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Pediatric Streptococcal Pharyngitis Testing and Treatment Practices

Amanda Welch
University of Missouri-St. Louis, agk9r6@umsystem.edu

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Amanda G. Welch

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Advisory Committee

Vanessa Loyd, DNP, PhD, RN

Elise Schaller, DNP, MHA, APRN, CPNP-PC

Christine Lane, MHA, MSN, FNP-C

Abstract

Objective: The purpose of this pilot quality improvement study was to implement SmartPhrases and assess its impact on adherence to the Infectious Disease Society of America (IDSA) guideline for Group A Streptococcus (GAS) pharyngitis testing and treatment in pediatric patients ages 1-16 years old. The aim was to use SmartPhrases to improve adherence with the IDSA guideline by 30% for GAS pharyngitis swabbing and 10% for appropriate antibiotic prescribing in three months.

Methods: A retrospective data analysis approach was used, in reviewing SmartPhrases data from the electronic health records (EHR) in a metropolitan Urgent Care. This data were collected from October 2022 and April 2023. The IOWA Model of Evidence-Based Practice was applied to evaluate the use of SmartPhrases. Sampling was done by convenience method.

Results: There were (N=116) met criteria for the pre and post-timeframe.Timeframe data was compared using the Chi-Square Goodness of Fit test, revealing a significant difference (p<0.001) in GAS Pharyngitis testing practices with Smartphrases. The test being performed were in the post timeframe were indicated compared to the pre timeframe. Antibiotic stewardship decreased by 7% from pre and post-timeframe. Limited use of SmartPhrases for RNs and NPs.

Conclusion: The impact of SmartPhrases on IDSA guideline usage was inconclusive. Recommendations for future studies is to investigate interventions to help improve guideline adherence, such as SmartPhrases, education, and protocols. Implications for practice are education and SmartPhrases may be able to improve guideline utilization.

Pediatric Streptococcal Pharyngitis Testing and Treatment Practices

Pharyngitis is a common illness among children ~~either~~ caused by viruses or bacteria (Linafelter et al., 2022; Shapiro et al., 2020). Viruses cause the majority of pharyngitis cases and are usually self-limiting without treatment (Centers for Disease Control and Prevention [CDC], 2021). The primary bacterial cause is Group A streptococcus (GAS), in which complications are not common; however, if left untreated can result in rheumatic fever, which can have long-term consequences (Thompson et al., 2022; Sauve et al., 2021). GAS presence in the pharynx is detected by a rapid antigen detection test (RADT) or a Group A Strep throat culture. Shulman et al. (2012) created a seminal guideline for the Infectious Disease Society of America (IDSA) to help determine the diagnosis and management of GAS pharyngitis. The IDSA guideline for the care of pediatric patients regarding GAS pharyngitis has been endorsed by the American Academy of Pediatrics, Canadian Pediatric Society, and CDC.

Shulman et al. (2012) posit that two groups should not be tested for GAS pharyngitis: patients with rhinorrhea, cough, oral ulcers, and hoarseness and children younger than three-years-old unless they have risk factors, such as recent direct exposure to an individual with GAS pharyngitis. Children with upper respiratory symptoms are more likely to have viral versus bacterial pharyngitis (Shulman et al., 2012; Sauve et al., 2021). Children less than three-years-old have a low incidence of GAS pharyngitis in children. (Shulman et al., 2012; Sauve et al., 2021). The prevalence rate of GAS pharyngitis in school-age children is 37%; in contrast, for children under three-years-old, their prevalence is 10-14% (Shulman et al., 2012; Sauve et al., 2021). In addition complications of GAS infection, such as rheumatic fever, are infrequent for children younger than three-years-old.

For treating GAS pharyngitis, Shulman et al. (2012) and Sauve et al. (2021) posit that the first-line antibiotics are penicillin or amoxicillin for 10 days. These medications have a narrow spectrum of activity, infrequent adverse reactions, and modest cost. Patients with penicillin allergies can be treated with first-generation cephalosporins for 10 days, clindamycin for 10 days, or azithromycin for five days. From these options, narrow-spectrum cephalosporins such as cefadroxil or cephalexin are preferred for the same reason as penicillin and amoxicillin (Shulman et al., 2012; Sauve et al., 2021).

