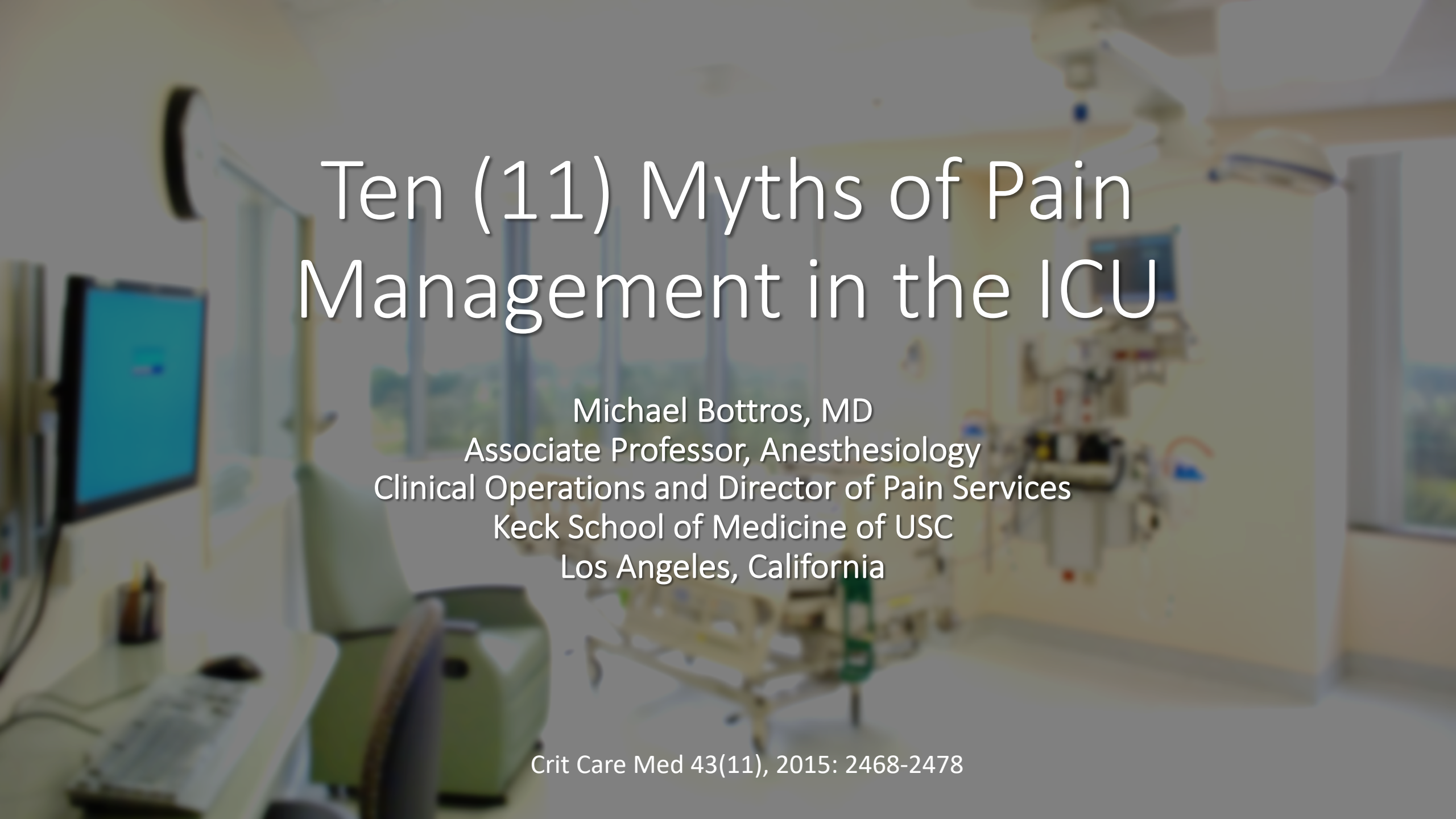


Ten (11) Myths of Pain Management in the ICU

Michael Bottros, MD
Associate Professor, Anesthesiology
Clinical Operations and Director of Pain Services
Keck School of Medicine of USC
Los Angeles, California

Crit Care Med 43(11), 2015: 2468-2478

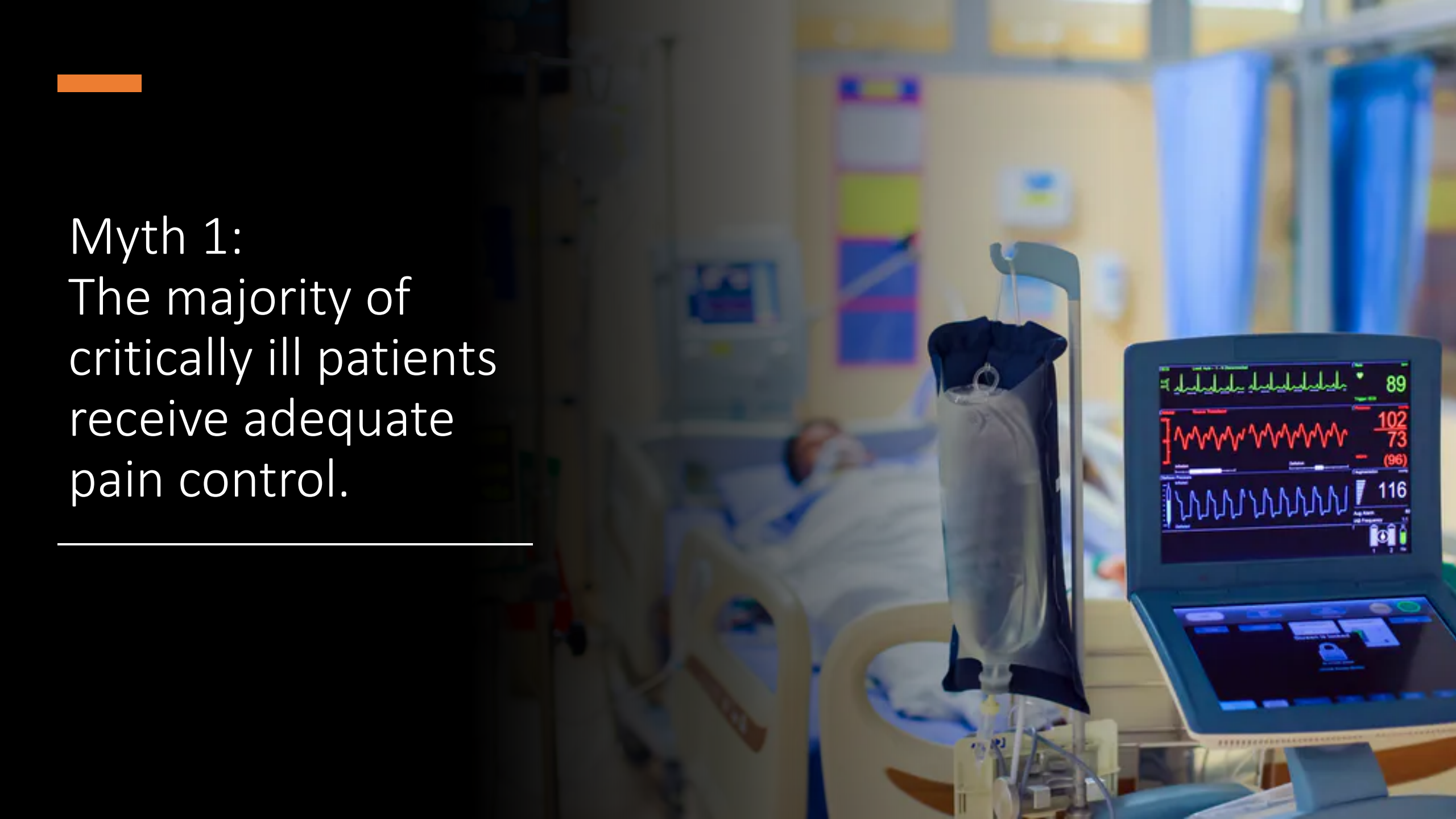
Disclosure

Dr. Bottros has no relevant financial interests to disclose.

