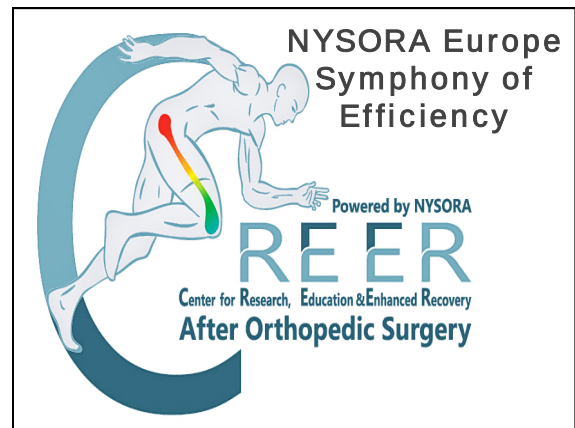




THE POWER OF REGIONAL ANESTHESIA

TURNOVER TIME = 6 MIN

OPERATING ROOM UTILIZATION 95%

Case in a high-volume orthopedic surgery service

by J. Desclacker, C. Baens D

Introduction

Perioperative service line strive for efficiency, effectiveness, value and overall cost reduction. The 4 ORs that comprise the orthopedic anesthesia service line at NYSORA-Europe's CREER Center, ZOL Genk, Belgium, have a unique design whose cost:benefit ratio is closely monitored. We critically examined the current workflows of these ORs to evaluate and optimize efficiency.

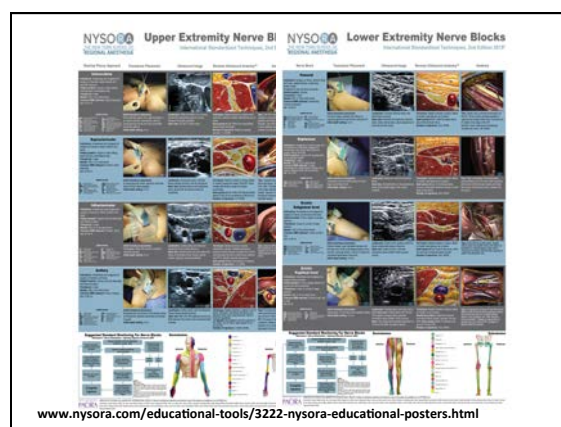
Methods

This observational study had 3 phases: (1) on-site assessment, (2) process analysis and (3) metrics development. The on-site assessment focused on the current workflow patterns for patients, anesthesia services, surgery services, and nursing staff. The flowchart illustrates the importance of consistent application of standardized protocols and optimal patient management pathways. An analysis of the operating room flows highlights the importance of parallel processing and specific role designation for all staff members.



ESSENTIALS

- **Standardize Clinical Care**
- Match surgeries with PNBs
- **Standardize Techniques**



NURSING EDUCATION



www.nysora.com/educational-tools/3222-nysora-

Standardization of premedication

- Every patient comfortable for a block
- Full ASA monitored
- Midazolam 1-2mg + Ketamine 5 5mg
- Minimum opioids perioperatively!



Safety: standardization of care

- Employ all available monitoring
- Routine Check-List (Time Out)



Standardization of documentation

Nerve Block(s)	Left	Consent	☐	Coagulation OK	☐	Ultrasound	☐
	Right	Premedication	☐	Midazolam iv	mg	☐	
		☐	Ketamine iv	mg	☐		
	Sterility	☐	Other	mg	☐		
		☐	Sterile gloves, disinfection, drape, probe cover, Full ASA monitoring	☐			
	Monitoring	☐	In plane	☐	Out of plane	☐	
		☐	Injection(s) made extraneural	☐			
	Equipment	☐	Number of injections		☐		
		☐	OIP ≤ 15psi (Opening Injection Pressure)	☐			
	Time out	☐	Nerve Stimulation (NS)	☐	No EMR ≤ 0.5 mA	☐	
☐		Needle: ☐ Stimplex 22G Length.....mm	☐	Not used	☐		
Doctors	☐	Other	G Length.....mm	☐			
	☐	Catheter:		☐			
Local anesthetic	☐	Ropivacaine:	%	ml	☐		
	☐	Bupivacaine:	%	ml	☐		
Additives	☐	Lidocaine:	%	ml	☐		
	☐	Adrenaline 1/.....	☐	Other	☐		



Intraoperative management

Noise protection

Headphones

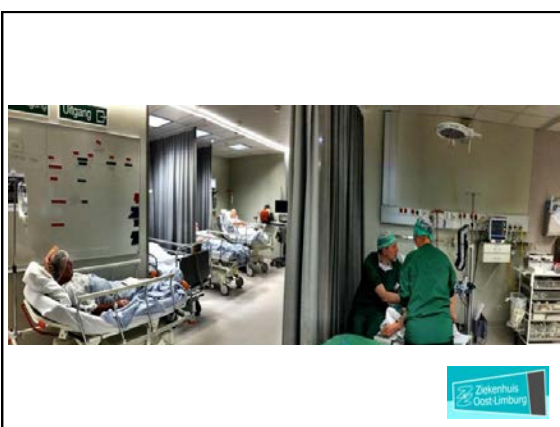
Music

TCI (0.5-1.5 mcg Propofol)



EFFICIENCY

- Establish **PNB room**
- All RA performed in block room
 - PNBs
 - Spinal
 - Epidural



TEAM WORK

- No Stars!!!
- Everyone is important
- No one is irreplaceable



TECHNIQUES

Multi-Modale Approach

MEDICAMENTEUS

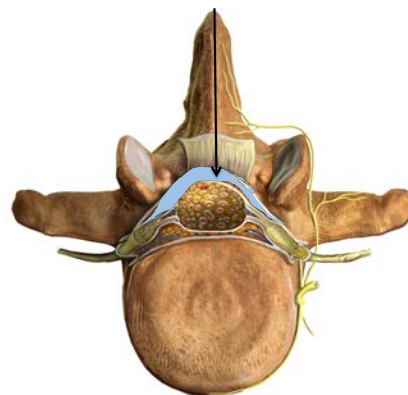
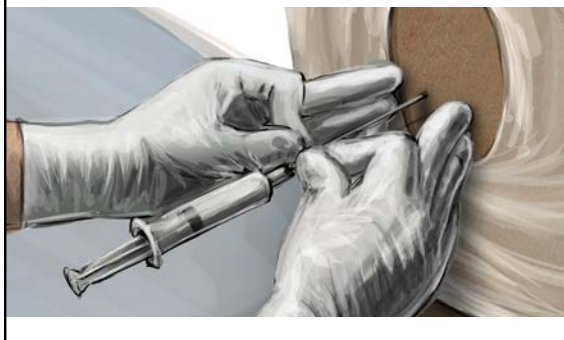
- Paracetamol iv /6u
- NSAIDS iv /8u
- Opiaten