When the IDSA guideline is not followed, consequences can occur: the cost of care, the stress on pediatric patients and caregivers, unjustified antibiotic usage, the risk of antibiotic side effects, and antimicrobial resistance all increase (Norton et al., 2018; Thompson et al., 2022). Children who are carriers of GAS often experience the previously mentioned outcomes, and when their clinical features do not match GAS pharyngitis upon testing, they are treated with antibiotics. Thompson et al. (2022) and Linafelter et al. (2022) estimated that 20-25% of children who are carriers could be detected and treated unnecessarily if they present with viral pharyngitis and have a RADT or throat culture performed.

The RADT is a point of care test used by many pediatric care sites. The RADT is less expensive and faster compared to the throat culture. When a patient has been treated with antibiotics for GAS pharyngitis, the bacteria die; however, the dead bacteria can remain in the individual’s throat. If the patient is tested with a RADT, it will detect the antigens of those dead bacteria (QuickVue, 2022). To avoid excess treatment a throat culture is better suited for those previously positive within the past 28 days (Barakat et al., 2019).

This pilot quality improvement (QI) project explored a metropolitan urgent care center not using the IDSA guideline for streptococcus pharyngitis. The purpose of this study was to implement SmartPhrases and assess its impact on adherence to the IDSA guideline for GAS pharyngitis testing and treatment in pediatric patients ages 1-16 years old. The Iowa Model of Evidence-Based Practice was the framework guiding this project. This project's aim was to use SmartPhrases to improve adherence with the IDSA guideline by 30% for GAS pharyngitis swabbing and 10% for appropriate antibiotic prescribing in three months. The primary outcome measure was the percentage of children tested and treated for GAS. Secondary outcome measures were the number SmartPhrases used. The study question for this project was: for patients 1-16 years old in an urgent care setting, what is the impact of SmartPhrase implementation compared to no SmartPhrases on IDSA GAS pharyngitis practice?

Review of Literature

The literature search was completed using CINHAL, PubMed, and Elsevier Science Direct. Boolean operators "OR", search terms and phrases included pediatric, child, children, infant, adolescent, strep throat, and streptococcal pharyngitis. In using the search terms, 8,225 results were found. Inclusion criteria for the studies were published between 2017 and 2022 in English, RADT, pharyngitis, and 0-18 years old. Exclusion criteria were publications not published in English before 2017, did not discuss RADT, pharyngitis, and on a population older than 18-years of age. When the exclusion and inclusion criteria were applied, 1,070 studies remained. An ancestry approach was completed, with seven references meeting the criteria. There were eleven publications

selected as part of the literature review, with one quality improvement project and 10 retrospective data analyses.

Shapiro et al. (2017) study highlighted the prevalence of viral features in pediatric patients and RADT for GAS pharyngitis which the GAS was significantly higher, 42% in those without viral symptoms and 29% for those with one viral symptom. However, in Shapiro et al. (2020) study, the prevalence was similar for those with no symptoms to one symptom, 37.6% and 30.9%, respectively. Nadeau et al. (2020) found similar results with one viral symptom prevalence of GAS pharyngitis at 17%, while no symptoms were 27%. The aforementioned studies found that having two or more viral symptoms was less likely to have GAS pharyngitis. In addition, the studies suggest there should be a balance between excessive swabbing and under-swabbing, and not swabbing individuals with viral symptoms may not be the best approach (Nadeau et al., 2020; Shapiro et al., 2020; Shapiro et al., 2017).

On the contrary, Wi and Choi (2021) discovered no significant trend in GAS positivity rate and the presence of viral symptoms. However, they report this could be related to the season the study took place in along with their sample, which was 45.4% below the age of three-years-old. Nadeau et al. (2020), Shapiro et al. (2020), and Shapiro et al. (2017) samples included individuals three to 21 years old. These studies had varying viral symptoms they tracked for adherence to the IDSA guideline, ranging from three to seven different symptoms. An inconsistency in the symptoms tracked could be related to differing results of GAS pharyngitis positivity in the presence of viral symptoms.

Compliance with the IDSA guideline on not testing patients with upper respiratory symptoms has been investigated. Several studies investigated testing on children with upper respiratory symptoms and found that 64%, 44%, and 39%, respectively, of their samples were being tested unnecessarily (Linafelter et al., 2022; Norton et al., 2018; Thompson et al., 2022). However, the definition of unnecessary differed Linafelter et al. and Norton et al. used the criteria of two or more viral symptoms present, while Thompson et al. (2022) used only one symptom. The IDSA does not provide a specific number of symptoms; they declare that patients with viral symptoms should not be tested, allowing room for interpretation (Linafelter et al., 2022; Nadeau et al., 2019; Shulman et al., 2012).

