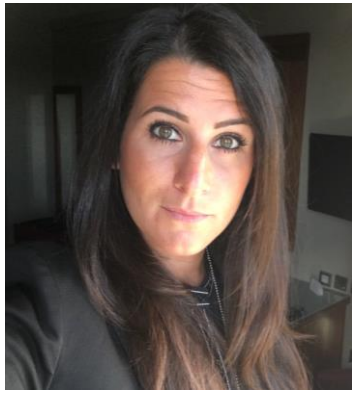
ASL ROMA 4
POLO OSPEDALIERO CIVITAVECCHIA - BRACCIANO

U.O.C. ORTOPEDIA

DIRETTORE: CARMELO D'ARRIGO

2021

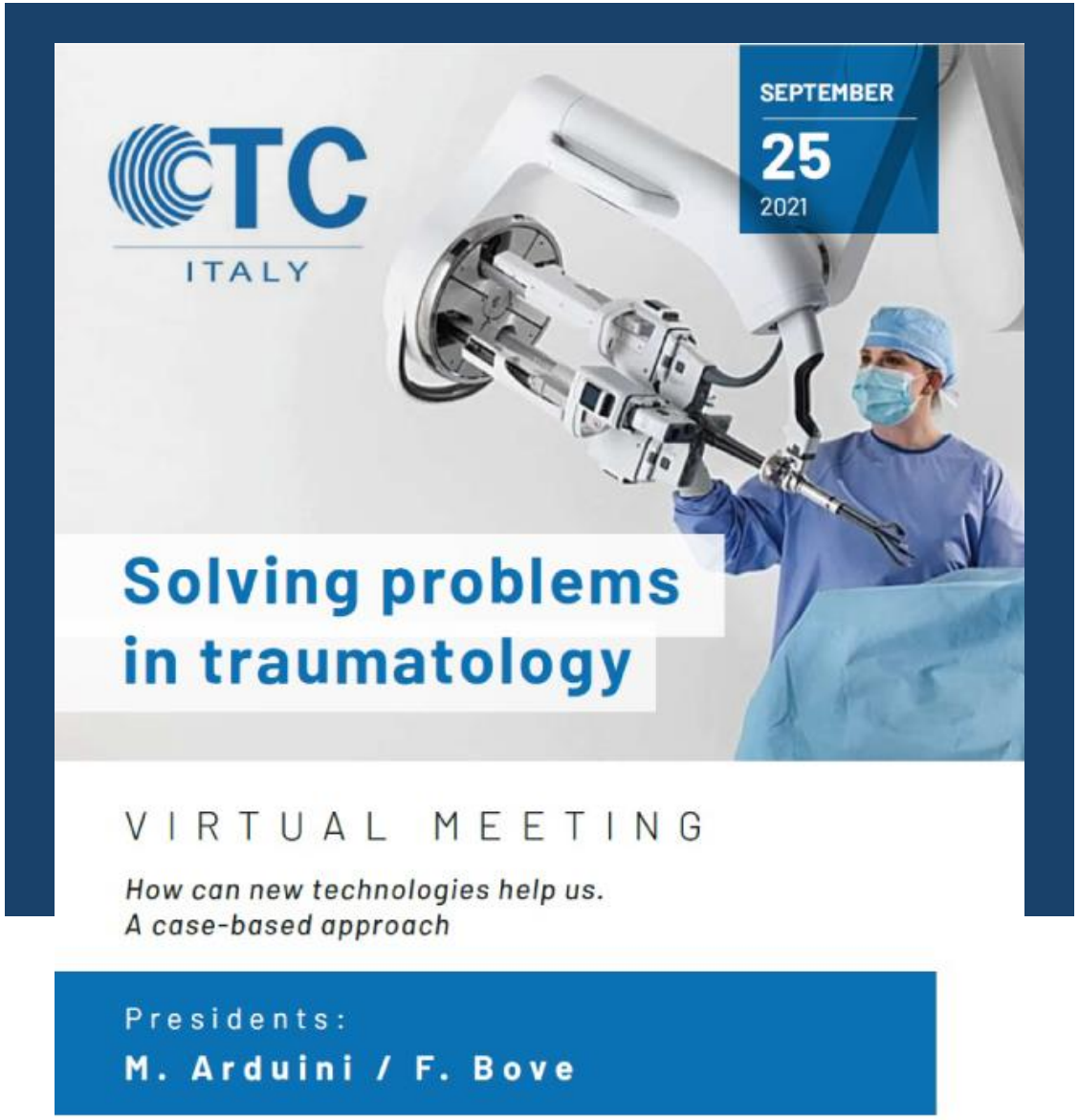


12.05 **COMPUTERIZED CRYO-COMPRESSION:** use and application in orthopedics and traumatology **R. ALONZO**

Dott. Raffaella Alonzo

Dir Med II livello UOC Ortopedia e Traumatologia

Ospedale San Paolo Civitavecchia



ASL ROMA 4

BENEFICI DELLA CRIOTERAPIA

- ✓ Riduce l'edema
- ✓ Riduce l'infiammazione locale
- ✓ Riduce lo spasmo muscolare per via della vasocostrizione riducendo indirettamente la perfusione locale
- ✓ Riduce la velocità della conduzione nervosa

› Am J Orthop (Belle Mead NJ). 2018 Sep;47(9). doi: 10.12788/ajo.2018.0075.

The Cold, Hard Facts of Cryotherapy in Orthopedics

Lauren E Piana, Kirsten D Garvey, Halle Burns, Elizabeth G Matzkin [1]

Affiliations

PMID: 30296319 DOI: 10.12788/ajo.2018.0075

Currently, cold therapy for pain reduction is an accepted and frequently used treatment in daily practice after trauma or surgery since the time of Hippocrates. Although the mechanism is not well understood, cold therapy has been used for centuries in treatment for pain and swelling. Cryotherapy involves the application of cold to the skin surrounding the injured soft tissues and in joint surgery is supposed to

ASL ROMA 4

Pie

Review Article

Journal of Orthopaedic Surgery

Journal of Orthopaedic Surgery
27(1) 1–6

DOI: 10.1177/2309499019832752
journals.sagepub.com/home/osj
SAGE

Cryotherapy following total knee arthroplasty: What is the evidence?

A Thacoor[1] and NA Sandiford[2]

Physiology of action

Cryotherapy involves the application of a cold substance, such as ice, to the skin surrounding inflamed soft tissues and joints. The theoretical physiological benefits of clinical cryotherapy have been widely documented since its use in the 1960s and the effects of ice have been demonstrated in several animal and human studies.[8,9] The proposed mechanism of action is that a reduction in temperature reduces intra-articular temperature and limits pain through reducing nerve conduction velocity in addition to promoting immediate vasoconstriction, reducing vascular spasm and slowing down of blood flow, ultimately decreasing tissue edema.[10]

The intra-articular temperature reduction is transient.[11] Studies in animal models have demonstrated that excessively low temperatures or prolonged cooling results in a paradoxical increase in local edema.[12] Despite immediate vasoconstriction and reduction in blood flow, cryotherapy could lead to delayed vasodilation and disruption of secondary hemostasis. Evidence also exists, showing that local application of ice could impair hemostasis, leading to prolonged bleeding time, increased clotting time, reduced platelet aggregation, and increased clot formation time, although this has not been shown to be an issue in patients without pre-existing coagulopathy.[13]

Some authors have reported limited benefit of cryotherapy on alleviating pain[14] or reducing blood loss[15] and inconsistent findings on decreasing swelling and improving mobility[16] post-TKA. The following discussion addresses these issues.

Knee Surgery, Sports Traumatology, Arthroscopy (2019) 27:1204–1212
https://doi.org/10.1007/s00167-018-4962-y

KNEE

Reduced opiate use after total knee arthroplasty using computer-assisted cryotherapy

Elke Thijs[1] · Martijn G. M. Schotanus[1] · Yoeri F. L. Bemelmans[1] · Nanne P. Kort[2]

Received: 4 January 2018 / Accepted: 23 April 2018 / Published online: 3 May 2018

J Athl Train. 2004 Jul-Sep; 39(3): 278–279.

PMCID: PMC522152
PMID: 15496998

Does Cryotherapy Improve Outcomes With Soft Tissue Injury?

Tricia J. Hubbard and Craig R. Denegar

Conclusions:

Based on the available evidence, cryotherapy seems to be effective in decreasing pain. In comparison with other rehabilitation techniques, the efficacy of cryotherapy has been questioned. The exact effect of cryotherapy on more frequently treated acute injuries (eg, muscle strains and contusions) has not been fully elucidated. Additionally, the low methodologic quality of the available evidence is of concern. Many more high-quality studies are required to create evidence-based guidelines on the use of cryotherapy. These must focus on developing modes, durations, and frequencies of ice application that will optimize outcomes after injury.