Systematisch multimodale analgesie ESSENTIEEL

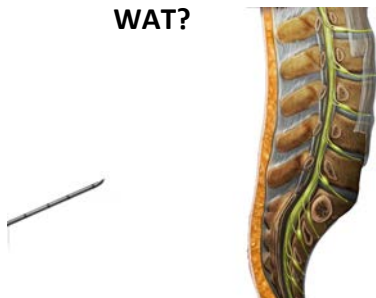
• NIET MEDICAMENTEUS

- Epidurale Analgesia (PCEA)
- Perifere Zenuwbloks/Plexus
 - Single Shot 4-18 uur
 - Continu via Catheter – tot 48 uur (PCA)
- Peri-operative infiltratie LA door chirurgen

Epidural Analgesie – WAT?



Epidural Analgesie – WAT?

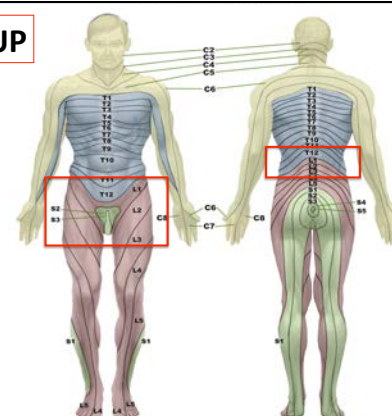


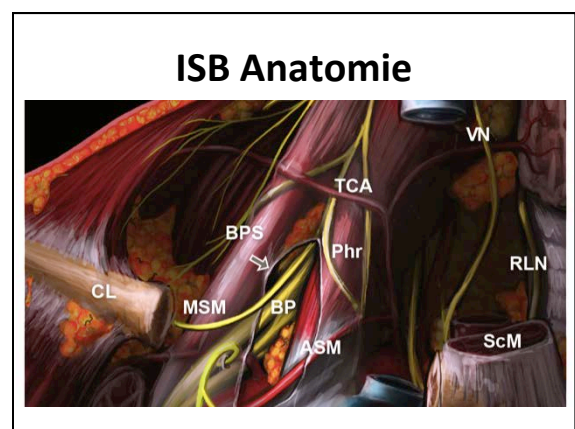
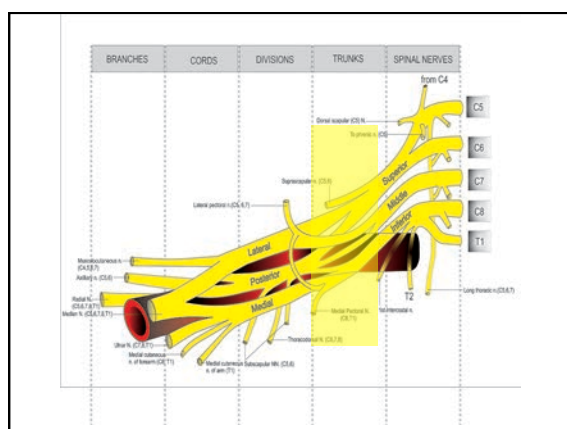
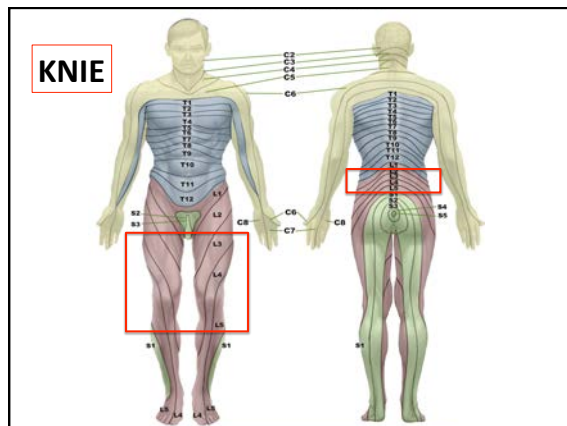
EPIDURALE – AANDACHTSPUNTEN

- Epidural anesthesia is preferentieel gesegmenteerd.
- Niveau plaatsing Epidurale bepaalt level sensorisch blok
- Precieze plaatsing en titratie LA (continu+bolus) essentieel voor:
 - Bekomen van effectieve analgesie
 - Beperkte motor blok
 - Motor blok mogelijk ondanks bovenstaande
 - Iedere patient is anders/reageert anders
 - MULTIMODAL analgesie en ESCAPE – NOODZAKELIJK
 - **NEUROLOGISCHE FOLLOW-UP!!!!**

Uitgangspunt	Indiceer punt te plaatsen – op de necessary van de 20"	op de afstand van de 20"
Algemene		
Arterieel: niet		
Beveiliging		
1. Controleer, niet verlaten	4	
2. Controleer, niet verlaten	3	
3. Controleer, niet verlaten	2	
4. Controleer, niet verlaten	1	
5. Controleer, niet verlaten	1	
6. Controleer, niet verlaten	1	
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100. Controleer, niet verlaten	1	

