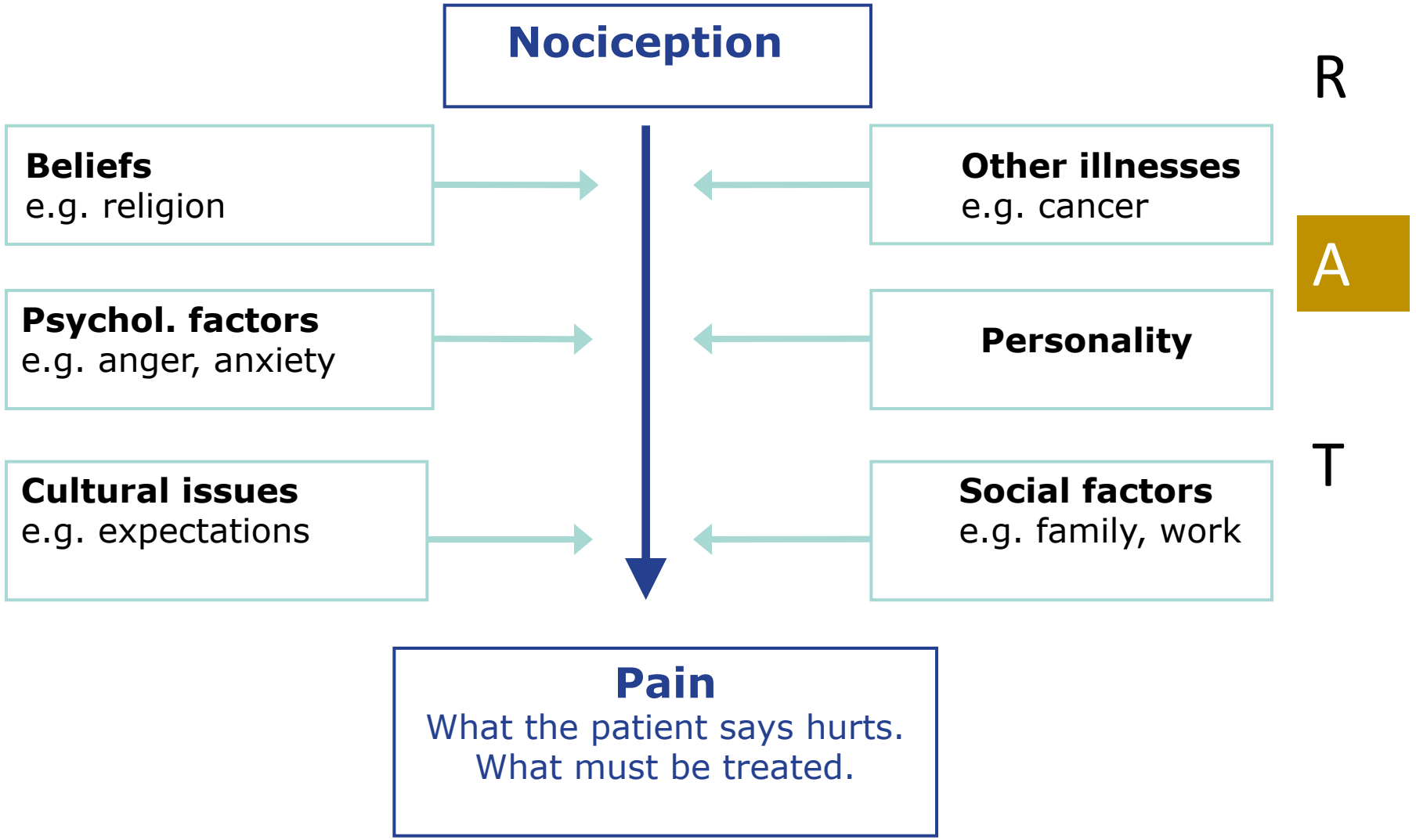
C unmyelinated (slow ~3ms^{-1}) neurones

Aδ - mechanical distortion & heat

C - heat, heat/cold, mech. distortion, chemical

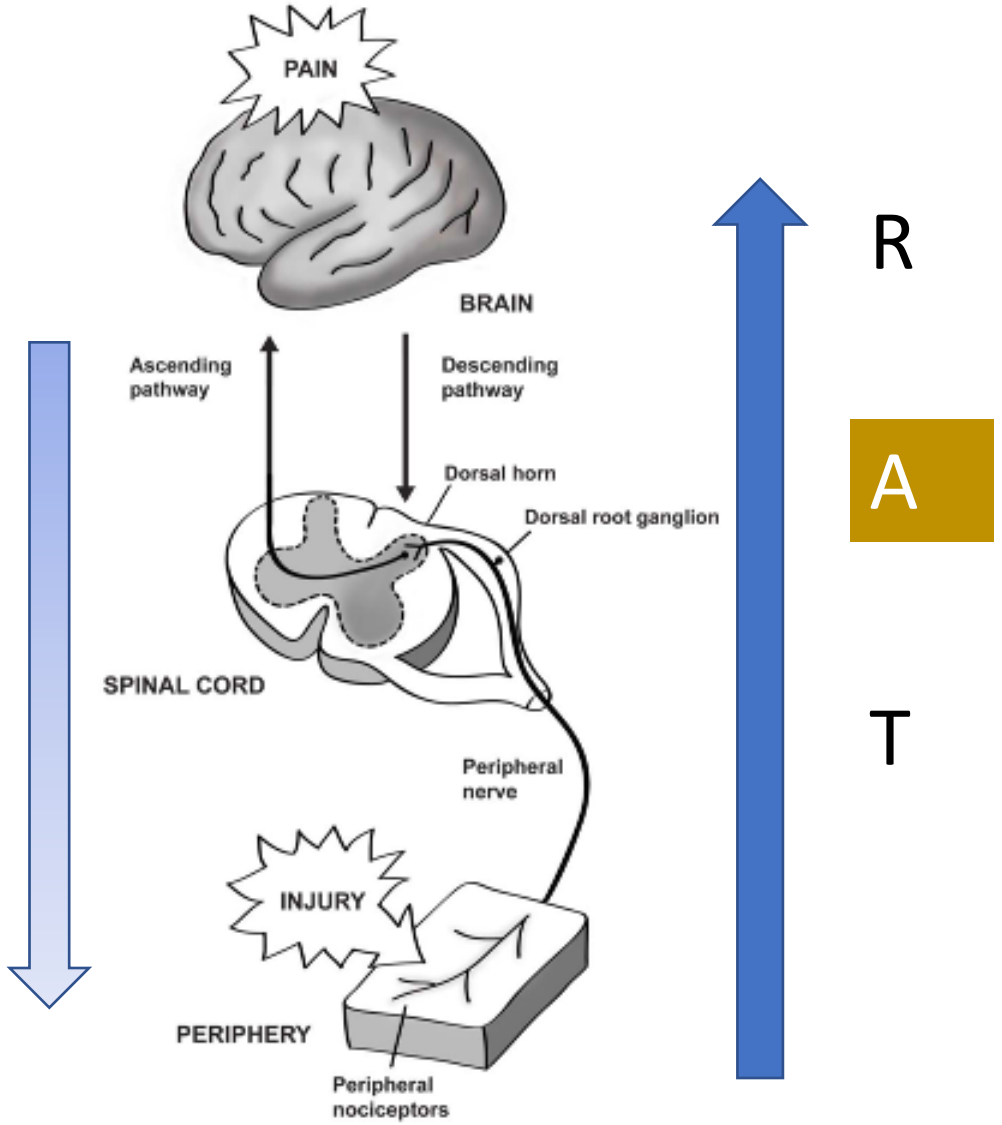
Roughly distinguish between *sharp, localised* pain and *dull, aching* pain

