

Indonesian pediatricians' understanding and management of infant regurgitation based on Rome IV criteria

Fransesco Bernado Hubert Jonathan¹, Agus T. Sridevi¹, Brahmantyo A. Wicaksono¹, Dewi Friska², Badriul Hegar³

Abstract

Background The diagnostic criteria of infant regurgitation have been well elucidated in the Rome IV criteria and pediatricians have been informed of them. However, as a functional disorder, infant regurgitation is susceptible to misdiagnosis and inappropriate management.

Objective To assess pediatricians' diagnostic knowledge of and therapeutic approach to infant regurgitation.

Methods We conducted a cross-sectional, analytical study using a questionnaire based on Rome IV criteria for infant regurgitation diagnosis and standardized guidelines for management. The questionnaire was face-level validated by an expert and tested for both reliability and correlation using 30 test respondents. The questionnaire was then distributed electronically to 131 randomized pediatricians, who were members of the *Indonesian Pediatric Society DKI Jakarta Branch* and graduated from pediatric residency within year 2005-2019.

Results Sixty-seven (51%) pediatricians reported applying the Rome IV criteria in daily clinical practice. Pediatricians who used Rome IV as their source of knowledge achieved mean and median diagnostic knowledge scores of 14.87 (SD 2.540) and 16 (range 8-20), respectively, with no significant correlation between the usage of ROME IV and the pediatricians' diagnostic understanding ($P=0.110$), and mean and median therapeutic knowledge scores of 9.10 (SD 2.264) and 10 (range 4-12), respectively, with no significant correlation between the usage of ROME IV and the pediatricians' therapeutic approach ($P=0.486$). Pediatricians' diagnostic knowledge and therapeutic approach were not significantly different with regards to their practice experience, specialist institution, workplaces, and source of information.

Conclusion The majority of pediatricians surveyed have good diagnostic and therapeutic knowledge scores with regards to handling of Rome IV infant regurgitation. [Paediatr Indones. 2022;62:373-81; DOI: <https://doi.org/10.14238/pi62.6.2022.373-81>].

Keywords: infant regurgitation; Rome IV criteria; FIGD

According to the Rome IV criteria, functional gastrointestinal disorders (FGID) are a set of diseases related to both chronic or recurrent gastrointestinal symptoms that are not associated with any biochemical or structural abnormalities.¹ The definition itself has changed over the years, especially with updated consensus among experts as well as new research findings.² Currently, FGIDs are believed to revolve around disorders related to brain-gut interaction. However, precise pathophysiological processes have yet to be elucidated.³

Regurgitation is the most common FGID in infants.^{4,5} Infant regurgitation is defined as uncontrolled reflux of food or stomach contents up to the infant's mouth, and sometimes through the pharynx and nose.³ Two obligatory diagnostic criteria for infant regurgitation in infants who are otherwise healthy must be met: regurgitation that occurs two or more times a day for 3 or more weeks, and the absence of retching, hematemesis, aspiration, apnea,

From Universitas Indonesia Medical School¹, Department of Community Medicine² and Department of Child Health³, Universitas Indonesia Medical School, Jakarta, Indonesia.

Corresponding authors: Badriul Hegar. Department of Child Health, Universitas Indonesia Medical School. Jl. Diponegoro No. 71, Jakarta, Indonesia. Phone: +62-21-3907742. E-mail: bhegars@gmail.com.

Submitted October 11, 2021. Accepted December 5, 2022.

failure to thrive, feeding or swallowing abnormalities, or abnormal posturing.⁶

In Indonesia, 77% of infants younger than the age of 3 months reportedly had regurgitation at least once a day.⁷ As the infant grows, the occurrence of regurgitation is expected to decrease, with a peak of regurgitations per day happening around the age of 4 months.^{8,9} By the age of 12 months, most infants do not regurgitate anymore.¹⁰

Mothers are found to be more concerned and worried even more if their infants have persistent regurgitation.⁷ Nearly 25% of parents are concerned about excessive regurgitation.⁷ Different approaches towards preventing and dealing with infant regurgitation have been found in caretakers (mostly parents), but no official guidelines exist prior to the introduction of the Rome IV criteria.⁴

