

Paediatric Trauma CT: A Quality Initiative For A Better Patient Care

F. Zanca¹ , M. Barati² , G. Volford² A. Roncacci³

1 Palindromo Consulting, Leuven, BELGIUM,

2 Affidea Hungary, Budapest, HUNGARY,

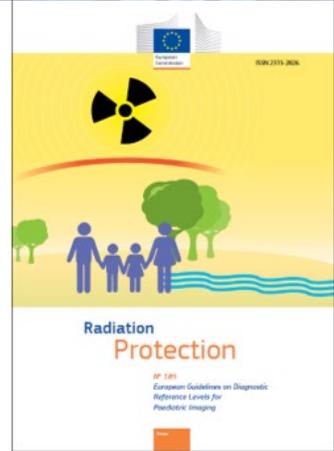
3 Roma, RM, ITALY

This document, its content and the Affidea trademark are proprietary to Affidea. This document cannot be transferred, duplicated or copied, in all or in parts, without the approval of Affidea. ©Affidea.



Background

- 2013/59/Euratom Basic Safety Standards Directive
 - continuous monitoring of dose exposure data is mandatory
- Affidea Dose Excellence Program (DEP)
 - Patient Dose (CTDIvol – series; DLP total/series) is recorded for each exam
 - Dose monitoring - Dosewatch™, GE, Milwaukee)
 - JSO (Justification Standardization Optimization)
 - Protocol Standardization (Adult)
 - Protocol Optimization
 - Justification of Dose Alerts
 - Monthly Dose Reports/Center (JSO report)
 - Monthly Dose Calls/Meetings to comply with Affidea quality standards
- Affidea Péterfy Trauma Center in Manninger Jenő Országos Traumatológia Intézet (Budapest, Hungary)
 - Level 3 Trauma center - Adult/Pediatric care
 - Pediatric CT protocols sorted by anatomy; patient age/weight
 - Operators are trained to use pediatric protocols under radiologist supervision
- **Trigger:** thesis by K. Bükkösi „Imaging of pediatric head injuries by minimizing the radiation dose”
 - Data collection – 2019. pediatric head injuries imaging
 - Retrospective data analysis showed a significant number of cases where imaging protocols for children could be optimized



Purpose

Call for Action

- Systematic revision of pediatric protocols
 - Correction
 - Inventing new protocols
- Training for the staff
- Close surveillance of pediatric protocols use
 - Reporting
 - Monitoring
 - Continuous Help
 - Feedback

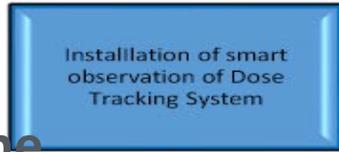
ONE SIZE
DOESN'T FIT ALL



Methods

Phase 1

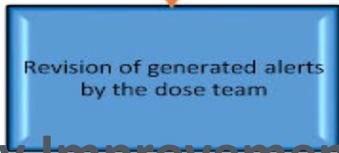
- **Baseline**



- Affidea Péterfy Trauma Center Paediatric CT meta data were retrospectively collected 01/2020- 03/2021
- Anatomical regions with sufficient amount of data were chosen for further analysis – Focus on exams under age 15

