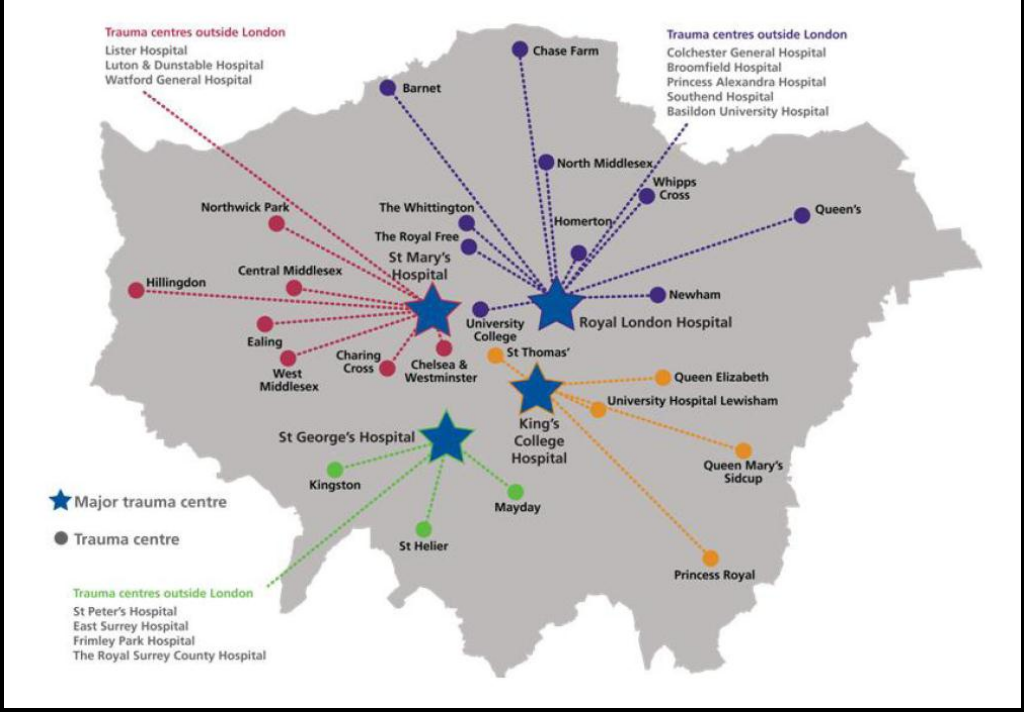
Trauma
Getting the balance right

Rick Kennedy
Consultant Anaesthetist
St George's Hospital

Scope

- The problem- painting the picture
- The impact
- Persistent pain
- Current models of care
- Timing
- Modalities
- Future models of care


ST. GEORGE'S HOSPITAL



TARN-ELIGIBLE PATIENTS ST GEORGE'S HOSPITAL

ISS	1-8	9-15	16-24	25-45	45-75	TOTAL	ISS>15
April 6th 2009 - Mar 31st 2010	110	93	110	130	10	453	250
April 6th 2010– Mar 31st 2011	117	145	125	159	14	560	298
Change in activity (+/-)	+7	+52	+15	+29	+4	+107	+48

Trauma

- “Wound”
- Poly-trauma/ fragility
- Indiscriminate
- 10,000 deaths a year
- No 1 cause of death in under 40’s
- Fractured NOF costs £384 million
- It is a disease
- It continues beyond Resus

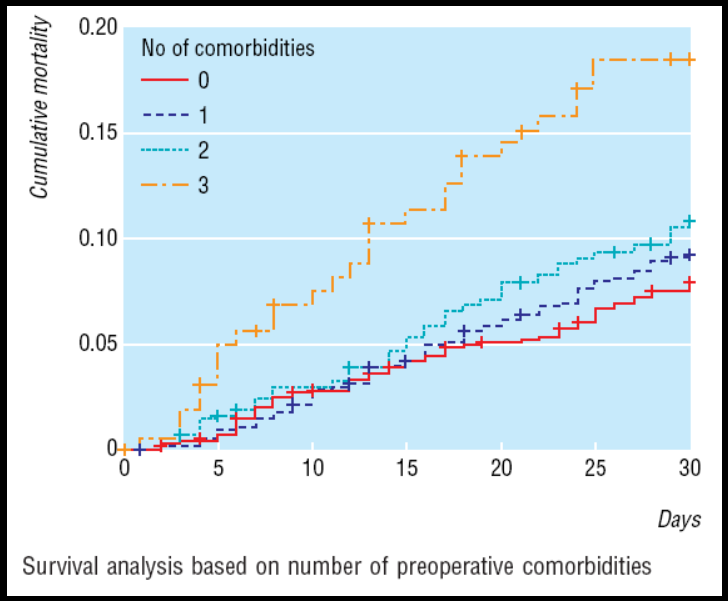

Elderly Asian Gentleman.

Effect of comorbidities and postoperative complications on mortality after hip fracture in elderly people: prospective observational cohort study

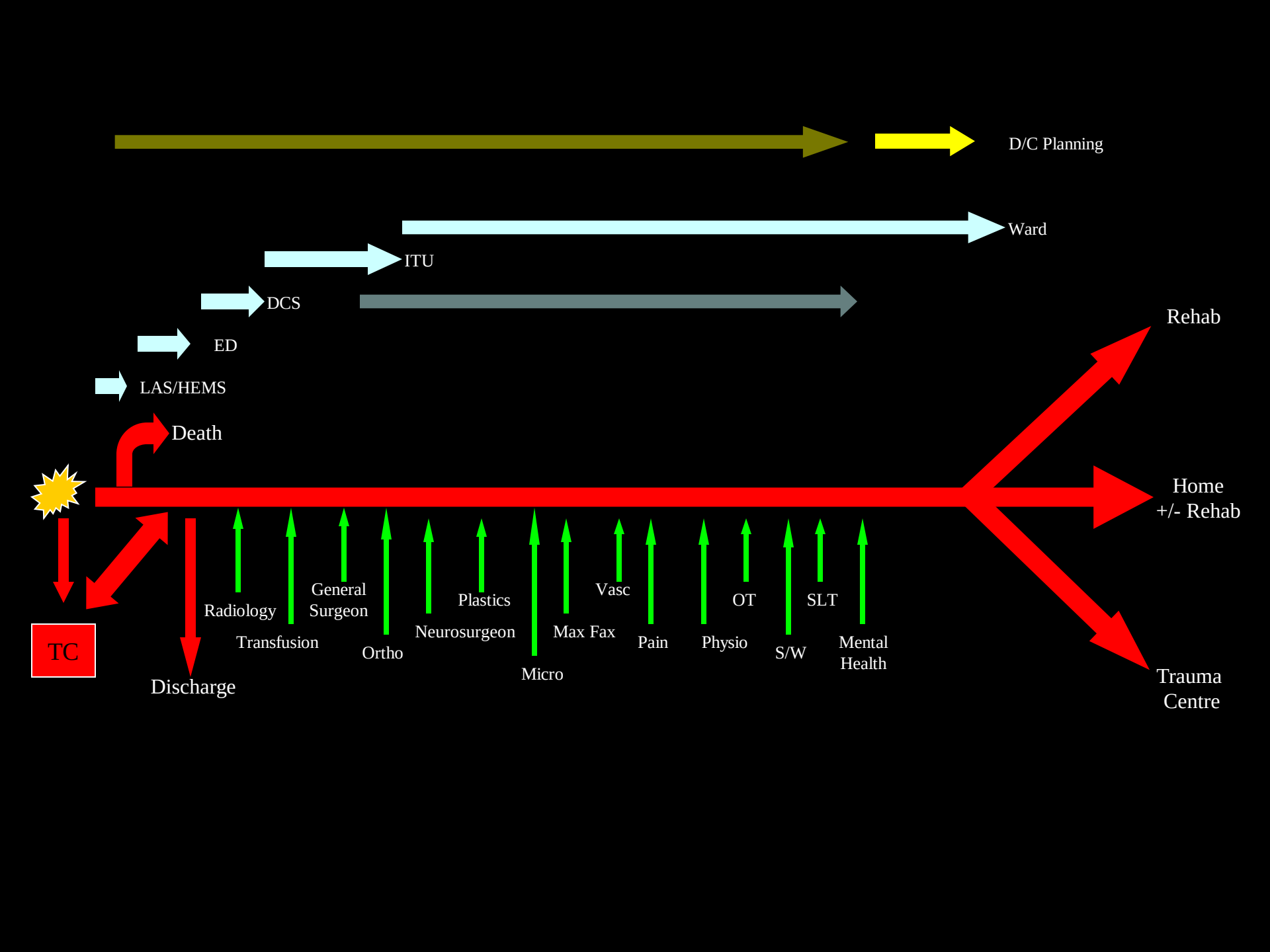
J J W Roche, R T Wenn, O Sahota, C G Moran