Learning Objectives

- Explain the consequences of inadequately treated pain in the ICU.
- Describe the tools used to assess patients' pain in the ICU.
- Describe alternative pain management modalities for ICU patients.

Myth 1:
The majority of critically ill patients receive adequate pain control.



Myth 1:
The Majority of Critically Ill Patients Receive Adequate Pain Control

- ~50% of pts interviewed after their ICU stay rated their pain intensity as **moderate to severe**, both at rest and during commonly performed procedures.
  [Am J Crit Care. 2001;10:252–259]

- Although underlying illness, extensive surgery, invasive procedures, incisions, penetrating tubes, and catheters are recognized sources of pain, pain associated with routine ICU care, such as tracheal suctioning, turning and mobilization, and dressing changes, are often **underappreciated** by caregivers.
  [Ann Fr Anesth Reanim. 2010;29:884–888.]

Myth 1:
The Majority of Critically Ill Patients Receive Adequate Pain Control

What are some provider barriers?

Crit Care Med 43(11), 2015: 2468-2478

Provider

- Knowledge deficits regarding the pathophysiologic effects of pain and pain management principles
- Assignment of a low priority to pain management
- Failure to assess and acknowledge the existence of pain
- Failure to evaluate the effect of treatment
- Failure to adjust management in a timely fashion
- Inappropriate attitudes regarding the use of opioids
- Lack of knowledge of the types and appropriate dosages of analgesics
- Overconcern about the development of tolerance to analgesic medications
- Subconscious reactions to "drug-seeking" behavior
- Personal and cultural biases
- Communication difficulties between the patient and the healthcare team

Myth 1:
The Majority of Critically Ill Patients Receive Adequate Pain Control

Healthcare systems barriers?

Crit Care Med 43(11), 2015: 2468-2478

Healthcare system
Inadequate quality improvement process for pain management
Lack of accountability for unsatisfactory outcomes related to poorly managed pain
Logistical hurdles to timely analgesic administration (e.g., increased nursing burdens)
Underemphasized use of multidisciplinary approaches for pain management

Myth 1:
The Majority of Critically Ill Patients Receive Adequate Pain Control

Patient barriers?

Crit Care Med 43(11), 2015: 2468-2478

Patient

- Inability to report pain
- Feelings that pain should be tolerated or is an inevitable part of the disease process
- Fear of the consequences of reporting pain
- Fear of side effects related to analgesic drugs

Myth 2:
Pain does not affect long and short term outcomes.

Myth 2: Pain does not affect long and short term outcomes

- Pain activates the autonomic nervous system, elevating circulating catecholamines and stress hormones that cause vasoconstriction, impair tissue perfusion, and reduce tissue oxygen partial pressure.

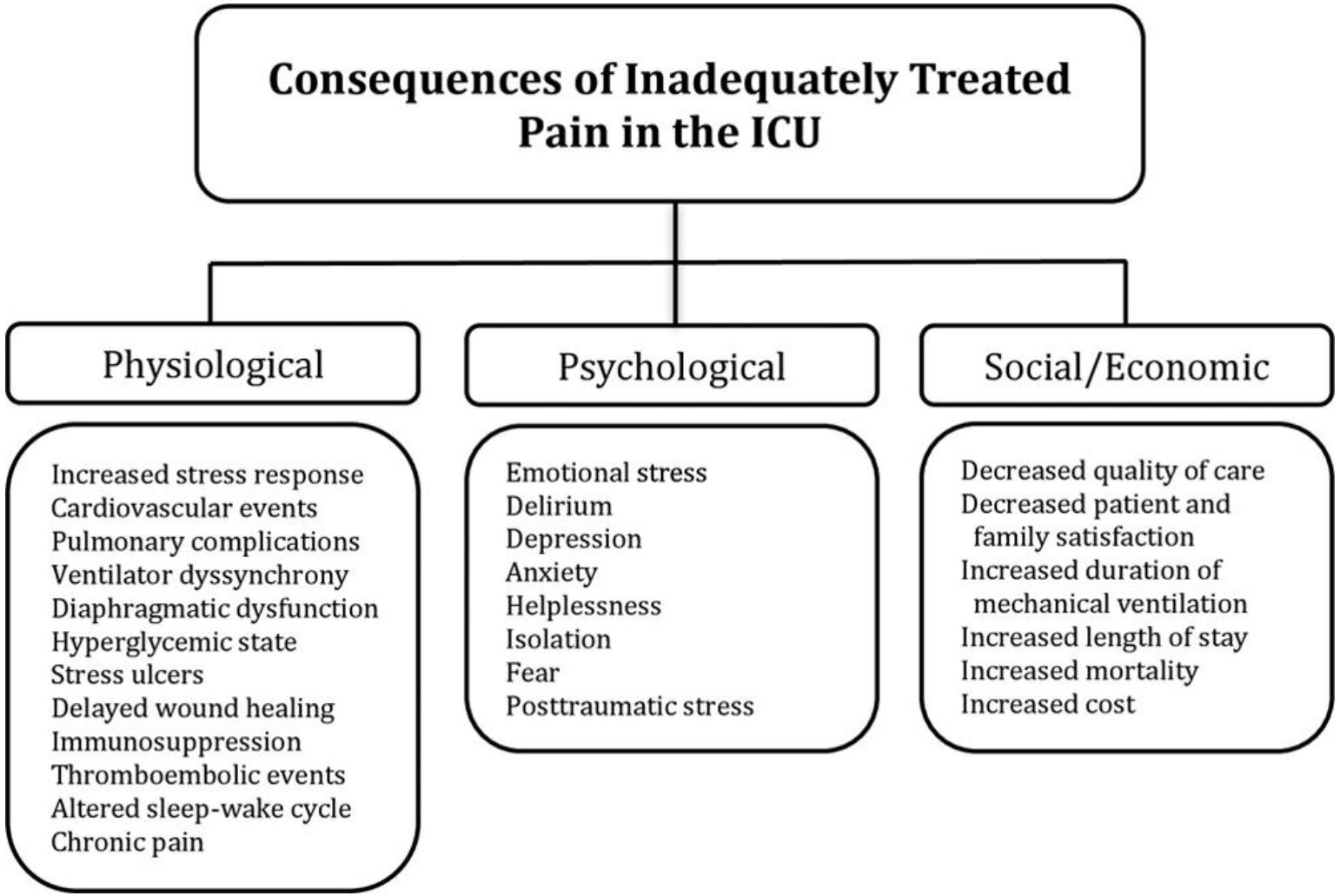
Am J Hosp Pharm. 1994;51:1539–1554

Myth 2: Pain does not affect long and short term outcomes

- This results in:
  - tachypnea
  - increased myocardial oxygen demand
  - activation of the renin-angiotensin-aldosterone axis
  - increased cytokine production
  - altered glycemic control
  - enhanced catabolic state
  - hypercoagulability
  - immune system dysfunction

