Infantile Gastroesophageal Reflux: Adherence to Treatment Guidelines in the Hospital Setting

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OBJECTIVES Recent guidelines defined and differentiated the management of gastroesophageal reflux (GER) and gastroesophageal reflux disease (GERD). The guidelines recommend against using empiric acid suppression therapy for infantile GER. The primary objective of this study was to assess inpatient guideline adherence regarding management of infantile GER through the perspective of pharmacists. Secondary objectives included assessing pharmacist comfort level with differentiation between GER and GERD, observing current trends in practice relating to the primary objective, and determining the availability of institution-specific guidelines that address the management of infantile GER.

METHODS An institutional review board–approved, national, online survey of pharmacists with inpatient pediatric experience was conducted. Pediatric pharmacy membership directories were used to create the listserve of eligible pharmacists. The 2009 NASPGHAN/ESPGHAN (North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition/European Society for Pediatric Gastroenterology, Hepatology, and Nutrition) Pediatric Gastroesophageal Reflux Clinical Practice Guideline was used to develop the survey and to define both GER and GERD. Demographic data was also collected regarding the institutional setting and pharmacists responding.

RESULTS The overall response rate was 14.8% (n = 149). Although 29.7% of pharmacists stated empiric acid suppression trials were not used for infantile GER at their institution, 44.6% responded that these trials are initiated 1 to 2 times per week in their hospitals. In addition, 19.6% responded that these empiric trials were initiated 3 to 5 times per week. A smaller percentage of responders reported even higher frequencies per week at their institutions.

CONCLUSIONS From the results of the survey, infants continue to receive empiric acid suppression trials for GER in the inpatient setting, which is not adherent to the current guideline recommendation.

ABBREVIATIONS AAP, American Academy of Pediatrics; ESPGHAN, European Society for Pediatric Gastroenterology, Hepatology, and Nutrition; GER, gastroesophageal reflux; GERD, gastroesophageal reflux disease; H2RA, histamine-2 receptor antagonist; IRB, institutional review board; IV, intravenous; NASPGHAN, North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition; PO, oral route of administration; PPI, proton pump inhibitor; SHM, Society of Hospital Medicine

KEYWORDS gastroesophageal reflux; guideline adherence; histamine h2 antagonists; infants; pediatrics; proton pump inhibitors; survey

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Introduction

Although there are many controversies regarding acid suppression therapy, one in particular has gained focus in the area of pediatrics. Specifically, the 2009 combined national and international pediatric gastroenterology guidelines strongly recommended against using acid suppression therapy for infantile gastroesophageal reflux (GER).¹ Instead, the guidelines recommend parental reassurance, education, and lifestyle changes for infants with GER. In contrast to the adult population, it is not recommended to start an empiric acid suppression trial in an otherwise healthy infant with GER and intermittent vomiting or irritability

without further diagnostic testing to suggest pathologic gastroesophageal reflux disease (GERD). An average of 50% of all infants experience normal, physiologic GER on a daily basis. However, it is estimated that about 95% of GER cases resolve naturally over time by the age of 12 months and that up to nearly 100% will resolve by 24 months.^{2,3} Yet, up to 20% of parents in the United States continue to seek medical attention for their healthy infants with GER and the overprescribing of acid suppressing agents in this subpopulation is a concern expressed frequently in the literature.^{1,4–7}

The American Academy of Pediatrics (AAP) continues to support this recommendation. In 2013, the guideline recommendation against using acid suppression

therapy for infantile GER was supported by the pediatric hospitalist workgroup from the Society of Hospital Medicine (SHM); noting it as one of its top 5 quality improvement initiatives.^{4,5} The SHM workgroup concluded that acid suppression therapy for infantile GER is medically wasteful and possibly harmful. Multiple studies point to the possible risk of community-acquired pneumonia and acute gastroenteritis in non-critical care infants who receive histamine-2 receptor antagonists (H2RAs) or proton pump inhibitors (PPIs).⁸ Other studies have called into question whether drugs such as PPIs are even better than placebo for infants.^{7,9} The pediatric SHM quality improvement initiative was included into the *Choose Wisely Campaign* to prevent unnecessary medical spending.¹⁰ The aim of this study was to assess adherence to the guideline recommendation against using acid suppression therapy for infantile GER on a national level from the perspective of pharmacists.