BMJ 2005;331:1374–6

- CVS 24%
- Resp 14%
- CVD 12%
- Renal 36%



Survival analysis based on number of preoperative comorbidities


D/C Planning
Ward
ITU
DCS
ED
LAS/HEMS
Death
Rehab
Home
+/- Rehab
Trauma
Centre
TC
Discharge
Radiology
Transfusion
General
Surgeon
Ortho
Neurosurgeon
Plastics
Micro
Max Fax
Vasc
Pain
Physio
OT
S/W
SLT
Mental
Health

What is the impact?

JOURNAL OF BONE AND MINERAL RESEARCH
Volume 21, Number 6, 2006
Published online on March 6, 2006; doi: 10.1359/JBMR.060301

Impact of Recent Fracture on Health-Related Quality of Life in Postmenopausal Women*

Susan K Brenneman,[1] Elizabeth Barrett-Connor,[2] Shiva Sajjan,[1] Leona E Markson,[1] and Ethel S Siris[3]

ABSTRACT: The effect of fractures other than hip and spine on HRQoL in younger and older women has not been extensively studied. In a cohort of 86,128 postmenopausal women, we found the impact of recent osteoporosis-related fractures on HRQoL to be similar between women <65 compared with those ≥65 years of age. The impact of spine, hip, or rib fractures was greater than that of wrist fractures in both age groups.

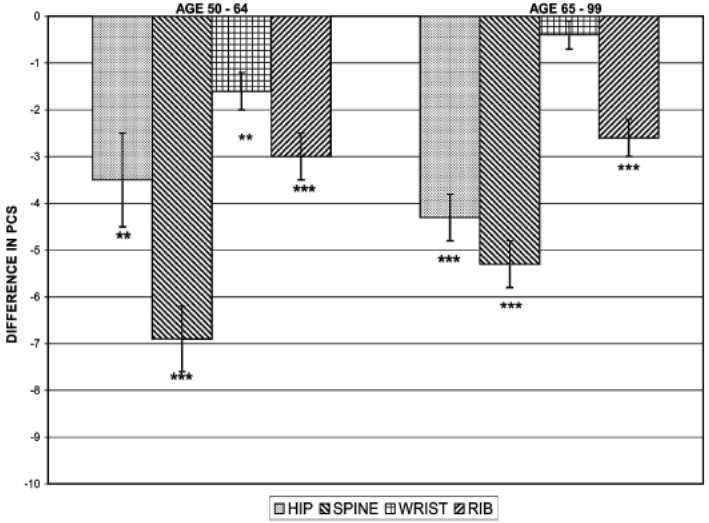


FIG. 1. Differences (SE) in adjusted follow-up mean PCS between women with fractures and women without fractures by age group and fracture site. *$p \leq 0.004$; **$p < 0.001$; ***$p < 0.0001$.

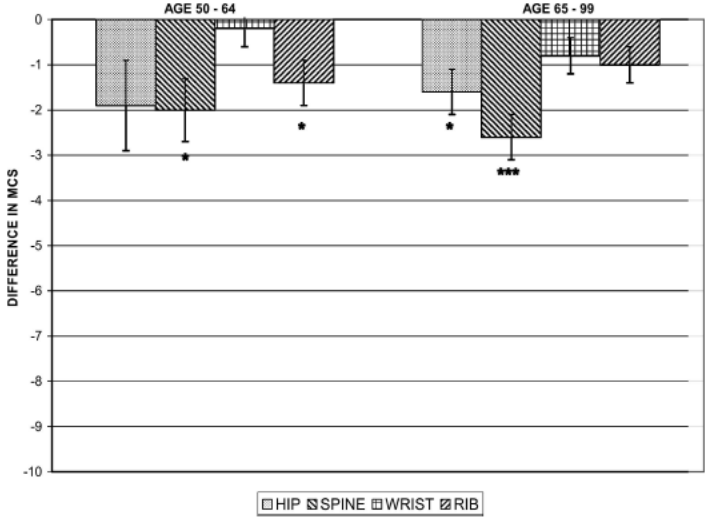


FIG. 2. Differences (SE) in adjusted follow-up mean MCS between women with fractures and women without fractures by age group and fracture site. *$p \leq 0.004$; **$p < 0.001$; ***$p < 0.0001$.

A Fate Worse Than Death? Long-Term Outcome of Trauma Patients Admitted to the Surgical Intensive Care Unit

David H. Livingston, MD, Tovah Tripp, BS, Carina Biggs, MD, and Robert F. Lavery, MS, MICP

The Journal of **TRAUMA®** *Injury, Infection, and Critical Care* • Volume 67, Number 2, August 2009

Conclusions: These data demonstrate that ICU survivors >3 years after severe injury have significant impairments including inability to return to work or regain previous levels of activity and that the goal of reintegrating patients back into the society is not being met. Further studies better defining the limitations and barriers to improved quality of life are necessary. Survival, although important, is no longer a sufficient outcome to measure trauma center success.

"I still don't have much strength - I can do a little less than half of what I used to be able to do in a day - but I have enough."

—Stephen King.[1]

Is persistent pain a problem?

ORIGINAL ARTICLE

Prevalence of Pain in Patients 1 Year After Major Trauma

Frederick P. Rivara, MD, MPH; Ellen J. MacKenzie, PhD; Gregory J. Jurkovich, MD; Avery B. Nathens, MD, PhD, MPH; Jin Wang, MS, PhD; Daniel O. Scharfstein, ScD

Objectives: To describe the prevalence of pain in a large cohort of trauma patients 1 year after injury and to examine personal, injury, and treatment factors that predict the presence of chronic pain in these patients.

Setting: Sixty-nine hospitals in 14 states in the United States.

Patients: There were 3047 patients (10 371 weighted) aged 18 to 84 years who were admitted to the hospital because of acute trauma and survived to 12 months after injury.

Main Outcome Measure: Pain 12 months after injury measured with the Chronic Pain Grade Scale.

Results: At 12 months after injury, 62.7% of patients reported injury-related pain. Most patients had pain in more than 1 body region, and the mean (SD) severity of pain in the last month was 5.5 (4.8) on a 10-point scale. The reported presence of pain varied with age and was more common in women and those who had untreated depression before injury. Pain at 3 months was predictive of both the presence and higher severity of pain at 12 months. Lower pain severity was reported by patients with a college education and those with no previous functional limitations.

