

# Post Trauma Pain

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# Uvod

## Brojne studije pokazuju lošu kontrolu bola nakon akutne traume

- ▶ 450 trauma pacijenata- bol meren na prijemu
- ▶ Prevalenca bola na prijemu- 91%
- ▶ Pri otpustu 86% – 2/3 umeren ili jak bol na otpustu

Berben et. al. Pain prevalence and pain relief in trauma patients in the Accident & Emergency department (2008) Injury; May;39(5):578-85

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# Zašto?

## Oslobađanje od bola je osnovno ljudsko pravo

(Association for the Study of Pain, European Federation of IASP Chapters and Human Rights Watch)

- Smanjiti negativne fiziološke efekte bola
- Smanjiti negativne psihološke efekte bola
- Smanjiti rizik pojave hroničnog bola
  - nelečen bol može dovesti strukturnih promena u nervnom sistemu
  - traumatsko oštećenje nerava, kompresija nerava usled kontrakture okolnog traumatizovanog tkiva...

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# Zašto?

## □ **Pravovremena i adekvatna analgezija**

- ubrzava proces isceljenja povreda
- Smanjuje stres odgovor
- Smanjuje morbiditet i mortalitet
- Smanjuje dužinu i troškove bolničkog lečenja

Cohen SP, Christo PJ, Moroz L.  
Pain management in trauma patients.  
Am J Phys Med Rehabil. 2004 Feb;83(2):142–61

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# Bol nakon traume

- Intenzitet bola ukazuje na težinu i tip povrede
- Može dovesti do ozbiljnih komplikacija i pogoršati opšte stanje bolesnika
- Nije uvek proporcionalan stepenu oštećenja tkiva

# TRAUMA, BOL

Simpatički i neurohumoralni (metabolički)  
odgovor

Povećanje nivoa **kortizola, kateholamina,**  
antidiuretskog hormona- *lipoliza, proteinoliza,*  
*imunosupresija, hiperkoagulabilnost*

*hipertenzija, tahikardija, hiperglikemija,*  
*tromboza, retencija soli i vode, povećanje*  
*bazalnog metabolizma, infekcija*

Manifestacija psihičkih simptoma u stresu  
Doprinosi razvoju hroničnog bola

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↑frekvenca  
↑Krvni pritisak  
↑Povećane potrebe  
za O<sub>2</sub>  
Hiper- koagulabilnost

Nestabilna angina  
Infarkt miokarda  
DVT  
PE



↓Disajni volumen  
↓Snižen refleks kašlja

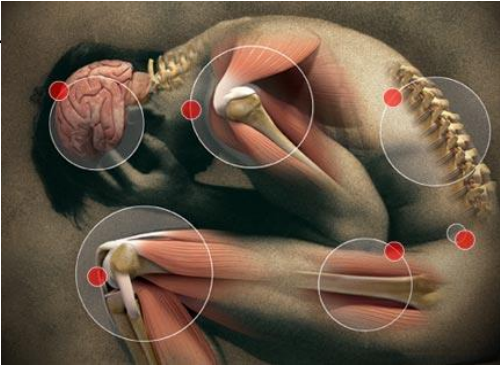

Atelektaze  
Pneumonia  
Hypoxemia



↓Pražnjenje želudca  
↓crevni motilitet

Konstipacija  
Anorexia  
Ileus (muka,  
povraćanje)

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	<p><b>Spazam mišića</b> <b>Oštećenje mišićne pokretljivost i funkcije</b></p>	<p><b>Nepokretnost slabost</b> <b>Gubitak mišićne mase</b></p>
	<p><b>anksioznost</b> <b>strah</b></p>	<p><b>Poremećaj spavanja</b> <b>Poremećaj rasuđivanja</b> <b>post-traumatski stres Sy</b></p>

## **HRONIČNI BOLNI SY, HIPERALGEZIJA**

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*"This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use that may be made of the information contained therein."* National Pharmaceutical Council (2001). Macintyre & Schug (2007).Cohen et al (2004)



# Faktori udruženi sa pojavom hroničnog bola

- Mlađa dob
- Višestruke operacije
- Loše kontrolisan bol
- Povrede nerava
- Trajanje nesposobnosti za rad (dužina bolovanja)
- Psihološki momenti - ↑ anksioznost, depresija, stres

Macrae (2008), Keene et al (2011) , Sommer et al (2010)

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# *Incidenca hroničnog/perzistentnog bola nako traume*

Povreda/terapijska op	Incidenca hroničnog bola
Amputacija	30-85%
Povrede grudnog koša/torakotomija	5-67%
Povrede kičmene moždine	>50%
Povrede moga	32-51%
Frakture kičmenih pršljenova	>25%
Opekotine	35-52%
Kompleksni regionalni bolni Sy	1-5%

Macintrye and Schug (2007), Kehlet et al.(2006), Sinha & Cohen (2011), Nampiaparampil (2008), Dauber et al. (2002), Singh & Cailliet (2011)

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# Mitovi..