The Rome IV criteria have been accepted worldwide as a reliable guideline for various functional gastrointestinal diseases, including infant regurgitation. However, pediatricians vary in diagnosis and treatment of infant regurgitation in daily practice. It is important for pediatricians to be able to recognize the signs and symptoms. Such knowledge and skill can be obtained through pediatricians' medical education, training as subspecialists, continuous medical education (CME), books, and medical journals, as well as information from various highly advanced media. Hence, there are many differences in how pediatricians perceive disorders and provide management of infant regurgitation. Pediatricians' clinical experience may also impact their diagnostic accuracy and therapeutic approach.

Considering the current condition, we aimed to evaluate pediatricians' diagnostic and therapeutic approaches to infant regurgitation, as well as identify factors that may influence their decisions. We hope that our findings will be used as a reference to develop better strategies to improve Indonesian pediatricians' management of infant regurgitation to enhance quality of life for both infants and their parents.

Methods

This study was done as a part of a larger research project including studies on infantile colic and constipation. Using a cross-sectional, analytical design,

we developed an electronic questionnaire based on the Rome IV criteria, along with up-to-date therapeutic approach principles. The questionnaire was in an online format (Google forms), which consisted of multiple-choice and short answer questions. The questions were designed to assess pediatricians' diagnostic understanding as well as therapeutic approaches for patients. Participants were members of the Jakarta Branch of the *Indonesian Pediatric Society* (IPS). The minimum required sample size was 100 subjects, who were included by consecutive sampling.

The questionnaire was validated by initially having 30 pediatricians fill the form. The reliability and correlation analyses were done with *Microsoft Excel* and *SPSS software version 20*. The questionnaire and scoring criteria had been reviewed by 2 gastrohepatology consultants to make sure that the questions reflected the appropriate diagnostic criteria and therapeutic approaches that the pediatricians must understand. The pediatricians were compared based on their practice experience, specialist study institution, workplace, source of information for diagnosis of infant regurgitation, and source of information for therapeutic approach of infant regurgitation.

Regarding the source of information for diagnosis, the pediatricians were split into 2: those who used and included Rome IV as their source of information and those who do not include Rome IV as their source of information (non-Rome IV). For the therapeutic approach of infant regurgitation, pediatricians were divided into those who referred to *Continuing Medical Education* (CMEs) events and non-CME for those who referred to other sources than CME. Once validated, the questionnaire was distributed to subjects (IPS pediatricians). The confidence interval used was 95%. Kolmogorov-Smirnov analysis was used to examine data normality, since the sample size was above 30 ($P < 0.05$ indicated non-normal data distribution, while $P > 0.05$ indicated normal data distribution). Normally distributed data were presented as mean score (average) and standard deviation, while non-normally distributed data were presented in median (range) score. Mean scores were also shown for the non-normally distributed data to provide better comparison between groups. Data analysis was done using Levene's test or independent T-test for normally distributed data and Mann-Whitney U test for non-

normally distributed data. Our study approved by the Ethics Committee of the Universitas Indonesia Medical School.

Results

A total of 131 filled questionnaires met the inclusion criteria, including 30 from reliability and correlation testing. Most of the pediatricians who participated had over 5 years of experience (69%); indicating that they have been practicing since before the Rome IV criteria was published in 2016. The institutions that they attended were largely well accredited, with as many as 77 (83%) pediatricians graduating from A-accredited universities. Unfortunately, the accreditation data was only available up to 2011, hence, the pediatrician's specialist study institution field data had a reduced sample size of 93. Also, only 26 (20%) pediatricians practiced in teaching hospitals. The majority (85%) of respondents recognized the Rome criteria. However, only 67 (51%) applied the Rome IV criteria in their daily clinical practice. Most pediatricians (74%) also admitted to CMEs as their knowledge source, which was a good sign that they put effort into keeping their knowledge up-to-date (Table 1).

