



April 15, 2026

RE: Launch of the CRISP Radiation Exposure Category (REC) in the DAP/kg Benchmark Check Interface

The CRISP Registry has historically utilized the **C3PO Radiation Exposure Category (REC) framework** for radiation dosage tracking and DAP/kg self-check during case entry.

Building on our recent analysis and publication work, the registry has now developed the **original CRISP REC classification**, consisting of six clinically intuitive procedural groups:

- **Biopsy only**
- **Biopsy with coronary angiography**
- **Diagnostic study**
- **Low-complexity interventional procedure**
- **Medium-complexity interventional procedure**
- **High-complexity interventional procedure**

Our recent analysis demonstrated a **significant difference in radiation exposure between pediatric and adult patients**, with adult patients receiving approximately **1.5-fold higher DAP/kg values** across most procedural categories. In response, the CRISP data entry interface will now display **both CRISP REC and C3PO REC benchmark classifications separately for children and adults** within the DAP/kg check section.

We believe this enhancement will provide a **more accurate, equitable, and clinically meaningful benchmark framework**, strengthening radiation quality improvement and cross-site benchmarking efforts throughout the CRISP network.

CRISP REC (children)

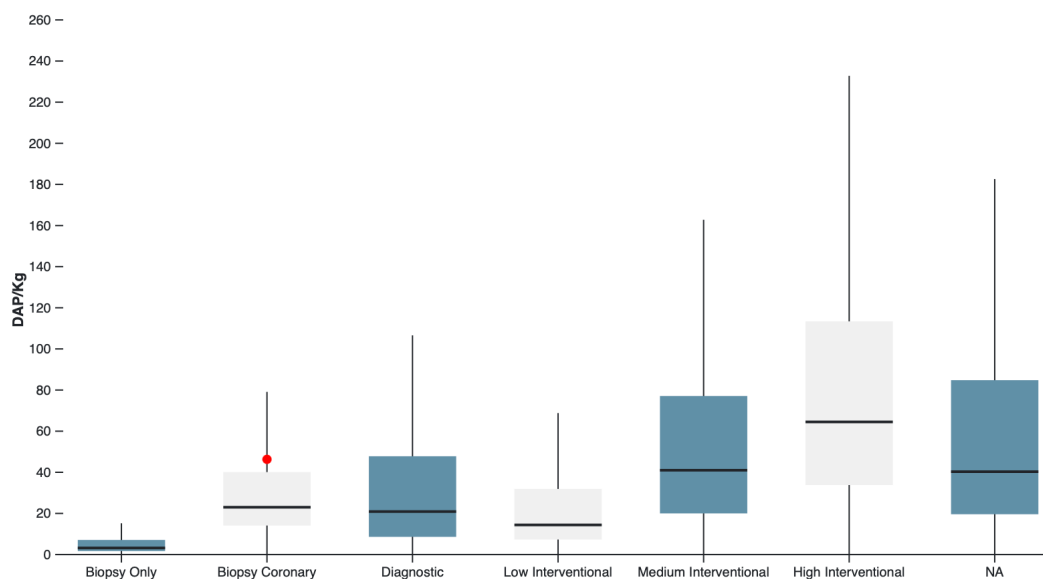
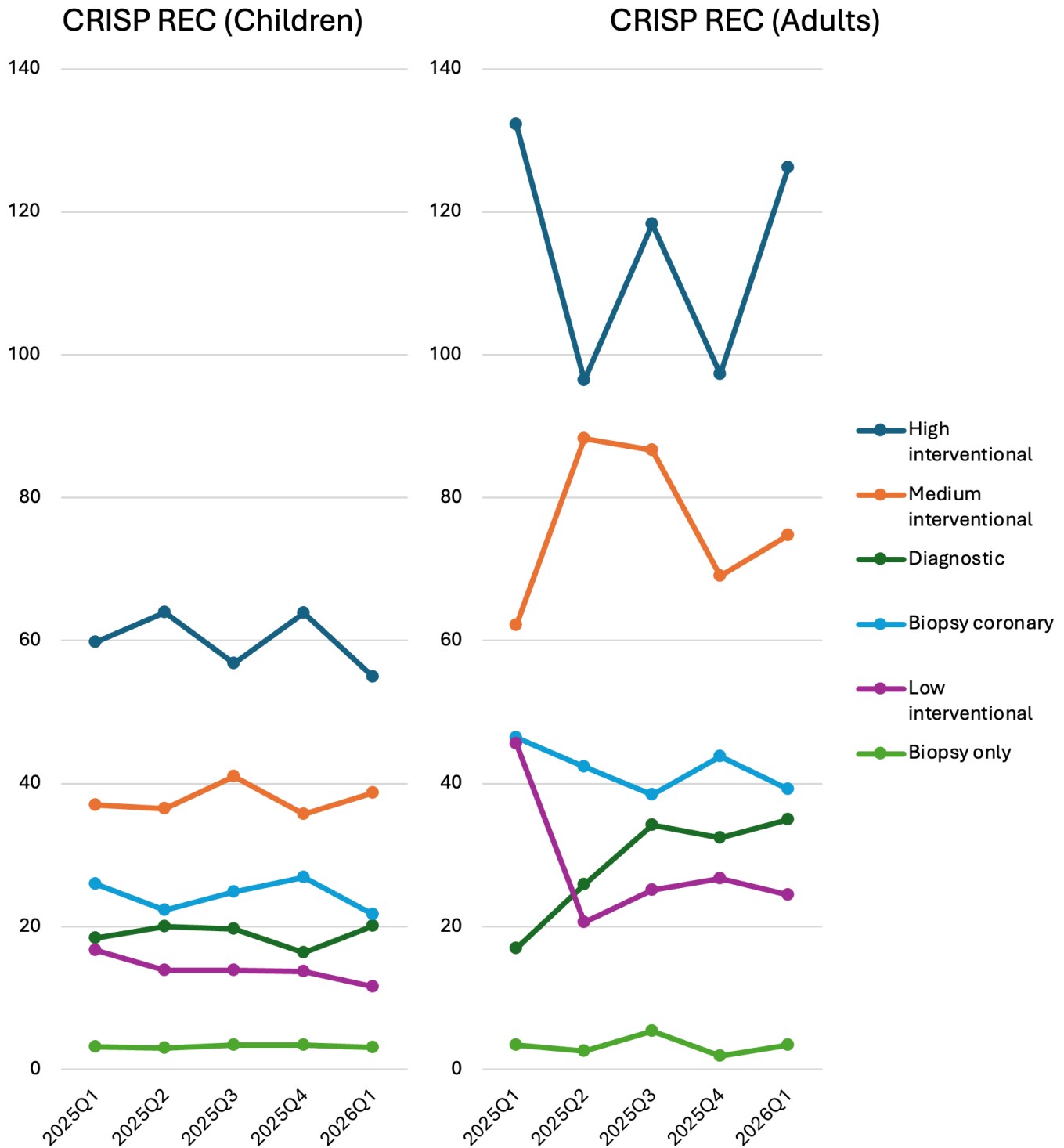


