CONGRESSO NAZIONALE IRC 2022

https://congresso.ircouncil.it/

TRAUMA: NUOVE EVIDENZE E PERCORSI

AUDITORIUM DELLA TECNICA • ROMA • 14-15 OTTOBRE

Il centro pediatrico che accoglie traumi pediatrici

Andrea Moscatelli MD

Head Emergency Department

Director
Division of Neonatal and Pediatric Critical care
Critical Care ECMO and Transport Team

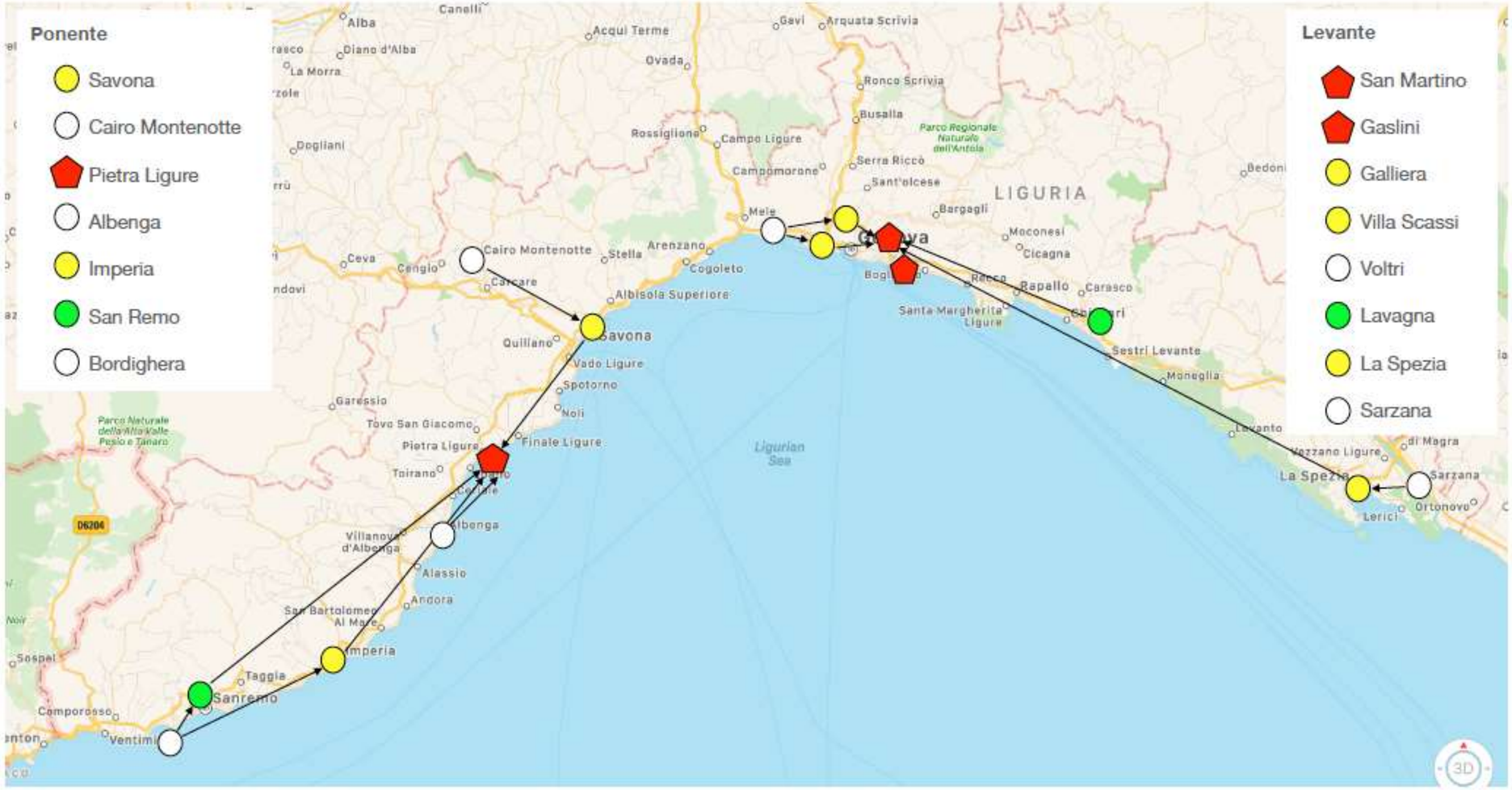
Giannina Gaslini Children's Hospital
Genova - Italy

andreamoscatelli@gaslini.org

Gaslini Children’s Hospital

350	30.000	42%	700	544.000	2.000
Hospital beds	Annual admissions	From outside Liguria	From abroad (74 countries)	Outpatients per year	Total employees

Total population: 1,509,805 (1/3 >65 years) 0-14:163,656 15-19: 63,710



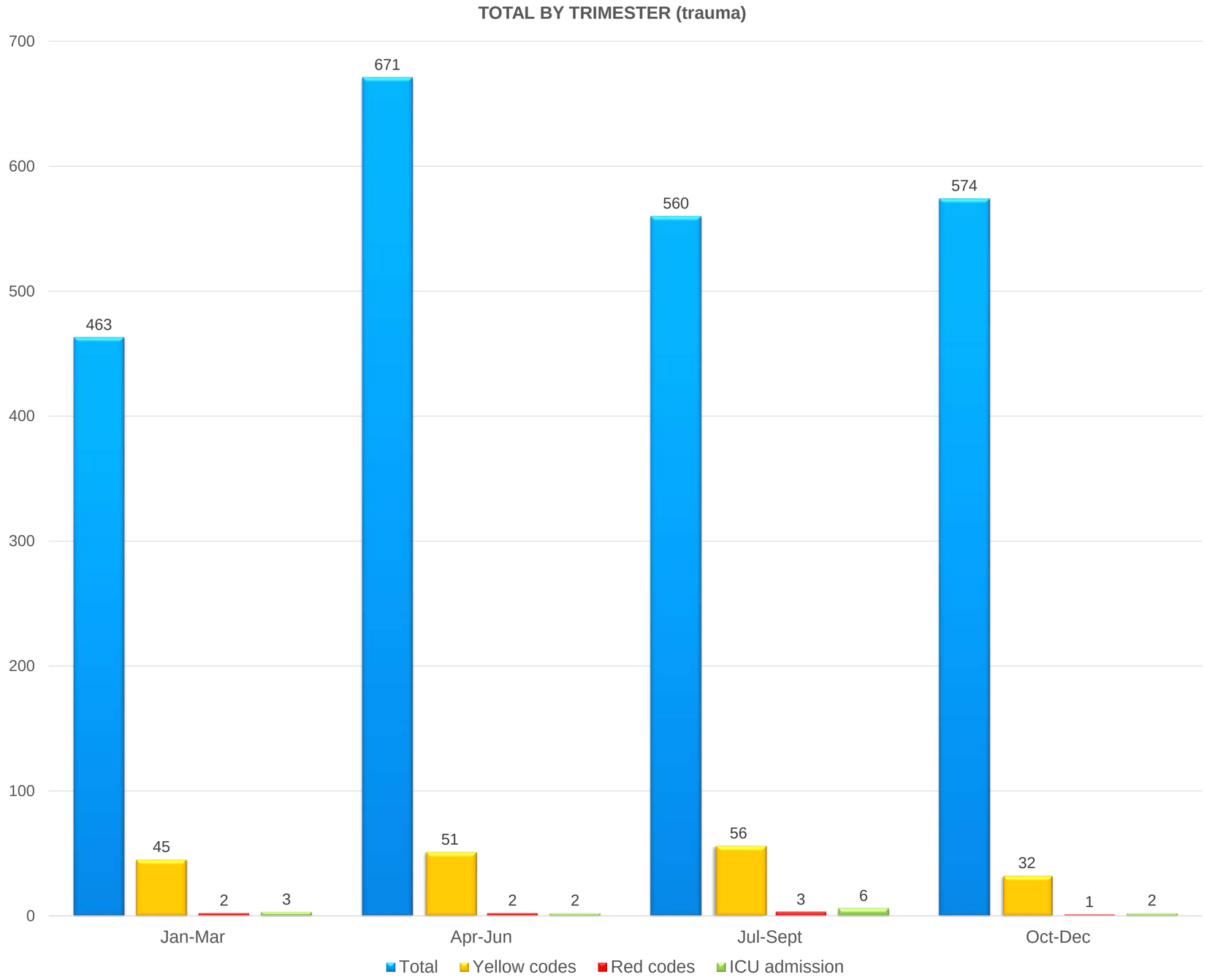
CTS (Level II TC): definitive treatment to any lesion

CTZ (Level I TC): definitive treatment to any lesion not requiring highly specialised care

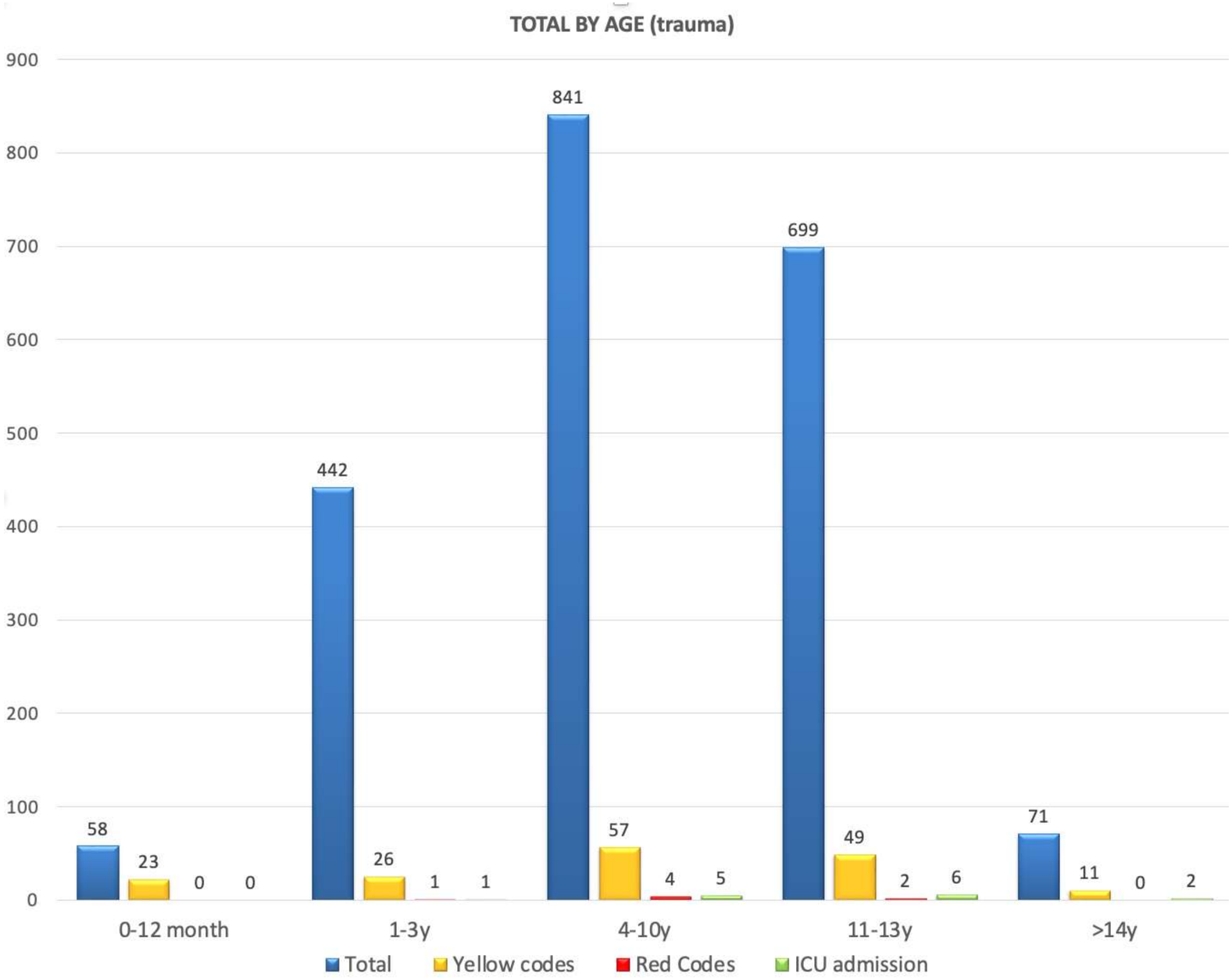
PST (EDT): ALS and surgical treatment of life threatening trauma related conditions

PS (ED): first aid facilities with no trauma capability

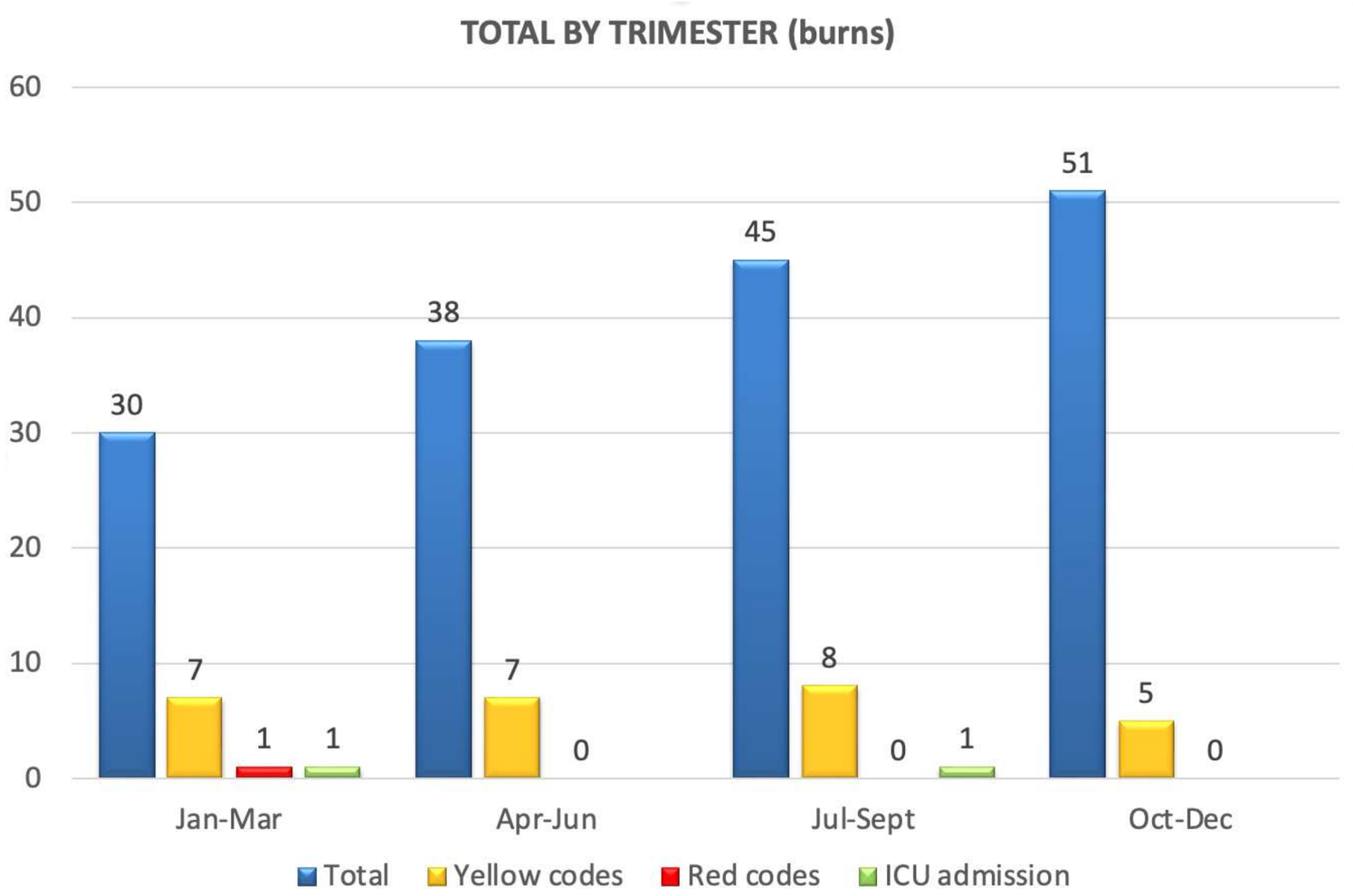
2021


TOTAL BY TRIMESTER (trauma)
700
600
500
400
300
200
100
0
463
45
2
3
671
51
2
2
560
56
3
6
574
32
1
2
Jan-Mar
Apr-Jun
Jul-Sept
Oct-Dec
Total
Yellow codes
Red codes
ICU admission