As many as 75% of the questions that assess diagnostic knowledge of infant regurgitation were answered correctly by >80% of pediatricians. In addition, most pediatricians (95%) understood that infant regurgitation may diminish as the

infant grows older (natural evolution in line with gastrointestinal tract maturation). However, less than half of pediatricians (48%) responded correctly to the statement "no failure to thrive" as part of the diagnostic criteria for regurgitation (Table 2).

Regarding diagnostic knowledge for gastroesophageal reflux disease (GERD), more than 80% of pediatricians achieved the right answers in at least 50% of the questions. Sixty-five percent of pediatricians still believed that prolonged infant crying or discomfort was an early sign of GERD, even though avoiding food and drinks was understood by 84 (64%) pediatricians as not a specific symptom of GERD. Three questions regarding the diagnostic tools of GERD (questions 3.3, 3.4, 3.6 respectively), were correctly answered by >80% of pediatricians, however, 27% of pediatricians still believed that barium meal procedure can be used as a supporting examination to diagnose GERD (Table 2).

Only 33% of questions on pediatricians' therapeutic approach were answered correctly by more than 80% of pediatricians. Interestingly, questions 4.1. and 4.2. achieved an outstanding number of correct answers: 100% and 98%, respectively. This finding shows that most pediatricians agree that parental reassurance was important and that breastfeeding must not be stopped when the infant had regurgitation. However, less than half (47%) of pediatricians responded correctly to a question regarding the modification of formula milk (Table 3).

Table 1. Subjects' characteristics

Characteristics	n (%)
Pediatrician's practice experience (n=131)	
< 5 years	40 (31)
5-15 years	91 (69)
Pediatrician's specialist study institution (n=93)*	
A-accredited	77 (83)
B-accredited	16 (17)
Pediatrician's workplace (n=131)	
Teaching hospital	26 (20)
Non-teaching hospital	105 (80)
Source of information on diagnosis of infant regurgitation (n=131)	
Rome IV	67 (51)
Non-Rome IV	64 (49)
Source of information on therapeutic approach of infant regurgitation (n=131)	
CME	97 (74)
Non-CME	34 (26)

*accreditation data only available from year 2011

Table 2. Pediatricians' knowledge on infant regurgitation and GERD (correct answers)

Components	n (%)
Diagnostic understanding of regurgitation* (n=131)	
2.1. Infant regurgitated recently consumed food or drinks	123 (94)
2.2. Retching present	114 (87)
2.3. Natural evolution of regurgitation	124 (95)
2.4. No failure to thrive	63 (48)
Diagnostic understanding of GERD* (n=131)	
3.1. Prolonged infant crying or discomfort as the early clinical sign for GERDa	46 (35)
3.2. Infant avoiding food and drinks is a specific sign for GERDa	84 (64)
3.3. GERD questionnaire cannot be used to exclude GERD in practicea	122 (93)
3.4. Esophagus epithelial mucosa damage is due to prolonged exposure of gastric acid in the esophagus	117 (89)
3.5. Diagnosis can be made using USG or barium meal examinationa	96 (73)
3.6. Definitive diagnosis can be made using endoscopy and tissue biopsy	108 (82)

*Multiple options could be selected, therefore, there are overlaps in the percentages; ^aFalse statement. The statement must not be chosen to be considered as a correct answer; GERD=gastroesophageal reflux disease

Table 3. Pediatricians' knowledge on therapeutic approach to infant regurgitation (correct answers) (N=131)

Components	n (%)
Therapeutic approach to infant regurgitation questions	
4.1. Provide parental reassurance?	131 (100)
4.2. Recommend stopping breastfeeding? ^a	129 (98)
4.3. Modify the administration of formula milk that is consumed by the infant? (for infants who do not receive exclusive breastfeeding)*	61 (47)
4.4. Change the formula milk given to the infant? (for infants who do not receive exclusive breastfeeding)*	88 (67)
4.5. Recommend positional changes to the infant?	99 (76)
4.6. Prescribe any medication to the infant? ^a	83 (63)

^aFalse statement. The statement must not be chosen to be considered as a correct answer. *Conditional scoring applied.