Am J Hosp Pharm. 1994;51:1539–1554

Myth 2: Pain does not affect long and short term outcomes



Thoracic surgery: T4-8

Upper abdominal
(Whipple, gastrectomy, hepatic):
T6-7

Mid-abdominal (GU): T7-10

Lower abdominal
(TAH, AP, colectomy): T9-10

Catheter-Incision Congruence

Reference	Epidural location	Surgical procedure	Study design	*N*	Epidural analgesia	Systemic analgesia	Earlier return of gastro-intestinal function	Length of stay
Scheinin et al (1987)	'Middle of planned incision'	Colectomy	RCT	60	Bupivacaine 0.25% or morphine (48 hours)	Oxycodone i.m.	Epidural	NA
Ahn et al (1988)	L2–L3	Rectal–sigmoid colectomy	RCT	30	Bupivacaine 0.25% (48 hours)	Pentazocine i.v.	Epidural	NA
Wattwil et al (1989)	T12–L1	Abdominal hysterectomy	RCT	40	Bupivacaine 0.25% (~24 hours)	Ketobemidon i.m.	Epidural	8 days versus 7 days
Seeling et al (1990)	T7–T11	Major abdominal	RCT	214	Bupivacaine 0.25% with fentanyl (~76 hours)	Piritramide i.v.–i.m.	Epidural	NA
Bredtmann et al (1990)	T8–T10	Colectomy	RCT	116	Bupivacaine 0.25% (72 hours)	Piritramide–tramadol i.m.	Epidural	20 days versus 19 days
Jayr et al (1993)	T7–T11	Major abdominal	RCT	153	Bupivacaine 0.125% with morphine (4 days)	Morphine s.c.	Epidural	Similar
Liu et al (1995a)	T8–T10	Colectomy	RCT	54	Bupivacaine (0.1–0.15%), MS, or both (60–100 hours)	Morphine i.v. PCA	Epidural	4 days versus 5 days
Scott et al (1996)	T6–T10	Colectomy	COS	128	Bupivacaine 0.10% with MS or morphine only	Morphine i.v. PCA	Epidural	9 days versus 9 days
de Leon-Casasola et al (1996)	T10–T12	Abdominal hysterectomy	COS	68	Bupivacaine 0.05% with morphine (~4 days)	Morphine i.v. PCA	Epidural	10 days versus 14 days

RCT, randomized controlled trial; COS, controlled observational study; MS, morphine sulphate.

Balliere's Clin Anaesthesiol 1999;13:9-22

Catheter-Incision Incongruence

Reference	Epidural location	Surgical procedure	Study design	N	Epidural analgesia	Systemic analgesia	Earlier return of gastro-intestinal function	Length of stay
Hjortso et al (1985)	L1–L2	Major (upper) abdominal	RCT	94	Bupivacaine 0.50% with morphine	Morphine i.m.	Similar	NA
Wallin et al (1986)	T12–L1	Cholycystectomy	RCT	30	Bupivacaine 0.25% (24 hours), followed by pentazocine i.m.	Pentazocine i.m.	Similar	NA
Kilbride et al (1992)	L3–L4	Colorectal	RCT	64	Bupivacaine 0.5% intraoperatively; MS post-operatively	Morphine i.m. or i.v. PCA	Similar	Similar
Morimoto et al (1995)	Not specified	Colectomy	COS	85	Fentanyl (1 µg/kg per hour) (3 days) + MS i.v.	Morphine i.v. (mostly PCA)	Epidural	NA
Lehman and Wiseman (1995)	Not specified	Colectomy	COS	102	Bupivacaine narcotic (4–5 days)	Opioids i.m., i.v. or i.v. PCA	Similar	Similar (9 days)
Kanazi et al (1996)	Not specified	Colectomy	COS	50	'Local anaesthetics' (24 hours), followed by opioids	Morphine i.v. (mostly PCA)	Similar	Similar
Scott et al (1996)	L2–L4	Colorectal	COS	126	Bupivacaine 0.10% with MS or morphine only	Morphine i.v. via PCA	Similar	Similar (9 days)

RCT, randomized controlled trial; COS, controlled observational study; MS = morphine sulphate.

Balliere's Clin Anaesthesiol 1999;13:9-22

Myth 2:
Pain does not affect long and short term outcomes

- Persistent pain inhibits effective coughing and deep breathing, predisposing patients to respiratory complications, such as atelectasis, pneumonia, hypoxemia, and hypercarbia.

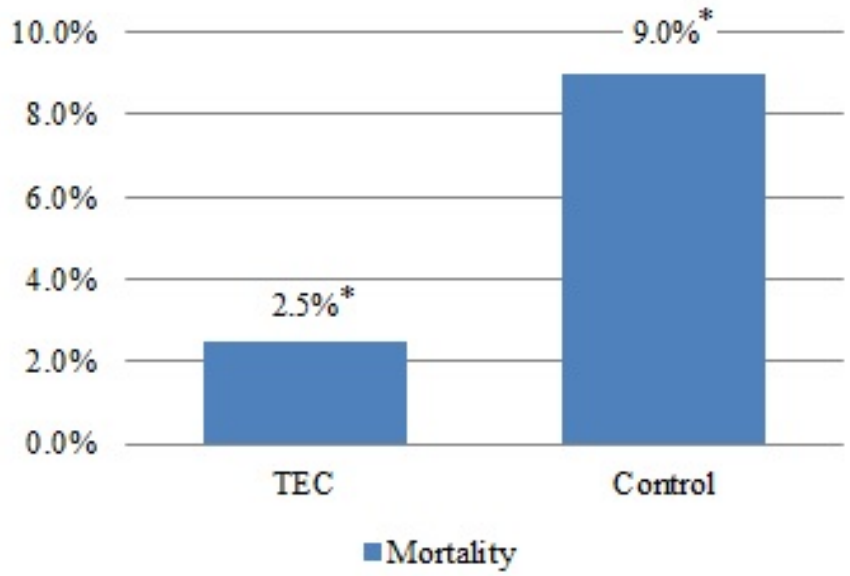
Epidurals in Trauma

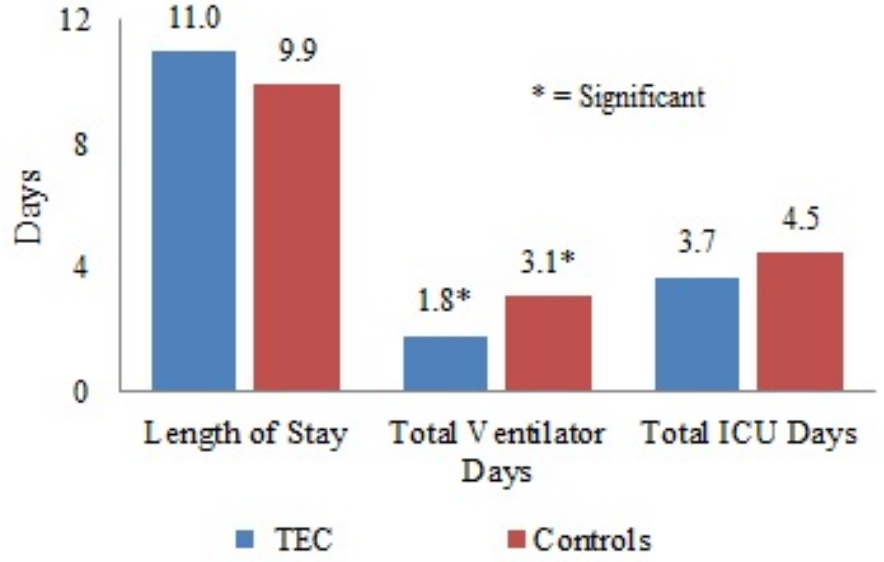
	TEC	Controls	P
N	158	301	N/A
Age (yrs)	53.4	52.2	0.44
Sex (Male/Female)	69%/31%	68%/32%	0.85
Mortality (%)	4 (2.5%)	27 (8.9%)	**0.009**
PE	4 (2.5%)	7 (2.3%)	0.89
DVT	5 (3.2%)	25 (8.3%)	**0.034**
ISS	18 (4-75)	18 (1-75)	**0.016**
Rib Fracture Count	6 (1-19)	6 (1-15)	0.054

