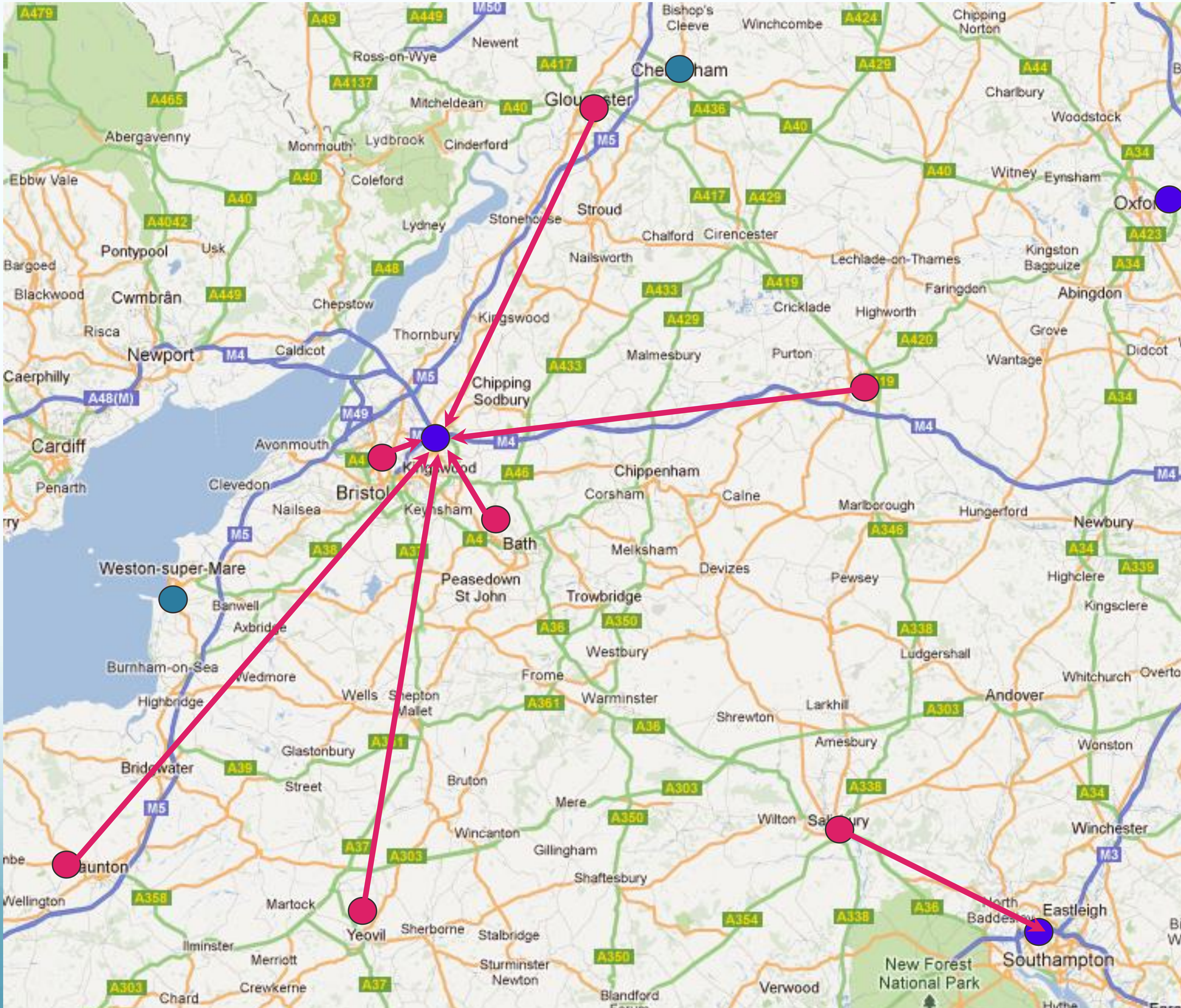
Major Trauma

Ben Walton
Consultant in ICM and Anaesthesia
Major Trauma Centre Clinical Lead
North Bristol NHS Trust

Theophrastus Bombastus Von Hohenheim 1493-1541

- The “Da Vinci” of the medical world
- Opium
- Mercurious chloride
- Sweet vitriol
- Zinc
- Learnt from evil spirits, vagabonds and wastrels


Bishop's Cleeve
Winchcombe
Chipping Norton
Newent
Ross-on-Wye
Gloucester
Charlbury
Woodstock
Mitcheldean
Abergavenny
Monmouth
Lydbrook
Cinderford
Coleford
Ebbw Vale
Witney
Eynsham
Stroud
Stonehouse
Lydney
Chalford
Cirencester
Nailsworth
Lechlade-on-Thames
Kingston Bagpuize
Pontypool
Usk
Bargoed
Blackwood
Cwmbrân
Chepstow
Faringdon
Abingdon
Cricklade
Highworth
Risca
Kingswood
Thornbury
Grove
Newport
Caldicot
Malmesbury
Purton
Didcot
Wantage
Caerphilly
Chipping Sodbury
Cardiff
Avonmouth
Chippenham
Penarth
Clevedon
Bristol
Corsham
Calne
Marlborough
Hungerford
Newbury
Nailsea
Keynsham
Bath
Melksham
Devizes
Pewsey
Highclere
Weston-super-Mare
Peasedown St John
Trowbridge
Kingsclere
Banwell
Axbridge
Westbury
Ludgershall
Burnham-on-Sea
Wedmore
Frome
Whitchurch
Overton
Wells
Shepton Mallet
Warminster
Larkhill
Andover
Highbridge
Shrewton
Amesbury
Glastonbury
Wonston
Bridgwater
Street
Bruton
Mere
Wincanton
Wilton
Salisbury
Winchester
Taunton
Gillingham
Shaftesbury
Wellington
Martock
Eastleigh
Yeovil
Sherborne
Stalbridge
Ilminster
Merriott
Sturminster Newton
New Forest National Park
Southampton
Crewkerne
Chard
Blandford Forum
Verwood
Hythe

MTC

TU

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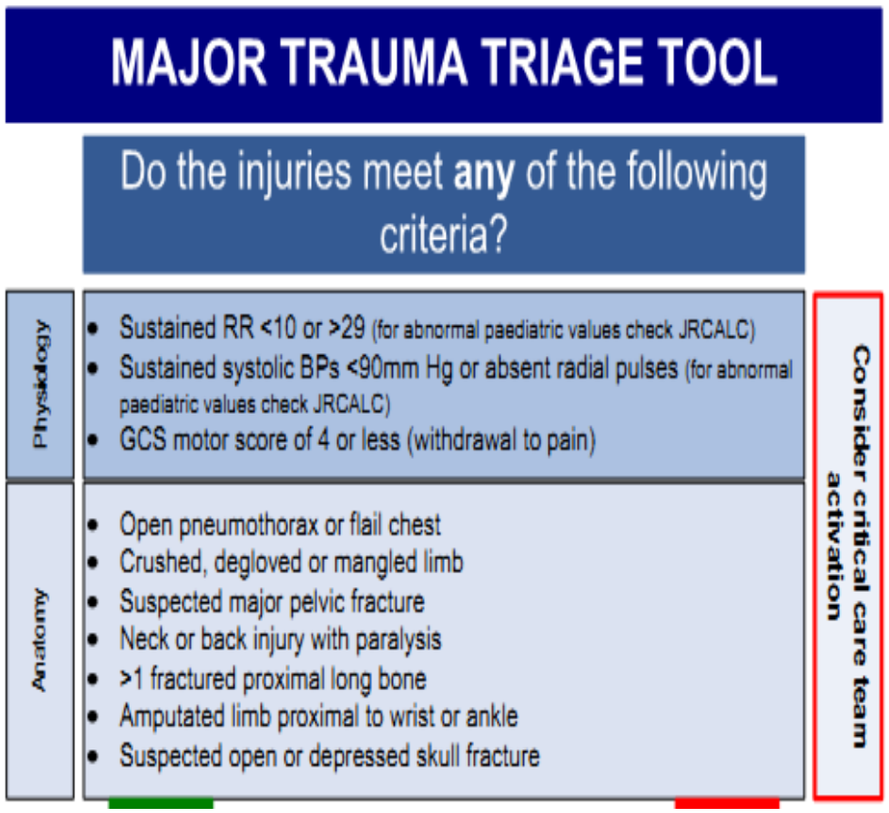
Severn Major Trauma Network

North Bristol NHS Trust

•Until April 2012 if you were seriously injured the aim was to get you from the scene to hospital as quickly as possible. And after that it was all a little vague.....