Due to the total of knowledge score being non-normally distributed, data analysis was done using Mann-Whitney U test, a non-parametric test for two independent samples. As shown in **Table 4**, pediatricians' diagnostic knowledge based on Rome IV criteria was not significantly correlated with subject characteristics, such as pediatricians' practice experience of <5 years vs. 5-15 years ($P=0.645$), or use of Rome IV vs. non-Rome IV ($P=0.110$) as a source of information. In fact, it seemed that longer duration of practice and the claim of using Rome IV did not correlate with better knowledge score.

Similar to the knowledge score, we applied Mann-Whitney U test to analyze the therapeutic approach to infant regurgitation and subject characteristics, due to abnormal data distribution. However, none of the differences in the **Table 5** variables were statistically significant ($P>0.05$).

Discussion

The mean diagnostic knowledge score was lower for pediatricians who used Rome IV than pediatricians who did not use Rome IV [14.87 (SD 2.540) vs. 15.59 (SD 2.549), respectively; both-median was 16 (range 8-20); $P=0.110$], but the differences were not significant. There are many factors that could influence Rome criteria use. The majority (85%) of respondents recognized the Rome criteria, but far fewer knew specifically of the Rome IV criteria and implemented it in daily practice (51%). Another factor was that the diagnostic criteria for infant regurgitation was minimally updated from Rome III to Rome IV. As such, some pediatricians correctly understood the diagnostic criteria for infant regurgitation, even though they were referring to the Rome III criteria.

As a general rule, knowledge may fade over time, thus, continuing medical education (CME) is considered to be an ideal way for physicians to implement life-long learning principles.^{11,12} The

Table 4. Analysis of pediatricians' diagnostic knowledge score for infant regurgitation and subjects' characteristics

Variables	Pediatricians' knowledge			P value*
	n (%)	Median score (range)	Mean score (SD)	
Pediatricians' practice experience (n=131)				0.465
<5 years	40 (31)	16 (8-20)	15.40 (2.872)	
5-15 years	91 (69)	16 (8-20)	15.15 (2.425)	
Pediatricians' specialist institution (n=93)				0.213
A-accredited	77 (83)	16 (8-20)	5.12 (2.646)	
B-accredited	16 (17)	16 (8-20)	15.88 (2.680)	
Pediatricians' workplace (n=131)				0.109
Teaching hospital	26 (20)	15 (8-20)	14.38 (2.940)	
Non-teaching hospital	105 (80)	16 (8-20)	15.43 (2.429)	
Pediatricians' use of Rome IV criteria (n=131)				0.110
Yes	67 (51)	16 (8-20)	14.87 (2.540)	
No	64 (49)	16 (8-20)	15.59 (2.549)	
Pediatricians' source of information (n=131)				0.772
CME	97 (74)	16 (8-20)	15.24 (2.557)	
Non-CME	34 (26)	16 (8-20)	15.18 (2.611)	

*Mann-Whitney U test

Table 5. Analysis of pediatricians' therapeutic approach to infant regurgitation and subjects' characteristics

Variables	Pediatricians' knowledge			P value*
	n (%)	Median score (range)	Mean score (SD)	
Pediatricians' practice experience (n=131)				0.148
<5 years	40 (31)	10 (4-12)	9.50 (2.013)	
5-15 years	91 (69)	10 (4-12)	8.81 (2.270)	
Pediatricians' specialist institution (n=93)				0.491
A-accredited	77 (83)	10 (4-12)	9.17 (2.233)	
B-accredited	16 (17)	9 (6-12)	8.88 (1.928)	
Pediatricians' workplace (n=131)				0.231
Teaching hospital	26 (20)	8 (6-12)	8.69 (1.784)	
Non-teaching hospital	105 (80)	10 (4-12)	9.10 (2.304)	
Pediatricians' use of Rome IV criteria (n=131)				0.519
Yes	67 (51)	10 (4-12)	9.10 (2.264)	
No	64 (49)	9 (4-12)	8.94 (2.167)	
Pediatricians' source of information (n=131)				0.486
CME	97 (74)	10 (4-12)	8.95 (2.200)	
Non-CME	34 (26)	10 (4-12)	.24 (2.257)	