- Ako pacijent spava ne trpi velike bolove
- Pacijenti lažu o intenzitetu bola
- Bolje je pričekati da bol postane zaista jak pa dati lek...

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## ***Analgezija, kada?***

- **ODMAH** po inicijalnoj resuscitaciji (ABCDE princip) i stabilizaciji vitalnih parametara
- Nestabilnim pacijentima NE davati analgetike

# ***Analgezija, kako?***

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## ***Procena bola***

- Ne postoji uređaj, test, niti biološki marker koji egzaktno meri bol
- Pitati pacijenta (nesvesnost, alkoholisanost, emocionalna trauma, psihosomatski distres- otežava procenu)
- Tražiti potencijalne uzroke bola
- Posmatrati ponašanje pacijenta
- Informacije od rodbine/staratelja
- Probati analgetsku Th

**Moramo verovati bolesniku**

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# Procena bola

## ➤ Opšta anamneza bola

### **OPQRST** - Onset of the event

Provocation or palliation

Quality of the pain

Region and radiation

Severity

Time (history)

## ➤ Fizikalni pregled

## ➤ Dodatna ispitivanja (laboratorijska, vizualizaciona)

## ➤ Skale i upitnici za ocenjivanje bola

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# Merenje intenziteta bola

- **Jednodimenzionalne skale**
  - Vizuelno-analogna skala (VAS)
  - Numerička skala
  - Verbalno deskriptivna skala
  - Skala izraza lica

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# Lečenje traumatskog bola

- **Psihološki tretman** (komunikacija, zadobiti poverenje, smanjiti strah, uliti sigurnost, emocionalna podrška)
- **Fizikalni tretman** (imobilizacija preloma, spoljašnje hlađenje mesta povrede, previjanje, sprečiti rashlađivanje i drhtanje, kasnije rana mobilizacija)
- **Farmakološka terapija bola**

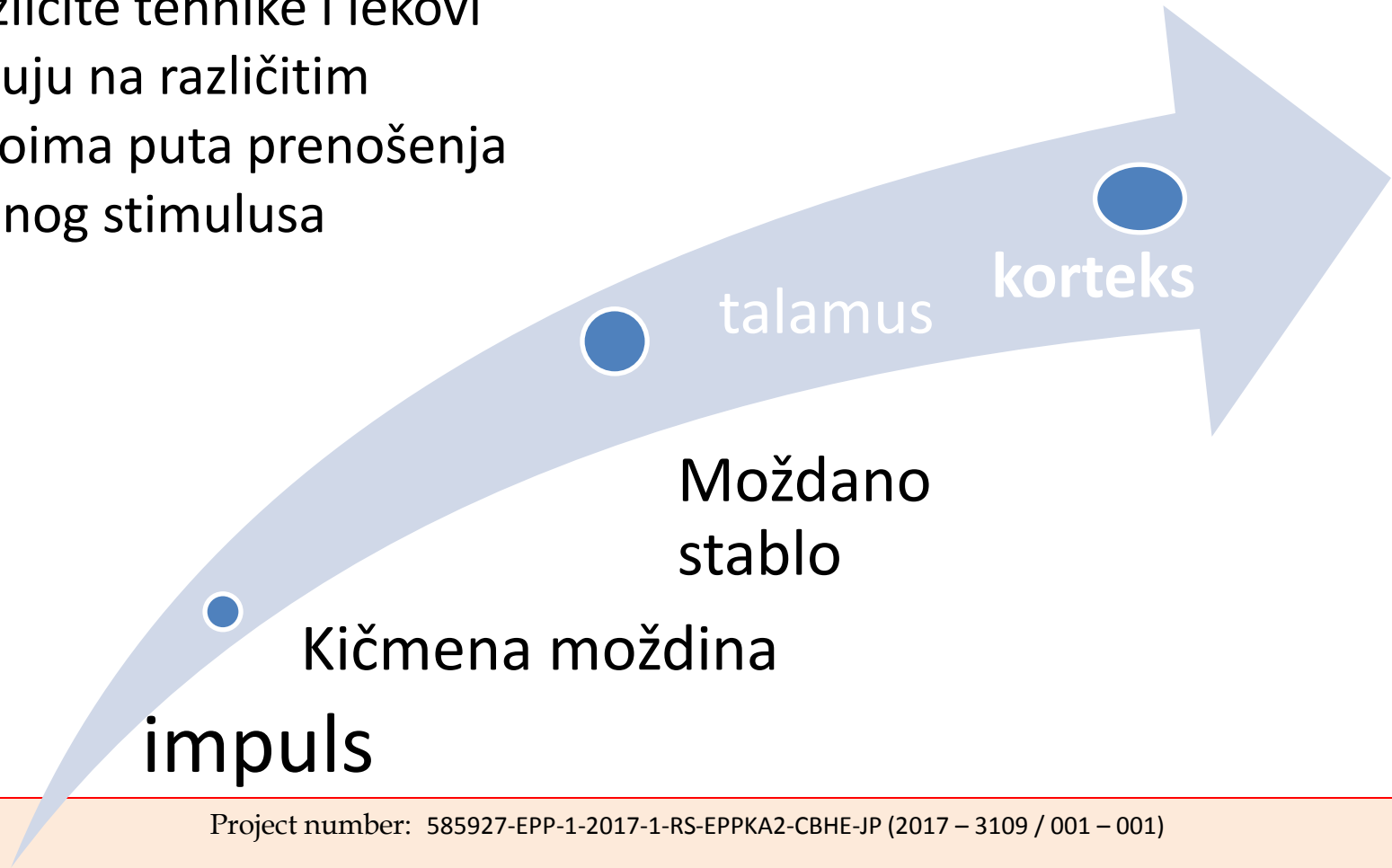
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# Lečenje bola