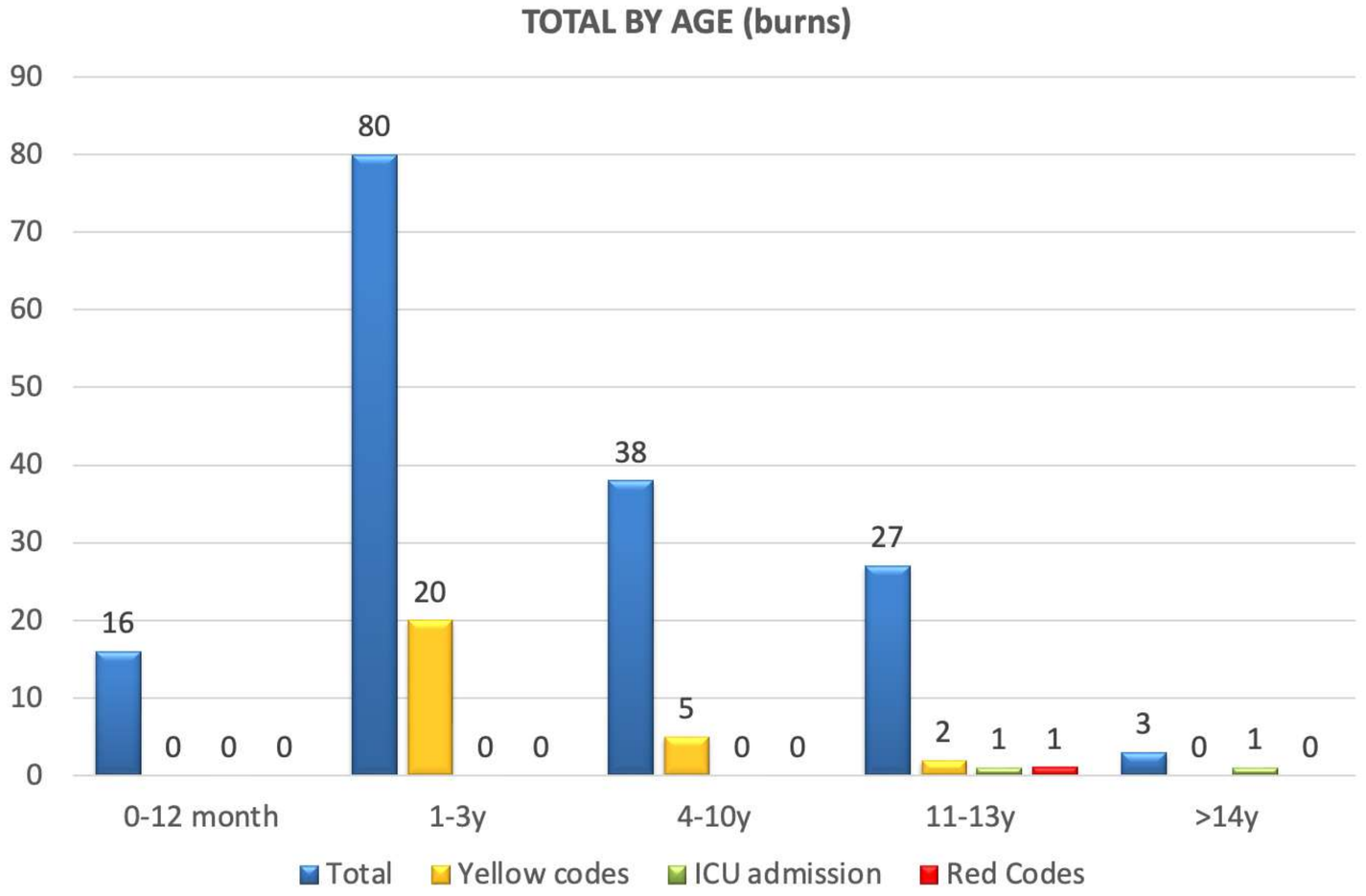
2021


TOTAL BY AGE (trauma)
900
800
700
600
500
400
300
200
100
0
58
23
0
0
442
26
1
1
841
57
4
5
699
49
2
6
71
11
0
2
0-12 month
1-3y
4-10y
11-13y
>14y
Total
Yellow codes
Red Codes
ICU admission

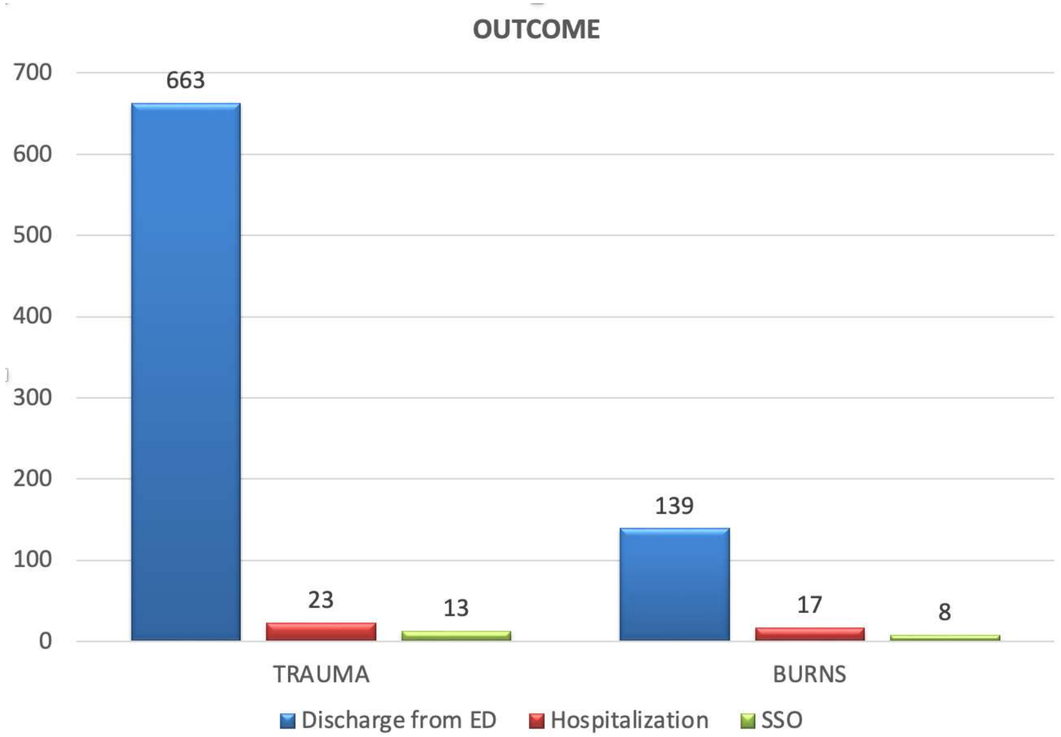
2021

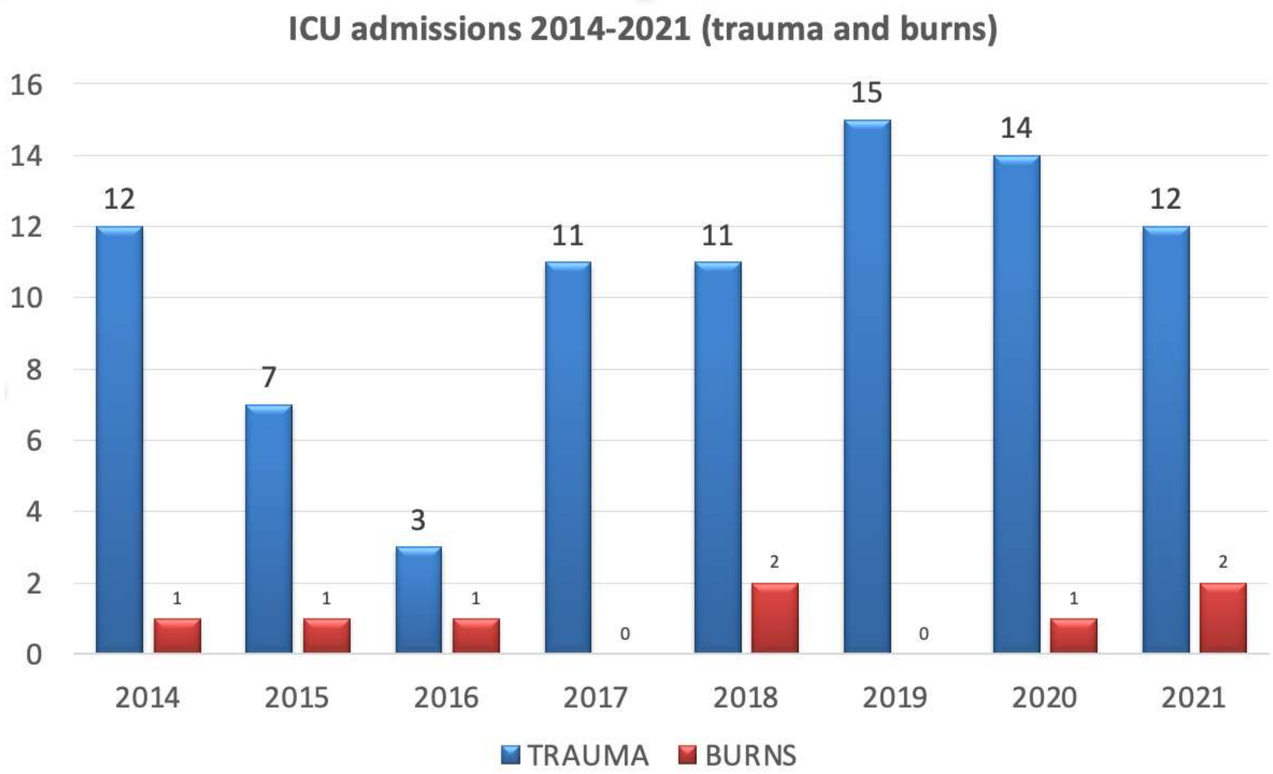

TOTAL BY TRIMESTER (burns)
60
50
40
30
20
10
0
30
7
1
1
38
7
0
45
8
0
1
51
5
0
Jan-Mar
Apr-Jun
Jul-Sept
Oct-Dec
Total
Yellow codes
Red codes
ICU admission

2021


TOTAL BY AGE (burns)
90
80
70
60
50
40
30
20
10
0
16
0
0
0
80
20
0
0
38
5
0
0
27
2
1
1
3
0
1
0
0-12 month
1-3y
4-10y
11-13y
>14y
Total
Yellow codes
ICU admission
Red Codes

2021


OUTCOME
700
600
500
400
300
200
100
0
663
23
13
139
17
8
TRAUMA
BURNS
Discharge from ED
Hospitalization
SSO

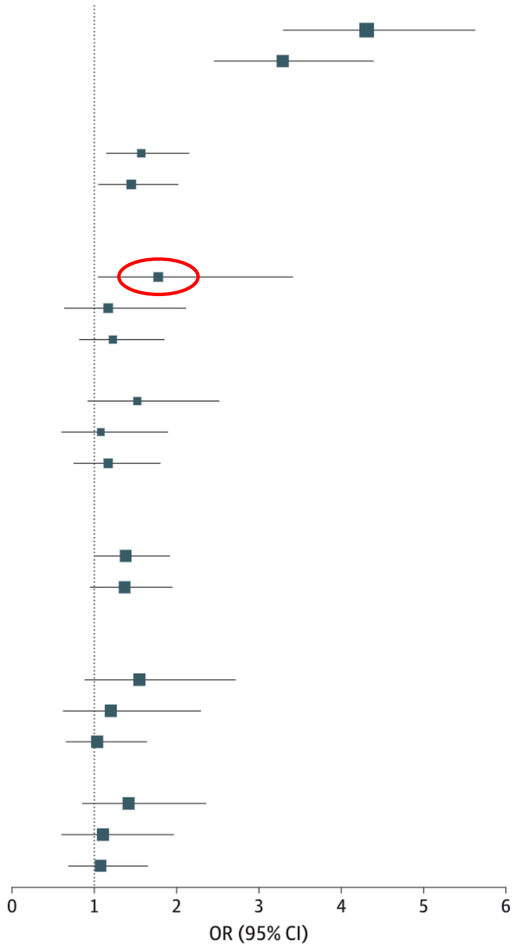

ICU admissions 2014-2021 (trauma and burns)
16
14
12
10
8
6
4
2
0
12
1
7
1
3
1
11
0
11
2
15
0
14
1
12
2
2014
2015
2016
2017
2018
2019
2020
2021
TRAUMA
BURNS

Mortality Among Injured Children Treated at Different Trauma Center Types

Sathya, C. et al.: Jama Surg 150, 874–881 (2015)