› Orthop Traumatol Surg Res. 2014 May;100(3):309-12. doi: 10.1016/j.otsr.2013.12.019. Epub 2014 Mar 25.

Cryotherapy with dynamic intermittent compression for analgesia after anterior cruciate ligament reconstruction. Preliminary study

J Murgier [1], X Cassard [2]

Affiliations
PMID: 24679367 DOI: 10.1016/j.otsr.2013.12.019

Comparative Study › J Foot Ankle Surg. May-Jun 2018;57(3):436-439.
doi: 10.1053/j.jfas.2017.08.002.

The Use of Cryotherapy for the Prevention of Wound Complications in the Treatment of Calcaneal Fractures

Sanfu Lin [1], Junjie Xie [2], Xuedong Yao [3], Zhangsheng Dai [3], Wenhua Wu [4]

Affiliations
PMID: 29685558 DOI: 10.1053/j.jfas.2017.08.002

Clin Orthop Relat Res (2014) 472:3417–3423
DOI 10.1007/s11999-014-3810-8

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

CLINICAL RESEARCH

Does Advanced Cryotherapy Reduce Pain and Narcotic Consumption After Knee Arthroplasty?

Emmanuel Thienpont MD, MBA

ASL ROMA 4

Z-ONE®

ZAMAR

ZAMAR MEDICAL d.o.o.
Sv. Martin, 6 - 52450 - Vrsar - (HR)
Tel: +385 (0)52 496 111 - VAT: 96642432252
info@zamar.care

Features

APPLICATION	COLD
TEMPERATURE RANGE	+5°C +15°C (41°F 60°F)
SCREEN	LCD 5" color TouchScreen
WRAPS	Liquid / Air Wraps
Glycol	NON TOX freeze
Air Compression levels	mmHg: 50 - 75 - 110
setup time limit	10 h.
Medical class for Wraps	BF
Salvable therapies	1 + 2
DIMENSIONS	cm. 29 x 26 x 30 inc. 11 x 10 x 11
WEIGHT	9 kg. - (20 lb.)

- LCD 5 inc, TFT color touch screen
- Easy software, Intuitive Menu icons
- Possibility to select temperature and tre-atment time
- Set programs that doctors can customize and save
- Totally automated cycle management
- Fast connecion/detatchment of wraps and pipes with Dripless connectors
- Anatomic Wraps pre charge with glycol
- NON-TOX cooling liquid

www.zamar.care

CE 1370

NO ICE / NO WATER
Therapeutic cooling technology without ice or water inside.

CLOSED & CLEAN SYSTEM
ZAMAR DRIPLESS SYSTEM preloaded with glycol doesn't need to refill or drain off liquid.

INNOVATIVE COOLING
Advance technology based on real-time temperature parameters.

STAY FOCUSED ON TEMPERATURE
Set exact temperature you want to reach.

INTERMITTENT COMPRESSION
Improves benefits of cold therapy and healing with 3 levels of air-compression.

INSPIRED BY YOUR SHAPE
Complete range of Anatomic wraps designed on your body.

ASL ROMA 4

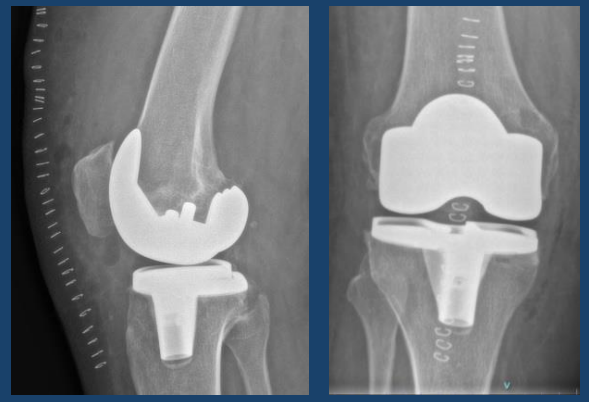
***Disclousure**: The authors have nothing to diclose*

ASL ROMA 4

LA NOSTRA ESPERIENZA

Traumatologia

utilizzo della crioterapia computerizzata nel pre e post operatorio nelle fratture dell'arto inferiore (fratture collo piede, gamba e ginocchio)

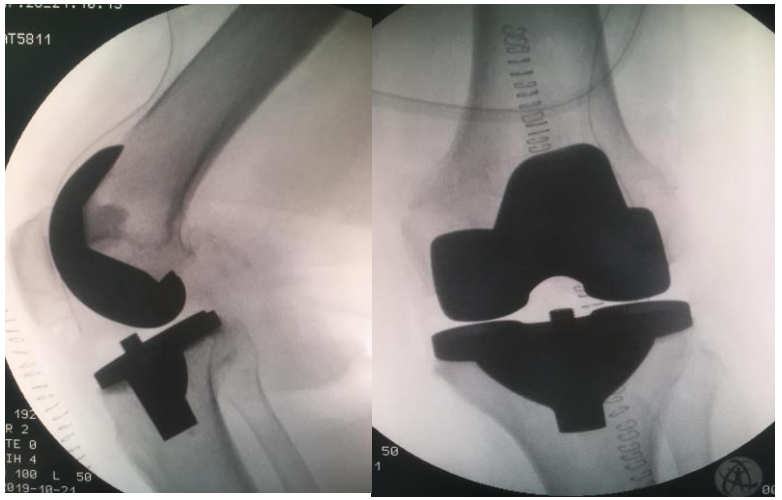


Ortopedia

Utilizzo della crioterapia nel post operatorio nelle tka

Utilizzo crioterapia computerizzata in Ortopedia

How can new technologies help us
A case-based approach



End point primario

VAS post operatoria e l' utilizzo di oppioidi e Fans

End point secondari

1. ROM
2. Infezioni

Knee Surgery, Sports Traumatology, Arthroscopy (2019) 27:1204–1212
https://doi.org/10.1007/s00167-018-4962-y

KNEE

Reduced opiate use after total knee arthroplasty using computer-assisted cryotherapy

Elke Thijs[1] · Martijn G. M. Schotanus[1] · Yoeri F. L. Bemelmans[1] · Nanne P. Kort[2]

Received: 4 January 2018 / Accepted: 23 April 2018 / Published online: 3 May 2018

Abstract

Purpose Despite multimodal pain management and advances in anesthetic techniques, total knee arthroplasty (TKA) remains painful during the early postoperative phase. This trial investigated whether computer-assisted cryotherapy (CAC) is effective in reduction of pain and consumption of opioids in patients operated for TKA following an outpatient surgery pathway.

ASL ROMA 4

LA NOSTRA ESPERIENZA

- Tutte le TKA da dicembre 2020 ad oggi
- OA primarie (varo o valgo)
- Stessa equipe da dicembre a oggi
- **Protocollo 3h+3h appena rientrati dalla sala**
- Intervallati da chinesi terapia mattina e pomeriggio
- Deambulazione dalla prima giornata post operatoria
- Profilassi anti TVP con EPBM 8-10 h dall'intervento

ASL ROMA 4

Studio prospettico randomizzato

107 pz (7 esclusi poichè non rientravano nei criteri di inclusione)

100 TKA 2 gruppi omogenei per età, comorbidità,BMI e sesso

Gruppo 1 : applicazione della crioterapia computerizzata e pressoterapia

Gruppo 2 : classico ice pack

No blocchi antalgici post operatori

VS

ASL ROMA 4

Randomizzazione tramite software dedicato

Consenso scritto

SISTEMA SANITARIO REGIONALE
ASL ROMA 4

REGIONE LAZIO

SCHEDA DI CRIOTERAPIA
PROTESI GINOCCHIO

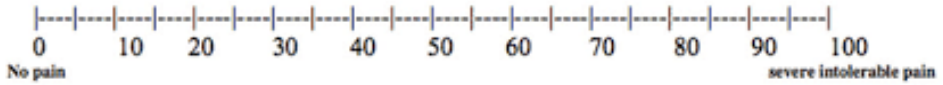
COGNOME	n. letto
NOME	ETA'
DIAGNOSI VARO O VALGO	
INDICAZIONI	INTERVENTO DATA E TIPO