Conclusions: Most trauma patients have moderately severe pain from their injuries 1 year later. Earlier and more intensive interventions to treat pain in trauma patients may be needed.

Arch Surg. 2008;143(3):282-287

Table 1.3 Risk factors for chronic postsurgical pain

Preoperative factors	Pain, moderate to severe, lasting more than 1 month
	Repeat surgery
	Psychologic vulnerability (eg catastrophising)
	Preoperative anxiety
	Female gender
	Younger age (adults)
	Workers' compensation
	Genetic predisposition
	Inefficient diffuse noxious inhibitory control (DNIC)
Intraoperative factors	Surgical approach with risk of nerve damage
Postoperative factors	Pain (acute, moderate to severe)
	Radiation therapy to area
	Neurotoxic chemotherapy
	Depression
	Psychological vulnerability
	Neuroticism
	Anxiety

Sources: Adapted from Kehlet et al (Kehlet et al, 2006) and Macrae (Macrae, 2008)

CRPS

75% of presentations follow trauma

Table 2 Incidence of type of inciting injury in patients presenting to a chronic pain clinic with CRPS (Allen *et al.*, 1999)

Type of injury	Number of patients	Percentage of patients
Sprain/strain	39	29
Postsurgical	32	24
Fractures	22	16
Contusion/crush injury	11	8
Spontaneous	8	6
Other or unknown	22	17

Is good analgesia important?

Table 1. Negative outcomes associated with inadequate analgesia

	Outcome
Thromboembolic events	++
Increased agitation	++
Pulmonary complications	++
Catabolic stress response	++
Immunosuppression	++
Needless suffering	++
Posttraumatic stress disorder	+
Chronic pain	+
Increased length of stay	+
Increased mortality	+

+, moderate correlation; ++, good correlation.

How do we do currently?

Pain Scores Improve Analgesic Administration Patterns for Trauma Patients in the Emergency Department

Paul A. Silka, MD, Mendel M. Roth, BS, Greg Moreno, BA, Lindsay Merrill, BS, Joel M. Geiderman, MD

ACAD EMERG MED • March 2004, Vol. 11, No. 3

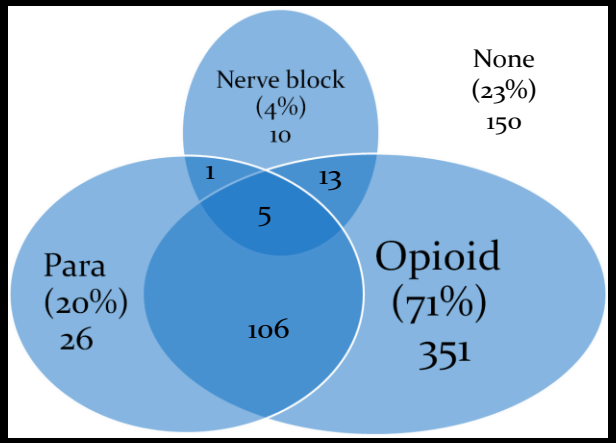
- 150 patients
- 0-10 verbal pain score
- 78% had their pain rated
- No analgesia 28% VPS 4-7
- No analgesia 18% VPS >7
- Mean time for administration 68 mins

Analgesia after admission to hospital with hip fracture – an audit of 663 patients.

R. C. P. Kennedy, S. J. Tilston, S. M. White

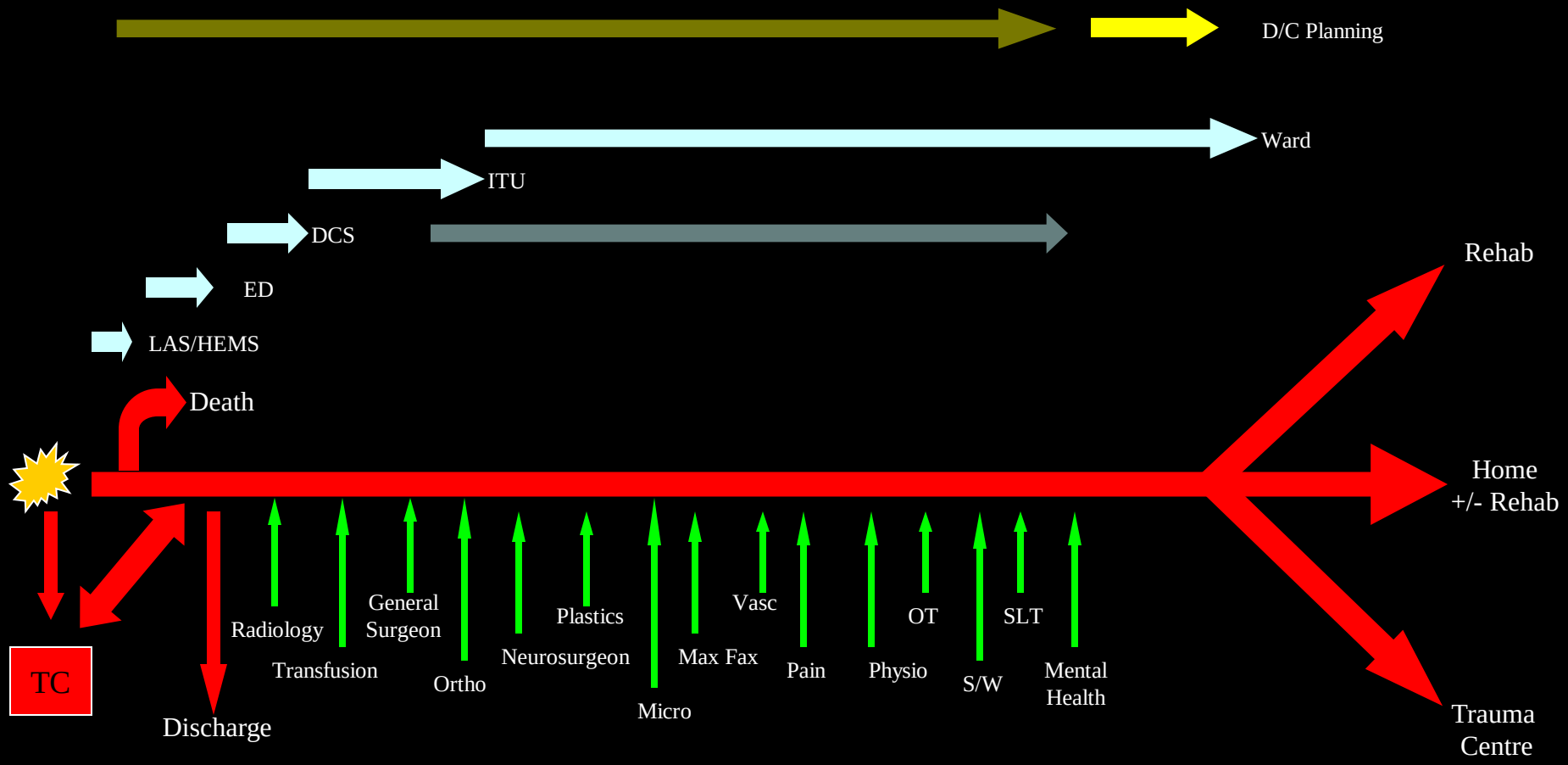
Royal Sussex County Hospital, Brighton, UK.