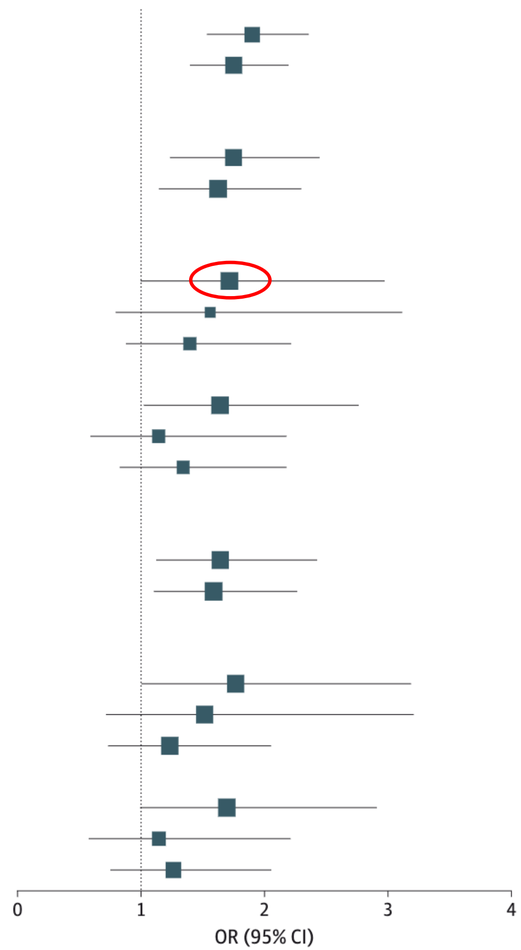
TC type & mortality

Analysis	OR (95% CI)
Unadjusted	
ATC	4.31 (3.31-5.62)
MTC	3.29 (2.47-4.37)
Adjusted without volume	
Overall	
ATC	1.57 (1.15-2.14)
MTC	1.45 (1.05-2.01)
Age stratified	
ATC	
≤5 y	1.78 (1.05-3.40)
6-11 y	1.17 (0.65-2.11)
12-18 y	1.23 (0.82-1.85)
MTC	
≤5 y	1.52 (0.92-2.52)
6-11 y	1.08 (0.61-1.89)
12-18 y	1.17 (0.76-1.79)
Adjusted with volume	
Overall	
ATC	1.38 (1.01-1.91)
MTC	1.36 (0.96-1.94)
Age stratified	
ATC	
≤5 y	1.55 (0.89-2.71)
6-11 y	1.20 (0.63-2.29)
12-18 y	1.04 (0.66-1.63)
MTC	
≤5 y	1.42 (0.86-2.35)
6-11 y	1.10 (0.62-1.96)
12-18 y	1.08 (0.70-1.65)



TC type & mortality (ISS>25)

Analysis	OR (95% CI)
Unadjusted	
ATC	1.90 (1.54-2.34)
MTC	1.75 (1.40-2.19)
Adjusted without volume	
Overall	
ATC	1.75 (1.25-2.44)
MTC	1.62 (1.15-2.29)
Age stratified	
ATC	
≤5 y	1.71 (1.01-2.96)
6-11 y	1.56 (0.79-3.10)
12-18 y	1.39 (0.88-2.21)
MTC	
≤5 y	1.65 (1.02-2.76)
6-11 y	1.14 (0.60-2.17)
12-18 y	1.34 (0.83-2.16)
Adjusted with volume	
Overall	
ATC	1.65 (1.13-2.42)
MTC	1.59 (1.11-2.26)
Age stratified	
ATC	
≤5 y	1.76 (1.01-3.18)
6-11 y	1.51 (0.72-3.19)
12-18 y	1.23 (0.74-2.05)
MTC	
≤5 y	1.70 (1.00-2.89)
6-11 y	1.14 (0.59-2.21)
12-18 y	1.26 (0.77-2.04)



175 585 injured children aged ≤18 years hospitalized in the US (252 level 1 & 2 TCs) Jan 1, 2010 - Decmber 31, 2013

Pediatric Mortality at Pediatric versus Adult Trauma Centers

Khalil, M., et al. J Emergencies Trauma Shock 14, 128–135 (2021)

- Retrospective analysis of severely injured children (ISS>15) ≤18 years of age entered into the National Trauma Data Bank (2011-2012)
- Subjects were stratified into 2 age cohorts: young children (0-14 years) and adolescents (15-18 years)
- A total of 10,028 children were included, median ISS 22 (IQR 17-29)
- 110 PTCs and 374 ATCs

Multivariable logistic regression analysis comparing PTC mortality to ATC mortality by age cohort*

	≤18 years age		≤14 years age		15-18 years age	
	OR (95% CI)	***P***	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
ED mortality	0.6 (0.4-0.8)	0.009	0.42 (0.25-0.71)	0.001	0.81 (0.5-1.3)	0.40
Blunt	0.54 (0.35-0.83)	0.005	0.4 (0.21-0.71)	0.002	0.74 (0.4-1.3)	0.34
Penetrating	0.96 (0.5-1.8)	0.91	0.9 (0.26-3.2)	0.89	0.91 (0.41-2.1)	0.82
IP mortality	0.86 (0.7-1.1)	0.10	0.73 (0.5-0.9)	0.02	1.01 (0.8-1.2)	0.88
Blunt	0.8 (0.72-1.07)	0.21	0.75 (0.5-1.03)	0.05	1.06 (0.8-1.3)	0.67
Penetrating	0.92 (0.61-1.4)	0.71	0.75 (0.3-1.5)	0.43	0.94 (0.5-1.5)	0.82

Variable	In-hospital complications		Discharge to home	
	OR (95% CI)	*P*	OR (95% CI)	*P*
Age in years	−0.01 (−0.02-0.009)	0.001	0.02 (0.01-0.03)	0.001
Penetrating mechanism	2.2 (1.1-2.9)	0.002	0.81 (0.6-0.8)	0.003
PTC	1.1 (0.9-1.8)	0.45	1.5 (1.1-1.7)	<0.001
Prehospital HDI	3.1 (2.2-3.9)	<0.001	0.4 (0.3-0.6)	<0.001
ED HDI	3.9 (2.1-4.2)	<0.001	0.22 (0.19-0.24)	<0.001

Variable	ICU free length of stay		Ventilator free days	
	β (95% CI)	*P*	β (95% CI)	*P*
Age in years	0.015 (0.01-0.02)	<0.001	0.002 (−0.003-0.007)	0.36
Penetrating mechanism	−0.11 (−0.03-−0.21)	<0.001	−0.11 (−0.09-−0.14)	0.001
PTC	0.20 (0.15-0.21)	<0.001	0.07 (0.009-0.14)	0.01
Prehospital HDI	0.30 (0.02-0.28)	<0.001	0.69 (0.4-0.8)	<0.001
ED HDI	0.01 (0.03-0.11)	<0.001	0.004 (−0.1-0.1)	0.95

Journal of Paediatrics and Child Health

Differences in survival outcome for severely injured paediatric trauma by type of trauma centre

Rebecca J Mitchell,[1] Kate Curtis,[2] Luke Testa,[1] Andrew JA Holland,[3] Soundappan SV Soundappan[3] and Sarah Adams[4]

[1]Australian Institute of Health Innovation, Macquarie University, [2]Sydney Nursing School, [3]Douglas Cohen Department of Paediatric Surgery and Centre for Trauma Care, Prevention, Education and Research, Sydney Medical School, University of Sydney and [4]Sydney Children's Hospital, Sydney, New South Wales, Australia

What is already known on this topic

1 Traumatic injury is the most common reason for hospitalisation and death of young children.
2 Outcomes from treatment of paediatric injury have been found to differ depending on whether a child was treated at a paediatric trauma centre (PTC) versus an adult trauma centre (ATC).
3 It is not conclusive whether treatment of injured children at PTCs provide a survival advantage over treatment at ATCs.

What this study adds

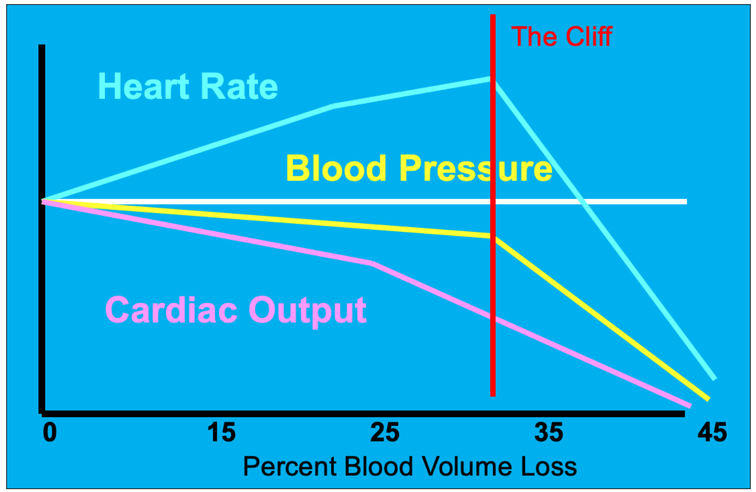
1 Children who had definitive care at a PTC had an ongoing survival advantage compared to those treated at a Level 1 ATC.
2 The current findings open avenues for further prospective examination of the processes of care for severely injured children.
3 Examining care processes will assist in identifying where quality and system changes need to be made to ensure optimal trauma care.

- 1230 severely injured (ISS > 12) children, age <15 years
- Pts treated at a Level 1 ATC had 6.1 times higher odds of not surviving than if treated at a PTC

Mitchell RJ, et al. Differences in survival outcome for severely injured paediatric trauma by type of trauma centre. J Paediatr Child Health. 2017;53(8):808-813.

Pediatric Patients in the Adult Trauma Bay—Comfort Level and Challenges

Kimberly P. Stone, MD, MS, MA,
George A. Woodward, MD, MBA



Anatomical and physiological differences

- Airway
- Large head
- Higher fulcrum in the neck (higher SC injuries)
- Laxity of the vertebral column (SCIWORA)
- More deformable chest wall (internal organs injuries without rib fractures)
- Abdominal organs less protected by ribs, fat and muscles
- Vulnerable bones at the level of growth plates
- Large skin surface area (hypothermia)

Nonaccidental trauma

Equipment

Medications & medications errors

Radiation exposure and ALARA approach (1 fatal cancer for every 1000 CT scans performed in a young child)

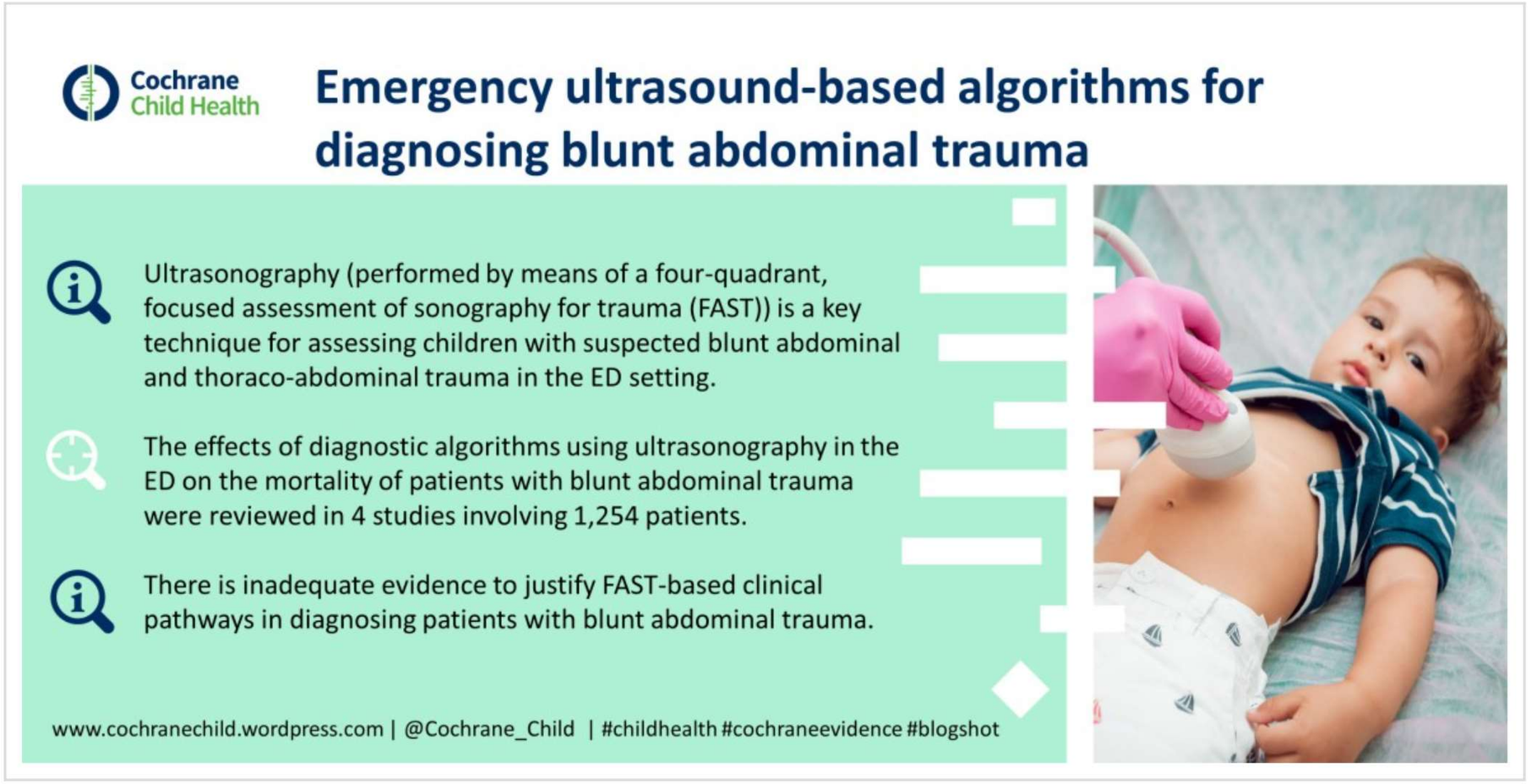
Diagnostic strategies (FAST and DPL less used)

Clin Pediatric Emerg Medicine 11, 48–56 (2010)

Cochrane Child Health

Passionate about Cochrane evidence for kids!

Scaife ER et al. J Pediatr Surg (2013), Vol 48:1377-1383
Calder BW et al. J Trauma Acute Care Surg (2017), Vol 83:218-224
Holmes JF et al. JAMA (2017), Vol 317:2290-2296



- Poor sensitivity and negative predictive value
- Misses intra-abdominal injuries

Presidenza del Consiglio dei Ministri

CONFERENZA PERMANENTE PER I RAPPORTI
TRA LO STATO, LE REGIONI E LE PROVINCIE AUTONOME
DI TRENTO E DI BOLZANO

Accordo Stato Regioni n. 248 del 21.12.2017

“Linee di indirizzo per la promozione ed il miglioramento della qualità, della sicurezza e dell’appropriatezza degli interventi assistenziali in area pediatrico-adolescenziale”

Età pediatrica: 0-17 anni e 364 giorni

Variable	AUC	Hosmer-Lemeshow Statistic	Mortality, %
All patients	0.98	13.0	3.1
Transferred	0.98	16.3	1.8
Not transferred	0.98	9.4	3.6
ATC	0.98	7.7	3.2
MTC	0.97	19.6	3.5
PTC	0.99	3.1	0.4
GCS motor score			
<6	0.91	11.9	26.4
6	0.90	7.4	0.4
AIS post-dot value			
Head <3	0.97	22.3	1.5
Head ≥3	0.95	27.0	12.4
Thorax <3	0.98	30.1	1.7
Thorax ≥3	0.94	48.3	10.2
Abdomen <3	0.98	21.5	2.7
Abdomen ≥3	0.94	25.2	11.1
Blunt	0.97	14.4	2.1
Penetrating	0.98	11.8	7.7

Abbreviations: AIS, Abbreviated Injury Scale; ATC, adult trauma center; AUC, area under the receiver operator curve; GCS, Glasgow Coma Scale; MTC, mixed trauma center; PTC, pediatric trauma center.