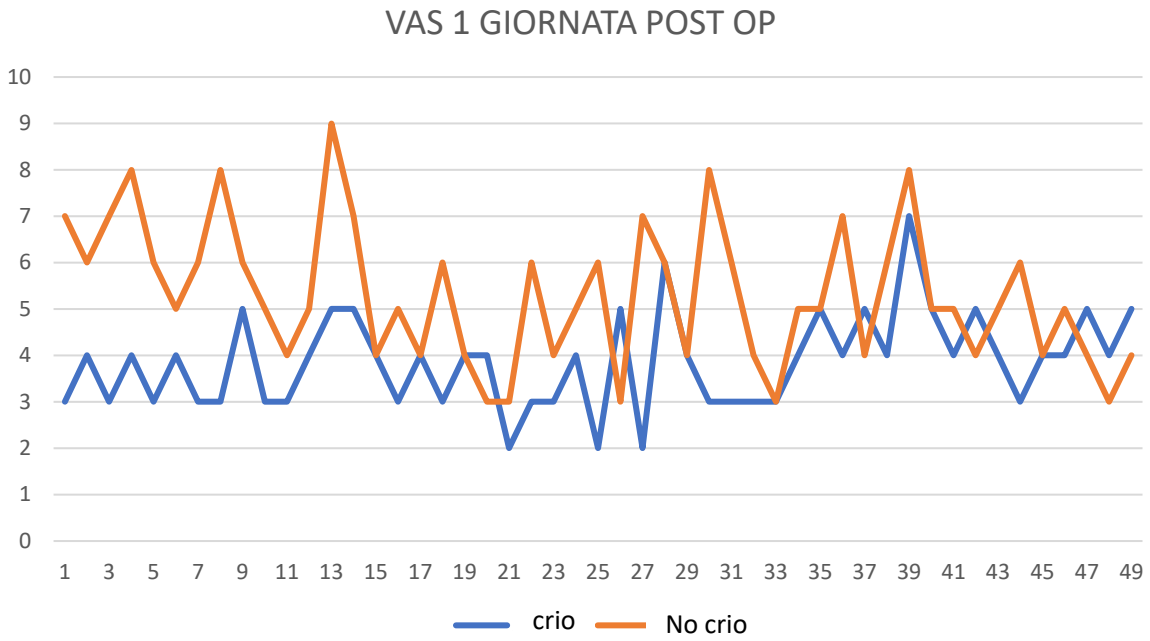
DATA	ORA INIZIO	VAS	ROM	PARACETAMOLO	FANS	TRAMADOLO	MORFINA

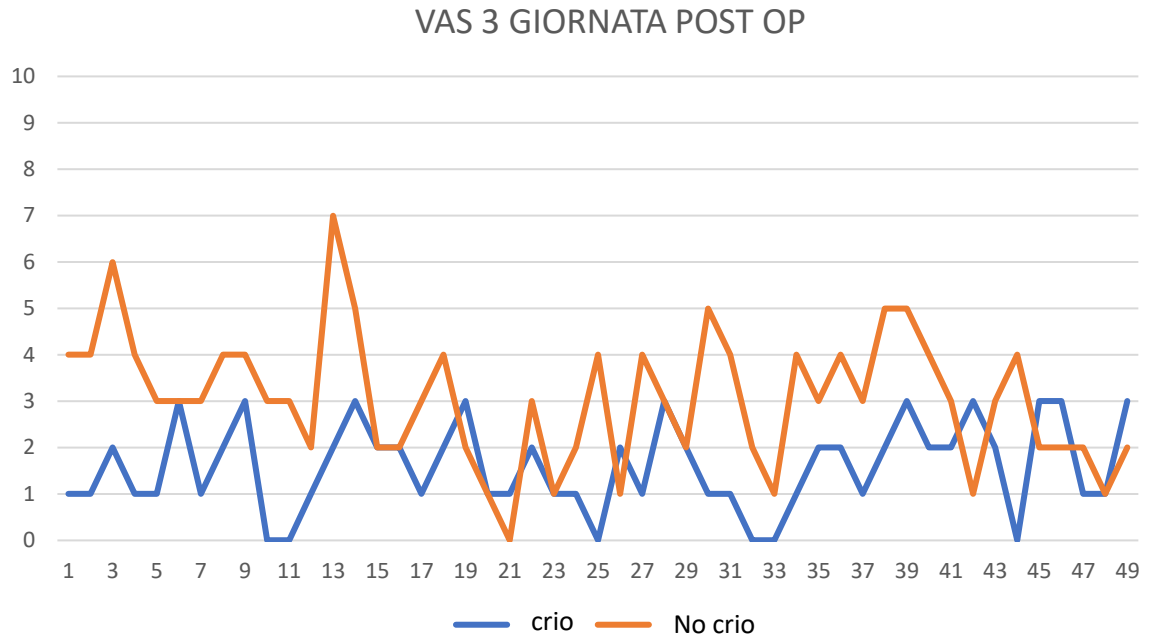
Azienda ASL Roma 4 – Via Terme di Traiano, 39/a – 00053 – Civitavecchia Tel. 06.966 69100 - P.I. 04743741003 – sito: www.aslrmf.it
U.O.C. Ortopedia e Traumatologia Presidi di Civitavecchia e Bracciano - Tel 0766 591312 (Civitavecchia) 06 99890265 (Bracciano)

ASL ROMA 4

Visual Analogue Scale (VAS)