Različite tehnike i lekovi deluju na različitim nivoima puta prenošenja bolnog stimulusa



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# Lečenje bola- lekovi sa perifernim dejstvom

- **Nesteroidni antiinflamatorni lekovi (NSAID)** –deluju na produkciju prostaglandina, koji izazivaju hiperalgeziju i inflamatorni odgovor
- **COX I i COX II inhibitori** (inhibiraju ciklooksigenazu- sintezu prostaglandina)

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# NSAID neželjeni efekti

- Peptičke ulceracije (inhibiraju sintezu prostaglandina koji štite gastričnu mukozu)
- Antitrombocitni (antiagregacioni) efekat
- Renalna disfunkcija
- *Rizik kod astme –moguć težak bronhospazam*

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# Lečenje bola-blokiranje prenosa nadražaja

- **LOKALNI ANESTETICI**- blokiraju prenos nadražaja na mestu aplikacije (smanjenje transfera Na i K na nivou neurona)
- **Lokalna infiltracija** na mestu incizije (efekat 48 h)
- **Interkostalna** nervna blokada, **paravertebralna** n b,
- **Intrapleuralna** analgezija (lok anestetik)
- **Periferni nervni blokovi** (kontinuirani-insercija katetera)-  
ultrazvuk

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# Lečenje bola-blokiranje prenosa nadražaja

- **Centralni nervni blokovi**
- **Epiduralna i subarhnoidalna infuzija** anestetika i opioida (opioidi blokiraju oslobađanje neurotransmitera koji su neophodni za prenošenje bolnog impulsa od kičmene moždine ka mozgu); kontinuirano-kateter
- NE-kod masivnog krvarenja (hipotenzija, akutna traumatska koagulopatija)

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# Lečenje bola- lekovi sa centralnim dejstvom

- Paracetamol
- Tramadol
- klonidin
- Ketamin, azot-oksidi
- Sistemski opioidi- i.m. s.c. i.v. transdermalno

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# Opioidi- zlatan standard

- **Morfin** spor početak dejstva (15-20min), dugo delovanje, akumulacija aktivnih metabolita kod renalne disf-je, histaminoliberator (obično se ne daje se u akutnoj fazi)
- **Fentanil**- nakon duže primene dugotrajnije dejstvo od morfina (dugo context-senzitivno polu vreme)
- **Remifentanil**- nespecifični esterazni metabolizam, brz početak i prestanak dejstva (context-senzitivno poluvreme 3 min) lako se titrira do efikasne doze