No study solely examined the prevalence of GAS pharyngitis in children less than three-years-old was found within the inclusion and exclusion criteria. However, some studies did have it as part of their data and found mixed results. Flood et al. (2020) found that 16% of their less than three-year-old sample were positive, similar to the prevalence reported by Shulman et al. (2012). Wi and Choi (2021) had a prevalence of 1.8% in their less than three-year-old population. This drastic decrease in prevalence could be related to sample size, study locations, and the study's timeframe difference. Flood et al.'s sample size was 4.6 times larger than Wi and Choi's, with 18% of their sample size younger than three-years-old compared to 45.4%, respectively.

In compliance with the IDSA recommendation to not test children under three-years-old, except in cases of known direct exposure, testing was still occurring. Flood et al. (2020) and Thompson et al. (2022) had 18-19% of their samples younger than three-years-old. As mentioned earlier, Wi and Chois's (2021) sample was 45.4%, over double

the other studies. Due to this disproportion, their results are possibly unreliable. In addition, none of the studies noted the reasoning behind the population being swabbed, such as caretaker request, known exposure, or clinician decision based on symptoms.

In attempts to help standardize the determination of GAS pharyngitis testing, clinical tools have been created. One is the Modified Centor Score (MCS), a validated tool for adult and pediatric patients. The tool works by assigning or deducting points for the patient's symptoms and risk factors. A point is given if the patient has a temperature greater than 38°C, absence of cough, swollen tender anterior cervical nodes, tonsillar swelling or exudate, and is between 3-14 years old (Shapiro et al., 2020; Nadeau et al., 2019; Brennan-Krohn et al., 2018; McIssac et al., 2004). A point is not given if 15-44 years old, while a point is deducted if older than 45. A score of two or higher results in the patient being tested and if positive treated. The MCS was created before the release of the 2012 IDSA guideline, and it has been investigated to see if the MCS remains applicable to the recommendations. Brennan-Krohn et al. observed that 96% of the test with enough information were indicated by the MCS in the scores. The MCS assesses for cough but does not assess for other upper respiratory symptoms such as rhinorrhea, oral ulcers, and hoarseness. This difference means compliance with the MCS does not equate to following the IDSA guideline. Brennan-Krohn et al. had difficulty completing the MCS thoroughly with each patient; only 30% of the tools were finished.

Regarding proper management of GAS pharyngitis, some studies focused on the type of antibiotics being prescribed, while others focused on whether antibiotics were being prescribed without a positive GAS result. Norton et al. (2018) was the most in-depth study in this literature review, finding some inappropriate antibiotics were due to

unnecessary GAS pharyngitis testing, treatment despite negative GAS RADT results, wrong selection of antibiotics, and some prescriptions were for the wrong duration. Flood et al. (2020), Luo et al. (2019), Thompson et al. (2022), and Wi and Choi (2021) revealed that approximately 50% of their samples with noncompliant GAS testing or diagnosed with viral pharyngitis received antibiotics. Similar to Norton et al., Flood et al. found most GAS pharyngitis cases were treated with the appropriate antibiotics. This contradicts Wi and Choi's study, which found Augmentin to be the number one antibiotic prescribed. Flood et al. and Luo et al. had limitations on the lack of information about whether some antibiotics were potentially prescribed due to another bacterial infection, such as otitis media or sinusitis. Overall, the most prominent hurdle with antibiotics is being prescribed to GAS-negative patients.

The IDSA guideline does not discuss the timeline of when patients can be retested for GAS pharyngitis after previously being treated (Shulman et al., 2012). Barakat et al. (2019) investigated the use of RADT in children recently treated for GAS pharyngitis. They found a false positive rate of 11.5% with RADT in the children previously treated for GAS pharyngitis in the last 28 days, while the false positive rate was 0% in those not previously treated (Barakat et al., 2019). Having false positive results could lead to children receiving antibiotics unnecessarily. Barakat et al. was the only study found discussing this topic within the given inclusion and exclusion criteria.

