American College of Radiology
ACR Appropriateness Criteria®

Antenatal Hydronephrosis-Infant

Variant 1: Antenatal diagnosis of hydronephrosis. Initial neonatal 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	Strong	O 0 mSv	O 0 mSv [ped]	9	9	1	0	0	0	0	0	0	2	16

References	Study Quality
25 (23474928)	4
3 (25435247)	4
6 (20951094)	3
20 (16427220)	4
12 (18071685)	4
22 (16716789)	4
23 (22506510)	2
24 (24413717)	2
27 (19484160)	4
26 (16025288)	2
28 (15197477)	4
29 (22836304)	4
30 (19663038)	4
21 (17653772)	2

Fluoroscopy voiding cystourethrography	Usually not appropriate	Limited	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	3	3	5	3	3	1	6	1	0	0	0

References	Study Quality

References	Study Quality
2 (18278521)	3
20 (16427220)	4
12 (18071685)	4
27 (19484160)	4
29 (22836304)	4
32 (18520762)	4
33 (8957961)	3
34 (22797098)	3
35 (16967282)	3
31 (20650494)	4
36 (22857837)	4
40 (10458467)	3
39 (27919407)	4
37 (25722643)	4
38 (28612058)	4

Voiding urosonography	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	3	3	4	1	12	0	0	1	0	0	0

References	Study Quality
41 (16086170)	4
42 (17520246)	1
43 (20686902)	3
44 (24659313)	2
45 (26597418)	3

MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	1	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	18	1	0	0	0	0	0	0	0
Nuclear medicine cystography	Usually not appropriate	Limited	TBD TBD	☢☢ 0.03-0.3 mSv [ped]	1	1	12	2	1	2	2	0	0	0	0

References	Study Quality

46 (6462809)	3
47 (11122000)	3

DTPA renal scan	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0
MAG3 renal scan	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	17	1	0	1	0	0	0	0	0
MRI abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0

Variant 2: Antenatal diagnosis of hydronephrosis with normal neonatal ultrasound.

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 follow-up in 1-6 months	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	1	0	0	1	0	0	4	7	5

References	Study Quality
3 (25435247)	4
4 (20399145)	4
5 ()	4
26 (16025288)	2
30 (19663038)	4
48 (22426549)	1
49 (22350369)	3
50 (24927968)	4

Fluoroscopy voiding cystourethrography	Usually not appropriate	Limited	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	3	3	5	3	3	2	6	0	0	0	0

References	Study Quality
2 (18278521)	3
20 (16427220)	4

12 (18071685)	4
27 (19484160)	4
29 (22836304)	4
32 (18520762)	4
33 (8957961)	3
34 (22797098)	3
35 (16967282)	3
31 (20650494)	4
36 (22857837)	4
40 (10458467)	3
39 (27919407)	4

Voiding urosonography	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	3	3	4	3	5	2	5	0	0	0	0

References	Study Quality
41 (16086170)	4
42 (17520246)	1
43 (20686902)	3
44 (24659313)	2
45 (26597418)	3

MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	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]	1	1	18	0	0	0	1	0	0	0	0
Nuclear medicine cystography	Usually not appropriate	Limited	TBD TBD	☢☢ 0.03-0.3 mSv [ped]	1	1	12	2	2	1	2	0	0	0	0

References	Study Quality
46 (6462809)	3
47 (11122000)	3

DTPA renal scan	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	18	1	0	0	0	0	0	0	0

MAG3 renal scan	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0
MRI abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	1	0	0	0	0	0	0

Variant 3: Antenatal diagnosis of hydronephrosis with isolated mild (SFU grade 1 and 2 or APRPD less than 15 mm) hydronephrosis on initial neonatal ultrasound.