Figure: Quarterly trend of median DAP/kg stratified by CRISP REC and children/adults



Key observation:

1. Median DAP/kg values are similar between children and adults for biopsy-only procedures.
2. Adult radiation exposure is consistently higher across most remaining CRISP REC categories.
3. Low-complexity interventions demonstrate lower DAP/kg values than biopsy with coronary angiography and diagnostic studies.
4. The difference between pediatric and adult DAP/kg values becomes increasingly pronounced in medium- and high-complexity interventions

Reference: Radiation Dosage Reference Values (DAP/kg, $\mu\text{Gy}\cdot\text{m}^2/\text{kg}$) in CRISP REC

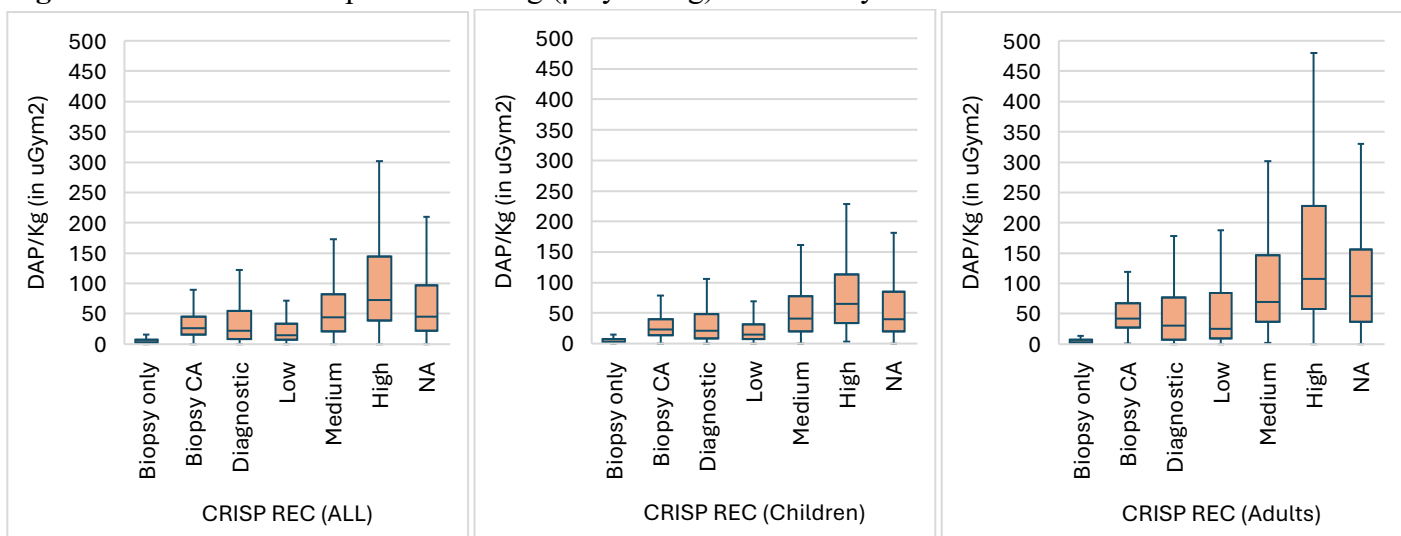
The dataset for this analysis was downloaded on **November 17, 2025**. After excluding **81 cases** with missing CRISP/CRISA score assignments or missing radiation dosage data, a total of **9,136 cases** were included in the final analysis. For the **CRISP REC** classification systems, the following radiation dosage reference values are presented: **Median, 25th percentile, 75th percentile, Upper whisker value**, defined as (*75th percentile* + $1.5 \times$ *interquartile range*). These statistics are shown for: **All patients combined, Children only and Adults only**.

CRISP REC (ALL)	Biopsy Only (n=634)	Biopsy Coronary (n=780)	Diagnostic (n=2,374)	Low Interventional (n=2,092)	Medium Interventional (n=1,422)	High Interventional (n=675)	NA (n=1,159)
Upper whisker	15.7	89.9	122.9	71.7	174.2	303.5	210.9
75 th percentile	7.3	45.3	54.2	33.1	82.1	144.6	97.3
Median	3.2	26.7	22.2	14.8	44.8	72.6	44.9
25 th percentile	1.7	15.6	8.4	7.4	20.7	38.7	21.6
Lower whisker	0	0	0	0	0	0	0

CRISP REC (Children)	Biopsy Only (n=542)	Biopsy Coronary (n=624)	Diagnostic (n=1,856)	Low Interventional (n=1,990)	Medium Interventional (n=1,274)	High Interventional (n=463)	NA (n=949)
Upper whisker	15.2	79.1	106.6	68.8	162.8	232.8	182.6
75 th percentile	7.1	40.1	47.8	31.9	77.1	113.4	84.8
Median	3.2	23.0	20.9	14.4	41	64.5	40.3
25 th percentile	1.7	14.1	8.6	7.3	20	33.8	19.6
Lower whisker	0	0	0	0	0	0	0

CRISP REC (Adults)	Biopsy Only (n=92)	Biopsy Coronary (n=156)	Diagnostic (n=518)	Low Interventional (n=102)	Medium Interventional (n=148)	High Interventional (n=212)	NA (n=210)
Upper whisker	16.1	127.9	180.1	196.3	311.7	482.7	334.6
75 th percentile	7.5	67.4	76.4	84.1	146.8	228.1	155.6
Median	3.3	41.8	30.1	25.5	69.7	108.2	79.5
25 th percentile	1.8	27.1	7.3	9.3	36.9	58.4	36.3
Lower whisker	0	0	0	0	0	0	0

Figure: Box-and-whisker plot of DAP/kg ($\mu\text{Gy}\cdot\text{m}^2/\text{kg}$) stratified by CRISP REC.