Nociception is not the same as pain

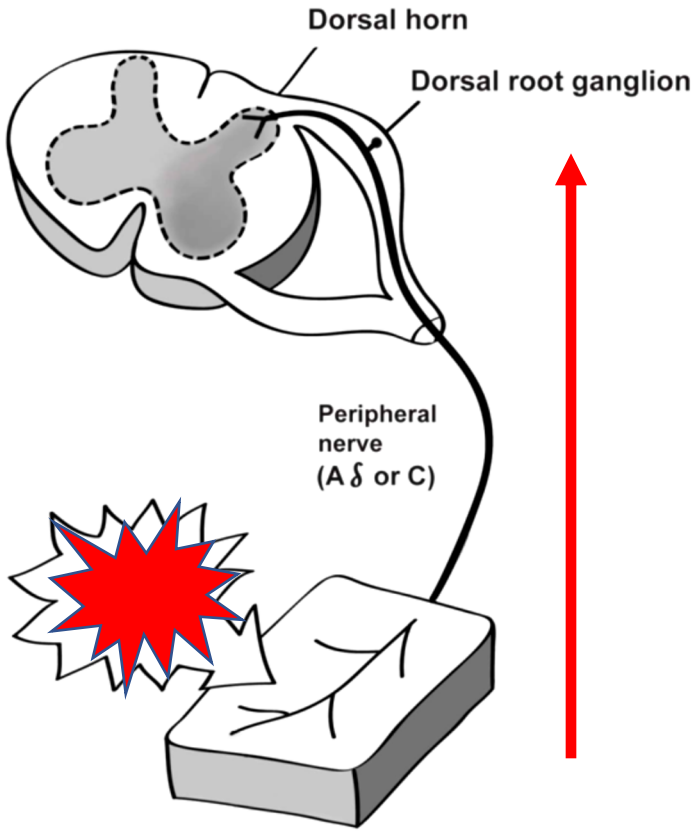


Physiology

- 4 steps:
  - Periphery
  - Spinal cord
  - Brain
  - Modulation
- We will look at each step



Periphery



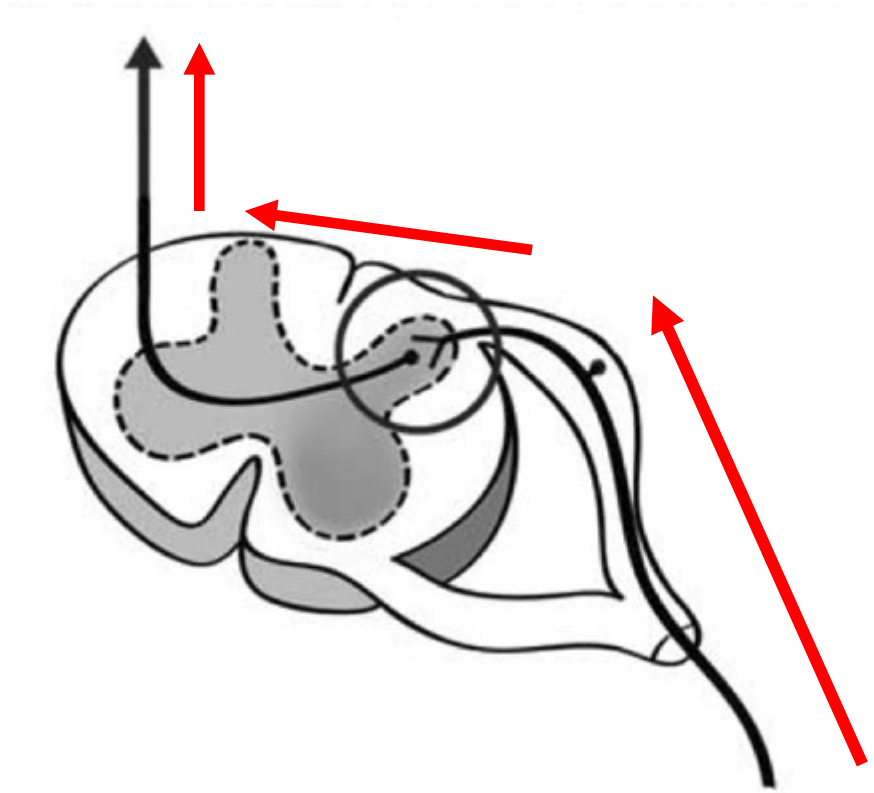
Tissue injury

Release of chemicals — R

Stimulation of pain receptors (nociceptors) — A

Signal travels in Aδ or C nerves to spinal cord — T

Spinal Cord



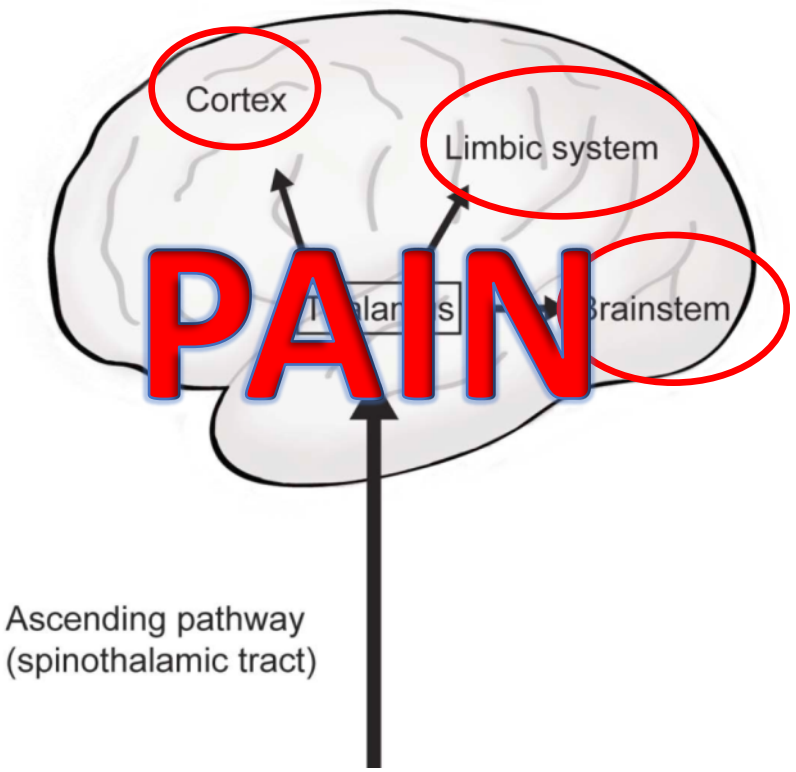
- Dorsal horn is the first relay station.
- Aδ or C nerve synapses (connects) with second order nerve.
- Second order nerve travels up opposite side of spinal cord.

R

A

T

Brain



- Thalamus is the second relay station.
- Connections to many parts of the brain.
  - Cortex
  - Limbic system
  - Brainstem

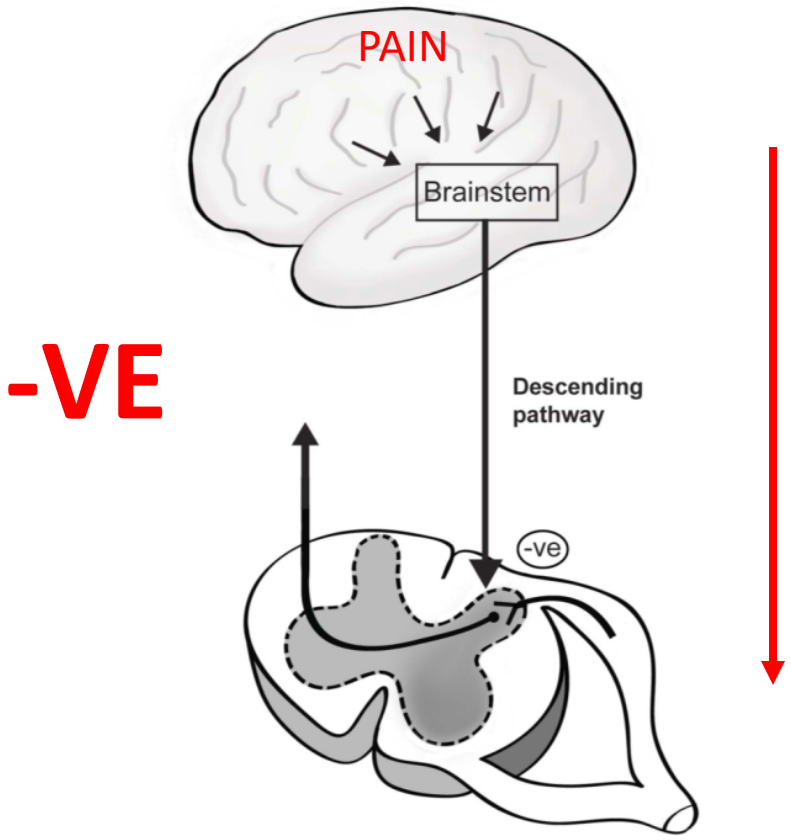
R

A

T

Pain perception occurs in the brain.