HEUP





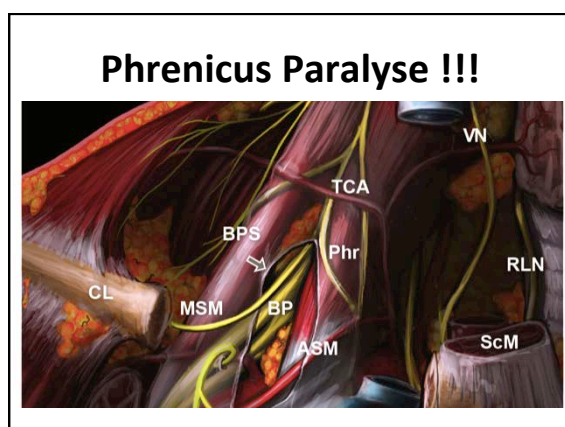
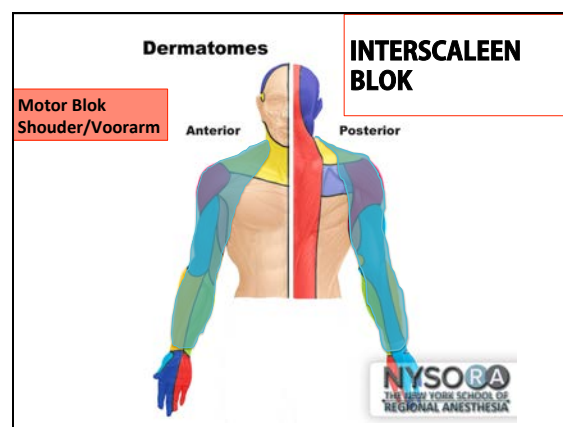
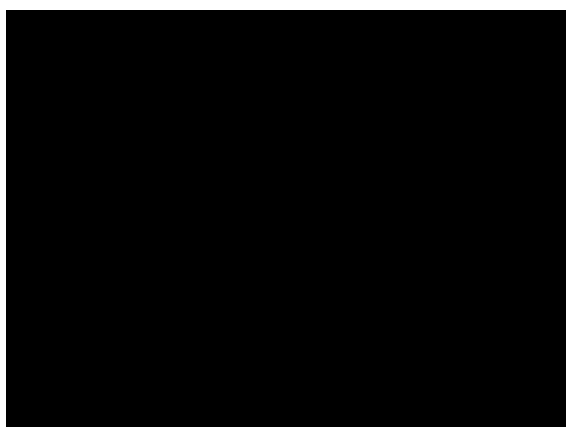
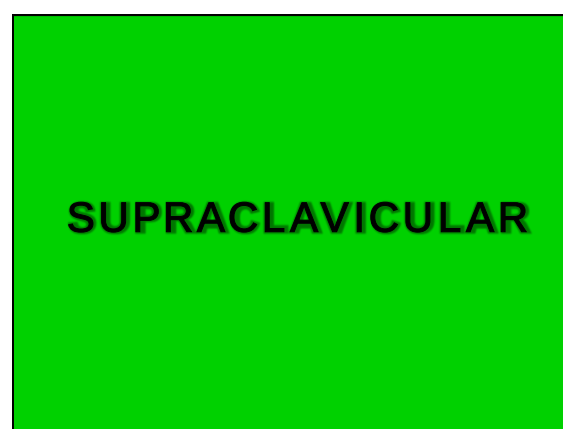
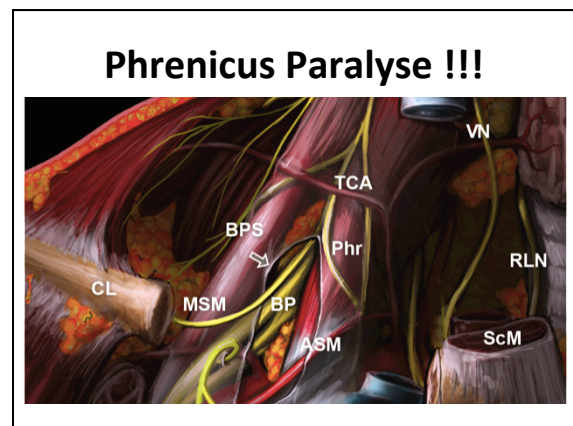
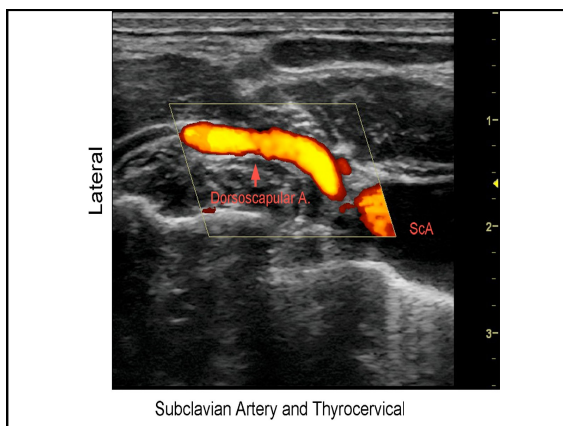
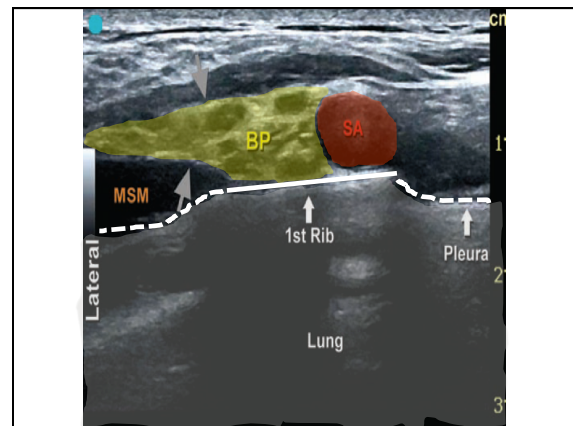
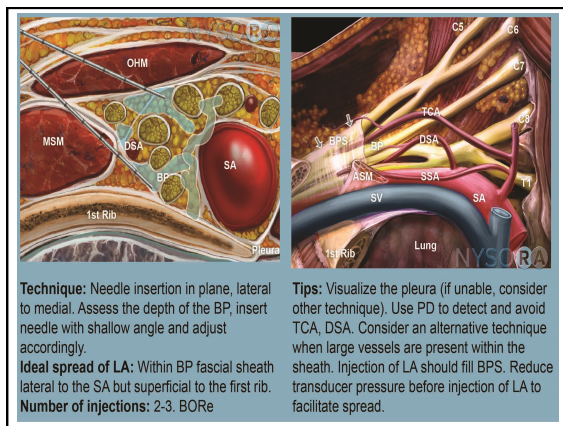
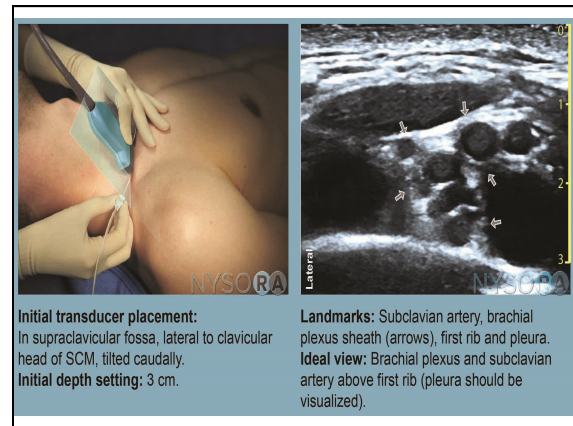
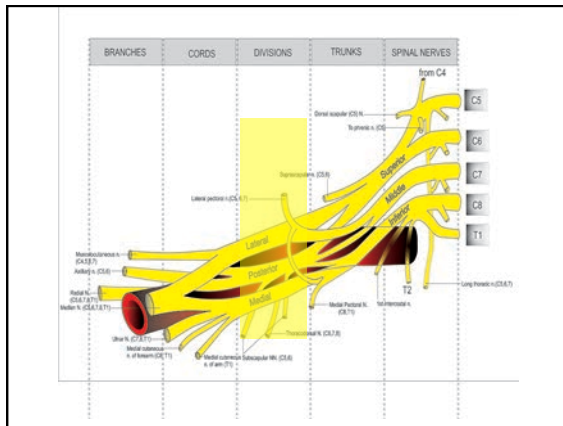


