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Caitlin A. Davidson
University of Kentucky, niltiac84@gmail.com

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DNP Final Project Report

An Evaluation of Provider Adherence to Adult Sinusitis Quality Measures and Guideline

Caitlin A. Davidson

University of Kentucky

College of Nursing

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Sharon Lock, PhD, APRN, FNAP, FAANP- Committee Chair

Nancy Kloha, DNP, APRN, FNP-BC- Committee Member

Mollie Aleshire, DNP, MSN, FNP-BC, PPCNP-BC- Clinical Mentor

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Abstract

Purpose

The purpose of this project is to evaluate adherence to Physician Quality Reporting System (PQRS) Measures #331 (delaying antibiotic treatment until at least seven days of symptoms) and #332 (prescribing amoxicillin or amoxicillin/clavulanate) on adult sinusitis treatment. Data was collected from patient encounters at the University of Kentucky College of Nursing Community Health Center (UKCONCHC) in Wilmore, Kentucky. To adhere to these quality measures would foster antibiotic stewardship. Further statistical analysis was completed to determine if gender or age bias was present in prescribing practices.

Methods

A retrospective chart audit was conducted to determine adherence to the quality measures. Records were also reviewed to determine if recommended antibiotics by the American Academy of Otolaryngology Head and Neck Surgery (AAOHNS) (Rosenfeld et al., 2015) were prescribed for patients with penicillin allergies. A total of 30 patient encounters met inclusion criteria. Information regarding patient age, gender, allergies, days of symptoms experienced, and antibiotic prescribed (if any) were collected.

Results

The adherence rate to Objective 1 (delaying antibiotic treatment until at least seven days of symptoms) was 60%. The adherence rate to Objective 2 (prescribing amoxicillin or amoxicillin/clavulanate) was 89.2%. The adherence rate to Objective 2, when adherence to Objective 1 was a prerequisite, was 53.5%. The adherence rate to Objective 3 (prescribing doxycycline or a fluoroquinolone when a penicillin allergy is present) was 50%. No gender or age bias was observed in regard to antibiotic prescribing practices.

Conclusion

In conclusion, the adherence rates demonstrated adequate adherence to PQRS measures #331 and #332 and the AAOHNS guideline. Attention should be focused on improving adherence to PQRS measure #331 (delaying antibiotic therapy until at least seven days of symptoms).

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An Evaluation of Provider Adherence to Adult Acute Quality Measures and Guideline

Introduction

Acute sinusitis is an illness caused by the inflammation of the paranasal sinuses and nasal cavity, which can last up to four weeks. Sinusitis can be the result of a viral or bacterial infection (Rosenfeld et al., 2015). In the United States, sinusitis is given as the primary diagnosis over 30 million times annually by health care providers (Blackwell, Lucas, & Clarke, 2014). In a large, retrospective analysis Benninger, Holy and Trask (2016) observed that antibiotic prescriptions for acute rhinosinusitis were written over 80% of the time. According to the Centers for Disease Control and Prevention (CDC) (2015), 90-98% of rhinosinusitis occurrences are due to a viral organism, not a bacteria. With such frequent use of antibiotic therapy for acute sinusitis, resistance has become both a reality and a concern. In fact, the CDC (2013) has deemed antibiotic utilization as the most significant influence of antibiotic resistance. Antibiotics are not an effective treatment for viral infection; therefore, the likelihood is high that many antibiotic prescriptions are not reducing severity or length of illness course for acute rhinosinusitis. Antibiotic stewardship, which is a concept that emphasizes the responsible use of antibiotic therapy, can help to slow the process of antibiotic resistance (CDC, 2013).

The most common bacteria associated with causing sinusitis are *Strep pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis* (Sinus and Allergy Health Partnership, 2004). These bacteria are susceptible to amoxicillin or amoxicillin/clavulanate, which are considered first-line therapies (Rosenfeld et al., 2015). Depending on local resistance patterns, amoxicillin/clavulanate may be necessary to treat sinusitis if causative bacteria produce beta-lactamase. Amoxicillin is recommended as the first line therapy for several reasons including: low side effect profile, narrow spectrum coverage, inexpensiveness, and effectiveness (Ahovuo-Saoranta et al., 2014; de Bock et al., 1997; Lau et al., 1999; Sinus and Allergy Health Partnership, 2004; Snow et al., 2001).