•90% of those hospitals would see a patient like you less than once every 3 weeks

Great Western Ambulance Service NHS Trust



"Getting the right patient to the right place at the right time"

Severn Major Trauma Network

Variation in Standards of Care

- Survival rates vary significantly from hospital to hospital, with a range from five unexpected survivors to eight unexpected deaths per 100 trauma patients
- 60% of trauma patients in 2007 received care that was less than good practice
- You’re more likely to die if you get run over at the weekend or at night than during working hours
  - National Audit Office. *Major Trauma care in England.* London: The Stationery Office (2010).

ISS / AIS

Table 1 To calculate the ISS, the highest severity code in each of the three most severely injured ISS body regions (*A*, *B*, *C*) is squared and added (ISS=$A^2+B^2+C^2$). If any of the three scores is 6, the score is automatically 75

Body regions	Injury severity	Score
Head or neck	Minor	1
Face	Moderate	2
Chest	Serious	3
Abdomen or pelvic contents	Severe	4
Pelvic skeleton	Critical	5
External	Maximal (currently untreatable)	6

Do Trauma Centres Work?

- Risk of death lower in a trauma centre (10.4% vs.13.8%; relative risk, 0.75; 95% CI 0.60 to 0.95)
- The relative reduction in risk was similar for in-hospital, 30-day, and 90-day mortality
- Good evidence to suggest that differences in mortality rates were primarily confined to patients with more severe injuries.

MacKenzie, E et al: A National Evaluation of the Effect of Trauma-Center Care on Mortality: N Engl J Med 2006; 354:366-378 Jan 26th 2006

TARN

THE TRAUMA AUDIT & RESEARCH NETWORK

Rate of Survival at this Hospital: Yearly Figures

Note: Data for the following years is not shown due to missing or incomplete data: 16/17, 18/19

Rate of Survival Breakdown at this Hospital

Survival band %	Number in group	Expected survivors	Actual survivors	Difference*	Adjusted difference**
95 - 100	1741	1712	1725	0.7	0.5
90 - 95	560	520	521	0.1	0.0
80 - 90	400	342	342	-0.2	0.0
65 - 80	221	162	167	1.9	0.1
45 - 65	96	53	53	-0.4	0.0
25 - 45	58	20	21	0.1	0.0
0 - 25	57	8	12	6.5	0.1
Total	**3133**	**2821**	**2841**	**0.6**	**0.6**

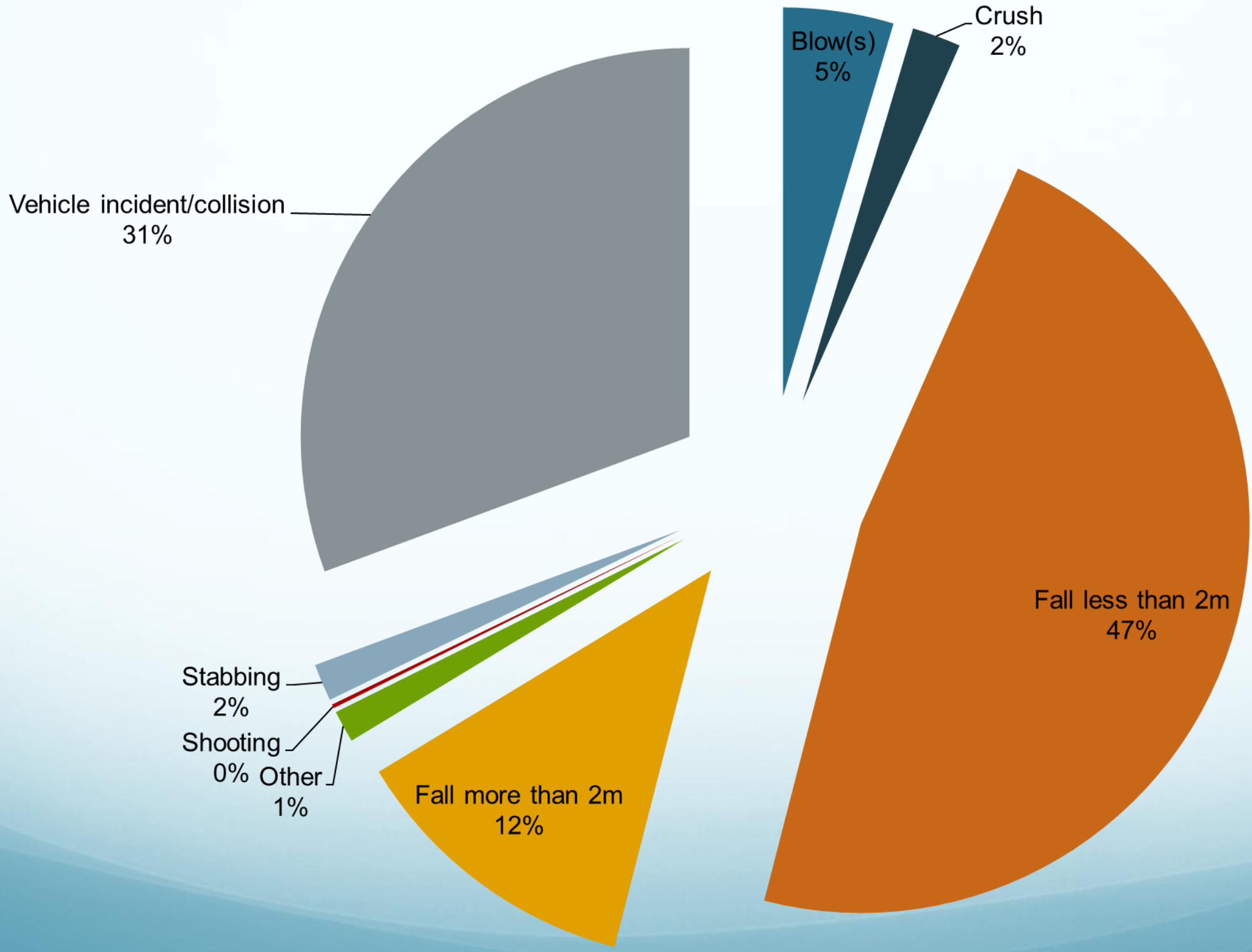
Unexpected deaths in minor/moderate injury
Usually due to poor management of co-morbidity and/or complications

Unexpected survivors with more serious injury
Usually indicates good initial resuscitation and the treatment of head injury in Neurological Centres