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# Opioidi- osnovna pravila

- U akutnoj fazi opioide primenjivati **I.V.**
- SC ili IM primena nije efikasna. Kasnije – oralno ili transdermalno
- **Odmah** startovati sa dozom koja će dati **oslobađanje od bola**
- Za konstantan bol- **regularan dozni interval-** omogućava održavanje stanja bez bola
- **PCA-** patient controlled analgesia

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# Ekstenzivne koštano-mišićne povrede **Opioidi- zlatan standard**

- Krvarenje, hipovolemija- prvo nadoknaditi cirkulat. volumen
- Opioidi imaju simpatolitički efekat-benefit
- Potreba za intenzivnom analgo-sedacijom nekoliko sati

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# Opioidi- zlatan standard

## Povrede grudnog koša

- Potreba za produženom mehaničkom ventilacijom
- Opioidi- smanjena potreba za sedativima
- Opioidi-smanjeno oslobađanje citokina (ARDS)

### *Epiduralna analgezija vs opioidi iv*

- Bolja analgezija i plućni funkcionalni testovi  
(manja depresija disanja)
  - nisu pospani
- nema neželjenih gastro-intestinalnih simptoma

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# Tehničke poteškoće ?

- An Eastern Association for the Surgery of Trauma guideline: **Epidural analgesia is the optimal modality of pain relief for BBT (level1)**
- Epiduralna analgezija zastupljena samo kod 15-22% BBTpacijenata

Bulger EM. J Trauma 2000;48:1040-1047



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# Opioidi- zlatan standard

## Povrede mozga

### ❖ Opioidi

#### ❑ Sprečavaju **sekundarna oštećenja**

- smanjuju **bazalni metabolizam** i potrebe za kiseonikom
- Sprečavaju **skok ICP** prilikom aspiracije, bronhoskopije i dr manipulacija, suprimiraju kašalj

#### ❑ Omogućava regularnu evaluaciju neurološko statusa

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# Neželjeni efekti opioida

- Muka
- Svrab
- Retencija urina
- Opstipacija
- **Respiratorna depresija-** rana (1 sat nakon davanja) ili kasna (posle 6-12 h)

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# Najčešće dg. dileme koje prate primenu opioida

- Hiperadrenergičko stanje- kod mlađih može biti fiziološki odgovor na traumu, hipovolemiju, operaciju, a ne izraz **oligoanalgezije**- dobar prognostički znak
- Hiperadrenergičko stanje- uticaj droga ili lekova/ apstinencijalni sindrom
- Hipotenzija- može biti posledica hipovolemije, koju je odgovor organizma na bol maskirao, a ne **predoziranja** opioida

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# Najčešće *zablude o primeni* opioida

- **maskiraju kliničku sliku**- neosnovano, analgezija olakšava klinički pregled
- **Mioza** (rezultat cen.dejstva opioida) maskira razvoj pupilarnih abnormalnosti koje prate **neurotraumu**- netačno (unilateralno proširena zenica još izrazitija kod mioze druge)
- **Zavisnost**- ne javlja se kod kratkotrajne primene

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## Koji je optimalan analgetik proceniti intenzitet bola