The Centers for Medicare & Medicaid Services (2015) have published quality measures (Physician Quality Reporting System-PQRS) regarding appropriate antibiotic use in the treatment of sinusitis in adults. The measures, #331 and #332, advise the appropriate utilization of antibiotics seven days after diagnosis or 10 days after onset of symptoms (#331) and recommend the use of amoxicillin or amoxicillin/clavulanate as initial treatment (#332). These

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quality measures are based on evidence-based clinical practice guidelines published by the American Academy of Otolaryngology-Head and Neck Surgery (AAOHNS) in 2015 (American Medical Association, 2015; Rosenfeld et al., 2015). By adhering to these quality measures, antibiotic stewardship is encouraged and the potential to slow the process of antibiotic resistance exists (Cantas et al., 2013; Lee, Cho, Jeong, & Lee, 2013; Centers for Disease Control and Prevention, 2013).

The current AAOHNS guideline is an update of the 2007 version of the sinusitis treatment recommendations (Rosenfeld et al., 2015). These guidelines provide direction for the management of sinusitis beyond what is evaluated by PQRs measures #331 and #332. The information within the AAOHNS guideline is particularly helpful when dealing with patients who cannot receive the recommended treatment and necessitate an alternative. For example, patients with a penicillin allergy that have been diagnosed with bacterial sinusitis cannot be prescribed amoxicillin or amoxicillin/clavulanate due to their allergy. The AAOHNS (Rosenfeld et al., 2015) recommends the use of doxycycline or a fluoroquinolone to treat sinusitis in patients who are allergic to penicillin.

Purpose

The purpose of this project was to evaluate provider adherence to PQRs Measures #331 and #332 on adult sinusitis treatment.

Objectives

The overall objective of the project was to evaluate antibiotic use for adults diagnosed with acute sinusitis at the University of Kentucky College of Nursing Community Health Center (UKCONCHC) from March 29, 2016- September 20, 2016. The specific objectives of the project were to:

Objective 1: Evaluate the adherence of nurse practitioners to PQRs Measure #331 (appropriate use of antibiotics).

Objective 2: Evaluate the adherence of nurse practitioners to PQRs measure #332 (use of amoxicillin or amoxicillin/clavulanate).

Objective 3: Evaluate the adherence of UKCONCHC nurse practitioners to the AAOHNS guideline recommendation to prescribe doxycycline or a fluoroquinolone for patients diagnosed with acute sinusitis who are allergic to penicillin.

Methods

Design

A univariate descriptive study design was used to observe the level of adherence to PQRS measures #331 and #332 and the AAOHNS guideline recommendation for patients with penicillin allergies. A retrospective chart audit was conducted.

Study Permission

Permission to conduct this study was received from Dr. Sharon Lock, Clinic Director of the UKCONCHC. In addition, prior to initiation of this study permission was received from the Institutional Review Board (IRB) via expedited review at the University of Kentucky in Lexington, Kentucky.

Study Population

The sample for this study was based on adult patient encounters at the UKCONCHC from March 29, 2016 - September 20, 2016. Inclusion criteria for the chart audit was 1) patient 18 years old or older at time of patient encounter, and 2) an ICD-10 (J01-J01.91) diagnosis of acute sinusitis. Patients with a documented allergy to penicillin and a diagnosis of acute sinusitis were included to evaluate appropriate antibiotic use. Exclusion criteria were patients less than 18 years old. A total of 30 patient encounters met inclusion criteria.

Setting

The UKCONCHC is licensed as a limited services clinic and has been open since September 14, 2015. Several University of Kentucky College of Nursing faculty members are the health care providers for the clinic.