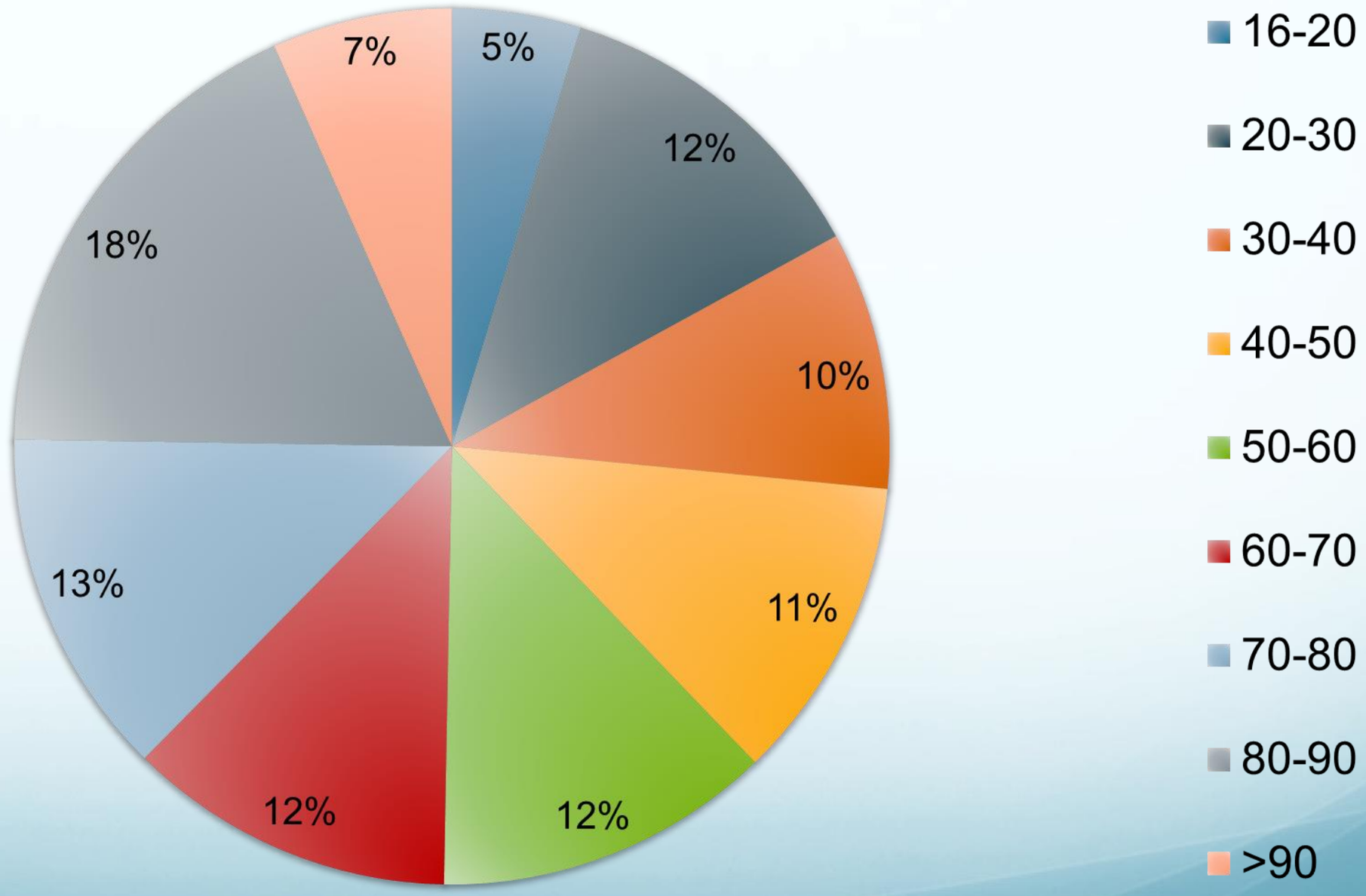
Doing the Right Thing to the Right Patient at the Right Time - Every Time

	1	2	3	4	5
pt A	x	x	x	x	x
pt B		x	x	x	x
pt C	x	x	x	x	
pt D	x		x	x	x
pt E	x	x	x	x	x

Mechanism of Injury –
Adults NBT 2014-16



Trauma by Age



TO SAVE LIVES

Do You Have What it Takes

TRAUMA TEAM

Analgesia in Trauma

Ben Walton
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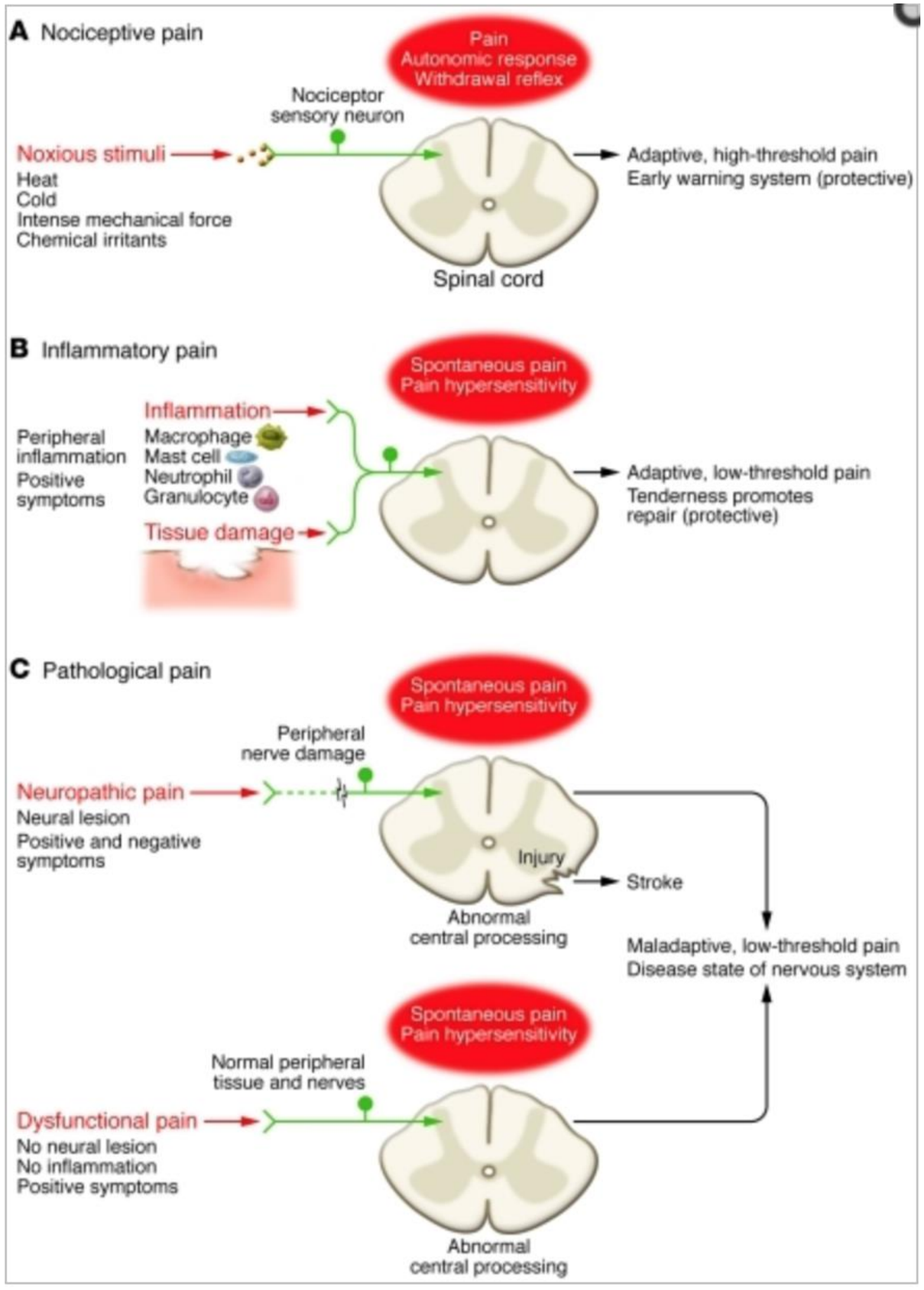
Pain