Association Between Trauma Center Type and Mortality Among Injured Adolescent Patients

Webman, R. B. et al. Jama Pediatr 170, 780 (2016)

Key Points

Question Is there a difference in the mortality rate for injured adolescents treated at pediatric trauma centers compared with those treated at adult trauma centers or mixed trauma centers that treat both adults and children?

Findings In this study, after controlling for patient and injury characteristics, adolescents treated at adult trauma centers and mixed trauma centers had a higher risk of death than did adolescents treated at pediatric trauma centers.

Meaning Injured adolescents treated at pediatric trauma centers have a lower risk of death than those treated at mixed trauma centers and adult trauma centers.

Pediatric and adult trauma centers differ in evaluation, treatment, and outcomes for severely injured adolescents

Imaging and procedures by mechanism for adolescents treated at ATC versus PTC.

	ATC	PTC	p Value
Imaging			
Blunt trauma	(n = 5865)	(n = 5588)	
CT head	40.5%	27.9%	<0.01*
CT chest	28.0%	22.1%	<0.01*
CT abdomen	43.1%	29.4%	<0.01*
U/S abdomen	16.8%	5.1%	<0.01*
Penetrating trauma	(n = 717)	(n = 691)	
CT head	15.8%	14.5%	0.48
CT chest	15.7%	15.6%	0.98
CT abdomen	27.6%	23.9%	0.11
U/S abdomen	11.5%	5.4%	<0.01*
Procedures			
Blunt trauma	(n = 5865)	(n = 5588)	
Laparotomy	11.3%	9.3%	<0.01*
Tube thoracostomy	20.4%	20.3%	0.94
Thoracotomy	1.0%	0.7%	0.05
ICP monitor insertion	6.9%	8.5%	<0.01*
Ventriculostomy	8.8%	7.3%	<0.01*
Craniotomy	8.8%	6.1%	<0.01*
Penetrating trauma	(n = 717)	(n = 691)	
Laparotomy	35.2%	29.2%	0.02*
Tube thoracostomy	39.7%	40.5%	0.74
Thoracotomy	6.7%	4.8%	0.13
ICP monitor insertion	2.2%	1.9%	0.65
Ventriculostomy	3.1%	3.0%	0.99
Craniotomy	3.3%	3.2%	0.88

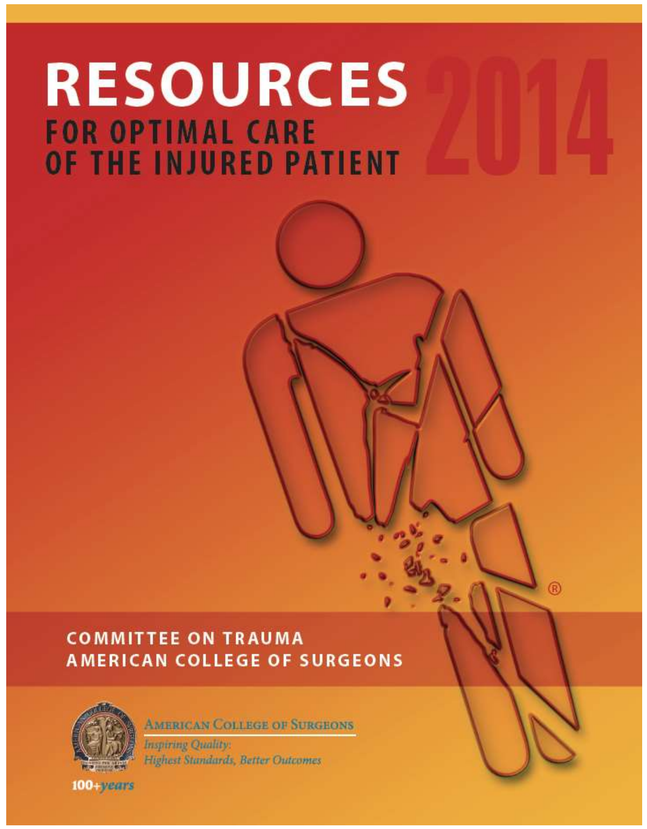
CT: computed tomography, U/S: ultrasound, ATC: adult trauma centers, PTC: pediatric trauma centers.
* $p < 0.05$.

Outcomes by mechanism for adolescents treated at ATC versus PTC.

	ATC	PTC	p Value
Overall	(n = 6582)	(n = 6279)	
ICU LOS	5 (2–12)	4 (2–11)	<0.01*
Hospital LOS	11 (6–20)	10 (6–20)	0.03*
Ventilator-free days in 28	26 (16–28)	26 (16–28)	0.08
Discharged home	49.9%	52.6%	<0.01*
Mortality	9.0%	8.7%	0.57
Blunt trauma	(n = 5865)	(n = 5588)	
ICU LOS	5 (2–12)	4 (2–12)	<0.01*
Hospital LOS	10 (6–20)	10 (5–20)	0.02*
Ventilator-free days in 28	26 (16–28)	26 (16–28)	0.12
Discharged home	48.7%	51.8%	<0.01*
Mortality	8.6%	8.3%	0.61
Penetrating trauma	(n = 717)	(n = 691)	
ICU LOS	4 (2–10)	4 (2–9)	0.04*
Hospital LOS	11 (6–21)	11 (6–21)	0.76
Ventilator-free days in 28	25 (16–28)	26 (15–28)	0.36
Discharge home	60.5%	59.3%	0.67
Mortality	12.5%	12.0%	0.79

Values provided in medians (interquartile ranges).
ATC: adult trauma centers, PTC: pediatric trauma centers, ICU: intensive care unit, LOS: length of stay.
* $p < 0.05$.

Walther, A. E., et al. J. Pediatr. Surg. 51, 1346–1350 (2016)



Conventional radiography must be available in all trauma centers 24 hours per day (CD 11–29). Computed tomography (CT) must be available in Levels I, II, and III trauma centers 24 hours per day (CD 11–30). An in-house radiology technologist and CT technologist are required at Level I and II trauma centers (CD 11–31).

In Level I, II, and III trauma centers, qualified radiologists must be available within 30 minutes in person or by teleradiology for the interpretation of radiographs (CD 11–32). In Level I and II trauma centers, qualified radiologists must be available within 30 minutes to perform complex imaging studies or interventional procedures (CD 11–33). In Level I, II, and III trauma centers, diagnostic information must be communicated in a written or electronic form and in a timely manner (CD 11–34).

Critical information deemed to immediately affect patient care must be verbally communicated to the trauma team in a timely manner (CD 11–35). The preliminary report must be permanently recorded. The final report must accurately reflect the chronology and content of communications with the trauma team, including changes between the preliminary and final interpretations (CD 11–36). Changes in interpretation between preliminary and final reports, as well as missed injuries, must be monitored through the PIPS program (CD 11–37).

The use of angiography in pediatric blunt abdominal trauma patients

Fenton SJ, et al. J Trauma Acute Care Surg. 2016 Aug;81(2):261-5

PECARN dataset review, 20 participating hospitals (14 children), 5/2007 – 1/2010

N = 12,044 children < 18 years with blunt torso trauma (thoracic and abdominal)

N = 973 confirmed abdominopelvic injury (62% SOI, 46% Pelvic fxr, 14% Vascular Injury-spleen related)

Angiography of abdomen/pelvis:

- 3% (29): 21 abdominal, 8 pelvic, 3 both.
- 11 splenic embolization only

Median time to angiography from ED evaluation = 7.2 hours [IQR 3, 8]

"The emergent use of angiography with embolization is uncommon in pediatric patients with blunt abdominal injuries. The requirement that pediatric trauma centers have access to interventional radiology within 30 minutes may be unnecessary"

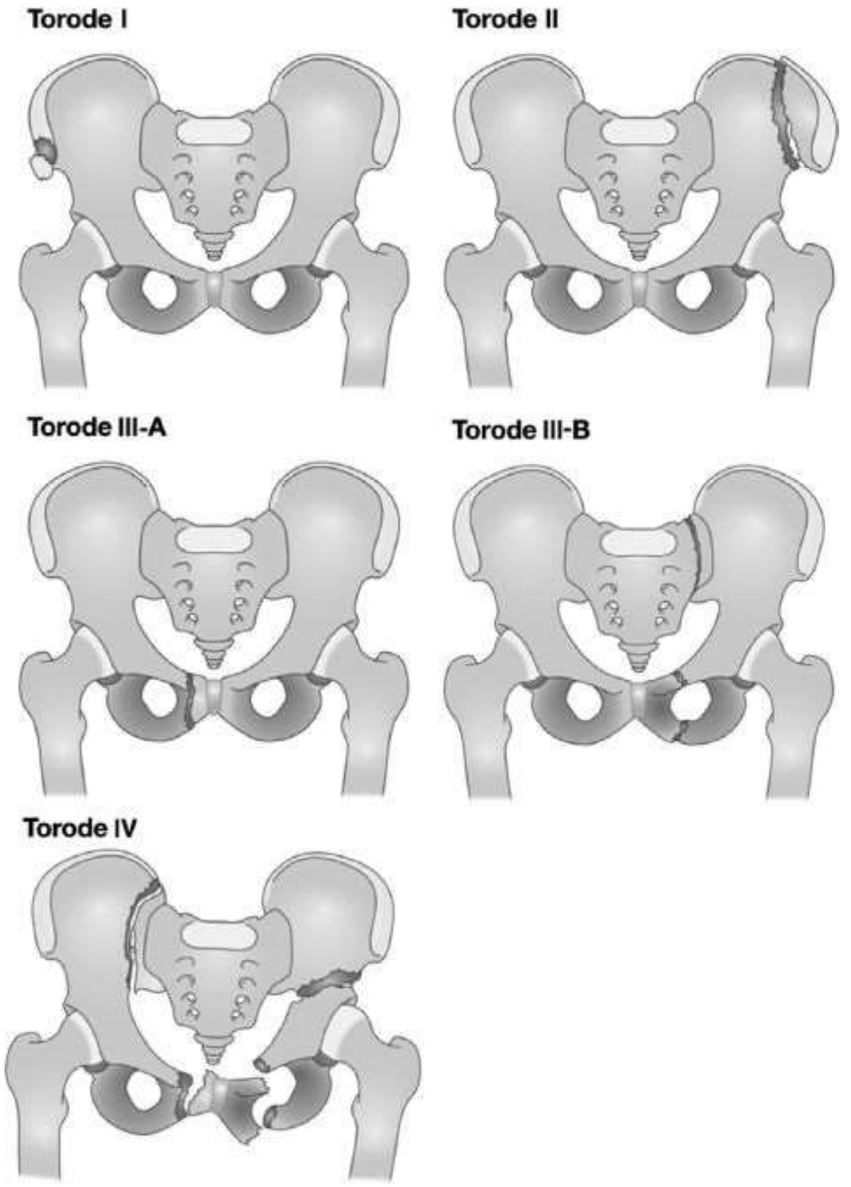
Pelvic Injuries

Pelvic Fractures ~ 5%

- Overall greater plasticity and flexibility
- Greater elasticity of the pubic symphysis and sacroiliac joints

Pediatric Pelvic Fracture Classification

- I – Avulsion Injuries
- II – Fractures of Iliac Wing
- III – Stable pelvic ring fracture
- IV – Unstable pelvic ring fracture



De la calva C et al. Pediatr Emerg Care (2018), EPUB ahead of print
Vo NJ et al. J Vasc Interv Radiol (2014), Vol 25:215-220

Pediatric Pelvic Fractures and Differences ComparedWith the Adult Population

De la Calva C., et al. Pediatr Emerg Care (2018), EPUB ahead of print

Single Institution, retrospective review over 10 years, pelvic fractures, ≤ 14 years

N = 81, mean age 10 years, 62% Boys

Type IIIA most common fracture, 46%

78% associated injuries

32% blood transfusion

11% PICU

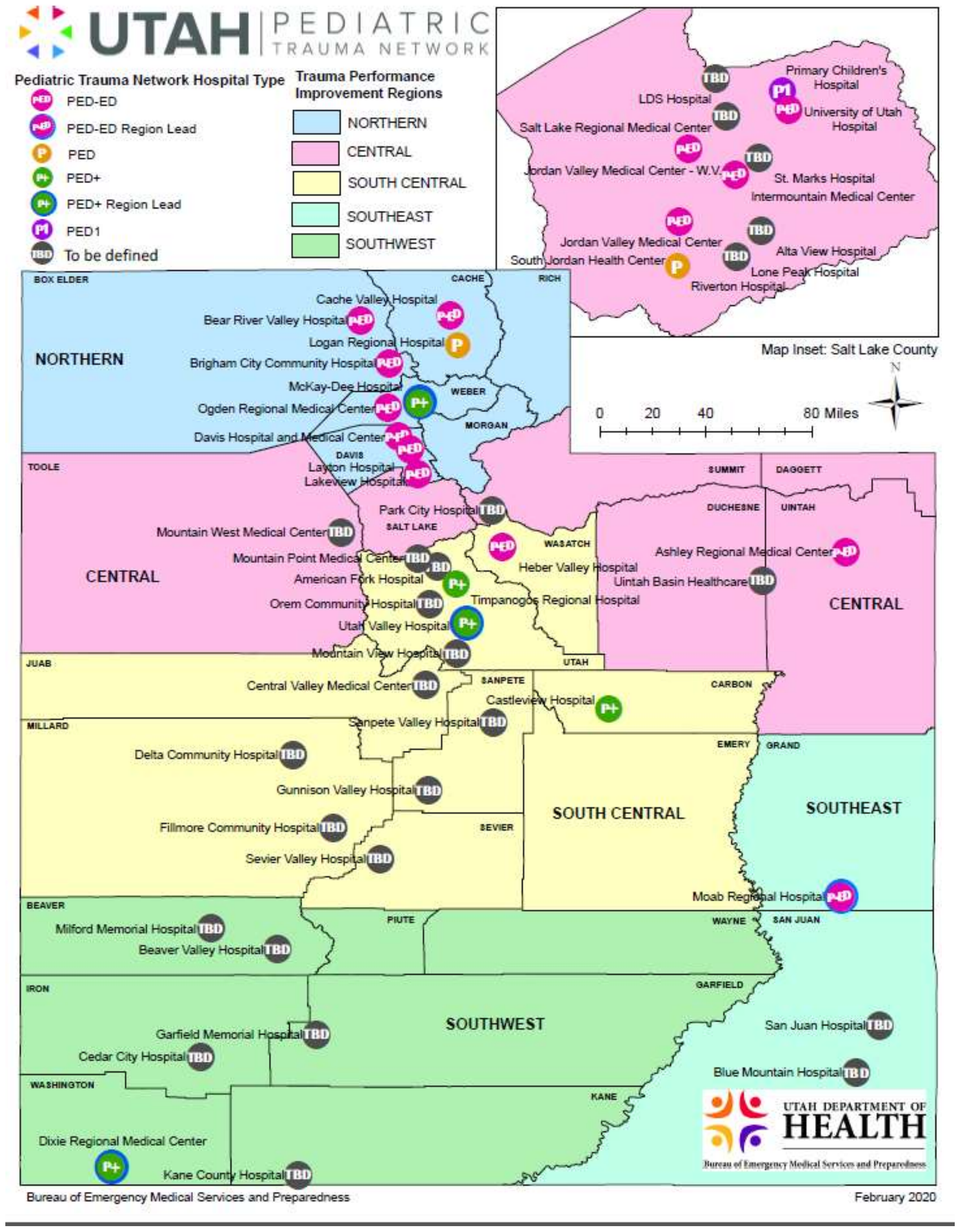
9% overall mortality

5% required surgical intervention

NO angiography required

UTAH | PEDIATRIC TRAUMA NETWORK

Dr. Stephen Fenton, Dr. Eric Scaife
Primary Children's Hospital, Salt Lake City, Utah