Modulation



-VE

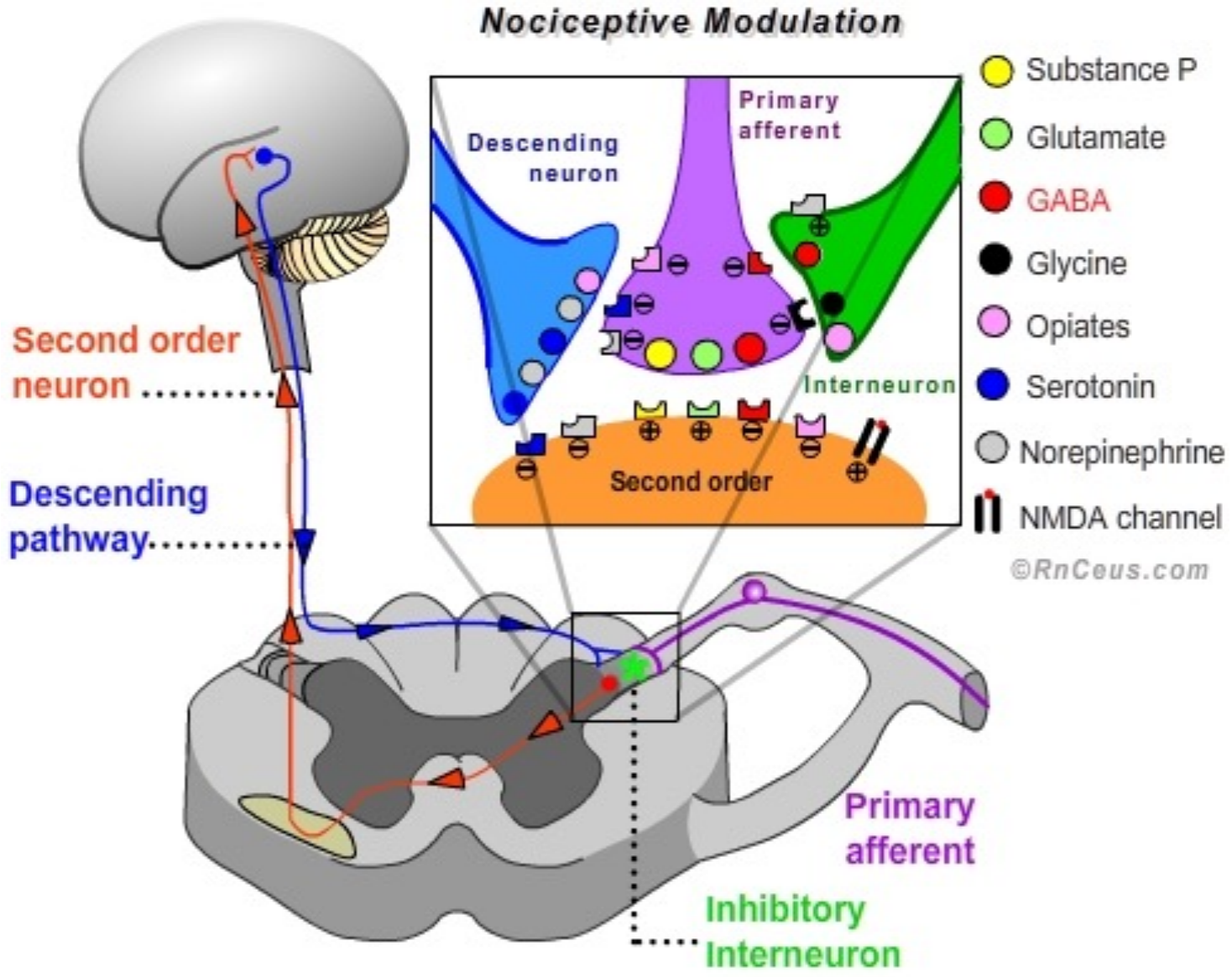
Descending pathway from brain to dorsal horn

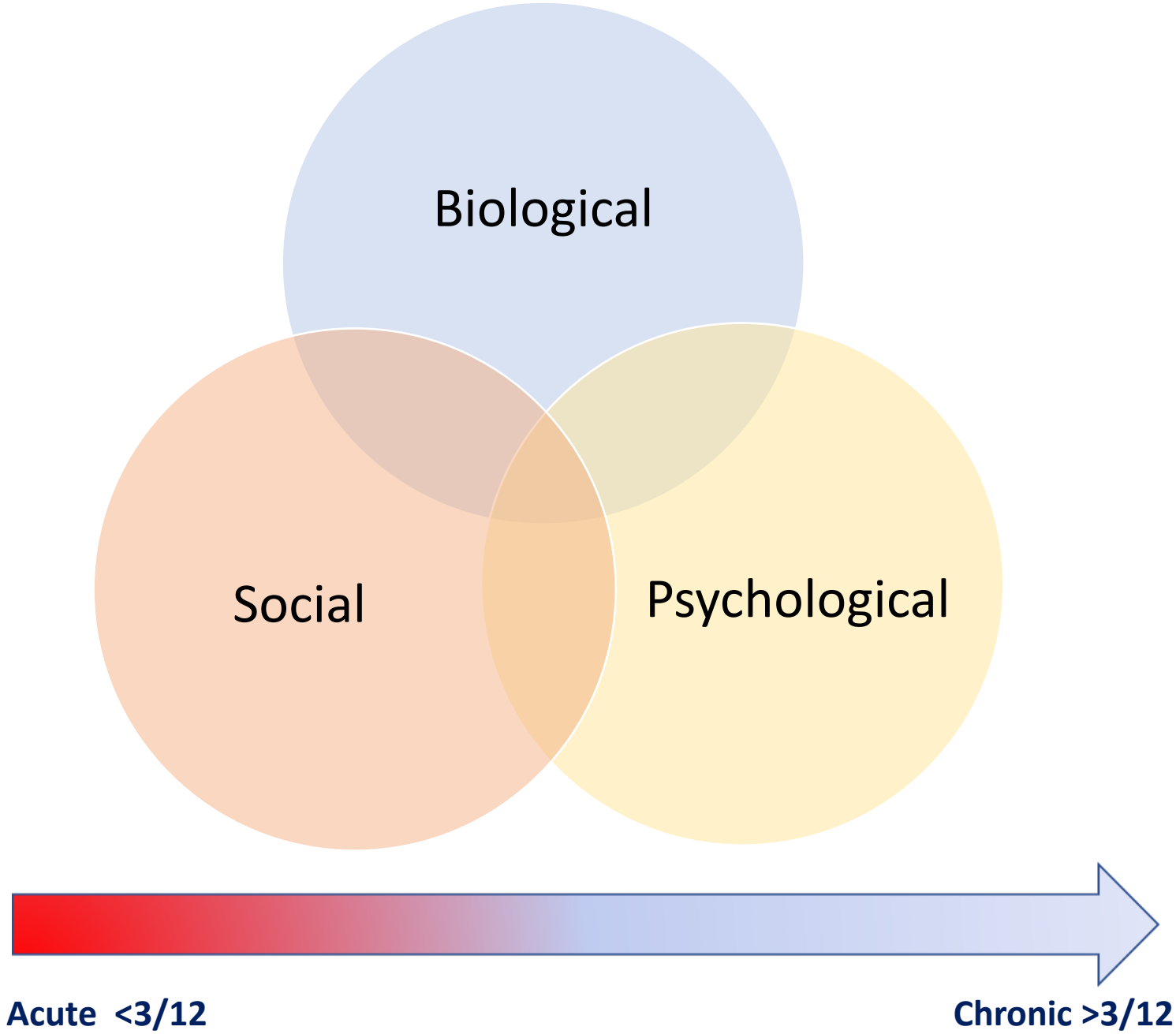
Usually inhibits pain signals from the periphery