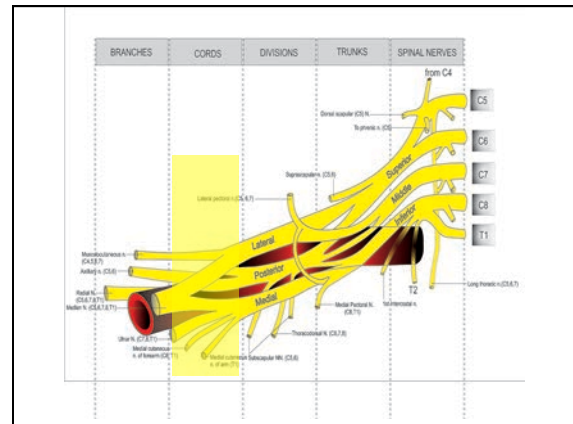
Table 4. Nursing Considerations for Patients Receiving Interscalene Blocks	
- Position patient supine with head turned away from operative site, operative arm and shoulder exposed - Consider alternatives for patients with history of severe respiratory disease <u>Ipsilateral phrenic paralysis</u> is an expected physiologic effect that occurs in all patients, and healthy patients are asymptomatic in general. The most common symptom related to ipsilateral phrenic paralysis is <u>anxiety</u>. The nurse should: - Remain with the patient; provide reassurance - Place patient in semi-Fowler's position, or position of optimal comfort - Continue supplemental O₂ - Monitor for Horner's syndrome. This syndrome results from sympathetic blockade and is an expected physiologic response that includes: - Ipsilateral pupillary constriction - Conjunctival hyperemia - Nasal congestion - Hoarseness - Monitor for suspected tension pneumothorax (rare)¹⁰ - Continue supplemental O₂ - Immediate chest radiograph - Upright anterior-posterior and lateral is optimal - Cross-table decubitus with suspected side up if patient unable to sit up - Remain vigilant for signs of hemodynamic decompensation - Hypotension, tachycardia - Prepare for insertion of chest tube - Arrange transfer as appropriate (15–20% of patients who develop small tension pneumothorax will not require hospitalization, but may be monitored in a short-stay unit instead.)¹⁰	- Hemidiaphragma Paralyse - Horner Syndroom (Spanningspneumothorax)





Phrenicus Paralyse !!!

INFRACLAVICULAR



Infracavicular

Indications: Anesthesia and analgesia for surgery on humerus, elbow, forearm and hand.

Patient position: Supine with arm abducted and flexed at elbow.

Transducer: Linear.

Needle: 22G, 8-10 cm short bevel.

Common EMR obtained: Forearm, Hand.

LA: 20-25 ml

ABBREVIATIONS

AA	Axillary Artery	MC	Medial Cord
AV	Axillary Vein	PC	Posterior Cord
BOR	Bolus Observe Reposition	PMaM	Pectoralis Major Muscle
PD	Power Doppler	PMiM	Pectoralis Minor Muscle
CV	Cephalic Vein	PN	Pectoral Nerve
EMR	Evident Motor Response	SAM	Serratus Anterior Muscle
LA	Local Anesthetic	SsM	Subscapular Muscle
LC	Lateral Cord		
LPA	Lateral Pectoral Artery		

Initial transducer placement: Parasagittal, below the clavicle, medial to coracoid process.

Initial depth setting: 5 cm.

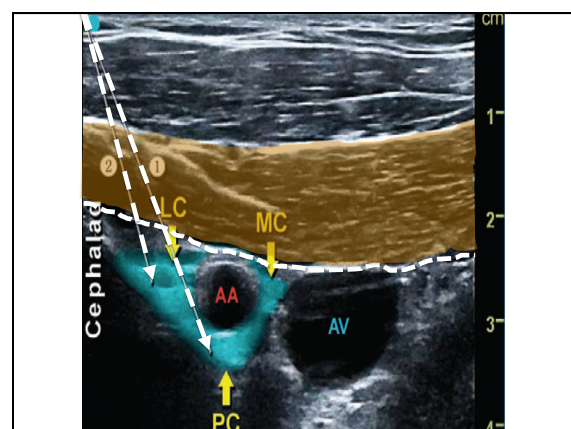
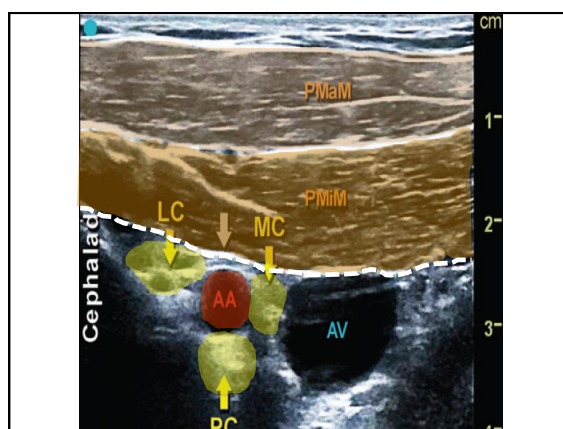
Landmarks: Axillary artery and fascia of pectoralis minor muscle (arrows).

Ideal view: Axillary artery and vein below the fascia of pectoralis minor muscle, lateral, medial, posterior cords periarterially.