*Mann-Whitney U test

CME may significantly improve both knowledge and psychomotor skills of physicians.¹³ Direct and hands-on learning greatly improved physician skills. Knowledge improvement through participating in symposiums and workshops has been shown to keep physicians updated on the latest medical advances.¹²

Interestingly, we found that neither diagnostic knowledge (P=0.772) nor therapeutic approach (P=0.486) were significantly different between CME and non-CME. Currently, pediatricians can update their knowledge and skills through various methods,

and are not limited to face-to-face CMEs. During the COVID-19 pandemic, live CME sessions with large groups of people were not recommended. As a result, online CME was the preferred choice at the time, despite several specific topics still requiring face-to-face CME, though with strict health protocols. The success of CME programs does not solely depend on the lecturer or tutor providing the education, but also the participants. Being actively involved throughout the process and maintaining continuity of the program is to be prioritized to achieve the goals of CME.¹⁴

Williams showed that despite trainings being delivered online, emergency physicians were satisfied with the learning modules, which proved to be effective in increasing knowledge.¹⁵

Institution accreditation grade should represent medical education quality, and identify weaknesses in the curriculum and/or facility in order to maintain or improve quality.¹⁶ A study reported that graduates of accredited medical schools had higher percentages of passing tests on the first attempt compared to those who graduated from non-accredited medical schools (85.2% vs. 71.9%, respectively). The discrepancy was even greater when they compared results of students who had graduated < 3 years prior to the study compared to \geq 3 years prior (86.4% vs. 58.9%, respectively).¹⁷ Thus, ideally, well-accredited medical schools along with more recent graduation results led to better competency of the practicing physicians. Interestingly, older graduates tended to forget things, especially if the skill or knowledge was not repeated or used regularly. Nevertheless, discrepancies may lead to an over-emphasis on statistical differences that may not be clinically relevant.¹⁸

In our study, neither diagnostic knowledge nor therapeutic approach were significantly different between A- and B-accredited institutions. This suggests that regurgitation, a standard competency taught to medical students and residents, was well-implemented in both accreditation levels. Pediatricians who have completed residency should be encouraged to actively join CMEs to improve or complement their knowledge on infant regurgitation. This can be proven as although a fraction of the pediatricians has graduated before ROME IV is published, they are still able to understand the diagnostic criteria of infant regurgitation (80% correct answers) (Table 5).

In other studies, physicians at teaching hospitals performed better than those at non-teaching hospitals.¹⁹ Teaching hospitals generally have more up-to-date knowledge and better training of medical doctors to fulfill the required competencies.^{19,20} Interestingly, the diagnostic knowledge and therapeutic approach scores were lower in pediatricians who practiced in teaching hospitals, but the differences were not significant (Table 4 and Table 5). Nonetheless, pediatricians' knowledge is not limited to their place of practice, but depends on the pediatrician's own habits in updating his or her knowledge and skills.²¹

Overall, most pediatricians performed well, in terms of recognizing the diagnostic criteria for regurgitation as well as differentiating it from GERD, with 94% getting the correct answer. A previous study reported that infant regurgitation regresses with age and resolves on its own without any intervention or medication therapy.¹⁰ Retching was well-recognized by pediatricians to not be a sign of regurgitation. Regurgitation is done effortlessly; the presence of retching excludes regurgitation as a diagnosis. The statement of "failure to thrive" (2.4) in Table 2 is a trick question that presents the correct answer as the opposite, hence, demanding more detailed attention that should correlate to their knowledge. We noted that less than half of the pediatricians (48%) had the correct answer. Presumably, many pediatricians mix up the definitions of GERD and regurgitation. Failure to thrive can be recognized as a GERD symptom, but not regurgitation, which is a physiological condition in infants. Infants with gastroesophageal reflux accompanied by failure to thrive require further evaluations to exclude other possibilities.²²