- ASA 3
- Pain scores in 25%
- 16% if cognitively impaired
- 35% moderate pain, 45% severe pain



Current model of care

- Poor assessment
- Long intervals
- Inadequate Rx
- Opioid based
- PRN based
- Low interventional rates
- Lack of education



Doing the right things right….at the right time

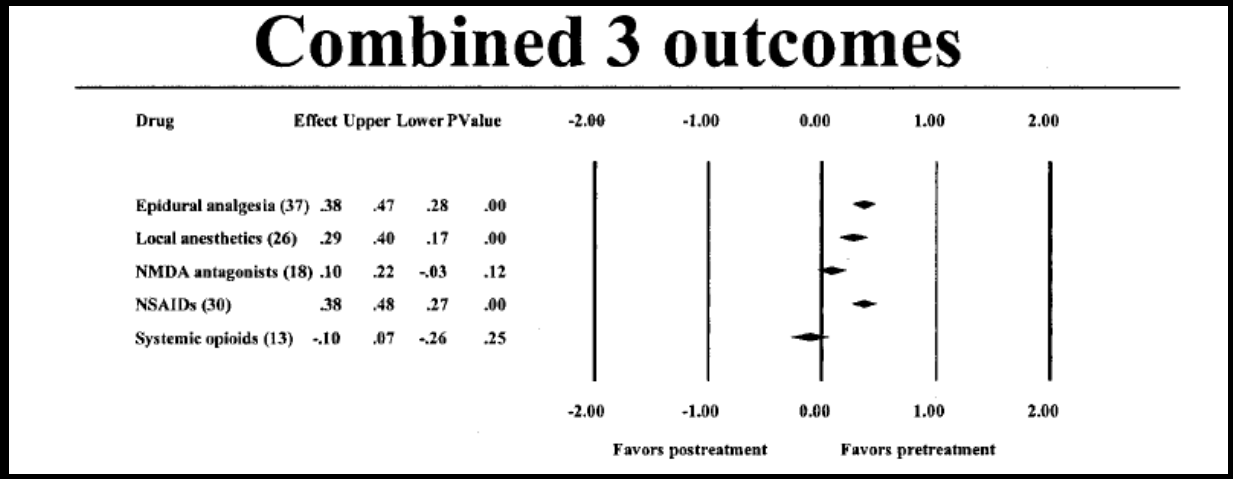
When is the right time?

The Efficacy of Preemptive Analgesia for Acute Postoperative Pain Management: A Meta-Analysis

Cliff K.-S. Ong, DDS*, Philipp Lirk, MD†, Robin A. Seymour, PhD‡, and Brian J. Jenkins, MD§

(Anesth Analg 2005;100:757–73)

- 66 RCT's
- 3261 patients
- Epidural
- LA
- Opioids
- NSAIDS
- NMDA
- Pain score/rescue/time to rescue



Preventive

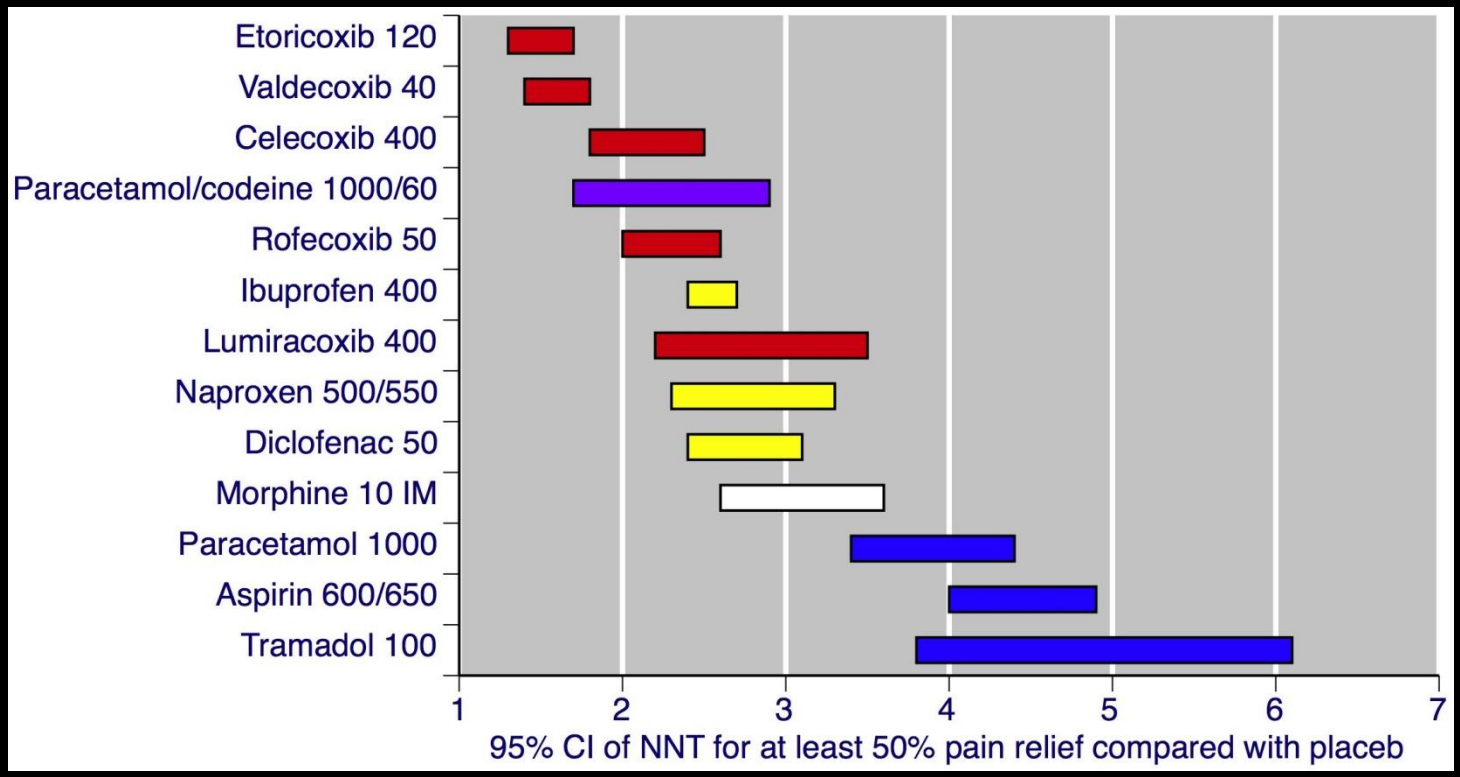
Table 1.5 Summary of studies according to target agent administered

		Pre-emptive effects		Preventive effects			
Agent(s)	**No. of studies**	**Positive**	**Negative**	**Positive**	**Negative**	**Opposite effects**	**Total no. effects**
Gabapentin	6	0 (0)	1 (16.7)	4 (66.6)	1 (16.7)	0 (0)	**6 (100)**
Local anaesthetics	13	3 (20)	3 (20)	6 (40)	1 (6.7)	2 (13.3)	15 (100)
Opioids	5	3 (60)	1 (20)	0 (0)	1 (20)	0 (0)	**5 (100)**
	[-1]	[-1]					**[-1]**
NSAIDs	14	7 (43.8)	3 (18.8)	4 (25)	2 (12.4)	0 (0)	**16 (100)**
	[-2]	[-1]		[-1]			**[-2]**
NMDA antagonists	14	2 (11.8)	1 (5.9)	9 (53)	4 (23.4)	1 (5.9)	**17 (100)**
Multimodal	5	1 (16.7)	1 (16.7)	2 (33.3)	2 (33.3)	0 (0)	**6 (100)**
Other	4	1 (25)	0 (0)	3 (75)	0 (0)	0 (0)	**4 (100)**
	[-1]			[-1]			**[-1]**
Total[a]	**61**	**17[b]**	**10**	**28[c]**	**11**	**3**	**69**
		(24.6)	**(14.5)**	**(40.6)**	**(15.9)**	**(4.4)**	**(100)**

Source: Reproduced with kind permission from Katz and Clark, Preventive analgesia and beyond: current status, evidence, and future directions, Table 9.4 p 165 *Clinical Pain Management: Acute Pain 2e*, Hodder Arnold.