The Good, the Bad and the Ugly

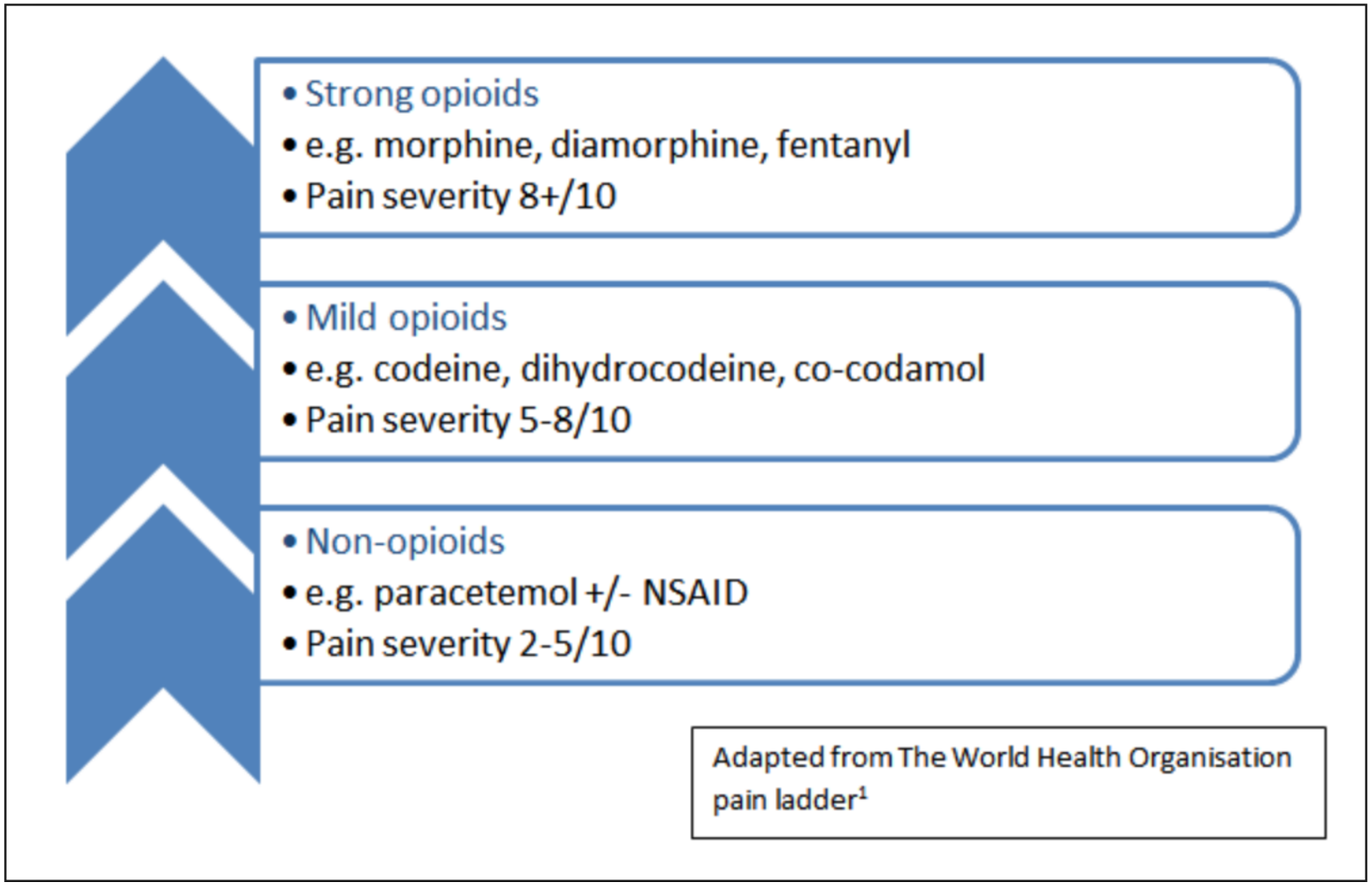


19th WHO Essential medicines list

2. MEDICINES FOR PAIN AND PALLIATIVE CARE	
2.1 Non-opioids and non-steroidal anti-inflammatory medicines (NSAIMs)	
acetylsalicylic acid	**Suppository:** 50 mg to 150 mg. **Tablet:** 100 mg to 500 mg.
ibuprofen [a]	**Oral liquid:** 200 mg/5 mL. **Tablet:** 200 mg; 400 mg; 600 mg. [a] Not in children less than 3 months.
paracetamol*	**Oral liquid:** 125 mg/5 mL. **Suppository:** 100 mg. **Tablet:** 100 mg to 500 mg. * Not recommended for anti-inflammatory use due to lack of proven benefit to that effect.
2.2 Opioid analgesics	
codeine	**Tablet:** 30 mg (phosphate).
☐ morphine*	**Granules (slow-release; to mix with water):** 20 mg – 200 mg (morphine sulfate). **Injection:** 10 mg (morphine hydrochloride **or** morphine sulfate) in 1- mL ampoule. **Oral liquid:** 10 mg (morphine hydrochloride **or** morphine sulfate)/5 mL. **Tablet (slow release):** 10 mg–200mg (morphine hydrochloride **or** morphine sulfate). **Tablet (immediate release):** 10 mg (morphine sulfate). *Alternatives limited to hydromorphone and oxycodone

WHO Pain Ladder

- Dose regularly
- Dose for the individual



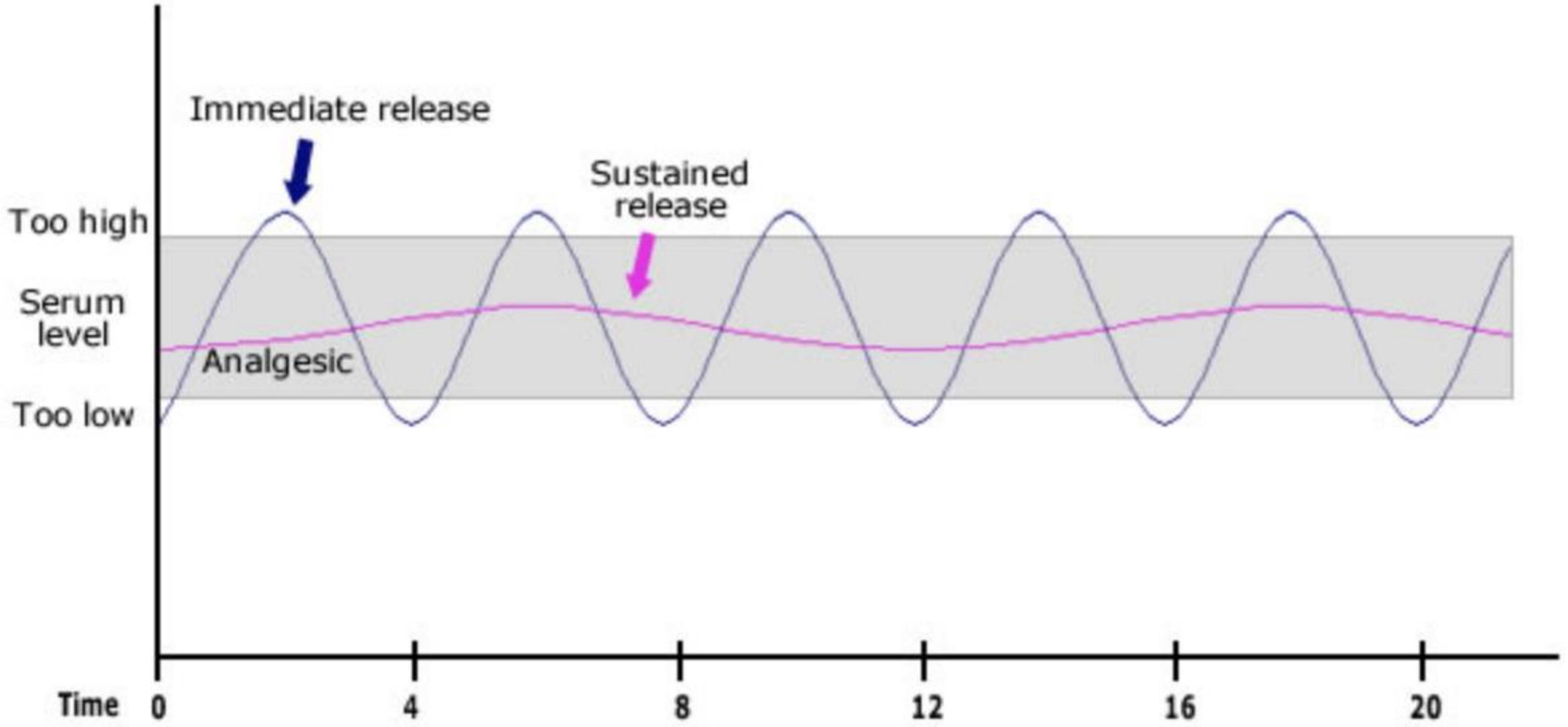
Naughty NSAIDS

- Delayed fracture healing?
- Increased infection risk?
- GI upset
- AKI
- Haemostasis

ysio 10 minutes after the patient has had some m

Route for administration
-Time until effect-

intravenous	30-60 seconds
intraosseous	30-60 seconds
endotracheal	2-3 minutes
inhalation	2-3 minutes
sublingual	3-5 minutes
intramuscular	10-20 minutes
subcutaneous	15-30 minutes
rectal	5-30 minutes
ingestion	30-90 minutes
transdermal (topical)	variable (minutes to hours)