Data Extraction Procedures

The University of Kentucky Center for Clinical and Translational Science (CCTS) assembled a list of medical record numbers of patients who met inclusion criteria.

The principal investigator reviewed the medical records and extracted data concerning patient age, gender, allergies to antibiotics, ICD-10 code, onset of symptoms (number of days), and antibiotic prescribed (if any).

Data Analysis

To analyze the data for Objective 1, the following procedure was followed. For each patient encounter that met inclusion criteria, a label of 'yes' or 'no' was applied in regard to whether or not the seven days of experienced symptoms was met. This coding provided the data

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for Objective 1. For the purposes of this study, a ‘yes’ label was given if symptoms were documented to have been occurring for 7 days or more. Technically, PQRS measure #331 states that antibiotics should only be given seven days after diagnosis or 10 days after onset of symptoms (Center for Medicare & Medicaid Services, 2015). However, providers often prescribe antibiotics after 7-10 days of symptoms (American Academy of Family Physicians, 2017; Aring & Chan, 2016; Patel & Hwang, 2017). The manner of this portion of the data analysis is reflective of this common practice. A frequency was calculated to determine provider adherence to PQRS measure #331.

For Objective 2, there were two interpretations of the data. Patients who were documented to have a penicillin allergy were excluded from data computations for Objective 2. The first interpretation looked at whether or not amoxicillin or amoxicillin/clavulanate was prescribed when sinusitis was diagnosed, irrespective of duration of symptoms. If amoxicillin or amoxicillin/clavulanate was prescribed, the encounter was labeled as ‘yes.’ If amoxicillin or amoxicillin/clavulanate was not prescribed, the patient encounter was labeled as ‘no.’ A frequency was calculated to determine provider adherence to this interpretation of PQRS measure #332.

For the second interpretation of the data for Objective 2, adherence to Objective 1 (minimum of 7 days of experienced symptoms prior to antibiotic prescription) was taken into consideration. Patients with a documented penicillin allergy were excluded from this data computation. Patient encounters were labeled as either ‘yes’ or ‘no.’ For this interpretation, adherence to Objective 1 (PQRS measure #331), was a prerequisite for adherence to Objective 2 (PQRS measure #332). If a patient encounter was adherent to Objective 1 and Objective 2, the encounter was labeled as a ‘yes.’ If a patient encounter was adherent to Objective 1 and was not adherent to Objective 2, the encounter was labeled as ‘no.’ If a patient encounter was not adherent to Objective 1, but had been prescribed amoxicillin or amoxicillin/clavulanate, the encounter was labeled as ‘no.’ In these instances, the antibiotic prescription could be considered incorrect due to the minimum number of days of symptoms not being met. A frequency was calculated to determine provider adherence to PQRS measure #332, when considering adherence to PQRS measure #331 as a prerequisite.

For Objective 3, only patient encounters with a documented allergy to penicillin were included for this portion of data analysis. Patient encounters were labeled as a ‘yes’ if symptoms

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had been present for a minimum of 7 days and if doxycycline or a fluoroquinolone was prescribed. Patient encounters were labeled as 'no' if either symptoms had been present for less than 7 days or if an antibiotic other than doxycycline or a fluoroquinolone was prescribed. This is in alignment with a recommendation from the AAOHNS (Rosenfeld et al., 2015). A frequency was calculated to determine provider adherence to the AAOHNS measure.

Results

Objective 1

Objective 1 sought to examine adherence to PQRS measure #331, which advises sinusitis symptoms to be present for a minimum of seven days prior to antibiotics prescription. A total of 30 patient encounters met inclusion criteria. Each of these patient encounters resulted in an antibiotic prescription. The data revealed that 18 of these 30 patient encounters had experienced a minimum of seven days of sinusitis symptoms before an antibiotic was prescribed. Therefore, an adherence rate of 60% (18/30) was demonstrated by providers at the UKCONCHC to PQRS measure #331.