Hsu S, et al. *Forthcoming*

Epidurals in Trauma

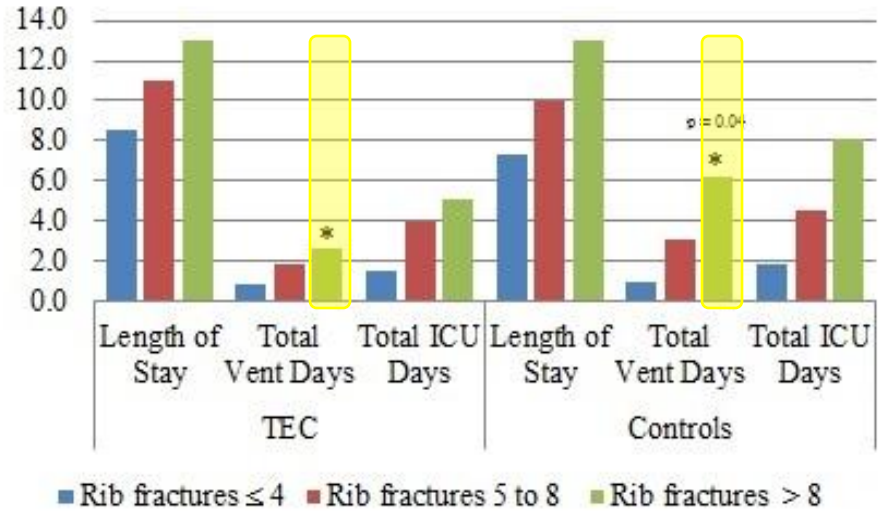
Thoracic Epidural Patients vs. Matched Controls:

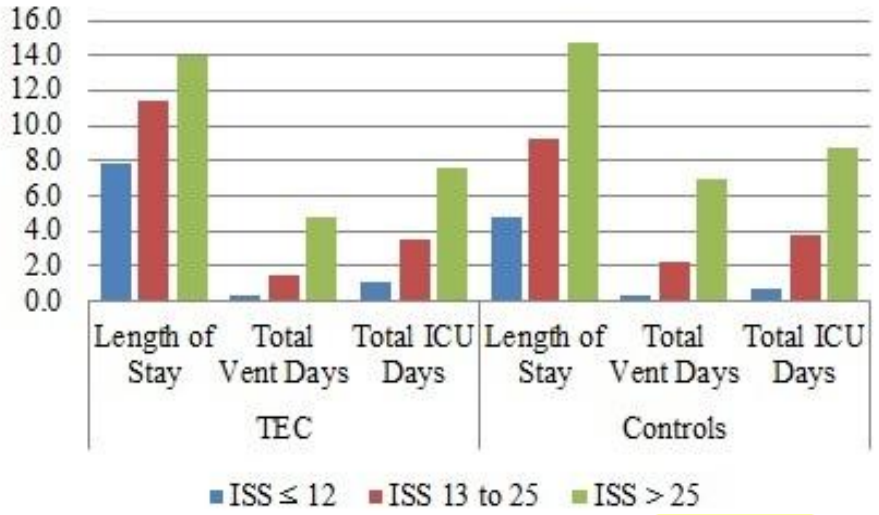


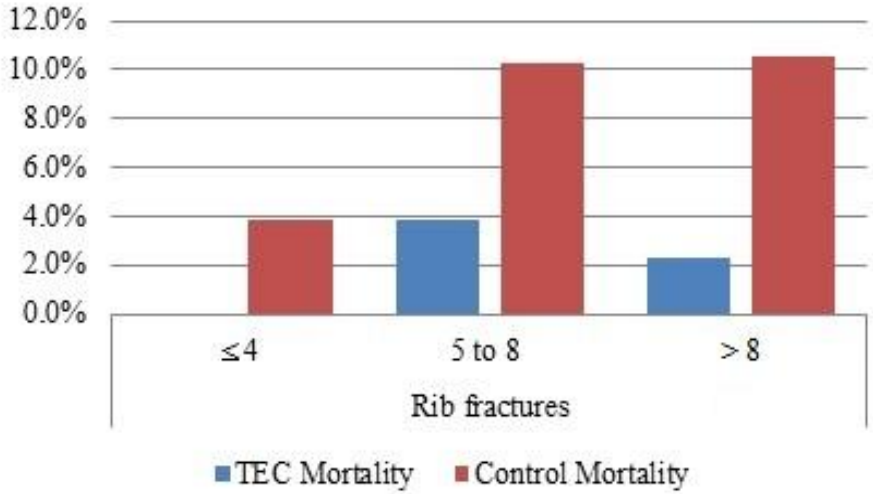


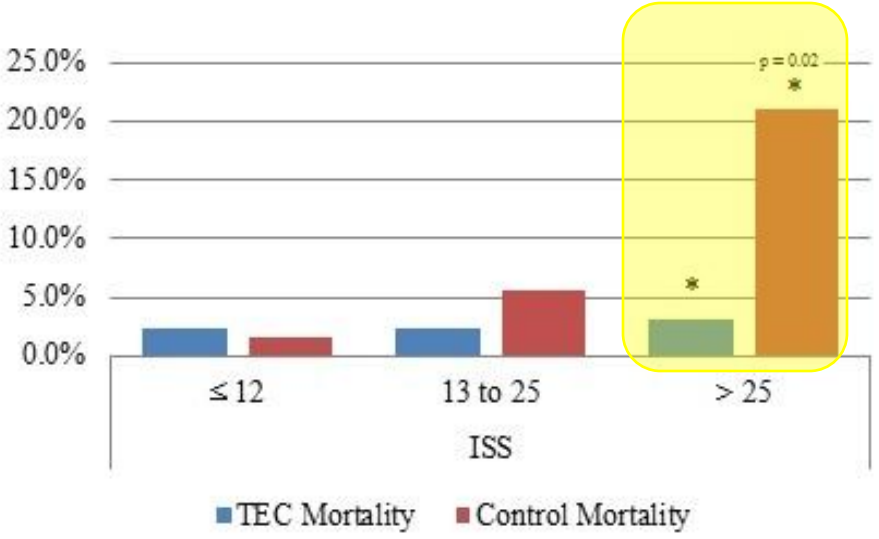
Hsu S, et al. *Forthcoming*

Epidurals in Trauma









Hsu S, et al. *Forthcoming*

Myth 3:
Accurate pain assessment cannot be performed in critically ill patients because pain is subjective.

Myth 3:
Accurate pain assessment cannot be performed in critically ill patients because pain is subjective

- Pain assessment in the ICU is often suboptimal, with infrequent assessments, poor documentation, and inconsistency in the use of assessment tools.
- Pain assessments are inaccurate up to 40% of the time and often underestimate pain, especially when pain scores are high.