R

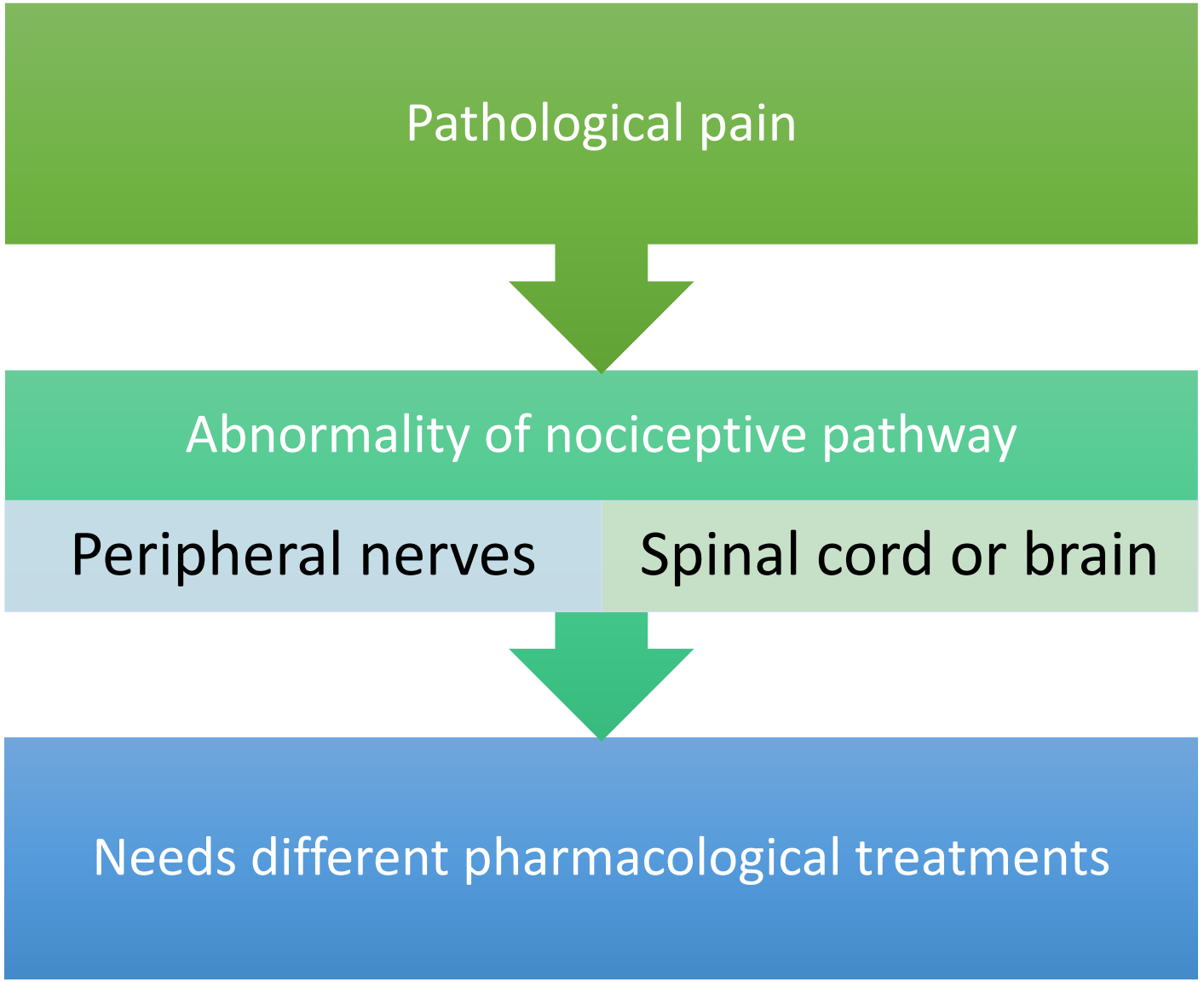
A

T


Nociceptive Modulation
Descending neuron
Primary afferent
Interneuron
Second order
Substance P
Glutamate
GABA
Glycine
Opiates
Serotonin
Norepinephrine
NMDA channel
©RnCeus.com
Second order neuron
Descending pathway
Primary afferent
Inhibitory Interneuron


Biological
Social
Psychological
Acute <3/12
Chronic >3/12

Neuropathic Pain (NeuP)



Clinical features Of NeuP

Patient with pain can experience stimulus - evoked pain

or pain that occurs in the absence of any stimulus.

- **Allodynia:** pain in response to a normally non-painful stimulus.
- **Hyperalgesia**: pain of greater severity than expected following a pain stimulus
- **Hyperpathia:** Increased response to a stimulus
- **Dysesthesia:** unpleasant atypical sensation.
- **Paraesthesia:** painless abnormal skin sensation.

- **Hypoesthesia**: a decrease in your normal sensation such as touch or temperature,
- **Hypoalgesia**: diminished experience of pain in response to a normally painful stimulus.
- **Anaesthesia**: temporary loss of sensation or awareness that is induced for medical purposes – LA and GA
- **Analgesia:** Reduction of pain or the absence of pain without loss of consciousness.

Neuropathic pain has positive and negative sensory symptoms

Positive Symptoms
(due to excessive activity)

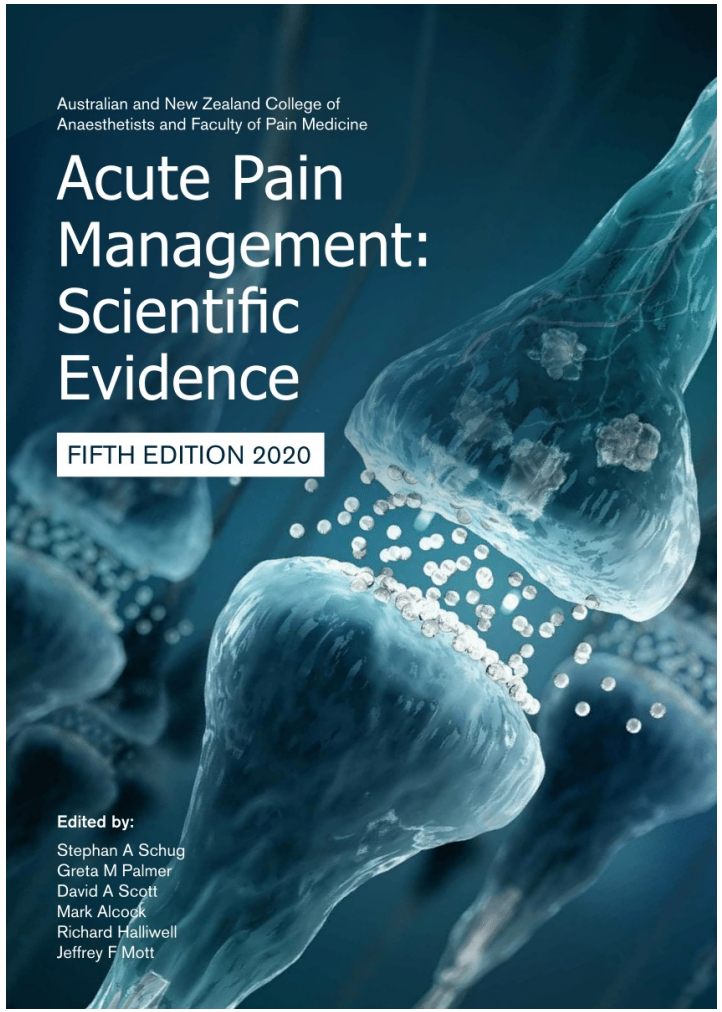
- Allodynia
- Hyperalgesia
- Dysesthesia
- Paraesthesia