Diagnostic understanding of GERD was also considered to be good, as over 80% of pediatricians responded correctly to 3 out of 6 questions. However, many pediatricians (65%) answered that prolonged infant crying or discomfort was an early clinical sign of GERD. GERD is not a common cause of unexplained crying, irritability, or distressed behavior in otherwise healthy infants.²³ Failure to recognize appropriate early clinical signs may lead to misdiagnosis and pointless treatment. Tricky or delusory questions should encourage pediatricians to be detailed and thorough when making a diagnosis. Infant avoidance of food and drink is not a specific sign of GERD, but is a sign of alarm symptoms of cow milk protein allergy. Because the clinical symptoms of GERD in infants are not very specific, a GERD questionnaire was published to help clinicians exclude GERD in practice.⁶

Parental reassurance along with nutritional recommendations are crucial to the management of FGIDs in infants, including regurgitation.²⁴ It is uncommon for regurgitation to progress into other diseases.³ Parents are often very concerned, since they, especially mothers, often do not have a proper understanding of the condition. Up to 25% of parents were reported to be concerned about excessive regurgitation. Some pediatricians still fail to recognize

the appropriate signs and symptoms to diagnose or exclude regurgitation.^{2,7} Discontinuing breastfeeding is not recommended in cases of infant regurgitation, but was recommended by most (98%) of our subjects. Infants who were partially breastfed regurgitated more than four times per day compared to infants who were exclusively breastfed (less than four times).⁷

Thickening the milk or formula as a treatment was commonly used to reduce regurgitation in infants.²⁵ Less than half (40%) of the pediatricians in our study (n=52) recommended thickening of milk. In practice, it is assumed that thicker feed or formula alters the consistency by increasing the viscosity or "stickiness" of the meal, thereby allowing longer retention of meal within the stomach.²⁵ This physical property became the basis for reducing regurgitation of consumed food without altering any organ structures. A study showed that thickening milk commercially with bean gum or modifying the milk with added rice flour, significantly reduced the frequency of regurgitation.²⁶

Positional therapy is beneficial in reducing the frequency of regurgitation. The position of choice is supine at a 45-60 degree angle to the plane of the bed after meals. This position keeps the esophagus higher than the stomach, but avoids exerting pressure on the stomach, thereby reducing the chances of regurgitation.²⁷ Lateral body positioning may also reduce the frequency of regurgitation.²⁸ A right-sided position alleviates pressure on the stomach and accelerates gastric emptying. However, this position may activate transient lower esophageal sphincter relaxation, which in turn causes reflux.²⁹ Left-sided positioning postprandially follows the greater curvature of the stomach, allowing for a larger reservoir to hold the contents and reducing the chance of regurgitation.¹ However, "right-sided positioning then left-sided positioning" cannot be the main recommendation, as anatomical locations of the stomach are unique for every person and the paradox of right-sided positioning therapy. Head elevation, as well as lateral and prone positioning are not recommended in sleeping infants due to the risk of sudden infant death syndrome.³⁰ A majority of pediatricians (89%) in our study recommended positional therapy, however, only 76% of them actually understood how to apply the recommended position.

In conclusion, Rome IV is well recognized and

used by most Indonesian pediatricians. The majority of pediatricians have good comprehension in recognizing the diagnostic criteria of infant regurgitation and knowledge of GERD. Likewise, most pediatricians have sufficient good therapeutic approaches along with relevant considerations, indicating a good application of knowledge in clinical practice. However, there are still small numbers of pediatricians who do not know and/or apply Rome IV, so they do not provide appropriate management for infant regurgitation. Although none of the variables had statistically significant associations with pediatricians' knowledge or therapeutic scores, pediatricians' with longer practice experience has slightly higher scores on patient assessments compared to those who have less practice experience.

Conflict of interest

None declared.

Acknowledgements

The authors would like to express their sincere gratitude to all pediatricians who participated in this study.

Funding acknowledgment

The authors did not receive any grants from funding agencies in the public, commercial, or not-for-profit sectors.