Crit Care. 2008;12:R15

Myth 3:

Accurate pain assessment cannot be performed in critically ill patients because pain is subjective

- Self-reporting is the gold standard for pain assessment.
- In a recent comparison of five self-reported pain intensity scales, the NRS was the most feasible (91%) and had the best negative predictive value (90%).
- Vital signs (blood pressure, heart rate, and respiratory rate) are widely used by clinicians for pain assessment. However, vital signs lack specificity for pain assessment since they can increase, decrease, or remain stable due to physiologic conditions unrelated to pain.

Pain. 2010;151:711–721

Myth 3:

Accurate pain assessment cannot be performed in critically ill patients because pain is subjective

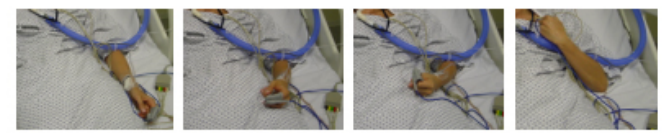
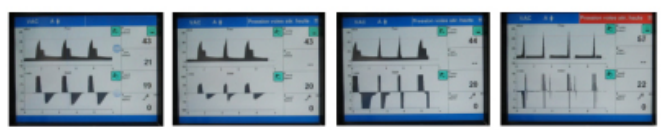
- In circumstances where self-reporting is not possible, pain assessment tools that incorporate behaviors and physiologic variables can be used.
- Of those developed and validated for ICU use, the **Behavioral Pain Scale (BPS)** and the **Critical Care Pain Observation Tool (CPOT)** have the strongest evidence for reliability and validity.

Myth 3:

Accurate pain assessment cannot be performed in critically ill patients because pain is subjective

- The **BPS** evaluates three behavioral domains: facial expression, movement of upper limbs, and compliance with ventilation in response to movement and painful stimuli.
- Each behavioral domain is rated from 1 (no response) to 4 (full response), with a composite score ranging from 3-12.

Behavioral Pain Scale (BPS) Training Poster

	BPS (intubated patients)					BPS-NI (non-intubated patients)				
	1	2	3	4		1	2	3	4	
①	Facial expression				=	Facial expression				
										
	Relaxed	Partially tightened = brow lowering	Fully tightened = eyelid closing	Grimacing = folded cheek		Relaxed	Partially tightened = brow lowering	Fully tightened = eyelid closing	Grimacing = folded cheek	
②	Movements of upper limbs				=	Movements of upper limbs				
										
	No movement	Partially bent	Very bent with finger flexion	Retracted, opposition to care		No movement	Partially bent	Very bent with finger flexion	Retracted, opposition to care	
		At rest: check the tonus by mobilisation of the limb					At rest: check the tonus by mobilisation of the limb			
③	Compliance with ventilation				≠	Vocalisation				
						No pain vocalization	Moaning not frequent (≤ 3/mn) and not prolonged (≤ 3 s)	Moaning frequent (> 3/mn) or prolonged (> 3 s)	Howling or verbal complaint including « Ow! , Ouch ! » or breath-holding	
	Tolerating ventilation	Coughing but tolerating ventilation most of the time	Fighting ventilator but ventilation possible sometimes	Unable to control ventilation						

①+②+③ = Total BPS value

from 3 (no) to 12 (maximum) pain behavior rated using the BPS

Myth 3:

Accurate pain assessment cannot be performed in critically ill patients because pain is subjective

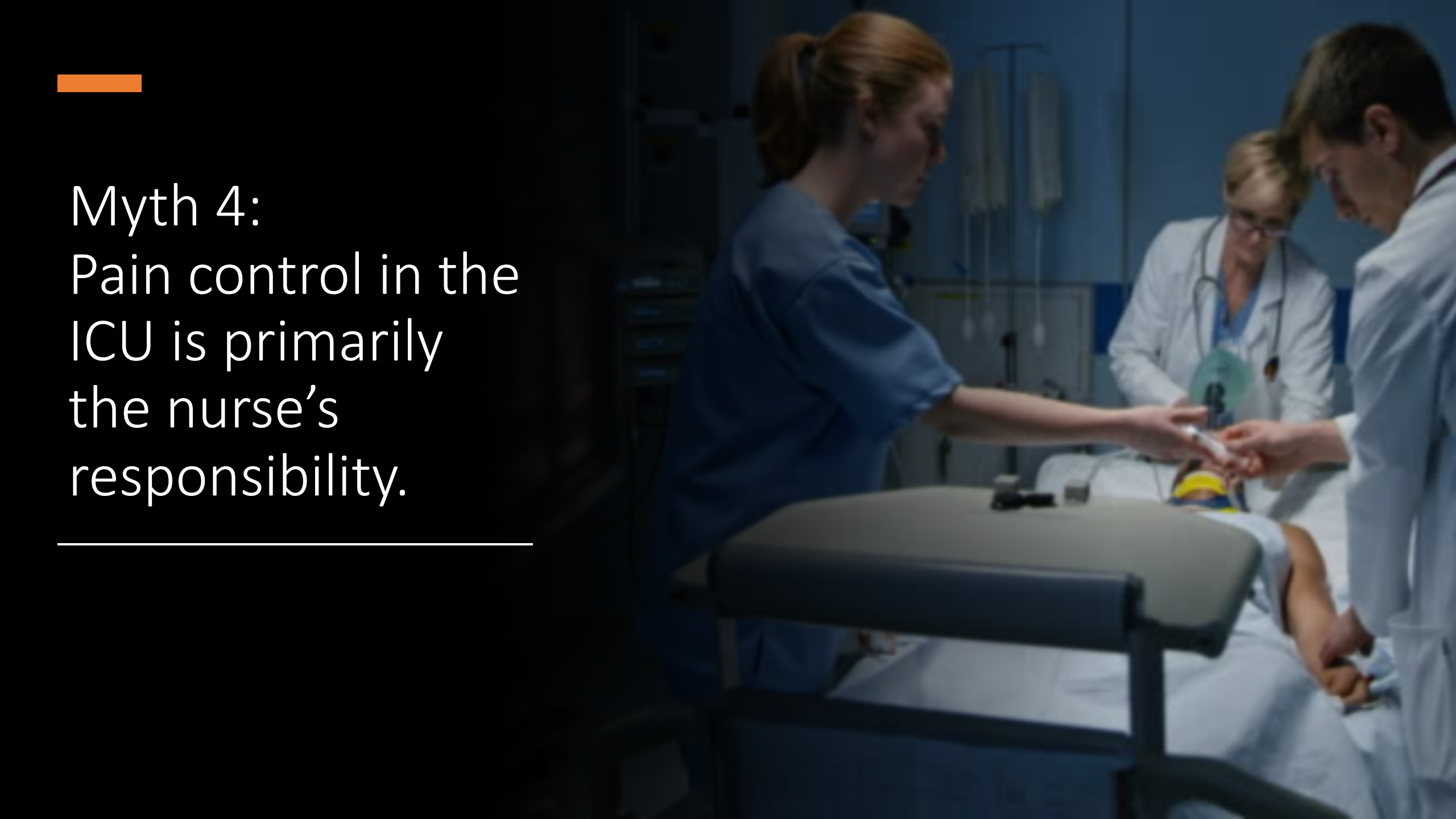
- The **CPOT** evaluates four behavioral domains: facial expressions, movements, muscle tension, and ventilator compliance.
- Each component is rated from 0-2 with a composite score ranging from 0-8.
- If patients do not have an artificial airway, the BPS and CPOT include a vocalization domain to be assessed.