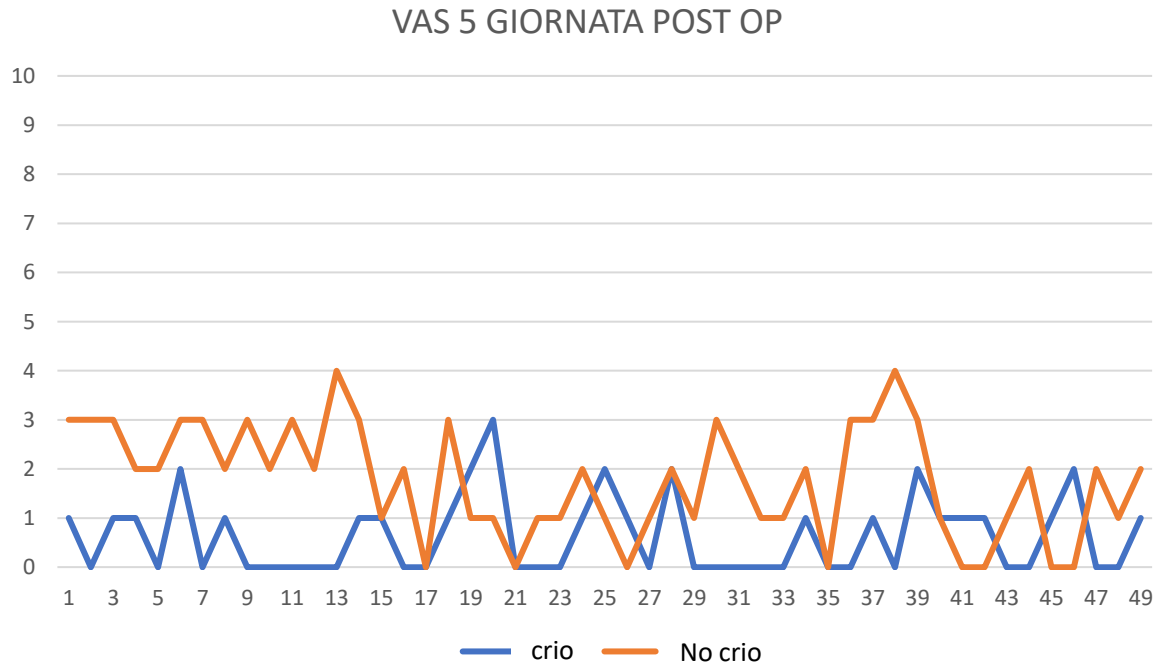






VAS MEDIA	1 giornata	3 giornata	5 giornata
CRIO	3,8	1,5	0,6
NO CRIO	5,3	3	1,75

p <0,01



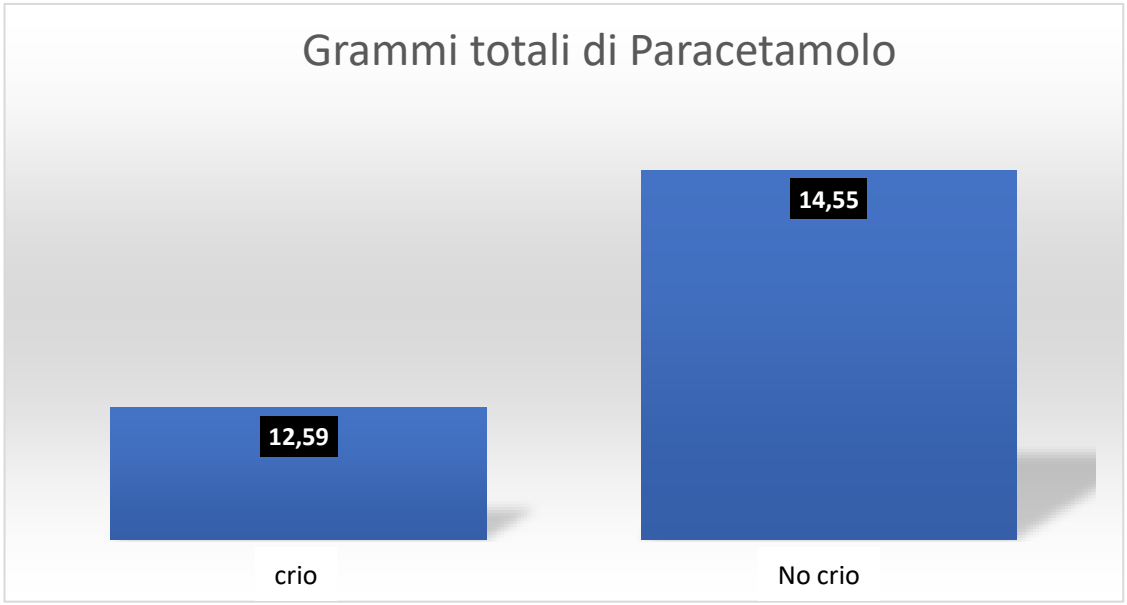
ASL ROMA 4

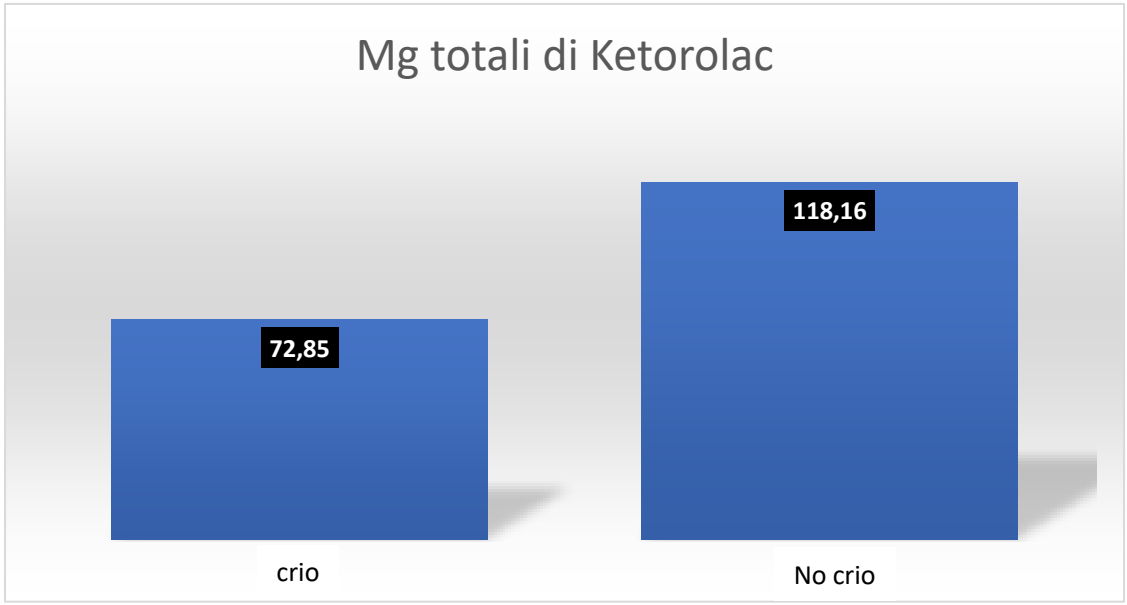
SOMMA DEI FARMACI ASSUNTI DURANTE LA DEGENZA

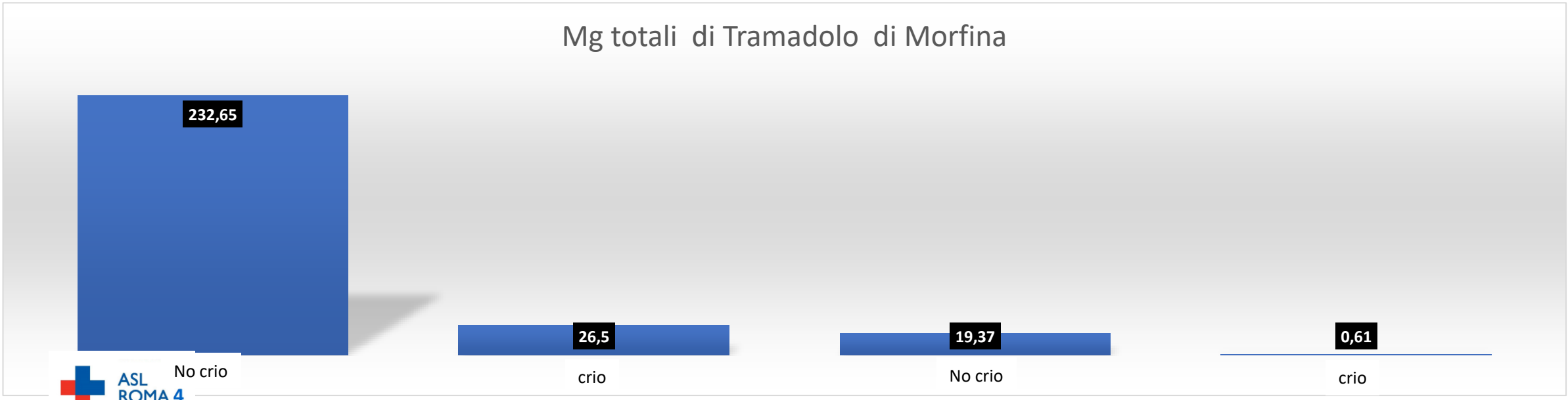
	Paracetamolo (g)	Ketorolac (mg)	Tramadolo (mg)	Morfina (mg)
GRUPPO1 (CAC)	12,59	72,85	26,53	0,65
GRUPPO 2 (no CAC)	14,55	118,16	232,65	19,30

$p < 0{,}01$

ASL ROMA 4

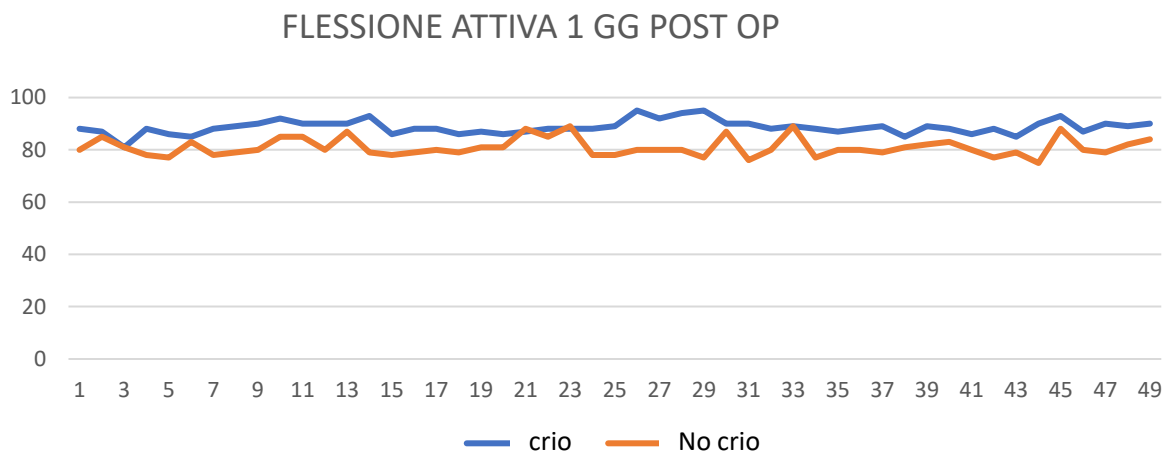

Grammi totali di Paracetamolo
12,59
14,55
crio
No crio

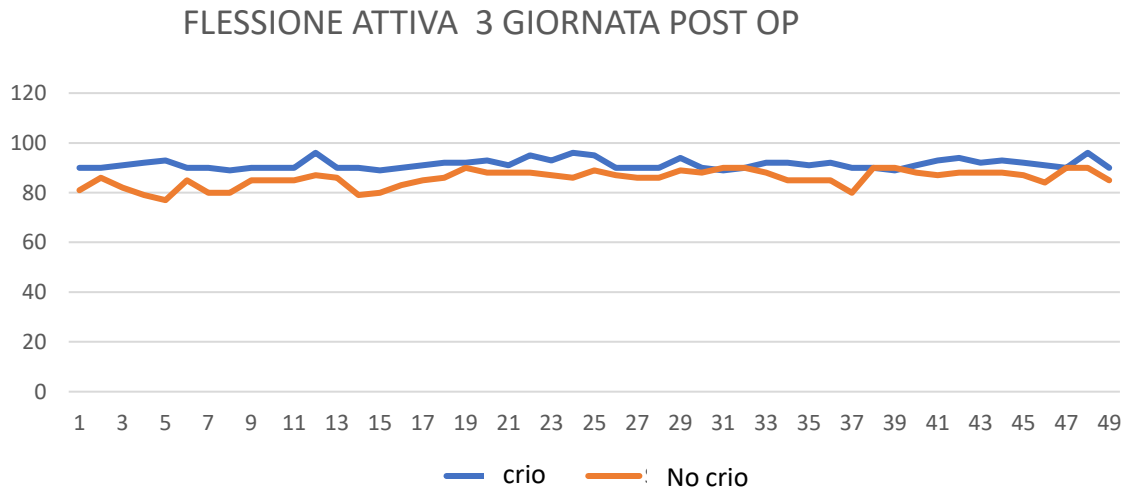

Mg totali di Ketorolac
72,85
118,16
crio
No crio


Mg totali di Tramadolo di Morfina
232,65
26,5
19,37
0,61
No crio
crio
No crio
crio