Some common strengths throughout the literature review were the large sample size and a year or longer timeframe which helps the robustness of the data. Common weaknesses include many of these studies being retrospective analyses, meaning they are limited by the medical personnel chart and only observe the problem. There is a need for

more systematic reviews. The scope of the literature review included urban, rural, emergency room, urgent care, and primary care offices. This results in versatility across outpatient settings. Common recommendations throughout the literature review were increased education for providers on antibiotic stewardship and education on the IDSA guideline (Brennan-Krohn et al., 2018; Flood et al., 2020; Luo et al., 2019; Shapiro et al., 2017; ~~&~~ Wi & Choi, 2021).

The Iowa Model of Evidence-Based Practice (EBP) was developed to guide nurses and other medical personnel in implementing evidence-based practice to improve the quality of care (White et al., 2021). A problem-focused trigger spurs this study by identifying a clinical problem regarding the lack of adherence to the IDSA guideline. The Iowa Model of EBP is a practical multistep process with checkpoints along the way to ensure the process is ready for the next step (Melnyk & Fineout-Overholt, 2019). The Iowa Model of EBP will guide this project from forming a team, assembly of evidence, designing and implementing a pilot, sustaining the change, and disseminating results.

Based on the literature review, it is a common and known problem that the IDSA guideline for GAS pharyngitis utilized consistently regarding testing of individuals with viral symptoms, younger than 3-years-old, and unnecessary antibiotic usage. Norton et al. (2018) was the only study found to implement a quality improvement project to influence adherence to the IDSA guideline. Although the IDSA guideline for GAS pharyngitis was last updated in 2012, clinicians are hoping a reevaluation will occur (Luo et al., 2017; Thompson et al., 2022).

Methods

Design

This pilot QI project used a retrospective data analysis approach. An analysis of electronic health record (EHR) data took place prior to the use of SmartPhrases and after using the SmartPhrases. SmartPhrases are narratives that can be rapidly entered into the medical providers' notes using keywords. The preliminary data from prior SmartPhrases use came from three months (October to December 2022) before the release of the SmartPhrases. After the release, a chart review occurred for three months (January to April 2023).

Setting

The study occurred in a metropolitan Urgent Care serving patients of all ages, with up to forty patients a day being seen. The urgent care was staffed by nurse practitioners, registered nurses, and radiology technicians.

Sample

The population for the study was 1-16-year-old patients with sore throats during the timeframes previously listed. Sampling will be performed by convenience method. Inclusion criteria will be ages 1-16 years old, presenting with a sore throat, and had a GAS test performed. Exclusion criteria will be patients less than one-years-old and greater than 16-years-old, who did not have a GAS testing performed, and who were given antibiotics for other conditions such as otitis media or sinusitis. GAS testing includes RADT and cultures. The desired sample size was 20 per month.

Procedures

The primary SmartPhrase implemented was for RNs who performed triaging and initial testing. The SmartPhrase included assessing the patient’s age, the presence of two or more viral symptoms, whether the patient was exposed to another individual with GAS

pharyngitis, and whether the patient was treated for GAS pharyngitis within the past 28 days. The secondary SmartPhrase was created for NPs to help with antibiotic decision-making, and if GAS testing was not indicated but performed, the NP has an opportunity to document why. In addition, zoom educational sessions were provided on using the SmartPhrases, along with reinforcement education emails dispersed during the posted timeframe. (To view SmartPhrases, see Appendix)

Data Collection/Analysis

Retrospective data was reviewed, and deidentified data was recorded from the previously mentioned timeframes. Data included whether the patient was younger or older than three-years-old, the presence of two or more viral symptoms, GAS pharyngitis exposure, previously treated for GAS pharyngitis in 28 days, whether GAS pharyngitis testing was indicated, amoxicillin/penicillin allergy, the antibiotic prescribed, and usage of SmartPhrases. Most information was directly collected from SmartPhrases and the clinical notes from the Urgent Care team.

The data was collected in Microsoft Excel and processed through IBM SPSS Statistics v28 software. The Chi-Square Goodness of Fit test was performed on the data to compare the timeframe before and after the SmartPhrases were released.

Approval Process

Formal written approval was obtained from participating clinic's Team Leader. The project was deemed QI by the clinical site's institutional review board (IRB). Further approval was obtained from the graduate school IRB.

A potential risk for participants during this study was missed diagnosis of GAS pharyngitis. Potential benefits include reduced RADT and throat cultures, medical costs,

stress to patients and caregivers, and unneeded antibiotics and side effects. Ethical considerations are the autonomy of caregivers and providers. Caregivers of pediatric patients have a right to request GAS testing. At the same time, providers can use clinician discretion to test patients for GAS pharyngitis even if they do not meet the criteria of the SmartPhrases.