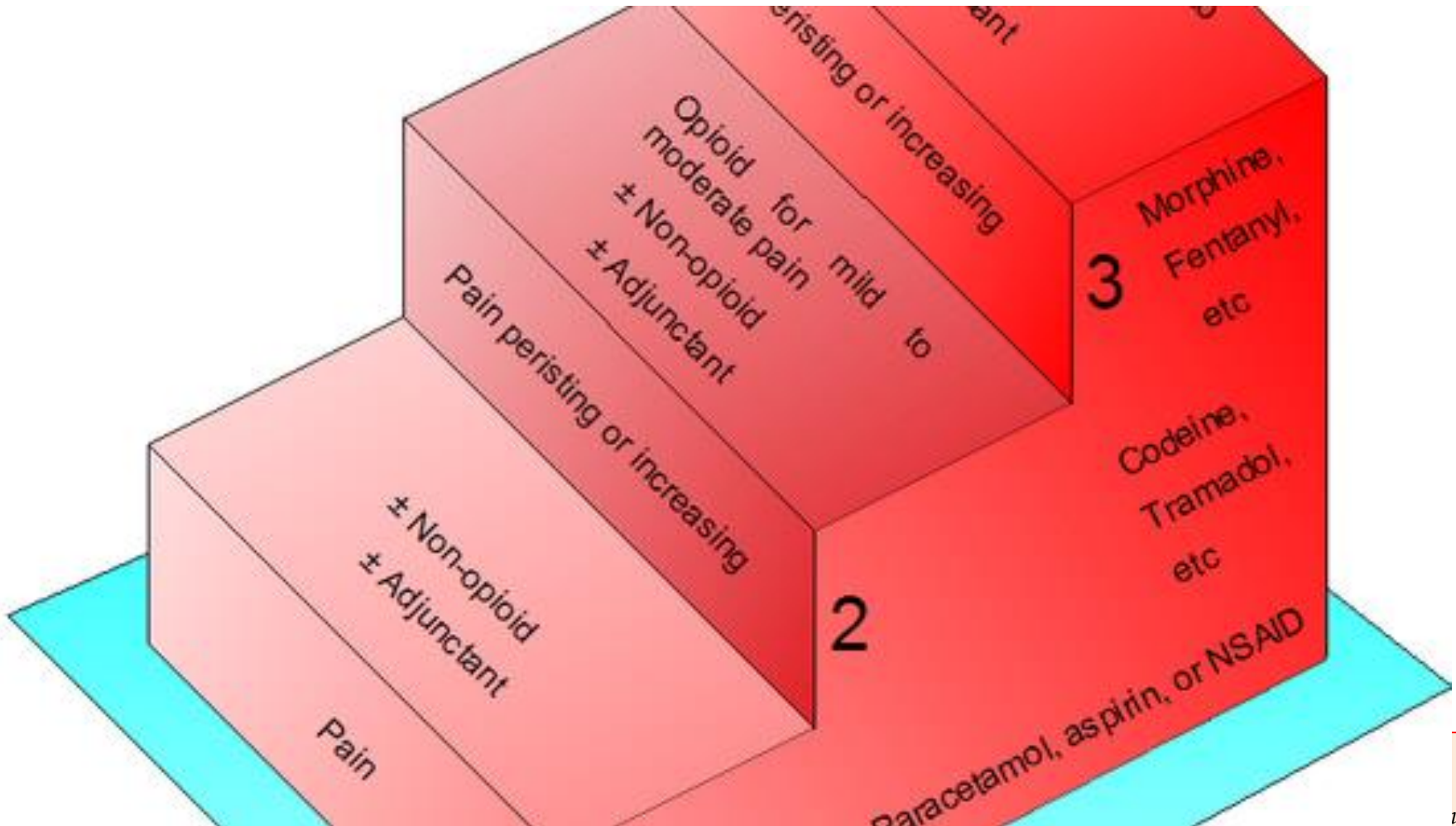


Table 1: Trauma Pain Management based on WHO Pain Ladder.

	Methods	Results	Action
Pain Assessment			
Acute Pain treatment			
Mild pain	VAS	$\frac{1 - 3}{10}$	Pentazocine NSAID's Cold/Hot compresses
Moderate pain	VAS	$\frac{4 - 6}{10}$	Cold/Hot compresses Tramadol Pethidine
Severe pain	VAS	$\frac{7 - 10}{10}$	Morphine Fentanyl
Re-assessment		Reassess every 5 minutes. Evidence of adverse effects should preclude further drug administration	

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# Važno: multi-modalna th

- Kominovati lekove sa drugačijim mehanizmom dejstva
- Dodatna Th
  - Triciklični antidepresivi, gabapentin, pregabalin (smanjuju pojavu hroničnog bola kao deo multi-modalne Th, kod rizičnih grupa)
  - Tretirati neželjene efekte terapije



Co-funded by the  
Erasmus+ Programme  
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**HEPMP**

HIGHER EDUCATION PAIN MEDICINE PROJECT

Strengthening Capacities for Higher Education of Pain Medicine  
in Western Balkan Countries - HEPMP

# Zaključak

- Započeti terapiju rano- još na terenu opiodi, ketamin
- Efikasna kontrola bola značajno doprinosi smanjenju mortaliteta i morbiditeta nakon traume i operacija
- Multimodalan pristup
- Titrirete analgeziju prema odgovoru, regularna reevaluacija
- Procena i tretman psiho-socijalnih faktora koji mogu doprineti pojavi hroničnog bola

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# *Hvala na pažnji*

THERE IS ONE  
GOOD THING I CAN  
SAY ABOUT PAIN:

IT REMINDS ME THAT  
I'M ALIVE!