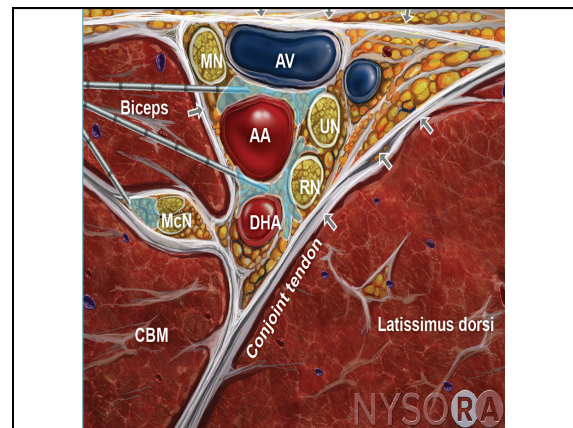
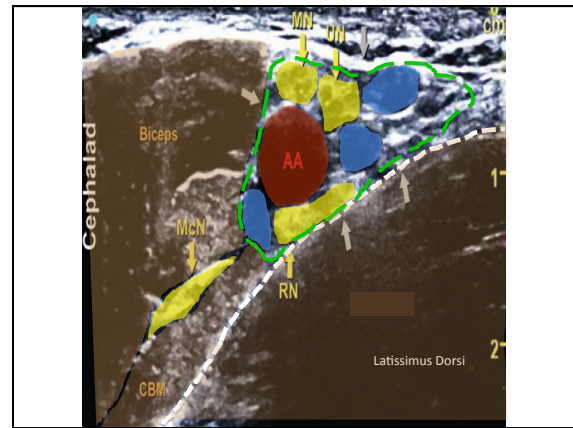
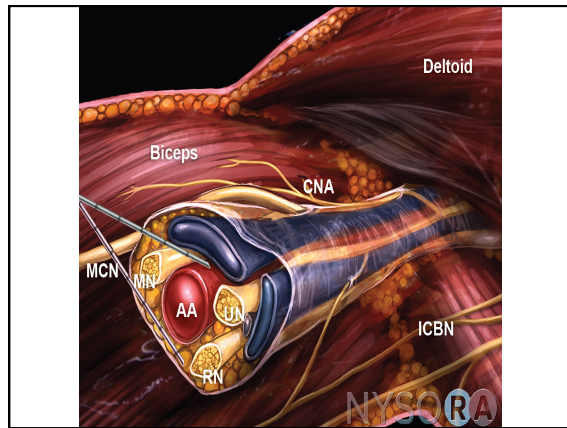
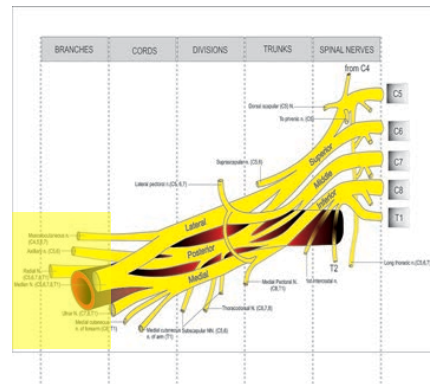
Technique: Needle insertion in plane, cephalad to caudad. Release transducer pressure before injection to detect AV and CV and decrease the risk of intravenous injection. Use PD to identify vascular structures.

Ideal spread of LA: periarterially (U-shaped).