Materials and Methods

Purpose. The primary objective of the study was to survey guideline adherence regarding GER management for infants in the hospital setting from the perspective of pharmacists with pediatric experience. Secondary objectives included assessing pharmacist comfort level with differentiation between GER and GERD in the infant population, observing current trends in practice related to acid suppression use in the infant population, and ascertaining the existence of institutional policies that address the management of infantile GER.

Study Population. The study's target population was United States licensed pharmacists with prior and/or current inpatient pediatric experience. The listserv of potentially eligible participants was developed from the membership directories of 2 popular pediatric pharmacy groups: the Pediatric Pharmacy Advocacy Group and the American College of Clinical Pharmacy Pediatric Practice and Research Network. The compiled listserv was developed in December 2013 and consisted of 1032 pharmacists. Eligibility for inclusion in the study was further confirmed through use of the first survey question (Table 1). Directory members classified as students, pharmacists without inpatient pediatric experience, and pharmacists who did not practice within the United States were excluded from the study.

Study Design and Definitions. The observational study was approved by the Institutional Review Board of Lancaster General Health. The 2009 pediatric gastroesophageal reflux clinical practice guideline was used to develop a 17-question survey along with 7 demographic questions using SoGoSurvey software (Table 1).¹ The survey asked the participants to apply the questions to their clinical experience and the infant population (defined as 1–12 months of age). Guideline definitions of GER and GERD were provided on the survey for reference.¹ The survey was successfully distributed to 1009 pharmacists with a 5-week imple-

mentation period.

Statistical Analysis. Final survey data was coded and analyzed with Minitab software (Minitab, Inc., State College PA). Descriptive statistics (i.e., percentages) were used for all survey variables collected. Differences in demographic characteristics between pharmacist groups were compared and tested for significant differences by using a Student *t* test for linear variables and a chi-squared test or Fisher's exact test for categorical variables. Statistical significance was defined as a *p* value of less than 0.05.

Results

Demographics. Upon completion of the survey period, 149 pharmacists responded to the survey, giving a response rate of 14.8%. Of those who responded, 148 (99.3%) were eligible for inclusion after their answer to the first question. Table 2 illustrates the demographics of the pharmacists who responded. Most participants were in their first 10 years of practice (68.2%) with varying areas of pediatric subspecialization involved. In terms of the types of health systems the pharmacists were affiliated with, 84.4% worked at teaching hospitals (community or university). The size of health systems represented in the survey greatly varied and there was an overall even distribution among freestanding and non-freestanding children's hospitals represented. No demographic variable interacted significantly with the primary or secondary objective survey questions (*p* > 0.05 for all variables).

Primary Objective. According to the pharmacists who responded, empiric acid suppression trials continue to be used for the indication of infantile GER. This does not follow the guideline recommendation to avoid such therapy (Figure 1). While 29.7% answered that empiric acid suppression is not started for infantile GER at their institutions, 44.6% stated that this therapy is initiated 1 to 2 times per week and 19.6% identified that it is started 3 to 5 times per week at their institutions. Another survey question revealed that most pharmacists (55.4%) were aware of a related guideline recommendation which states that an infant with GER plus intermittent irritability without further testing would not warrant an acid suppression trial. However, 44.6% answered either that in their clinical opinion the acid suppression trial would be warranted (30.4%) or that they were uncertain (14.2%).

Secondary Objectives. In relation to the secondary objectives, most pharmacists (77.7%) stated that they were at least "somewhat comfortable" with the differentiation and management of infantile GER and GERD (Figure 2). It was noted that 84.5% of responders stated that they intervened less than or equal to 3 times per week for GER or GERD indications and that 15.5% intervened greater than 3 times per week. In relation to interventions made, the top 3 inpatient pharmacist interventions for GER or GERD include the following:

Table 1. Survey on GER Versus GERD Management in the Hospital Setting

1. Do you have current or prior experience caring for pediatric patients in a hospital setting?
 - A. Yes (if yes, then able to proceed throughout survey)
 - B. No
2. How would you rate your comfort level with differentiating between GER and GERD in the infant population and the respective management of each?
 - A. Very comfortable
 - B. Comfortable
 - C. Somewhat comfortable
 - D. Neither comfortable nor uncomfortable
 - E. Somewhat uncomfortable
 - F. Uncomfortable
 - G. Very uncomfortable
3. Approximately, how often PER WEEK do you make an intervention/recommendation on acid suppression therapy in the infant age group related to GER or GERD indications?
 - A. Never (skip 4 & 5)
 - B. <1 time/wk
 - C. 1–3 times/wk
 - D. 4–6 times/wk
 - E. 7–10 times/wk
 - F. 11–15 times/wk
 - G. >15 times/wk
4. Of the options below, which ONE is the MOST frequent reason you make an intervention/recommendation on acid suppression therapy related to GER or GERD for infants?
 - A. The patient should not be on acid suppression therapy in your clinical opinion but currently is
 - B. The patient should be on acid suppression therapy in your clinical opinion but currently is not
 - C. To add an additional acid suppression agent onto existing acid suppression therapy
 - D. Inappropriate dose requiring adjustment
 - E. To switch from a PPI to an H2RA
 - F. To switch from an H2RA to a PPI
 - G. To make another type of acid suppression therapy medication class switch
 - H. Switch from IV to PO route of administration
 - I. Other: (room for responder to specify)
5. Of the options below, please CHECK ALL THAT APPLY for reasons you make an intervention/recommendation on acid suppression therapy related to GER or GERD for infants greater than or equal to 1 time/wk?
 - A. The patient should not be on acid suppression therapy in your clinical opinion but currently is
 - B. The patient should be on acid suppression therapy in your clinical opinion but currently is not
 - C. To add an additional acid suppression agent onto existing acid suppression therapy
 - D. Inappropriate dose requiring adjustment
 - E. To switch from a PPI to an H2RA
 - F. To switch from an H2RA to a PPI
 - G. To make another type of acid suppression therapy medication class switch
 - H. N/A (i.e., interventions/recommendations are made < 1 time/wk)
 - I. Other: (room for responder to specify)
6. In your experience, how often PER WEEK is an empiric acid suppression trial started for infants by definition to have GER?
 - A. 0 times/wk
 - B. 1–2 times/wk
 - C. 3–5 times/wk
 - D. 6–8 times/wk
 - E. 9–10 times/wk
 - F. >10 times/wk
7. In your experience, how often PER WEEK is an empiric acid suppression trial started for infants by definition to have GERD?
 - A. 0 times/wk
 - B. 1–2 times/wk
 - C. 3–5 times/wk
 - D. 6–8 times/wk
 - E. 9–10 times/wk
 - F. >10 times/wk
8. In your clinical opinion, does an infant with GER + intermittent irritability without further testing warrant a trial of acid suppression therapy?
 - A. Yes
 - B. No
 - C. Uncertain
9. When placed on acid suppression therapy for GER or GERD, in your experience, which class of medication and applicable regimen is chosen MOST frequently for infants?
 - A. Antacid
 - B. H2RA once daily
 - C. H2RA twice daily
 - D. PPI once daily
 - E. PPI twice daily
 - F. Prokinetic*
 - G. Sucralfate
 - H. Other: (room for responder to specify)

GER, gastroesophageal reflux; GERD, gastroesophageal reflux disease; H2RA, histamine-2 receptor antagonist; IV, intravenous; N/A, not applicable; PO, oral route of administration; PPI, proton pump inhibitor

* Metoclopramide; baclofen; erythromycin; bethanechol.

Table 1. Survey on GER Versus GERD Management in the Hospital Setting (*cont.*)

10. For the medication regimen chosen in the prior question and in your experience, what is the frequency of use for this regimen PER WEEK in infants at your institution?			
A. 0 times/wk	C. 3–5 times/wk	E. 9–10 times/wk	
B. 1–2 times/wk	D. 6–8 times/wk	F. >10 times/wk	
11. In your experience, how often PER WEEK does an infant get admitted who was on acid suppression therapy before admission with no clear indication for use?			
A. 0 times/wk	C. 3–5 times/wk	E. 9–10 times/wk	
B. 1–2 times/wk	D. 6–8 times/wk	F. >10 times/wk	
12. In your experience, what percentage of these particular infants from the prior question are continued on their acid suppression agent during their inpatient hospitalization?			
A. 0%	C. Up to 50%	E. Up to 90%	
B. Up to 25%	D. Up to 75%	F. >90%	
13. Does your institution have admission order sets that would apply to infants for which acid suppression therapy is prechecked for GER or GERD indications?			
A. Yes	B. No	C. Uncertain	
14. Does your institution have a policy or guideline in place regarding the appropriate use of acid suppression therapy in infants relating to GER and/or GERD?			
A. Yes	B. No	C. Uncertain	
15. (If YES to 13) In your experience what is the frequency, on average, of providers following this policy/guideline?			
A. 0%	C. Up to 50%	E. Up to 90%	
B. Up to 25%	D. Up to 75%	F. >90%	
16. (If YES to 13) Does your guideline/policy explicitly differentiate between the management of infants with GER versus those with GERD?			
A. Yes	B. No	C. Uncertain	
17. (If YES to 15) How helpful do you find your institution's policy/guideline regarding the management of infants with GER and GERD?			
A. Very helpful	C. Somewhat helpful	E. Somewhat unhelpful	G. Very unhelpful
B. Helpful	D. Neutral	F. Unhelpful	