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 follow-up in 1-6 months	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	1	0	0	0	2	1	3	5	6

References	Study Quality
4 (20399145)	4
5 ()	4
8 (15653195)	3
10 (16362721)	M
49 (22350369)	3
50 (24927968)	4

Fluoroscopy voiding cystourethrography	May be appropriate	Limited	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	4	4	3	1	4	3	8	0	0	0	0

References	Study Quality
2 (18278521)	3
20 (16427220)	4
12 (18071685)	4
27 (19484160)	4
29 (22836304)	4
32 (18520762)	4
33 (8957961)	3
34 (22797098)	3
35 (16967282)	3

		31 (20650494)		4												
		36 (22857837)		4												
		40 (10458467)		3												
		39 (27919407)		4												
Voiding urosonography	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	4	4	2	0	7	3	6	0	0	0	1
		References		Study Quality												
		41 (16086170)		4												
		42 (17520246)		1												
		43 (20686902)		3												
		44 (24659313)		2												
		45 (26597418)		3												
Nuclear medicine cystography	Usually not appropriate	Limited	TBD TBD	☢☢ 0.03-0.3 mSv [ped]	2	2	8	4	4	1	2	0	0	0	0
		References		Study Quality												
		48 (22426549)		1												
		47 (11122000)		3												
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	1	0	0	0	1	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	17	0	1	0	1	0	0	0	0
DTPA renal scan	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0
MAG3 renal scan	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	1	15	4	0	0	0	0	0	0	0
MRI abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	1	1	0	0	0	0	0	0

Variant 4: **Male. Antenatal diagnosis of hydronephrosis with moderate or severe (SFU grade 3 or 4 or APRPD greater than 15 mm) hydronephrosis on initial neonatal ultrasound, or hydronephrosis associated with parenchymal abnormalities, hydroureter, bladder wall thickening, or posterior urethral dilation.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Fluoroscopy voiding cystourethrography	Usually appropriate	Moderate	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	9	9	0	0	0	0	0	0	1	3	14

References	Study Quality
3 (25435247)	4
20 (16427220)	4
12 (18071685)	4
26 (16025288)	2
28 (15197477)	4
29 (22836304)	4
50 (24927968)	4
31 (20650494)	4
57 (19239817)	4
51 (16882811)	M
60 (25813560)	3
56 (20524012)	3
58 (7717237)	3
59 (10588268)	4

US kidneys and bladder follow-up in 1-6 months	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	1	0	0	1	0	1	3	12

References	Study Quality
1 (21683656)	3
23 (22506510)	2
50 (24927968)	4
34 (22797098)	3

MAG3 renal scan	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	7	7	0	1	0	1	0	2	9	5	0

References	Study Quality
21 (17653772)	2
51 (16882811)	M
52 (17619702)	4
53 (19484161)	4
55 (20713223)	2
54 (16945650)	3

MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	3	3	3	5	7	0	2	0	1	0	0

References	Study Quality
20 (16427220)	4
29 (22836304)	4
62 (21830021)	2
52 (17619702)	4
53 (19484161)	4
63 (15148596)	2
73 (22570256)	3
55 (20713223)	2
72 (24206785)	4
70 (23500640)	3
71 (26165191)	2
68 ()	2
66 (18631923)	3
67 (15758800)	2
61 (24549283)	4

References	Study Quality
74 (24183522)	4
76 (25102294)	2
75 (29702016)	3

DTPA renal scan	Usually not appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	3	3	3	4	8	1	2	0	0	0	0

References	Study Quality
20 (16427220)	4
29 (22836304)	4
62 (21830021)	2
53 (19484161)	4
63 (15148596)	2
61 (24549283)	4

MRI abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	5	4	6	0	3	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	8	3	2	3	1	0	1	0	0
Nuclear medicine cystography	Usually not appropriate	Limited	TBD TBD	☢☢ 0.03-0.3 mSv [ped]	2	2	8	4	3	0	1	0	1	1	0

References	Study Quality
46 (6462809)	3

Voiding urosonography	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	5	6	4	2	1	0	0	0	0

References	Study Quality
41 (16086170)	4
42 (17520246)	1
43 (20686902)	3
44 (24659313)	2
45 (26597418)	3

Variant 5: Female. Antenatal diagnosis of hydronephrosis with moderate or severe (SFU grade 3 or 4 or APRPD greater than 15 mm) hydronephrosis on initial neonatal ultrasound, or hydronephrosis associated with parenchymal abnormalities, hydroureter, bladder wall thickening.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Fluoroscopy voiding cystourethrography	Usually appropriate	Limited	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	9	9	0	0	1	0	0	1	1	3	12