Number of injections: 1-2. BOR



AXILLARY



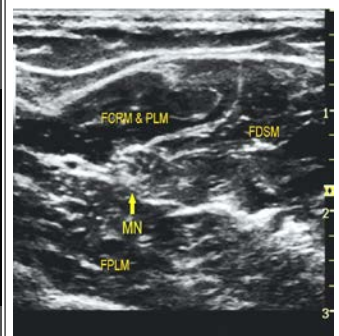
FOREARM BLOCKS

Median Nerve Block

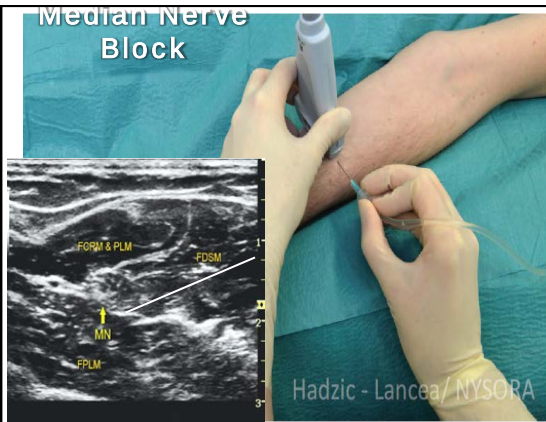


2 BIGGIES:
Dupuytren's contracture
Carpal tunnel surgery

Median Nerve Block



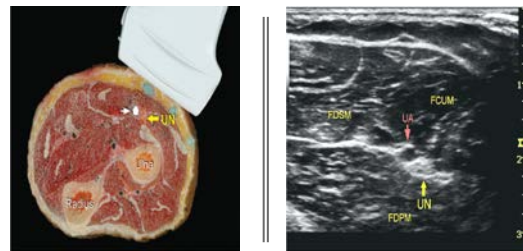
Median Nerve Block



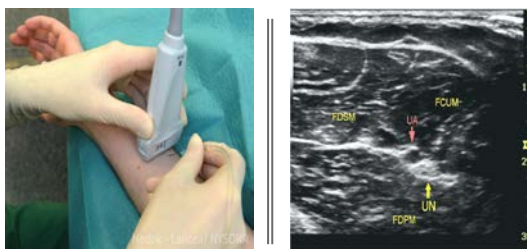
Hadzic - Lancea/ NYSORA



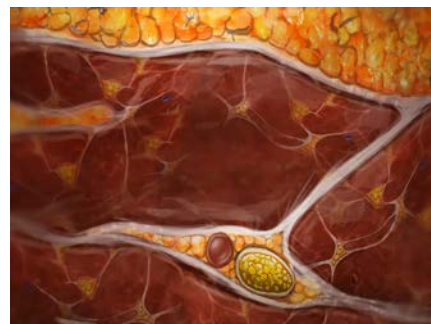
Ulnar Nerve Block



Ulnar Nerve Block

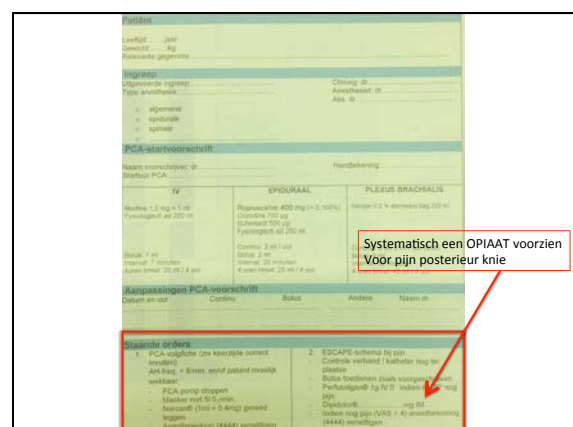
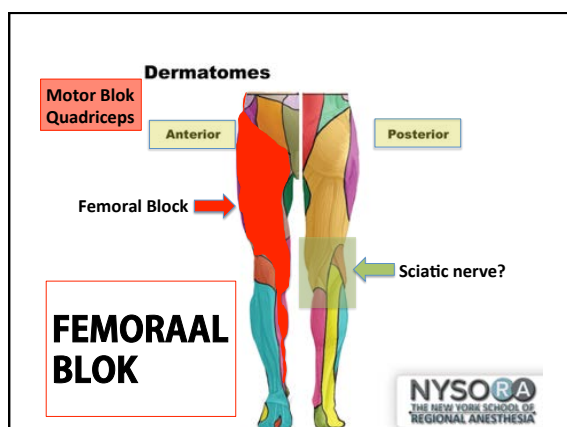
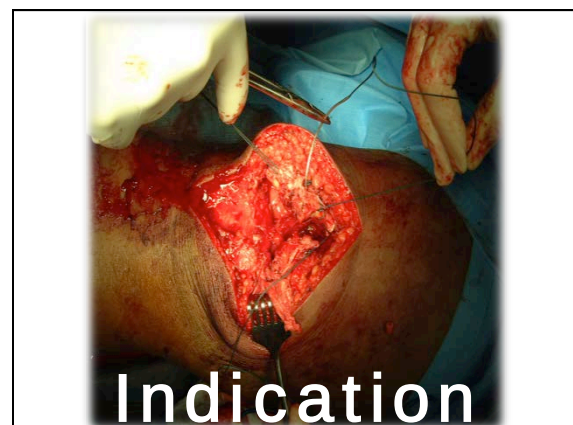
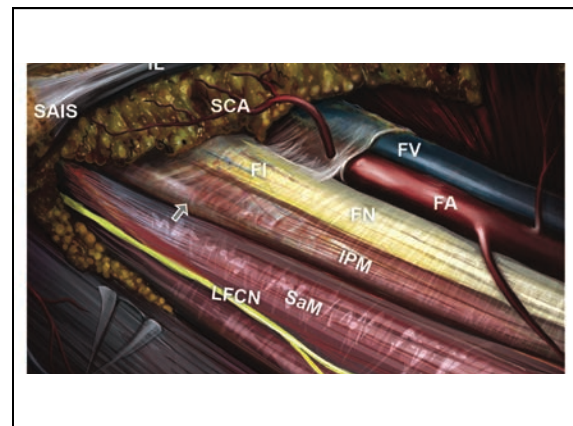


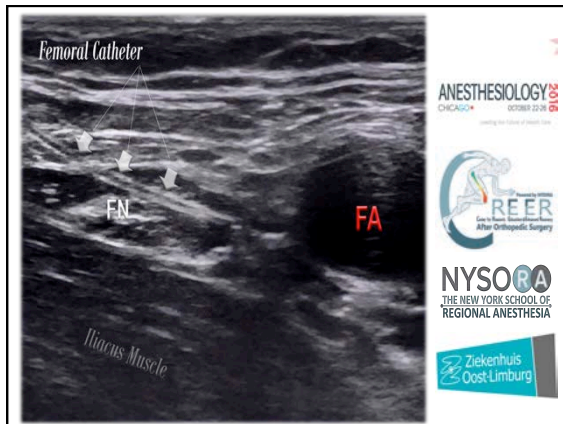
Ulnar Nerve Block
Out of Plane



LOWER EXTREMITY

Femoral Nerve Block Femoral Triangle Block Adductor Canal Block





20 Lean Volunteers

↓

US-guided FNB

↓

Cath 3 cm beyond tip

↓

Ambulate Q.1hr

↓

Check Cath Tip by US

Dislocation rates of perineural catheters: a volunteer study
D. Marhofer^{1,2}, P. Marhofer^{1,2}, L. Triffittner¹, M. Leonhardt¹, M. Weber¹ and M. Zeitlinger¹

How many catheters are not in the therapeutic position after 1, 2, 3, 4, 5, 6 hrs?

25%

Accepted for publication 1 April 2013

US guided performance of continuous femoral nerve block

Sterilization procedures and skin wheal were performed, and catheter and US equipment were used as described above. Once the femoral nerve was identified by US, the puncture was performed as described⁶ with an out-of-plane needle guidance technique and a needle introduction site 2 cm caudal to the US transducer. Five millilitres of saline were administered to confirm that the tip of the cannula was in the correct position. The catheter was advanced through the cannula 30 mm beyond the tip of the cannula and retracted under permanent slow saline administration and US guidance until the spread of the fluid was confirmed as optimal relative to the femoral nerve. The introduction length of the catheter was recorded and the catheter was fixed with sterile transparent tapes (Fig. 2). A 0.2 µm filter was connected at the proximal

25%?

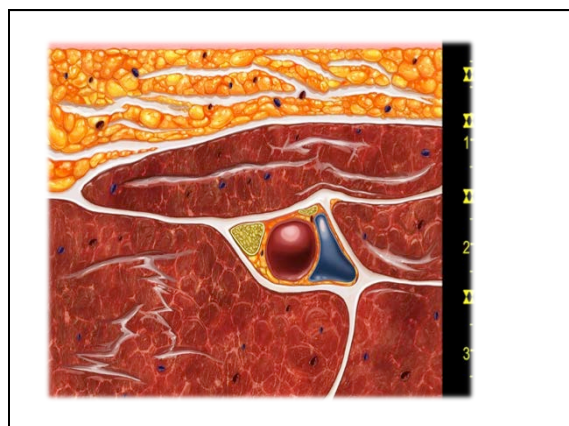
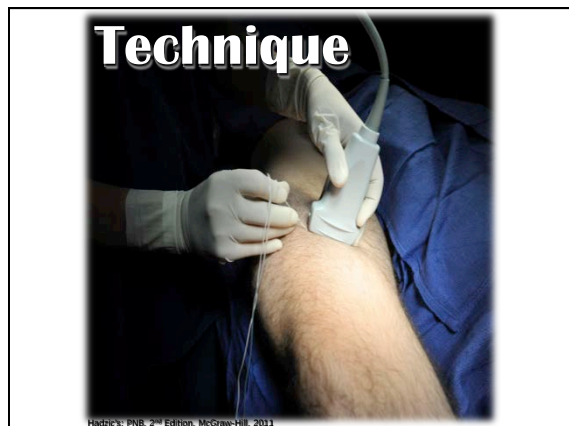
Technique ???