Opiate Toxicity

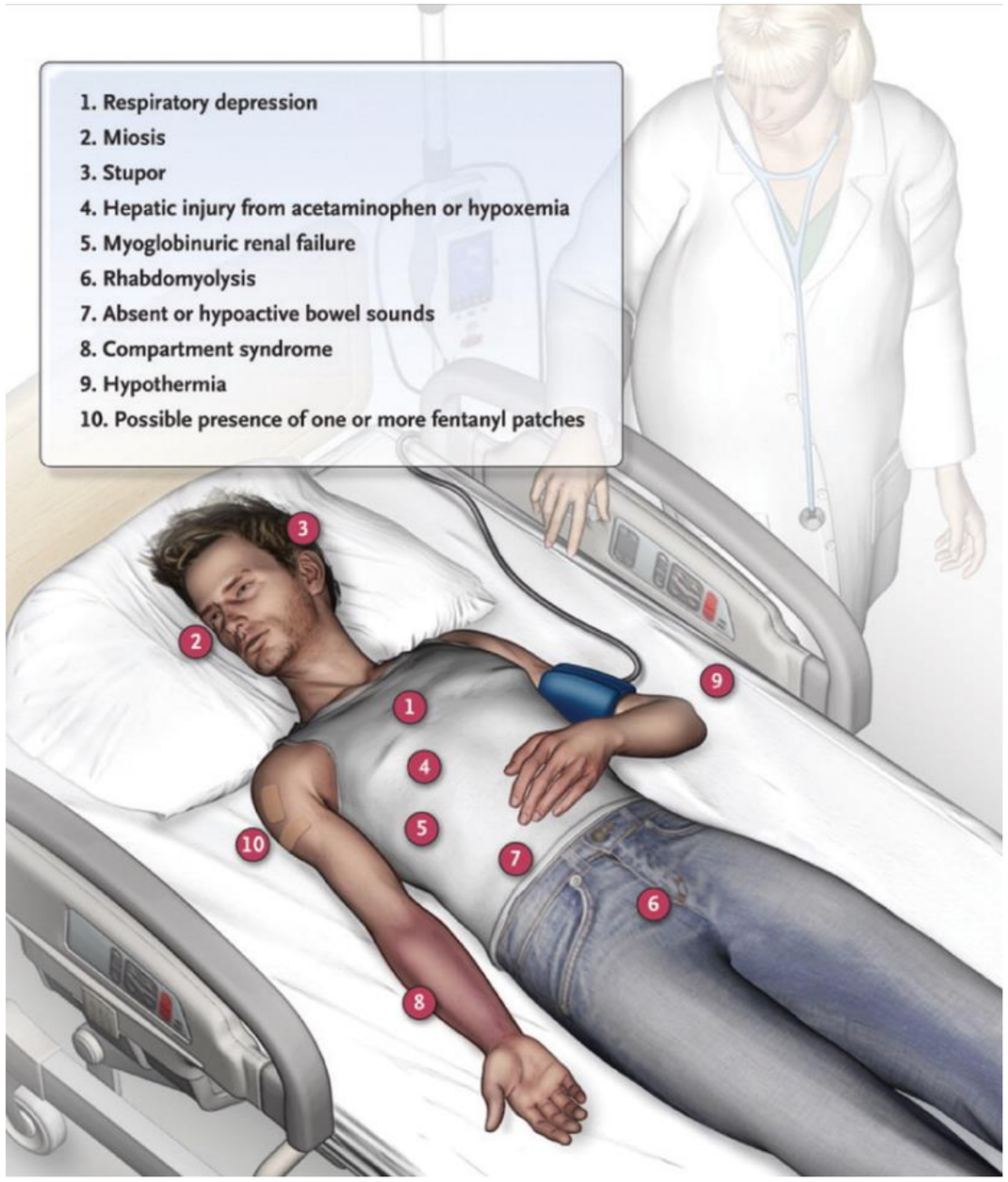
1. Reversal of respiratory depression and reduced conscious level from medicinal use of opioids (including post-operative use), patients receiving palliative care or are long-term (chronic) opioid users for pain control.

Naloxone initially 100-200 micrograms (1.5micrograms-3micrograms/kg) as a slow IV bolus over 30 seconds with 100 micrograms repeated every 2 minutes until a satisfactory rise in respiratory rate is achieved.

Prepared as 400micrograms diluted to 4ml with sodium chloride 0.9% and administered in 1ml (100microgram) aliquots.

The dose should be titrated against the respiratory function and not the level of consciousness. Where possible the aim is to maintain adequate analgesia.

If no IV access then naloxone 100-200 microgram boluses can be given intramuscularly or subcutaneously whilst IV access is obtained



Rib Fractures

Rib Fracture Analgesia Algorithm

Uncontrolled pain and presence of risk factors require more advanced analgesia

A. Risk Factors

Presence of more risk factors predicts increased risk of complications

1. Age > 60
2. ↓SpO_2
3. Obesity/malnourished
4. ≥ 3 rib #, flail segment, pulmonary contusion or other chest injury
5. Smoker and/or chronic resp. disease
6. Anticoagulated
7. Major Trauma

Notes

≥ 2 risk factors ensure referred to

1. Acute Pain Team (Bleep 1509 or 9670)
2. Physiotherapy (Bleep 1395 or 9552)

B. Pain Score

Assess pain on deep inspiration and coughing on Verbal Rating Scale (VRS) *or equivalent*

	"No Pain"	"Mild"	"Moderate"	"Severe"
VRS	0	1	2	3
VAS	*0-1*	*2-4*	*5-7*	*8-10*
Abbey	*0-2*	*3-7*	*8-13*	*≥14*