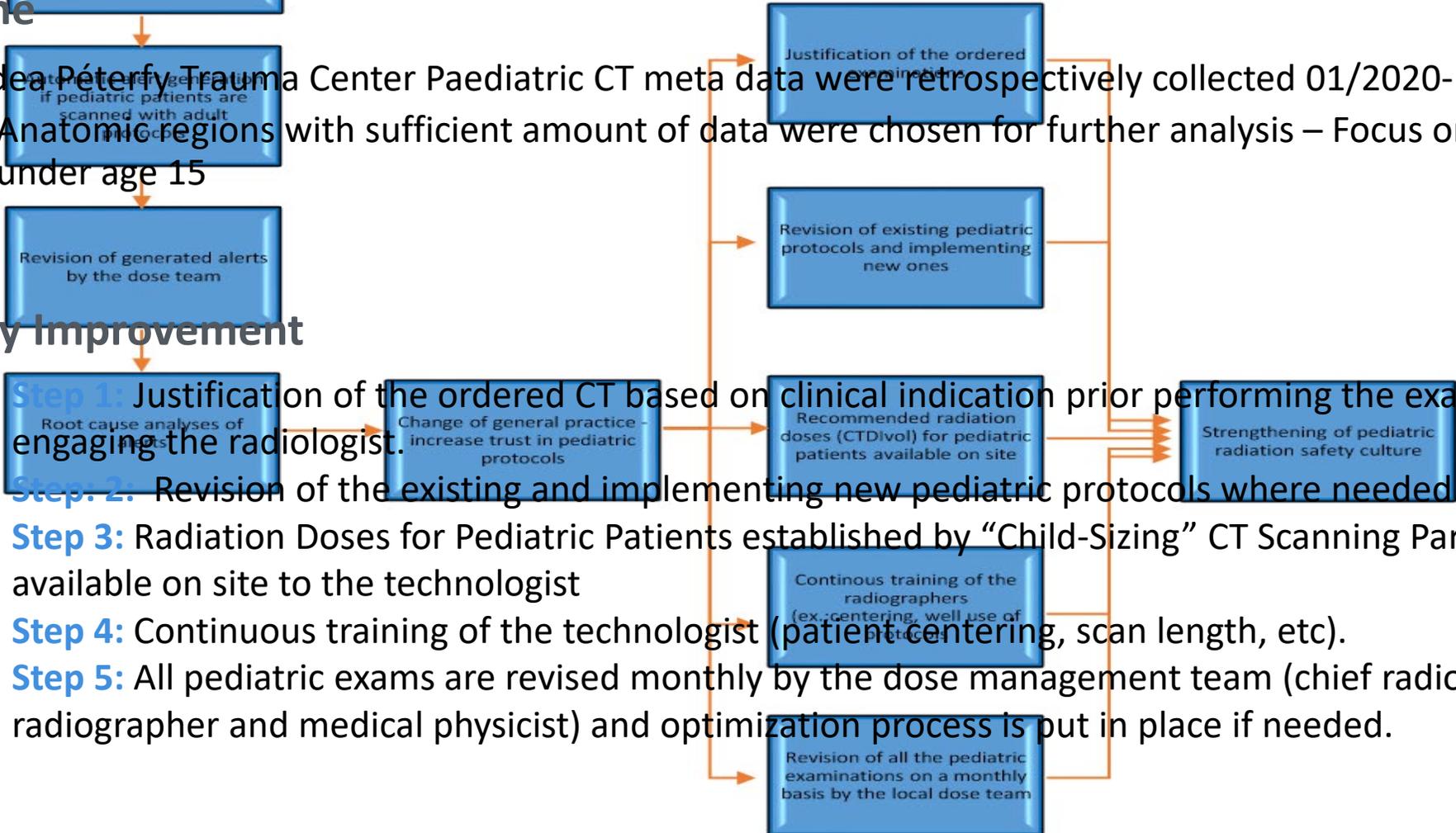
Phase 2

- **Quality Improvement**



- **Step 1:** Justification of the ordered CT based on clinical indication prior performing the exam by engaging the radiologist.
- **Step 2:** Revision of the existing and implementing new pediatric protocols where needed.
- **Step 3:** Radiation Doses for Pediatric Patients established by “Child-Sizing” CT Scanning Parameters and available on site to the technologist
- **Step 4:** Continuous training of the technologist (patient centering, scan length, etc).
- **Step 5:** All pediatric exams are revised monthly by the dose management team (chief radiologist, radiographer and medical physicist) and optimization process is put in place if needed.