Reference: Radiation Dosage Reference Values (DAP/kg, $\mu\text{Gy}\cdot\text{m}^2/\text{kg}$) in C3PO REC

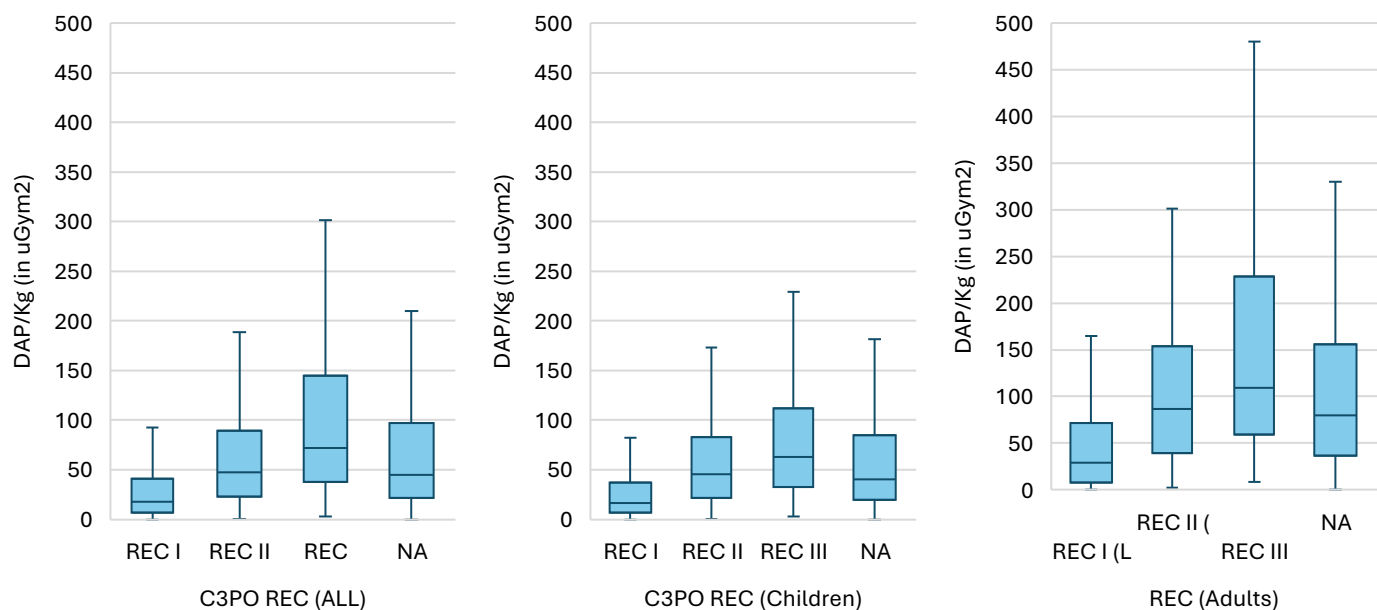
The dataset for this analysis was downloaded on **November 17, 2025**. After excluding **81 cases** with missing CRISP/CRISA score assignments or missing radiation dosage data, a total of **9,136 cases** were included in the final analysis. For the **C3PO REC** classification systems, the following radiation dosage reference values are presented: **Median, 25th percentile, 75th percentile, Upper whisker value**, defined as (*75th percentile + 1.5 × interquartile range*). These statistics are shown for: **All patients combined, Children only and Adults only**.

C3PO REC (ALL)	REC I (n=6,141)	REC II (n=1,169)	REC III (n=667)	NA (n=1,159)
Upper whisker	92.8	188.7	305.3	210.9
75 th percentile	41.3	89.1	144.9	97.3
Median	17.5	45.5	72.2	44.9
25 th percentile	7.0	22.7	38.0	21.6
Lower whisker	0	0	0	0

C3PO REC (Children)	REC I (n=5,229)	REC II (n=1,064)	REC III (n=456)	NA (n=949)
Upper whisker	82.9	174	231.5	182.6
75 th percentile	37.3	82.6	112.1	84.8
Median	16.4	45.7	63.2	40.3
25 th percentile	6.9	21.7	32.5	19.6
Lower whisker	0	0	0	0

C3PO REC (Adults)	REC I (n=912)	REC II (n=105)	REC III (n=211)	NA (n=210)
Upper whisker	167.4	324.6	483.3	334.6
75 th percentile	71.5	153.6	228.7	155.6
Median	29.3	86.8	109.4	79.5
25 th percentile	7.6	39.6	59	36.3
Lower whisker	0	0	0	0

Figure: Box-and-whisker plot of DAP/kg ($\mu\text{Gy}\cdot\text{m}^2/\text{kg}$) stratified by C3PO REC.