GER, gastroesophageal reflux; GERD, gastroesophageal reflux disease; H2RA, histamine-2 receptor antagonist; IV, intravenous; N/A, not applicable; PO, oral route of administration; PPI, proton pump inhibitor

* Metoclopramide; baclofen; erythromycin; bethanechol.

discontinuation of inappropriate acid suppression, inappropriate dose requiring adjustment, and switching from intravenous (IV) to oral (PO) formulation (Figure 3). It was also noted that for those infants on home acid suppression therapy without a clear indication for use, 62.8% responded that up to and greater than 90% are continued on this agent during their hospitalization (Figure 4). Figure 5 shows the breakdown of the types of acid suppression regimens used for GER and GERD by the providers at the institutions represented. The most common regimen reported was an H2RA twice daily. Five pharmacists (3.4%) reported that their institution had a specific policy or guideline available to address the appropriate use of acid suppression therapy for infantile GER and/or GERD. Of those 5 pharmacists, 2 answered that up to 50% of their providers follow it, 2 answered up to 75%, and 1 answered up to 90% follow the policy/guideline. One of the 5 stated that their policy or guideline specifically differentiated between GER and GERD and found it to be “somewhat helpful.”

Discussion

The survey results suggest that infants continue to receive empiric acid suppression trials for GER in the inpatient setting, thus inferring that hospitals are not necessarily compliant with the guideline recommendation to avoid such trials. The fact that the AAP continues to support this 2009 international recommendation and the recent inclusion of this topic in the top 5 recommendations to focus on improvement by the SHM's pediatric workgroup suggests that this is an area of opportunity for improvement for inpatient pediatric departments. Avoiding the use of acid suppression trials in infantile GER can lead to cost savings and reduction of medical waste as noted in the literature. Noting that these medications (i.e., H2RA, PPI) are not benign in side effects only increases the importance of becoming compliant with this recommendation.

Pediatric pharmacists were noted to make a variety of interventions for GER and GERD indications and most were at least somewhat comfortable with the

Table 2. Survey Participant Demographics

Demographic Characteristic	Number (%)
Age	
<1 yr	7 (4.7)
1–4 yr	43 (29)
5–10 yr	51 (34.5)
11–15 yr	20 (13.5)
16–20 yr	18 (12.16)
>20 yr	9 (6.1)
Current PGY-1 (general practice)	0 (0)
Current PGY-1 (pediatric focus)	0 (0)
Current PGY-2	0 (0)
Current fellow	0 (0)
Area of pediatric expertise	
General pediatrics	49 (33.1)
PICU	33 (22.3)
NICU	49 (33.1)
Hematology/oncology	6 (4.1)
Emergency medicine	1 (0.7)
Other*	10 (6.8)
Type of health system	
Community	13 (8.8)
Community teaching	60 (40.5)
University teaching	65 (43.9)
Private	7 (4.7)
Veterans affairs	0 (0)
Other†	3 (2)
Freestanding children's hospital	
Yes	70 (47.3)
No	78 (52.7)
Total hospital beds	
<100	2 (1.3)
100–399	45 (30.4)
400–699	48 (32.4)
700–1000	37 (25)
>1000	16 (10.8)
Total pediatric beds	
<50	17 (11.5)
51–100	29 (20)
101–150	34 (23)
151–200	19 (12.8)
201–250	13 (8.8)
>250	36 (24.3)
General pediatric beds	
<10	13 (8.8)
10–20	15 (10.1)
21–30	16 (10.8)
31–40	20 (13.5)
41–60	29 (19.6)
61–80	14 (9.5)
81–100	10 (6.8)
>100	31 (21)

GI, gastrointestinal; NICU, neonatal intensive care unit; PICU, pediatric intensive care unit; PGY, postgraduate year

* Cardiology, endocrinology, GI/nutrition, infectious disease, medication safety, pulmonology, or combination.