Notes

1. Instigate analgesia ASAP to achieve VRS 0 or 1 *(or equivalent VAS/Abbey score)*

C. Analgesia Strategy

Escalate analgesia to achieve VRS of 0 or 1

STEP 1
Paracetamol
NSAID*
*(*Unless contraindicated)*
Codeine/Tramadol

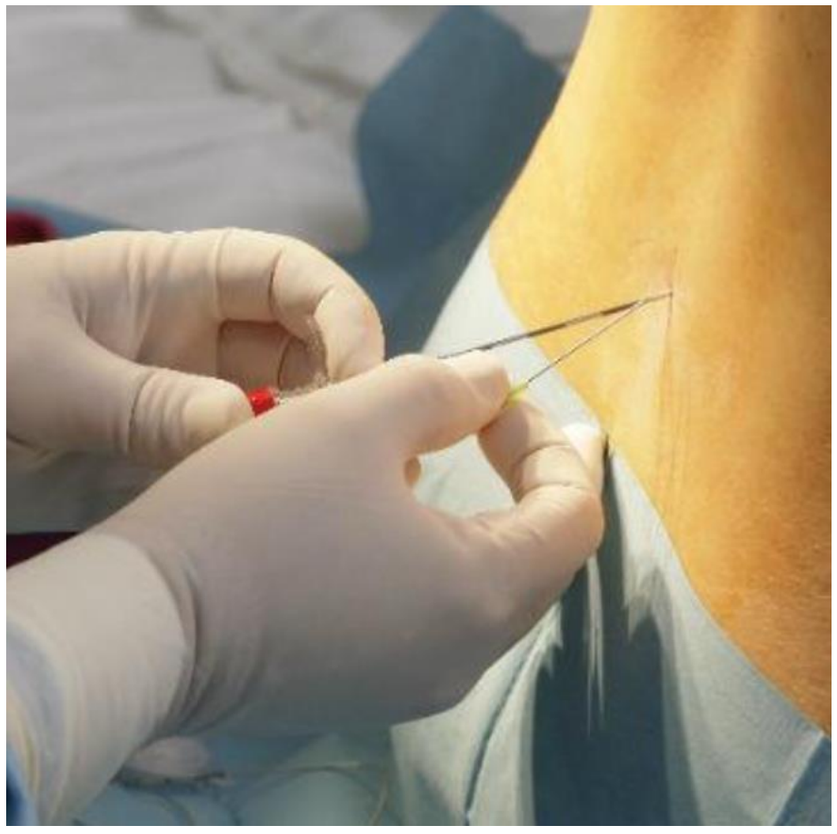
STEP 2
Paracetamol
NSAID
Opioid PCA
Consider Regional Technique

STEP 3
Paracetamol
NSAID
Opioid PCA
Regional Technique

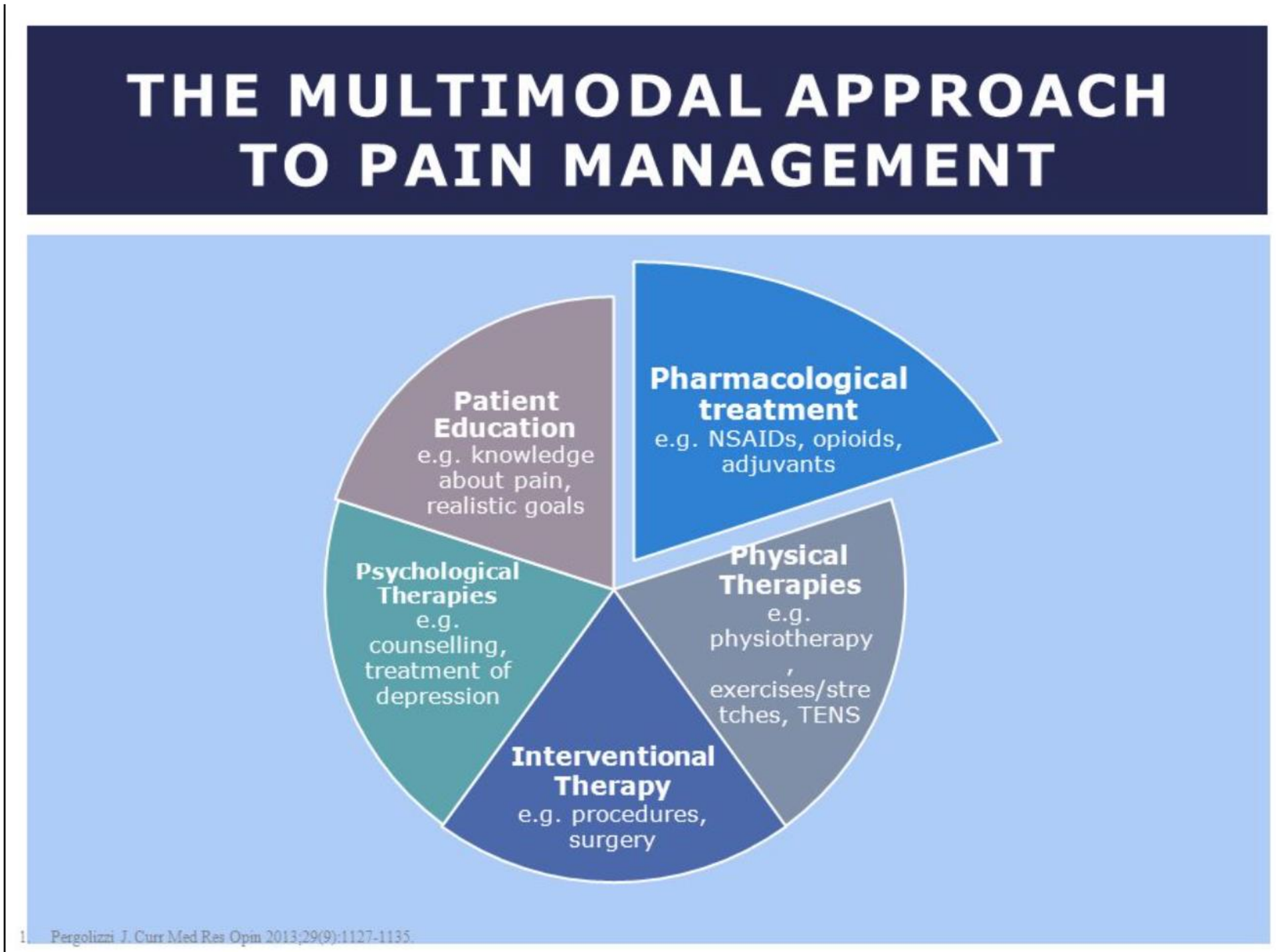
Notes

1. Alternatives to consider: Lignocaine patch, ketamine infusion and/or gabapentin
2. Ensure antiemetics and laxatives are prescribed
3. ≥ Step 2 refer Acute Pain Team and Physiotherapy

So what is there other than pills?