References

1. Drossman D, Chang L, Kellow J, Chey W, Tack J, Whitehead W. ROME IV Functional gastrointestinal disorders for primary care and non-GI clinicians. Raleigh: The Rome Foundation; 2016. p. 82-3.
2. Trivić I, Hojsak I. Initial diagnosis of functional gastrointestinal disorders in children increases a chance for resolution of symptoms. *Pediatr Gastroenterol Hepatol Nutr.* 2018;1:264-70. DOI: <https://doi.org/10.5223/pghn.2018.21.4.264>.
3. Salvatore S, Barberi S, Borrelli O, Castellazzi A, Di Mauro D, Di Mauro G, et al. Pharmacological interventions on early functional gastrointestinal disorders. *Ital J Pediatr.*

- 2016;42:68. DOI: <https://doi.org/10.1186/s13052-016-0272-5>.
4. Cai W, Bharadia L, Juffrie M, Cheah FC, Quak SH, Titapant V, et al. Prevalence and management of functional gastrointestinal disorders in infants: an Asian perspective. *Pediatr Gastroenterol Hepatol Nutr*. 2018;21:76-7. DOI: <https://doi.org/10.5223/pghn.2018.21.1.76>.
 5. Van Tilburg MAL, Hyman PE, Walker L, Rouster A, Palsson OS, Kim SM, et al. Prevalence of functional gastrointestinal disorders in infants and toddlers. *J Pediatr*. 2015;166:684-9. DOI: <https://doi.org/10.1016/j.jpeds.2014.11.039>.
 6. Palsson OS, Whitehead WE, van Tilburg MA, Chang L, Chey W, Crowell MD, et al. Rome IV diagnostic questionnaires and tables for investigators and clinicians. *Gastroenterology*. 2016 :S0016-5085(16)00180-3. DOI: <https://doi.org/10.1053/j.gastro.2016.02.014>.
 7. Hegar B, Boediarso A, Firmansyah A, Vandenplas Y. Investigation of regurgitation and other symptoms of gastroesophageal reflux in Indonesian infants. *World J Gastroenterol*. 2004;10:1795-7. DOI: <https://doi.org/10.3748%2Fwjg.v10.i12.1795>.
 8. Nelson SP, Chen EH, Syniar GM, Christoffel KK. Prevalence of symptoms of gastroesophageal reflux during infancy. A pediatric based survey. *Arch Pediatr Adolesc Med*. 1997;151:569-72. DOI: <https://doi.org/10.1001/archpedi.1997.02170430035007>.
 9. Hegar B, Satari DHI, Sjarif DR, Vandenplas Y. Regurgitation and gastroesophageal reflux disease in six to nine months old Indonesian infants. *Pediatr Gastroenterol Hepatol Nutr*. 2013;16:240-7. DOI: <https://doi.org/10.5223/pghn.2013.16.4.240>.
 10. Hegar B, Dewanti NR, Kadim M, Alatas S, Firmansyah A, Vandenplas Y. Natural evolution of regurgitation in healthy infants. *Acta Paediatr*. 2009;98:1189-93. DOI: <https://doi.org/10.1111/j.1651-2227.2009.01306.x>.
 11. Santen SA, Hemphill RR, Pusic M. The responsibility of physicians to maintain competency. *JAMA*. 2020;323:117-8. DOI: <https://doi.org/10.1001/jama.2019.21081>.
 12. Ahmed K, Wang TT, Ashrafian H, Layer GT, Athanasiou T. The effectiveness of continuing medical education for specialist recertification. *Can Urol Assoc J*. 2013;7:266-72. DOI: <https://doi.org/10.5489/auaj.378>.
 13. Levy R, Dubrowski A, Amin H, Bismilla Z. Procedural skills in paediatric residency: re-evaluating the competencies. *Paediatr Child Health*. 2014;19:180-4. DOI: <https://doi.org/10.1093%2Fpch%2F19.4.180>.
 14. Mansouri M, Lockyer J. A meta-analysis of continuing medical education effectiveness. *J Contin Educ Health Prof*. 2007;27:6-15. DOI: <https://doi.org/10.1002/chp.88>.