Project Management Lifecycle

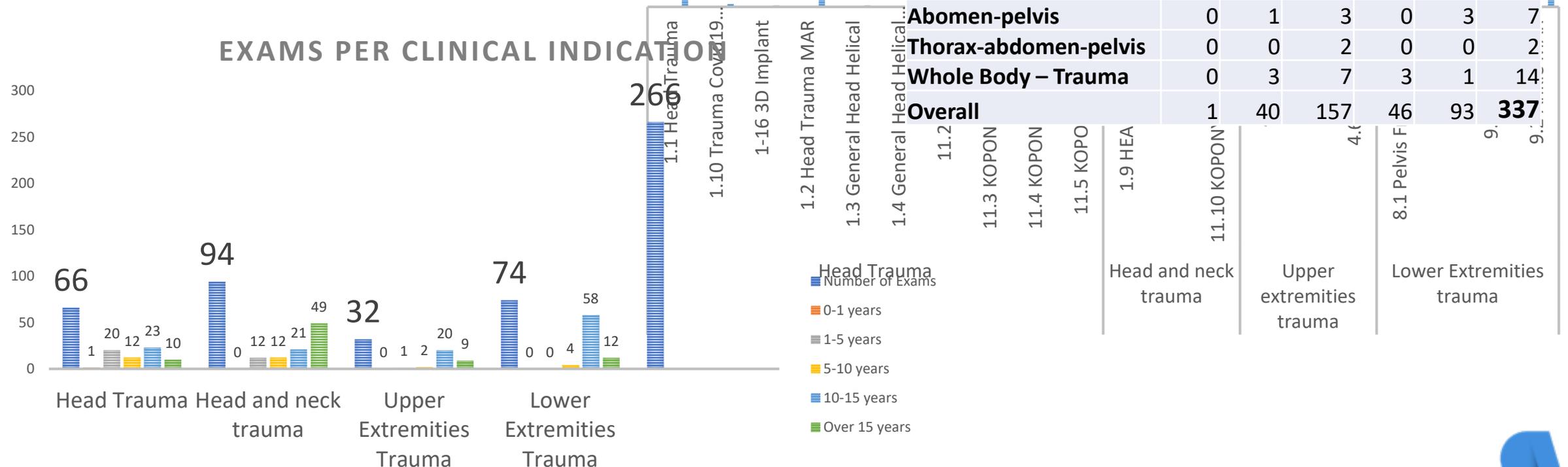


Results

Phase 1

• Baseline

- 337 pediatric exams
- Sufficient amount of data for analysis (n>20)
 - Focus under age 15
 - In depth analysis protocols/ anatomic region/clinical indication

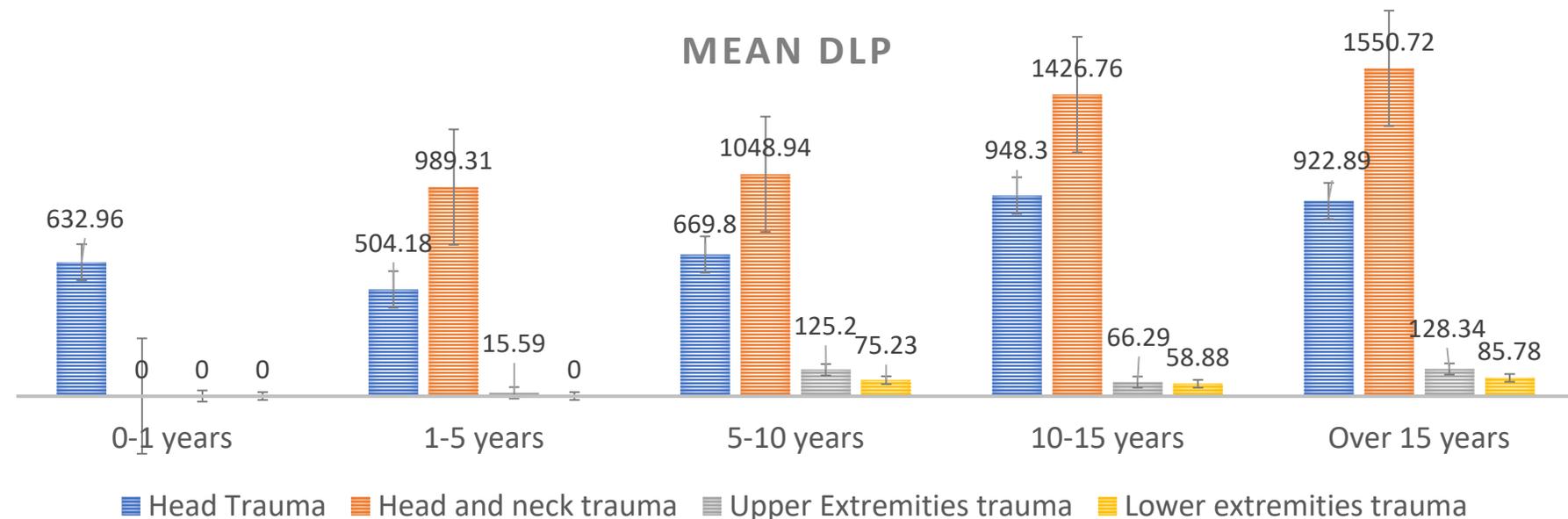
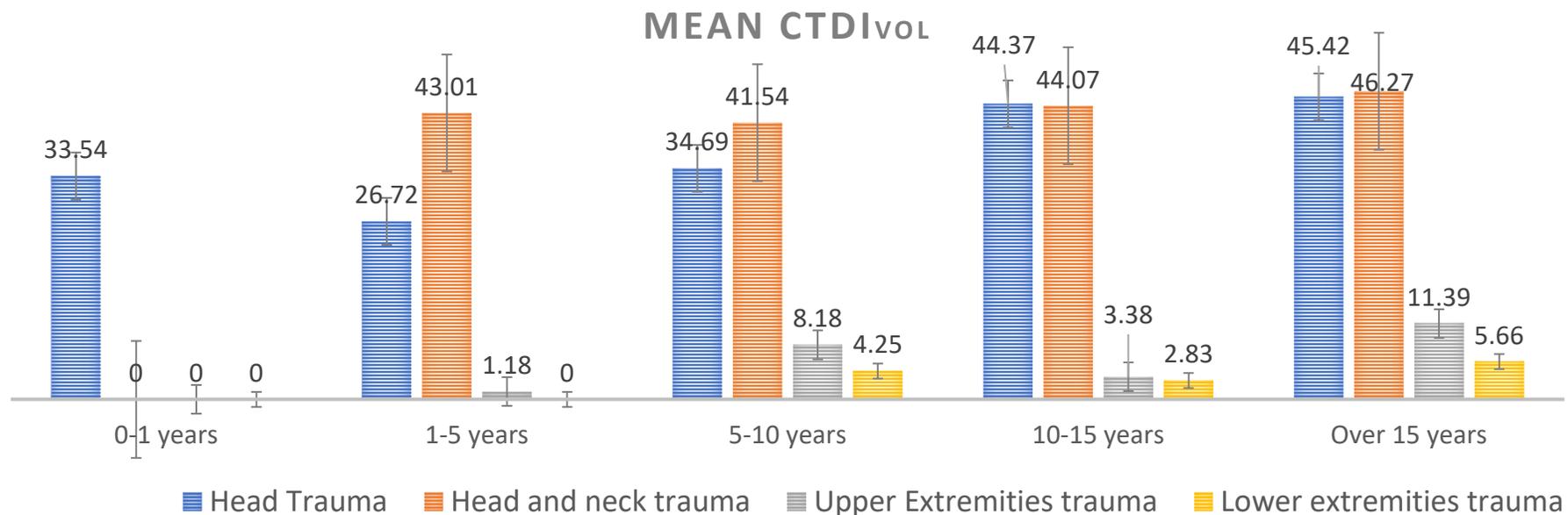