Population: 3 205 958

Development of a dedicated pediatric trauma network in Liguria

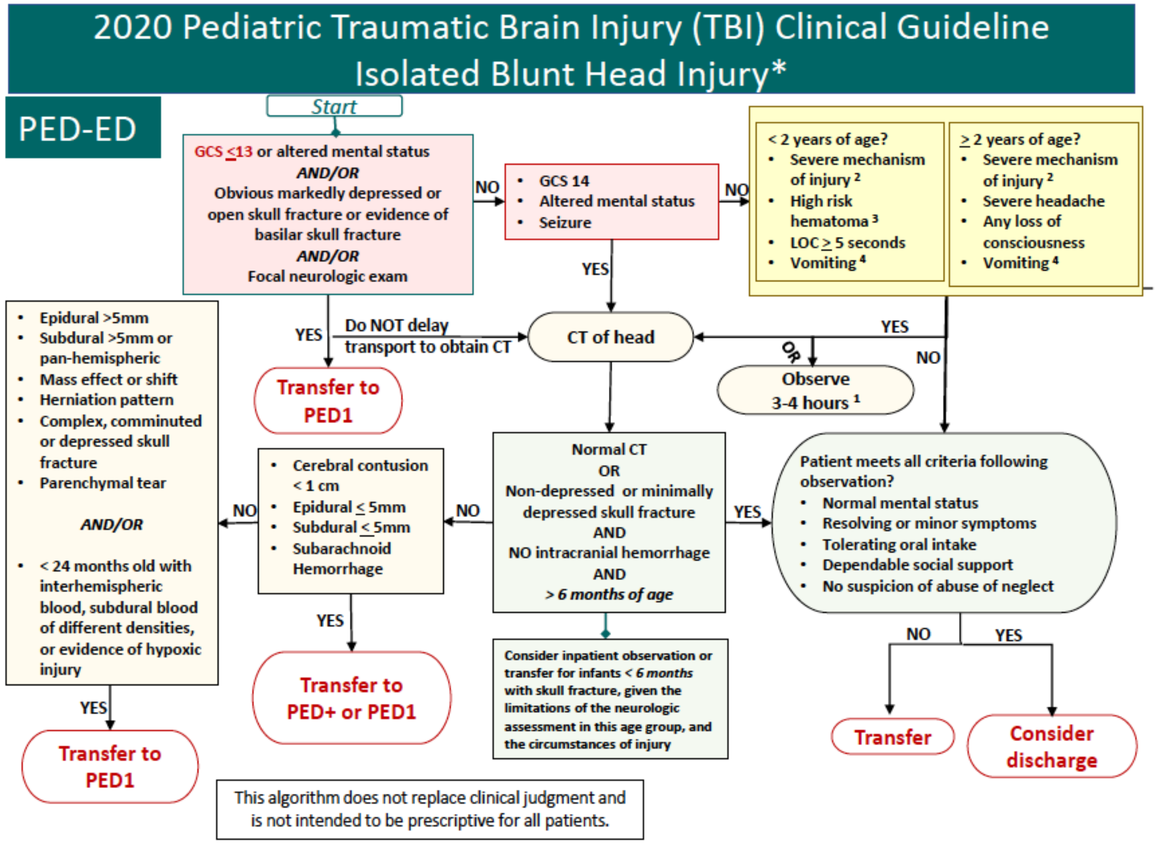
Implementation of shared Regional Trauma Protocols

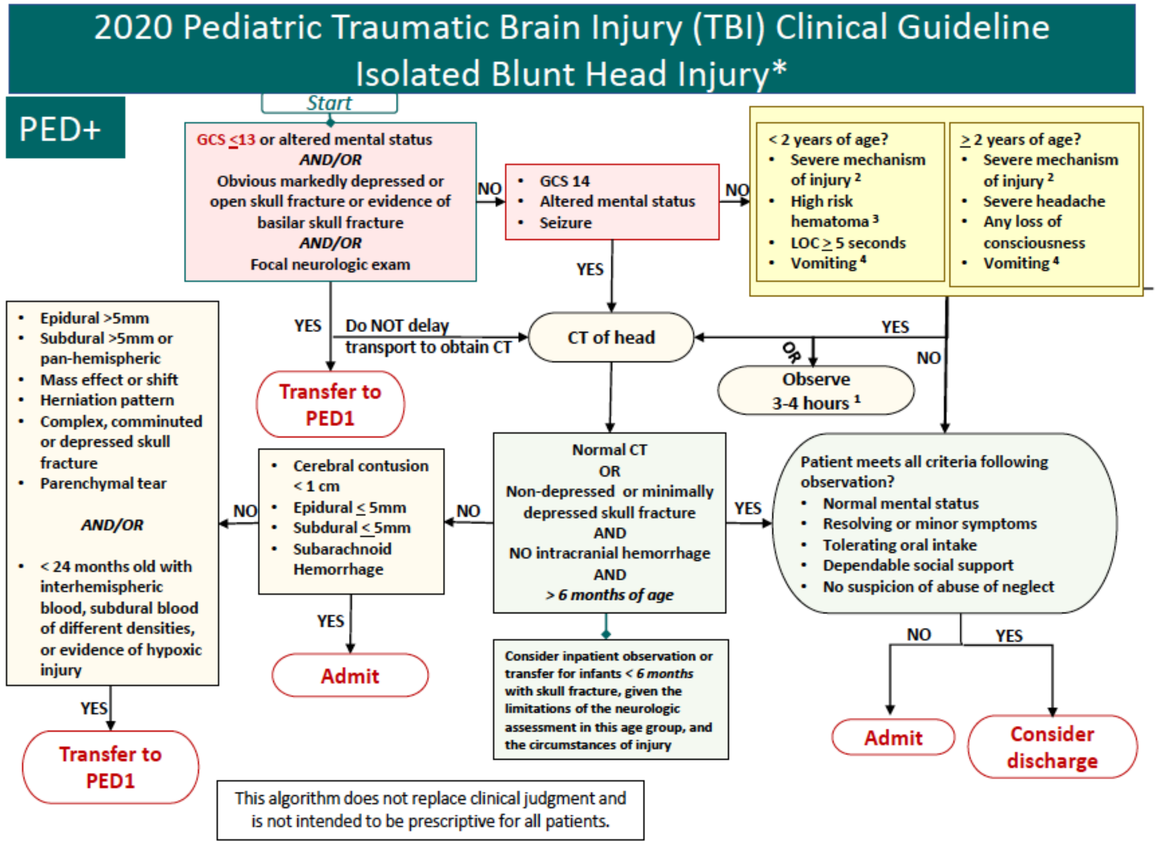
- Field triage/communication
- Expedite referral
- Head trauma (minor and severe)
- Cervical (clearance) and spinal trauma
- Thoracic trauma
- Abdominal trauma
- Extremity trauma
- Child abuse
- Burns

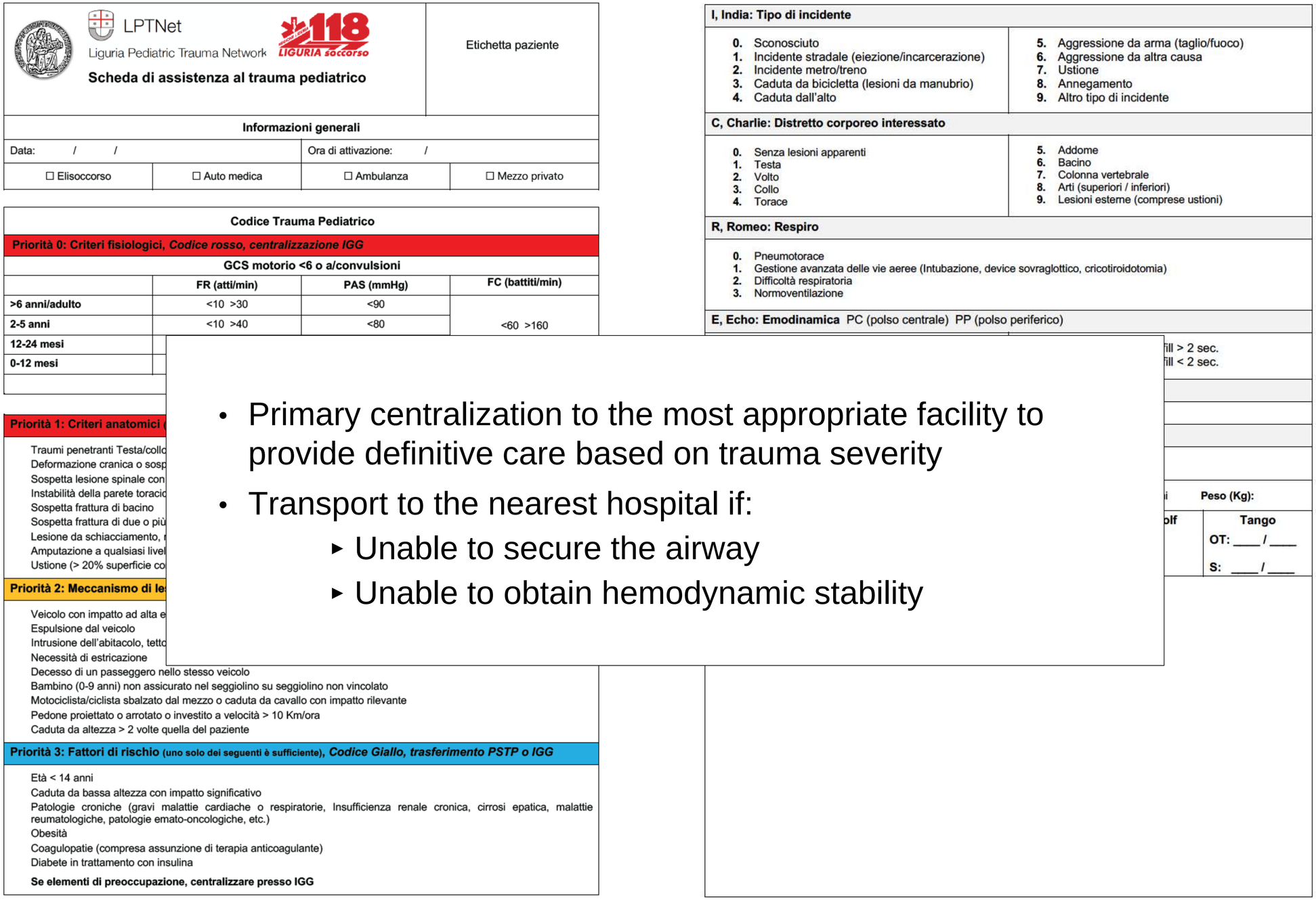
Protocols should be tailored to the locally available resources and must define criteria for referral to higher levels of care → Limit preventible unnecessary transfers

	Gaslini	San Martino	Galliera	Villa Scassi	Evangelico	Savona	Pietra Ligure	Imperia	San Remo	Lavagna Vedi *	La Spezia
Guardia attiva (G)											
PS-DEA	G	v		G		SI	X	G	v	x	si
Pediatra	G					SI	?	G		x	si
Neonatologo	G	v		G		=				x	si
Ostetricia/Gineco	G	v		G		SI		G		x	si
Terapia Intensiva	G	v		G		SI	X	G	v	x	si
Anestesia	G	v		G		SI	X	G	v	x	si
Chirurgia Generale	G	v		G		Interdi v.	X	G		X diurna	no
Neurochirurgia	R	v				NO					si
Ortopedia	Fino 20 poi R	Fino 24		R		Interdi v.	X	R		X diurna	si
Radiologia	G	v		G		SI	X	G	v	x	Si diurna
Neuroradiologia	R	v				NO					si
Centro Trasfusionale	R	v				SI	X	R		X diurna	si
Laboratorio	G	v		G		SI	X	G		x	si
Cardiologia	R	v		G		SI	X	G	v	x	
Reperibilità (R)											
Radiologia interventistica	R	v				NO	X				si
Neuroradiologia interventistica	R	v				NO	X				no
Chirurgia Toracica	R	v		R		NO	X				si
Chirurgia Vascolare	R	v		R		NO	X	R			si
Cardiochirurgia	R	v				NO					no
Chirurgia Urologica	R	v		R		SI	X	R		notturna	si
Chirurgia maxillo-facciale	?	v				NO	X				no
Chirurgia plastica	?	no		G		NO	X				no
Chirurgia oftalmica	R	v		R		SI		R			si
Chirurgia ORL	R	v		R		SI	X	R	v	H24	si
Chirurgia dei trapianti	?	v				NO					no
Neurologia		v		G		SI	X	G	v	notturna	si
Psichiatria		v		G		SI		R			si
Neuropsichiatria Infantile	R	no				NO					Non so
Pneumologia		no		R/G		NO		R			si
Nefrologia	R	v		R		SI		R		H24	si
Gastroenterologia	R	v				SI	X	R	v	diurna	si
Infettivologia	?	v				SI		R	v		si
Fisiatria		no				NO					Non so
Anatomia patologica		v				WE					si
Medicina legale		v				NO		R			si
Servizi											
Degenza pediatrica >24h	X	no				SI		*		x	si
Patologia Neonatale I livello		v		v		NO		*		x	si
Patologia Neonatale II livello		v				SI					no
Patologia Neonatale III livello	X					NO					no
Risonanza Magnetica	X	v		v		SI	X	*	v	x	si
Emodinamica (cardiologia)	X	v		v		SI	X	*	v	x	si
ECMO	X	v				NO					no
Tecnico perfusionista	X	v				NO					no
Dialisi	X	v		v		SI		*	v	X	si
Endoscopia vie aeree	X	Incarico anest/orl guardia		v		SI	X	*		x	si
Endoscopia digestiva	X	v		v		SI	X	*	v	x	si
Chirurgia plastica/Centro ustioni	X	Plastica si c. ustioni no		v		NO	X				no
Camera iperbarica		v				NO					no

Resources adapted protocols







LPTNet
Liguria Pediatric Trauma Network
118 LIGURIA soccorso
Scheda di assistenza al trauma pediatrico