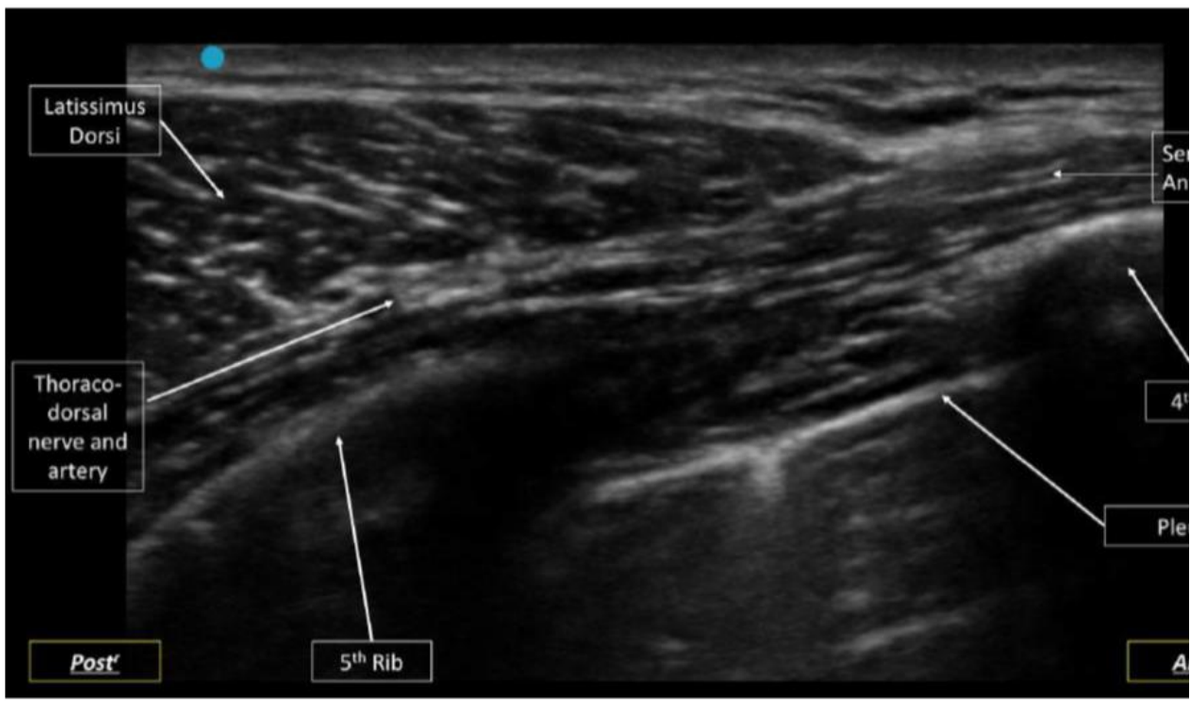


Multi-modal Pain Management



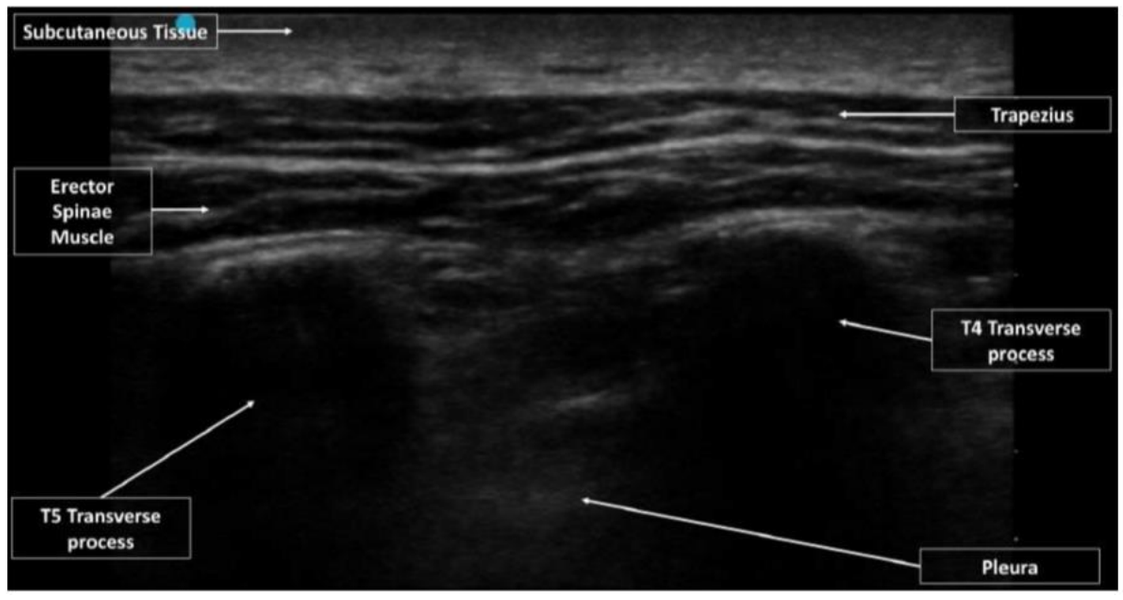
Serratus Anterior Plane Catheter

Position:
Supine with arm abducted or brought across to contralateral shoulder.
Alternatively lateral position with "bad-side up"
Equipment:
Pajunk Sonolong 100mm Nerve Catheter (or Pajunk E-catheter 51mm/83mm for slim patient
High frequency linear US probe
Technique:
Full aseptic technique inc. US probe cover i.e. as per insertion of a central line
0.5% Chlorhexidine to skin
Transverse scan at T5, mid-axillary line
Lignocaine to anaesthetise skin
Hydrodissect plane immediately superficial to Serratus Anterior and deep to Latissimus Dors
Place catheter and secure with sterile transparent dressing.

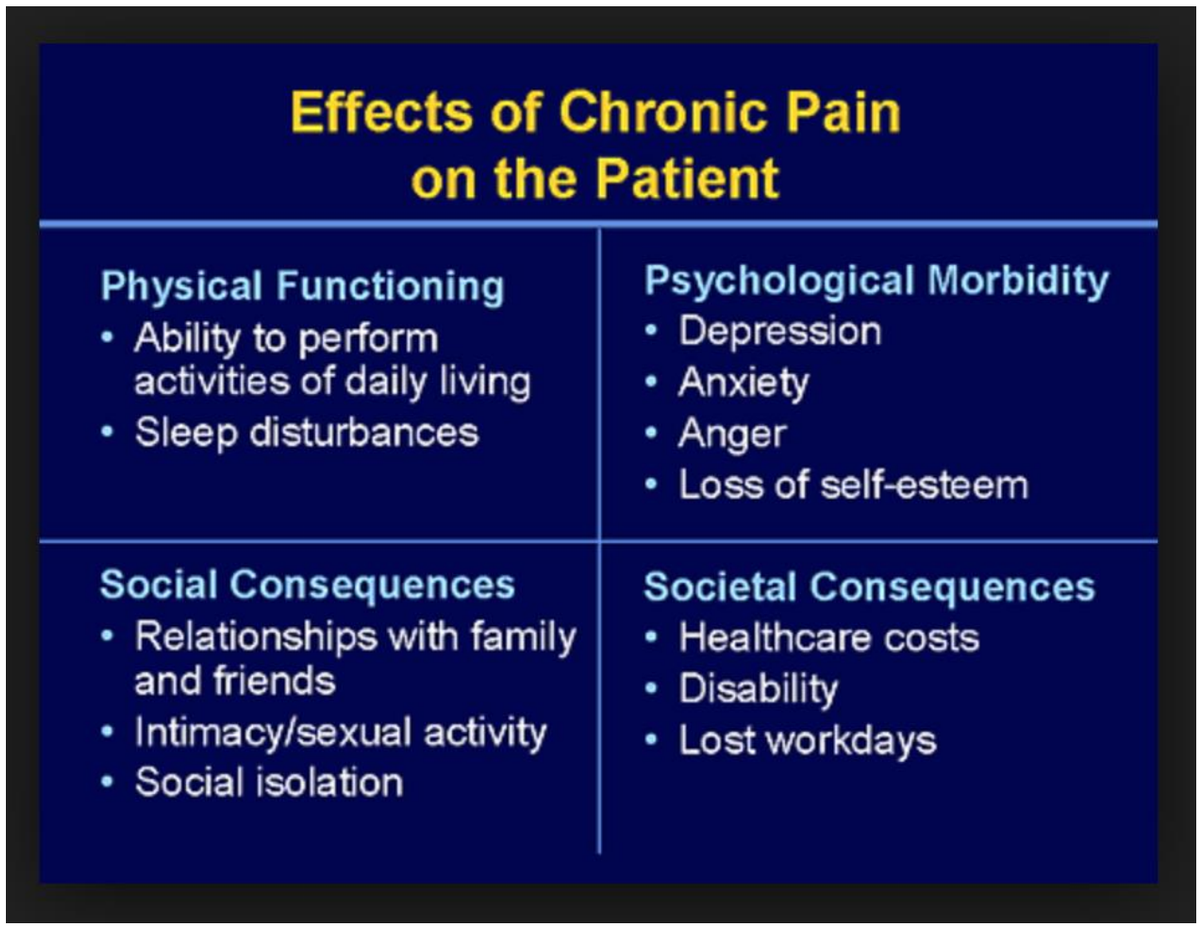


Erector Spinae Plane (ESP) Catheter

Position:
Lateral position with "bad-side up"
Equipment:
Pajunk Sonolong 100mm nerve catheter
High frequency linear US probe. Curvilinear may be required for larger patients.
Technique:
Full aseptic technique inc. US probe cover i.e. as per insertion of a central line
0.5% Chlorhexidine to skin
Sagittal scan to identify transverse process at desired level. *(Tip: scan to identify the "square tombstone profile" of the transverse process. Compare medially the "sawtooth" pattern of the laminae; and laterally the rounded profile of the rib).*
Lignocaine to anaesthetise the skin
Hydrodissect plane immediately superficial to transverse process, deep to overlying erector spinal muscle group.
Place catheter and secure with sterile, transparent dressing.



