American College of Radiology
ACR Appropriateness Criteria®

Hematuria-Child

Variant 1: Child. Isolated microscopic hematuria (nonpainful, nontraumatic) without proteinuria. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations 1	2	3	4	5	6	7	8	9
US kidneys and bladder	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	2	3	8	0	1	0	1	0	0

References	Study Quality
4 (15844394)	4
14 (15313065)	4
21 (2958464)	3
11 (2047140)	4
7 (8977964)	4
8 (7855959)	4
9 (8041670)	4
20 (7696121)	4

CT abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	10	3	0	0	1	0	0	0	0
CT abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	9	4	0	1	0	0	0	0	0
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	1	1	11	2	0	0	0	1	0	0	0

Radiography intravenous urography	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	10	4	0	0	0	0	0	0	0
	References		Study Quality												
	14 (15313065)		4												
	21 (2958464)		3												
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	1	1	9	2	2	1	0	0	0	0	0
Arteriography kidneys	Usually not appropriate	Expert Consensus		☢☢☢☢ 3-10 mSv [ped]	1	1	13	1	0	0	0	0	0	0	0
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	4	1	0	0	0	0	0	0
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	5	0	0	0	0	0	0	0
Radiography abdomen and pelvis	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	9	2	2	0	0	1	0	0	0
Voiding urosonography	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	1	2	1	0	0	0	0	0

Variant 2: Child. Isolated microscopic hematuria (nonpainful, nontraumatic) with proteinuria. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US kidneys and bladder	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	0	4	3	4	2
	References		Study Quality												
	23 (16869009)		4												
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	2	2	7	6	0	0	1	0	0	0	0

CT abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	10	3	0	0	1	0	0	0	0
CT abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	9	3	1	1	0	0	0	0	0
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	1	1	11	2	0	0	0	0	1	0	0
Radiography intravenous urography	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	10	3	1	0	0	0	0	0	0
Arteriography kidneys	Usually not appropriate	Expert Consensus		☢☢☢☢ 3-10 mSv [ped]	1	1	13	1	0	0	0	0	0	0	0
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	1	5	0	0	0	0	0	0
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	3	2	0	0	0	0	0	0
Radiography abdomen and pelvis	Usually not appropriate		☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
Voiding urosonography	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	9	3	1	1	0	0	0	0	0

Variant 3: Child. Isolated macroscopic hematuria (nonpainful, nontraumatic). Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US kidneys and bladder	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	1	6	7

References	Study Quality
4 (15844394)	4

		14 (15313065)		4												
		11 (2047140)		4												
		30 (20080447)		4												
		27 (8042248)		4												
		28 (8102287)		4												
		29 (3052954)		4												
		31 (25787072)		4												
		32 (25627663)		4												
CT abdomen and pelvis with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	2	4	9	0	0	0	0	0	0
		References		Study Quality												
		33 (16882045)		4												
CT abdomen and pelvis without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	3	3	7	2	0	0	0	0	0
		References		Study Quality												
		33 (16882045)		4												
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	3	3	3	4	5	1	0	0	0	1	0
		References		Study Quality												
		33 (16882045)		4												
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	3	3	2	4	8	1	0	0	0	0	0
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	5	2	2	2	2	1	0	0	0
		References		Study Quality												
		25 (17051355)		3												
		27 (8042248)		4												
		28 (8102287)		4												
		29 (3052954)		4												

References	Study Quality
35 (17459998)	4
36 (8439476)	3
33 (16882045)	4
37 (17106691)	4
38 (15772835)	4
39 (21791722)	4
40 (20627282)	4
41 (21920714)	4

MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	1	6	6	2	0	0	0	0	0

References	Study Quality
25 (17051355)	3
27 (8042248)	4
28 (8102287)	4
29 (3052954)	4
35 (17459998)	4
36 (8439476)	3
33 (16882045)	4
37 (17106691)	4
38 (15772835)	4
39 (21791722)	4
40 (20627282)	4
41 (21920714)	4

Radiography abdomen and pelvis	Usually not appropriate		☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	3	n/a	0	0	0	0	0	0	0	0	0
Radiography intravenous urography	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	7	4	2	1	0	0	0	0	0

References	Study Quality
14 (15313065)	4
34 (15204378)	4

Voiding urosonography	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	4	6	4	1	0	0	0	0	0
Arteriography kidneys	Usually not appropriate	Expert Consensus		☢☢☢☢ 3-10 mSv [ped]	1	1	10	2	1	0	1	0	0	0	0

Variant 4: Child. Painful hematuria (nontraumatic). Suspected urolithiasis. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen and pelvis without IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	8	0	0	0	0	0	0	0	0	0

References	Study Quality
44 (11956719)	4
48 (15587558)	3
50 (18328883)	4
49 (16145452)	3
51 (18303544)	4
53 (18647908)	M
54 (17377025)	2
55 (8571915)	2
52 (9146582)	3
57 (22891359)	3
56 (19098193)	1
47 (9205218)	2

US kidneys and bladder	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	0	0	0	0	0