ASL ROMA 4

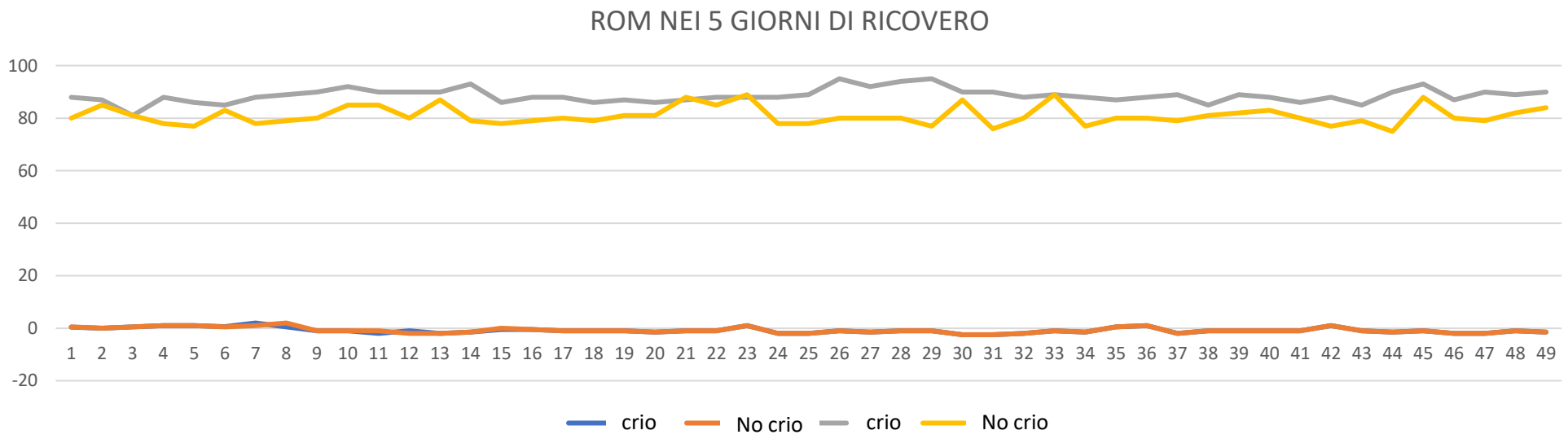
Migliore ROM soprattutto attivo in 3 e 5 giornata post operatoria





ASL ROMA 4

FLESSIONE ATTIVA (media)	Crio	No crio
1 giornata	88,6	80,9
3 giornata	91,4	85,7
5 giornata	92,3	90,2



ASL ROMA 4

Nessuna differenza significativa :

- Nell’estensione attiva o passiva
- Nelle perdite ematiche (valori medi di HB in 1, 3 , 5 gg post op)
- Nel tempo di ricovero (tempo medio di ricovero di 5,35 gg in entrambi i gruppi)
- Nessuna infezione
- Nessun evento tromboembolico

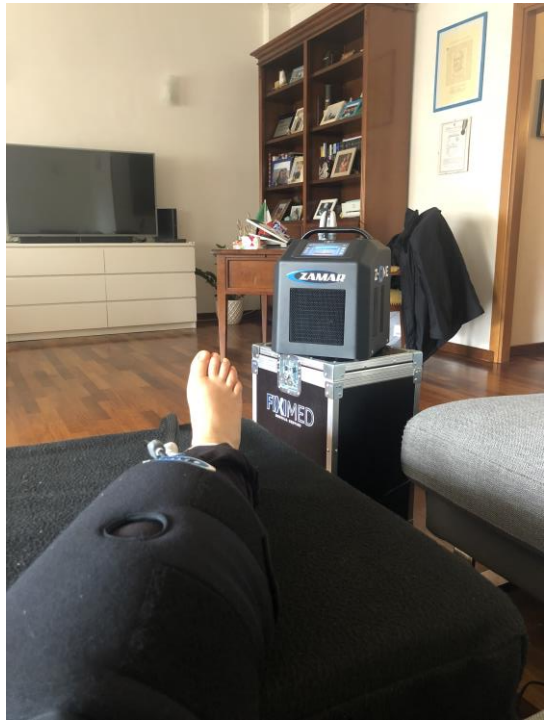
ASL ROMA 4

Forza dello studio

netta riduzione del dolore nel post operatorio, con minore utilizzo di antidolorifici

Debolezze dello studio

- **Serie limitata di casi**
- **Mancato utilizzo del macchinario dopo la dimissione**
- **Compliance del personale**



ASL ROMA 4

Utilizzo crioterapia computerizzata in Traumatologia

End point primario

Time to surgery e tempi di ricovero

End point secondari

1. Infezioni
2. Deiscenza della ferita chirugica
3. Controllo del dolore (VAS)
4. Soddisfazione del paziente (smile)

ASL ROMA 4

ASL ROMA 4

Protocollo crioterapia in traumatologia

- Applicazione crioterapia 6h +6h nelle 24h
- Applicata nel minor tempo utile
- Applicazione nel pre e nel post operatorio
- Fondamentale la compliance di tutto il personale della UOC