Critical Care Pain Observation Tool 0-8

Indicator	Description	Score	
Facial expression	No muscular tension observed	Relaxed, neutral	0
	Presence of frowning, brow lowering, orbit tightening, and levator contraction	Tense	1
	All of the above facial movements plus eyelid tightly closed	Grimacing	2
Body movements	Does not move at all (does not necessarily mean absence of pain)	Absence of movements	0
	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements	Protection	1
	Pulling tube, attempting to sit up, moving limbs/ thrashing, not following commands, striking at staff, trying to climb out of bed	Restlessness	2
Muscle tension Evaluation by passive flexion and extension of upper extremities	No resistance to passive movements	Relaxed	0
	Resistance to passive movements	Tense, rigid	1
	Strong resistance to passive movements, inability to complete them	Very tense or rigid	2
Compliance with the ventilator (intubated patients)	Alarms not activated, easy ventilation	Tolerating ventilator or movement	0
	Alarms stop spontaneously	Coughing but tolerating	1
	Asynchrony: blocking ventilation, alarms frequently activated	Fighting ventilator	2
OR			
Vocalization (extubated patients)	Talking in normal tone or no sound	Talking in normal tone or no sound	0
	Sighing, moaning	Sighing, moaning	1
	Crying out, sobbing	Crying out, sobbing	2
Total, range			0-8

Gelinas C, et al. *Am J Crit Care*. 2006;15:420-427.

Myth 4:
Pain control in the ICU is primarily the nurse’s responsibility.

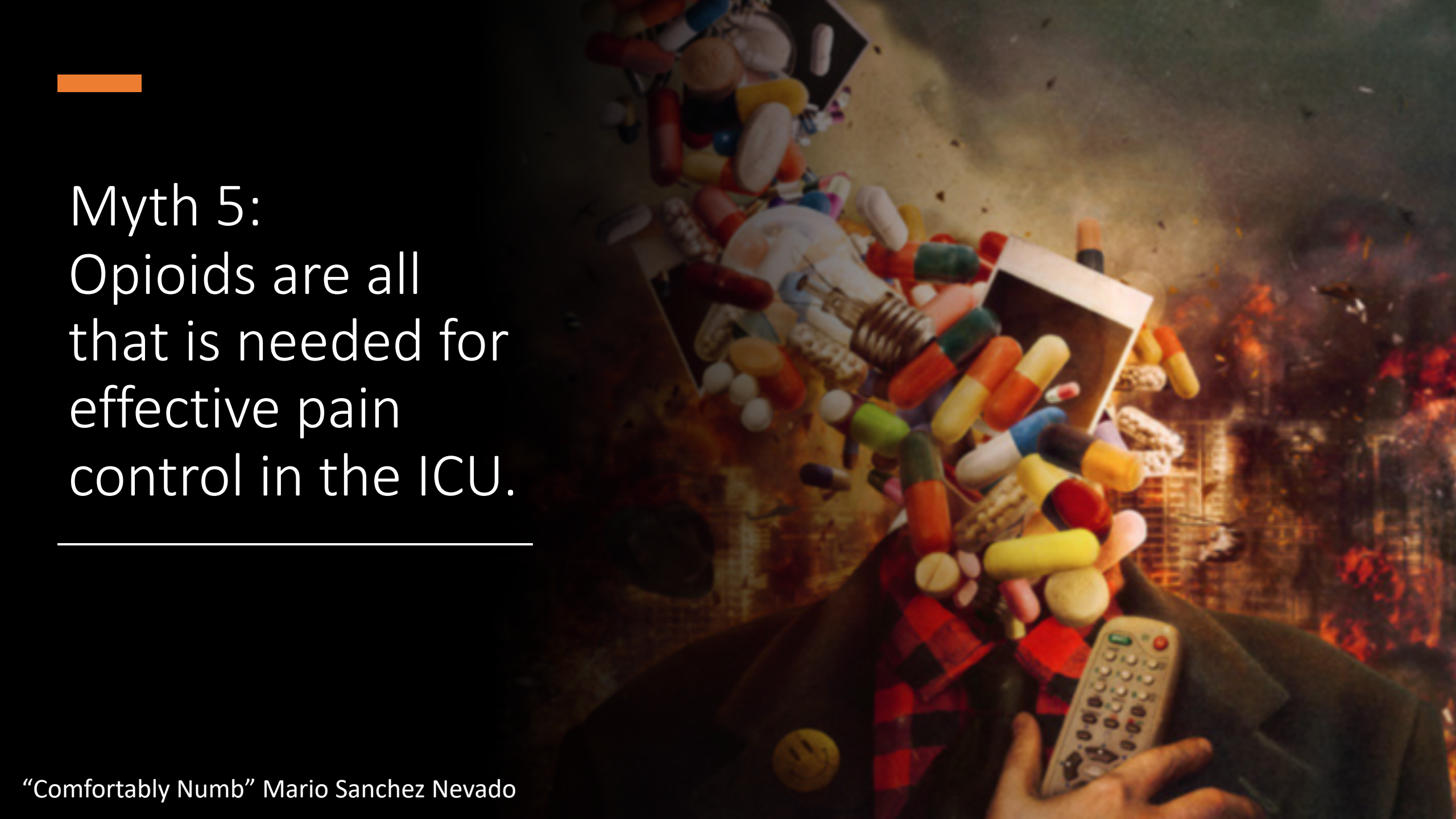


Myth 4: Pain control in the ICU is primarily the nurse's responsibility

- The bedside nurse plays an essential role in assessment and management of pain in critically ill patients
- However, the most effective approach to pain assessment and management in the ICU is a team approach (physician, nurse, and pharmacist)

Crit Care Med 43(11), 2015: 2468-2478

Myth 5:
Opioids are all that is needed for effective pain control in the ICU.



“Comfortably Numb” Mario Sanchez Nevado

Myth 5: Opioids are all that is needed for effective pain control in the ICU

- The cornerstone of comprehensive, individualized pain management is multimodal analgesia.
- Multimodal therapy encompasses a wide range of medications.
- Multimodal therapy also includes optimal timing of these intervention.

Crit Care Med 43(11), 2015: 2468-2478

Myth 5:
Opioids are all that is needed for effective pain control in the ICU

- Although the potential benefits of multimodal analgesia are clear, the literature indicates that nonopioid analgesics are less commonly used in critical care compared with other healthcare environments.

Crit Care Med 43(11), 2015: 2468-2478

Myth 6:
There is a maximum dose of opioids that should be used to treat acute pain.

Myth 6:
There is a maximum dose of opioids that should be used to treat acute pain

Despite receiving large doses of opioids, inadequate pain control may still occur in some patients:

- opioid dependence
- chronic pain requiring opioid therapy
- substance abusers
- recovering substance abusers in opioid maintenance programs

Reg Anesth Pain Med. 2008;33:199–206.