Etichetta paziente

Informazioni generali

Data: / /

Ora di attivazione: /

☐ Elisoccorso ☐ Auto medica ☐ Ambulanza ☐ Mezzo privato

Codice Trauma Pediatrico

Priorità 0: Criteri fisiologici, *Codice rosso, centralizzazione IGG*

GCS motorio <6 o a/convulsioni

	FR (atti/min)	PAS (mmHg)	FC (battiti/min)
>6 anni/adulto	<10 >30	<90	
2-5 anni	<10 >40	<80	<60 >160
12-24 mesi			
0-12 mesi			

Priorità 1: Criteri anatomici (

Traumi penetranti Testa/collo
Deformazione cranica o sosp
Sospetta lesione spinale con
Instabilità della parete toracic
Sospetta frattura di bacino
Sospetta frattura di due o più
Lesione da schiacciamento,
Amputazione a qualsiasi livel
Ustione (> 20% superficie co

Priorità 2: Meccanismo di le

Veicolo con impatto ad alta e
Espulsione dal veicolo
Intrusione dell'abitacolo, tetto
Necessità di estricazione
Decesso di un passeggero nello stesso veicolo
Bambino (0-9 anni) non assicurato nel seggiolino su seggiolino non vincolato
Motociclista/ciclista sbalzato dal mezzo o caduta da cavallo con impatto rilevante
Pedone proiettato o arrotato o investito a velocità > 10 Km/ora
Caduta da altezza > 2 volte quella del paziente

Priorità 3: Fattori di rischio (uno solo dei seguenti è sufficiente), *Codice Giallo, trasferimento PSTP o IGG*

Età < 14 anni
Caduta da bassa altezza con impatto significativo
Patologie croniche (gravi malattie cardiache o respiratorie, Insufficienza renale cronica, cirrosi epatica, malattie reumatologiche, patologie emato-oncologiche, etc.)
Obesità
Coagulopatie (compresa assunzione di terapia anticoagulante)
Diabete in trattamento con insulina

Se elementi di preoccupazione, centralizzare presso IGG

I, India: Tipo di incidente

0. Sconosciuto
1. Incidente stradale (eiezione/incarcerazione)
2. Incidente metro/treno
3. Caduta da bicicletta (lesioni da manubrio)
4. Caduta dall'alto
5. Aggressione da arma (taglio/fuoco)
6. Aggressione da altra causa
7. Ustione
8. Annegamento
9. Altro tipo di incidente

C, Charlie: Distretto corporeo interessato

0. Senza lesioni apparenti
1. Testa
2. Volto
3. Collo
4. Torace
5. Addome
6. Bacino
7. Colonna vertebrale
8. Arti (superiori / inferiori)
9. Lesioni esterne (comprese ustioni)

R, Romeo: Respiro

0. Pneumotorace
1. Gestione avanzata delle vie aeree (Intubazione, device sovraglottico, cricotiroidotomia)
2. Difficoltà respiratoria
3. Normoventilazione

E, Echo: Emodinamica PC (polso centrale) PP (polso periferico)

ill > 2 sec.
ill < 2 sec.

Peso (Kg):

olf | **Tango**
OT: ____ / ____
S: ____ / ____

- Primary centralization to the most appropriate facility to provide definitive care based on trauma severity
- Transport to the nearest hospital if:
  - Unable to secure the airway
  - Unable to obtain hemodynamic stability

Newgard, C. D. et al. National guideline for the field triage of injured patients: Recommendations of the National Expert Panel on Field Triage, 2021. J Trauma Acute Care 93, e49–e60 (2022).

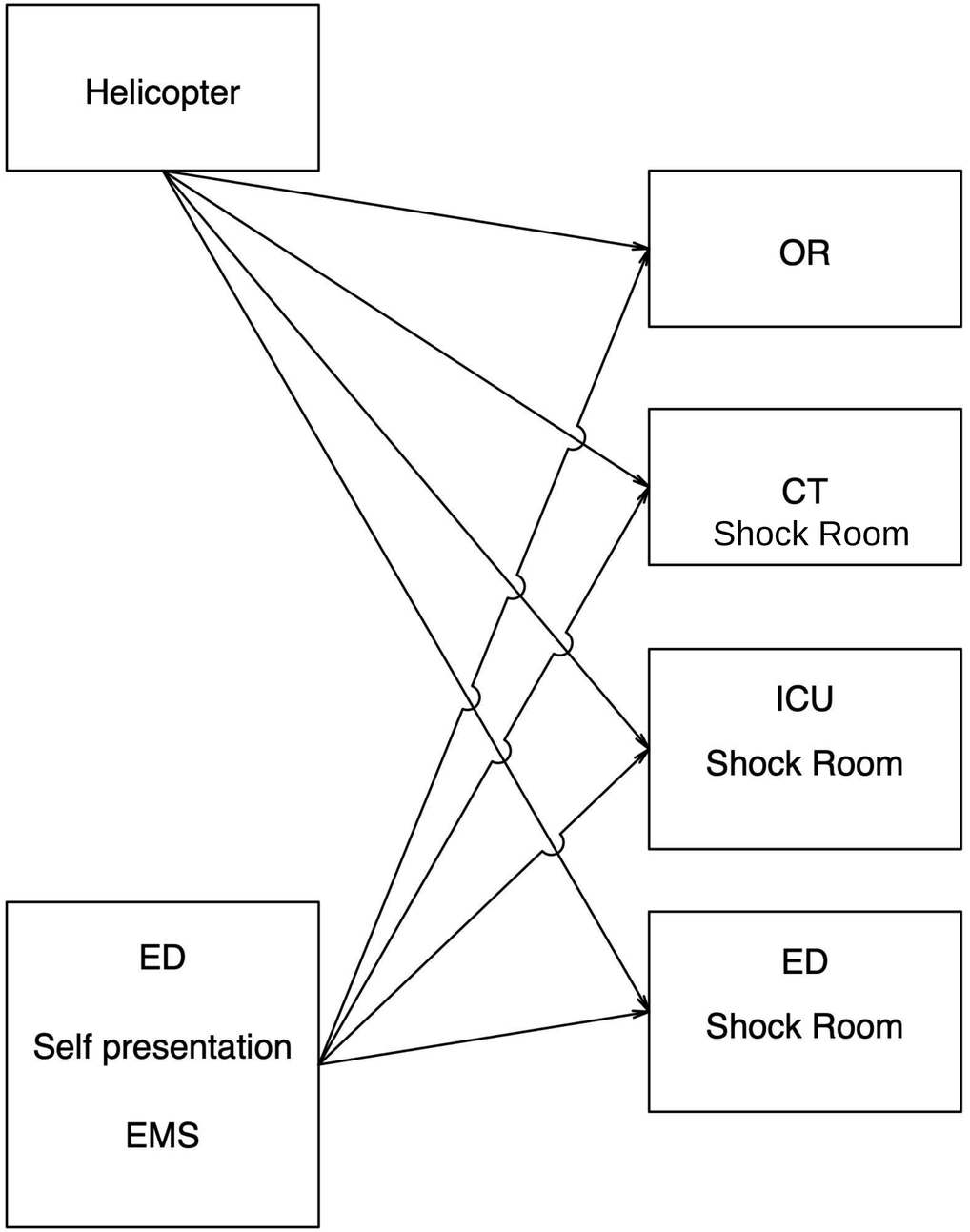
Gaslini Trauma Team

The Critical Care Physician is the leader of the trauma team:

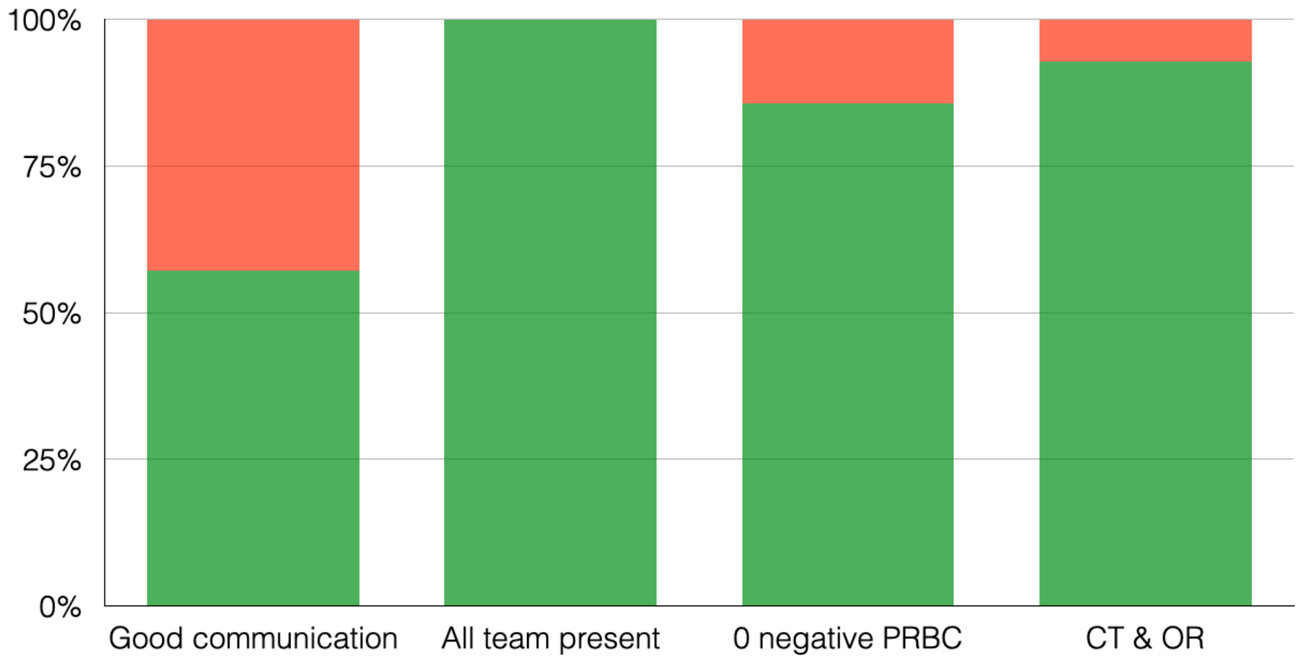
- 1 Critical Care Physician (RRT)
- 1 Surgeon
- 1 ED physician
- 1 Critical Care Nurse (RRT)
- 1-2 ED Nurses
- 1 Nurse Assistant

“In more advanced trauma systems it is possible to simultaneously resuscitate and perform a CT scan”

ETC manual, edition 3.1



2021 Total Cases: 14 (2 burns), mean activation time (all team present) 3.77’+/-0,89 SD, RRT 42,77” +/-9,74 SD



- Time of activation
- Good communication (relevant data available)
- All team present
- 0 negative PRBC present
- OR & CT activation

Telemedicine

- Dedicated ICU phone line (24/7)
- Sharing of images and clinical data
- Teleconsultation

Pediatric critical care transport: why?

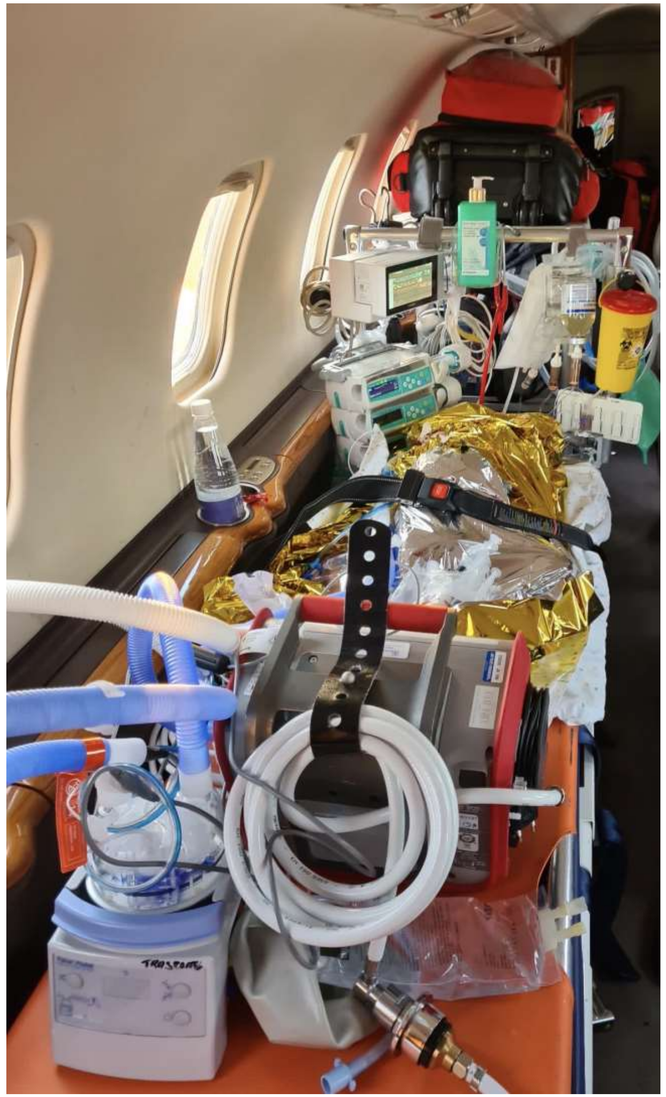
- A single-center, prospective, cohort study (January 2001 and September 2002), 1085 infants and children referred to a tertiary care children's hospital
- 1021(94%) were transported by a specialty team and 64 (6%) by non-specialized teams

Unplanned Events During Transport ($N = 55$)	61% *n* (%)	1.5%	*P*
	Patients Transported by Specialized Team ($N = 1021$)	Patients Transported by Nonspecialized Team ($N = 64$)	
Airway events	5 (0.5)	13 (20)	<.001
Cardiopulmonary arrest	2 (0.2)	8 (12.5)	<.001
Equipment failure with deterioration of patient status	0 (0)	2 (3.1)	<.001
Hypotension (sustained)	2 (0.2)	7 (10.9)	<.001
Hypothermia	3 (0.3)	1 (1.5)	.574
Loss of crucial intravenous line	1 (0.1)	6 (9.4)	<.001
Medication error	2 (0.2)	0 (0)	.251
Pneumothorax	1 (0.1)	2 (3.1)	.001