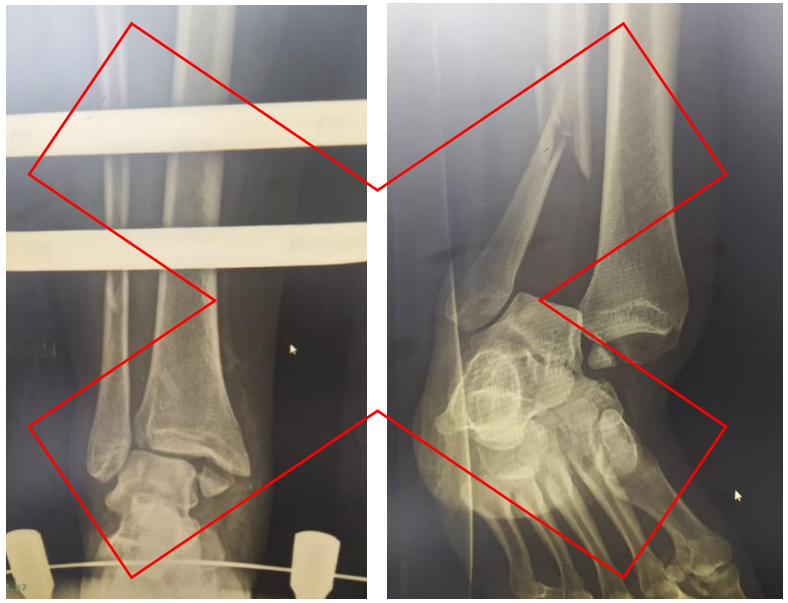
ASL ROMA 4

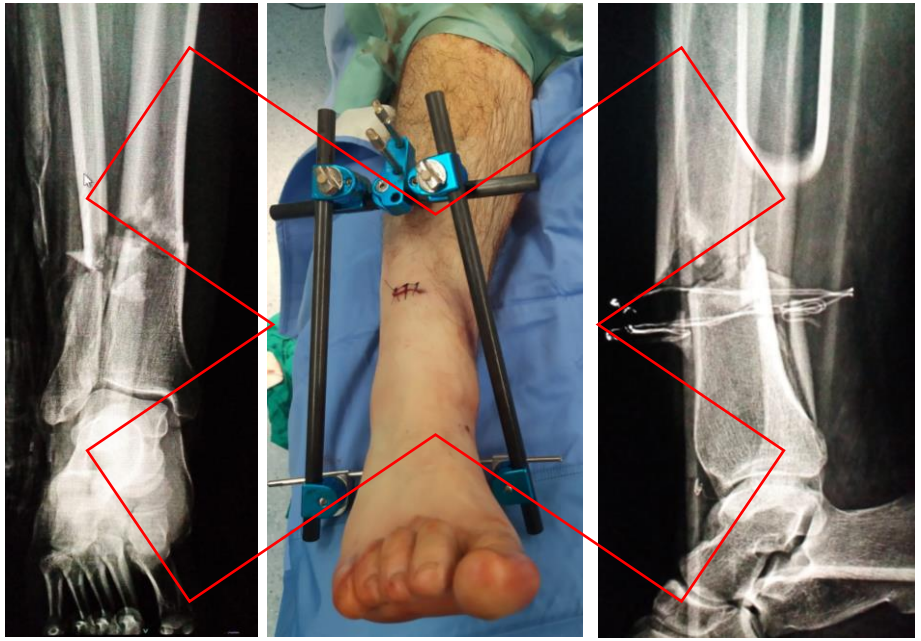
Studio prospettico

Gennaio 2021 – Settembre 2021

Totale casi : 42

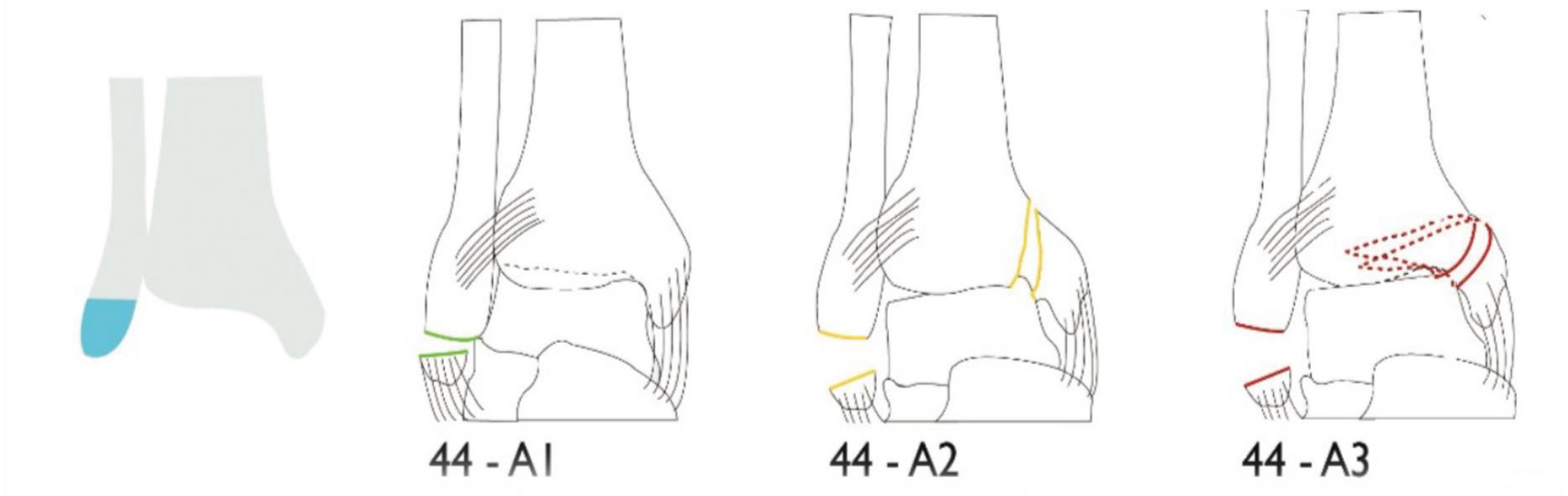
- 29 fratture bi/trimalleolari classificate AO 44 (A,B,C)
- 4 fratture gamba classificate AO 42 (A,B,C)
- 2 fratture del piatto tibiale
- 5 Fratture di rotula
- 2 Fratture calcagno