Dislocating rates of perineural catheters: a volunteer study
D. Marhofer^{1,2}, P. Marhofer^{1,2}, L. Triffittner¹, M. Leonhardt¹, M. Weber¹ and M. Zeitlinger¹





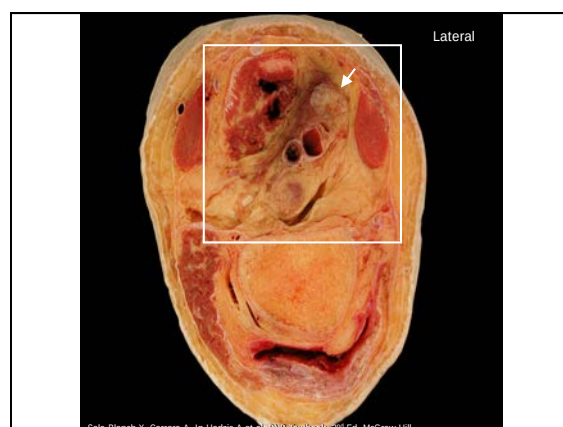
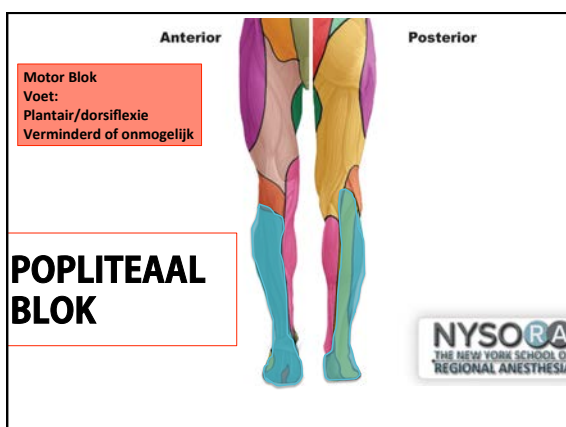
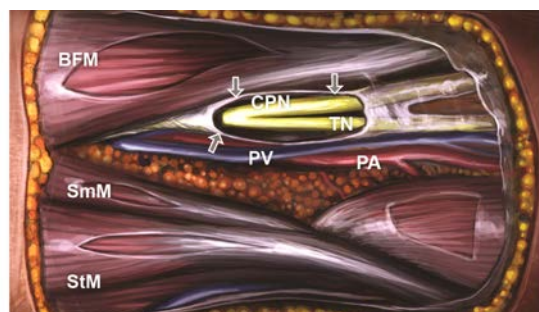
Adductor Canal Block

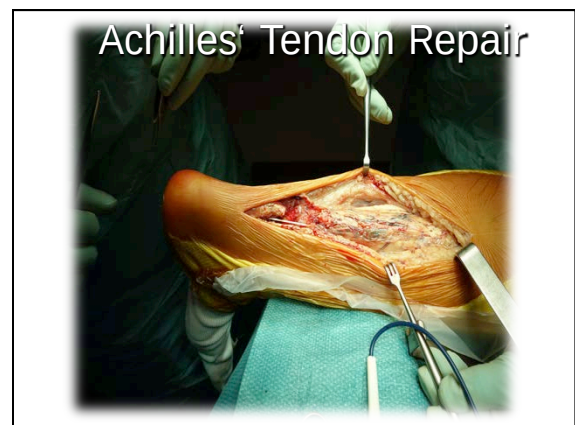
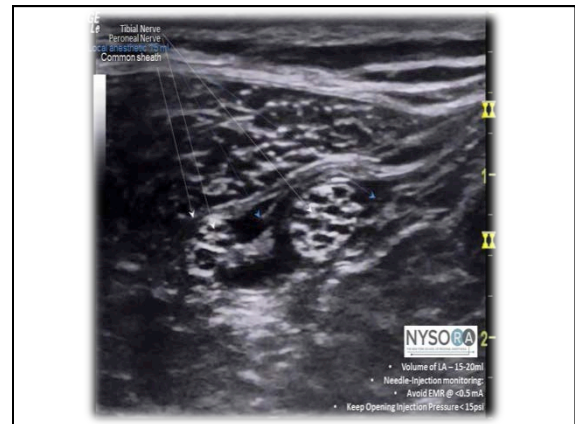
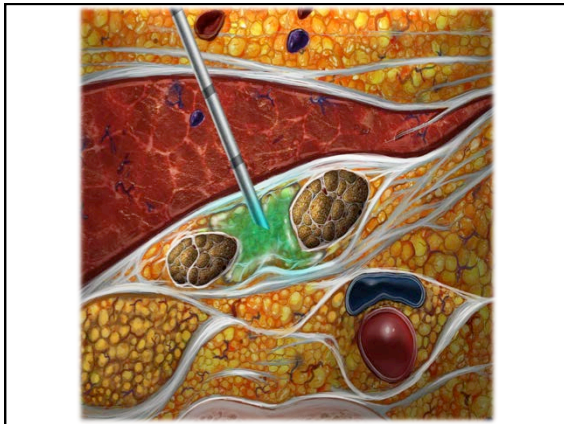


Sciatic Nerve Block

Sciatic Nerve in Popliteal Fossa

POPLITEAAL BLOK



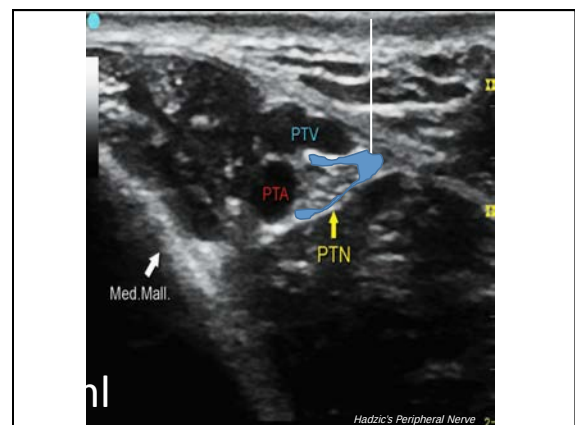
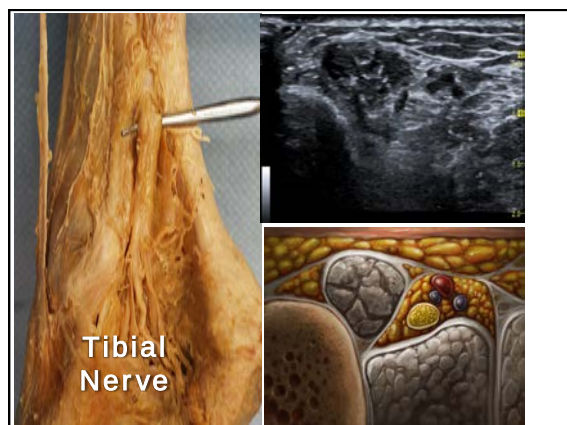