Negative Symptoms
(due to deficit of function)

- Hypoesthesia
- Anaesthesia
- Hypoalgesia
- Analgesia

Sensory abnormalities and pain often co-exist
Each patient may have a combination of symptoms
That may change over time (even within a single aetiology)

Other recent publications



Anaesthesia 2020 doi:10.1111/anae.15262

Guidelines

An international multidisciplinary consensus statement on the prevention of opioid-related harm in adult surgical patients

N. Levy,[1] J. Quinlan,[2] K. El-Boghdadly,[3,4] W. J. Fawcett,[5] V. Agarwal,[6] R. B. Bastable,[7] F. J. Cox,[8] H. D. de Boer,[9] S. C. Dowdy,[10] K. Hattingh,[11] R. D. Knaggs,[12] E. R. Mariano,[13,14] P. Pelosi,[15,16] M. J. Scott,[17] D. N. Lobo[18,19] and P. E. Macintyre[20]

Aims of the consensus statement

- To produce a document to support the judicious and safe of opioids in the perioperative arena and to
  - Promote recovery
  - Ensure safe weaning & deprescribing
  - Reduce the risk of harm
    - Postoperative
    - At home
    - Driving etc

Postoperative factors

- Over reliance on unidimensional pain scoring
- Over reliance on opioids
- MR and compound analgesic

Discharge

- Over reliance on opioids
- Over prescribing of opioids
- Inexperienced prescribers

At home

Repeat opioid prescriptions

Lack of safe storage and disposal

Opioid Induced Ventilatory Impairment

It is caused by one or more of the following three factors:

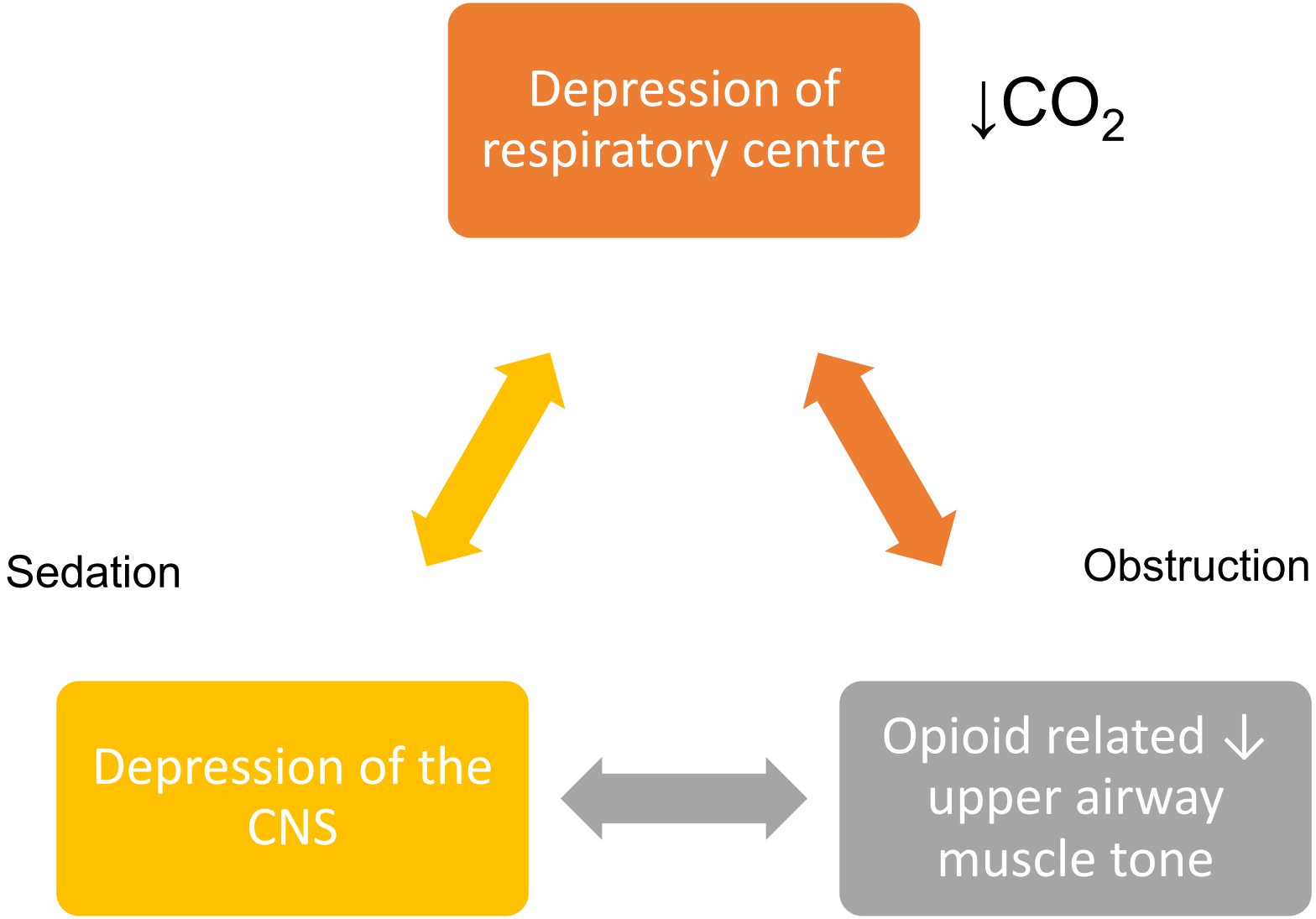
- Depression of the respiratory centre in the brainstem, leading to a reduction in alveolar ventilation (reduced respiratory rate and/or tidal volume)
- Reduced oropharyngeal muscle tone, which can result in upper airway obstruction
- Depression of the hypothalamus leading to increased arousal thresholds and reduced wakefulness (sedation)

O

I

V

I


Depression of respiratory centre
↓CO_2
Sedation
Obstruction
Depression of the CNS
Opioid related ↓ upper airway muscle tone

Sedation scoring

0 – Wide awake

1 – Easy to rouse (and can stay awake)

2 – Easy to rouse but unable to remain awake

3 – Difficult to rouse

*A score of **2** is taken to indicate early OIVI and, therefore, the aim should be to titrate an opioid so that a patient's sedation score is always < 2*

Postoperative period in hospital		Not modifying opioid dose according to age	Opioid sensitivity increases with age: use age-adjusted opioid doses initially
		Continuous infusions or use of more than one opioid or formulation	Avoid where possible
		Initiation of long-acting opioids	Use immediate-release opioids
		Co-administration of sedatives	Avoid gabapentinoids and benzodiazepines where possible
		Reliance on unidimensional pain scores alone	Titrate immediate-release opioids to functional outcomes
		Inadequate monitoring and 'track and trigger' responses	Measure sedation scores in all patients and respond appropriately
		Inadequate education of healthcare professionals	Education to recognise OIVI at an early stage and institute appropriate interventions
		Using opioids for minimally or non-opioid-responsive pain	Some pain is not opioid-responsive and continuation of opioids may lead to OIVI
Preparation for hospital discharge and post-discharge		Over-emphasis on opioids for discharge medication	Educate patients and carers about multimodal analgesia and non-pharmacological techniques for pain relief
		Lack of deprescribing advice and risks of concurrent sedative use	Educate patients and carers about reducing opioids and avoiding sedatives and alcohol
		Lack of recognition that increasing sedation is a marker of OIVI	Educate patients and carers to stop opioids if sleepy and seek medical advice if having difficulty staying awake. Call emergency services if unrousable

Acute and Perioperative
Research Paper

OPEN

PAIN REPORTS®

Predicting poor postoperative acute pain outcome in adults: an international, multicentre database analysis of risk factors in 50,005 patients

Alexander Schnabel[a], Maryam Yahiaoui-Doktor[b], Winfried Meissner[c], Peter Konrad Zahn[d], Esther Miriam Pogatzki-Zahn[a,*]

Abstract

Background: The aim of this study was to determine simple risk factors for severe pain intensity (≥7 points on a numeric rating scale [NRS]), to analyse their relation to other patient-reported outcome measures and to develop a simple prediction model.