Objective 2

Objective 2 assessed adherence to PQRS measure #332, which advises the prescription of amoxicillin or amoxicillin/clavulanate for adult patients diagnosed with sinusitis. Therefore, patients with a documented allergy to penicillin were excluded from this portion of data analysis. For the chart audit, 28 patient encounters were examined for Objective 2. Each of these patient encounters included an antibiotic prescription. Of these 28 patient encounters, 25 were prescribed amoxicillin or amoxicillin/clavulanate. Thus, providers at the UKCONCHC were 89.3% adherent to PQRS measure #332. This frequency does not consider whether or not the sinusitis symptoms had been experienced for a minimum of seven days.

It is important to realize some of the patient encounters that were not adherent to PQRS measure #331 were labeled as adherent to PQRS measure #332. After taking into account both quality measures the percentage of adherence is lowered. In other words, to be labeled as adherent to PQRS measure #332, the patient encounter must be labeled as adherent to PQRS measure #331, as a prerequisite. To look at the data in this manner reflects true antibiotic appropriateness and demonstrates antibiotic stewardship. The combination of these two quality measures work together to practice antibiotic stewardship. The number of patient encounters

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that were adherent to PQRS measure #331 and #332 were 15 out of the total 28 patient encounters. Thus, after taking into consideration adherence to PQRS measure #331, providers at the UKCONCHC demonstrated an adherence rate of 53.5% (15/28) to PQRS measure #332.

Objective 3

Objective 3 sought to observe adherence to the AAOHNS guideline recommendation (Rosenfeld et al., 2015), which advises the prescription of a fluoroquinolone or doxycycline for the treatment of sinusitis among adults in the presence of a penicillin allergy. Of the 30 patient encounters included in the study, only 2 patient encounters were documented to have a penicillin allergy. Of those 2 patient encounters, 1 chart was adherent to the AAOHNS guideline. Therefore, an adherence rate of 50% (1/2) was observed to the AAOHNS guideline by providers at the UKCONCHC clinic.

Data were also analyzed to determine if gender and age influenced provider adherence. For the analysis concerning gender and provider adherence, a Chi-Square analysis was computed using the SPSS program, version 23, by IBM. A total of 28 patient encounters were included in this analysis. Males accounted for 8 patient encounters. Females accounted for 20 patient encounters. The data for Objective 2, which viewed adherence to PQRS measure #331 as a prerequisite for adherence to Objective 2, was utilized for this computation. There was no significant difference of provider adherence rates between male and female patients ($p > 0.05$).

To explore if patient age influenced provider adherence rates, an Independent Samples T-Test was run in the SPSS program, version 23, by IBM. A total of 28 patient encounters were included for this analysis. The data included for this analysis considered adherence to PQRS measure #331 as a prerequisite to adherence for adherence to Objective 2. There was no significant difference ($p > 0.05$) between patient age and provider adherence rate.

Discussion

The results show that nurse practitioners at the UKCONCHC are prescribing antibiotics for sinusitis after at least seven days of symptoms (PQRS measure #331) 60% of the time. When antibiotics are prescribed for sinusitis among patients without a penicillin allergy, 89.3% receive a prescription for amoxicillin or amoxicillin/clavulanate (PQRS measure #332). When accounting for the presence of at least 7 days of sinusitis symptoms and amoxicillin or amoxicillin/clavulanate being prescribed, 53.5% of patient encounters met both quality

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measures. For patients with a penicillin allergy and diagnosed with sinusitis, a fluroquinolone or doxycycline was prescribed (AAOHNS guideline) in 50% of patient encounters.

While these rates are commendable, there is room for improved adherence to these quality measures and guideline. At first thought, one might believe that this adherence rate is strictly due to the knowledge and practice of the providers. However, it is important to appreciate that some patients come to medical appointments with preconceived expectations. Some of these patients may be of the belief that their illness necessitates an antibiotic when, in fact, current guidelines state otherwise (Rosenfeld et al., 2015). Despite patient education, some patients are persistent enough to persuade the provider to prescribe an unnecessary antibiotic. The PQRS measures included in this study encourage more cautious use of antibiotics. This is in contrast to medical practice within the last 15 years, during which over 80% of visits for sinusitis included an antibiotic prescription (Benninger, Holy & Trask, 2016; Smith et al., 2013). Over time, it is hoped that general knowledge of current guidelines will be disseminated among the public so that patients will be more accepting of less aggressive treatment plans. As this occurs, adherence to the quality measures of PQRS will be improved.