Results

Phase 1

- Dose analysis

Clinical Indication	0-1 years	1-5 years	5-10 years	10-15 years	Over 15 years
Head Trauma	1	20	12	23	10
Head and neck trauma	0	12	12	21	49
Upper Extremities Trauma	0	1	2	20	9
Lower Extremities Trauma	0	0	4	58	12



Median dose levels were below European Dose Reference Levels, 95% of the Phase 1 exams



RESULTS

Phase 2

•Dose analysis - First results

May 2021 - September 2021

Lower Extremities Trauma			
Age Group	Median DLP	Median CTDIvol	Number of exams
0-1 years	N/A	N/A	0
1-5 years	N/A	N/A	0
5-10 years	56,76	2,83	1
10-15 years	54,28	2,83	9
Over 15 years	68,65	2,83	9

Baseline

Lower Extremities Trauma			
Age Group	Median DLP	Median CTDIvol	Number of exams
0-1 years	N/A	N/A	0
1-5 years	N/A	N/A	0
5-10 years	75,23	4,25	4
10-15 years	58,88	2,83	58
Over 15 years	85,78	5,66	12

- The limited amount of data is not sufficient yet to discuss the trends, but the constant monitoring led to better compliance of the staff.
- Raw data analysis age under 18, every anatomic region (n=124):
 - 8 protocol deviation (6%); 5 deviation was justified with patient overweight and size.
 - 5 CT exams (4%) resulted in relatively high patient doses (3 Politrauma-wholebody; 2 head and neck)



Conclusion

- The installation of pediatric protocols is essential but not sufficient for quality and safety.
- The implementation of an alert system for optimizable protocol in pediatric patients combined with quality guidelines strengthen radiation safety culture in healthcare and allows to reduce radiation dose.
- Based on our initial findings our call for action resulted in better care.
- Good practice should be shared among our centers.



Take Home

- Proper Dose management solutions in place is needed for quality control.
- Standardized protocols are needed for follow up of everyday practice.
- Justification is needed for each CT exam with high dose.
- Protocol deviations must be recorded.
- In case of significant number of deviations, a call for action is needed
- Since pediatric CT exams in many places is not an everyday practice it should be executed with care.
- The installation of pediatric protocols is essential but not sufficient for quality and safety.
- The use of proper protocols and their results should be constantly monitored
- Continuous training and feedback is essential.



Thank you for your attention!