Methods: We used data from 50,005 patients from the PAIN-OUT project. Within a first data set (n = 33,667), relevant risk factors were identified by logistic binary regression analysis, assessed for additional patient-reported outcome measures beyond pain intensity and summed up for developing a simple risk score. Finally, sum of factors was plotted against postoperative pain outcomes within a validation data set (n = 16,338).

Results: Odds ratios (OR) for the following risk factors were identified: younger age (<54 years, OR: 1.277), preoperative chronic pain at the site of surgery (OR: 1.195), female sex (OR: 1.433), duration of surgery (>90 minutes, OR: 1.308), preoperative opioid intake (OR: 1.250), feeling anxious (OR: 1.239) and feeling helpless due to pain (OR: 1.198), and the country of the recruiting centre (OR: 1.919). Patients with ≥3 risk factors had more severe pain intensity scores, spent a longer time in severe pain, and wished to have received more pain treatment ($P < 0.001$). A simple risk score was created with 4 risk factors showing a moderate prediction level.

Conclusions: Patients with ≥3 risk factors are at higher risk for poor postoperative acute pain outcome after surgery. Future studies using this score might show that preventive strategies might decrease pain intensity, pain-related postoperative dysfunction, and the development of chronic pain.

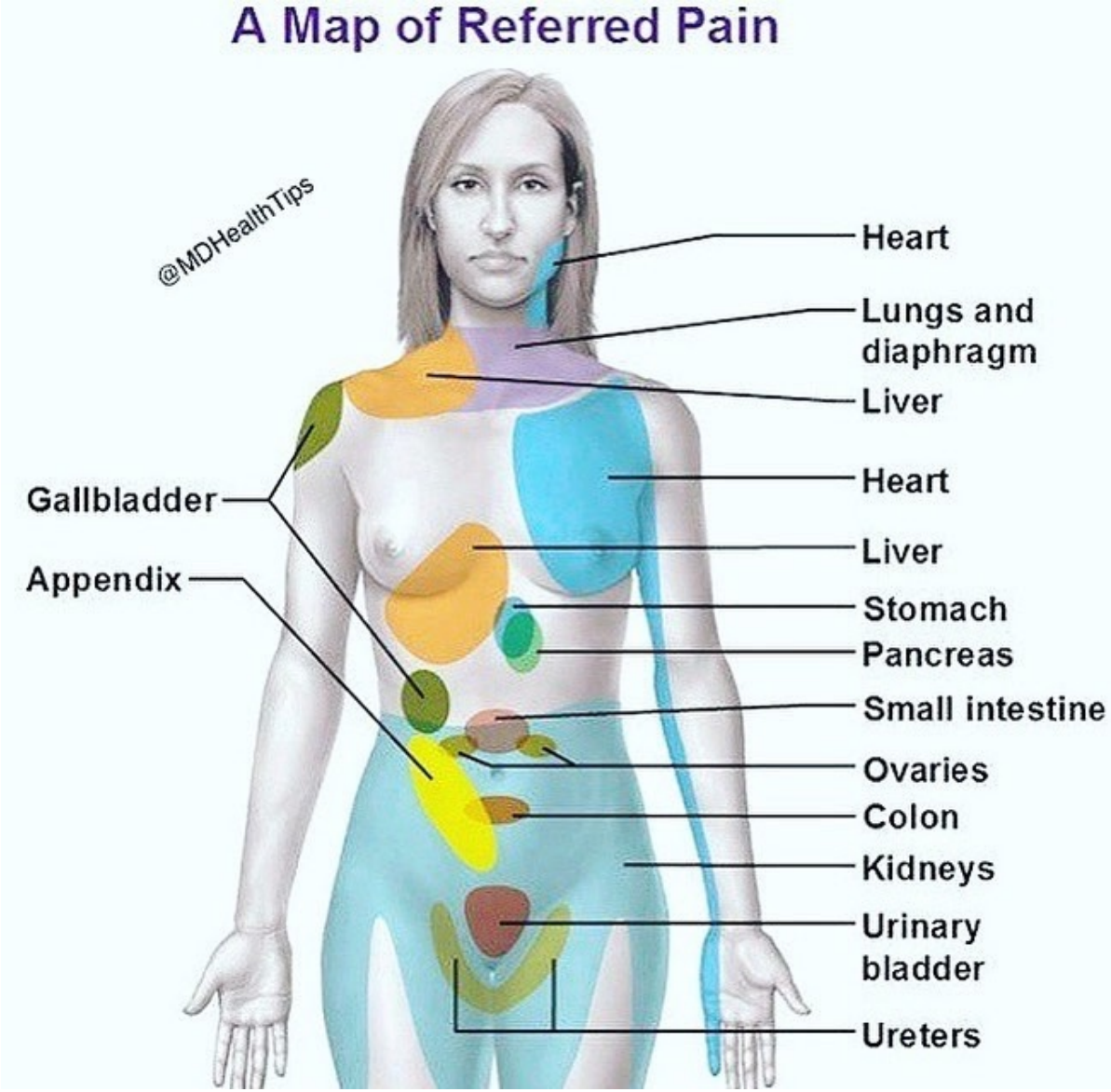
Keywords: Risk factors, Postoperative pain, Risk prediction, Database analysis, Chronification of pain

Patient One

- 32 year old female non-smoker post laparoscopic ablation for endometriosis. Multimodal intraoperative analgesia + dex 4mg + ondansetron 4mg.
- In recovery reporting:
  - Severe pain in
    - abdomen and pelvis
    - both shoulders
  - Severe nausea and urge to vomit

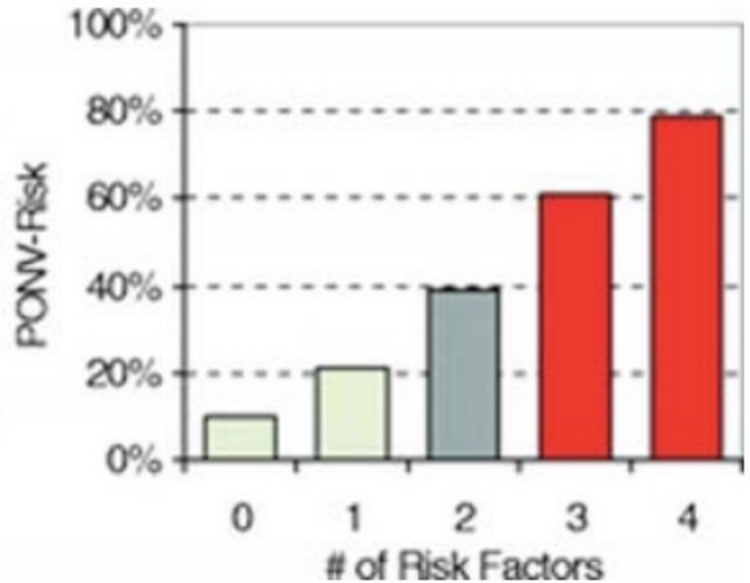
What are you thoughts about aetiology and treatment of:

1. Pain
2. Nausea


A Map of Referred Pain
@MDHealthTips
Heart
Lungs and diaphragm
Liver
Gallbladder
Heart
Appendix
Liver
Stomach
Pancreas
Small intestine
Ovaries
Colon
Kidneys
Urinary bladder
Ureters