Myth 6:
There is a maximum dose of opioids that should be used to treat acute pain

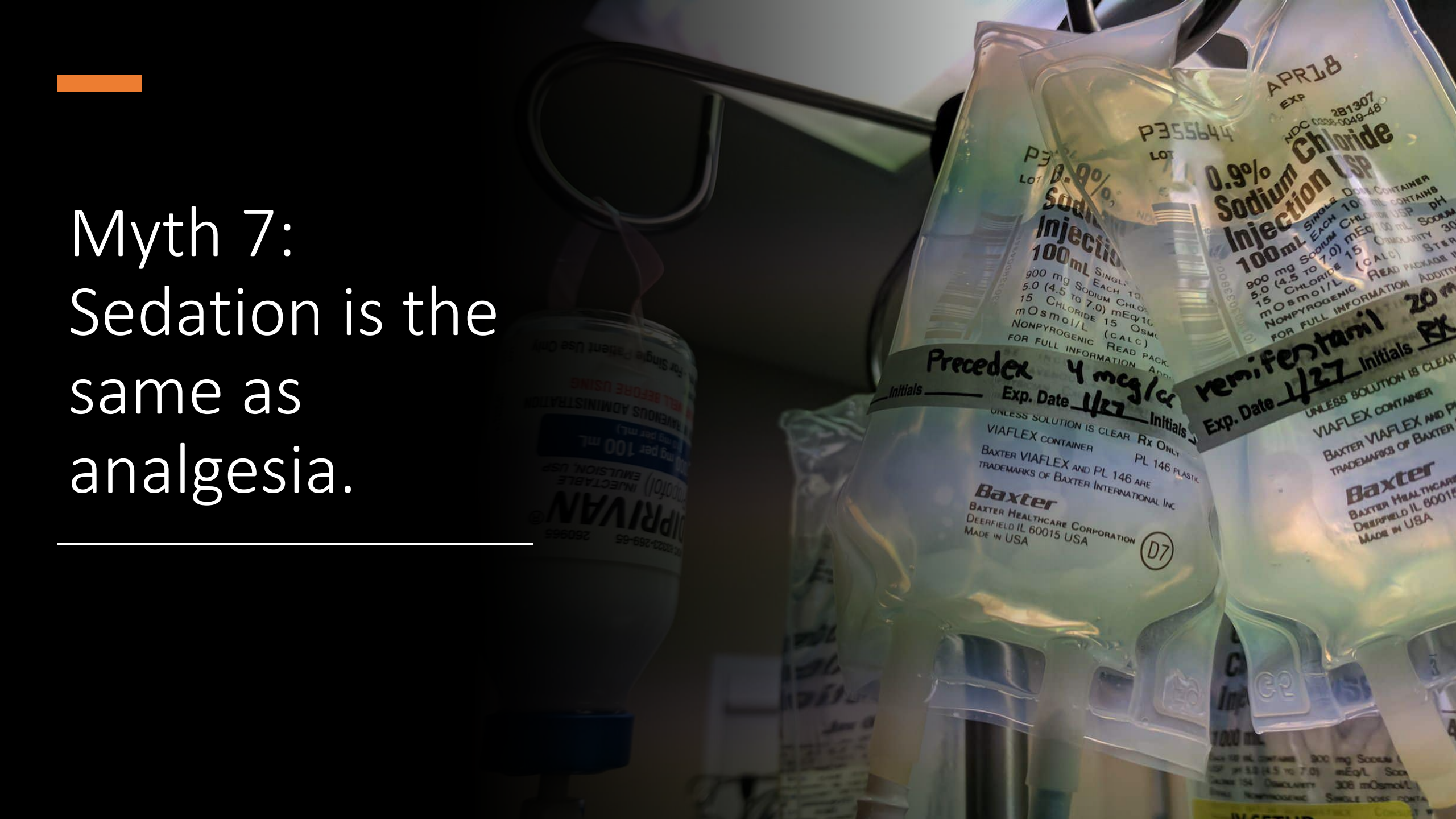
- Studies have shown a lower tolerance for painful stimuli among opioid-dependent patients receiving chronic methadone treatment when compared with controls.
- In addition, these opioid-dependent patients achieve less robust and shorter responses to opioids and experience reduced analgesic effects despite serum morphine levels that are typically therapeutic for the nonopioid-dependent patients.

Reg Anesth Pain Med. 2008;33:199–206.

Myth 6:
There is a maximum dose of opioids that should be used to treat acute pain

- Patients receiving buprenorphine therapy for addiction create a distinct challenge for management of acute pain.
- Buprenorphine is a partial μ-opioid agonist with antagonist properties that can interfere with the analgesic effectiveness of adjunct opioids.
- Substantially, increased doses of opioids may be needed in patients receiving buprenorphine to overcome the antagonist properties of the drug.

Myth 7: Sedation is the same as analgesia.



Myth 7: Sedation is the same as analgesia

- A continuous sedative-hypnotic approach with benzodiazepines or propofol has historically been the first-line intervention used to provide comfort for critically ill patients receiving mechanical ventilatory support.

Myth 7: Sedation is the same as analgesia

- In 2007 and 2009, Payen et al reported results from a prospective, multicenter, observational survey of 44 French ICUs, referred to as the DOLOREA study.
- It evaluated the analgesic and sedation practices of mechanically ventilated patients during the first week of ICU stay.
- It demonstrated a lack of protocolized evaluation of pain and sedation levels for patients receiving analgesics and sedation in the ICU.
- Furthermore, several improved outcomes in critically ill ventilated patients occurred when protocolized assessments were used for pain and sedation, regardless of initial analgesic and sedative strategy.

Anesthesiology. 2009;111:1308–1316 Crit Care. 2009;13:R204

Myth 8: Procedural pain can be effectively managed after the intervention.

Myth 8: Procedural pain can be effectively managed after the intervention

Pain assessment before procedures has been reported to be performed only 35% of the time, and less than 25% of patients receive analgesics before procedures.

Ann Pharmacother. 2012;46:530–540.

Myth 8: Procedural pain can be effectively managed after the intervention

- 3,851 patients underwent 4,812 procedures in 192 ICUs throughout 28 countries.
- An increase in pain occurred with all 12 types of procedures studied.
- For the 3 most painful procedures (chest tube removal, wound drain removal, and arterial catheter insertion), pain intensity more than doubled during the procedure compared with the preprocedural level.

Am J Respir Crit Care Med. 2014;189:39–47

Myth 8: Procedural pain can be effectively managed after the intervention

- Paradoxically, Puntillo et al found that the preemptive use of opioids was associated with greater intensity of procedural pain.
- This finding may reflect inadequate dosage or timing of opioid administration, suggesting that greater consideration should be given to these factors before procedures.

Am J Respir Crit Care Med. 2014;189:39–47

Myth 8: Procedural pain can be effectively managed after the intervention

- Although opioids are commonly used to manage procedure-related pain, nonopioid analgesics may also be beneficial in a variety of circumstances.
- For example, when equianalgesic doses of ketorolac were compared with morphine for chest tube removal, both were found to be effective in minimizing pain.
- Pain caused by wound drain removal and arterial catheter insertion, the second and third most painful procedures in the study, can be effectively reduced by preventive local lidocaine injection.

Am J Respir Crit Care Med. 2014;189:39–47

Myth 9: Elderly patients experience less pain than non-elderly patients.

Myth 9: Elderly patients experience less pain than non-elderly patients

- People who were 65 years old or older are the fastest growing segment of the population and account for 42–52% of the ICU admissions in the United States.
- Although elderly people may have a slightly **higher pain threshold** (the point at which pain is first felt), they have a **lower pain tolerance** (the maximum pain level endured).