What are the right things?

Simple analgesics



Opioids

- Efficacy of PCA (8%)
- Good nurse administed analgesia as good (Evans, Level 2)
- Real world (Cashman, Dolin)
- Methadone (NMDA,5HT,NA)
- Tapentadol (NA)

Gabanoids

- CPSP
- Clarke et al 2012
- Systematic review and meta analysis
- 11 studies
- 4/8 gabapentin and 2/3 pregabalin studies reduced pain 2/12 post op
- Pregabalin > Gabapentin (level 1)

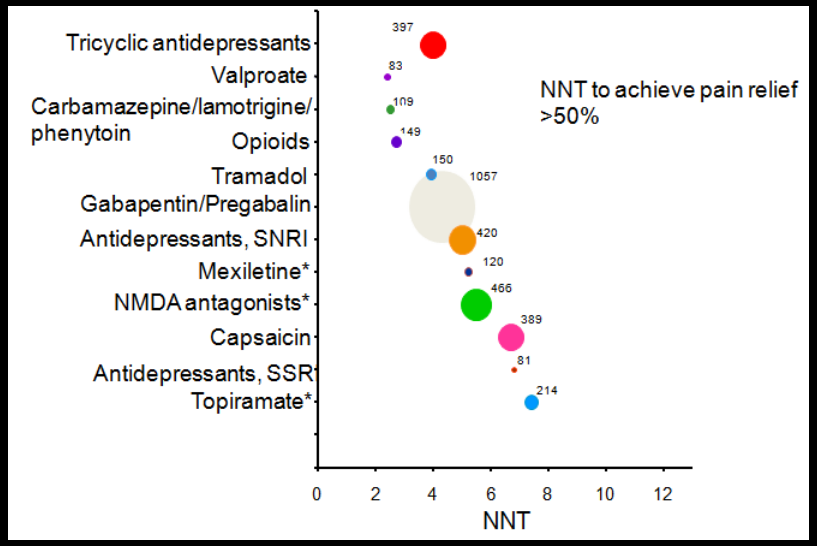
Antidepressants

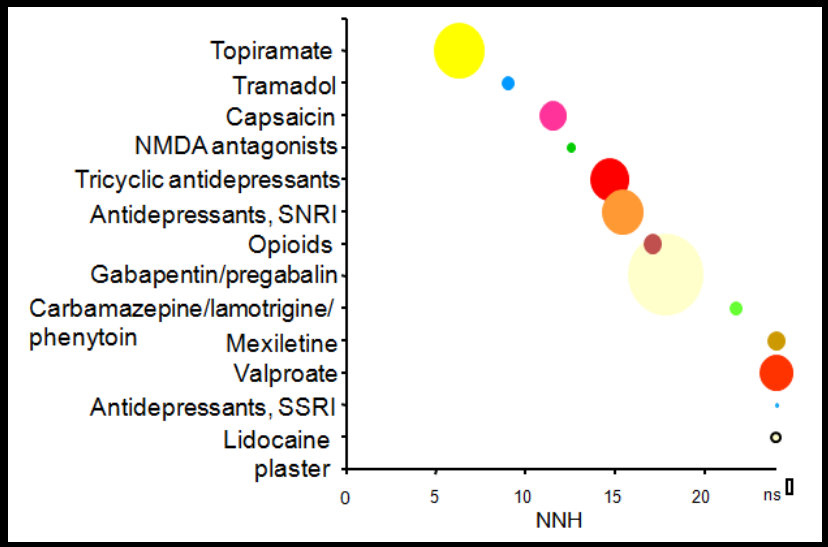
Efficacy	NNT (95% CI)
Overall	
TCAs	3.6 (3.0–4.5)
SSRIs	limited evidence of benefit
Duloxetine	5.8 (4.5–8.4)
Diabetic neuropathy	1.3 (1.2–1.5)
Postherpetic neuralgia	2.7 (2.0–4.1)
HIV-related neuropathies	no evidence of benefit
Minor adverse effects	NNH (95% CI)
Pooled diagnoses	
Amitriptyline	6.0 (4.2–10.7)
SSRIs	no dichotomous data available
Major adverse effects (withdrawal from study)	NNH (95% CI)
Pooled diagnoses	
Amitriptyline	28.0 (17.6–68.9)
Duloxetine	15 (11–25)
SSRIs	not different from placebo

Note: CI: confidence interval; TCA: tricyclic antidepressants; SSRI: selective serotonin re-uptake inhibitors.

Source: Adapted from Collins, Moore, McQuay & Wiffen (2000), Saarto & Wiffen (2007), Sultan et al 2008[8]

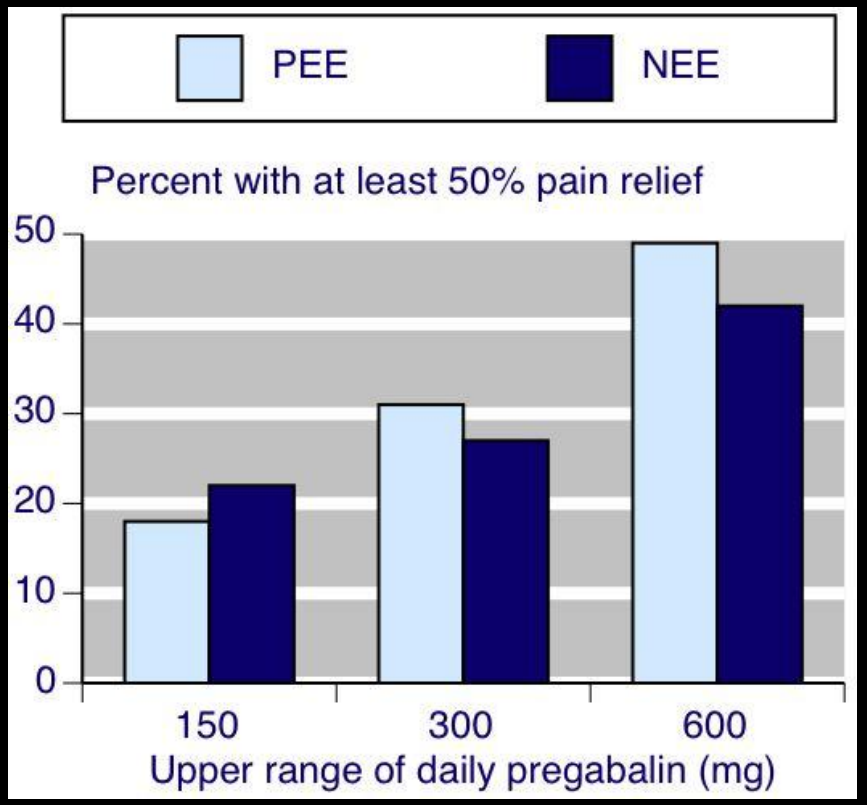
NNT/NNH


Tricyclic antidepressants
Valproate
Carbamazepine/lamotrigine/ phenytoin
Opioids
Tramadol
Gabapentin/Pregabalin
Antidepressants, SNRI
Mexiletine*
NMDA antagonists*
Capsaicin
Antidepressants, SSRI
Topiramate*
397
83
109
149
150
1057
420
120
466
389
81
214
NNT to achieve pain relief >50%
0
2
4
6
8
10
12
NNT