Simplified Apfel Score

Risk Factors	Points
Female Gender	1
Non-Smoker	1
History of PONV	1
Postoperative Opioids	1
Sum =	0 ... 4



Cochrane Library

Cochrane Database of Systematic Reviews

Interventions for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section (Review)

Griffiths JD, Gyte GML, Popham PA, Williams K, Paranjothy S, Broughton HK, Brown HC, Thomas J

PONV after Gynaecological Surgery

Class	Medicines	Nausea	Vomiting
5-HT_3 antagonists	Ondansetron, granisetron	**Probably**	**Probably**
Dopamine antagonists	Metoclopramide, droperidol	Unclear	Unclear
Steroids	Dexamethasone	**Probably**	**Probably**
Antihistamines	Cyclizine, dimenhydranate	**Probably**	Unclear
Anticholinergics	Scopolamine	**Probably**	**Probably**
Sedatives	Midazolam, propofol	Unclear	**Probably**
Opioid antagonists	Nalbuphine, naloxone	No difference	No difference
Acupressure/acupuncture		Unclear	Unclear
Ginger		Unclear	Unclear

Adapted from Griffiths et al (2021) Cochrane review

Patient Two

62kg 32yo IV drug misuser; smokes crack + snorts fentanyl …….

Incision and drainage of bilateral groin abscesses

- Arrives in recovery with a RIJ line screaming and very restless
  - TAP block + intraoperative fentanyl 150mcg + parecoxib 40mg + morphine 10+5mg + paracetamol 1g
- Prescribed PCA morphine
  - 5-10mg loading dose
  - 1mg bolus, 5 minute lockout, no background infusion

What are your thoughts?

COWS Clinical Opiate Withdrawal Scale

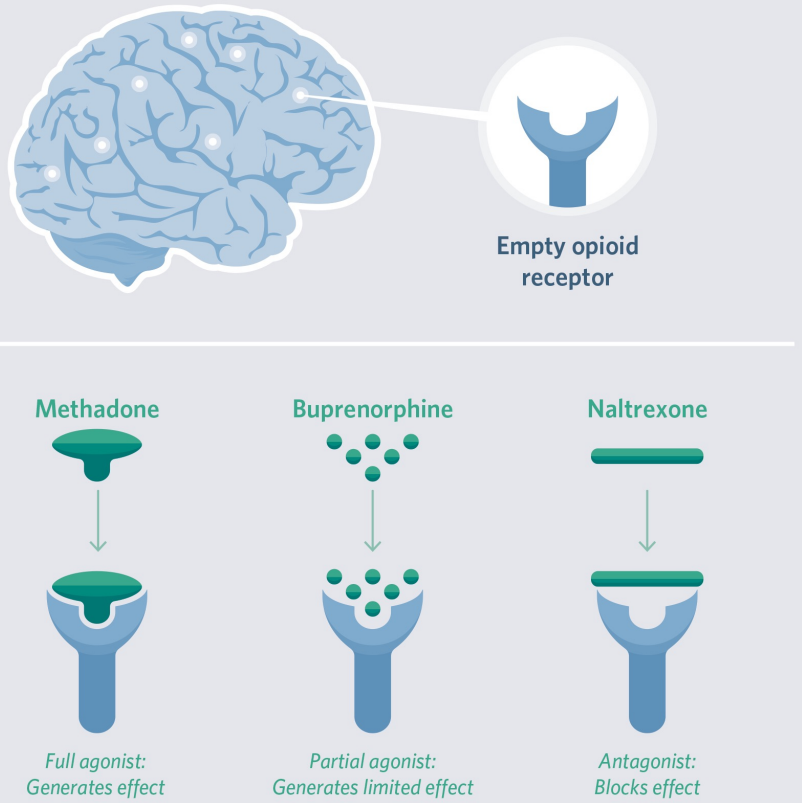
Wesson & Ling, J Psychoactive Drugs. 2003 Apr-Jun;35(2):253-9.

Resting Pulse Rate: _____beats/minute *Measured after patient is sitting or lying for one minute* 0 Pulse rate 80 or below 1 Pulse rate 81-100 2 Pulse rate 101-120 4 Pulse rate greater than 120	GI Upset: *over last 1/2 hour* 0 No GI symptoms 1 Stomach cramps 2 Nausea or loose stool 3 Vomiting or diarrhea 5 Multiple episodes of diarrhea or vomiting
Sweating: *over past 1/2 hour not accounted for by room temperature or patient activity.* 0 No report of chills or flushing 1 Subjective report of chills or flushing 2 Flushed or observable moistness on face 3 Beads of sweat *on* brow or face 4 Sweat streaming off face	Tremor *observation of outstretched hands* 0 No tremor 1 Tremor can be felt, but not observed 2 Slight tremor observable 4 Gross tremor or muscle twitching
Restlessness *Observation during assessment* 0 Able to sit still 1 Reports difficulty sifting still, but is able to do so 3 Frequent shifting or extraneous movements of legs/arms 5 Unable to sit still for more than a few seconds	Yawning *Observation during assessment* 0 No yawning 1 Yawning once or twice during assessment 2 Yawning three or more times during assessment 4 Yawning several times/minute
Pupil size 0 Pupils pinned or normal size for room light 1 Pupils possibly larger than normal for room light 2 Pupils moderately dilated 5 Pupils so dilated that only the rim of the iris is visible	Anxiety or irritability 0 None 1 Patient reports increasing irritability or anxiousness 2 Patient obviously irritable anxious 4 Patient so irritable or anxious that participation in the assessment is difficult
Bone or Joint aches *If patient was having pain previously, only the additional component attributed to opiates withdrawal is scored* 0 Not present 1 Mild diffuse discomfort 2 Patient reports severe diffuse aching of joints/ muscles 4 Patient is rubbing joints or muscles and is unable to sit still because of discomfort	Gooseflesh skin 0 Skin is smooth 3 Piloerrection of skin can be felt or hairs standing up on arms 5 Prominent piloerrection
Runny nose or tearing *Not accounted for by cold symptoms or allergies* 0 Not present 1 Nasal stuffiness or unusually moist eyes 2 Nose running or tearing 4 Nose constantly running or tears streaming down cheeks	Total Score _____ The total score is the sum of all 11 items Initials of person completing Assessment:_____

Score: 5-12 mild; 13-24 moderate; 25-36 moderately severe; more than 36 = severe withdrawal