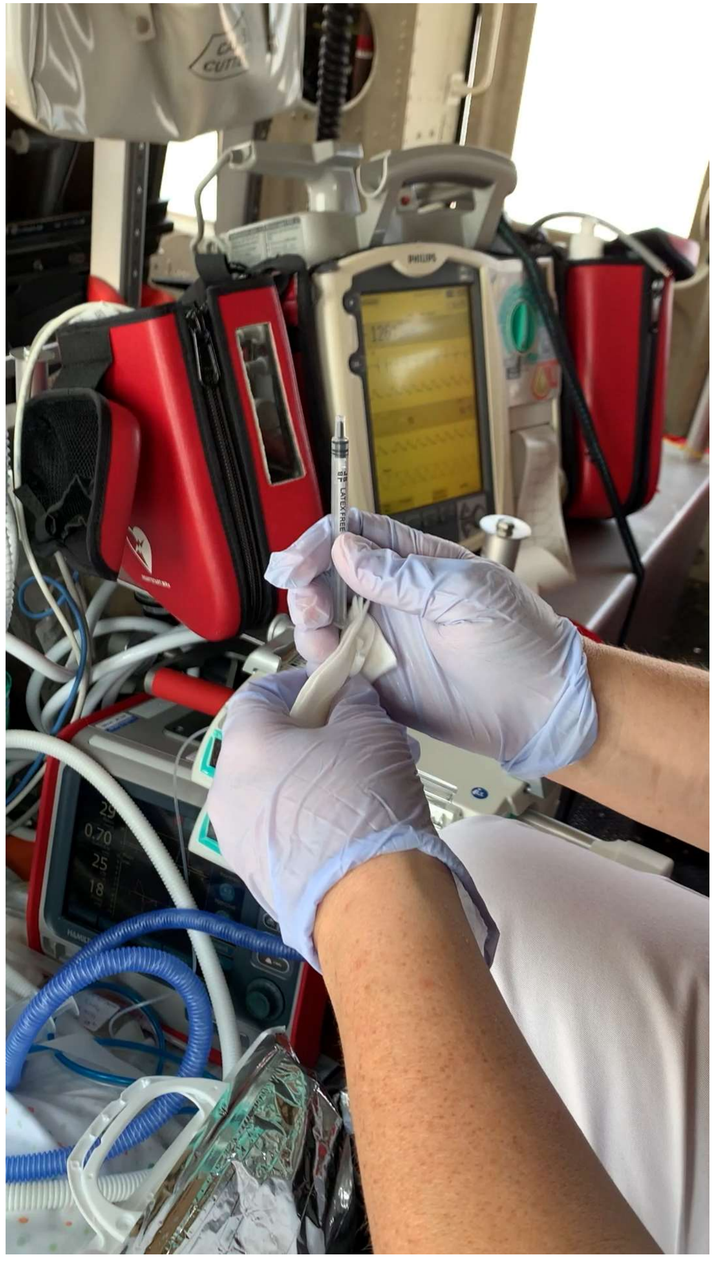
Death at 28 days was more common among patients transported by non specialized teams (23% vs 9%)

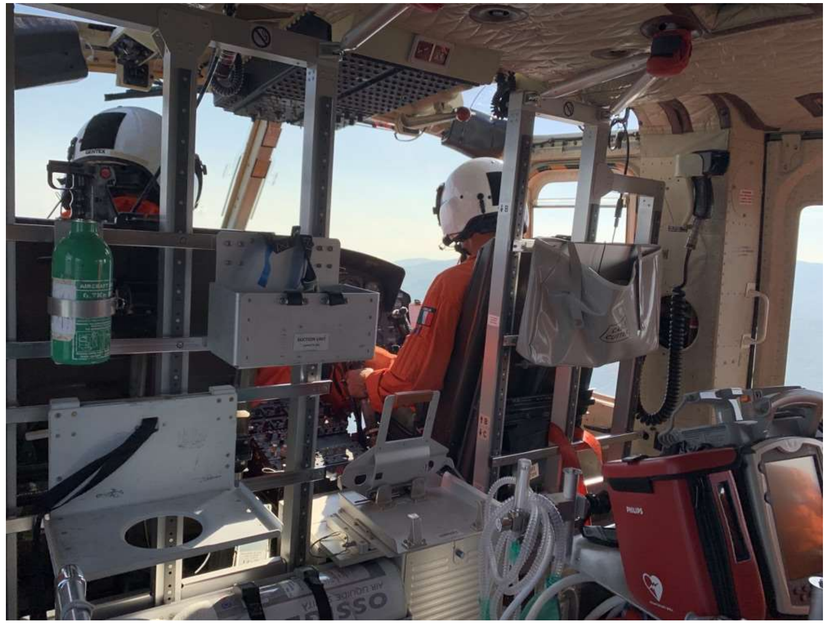
Pediatric critical care transport

- Transport teams should be an extension of the ICU
- Take the ICU to the patient in a controlled fashion, not rush the patient to the ICU




NO HAND HOLD
GUARD
IA COS


PHILIPS



PHILIPS

Vehicle	Speed (Km/h)	Range (Km)
Ambulance	Legal speed	250-400
Rotor Wing	250 - 300	600-1250
Fixed Wing	640-950	3000-7200

Pediatric critical care transport: Gaslini-118 collaboration

- Trauma and myocardial infarction are two common clinical entities encountered by adult EMS transports
- Only 10% of EMS transports involve pediatric patients
- EMS personnel are trained to provide supportive care until the patient reaches an emergency department
- The most common clinical problems in children in need of transport involve the respiratory system
- Half of all critical care pediatric transports require some form of airway intervention

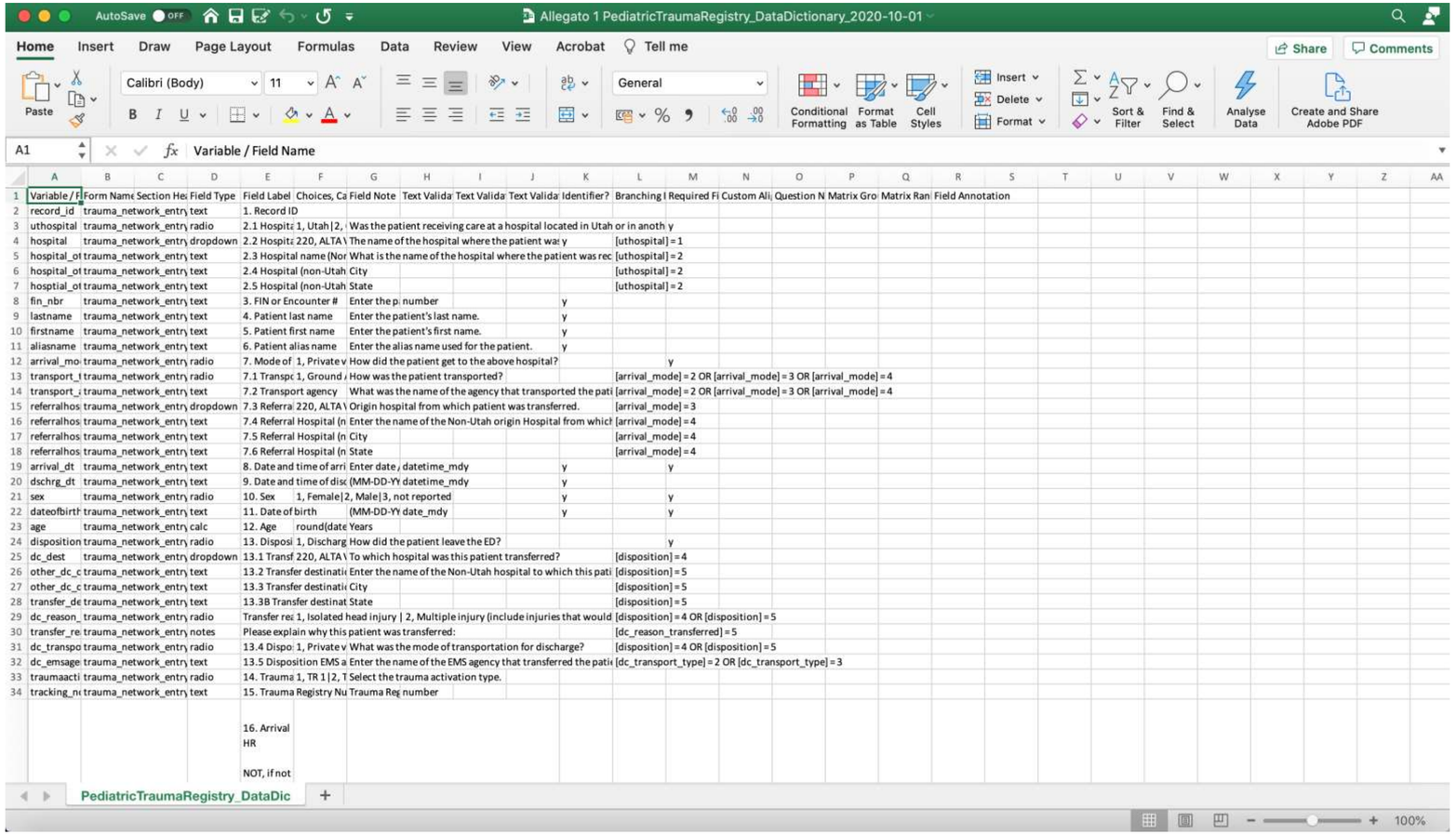
Pediatric transport services usually fill the gap between the ED and the tertiary care facility

Ajizian SJ, et al. Interfacility Transport of the Critically Ill Pediatric Patient. CHEST. 2007;132(4):1361-1367. doi:10.1378/chest.07-0222.

Pediatric transport, training, remote support

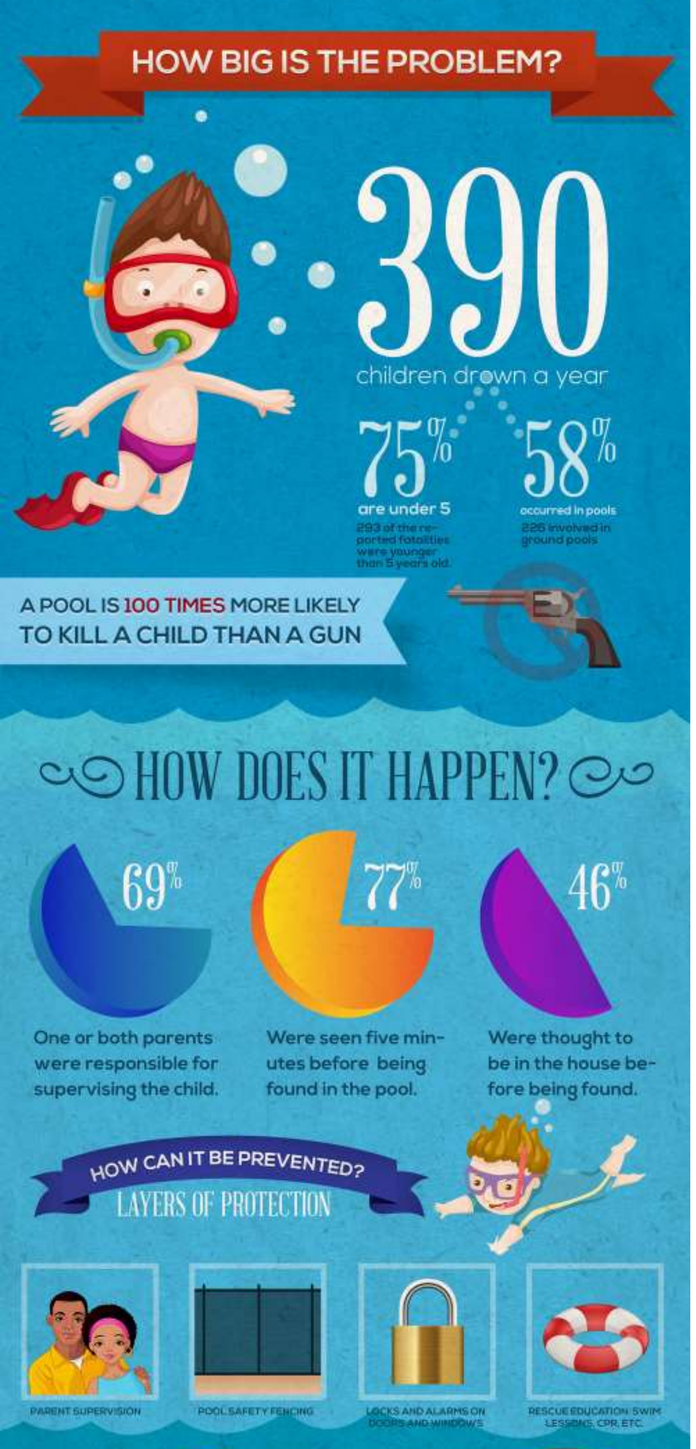
- Pediatric training to EMS (118 Helicopter Transport Team)
- Close collaboration with the EMS (118 Helicopter transport team), joint teams
- Remote support (augmented reality)