Topiramate
Tramadol
Capsaicin
NMDA antagonists
Tricyclic antidepressants
Antidepressants, SNRI
Opioids
Gabapentin/pregabalin
Carbamazepine/lamotrigine/ phenytoin
Mexiletine
Valproate
Antidepressants, SSRI
Lidocaine plaster
0
5
10
15
20
ns
NNH

Dosage

- Straube et al
- 2008
- Pregabalin
- Neuropathic pain
- 150mg NNT 14
- 300mg NNT 6.1
- 600mg NNT 3.8

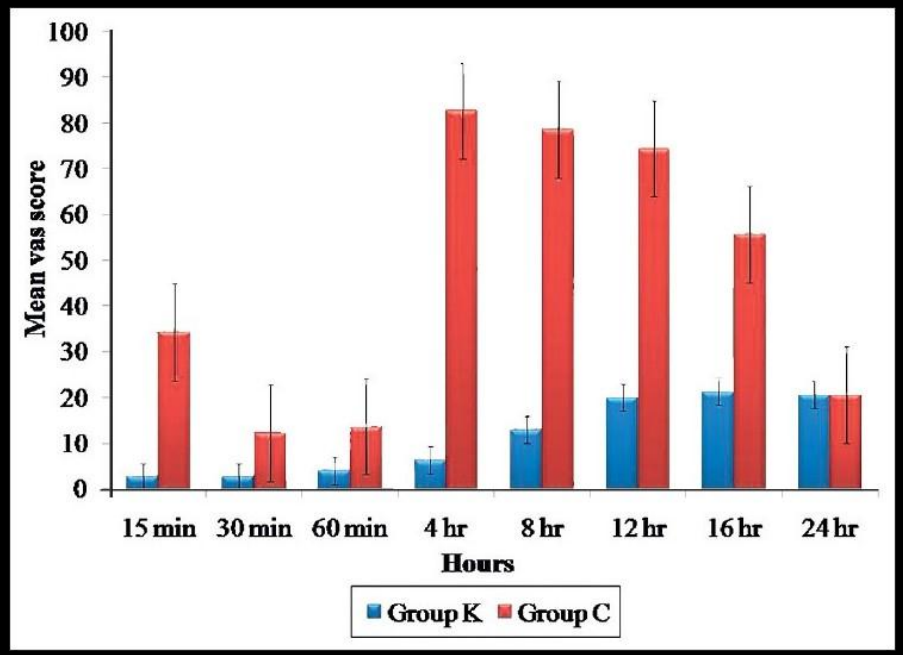


Alpha 2 agonists

- Clonidine, Dexmedetomidine
- Intra op clonidine, decreased pain but not opioid requirements (level 2)
- No benefit if added to PCA after 12 hrs (level 2)
- 50% reduction in opioids in ITU patients (level 2)
- Reduction in MI (14 vs 31%)
  and 2 yr mortality(15 vs 29%)
- Anxiolytic / sedative
- Limited by side effects

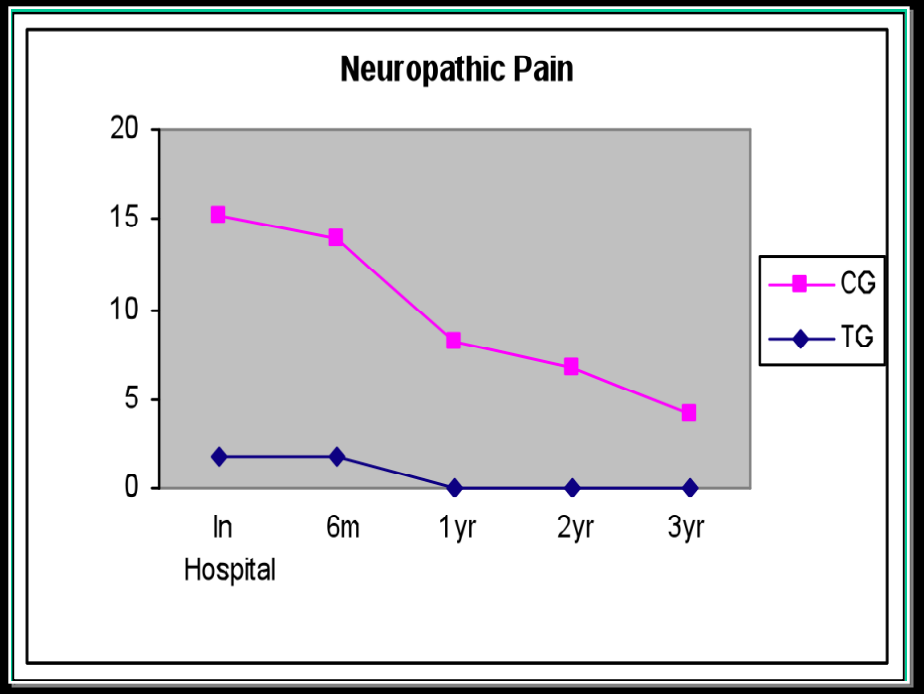
Ketamine

- Preventative analgesia (Level 1)
- Opioid sparing with PCA (level 1)
- Reduces PONV (level 1)
- Antihyperalgesic
- Safe (level 1)



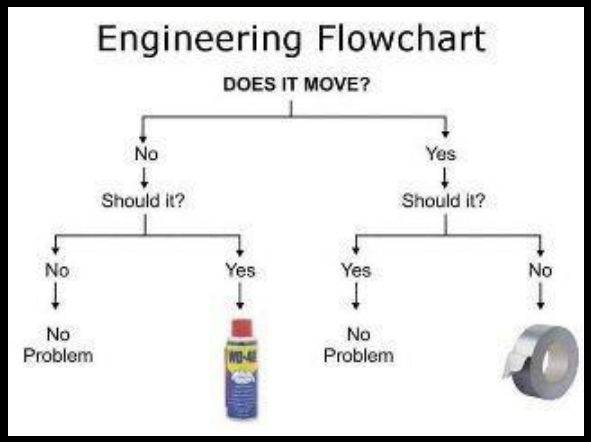
Ketamine PCA

	Morphine/Ketamine (N=59)	Control (N=73)
Morphine dose (mg) per 24 hr; Median (Interquartile Range)	57 (35-77)	48 (34-62)
Pain problem score*	3%	4%
Side effects		
Raised BP	3%	0
Hallucinations	7%	5%
Pruritus	3%	8%
Overall Pain Experience		
Better than expected	46%	64%
Worse than expected	8%	5%



Surgery

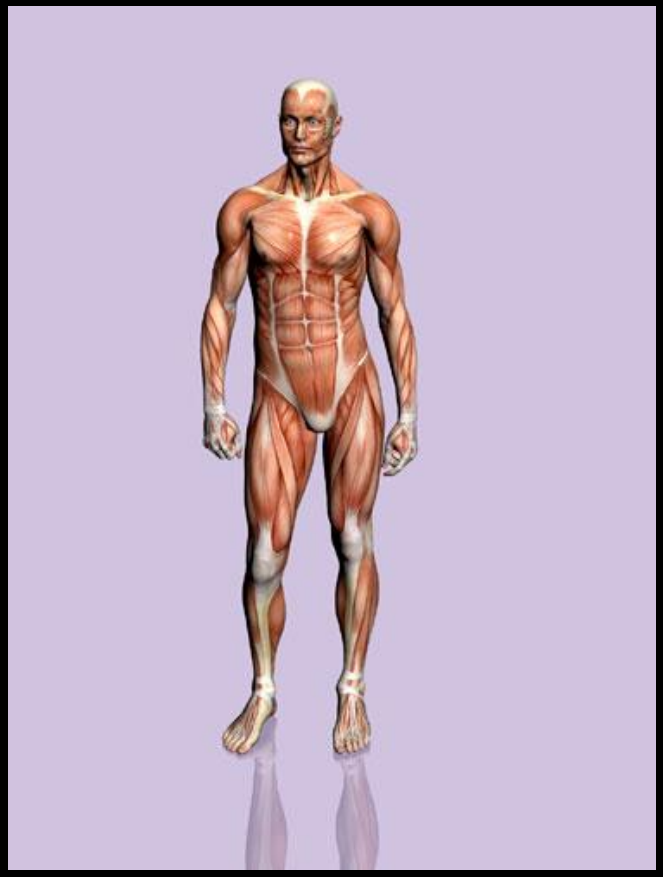
- Debridement
- Fixation
- DCS vs definitive
- Often the best analgesic