Results

During the pre-SmartPhrase portion, (*N*=116) met this study's inclusion and exclusion criteria. During the post-SmartPhrase, the first (*n*=116) patients of the original (*N*=169) that met the criteria were selected to compare with the pre-SmartPhrase. The sample size adjustment was made to compare equal samples with the Chi-Square Goodness of Fit test.

Sample Demographics

In order to protect the personal identifying information of the patients being seen, limited demographics were recorded. Therefore, the only demographic collected was whether the patients were younger than three-years-old or three-years and older. In the pre and post-SmartPhrase, 6% (*n*=7, *N*=116) and 9% (*n*=10, *N*=116) of the sample were less than three-years-old, respectively. See Table 1 for demographics.

Table 1

Demographics

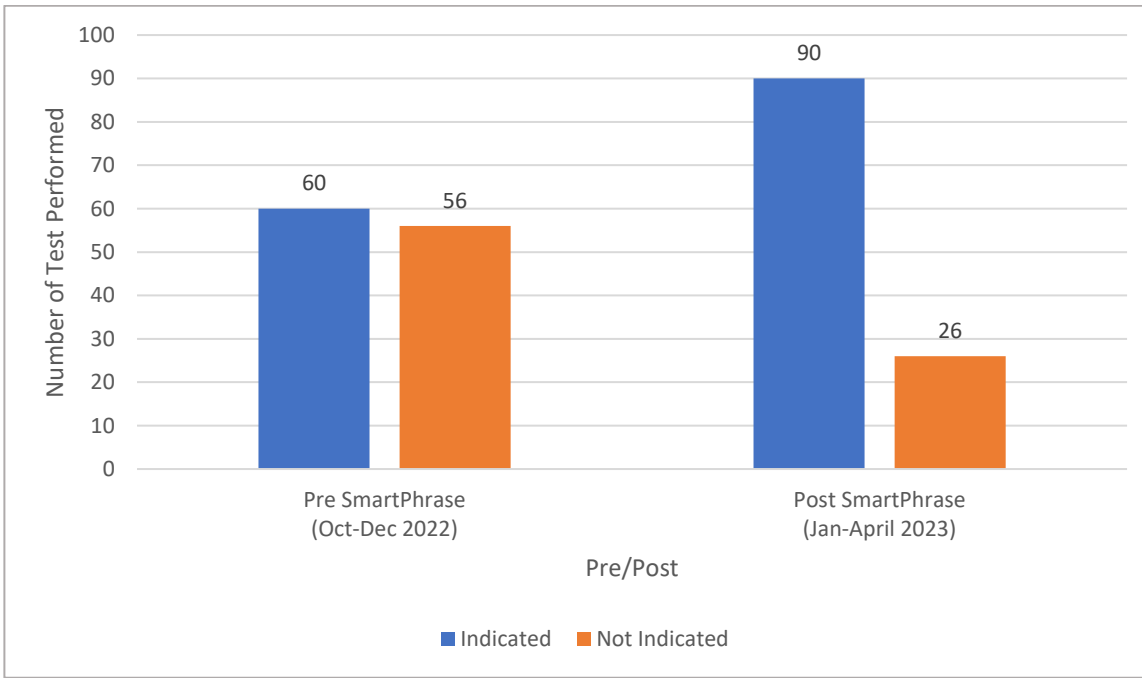
		Pre/Post SmartPhrase	
		Pre	Post
Patient less than three years old	Yes	7	10
	No	109	106
	Total	116	116

Data Report

The first aspect investigated was the difference between the test performed and the indication to be performed. In the pre-SmartPhrase, 52% (*n*=60, *N*= 116) of the tests were indicated, while in the post-Smartphrase, 77% (*n*=90, *N*=116)) of the tests were indicated (see Figure 1). A Chi-square Goodness of Fit test compared the test indication rate before and after SmartPhrase implementation. A *p*-value <0.001-(see Figure 1), indicated a statistically significant difference between the two timeframes.