Accountability

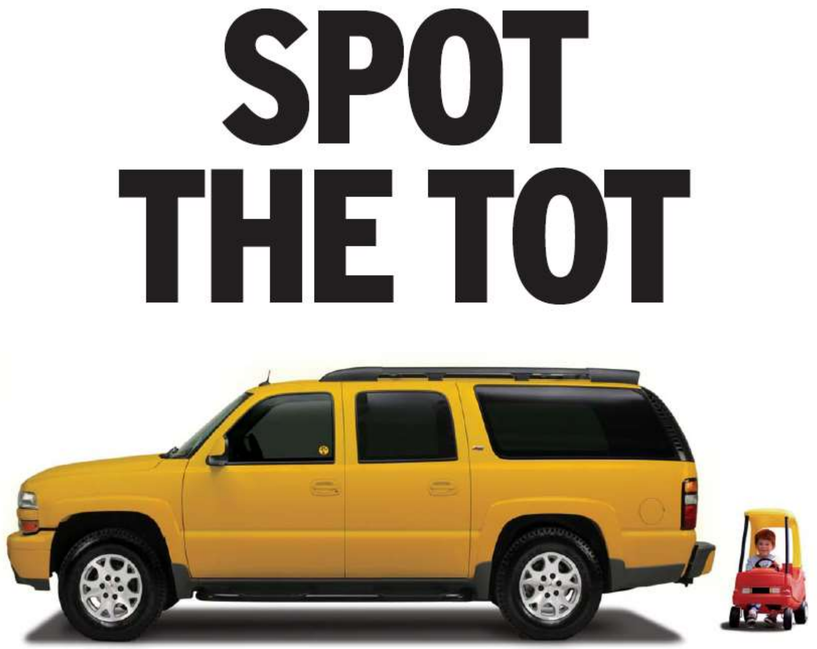


Variable / F	Form Name	Section He	Field Type	Field Label	Choices, Ca	Field Note	Text Valida	Text Valida	Text Valida	Identifier?	Branching l	Required Fi	Custom Ali	Question N	Matrix Gro	Matrix Ran	Field Annotation
record_id	trauma_network_entry		text	1. Record ID													
uthospital	trauma_network_entry		radio	2.1 Hospita	1, Utah | 2,	Was the patient receiving care at a hospital located in Utah or in anoth						y					
hospital	trauma_network_entry		dropdown	2.2 Hospita	220, ALTA \	The name of the hospital where the patient wa					y		[uthospital] = 1				
hospital_ot	trauma_network_entry		text	2.3 Hospital name (Nor		What is the name of the hospital where the patient was rec					[uthospital] = 2						
hospital_ot	trauma_network_entry		text	2.4 Hospital (non-Utah		City					[uthospital] = 2						
hosptial_ot	trauma_network_entry		text	2.5 Hospital (non-Utah		State					[uthospital] = 2						
fin_nbr	trauma_network_entry		text	3. FIN or Encounter #		Enter the p	number			y							
lastname	trauma_network_entry		text	4. Patient last name		Enter the patient's last name.				y							
firstname	trauma_network_entry		text	5. Patient first name		Enter the patient's first name.				y							
aliasname	trauma_network_entry		text	6. Patient alias name		Enter the alias name used for the patient.				y							
arrival_mo	trauma_network_entry		radio	7. Mode of	1, Private v	How did the patient get to the above hospital?						y					
transport_t	trauma_network_entry		radio	7.1 Transpo	1, Ground /	How was the patient transported?					[arrival_mode] = 2 OR [arrival_mode] = 3 OR [arrival_mode] = 4						
transport_a	trauma_network_entry		text	7.2 Transport agency		What was the name of the agency that transported the pati					[arrival_mode] = 2 OR [arrival_mode] = 3 OR [arrival_mode] = 4						
referralhos	trauma_network_entry		dropdown	7.3 Referra	220, ALTA \	Origin hospital from which patient was transferred.					[arrival_mode] = 3						
referralhos	trauma_network_entry		text	7.4 Referral Hospital (n		Enter the name of the Non-Utah origin Hospital from whic					[arrival_mode] = 4						
referralhos	trauma_network_entry		text	7.5 Referral Hospital (n		City					[arrival_mode] = 4						
referralhos	trauma_network_entry		text	7.6 Referral Hospital (n		State					[arrival_mode] = 4						
arrival_dt	trauma_network_entry		text	8. Date and time of arri		Enter date /	datetime_mdy			y		y					
dschrg_dt	trauma_network_entry		text	9. Date and time of disc		(MM-DD-YY	datetime_mdy			y							
sex	trauma_network_entry		radio	10. Sex	1, Female | 2, Male | 3, not reported					y		y					
dateofbirth	trauma_network_entry		text	11. Date of birth		(MM-DD-YY	date_mdy			y		y					
age	trauma_network_entry		calc	12. Age	round(date	Years											
disposition	trauma_network_entry		radio	13. Disposi	1, Discharg	How did the patient leave the ED?						y					
dc_dest	trauma_network_entry		dropdown	13.1 Transf	220, ALTA \	To which hospital was this patient transferred?					[disposition] = 4						
other_dc_c	trauma_network_entry		text	13.2 Transfer destinati		Enter the name of the Non-Utah hospital to which this pati					[disposition] = 5						
other_dc_c	trauma_network_entry		text	13.3 Transfer destinati		City					[disposition] = 5						
transfer_de	trauma_network_entry		text	13.3B Transfer destinat		State					[disposition] = 5						
dc_reason_	trauma_network_entry		radio	Transfer rea	1, Isolated head injury | 2, Multiple injury (include injuries that would						[disposition] = 4 OR [disposition] = 5						
transfer_re	trauma_network_entry		notes	Please explain why this patient was transferred:							[dc_reason_transferred] = 5						
dc_transpo	trauma_network_entry		radio	13.4 Dispo	1, Private v	What was the mode of transportation for discharge?					[disposition] = 4 OR [disposition] = 5						
dc_emsage	trauma_network_entry		text	13.5 Disposition EMS a		Enter the name of the EMS agency that transferred the pati					[dc_transport_type] = 2 OR [dc_transport_type] = 3						
traumaacti	trauma_network_entry		radio	14. Trauma	1, TR 1 | 2, T	Select the trauma activation type.											
tracking_n	trauma_network_entry		text	15. Trauma Registry Nu		Trauma Reg	number										
				16. Arrival HR NOT, if not													

- Severity scores on admission
- Outcome scores
- Periodic cases review, network M&M meetings

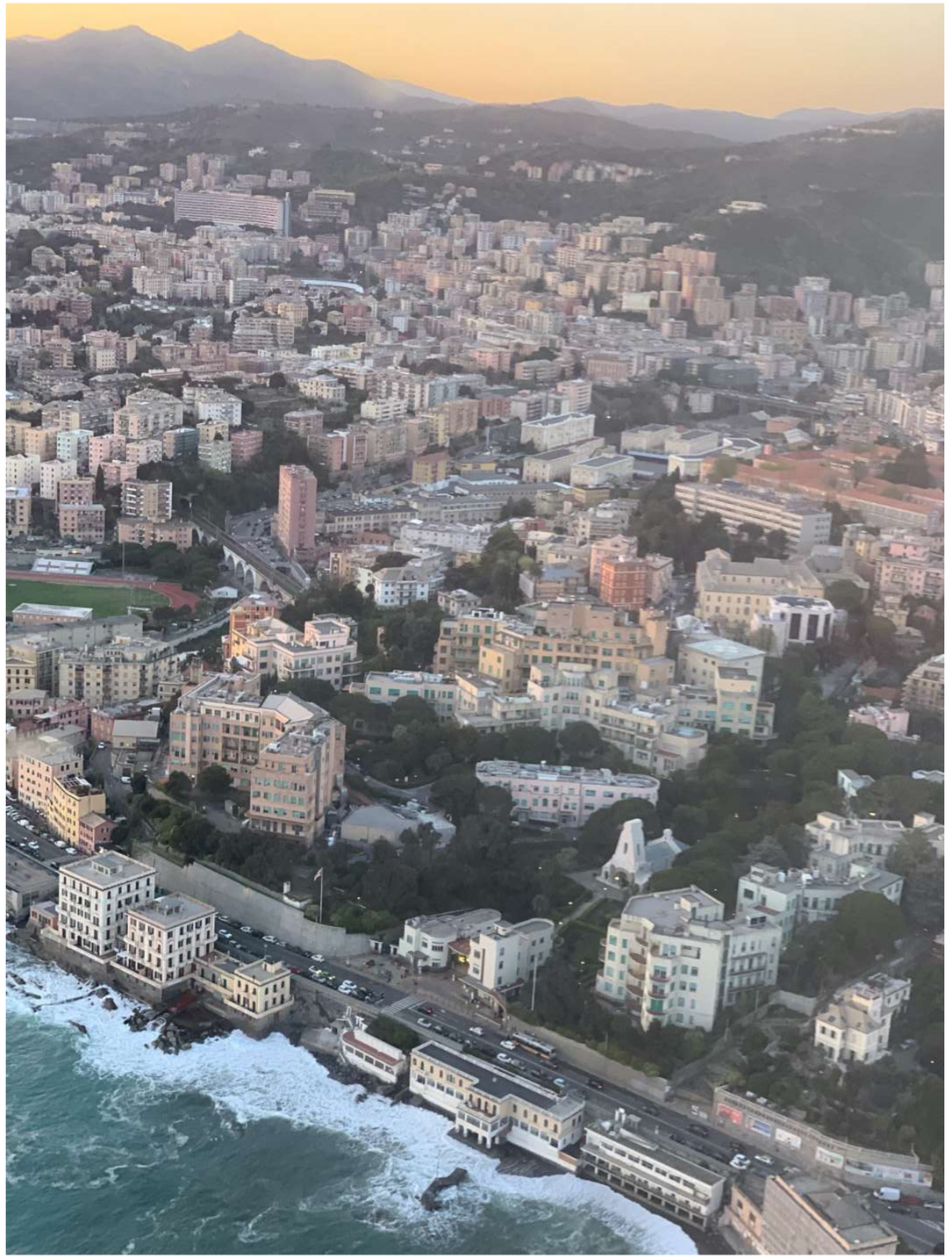


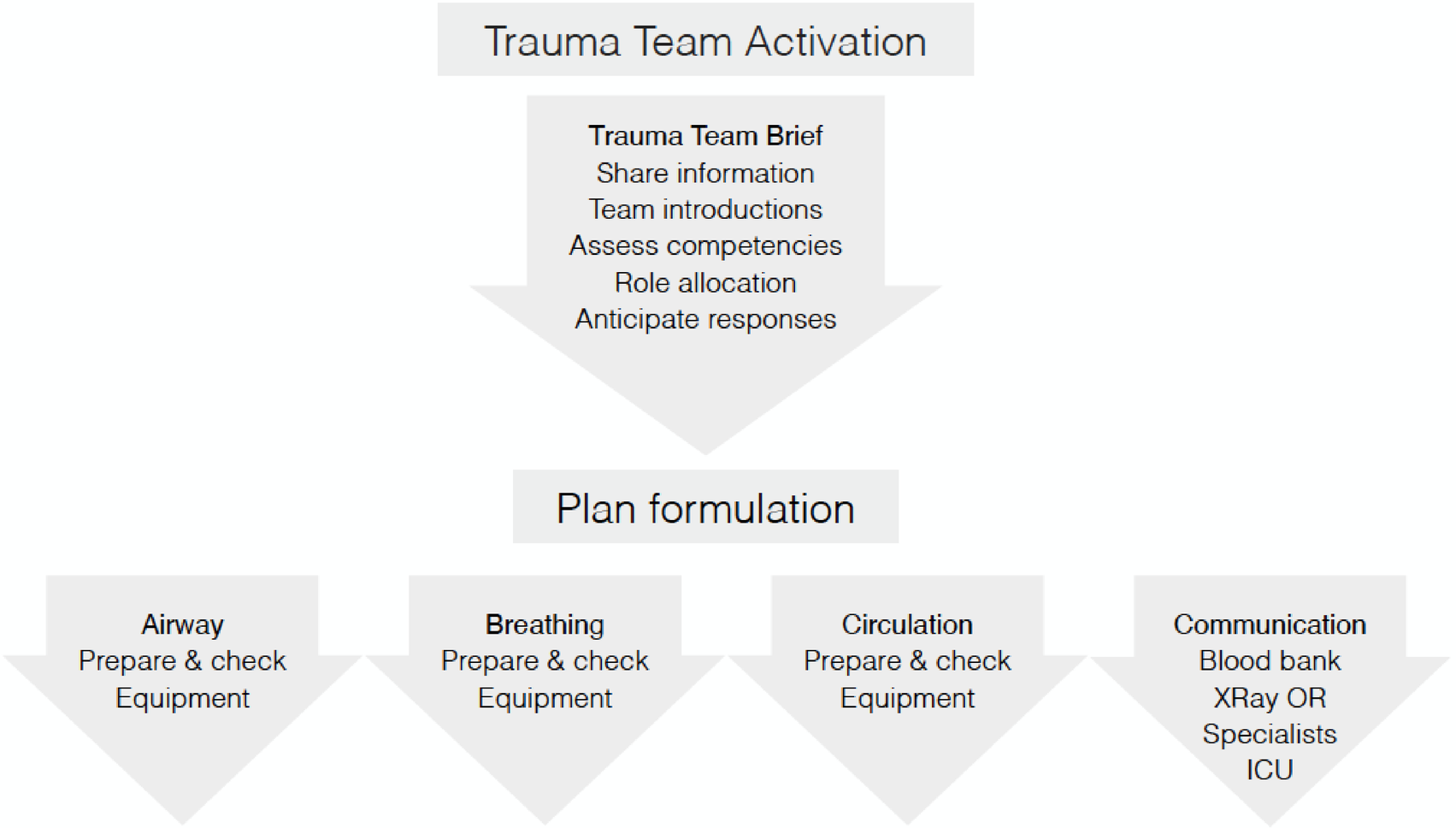
Regional trauma prevention campaigns



- Helmets
- Car seats
- Falls
- Drowning
- Burns

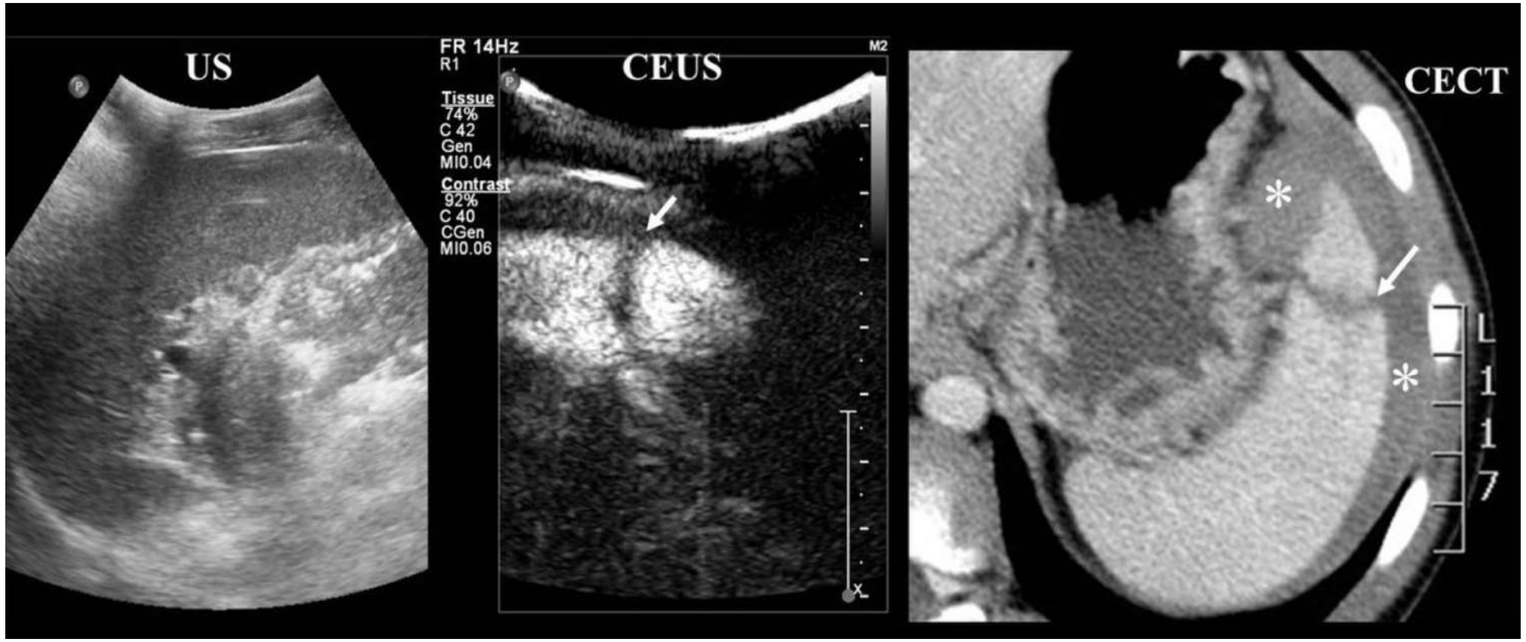
Thank you




Trauma Team Activation
Trauma Team Brief
Share information
Team introductions
Assess competencies
Role allocation
Anticipate responses
Plan formulation
Airway
Prepare & check
Equipment
Breathing
Prepare & check
Equipment
Circulation
Prepare & check
Equipment
Communication
Blood bank
XRay OR
Specialists
ICU

Contrast-enhanced ultrasound (CEUS) in pediatric blunt abdominal trauma

Trinci, M. et al. J Ultrasound 22, 27–40 (2019)



CEUS has been demonstrated to be almost as sensitive as contrast-enhanced CT in the detection of traumatic injuries in patients affected by low-energy isolated abdominal trauma, with levels of sensitivity and specificity up to 95%