Presently, there exists a void in the literature regarding adherence rates of these quality measures and guideline. This is likely due to their relatively recent publication within the past two years. Therefore, at this time, it is not possible to compare the adherence rates at the UKCONCHC to other clinics or national trends because the data has not been analyzed or made public. Though not necessarily reflective of current practice, the most recent data has indicated that antibiotics are prescribed over 80% of the time when sinusitis is diagnosed (Benninger, Holy & Trask, 2016; Smith et al., 2013). This data does not consider the duration of symptoms; however, according to the CDC (2015), 90-98% of rhinosinusitis is due to a viral organism, not a bacteria. When considering this, only 10% of sinusitis cases, at most, warrant an antibiotic prescription. Thus, the most recent data demonstrates the over prescription of antibiotics for this condition. It is clear that more cautious use of antibiotics is needed. Historically, adult sinusitis clinical practice guidelines have impacted the management of sinusitis (Bhattacharyya & Kepnes, 2013). The improvements to practice have not occurred at an exceedingly high degree as the over prescription of antibiotics for sinusitis has continued (Benninger, Holy & Trask, 2016; Smith et al., 2013).

Adherence to these quality measures and guideline not only affect the patients of the

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UKCONCHC, but also contribute to staving off the bigger issue of antibiotic resistance. Antibiotic resistance has increased in recent years, along with new resistance patterns emerging (CDC, 2013). The overuse of antibiotics has had a direct impact on antibiotic resistance by advancing the process (Cantas et al., 2013; Lee, Cho, Jeong, & Lee, 2013). As antibiotic resistance continues to develop, current first-line treatments have become useless in some instances (CDC, 2013). It is important to note the ramifications of antibiotic resistance reach beyond simply prescribing a different antibiotic. Annually, at least two million people become infected with antimicrobial resistant bacteria and an estimated 23,000 people die from these infections in the United States (CDC, 2013). Infection with antibiotic resistant bacteria has been correlated with increased morbidity following initial infection (Huang et al., 2011). Cosgrove (2006) and Huang et al. (2011) demonstrated that antibiotic resistant bacteria led to increased mortality among those who had acquired a resistant infection.

The economic burden of antimicrobial resistance is also profound. Antimicrobial resistance has been associated with increases in medical costs and duration of hospital stay (Cosgrove, 2006; Roberts et al., 2009). Further, antibiotic stewardship has been shown to save money in the healthcare setting (Beardsley et al., 2012; Standiford et al., 2012).

In an effort to stave off antibiotic resistance, the CDC has created the Antibiotic Resistance (AR) Solutions Initiative (CDC, 2017a). The conception of this initiative speaks to the recognized threat antibiotic resistance has on the health of current and future generations. Two pieces of this initiative include the implementation of antibiotic stewardship programs in doctors' offices and continuing education program regarding current guidelines in hopes of eliminating inappropriate antibiotic prescribing (CDC, 2017b). Through the AR Solutions Initiative, over \$1.1 million dollars were spent on antibiotic resistance activities during fiscal year 2016 in Kentucky. Over \$500,000 dollars were invested in efforts to improve antibiotic stewardship by educating medical providers and the general public (CDC, 2016a).