† Freestanding children's hospital.

Figure 1. Primary objectives: empiric acid suppression trials started for infants with GER.

GER, gastroesophageal reflux

differentiation between GER and GERD. Yet, responders were nearly split between correctly answering that infants with GER plus intermittent irritability would not warrant an acid suppression trial and incorrectly answering that a trial would be warranted or were uncertain about it. The answer to this question is at the core of the guideline recommendation to avoid such empiric trials. Therefore, one would expect more to answer correctly if most responders had stated they were at least somewhat comfortable with differentiation and management of GER versus GERD. However, determining the exact reasons why an individual or the group of pharmacists may have responded in a certain way is beyond the scope of the current study. It can be inferred that pharmacists themselves would benefit from further education on the topic of reflux versus reflux disease management in infants. This would increase their utility in making interventions and recommendations for the medical teams and their patients. In addition, it was observed that there is an overall lack of institution-specific policies and guidelines to help address the differentiation and management of GER and GERD as it would apply to an individual hospital. It may be suggested that pharmacists work together with their interdisciplinary teams and the institution to come up with a guide or policy to help increase awareness and understanding of the recommendation among

Figure 2. Secondary objective: comfort level with differentiation and management of GER and GERD.

GER, gastroesophageal reflux; GERD, gastroesophageal reflux disease

* Likert Scale: 1: Very Uncomfortable, 2: Uncomfortable, 3: Somewhat Uncomfortable, 4: Neither Comfortable nor Uncomfortable, 5: Somewhat Comfortable, 6: Comfortable, 7: Very Comfortable

Figure 3. Secondary objectives: pharmacist interventions related to acid suppression therapy for GER or GERD.*

GER, gastroesophageal reflux; GERD, gastroesophageal reflux disease

* Based on intervention of at least 1 per wk with multiple responses allowed.

† Other: Drug change within same medication class, take H2RA off when PPI is at steady state.

pharmacists, physicians, nurses, and other health care professionals. It would be expected that the creation of institution-specific policies or guidelines would further help to increase compliance to the national guideline recommendations.

There are several limitations to the current study. The survey was observational in nature and based on self-reporting of clinical experience. The results may also be limited by the response rate. However, the authors believe that the result of over 140 completed surveys likely represents an adequate sampling of the nation's inpatient pediatric pharmacists. It is possible that there is overrepresentation or underrepresentation of different regions of the nation and their respective hospitals due to the lack of knowledge regarding the hospital to which the responding pharmacist was affiliated. However, the authors chose anonymity regarding exact locations of the responders and their institutions. The survey also focused exclusively on the inpatient practice setting. This leaves much to be discovered

about trends in the outpatient setting regarding the compliance to guideline recommendations to avoid acid suppression therapy for infantile GER.

To the authors' knowledge, this is the first study to survey guideline compliance to avoid the use of empiric acid suppression therapy for infantile GER within the inpatient setting across the United States. The survey results suggest that hospitals are not necessarily compliant with the recommendation. Results of the survey can increase awareness of trends in practice regarding this guideline recommendation and therefore lead to increased education efforts and improved practice among pharmacists, physicians, and other health care professionals within hospitals. Literature about outpatient practice patterns regarding appropriate acid suppression utilization for GER versus GERD is highly needed, since it is expected that this is where a significant portion of infants are started on empiric trials for either of the indications. Research in the outpatient setting can help further direct educational efforts to

Figure 4. Secondary objective: home acid suppression therapy without a clear indication for use continued during hospitalization.

Figure 5. Secondary objective: most frequent regimen used for acid suppression therapy for GER or GERD.

GER, gastroesophageal reflux; GERD, gastroesophageal reflux disease; H2RA, histamine-2 receptor antagonist; PPI, proton pump inhibitor

* Metoclopramide; baclofen; erythromycin; bethanechol.

influence pediatric practices and improve compliance to this guideline recommendation.

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