American College of Radiology
ACR Appropriateness Criteria®

Vomiting in Infants

Variant 1: Vomiting within the first 2 days after birth. Poor feeding or no passage of meconium. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography abdomen	Usually appropriate	Limited	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	9	9	0	0	0	0	0	0	1	2	15
		References		Study Quality											
		8 (19380551)		4											
Fluoroscopy upper GI series	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	3	3	6	2	5	1	3	1	0	0	0
Fluoroscopy contrast enema	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	7	5	5	0	0	0	0	0	0
US abdomen (UGI tract)	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	3	5	1	1	0	0	0	0
Nuclear medicine gastroesophageal reflux scan	Usually not appropriate	Expert Consensus		☢☢☢ 0.3-3 mSv [ped]	1	1	14	3	1	0	0	0	0	0	0

Variant 2: Vomiting within the first 2 days after birth. Radiographs show classic double bubble or triple bubble with little or no gas distally (suspected proximal bowel obstruction or atresia). Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Fluoroscopy upper GI series	May be	Expert	☢☢☢ 1-10	☢☢☢ 0.3-	4	4	0	1	1	7	6	2	0	0	0

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
	appropriate	Consensus	mSv	3 mSv [ped]											
US abdomen (UGI tract)	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	2	6	1	0	0	1	0	0
Fluoroscopy contrast enema	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	10	1	5	0	1	1	0	0	0
		References		Study Quality											
		11 (26093906)		2											
Nuclear medicine gastroesophageal reflux scan	Usually not appropriate	Expert Consensus		☢☢☢ 0.3-3 mSv [ped]	1	1	15	1	2	0	0	0	0	0	0

Variant 3: Vomiting within the first 2 days after birth. Radiographs show a distal bowel obstruction. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Fluoroscopy contrast enema	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	9	9	0	0	0	0	0	0	0	2	16
		References		Study Quality											
		12 (29528714)		4											
Fluoroscopy upper GI series	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	3	3	6	2	5	0	4	1	0	0	0
Nuclear medicine gastroesophageal reflux scan	Usually not appropriate	Expert Consensus		☢☢☢ 0.3-3 mSv [ped]	1	1	14	3	1	0	0	0	0	0	0
US abdomen (UGI tract)	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	3	4	0	0	0	0	0	0

Variant 4: Bilious vomiting within the first 2 days after birth. Radiographs show a nonclassic double bubble with gas in the distal small bowel, or few distended bowel loops, or a normal bowel gas pattern. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Fluoroscopy upper GI series	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	9	9	0	0	0	0	0	0	1	1	16

References	Study Quality
5 (10546672)	4
17 (21763833)	3
6 (3717104)	4
15 (15378215)	4
16 (18265969)	2
18 (8628870)	4
11 (26093906)	2

US abdomen (UGI tract)	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	1	1	1	7	6	1	0	0	0

References	Study Quality
15 (15378215)	4
19 (18678603)	4
22 (16677901)	3
23 (1529850)	3
24 (22684229)	4
25 (23132236)	4
28 (29049228)	3
21 (20552188)	4
20 (-3149156)	4
27 (19308378)	4
26 (23407700)	3

Fluoroscopy contrast enema	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	7	6	3	1	0	0	0	0	0

References	Study Quality
4 (20432010)	4
13 (8337877)	4
14 (19551391)	4

Nuclear medicine gastroesophageal reflux scan	Usually not appropriate	Expert Consensus		☢☢☢ 0.3-3 mSv [ped]	1	1	16	1	1	0	0	0	0	0	0

Variant 5: Bilious vomiting in an infant older than 2 days (suspected malrotation). Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Fluoroscopy upper GI series	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	9	9	0	0	0	0	0	0	1	2	15

References	Study Quality
5 (10546672)	4
17 (21763833)	3
6 (3717104)	4
15 (15378215)	4
16 (18265969)	2
18 (8628870)	4

US abdomen (UGI tract)	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	1	2	1	2	9	2	0	0	0

References	Study Quality
15 (15378215)	4
19 (18678603)	4
22 (16677901)	3
23 (1529850)	3

		24 (22684229)		4												
		25 (23132236)		4												
		28 (29049228)		3												
		21 (20552188)		4												
		20 (-3149156)		4												
		27 (19308378)		4												
		26 (23407700)		3												
Radiography abdomen	May be appropriate (Disagreement)	Expert Opinion	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	5	5	1	4	1	2	5	3	0	0	1	
		References		Study Quality												
		6 (3717104)		4												
Fluoroscopy contrast enema	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	8	2	5	2	0	1	0	0	0	
		References		Study Quality												
		29 (16973777)		4												
Nuclear medicine gastroesophageal reflux scan	Usually not appropriate	Expert Consensus		☢☢☢ 0.3-3 mSv [ped]	1	1	17	0	1	0	0	0	0	0	0	

Variant 6: Infant with nonbilious vomiting, and otherwise healthy (suspected uncomplicated esophageal reflux). Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Fluoroscopy upper GI series	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		2 (11525610)		4											
		34 (19745761)		4											
Nuclear medicine gastroesophageal reflux scan	May be appropriate (Disagreement)	Expert Opinion		☢☢☢ 0.3-3 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
42 (7830141)	4
35 (6602471)	3
36 (8708772)	3
37 (19352210)	3
38 (8326376)	2
39 (21849926)	4
41 (3277230)	4
40 (18483812)	3

US abdomen (UGI tract)	Usually not appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
47 (16926562)	1
43 (16622332)	3
44 (9805307)	3
45 (3532185)	4
46 (7972822)	3

Fluoroscopy contrast enema	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
Radiography abdomen	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 7: Infant older than 2 weeks and up to 3 months old. New onset nonbilious vomiting (suspected hypertrophic pyloric stenosis). Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US abdomen (UGI tract)	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	0	2	16

References	Study Quality
30 (1994426)	4

References	Study Quality
45 (3532185)	4
46 (7972822)	3
31 (19308372)	4
51 (3285655)	2
41 (3277230)	4
52 (17958692)	4
53 (15154530)	3

Fluoroscopy upper GI series	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	5	5	0	0	0	4	10	2	0	0	1

References	Study Quality
4 (20432010)	4
3 (-3149148)	4
48 (9396536)	4
49 (10353929)	4

Radiography abdomen	Usually not appropriate	Limited	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	3	3	6	0	4	2	5	1	0	0	0

References	Study Quality
50 (-3157907)	4

Fluoroscopy contrast enema	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	2	0	0	0	0	0	0	0
Nuclear medicine gastroesophageal reflux scan	Usually not appropriate	Expert Consensus		☢☢☢ 0.3-3 mSv [ped]	1	1	11	1	1	1	3	1	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.**