Limitations

For this study, several limitations are identified. The first limitation of this study is the small sample size. As with any research endeavor, the larger the sample size, the more reliable results become. The small sample size can be attributed to several factors. For one, the dates set by the inclusion criteria did not include the Fall or Winter months. It would be expected to experience a larger volume of patient encounters with a chief complaint of sinusitis symptoms

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during these months, which in turn would have provided a larger study sample. A wider date range for inclusion criteria was not selected for this study due to a change in electronic medical record platform. Prior to March 29, 2016, the UKCONCHC used McKesson Practice Choice as the electronic health record (EHR). The clinic transitioned to UKHC Ambulatory Electronic Health Record (AEHR) on March 29, 2016. Paper copies of the McKesson records were available, but the records could not be searched electronically. Therefore, for this project, only records from the UKHC AEHR were reviewed. In addition, the UKCONCHC had been open less than one year during the inclusion criteria dates. Limited local knowledge of the clinic could also have contributed to the small sample size. Lastly, the clinic is located in a small town without a large amount of economic activity. It is located about 10 minutes from a larger town within the county that has several primary care offices.

A second limitation of the study is the opportunity for providers to use several ICD-10 diagnosis codes for upper respiratory symptoms, many of which do not indicate sinusitis. The current AAOHNS guideline (Rosenfeld et al., 2015) defines acute bacterial rhinosinusitis as “symptoms of...rhinosinusitis persist without evidence of improvement for at least 10 days” (p. S6). This guideline definition encourages practitioners to not use ICD-10 diagnosis codes J01-J01.91 for sinusitis until symptoms meet the minimum number of days of symptoms. There may be a tendency for medical practitioners to label patient encounters with other diagnosis codes, such as upper respiratory infection, when the minimum number of symptom days has not been met and the causative agent is suspected to be viral. This tendency is evidenced by the study sample. Each patient encounter that met inclusion criteria included an antibiotic prescription. A higher rate of adherence to PQRS measure #331 may have been observed if patient encounters were diagnosed as sinusitis earlier in illness course or if other diagnosis codes, such as upper respiratory infection, were included in the inclusion criteria.

Another limitation of this study is that data extraction procedures did not observe for the presence of delayed prescription writing. This concept allows for providers to write an antibiotic prescription that will not become active until after the minimum seven days of symptoms have been experienced. If delayed prescription writing had been taken into account, there may have been an increase in adherence rates, in particular to PQRS measure #331.

Another limitation of this study was the exclusion of the phenomenon known as *double worsening* from the data analysis (Rosenfeld et al., 2015). *Double worsening* is defined as the

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worsening of acute rhinosinusitis symptoms after initial improvement within 10 days of symptom onset (Rosenfeld et al., 2015). The AAOHNS guideline states that antibiotics can be prescribed if *double worsening* has occurred (Rosenfeld et al., 2015). This phenomenon was not taken into consideration during data extraction procedures because PQRS measures #331 and #332 do not include *double worsening* to warrant antibiotic use. However, nurse practitioners at the UKCONCHC may have prescribed antibiotics within the 10 day window due to *double worsening*, which is appropriate antibiotic use according to the AAOHNS guideline (Rosenfeld et al., 2015). *Double worsening* could have been a piece of the exclusion criteria for this study to help control for the influence of the AAOHNS guideline in practice. This would not be done to insinuate that prescribing antibiotics in the presence of *double worsening* is incorrect. Rather, this would be done because the aim of this study was to observe adherence to PQRS measures #331 and #332. Currently, PQRS does not address *double worsening* in its' quality measures. As previously stated, PQRS measures #331 and #332 were written to mirror the recommendations from the AAOHNS guideline (American Medical Association, 2015). However, as this limitation illustrates, they were not mirrored verbatim.

The aforementioned example of the PQRS measures and AAOHNS guideline containing different information leads the discussion to another limitation of this study. It is important to realize that PQRS is a quality improvement program, not a treatment guideline (Centers for Medicare & Medicaid Services, 2015). Nonetheless, there are other sinusitis treatment guidelines besides the AAOHNS guideline that have been published by reputable organizations, like the Infectious Disease Society of America (IDSA). The IDSA treatment guidelines for sinusitis contain different recommendations than the AAOHNS guideline (Chow et al., 2012; Rosenfeld et al., 2015). Yet, both of these guidelines are acceptable for use in clinical practice. This study sought to look at adherence to PQRS measures #331 and #332, which were written to reflect the AAOHNS guideline (American Medical Association, 2015). To summarize, if a patient encounter was not in alignment with PQRS measures #331 and #332, it does not necessarily demonstrate incorrect practice, which is how the results of this study could be interpreted.