Reference Table: List of 40 unique procedure types in the CRISP REC

CRISP REC		C3PO Registry 40 unique procedure types
1	Biopsy only	1: Biopsy
2	Biopsy with coronary	7: Biopsy + CA
3	Diagnostic	4: Vasodilator testing 9: Diagnostic catheterization
4	Low complexity interventional	2: ASD or PFO closure 3: PDA device or coil closure 5: Atrial septostomy 6: Pulmonary valvotomy 8: PDA stent placement 11: Aortic valvotomy
5	Medium complexity interventional	10: Fenestration device closure 12: Aorta dilation and or stent 14: Proximal pulmonary angioplasty or stent 15: VSD device closure +intervention 16: RVOT dilation/stent 17: ASD or PFO closure + intervention 18: Venous collateral closure 19: Distal pulmonary angioplasty or stent 20: Aorta dilation/stent +intervention 21: Atrial needle transeptal puncture 22: Atrial septostomy +intervention 23: Coil systemic pulmonary collateral 24: Proximal R and L pulmonary angioplasty 25: Proximal or distal pulmonary angioplasty or stent +intervention 27: Atrial septal stent placement 30: Mitral valvotomy +intervention 33: Coil systemic pulmonary collateral +intervention 34: Aortic valvotomy +intervention 35: RVOT dilation/stent and ≥ 2 vessel proximal or distal pulmonary angioplasty or stent
6	High complexity interventional	13: Pulmonary valvotomy +intervention 26: Atretic valve perforation 28: Fenestration device closure +intervention 29: RVOT dilation or stent +proximal pulmonary angioplasty or stent 31: TPV implantation 32: ≥ 2 vessel proximal or distal angioplasty or stent 36: TPV implantation and PA intervention 37: ≥ 2 vessel proximal or distal angioplasty or stent +intervention 38: Pulmonary vein dilation or stent 39: TPV implantation +intervention 40: Pulmonary vein dilation or stent +intervention

Reference Table: List of 40 unique procedures types with C3PO and CRISP REC

C3PO Registry 40 unique procedure types	C3PO REC (historical)	CRISP REC (new)
1: Biopsy	1	1
2: ASD or PFO closure	1	4
3: PDA device or coil closure	1	4
4: Vasodilator testing	1	3
5: Atrial septostomy	1	4
6: Pulmonary valvotomy	1	4
7: Biopsy + CA	1	2
8: PDA stent placement	1	4
9: Diagnostic catheterization	1	3
10: Fenestration device closure	1	5
11: Aortic valvotomy	1	4
12: Aorta dilation and or stent	1	5
13: Pulmonary valvotomy +intervention	1	6
14: Proximal pulmonary angioplasty or stent	2	5
15: VSD device closure +intervention	2	5
16: RVOT dilation/stent	2	5
17: ASD or PFO closure + intervention	2	5
18: Venous collateral closure	2	5
19: Distal pulmonary angioplasty or stent	2	5
20: Aorta dilation/stent +intervention	2	5
21: Atrial needle transeptal puncture	2	5
22: Atrial septostomy +intervention	2	5
23: Coil systemic pulmonary collateral	2	5
24: Proximal R and L pulmonary angioplasty	2	5
25: Proximal or distal pulmonary angioplasty or stent +intervention	2	5
26: Atrietic valve perforation	2	6
27: Atrial septal stent placement	2	5
28: Fenestration device closure +intervention	2	6
29: RVOT dilation or stent +proximal pulmonary angioplasty or stent	2	6
30: Mitral valvotomy +intervention	3	5
31: TPV implantation	3	6
32: >=2 vessel proximal or distal angioplasty or stent	3	6
33: Coil systemic pulmonary collateral +intervention	3	5
34: Aortic valvotomy +intervention	3	5
35: RVOT dilation/stent and >=2 vessel proximal or distal pulmonary angioplasty or stent	3	5
36: TPV implantation and PA intervention	3	6
37: >=2 vessel proximal or distal angioplasty or stent +intervention	3	6
38: Pulmonary vein dilation or stent	3	6
39: TPV implantation +intervention	3	6
40: Pulmonary vein dilation or stent +intervention	3	6