Figure 1

GAS Test Performed and Indication Status



Note. Chi-Square Goodness of Fit Test, a significant difference (*p*<0.001)
For antibiotic usage, first-line antibiotics were penicillin and amoxicillin. Secondary antibiotics included amoxicillin-clavulanic acid, azithromycin, cefdinir, cefalexin, and clindamycin. The antibiotic prescribed was considered appropriate based upon allergies to the first line antibiotics. If the patient was not allergic to amoxicillin or penicillin and a second-line antibiotic was given, it was considered inappropriate

prescribing,. Of the 232 pre and post-patients meeting inclusion and exclusion criteria, 54 and 91 patients were treated with antibiotics, respectively. In the pre-SmartPhrase, 92% (*n*=50, *N*=54) of the antibiotics prescribed were first line, while in post-SmartPhrase, 85% (*n*=77, *N*= 91) of the antibiotics were first line (see Table 2). The Chi-Square Goodness of Fit test's *p*-value was 0.004 (see Table 2), indicating a statistically significant difference between the antibiotic prescribing patterns of the two timeframes.

Table 2

Antibiotic Prescribed

		Pre/Post SmartPhrase	
		Pre	Post
The antibiotic prescribed	Appropriate	50	77
	Inappropriate	4	14
	Total	54	91

Note. Chi-Square Goodness of Fit test, a statistically significant difference (*p*= 0.004)

The final aspect this study delved into was the retesting style for patients recently tested positive for GAS within the past 28 days. In the pre and post-SmartPhrase portion, five and eight patients, respectively, met the inclusion and exclusion criteria and were recently treated for GAS within the past 28 days. A Chi-Square Goodness of Fit test compared the pre and post-Smartphrases. The *p*-value was 0.069 (see Table 3), which is not a statistically significant finding. Pre-SmartPhrase, 20% (*n*=1, *N*=5) of the test for 28 days positive were cultures, while post it was 25% (*n*=2, *N*=8). There was an increase in performing dual RADT and culture on these patients during the post-SmartPhrase. Refer to Table 3 to see the frequency of test type.

Table 3

28 Day Positive Testing

	Pre/Post SmartPhrase	
	Pre	Post

Type of testing performed on previously positive in past 28 days.	RADT	3	2
	Culture	1	2
	RADT and Culture	1	4

Note. Chi-Square Goodness of Fit test, nonsignificant difference (p= 0.069)

Discussion

The study question for this project was: for patients 1-16 years old in an urgent care setting, what is the impact of SmartPhrase implementation compared to no SmartPhrases on IDSA GAS pharyngitis practice? Based on the Chi-Square Goodness of Fit test, there is a significant difference between the pre and post-SmartPhrase portion of testing when indicated as the IDSA GAS pharyngitis guideline. However, when looking at the rate of SmartPhrase usage, see Table 4, the SmartPhrases were used by the RNs and NPs 23% (n=27, N=116) and 12% (n=14, N=116) of the time, respectively. This brings to question whether the SmartPhrase made an impact or if external factors could be the cause. When the SmartPhrase was introduced, video sessions were done to educate on the contents of the SmartPhrase, and a flyer was displayed at the provider and RN's desks. Reinforcing emails were sent out on the content two weeks after the start of SmartPhrase use and midway through the post timeframe. Education could have influenced some changes by increasing awareness of the IDSA GAS guidelines.

Table 4

SmartPhrase Usage

SmartPhrase by RNs	Yes	27
	No	89
SmartPhrase by NPs	Yes	14
	No	102

The second part of the IDSA GAS pharyngitis practice is the recommended antibiotics. As mentioned in the results section, 85-92% of the antibiotics prescribed in

the Pre and Post phase were appropriate. A statistically significant difference was observed with the Chi-Square Goodness of Fit test. The decrease in antibiotic stewardship could be related to an external factor not considered in data analysis, such as past antibiotic usage over the last 90 days. For example, suppose a patient was treated with amoxicillin or penicillin for GAS pharyngitis, sinusitis, or otitis media. In that case, the first-line antibiotic may not have been selected even if the child was not allergic to it. There was limited use of the NP SmartPhrase, which was aimed at helping with antibiotic selection.

The third part was the retest of recently positive patients within 28 days. There was not a significant difference between the pre and post-SmartPhrase. The RN SmartPhrase assessed the patient's previous 28-day positive status, guiding the proper selection of testing type. The SmartPhrase was used 27 out of 116 times by RNs. More combination tests were performed, which could be influenced by the SmartPhrase and education on the topic provided at the beginning of the QI.