Finally, the last identified limitation of this study is that all nurse practitioners at the UKCONCHC are faculty members at the University of Kentucky College of Nursing in Lexington, Kentucky. As employees of an academic institution, there exists an expectation to maintain knowledge of current evidence-based practice. In an environment where evidence-

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based practice is encouraged, adherence rates to quality initiatives could be higher than they would be in private practice or rural communities where the motivation to stay abreast on current guidelines is not as high. This limitation does not affect the results of this study. However, it could impact how confidently this data could be extrapolated.

Implications for Practice

The results of this study reveal the current practice among providers at the UKCONCHC. Although the findings demonstrated practice was in alignment with PQRS measures and AAOHNS guideline most of the time, there remains room for improvement. A potential method to improve practice would be for nurse practitioners at the UKCONCHC to incorporate delayed prescription writing into practice. This practice would allow for a compromise between patients who believe they need an antibiotic for their illness and nurse practitioners who know evidence-based guidelines state otherwise. The incorporation of delayed prescription writing into practice may help to improve adherence to PQRS measure #331 and #332.

As previously mentioned in this paper, the results of this study will be used in a reflective manner by nurse practitioners at the UKCONCHC. However, another way to use this data would be to formulate an intervention designed to improve adherence to PQRS measures #331 and #332. If an intervention were to be designed in response to the results of this study, the focus of the intervention would be on Objective 1, waiting to prescribe an antibiotic until sinusitis symptoms have been experienced for at least 7 days. This intervention would entail an education session regarding the quality measures and guideline included in this study, the results of this chart audit, and how the quality measures and guideline help to strengthen antibiotic stewardship. An emphasis would be placed on PQRS measure #331 during the education session. If desired, a repeat of this study could be conducted after this intervention to determine the interventions' impact on practice.

A potential resource for an intervention is the *Get Smart About Antibiotics* program, which is published by the CDC (2016b). This program provides printed materials regarding responsible antibiotic use for both patients and providers. Also, online resources are available for providers. The *Get Smart About Antibiotics* program could be used at the UKCONCHC to help improve patient understanding of responsible antibiotic use, which may have been an influencing factor in the results of this study as mentioned in the discussion section of this paper. In addition,

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this program can provide tools for the nurse practitioners at the UKCONCHC to utilize in clinic that may improve adherence to PQRS measures #331 and #332.

Conclusion

In conclusion, the results of this retrospective chart audit demonstrate the need for improvement of adherence to PQRS measures #331 and #332. To improve adherence would not only affect the practice of medical providers at the UKCONCHC, but also promote the concept of antibiotic stewardship. Although this study examined three separate quality recommendations, it is imperative to realize that that they all work in combination to uphold antibiotic stewardship. Judicious practice of antibiotic stewardship is essential among all medical providers. The health of current and future populations depends on it.

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Table 1: Demographic Information- Gender

Gender	Number of patient encounters
Male	8
Female	22

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Table 2: Demographic Information- Age

Age at date of encounter	Number of patients in age group
18-29 years of age	5
30-39 years of age	14
40-49 years of age	1
50-59 years of age	8
60-69 years of age	2
70 years of age and older	0

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Table 3: Results- Objective 1

Symptoms present for at least seven days prior to antibiotic prescription	Number of patient encounters
Yes	18
No	12

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Table 4: Results- Objective 2 (Objective 1 adherence not considered)

Amoxicillin or Amoxicillin/clavulanate prescribed	Number of patient encounters
Yes	25
No	3

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Table 5: Results- Objective 2 (Objective 1 adherence considered)

Amoxicillin or amoxicillin/clavulanate prescribed after at least seven days of symptoms	Number of patient encounters
Yes	15
No	13

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Table 6: Results- Objective 3

Fluroquinolone or doxycycline prescribed	Number of patient encounters
Yes	1
No	1