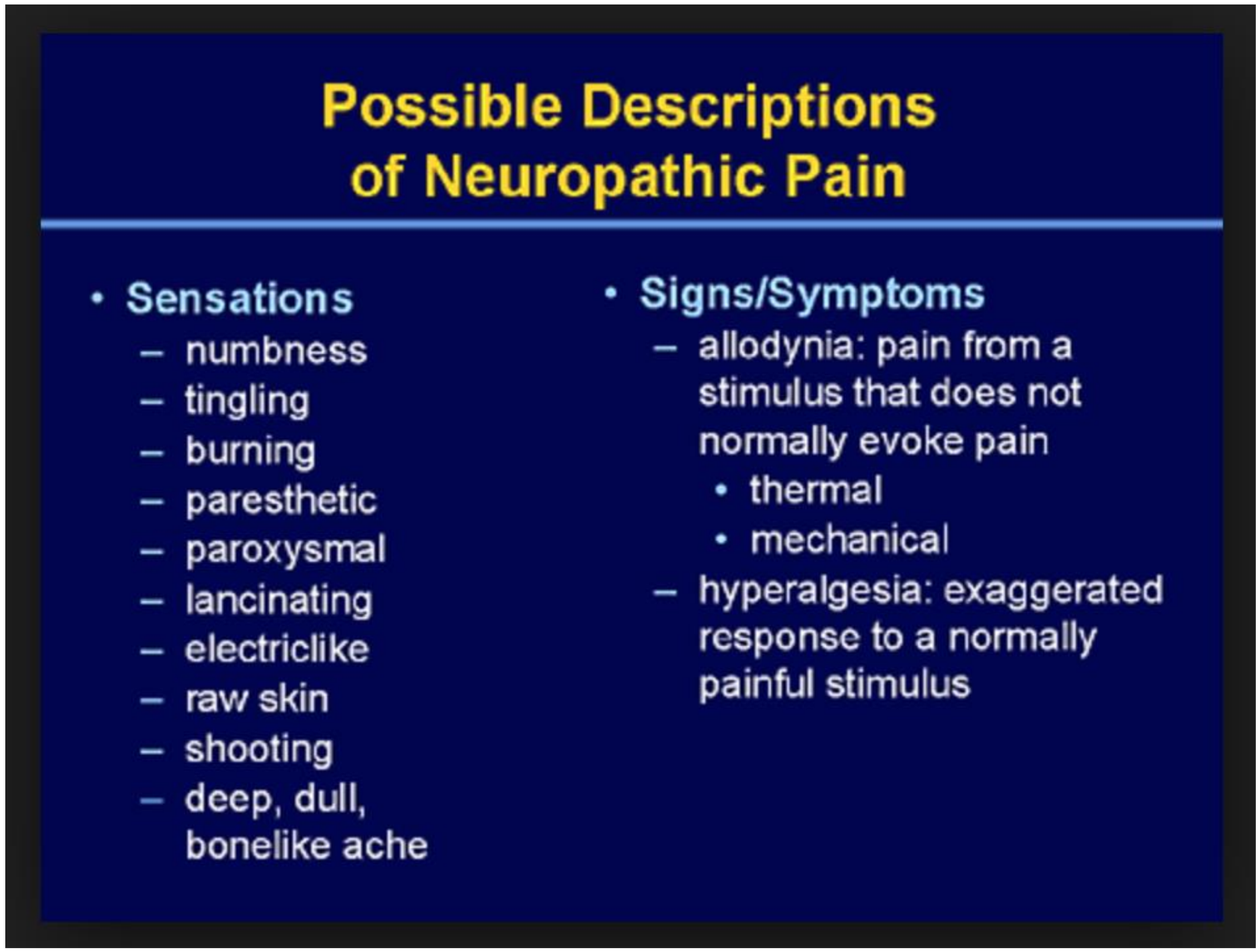
Chronic Pain - pain that outlasts the normal time of healing



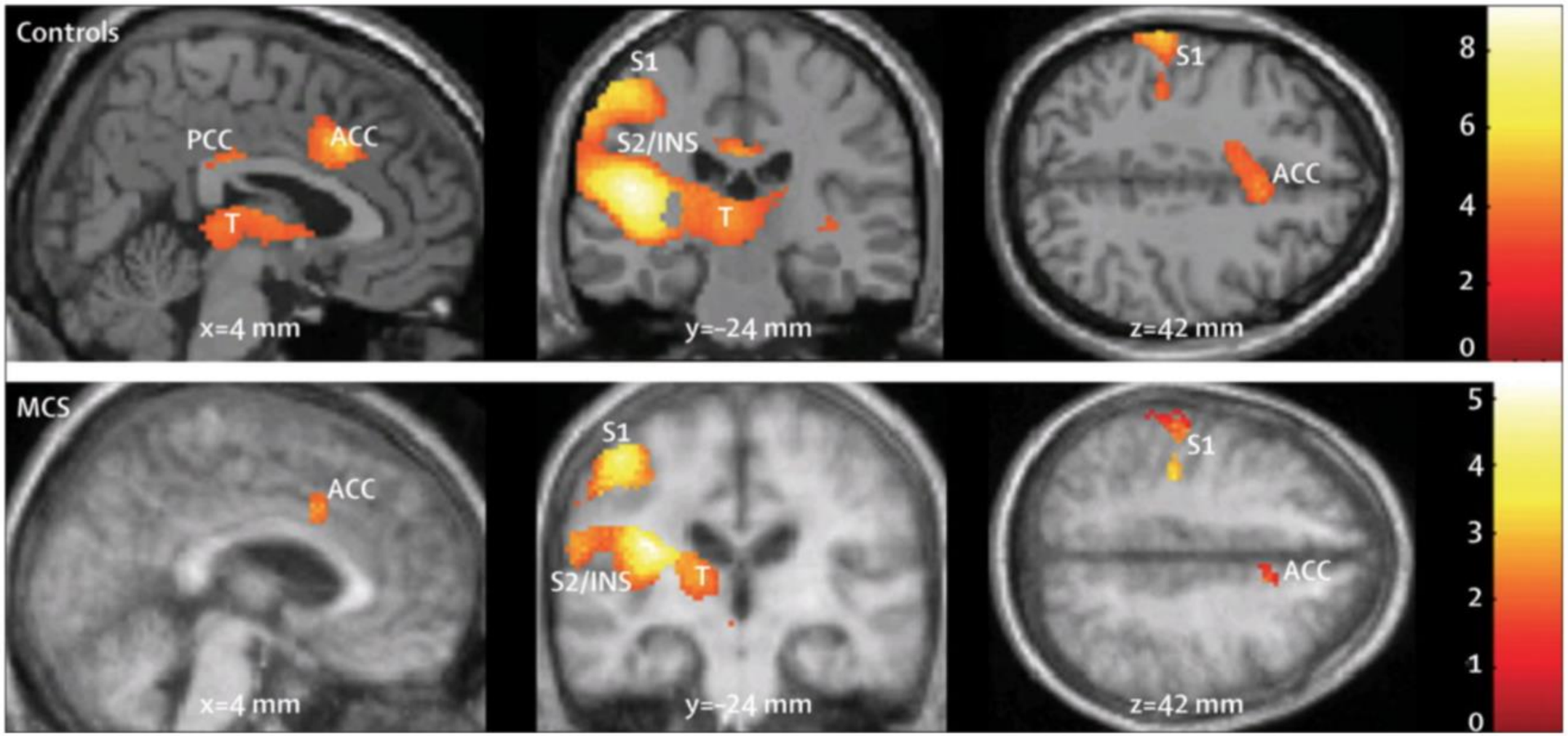
Neuropathic pain

The International Association for the Study of Pain (IASP 2011) defines

- Neuropathic pain as 'pain caused by a lesion or disease of the somatosensory nervous system'.
- Central neuropathic pain is defined as 'pain caused by a lesion or disease of the central somatosensory nervous system’
- Peripheral neuropathic pain is defined as 'pain caused by a lesion or disease of the peripheral somatosensory nervous system'.



Can you feel pain if you are unconscious?



Aggregation of Marginal Gains