ASL ROMA 4

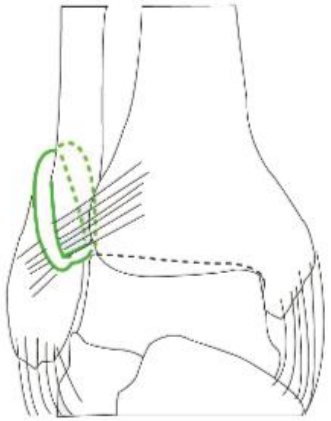
TIPOLOGIE DI CASI TRATTATI



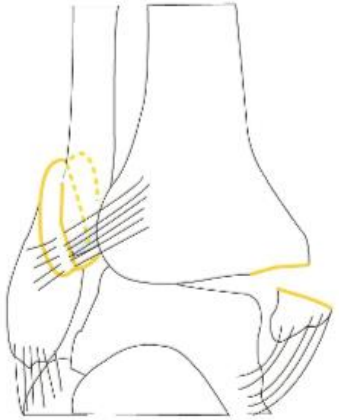
4 CASI - TIPO A1

1 CASO - TIPO A2

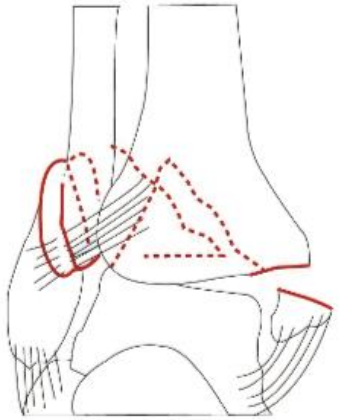
TIPOLOGIE DI CASI TRATTATI



44 - B1



44 - B2



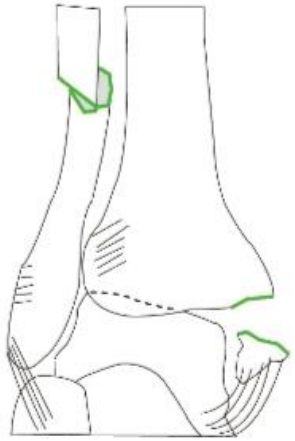
43 - B3

5 CASI - TIPO B1

10 CASI - TIPO B2

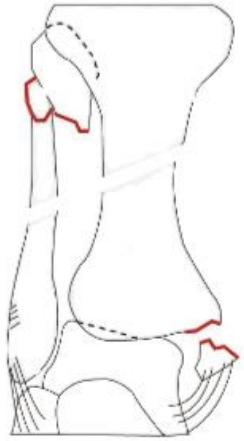
10 CASI - TIPO B3

TIPOLOGIE DI CASI TRATTATI



44 - C1

44 - C2



44 - C3

2 CASI - TIPO C 2

ASL ROMA 4

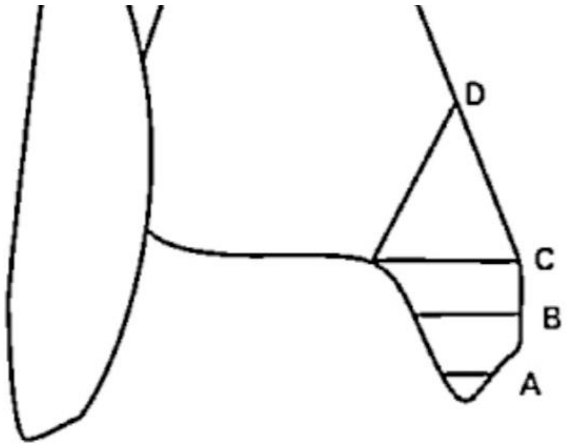
TIPOLOGIE DI CASI TRATTATI

Herscovici classification for fractures of the medial malleolus

2 CASI

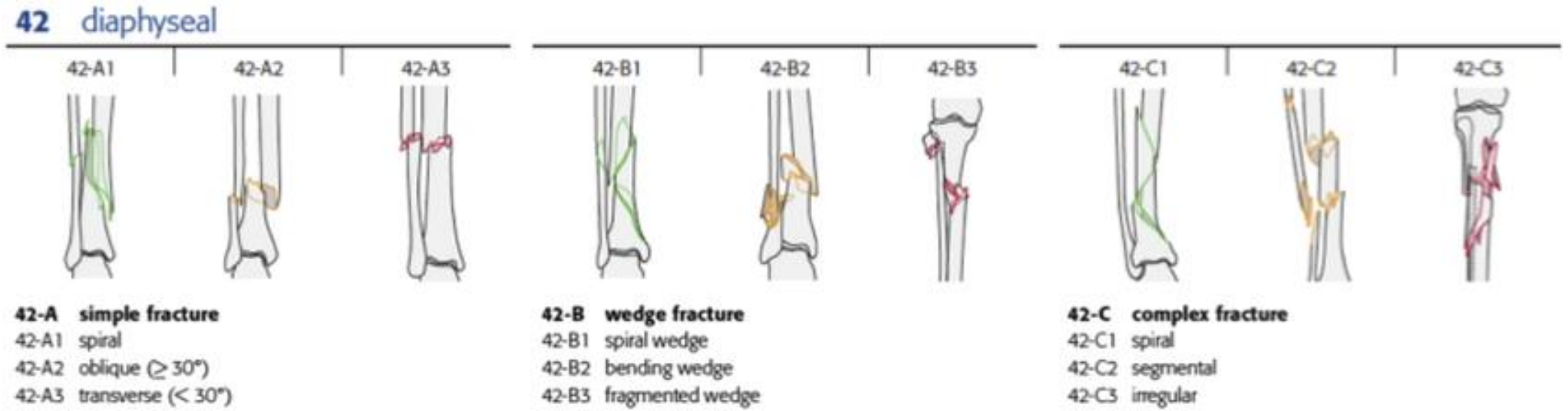
1 TIPO B

1 TIPO C



ASL ROMA 4

TIPOLOGIE DI CASI TRATTATI



1 CASO A1
2 CASI B1
1 CASO B2

ASL ROMA 4

TIPOLOGIE DI CASI TRATTATI

5 FRATTURE DI ROTULA
2 FRATTURE DI PIATTO TIBIALE
2 FRATTURE DI CALCAGNO

ASL ROMA 4

GRUPPO DI CONTROLLO

- ✓ EPOCA PRE CIO …
- ✓ FRATTURE TRANSITATE DA APRILE 2018 A GENNAIO 2021
- ✓ PATTERN DI FRATTURA EQUIVALENTE

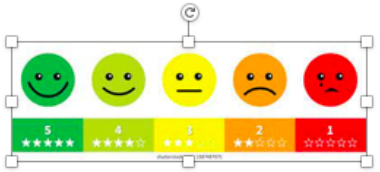
Traumatologia

End point primario

Time to surgery e tempi di ricovero

End point secondari

1. Infezioni
2. Deiscenza della ferita chirugica
3. Controllo del dolore (VAS)
4. Soddisfazione del paziente (smile)

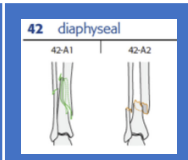


Totale casi : 84 SUDDIVISI IN 2 GRUPPI

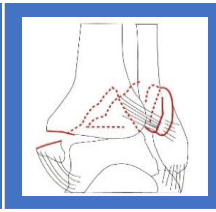
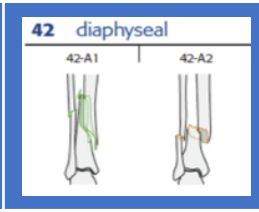
	Crio Group	No crio Group
AO 44 A, B,C	29	29
AO 42 A,B,C	4	4
PIATTO TIBIALE	2	2
ROTULA	5	5
CALCAGNO	2	2

	Crio Group	No crio Group
Età media	55,4 16-80	56 18-82
Sesso	26 F 16 M	29 F 13 M
Lato	20 dx 22 sx	23 dx 19 sx
ASA media	1,9	2

Pie

CRIO GROUP				rotula	calcagno
Time to surgery (Media in ore)	40 h	72 h	48 h	26 h	62 h
Deiscenze	0	0	0	0	0
Infezioni	0	0	0	0	0
Vas media	1,9	2,3	3	1	1,8
Soddisfazione del pz					
Giorni di ricovero	3,25 gg	5 gg	5gg	3gg	6 gg

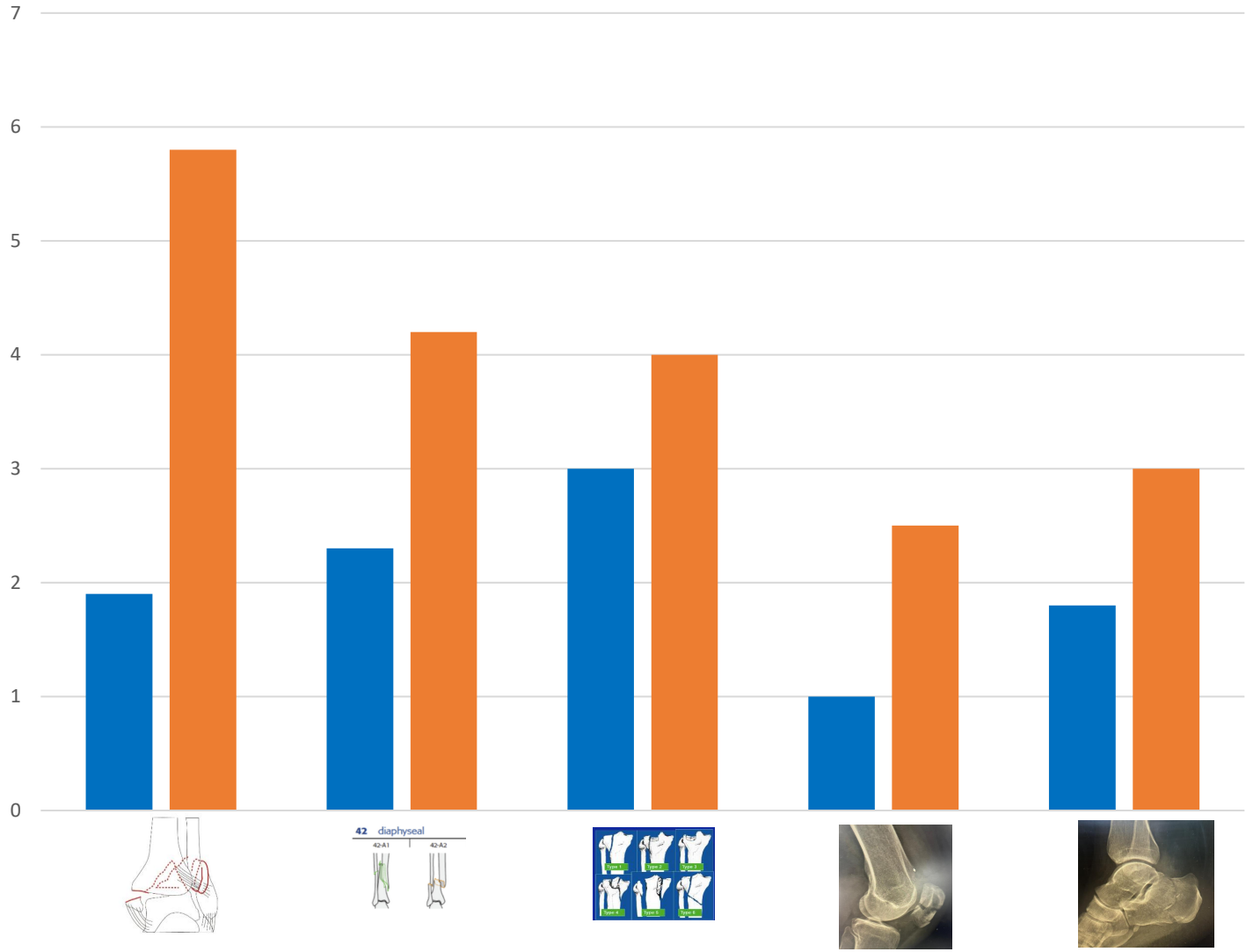
ASL ROMA 4

NO CRIO GROUP				rotula	calcagno
Time to surgery (Media in ore)	88 h	104 h	52 h	28 h	76 h
Deiscenze	4	0	1	0	1
Infezioni	1	0	0	0	0
Vas media	5,8	4,2	4	2,5	3
Soddisfazione del pz	😐	🙂	😐	🙂	☹️
Giorni di ricovero	5 gg	6,25 gg	7 gg	3 gg	8 gg