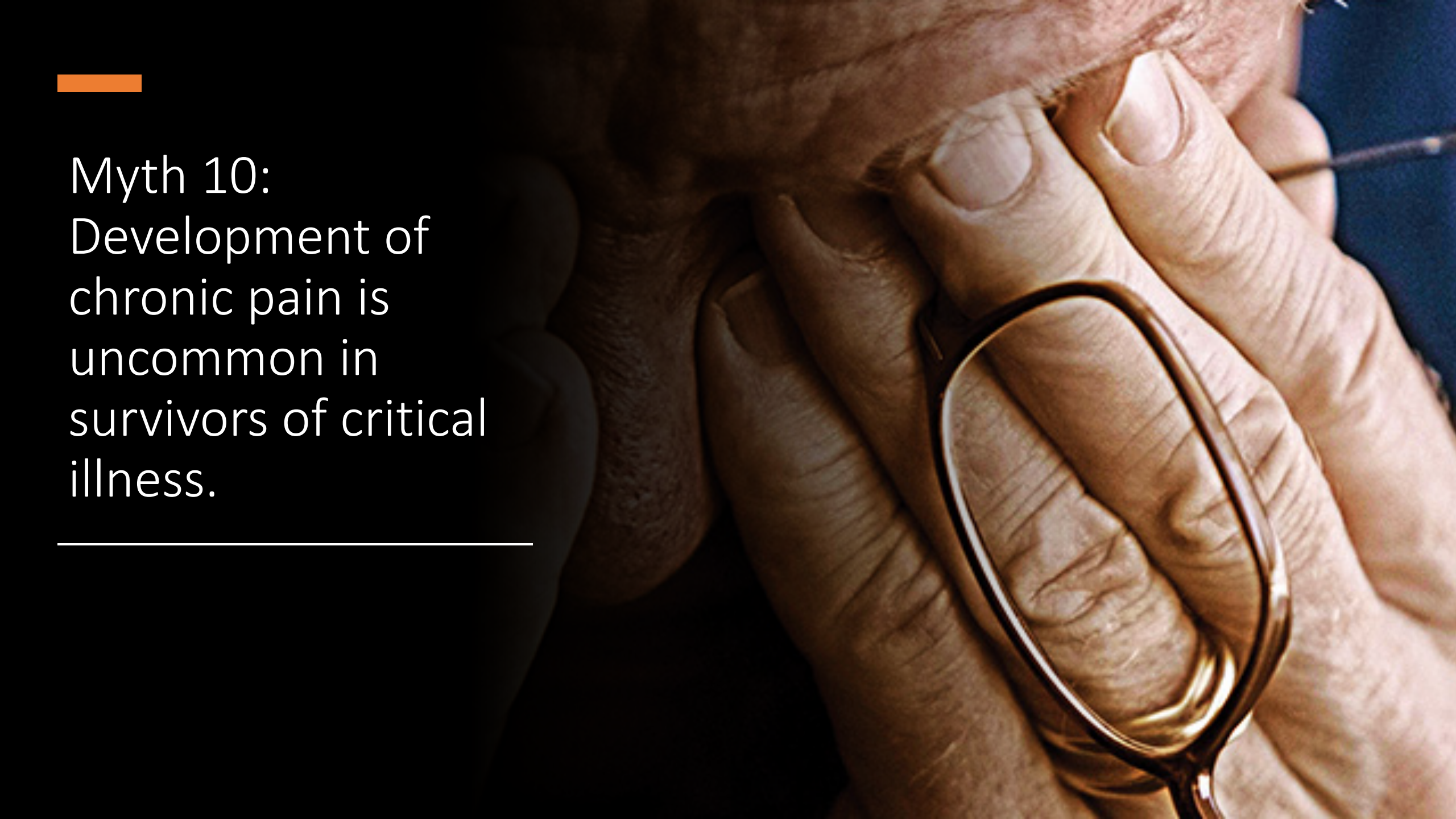
Crit Care. 2013;17:R101.

Myth 9: Elderly patients experience less pain than non-elderly patients

- Elderly patients may believe that pain is something to be tolerated or may be reluctant to report pain because they fear that pain is indicative of severe disease or even impending death.
- They may also fear the consequences of acknowledging pain, such as the need for further painful interventions, medications that have undesirable side effects, additional expenses, or further loss of independence or autonomy.
- Because of the wide variation of physiologic variables present between older individuals, the adage “start low and go slow” should be applied when initiating drug therapy.

Crit Care. 2013;17:R101.

Myth 10: Development of chronic pain is uncommon in survivors of critical illness.



Myth 10: Development of chronic pain is uncommon in survivors of critical illness

- Pain commonly persists after ICU discharge.
- Higher rates of chronic pain have been reported in survivors of critical illness with acute respiratory distress syndrome and severe sepsis compared with a matched non-ICU population.

Response	*N*= 196	%
Total number of patients reporting no pain	110	56
Total number of patients reporting pain	86	44
Shoulder	44	22
Lower limb	17	9
Lumbar spine	17	9
Cervical spine	12	6
Upper limb	12	6
Abdomen	8	4
Pelvis	6	3
Thorax	2	1
Nonspecific (all-over ache)	4	2
Total number of patients who have received healthcare input specifically for pain	62	32

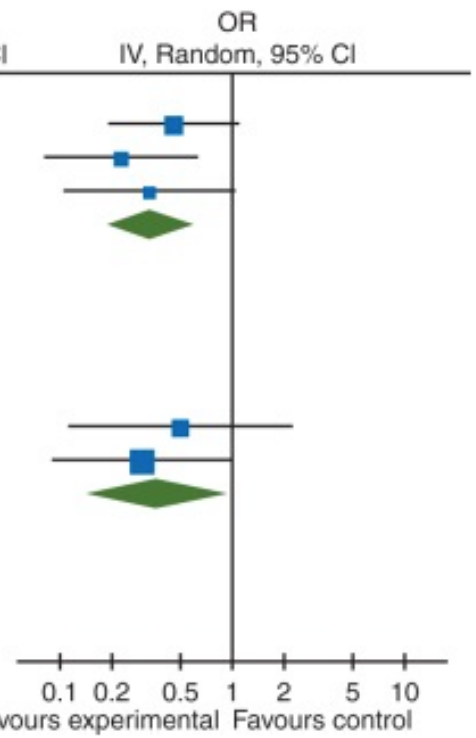
Risk factors for the incidence of chronic pain after ICU discharge: results of the multivariable analysis

Risk factor	*P*value	Adjusted OR (95% CI)
Age	0.025 [a]	1.0 (1.00-1.04)
Sepsis	0.001 [a]	4.3 (2.04-9.23)
Wound	0.075	0.6 (0.31-1.06)
ILOS	0.347	1.0 (0.98-1.06)
HLOS	0.707	1.0 (0.98-1.03)
Surgical	0.447	0.7 (0.36-1.58)

Crit Care. 2013;17:R101.

Myth 10: Development of chronic pain is uncommon in survivors of critical illness

Study or subgroup	Favours regional Events	Total	Conventional pain control Events	Total	Weight	OR IV, Random, 95% CI
1.1.1 Thoracotomy (epidural analgesia)						
Ju 2008	26	48	31	43	43.4%	0.46 [0.19, 1.10]
Lu 2008	9	62	12	28	31.4%	0.23 [0.08, 0.63]
Senturk 2002	25	46	18	23	25.2%	0.33 [0.10, 1.04]
Subtotal (95% CI)		156		94	100.0%	0.34 [0.19, 0.60]
Total events	60		61			
Heterogeneity: τ^2=0.00; χ^2=1.04, df=2 (P=0.59); I^2=0%						
Test for overall effect: Z=3.69 (P=0.0002)						
1.1.2 Breast cancer surgery (paravertebral block)						
Ibarra 2011	5	15	7	14	39.3%	0.50 [0.11, 2.24]
Kairaluoma 2006	5	30	12	30	60.7%	0.30 [0.09, 1.00]
Subtotal (95% CI)		45		44	100.0%	0.37 [0.14, 0.94]
Total events	10		19			
Heterogeneity: τ^2=0.00; χ^2=0.27, df=1 (P=0.60); I^2=0%						
Test for overall effect: Z=2.09 (P=0.04)						



Br J Anaesth. 2013;111(5):711-720.

Myth 11:
To maintain hemodynamics, we sometimes unfortunately have to withhold pain medications.