Figure 1

How OUD Medications Work in the Brain



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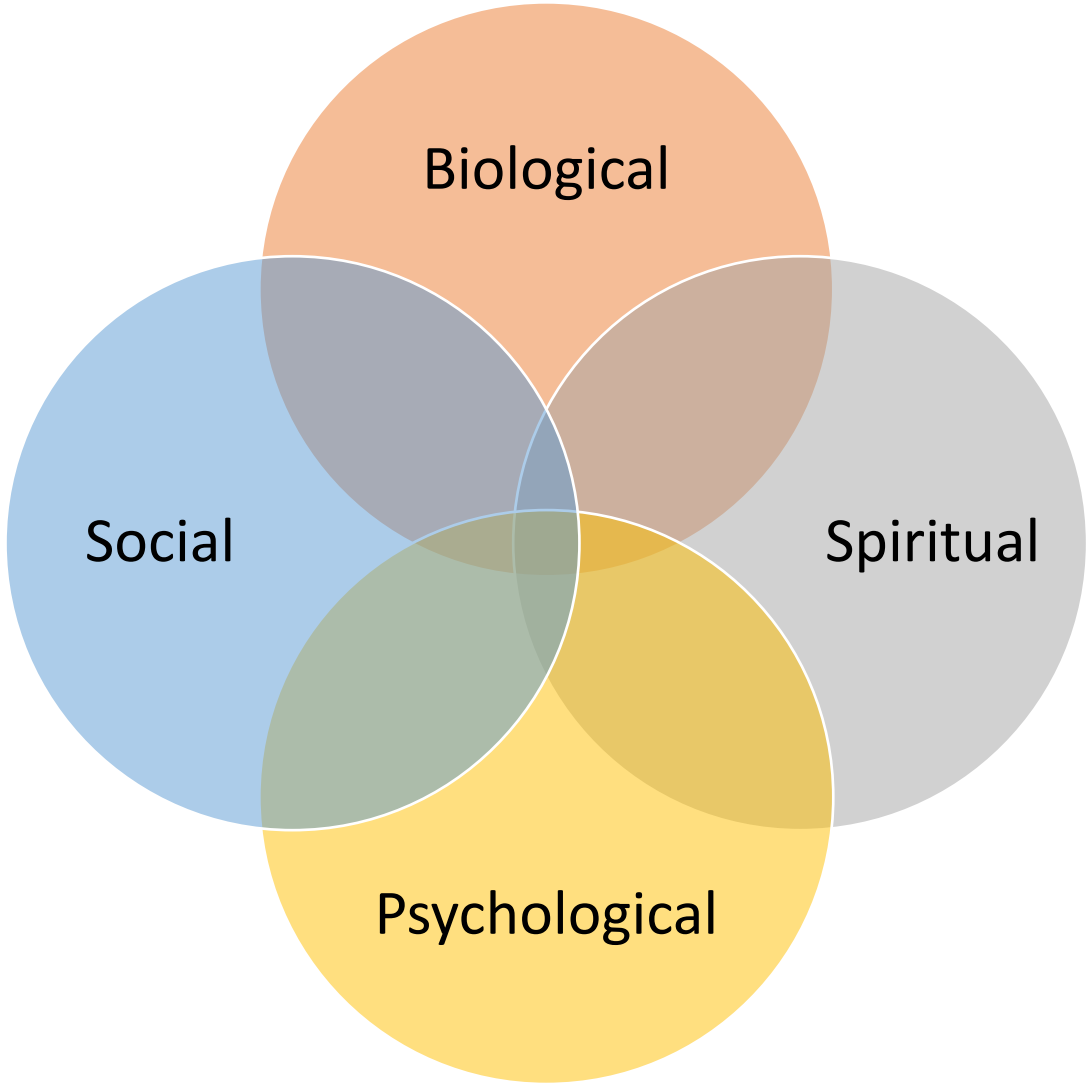
Patient Three

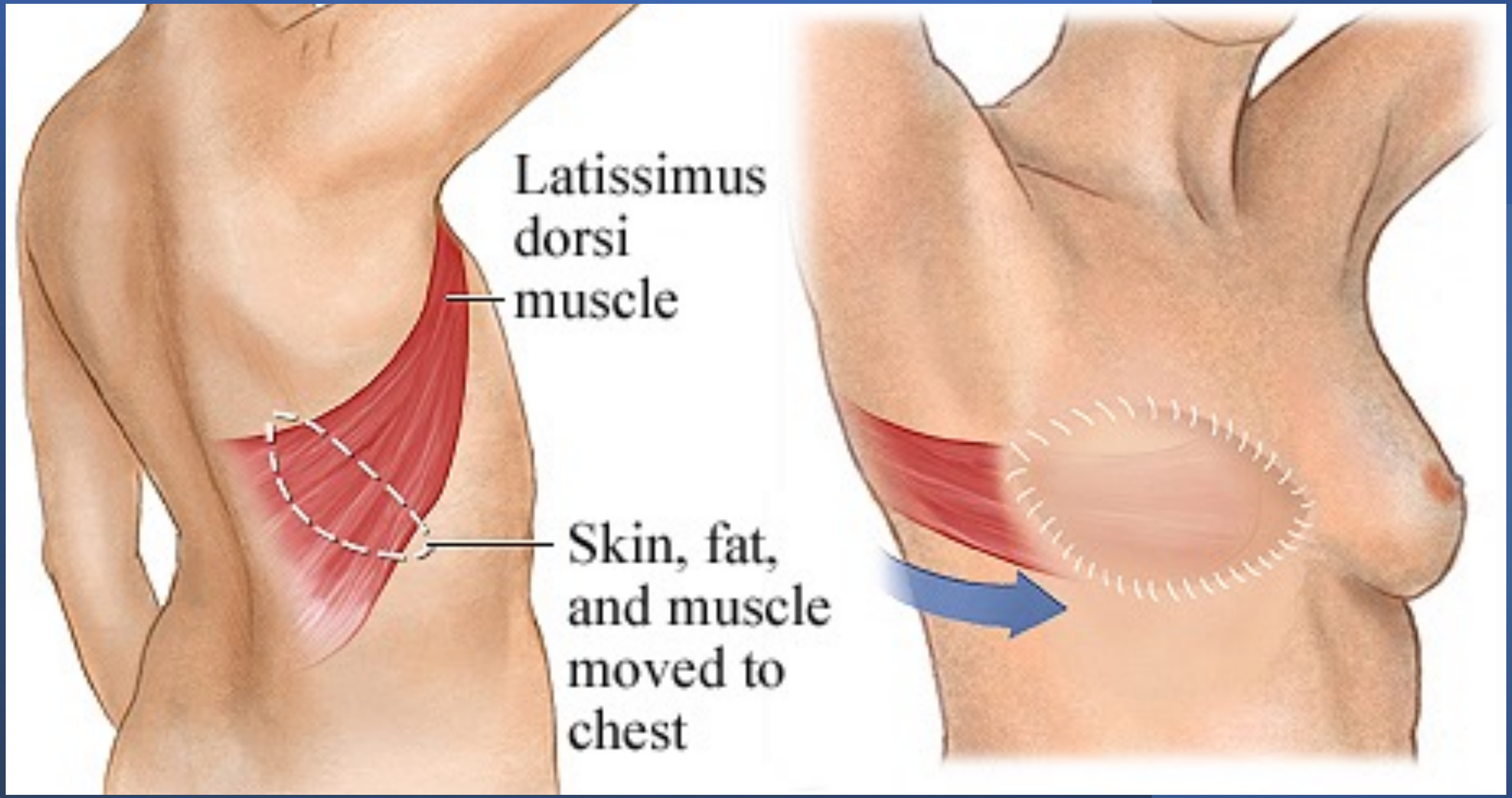
42-year old female after mastectomy for malignancy and reconstruction

- Intraop fentanyl 100mcg, oxycodone 15mg, parecoxib 40mg, paracetamol 1g
- Arrives in Recovery with:
  - a PVB catheter (loading dose given during skin closure) + 2 redivacs
  - A prescription for
    - regular paracetamol 1g IV qds + parexocib 40mg bd for 3 further doses
    - oxycodone IV PCA
      - 2mg bolus, 5 minute lockout, no background infusion

Reporting severe pain in shoulder tip behind scapula and near drain sites



The concept of **‘Total pain’** as introduced by Dame Cicely Saunders


Latissimus dorsi muscle
Skin, fat, and muscle moved to chest

Clinical features Of NeuP

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or pain that occurs in the absence of any stimulus.

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Further reading

- Levy N, Quinlan J, El-Boghdadly K, Fawcett WJ, Agarwal V, Bastable RB, Cox FJ, de Boer HD, Dowdy SC, Hattingh K, Knaggs RD, Mariano ER, Pelosi P, Scott MJ, Lobo DN & Macintyre PE (2021) An international multidisciplinary consensus statement on the prevention of opioid-related harm in adult surgical patients. Anaesthesia, 76: 520-536. https://doi.org/10.1111/anae.15262
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- ANZCA Acute Pain Management: Scientific Evidence (5th edn.) https://www.anzca.edu.au/resources/college-publications/acute-pain-management/apmse5.pdf
-
- FPM, BPS Opioids Aware Resource Opioids Aware | Faculty of Pain Medicine (fpm.ac.uk)
-
- FPM et al Surgery & Opioids
- https://fpm.ac.uk/sites/fpm/files/documents/2021-03/surgery-and-opioids-2021_4.pdf