Overall, the aim of this QI project was to improve adherence with the IDSA guideline by 30% for GAS pharyngitis swabbing and 10% for appropriate antibiotic prescribing in three months. As previously mentioned, antibiotic stewardship was excellent pre and post-SmartPhrase intervention. There was a 25% increase in adherence with the IDSA guidelines for GAS pharyngitis swabbing. This study did not meet its aims.

Limitations

There are limitations to this study. The Urgent Care operates with three RNs, one of whom is the research coordinator. There is a risk of bias as the research coordinator

potentially uses the SmartPhrase more, and her presence influences the providers to use their SmartPhrase more. Of the RN SmartPhrase use, 24 of the 27 were the research coordinator. The Chi-Square Goodness of Fit test was performed on the data with and without the patients cared for by the research coordinator. There was no change in statistical significance detected for any of the tests performed.

Nurse practitioners use their own SmartPhrases, which may have been variations of the created SmartPhrase, specifically for positive results. However, the NPs may have also altered the created SmartPhrase, making it difficult to know if the SmartPhrase was being used upon review.

A limitation outside the control of the Urgent Care was a nationwide shortage of oral suspension amoxicillin beginning around October 2022. This could influence which antibiotics were chosen based on availability during the pre-phase. A ripple effect of secondary antibiotic shortages did occur.

During the post-SmartPhrase of this study, there was an influx in the magnitude of the GAS season. This influx could have resulted in more patients being seen for indicated GAS. Enough of an increase may have caused a statistical significant difference between the pre and post-Smartphrases, despite limited SmartPhrase usage. To compensate for this, the post-SmartPhrase sample size was reduced to match the pre-SmartPhrase. The first 116 patients meeting the inclusion and exclusion criteria of the post timeframe were selected.

Implications and Recommendations

Implications for practice are that unnecessary testing is occurring and solutions need to be investigated. This aligns with what was discovered in the literature review

with rates ranging from 39-64% (Linafelter et al., 2022; Norton et al., 2018; Thompson et al., 2022). Similar to Flood et al (2020), this study had most antibiotics being appropriately prescribed. Antibiotic stewardship is not a pressing issue at the study site compared to testing appropriateness.

Brennan-Krohn et al. (2018) was the only part of the literature review that looked into an intervention. Future recommendations are for studies to explore more methods to improve the following of IDSA streptococcal guidelines.

Conclusion

The IDSA guidelines state that two groups should not be tested for GAS pharyngitis: patients with rhinorrhea, cough, oral ulcers, and hoarseness and children younger than three-years-old unless they have risk factors, such as recent direct exposure to an individual with GAS pharyngitis (Shulman et al., 2012). The IDSA guidelines also encourage the use of penicillin and amoxicillin. This study also delved into the retesting of patients who were previously positive in the past 28 days with culture tests versus RADT. The literature review showed a need for follow-through with the IDSA and limited study of interventions. A pilot QI project with a retrospective data analysis approach was performed to see the impact of a SmartPhrase on GAS testing and treatment in pediatric patients. The aim was for the SmartPhrases to improve adherence with the IDSA guideline by 30% for GAS pharyngitis swabbing and 10% for appropriate antibiotic prescribing in three months.

There was limited use of the SmartPhrase and only significant improvement in the appropriate testing when indicated. Antibiotic stewardship was comparable pre and post-SmartPhrase introduction. Implications for practice are that SmartPhrases may not be the

way to implement change. Recommendations are for further studies to explore interventions to help promote adherence to guidelines like the IDSA GAS guideline.

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Appendix

SmartPhrase for RNs:

@NAME@ has sore throat:
1. Was @NAME@ recently exposed to someone with Strep Throat? {YES/NO:23935}
If yes, test for Strep regardless of remainder of questions. See Q2 for method of testing.
2. Was @NAME@ recently treated for Strep Throat in the past 28 days? {YES/NO:23935}
If yes, only test with throat culture. If no, test with RADT.
3. Is the patient younger than 3 years old? {YES/NO:23935}
4. Does @NAME@ have two or more of the following symptoms: cough, rhinorrhea, hoarseness, nasal congestion, and diarrhea? {YES/NO:23935}
If yes to either of the following, do not test patient for Strep.

SmartPhrase for Providers:

If Strep test was positive:
Does @NAME@ have allergy to penicillin/amoxicillin? {YES/NO/NA:23205}
Prescription chosen for treatment: {Strepabx:65457}

If Strep test was not indicated but performed the reason was: {strep performed:65399}