Review Article

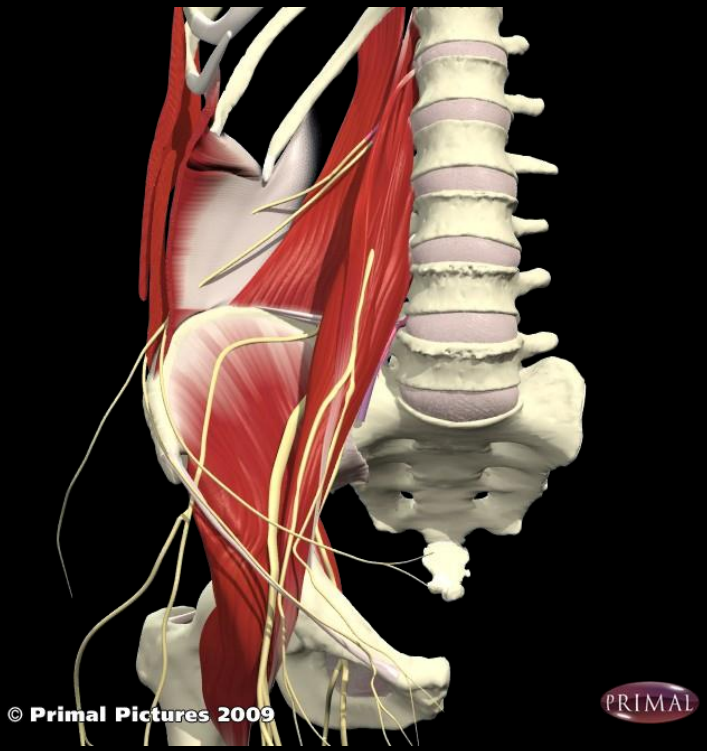
Regional Anesthesia in Trauma Medicine

- Grabinsky 2011
- Often considered too late
- Neuraxial vs Extremity blocks
- Skill/experience
- Landmark based
- Safe
- Effective
- Compartment syndrome (Mar)



Regional blocks

- Suprascapular/Axillary
- Paravertebral (level 1)
- TAP
- Femoral/Sciatic (level 1)
- Continuous infusion (level 1)
- Adjuncts



Pilot study

- St George's
- Landmark
- 137 patients
- 75% had pain reduction >30%
- Easy to learn
- Cheap

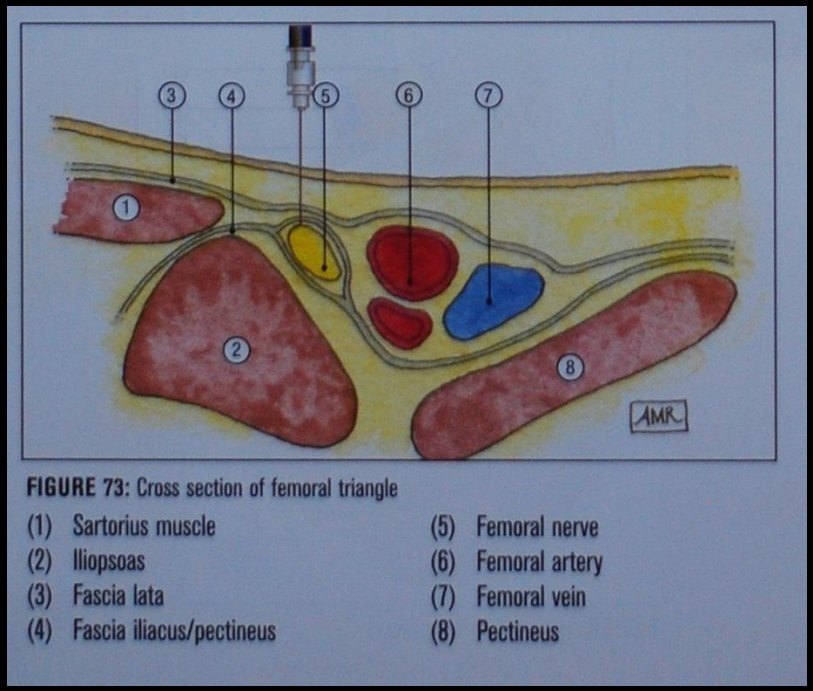


FIGURE 73: Cross section of femoral triangle

(1) Sartorius muscle
(2) Iliopsoas
(3) Fascia lata
(4) Fascia iliacus/pectineus
(5) Femoral nerve
(6) Femoral artery
(7) Femoral vein
(8) Pectineus

Virtual reality experiment finds video game works better on wounded soldiers' pain than anaesthetic

- **SnowWorld uses a distraction method to keep a patient's mind off painful therapy**

By DAILY MAIL REPORTER

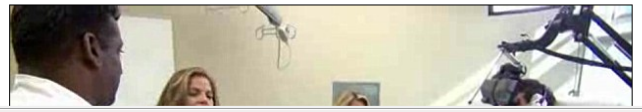
PUBLISHED: 02:11, 25 October 2012 | **UPDATED:** 08:12, 25 October 2012

A wounded soldier who was horribly burned while serving in Afghanistan is moving forward from what was once intense pain - all with the help of this unconventional treatment.

Lt Sam Brown suffered burns over 30 per cent of his body when the Humvee he was riding in was blown up by an IED in 2008.

He survived, but was burned so badly in the explosion that he was kept in a medically-induced coma for weeks.

Scroll down for video



FEMAIL TODAY

- The charmer has left the building! Gary Barlow leaves Tulisa stunned as he accuses her of having 'fag ash breath' on X Factor
  The gloves are off!