ASL ROMA 4

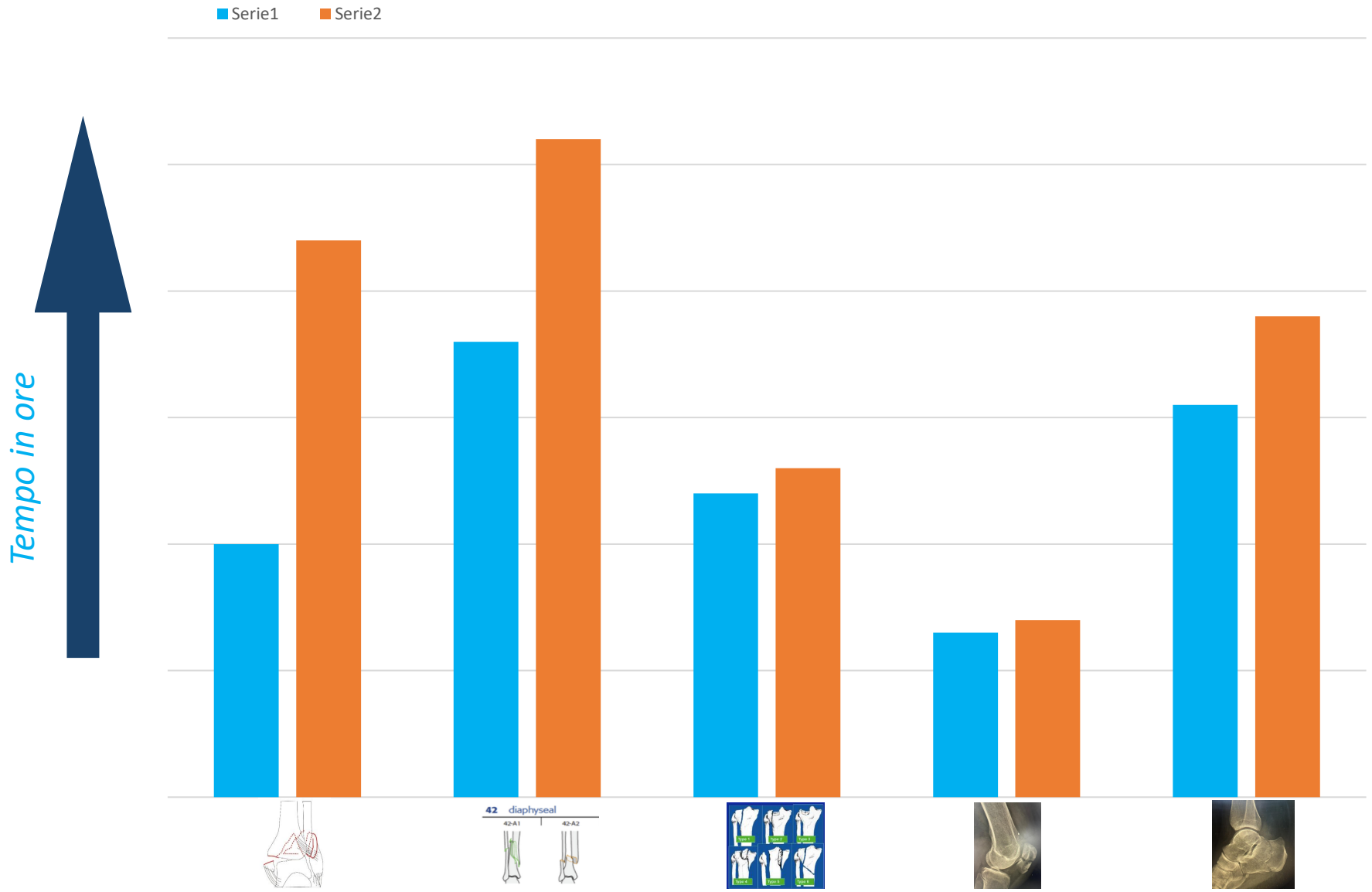
Retrospettivamente selezionato

VAS MEDIA



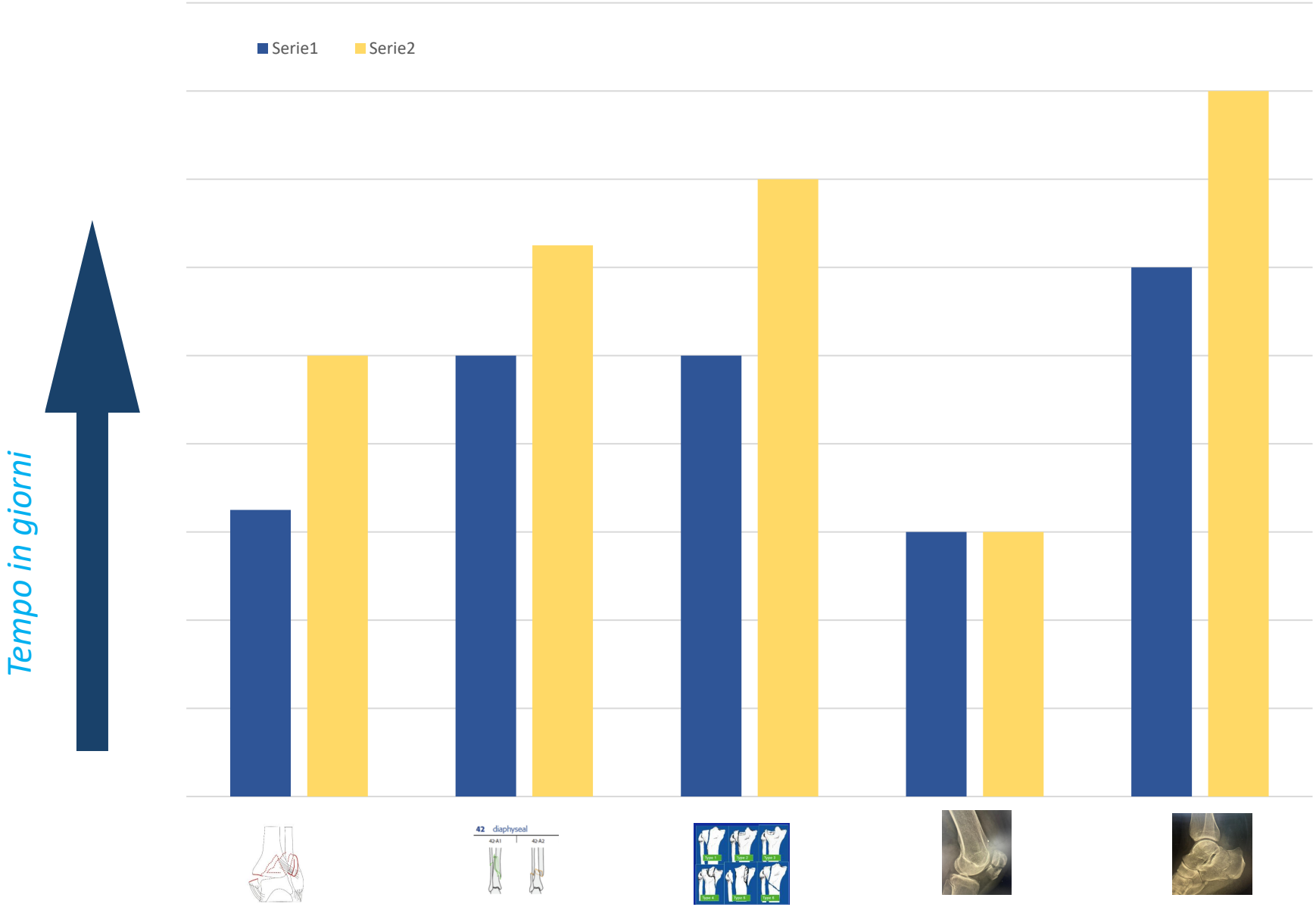
ASL ROMA 4

TIME TO SURGERY



ASL ROMA 4

DURATA DEL RICOVERO



ASL ROMA 4

Debolezze dello studio

- ✓ Serie di casi limitata
- ✓ FU molto breve
- ✓ Tipologie diverse di fratture con tempi di recupero molto diversi
- ✓ Distretti interessati altrettanto vari

Forza dello studio

- Riduzione del tempo di attesa medio all'intervento
- Riduzione del dolore durante la degenza
- Riduzione dei giorni di ricovero

ASL ROMA 4

Vantaggi

- ✓ Nessuna reazione locale
- ✓ Nessun intolleranza alla crio
- ✓ Nessuna complicanza connessa alla macchina

- ✓ Migliore controllo del dolore
- ✓ Migliore soddisfazione del paziente
- ✓ Miglior recupero funzionale

Svantaggi

- ✓ Costi?
- ✓ Compliance di tutta la UOC

ASL ROMA 4

In conclusione, nella nostra serie …

la Crioterapia computerizzata è:

- ✓ Un presidio sicuro ed efficace nella gestione del dolore acuto post operatorio e nel precoce recupero funzionale
- ✓ Garantisce una migliore soddisfazione del paziente

AZIENDA USL ROMA 4

Via Terme di Traiano 39/A – 00053 Civitavecchia (RM)

Ortopedia e Traumatologia
Ospedale San Paolo Civitavecchia
Direttore: Dott. Carmelo D'Arrigo

VALUTA IL TUO RICOVERO

INIZIALI PAZIENTE	N LETTO
ETA'	PATOLOGIA

SEI SODDISFATTO DEL TUO RICOVERO ?

CONSIGLIERESTI QUESTO REPARTO AD ALTRI ?

SI NO

COME VALUTI LA GESTIONE DEL DOLORE IN QUESTO REPARTO ?

COME VALUTI IL TRATTAMENTO FISIOTERAPICO ?

ASL ROMA 4

...è un *alleato prezioso*

- per ridurre i tempi di attesa all'intervento
- per limitare e prevenire l' edema dell'arto
- proteggendo il paziente dal rischio di deiscenze della ferita chirurgica ed eventuali infezioni

ASL ROMA 4

Grazie

ASL
ROMA 4