References	Study Quality
64 (21722946)	4
48 (15587558)	3
49 (16145452)	3

		59 (11373210)		3												
		60 (17874239)		3												
		61 (19041171)		4												
		62 (21460031)		3												
		63 (26797359)		2												
		58 (26301788)		2												
Radiography abdomen and pelvis	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	6	6	0	0	0	0	0	0	0	0	0	
		References		Study Quality												
		48 (15587558)		3												
		47 (9205218)		2												
CT abdomen and pelvis with IV contrast	Usually not appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	0	0	0	0	0	0	0	0	0	
		References		Study Quality												
		44 (11956719)		4												
		48 (15587558)		3												
		50 (18328883)		4												
		49 (16145452)		3												
		51 (18303544)		4												
		53 (18647908)		M												
		54 (17377025)		2												
		55 (8571915)		2												
		52 (9146582)		3												
		57 (22891359)		3												
		56 (19098193)		1												
		47 (9205218)		2												
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	0	0	0	0	0	0	0	0	0	

CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Strong	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0

References	Study Quality
44 (11956719)	4
48 (15587558)	3
50 (18328883)	4
49 (16145452)	3
51 (18303544)	4
53 (18647908)	M
54 (17377025)	2
55 (8571915)	2
52 (9146582)	3
57 (22891359)	3
56 (19098193)	1
47 (9205218)	2

Radiography intravenous urography	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Arteriography kidneys	Usually not appropriate	Expert Consensus		☢☢☢☢ 3-10 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Voiding urosonography	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	4	7	3	0	0	0	0	0	0

Variant 5: Child. Traumatic hematuria (macroscopic). Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen and pelvis with IV contrast	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	9	9	0	0	0	0	0	0	0	0	0

References	Study Quality
72 (14713834)	4
67 (11775191)	4
68 (11987100)	4
70 (8911380)	4
71 (11992916)	4
73 (15454790)	4
78 (15290488)	4
79 (20708220)	3
82 (10541103)	3
81 (10628460)	3
83 (7717239)	3
84 (17056919)	3

Fluoroscopy retrograde urethrography	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	6	6	0	0	0	0	0	0	0	0	0

References	Study Quality
76 (8632293)	4

CT pelvis with bladder contrast (CT cystography)	May be appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	0	0	0	0	0	0	0	0	0

References	Study Quality
80 (14521207)	4
72 (14713834)	4
67 (11775191)	4
68 (11987100)	4
70 (8911380)	4
71 (11992916)	4

73 (15454790)	4
78 (15290488)	4
79 (20708220)	3
82 (10541103)	3
81 (10628460)	3
83 (7717239)	3
84 (17056919)	3

Arteriography kidneys	Usually not appropriate	Limited		☢☢☢☢ 3-10 mSv [ped]	3	3	0	0	0	0	0	0	0	0	0

References	Study Quality
91 (12559307)	4
92 (16291147)	4

US kidneys and bladder	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	3	3	0	0	0	0	0	0	0	0	0

References	Study Quality
89 (16928927)	1
85 (3306591)	3
86 (18203940)	4
87 (14657314)	3
90 (18195385)	1
88 (7644308)	3

CT abdomen and pelvis without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0

References	Study Quality
72 (14713834)	4
67 (11775191)	4
68 (11987100)	4
70 (8911380)	4
71 (11992916)	4
73 (15454790)	4

		78 (15290488)		4												
		79 (20708220)		3												
		82 (10541103)		3												
		81 (10628460)		3												
		83 (7717239)		3												
		84 (17056919)		3												
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0	
		References		Study Quality												
		80 (14521207)		4												
		72 (14713834)		4												
		67 (11775191)		4												
		68 (11987100)		4												
		70 (8911380)		4												
		71 (11992916)		4												
		73 (15454790)		4												
		78 (15290488)		4												
		79 (20708220)		3												
		82 (10541103)		3												
		81 (10628460)		3												
		83 (7717239)		3												
		84 (17056919)		3												
Radiography intravenous urography	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0	
		References		Study Quality												
		81 (10628460)		3												
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	2	2	3	9	2	0	0	0	1	0	0	

MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Radiography abdomen and pelvis	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Voiding urosonography	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	5	1	1	0	0	0	0	0

Variant 6: Child. Traumatic hematuria (microscopic). Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen and pelvis with IV contrast	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	7	0	0	0	0	0	0	0	0	0

References	Study Quality
72 (14713834)	4
67 (11775191)	4
70 (8911380)	4
71 (11992916)	4
79 (20708220)	3
95 (19250706)	3

CT pelvis with bladder contrast (CT cystography)	May be appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	6	6	0	0	0	2	3	5	4	1	0

References	Study Quality
82 (10541103)	3
81 (10628460)	3
83 (7717239)	3

Fluoroscopy retrograde urethrography	May be appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	4	4	2	3	2	3	3	1	0	0	0
US kidneys and bladder	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	4	4	0	0	0	0	0	0	0	0	0
CT abdomen and pelvis without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0

References	Study Quality
72 (14713834)	4
67 (11775191)	4
70 (8911380)	4
71 (11992916)	4
79 (20708220)	3
95 (19250706)	3

CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0

References	Study Quality
72 (14713834)	4
67 (11775191)	4
70 (8911380)	4
71 (11992916)	4
79 (20708220)	3
95 (19250706)	3

Radiography intravenous urography	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Arteriography kidneys	Usually not appropriate	Expert Consensus		☢☢☢☢ 3-10 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0

MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Radiography abdomen and pelvis	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	0	0	0	0	0	0	0	0	0
Voiding urosonography	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	3	11	0	0	0	0	0	0	0

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality**: The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at **www.acr.org/ac.**