- Tulisa spotted on THIRD date with new

Non Pharmacological

- Distraction (level1)

  Systematic review 2012

- Relaxation unlikely to help (level 4)

- Music helps a little (level1)

- CBT no role in acute phase

Systems of care

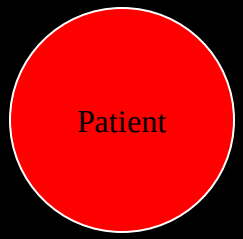
Bringing it all together

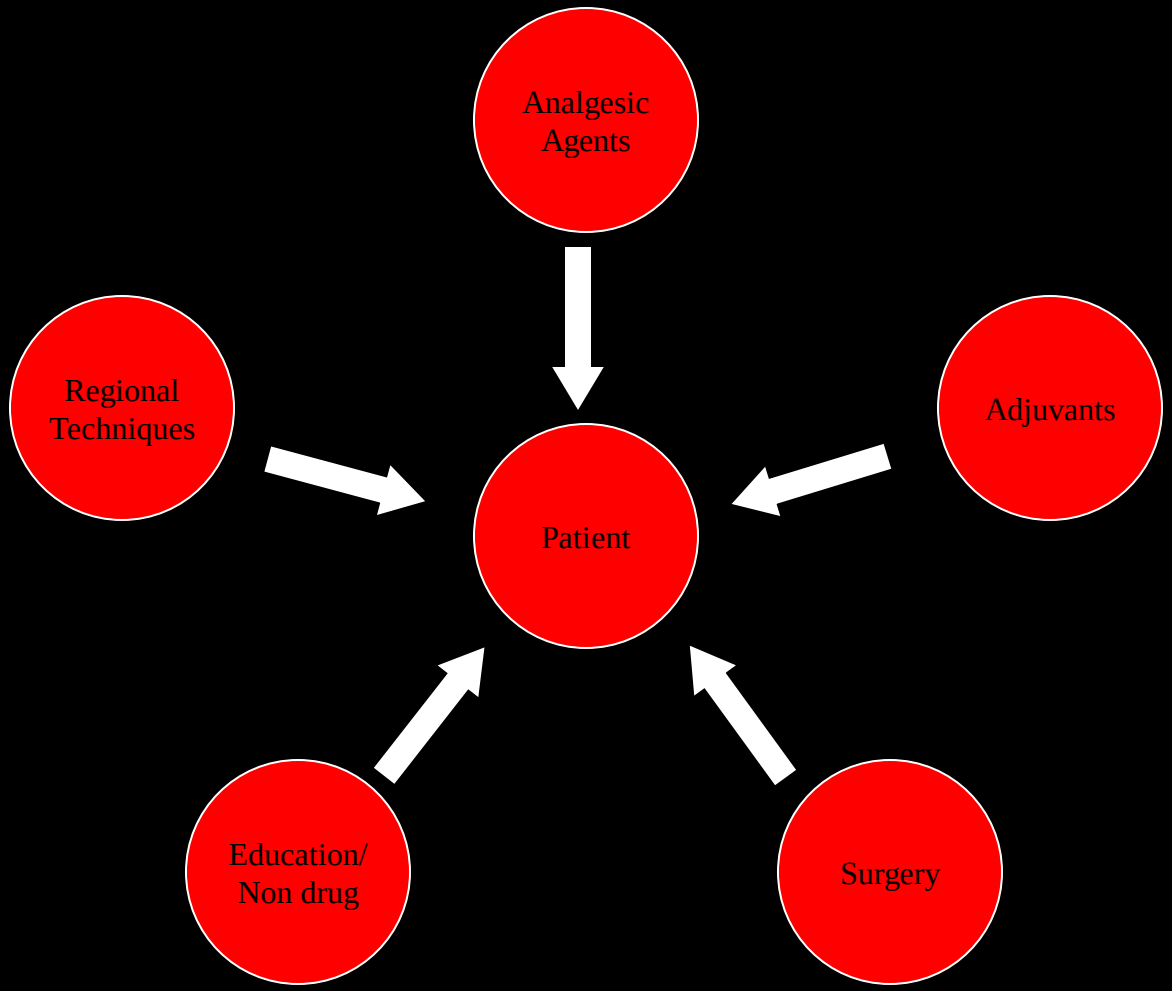
The evolution of pain management in the critically ill trauma patient: Emerging concepts from the global war on terrorism

Randall J. Malchow, MD; Ian H. Black, MD

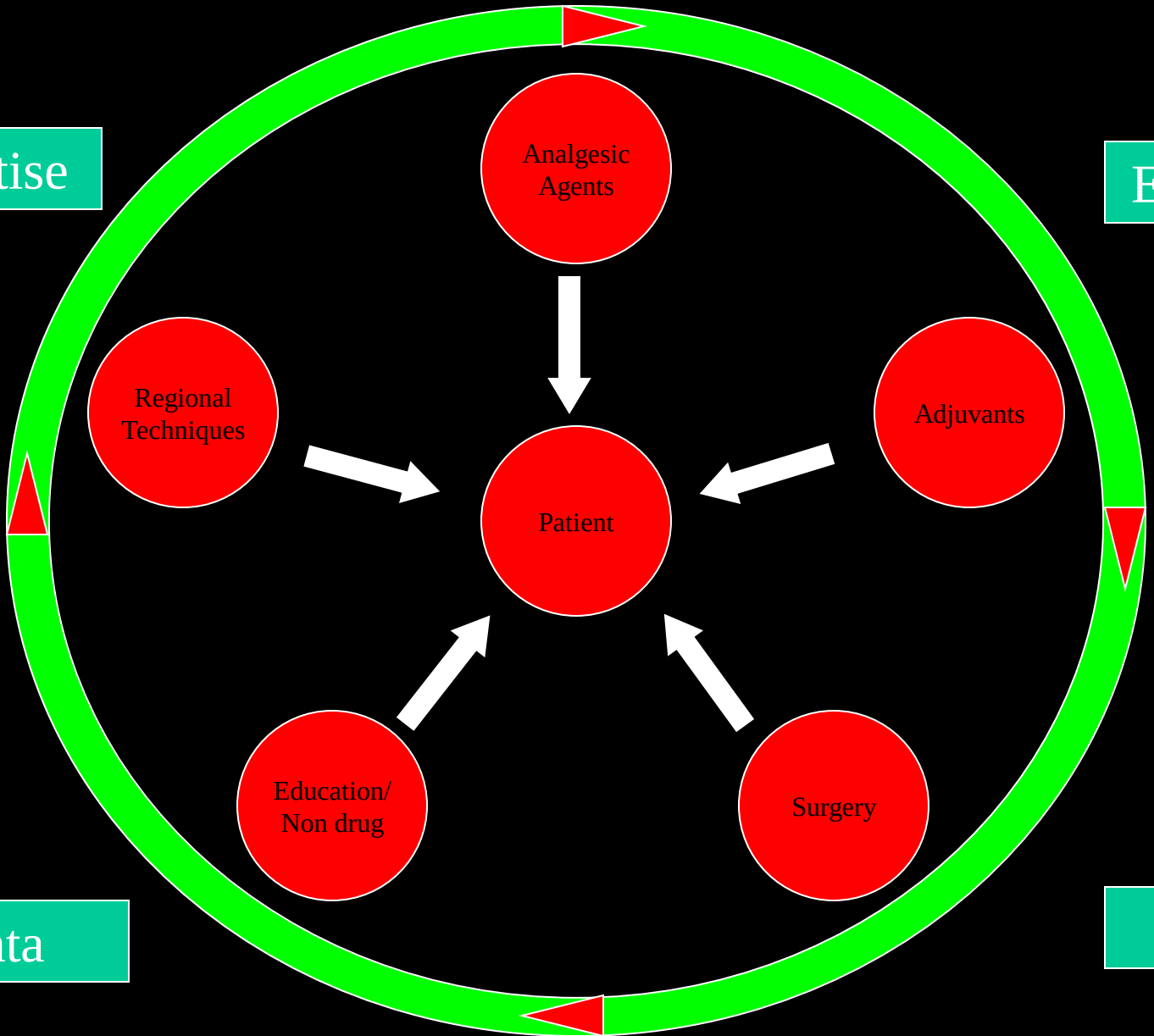
Crit Care Med 2008 Vol. 36, No. 7

- Early aggressive intervention
- Reduced rates of acute and chronic pain
- Mutimodal
- Peripheral and central sites of action
- Judicious opioids
- Greater use of regional anaesthesia
- Applicable to civilian trauma


Patient


Analgesic Agents
Regional Techniques
Adjuvants
Patient
Education/ Non drug
Surgery

Do the right things right….at the right time



Expertise

Education

Data

Culture