**Proximal
Sciatic
Nerve**

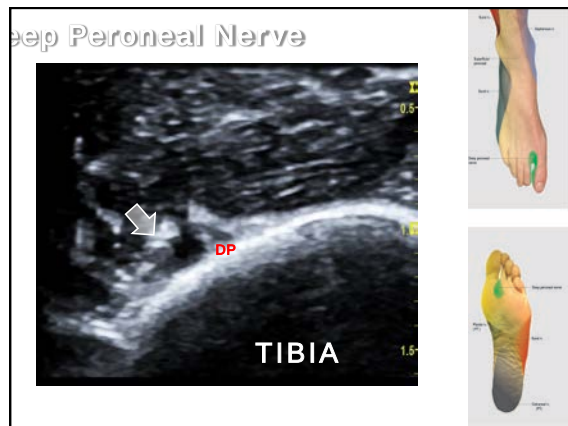
**Ankle
Blocks**



Posterior Tibial Block

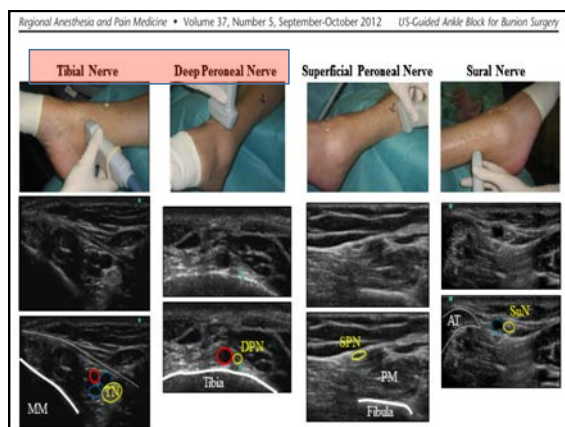


Deep Peroneal Nerve



**Saphenous,
Superficial
Peroneal, Sural
Nerves?**





Waarom is ESCAPE NOODZAKELIJK? voorbeeld

Dislocation rates of perineural catheters: a volunteer study

D. Marhofer^{1,2}, P. Marhofer^{1*}, L. Triffert², M. Leonhardt¹, M. Weber¹ and M. Zeitlinger¹

¹ Department of Clinical Pharmacology, Medical University

² Department of Anesthesiology and General Intensive

³ Department of Anesthesiology and General Intensive

Austria

⁴ Medical University of Vienna, Vienna, Austria

*Corresponding author: Department of Anesthesiology, St. Gertraud 18-20, A-1090 Vienna, Austria. E-mail: peter.m

Editor's key points

- This study investigated dislocation rates of interscalene and femoral nerve catheters in volunteers under standardized study conditions via ultrasound (US).
- They found a 15% overall dislocation rate of interscalene and femoral nerve catheters with a highly significant correlation between the time and rate of catheter dislocation.
- US was a useful technique to detect the dislocation of the spread of fluid through peripheral nerve catheters.

6 hours after catheter placement:

15% Dislocation for ISB

25% Dislocation for FNB

Background. Dislocation rates on conscious peripheral nerve block are poorly investigated even though this technique is frequently used in clinical practice. The present study was designed to evaluate dislocation rates over time of interscalene and femoral nerve catheters under defined experimental circumstances. Ultrasound (US) monitoring was used to detect the position of the perineural catheters.

Methods. Twenty volunteers received US-guided interscalene and femoral nerve catheters. The volunteers performed standardized physical exercises in regular intervals and the position of both catheters was examined by US confirmation of the spread of fluid. The maximal time of investigation in each volunteer was 6 h. The main outcome parameters were the overall dislocation rates and the cumulative dislocation rates at a given time point.

Results. We observed an overall dislocation rate of 15% for interscalene catheters, 25% for femoral nerve catheters and a significant correlation between time and rate of dislocations ($r=0.99$, $P<0.001$). US visualization of the spread of fluid was possible in all cases.

Conclusions. This is the first dedicated evaluation of dislocation rates of peripheral nerve catheters (PNCs) via US investigation. Both movement and time are considerable factors for perineural catheter displacement. US is useful for the performance of PNCs and for the continuous detection of the spread of fluid relative to the nerve and adjacent anatomical structures. Translational research is required to confirm the study results in the clinical practice.

German Clinical Trials Register: DRKS00003494.

Keywords: anesthetic techniques; regional; brachial plexus; anesthetic techniques; regional; lumbar plexus; monitoring; ultrasound

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AANDACHTSPUNTEN voor VERPLEEGKUNDIGEN bij Locoregionale Anesthesie Technieken

- **BESCHERM** "blocked" lidmaat!!
- **Block-specifieke complicaties monitoren** (cfr next slide)
- **Catheters: connecties en fixatie!!**
- **Insertie punt van catheter opvolgen**
- **Steriliteit verband catheters**
- **Beperkte lekkage via catheter = NORMAAL**
- **Uitleg aan patient te verwachten blok-duur:**
 - **Krachtsverlies**
 - **Sensorisch blok**
- **Wat doen bij pijn? Back-up R/ + Contactpersoon (5089) (cfr geel blad)**

INSTRUCTIES VOOR patient MET Perifeer Zenuwblok door ORTHO verpleegkundige

- Strategien ter **preventie van schade lidmaat**
 - . Sling tot sensorische en motor functie terugkeert
 - . Oppassen bij mobilisatie
 - . CAVE brandwonden/warmte ongevoelig!!
- **DUUR** anesthesie
 - Variabel ifv LA en type blok!! (protocols worden bijgewerkt)
- **Te verwachten sensatie bij uitwerken blok**
 - Tintelingen, paresthesieën
 - Verstoorde gevoel: waar is mijn been/arm?
 - Terugkeren postop pijn!!
- **Pijn management**
 - Wanneer pijnmedicatie nemen?
 - Pijnschema: voorkomen doorbraakpijn



CREER Movie