References	Study Quality
3 (25435247)	4
20 (16427220)	4
12 (18071685)	4
26 (16025288)	2
28 (15197477)	4
29 (22836304)	4
50 (24927968)	4
31 (20650494)	4
57 (19239817)	4
51 (16882811)	M
60 (25813560)	3
56 (20524012)	3

US kidneys and bladder follow-up in 1-6 months	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	1	0	0	0	1	0	1	1	14

References	Study Quality
1 (21683656)	3
23 (22506510)	2
50 (24927968)	4
34 (22797098)	3
21 (17653772)	2
52 (17619702)	4
53 (19484161)	4
55 (20713223)	2
54 (16945650)	3

MAG3 renal scan	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	7	7	0	1	0	1	0	1	9	5	1

References	Study Quality
4 (20399145)	4
20 (16427220)	4
29 (22836304)	4
62 (21830021)	2
52 (17619702)	4
53 (19484161)	4
63 (15148596)	2
73 (22570256)	3
55 (20713223)	2
72 (24206785)	4
70 (23500640)	3
71 (26165191)	2
69 ()	4
68 ()	2
66 (18631923)	3
67 (15758800)	2
61 (24549283)	4

Voiding urosonography	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	1	0	0	0	4	1	7	4	1

References	Study Quality
41 (16086170)	4
42 (17520246)	1
43 (20686902)	3
44 (24659313)	2
45 (26597418)	3

Nuclear medicine cystography	May be appropriate (Disagreement)	Expert Opinion	TBD TBD	☢☢ 0.03-0.3 mSv [ped]	5	5	0	1	1	4	8	1	1	1	1

References	Study Quality
46 (6462809)	3
47 (11122000)	3

MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	2	2	6	4	3	0	1	0	0
DTPA renal scan	Usually not appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	3	3	1	7	7	0	2	1	0	0	0

References	Study Quality
20 (16427220)	4
29 (22836304)	4
62 (21830021)	2
53 (19484161)	4
63 (15148596)	2
64 (15821462)	4
65 (20823803)	4
61 (24549283)	4

MRI abdomen and pelvis with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	4	3	7	1	3	0	0	0	0

References	Study Quality
74 (24183522)	4
75 (29702016)	3

MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	2	3	3	1	1	0	0	0

Variant 6: Antenatal diagnosis of hydronephrosis with moderate or severe (SFU grade 3 or 4 or APRPD greater than 15 mm) hydronephrosis on initial neonatal ultrasound and no evidence of reflux on VCUG.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MAG3 renal scan	Usually	Strong	☢☢☢ 1-10	☢☢☢ 0.3-	8	8	0	0	0	0	1	2	5	2	9

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
	appropriate		mSv	3 mSv [ped]											

References	Study Quality
3 (25435247)	4
20 (16427220)	4
22 (16716789)	4
27 (19484160)	4
28 (15197477)	4
52 (17619702)	4
73 (22570256)	3
55 (20713223)	2
72 (24206785)	4
70 (23500640)	3
71 (26165191)	2
68 ()	2
66 (18631923)	3
67 (15758800)	2
61 (24549283)	4

US kidneys and bladder follow-up in 1-6 months	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	1	0	1	0	1	0	2	8	5

References	Study Quality
1 (21683656)	3
2 (18278521)	3
4 (20399145)	4
6 (20951094)	3
22 (16716789)	4
23 (22506510)	2
29 (22836304)	4
48 (22426549)	1

DTPA renal scan	May be appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	6	6	0	1	0	1	5	4	6	2	0
MRI abdomen and pelvis without and with IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	1	1	1	2	7	5	0	1	0
MRI abdomen and pelvis with IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	4	2	2	1	5	3	1	0	0
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	3	3	4	3	3	4	2	2	0	0	0

References	Study Quality
21 (17653772)	2
51 (16882811)	M
53 (19484161)	4
55 (20713223)	2
54 (16945650)	3
77 (23726167)	3

References	Study Quality
20 (16427220)	4
29 (22836304)	4
62 (21830021)	2
53 (19484161)	4
63 (15148596)	2
64 (15821462)	4
65 (20823803)	4
61 (24549283)	4

References	Study Quality
74 (24183522)	4
76 (25102294)	2
75 (29702016)	3

References	Study Quality
74 (24183522)	4
76 (25102294)	2

75 (29702016)	3

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.**