 15. Williams JG. Are online learning modules an effective way to deliver hand trauma management continuing medical education to emergency physicians? *Plast Surg (Oakv)*. 2014;22:75-8. PMID: <http://www.ncbi.nlm.nih.gov/pmc/articles/pmc4116318/>.
 16. Mustika R, Nishigori H, Ronokusumo S, Scherpbier A. The odyssey of medical education in Indonesia. *TAPS*. 2019;4:4-8. DOI: <http://doi.org/10.29060/TAPS.2019-4-1/GP1077>.
 17. van Zanten M. The association between medical education accreditation and examination performance of internationally educated physicians seeking certification in the United States. *Perspect Med Educ*. 2015;4:142-5. DOI: <https://doi.org/10.1007/s40037-015-0183-y>.
 18. Faber J, Fonseca LM. How sample size influences research outcomes. *Dental Press J Orthod*. 2014;19:27-9. DOI: <https://doi.org/10.1007/s40037-015-0183-y>.
 19. Burke LG, Frakt AB, Khullar D, Orav EJ, Jha AK. Association between teaching status and mortality in US hospitals. *JAMA*. 2017 May 23;317:2105-13. DOI: <https://doi.org/10.1001/jama.2017.5702>.
 20. Allison JJ, Kiefe CI, Weissman NW, Person SD, Rousculp M, Canto JG, et al. Relationship of hospital teaching status with quality of care and mortality for Medicare patients with acute MI. *JAMA*. 2000;284:1256-62. DOI: <https://doi.org/10.1001/jama.284.10.1256>.
 21. Davari M, Khorasani E, Tigabu BM. Factors influencing prescribing decisions of physicians: a review. *Ethiop J Health Sci*. 2018;28:795-804. DOI: <https://doi.org/10.4314%2Fejhs.v28i6.15>.
 22. Baird D, Harker D, Karmes A. Diagnosis and treatment of gastroesophageal reflux in infants and children. *Am Fam Physician*. 2015;92:705-14. PMID: 26554410.
 23. Wolke D, Bilgin A, Samara M. Systematic review and meta-analysis: fussing and crying durations and prevalence of colic in infants. *J Pediatr*. 2017;185:55-61.e4. DOI: <https://doi.org/10.1016/j.jpeds.2017.02.020>.
 24. Salvatore S, Abkari A, Cai W, Catto-Smith A, Cruchet S, Gottrand F, et al. Review shows that parental reassurance and nutritional advice help to optimise the management of functional gastrointestinal disorders in infants. *Acta Paediatr*. 2018;107:1512-20. DOI: <https://doi.org/10.1111%2Fapa.14378>.
 25. Kwok TC, Ojha S, Dorling J. Feed thickeners in gastro-oesophageal reflux in infants. *BMJ Paediatr Open*. 2018;2:e000262. DOI: <http://doi.org/10.1136/bmjpo-2018-000262>.
 26. Hegar B, Rantos R, Firmansyah A, De Schepper J, Vandenplas

- Y. Natural evolution of infantile regurgitation versus the efficacy of thickened formula. *J Pediatr Gastroenterol Nutr.* 2008;47:26-30. DOI: <https://doi.org/10.1097/mpg.0b013e31815eeae9>.
27. Ferguson TD. Gastroesophageal reflux: regurgitation in the infant population. *Crit Care Nurs Clin North Am.* 2018;30:167-77. DOI: <https://doi.org/10.1016/j.cnc.2017.10.015>.
28. Omari T. Gastroesophageal reflux in infants: can a simple left side positioning strategy help this diagnostic and therapeutic conundrum? *Minerva Pediatr.* 2008;60:193-200. PMID: 18449136.
29. Omari T, Rommel N, Staunton E, Lontis R, Goodchild L, Haslam R, et al. Paradoxical impact of body positioning on gastroesophageal reflux and gastric emptying in the premature neonate. *J Pediatr.* 2004;145:194-200. DOI: <https://doi.org/10.1016/j.jpeds.2004.05.026>.
30. Leung AK, Hon KL. Gastroesophageal reflux in children: an updated review. *Drugs Context.* 2019;8:212591. DOI: <https://doi.org/10.7573%2Fdic.212591>.