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Treatment of Acute Bronchitis in Active Duty Military Members Benchmark Project

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Treatment of Acute Bronchitis in Active Duty Military Members Benchmark Project

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Contents

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Executive Summary

Antibiotic resistant infections are a growing problem in the United States and the world. The main cause of this is antibiotic prescriptions, which can not only cause antibiotic resistance but adverse events. Decreasing the amount of antibiotics prescribed for inappropriate conditions can help to decrease the rates of antibiotic resistant infections and the problems these infections can cause. One illness that is treated frequently with antibiotics, against recommendations, is acute bronchitis. Acute bronchitis is a self-limiting viral infection, characterized by cough. By decreasing the number of providers who are prescribing antibiotics for acute bronchitis, the clinic can help to prevent the chance of antibiotic resistant infections and adverse events. Another benefit is getting all the providers to treat patients the same for this illness. Currently, when one provider doesn't give the patient what they want, they may be able to see another, who may prescribe an antibiotic.

This project will be accomplished though a training session with all providers and will include clinic staff. Providers will need to take a pre and post training assessment to evaluate the effectiveness. Providers and staff will be presented with a PowerPoint lesson on acute bronchitis, treatment options, antibiotic effectiveness, and improvement timeframes with antibiotics. Providers may feel the need to give patients what they are requesting due to time constraints, patient satisfaction scores, fear of complications, and legal concerns (Evertsen et al., 2010). Educating providers and staff will provide them with the resources needed to explain why patients will not receive an antibiotic.

Success will be determined by reduced prescribed antibiotic scores, and a 50% reduction in the amount of antibiotic prescribed for acute bronchitis. If it works well in the Operational Medicine Clinic it can be expanded to the rest of the facility.

Treatment of Acute Bronchitis in Active Duty Military Members Benchmark Project Rationale

Antibiotic resistance infections affect millions of people every year and cause numerous deaths. Antibiotic use can cause many problems from allergic reactions to antibiotic resistant infections. The National Action Plan for Combating Antibiotic-Resistant Bacteria, created by the White House in 2015, set a goal to reduce inappropriate antibiotic use by 50% in the outpatient setting by 2020, with over 262 million antibiotic prescription dispensed in 2011 (Fleming-Dutra et al., 2016). Inappropriate antibiotic prescribing has been an issue in the United States for years. This caused the Centers for Disease Control and Prevention (CDC) to create a campaign in 1995 to combat inappropriate prescribing called the National Campaign for Appropriate Antibiotic Use in the Community, later called Get Smart: Know When Antibiotics Work (Schroeck et al., 2015; Fleming-Dutra et al., 2016). With the Get Smart campaign name change, a national media campaign was launched to inform providers and the general population about the risks associated with antibiotics. One of the most common diagnosis associated with inappropriate antibiotic prescribing is acute bronchitis. Acute bronchitis is a self-limiting viral respiratory disease. The main symptom of bronchitis is cough, which may or may not be associated with respiratory secretions. Acute bronchitis tends to be prescribed antibiotics despite recommendations that acute bronchitis not be treated with antibiotics. A healthcare effectiveness data and information set (HEDIS), which is used by many insurance plans as a performance measurement tool, was incorporated in 2006 measuring the avoidance of antibiotic treatment in adults with acute bronchitis (CDC, 2020). The mean rate of performance was 23% in 2012, across all health plans, compared to a goal of 100% (CDC, 2020). Ensuring that providers at Mountain Home Air Force Base Warrior Operational Medicine Clinic are aware of the literature suggesting that antibiotics

are not necessary for acute bronchitis can help to decrease the rate of antibiotic prescriptions seen within the facility.

Project Goals

The goal of this benchmark project is to decrease the number of prescriptions being written for antibiotics for acute bronchitis by educating medical providers and staff. Antibiotic resistance is increasing due to the overprescribing of antibiotics, and one way to combat that is to properly prescribe antibiotics. As providers leave medical school, it becomes the responsibility of the provider to stay on top of current treatments and recommendations for all sorts of disease processes. While the treatment for acute bronchitis hasn't changed in years, providers have to deal with patients who believe they know what is best, and what they need. Provider can get caught in a limbo of proper medical care and the needs and desires of the patient and the organization. Many different factors contribute to a provider prescribing an antibiotic for acute bronchitis including patient expectations, clinical error, office location, workload, and legal consideration (Evertsen et al., 2010; Sanchez et al., 2014; Schroeck et al., 2015). One major concern with patients believing in the need for antibiotic treatment is the mismatch between perceptions of how long the cough can last. Patients report that a cough lasts between 6.5 to 9.2 days, while coughs in reality can last up to an average of 18 days, this can cause patients to return to the provider to request an antibiotic (Ebell et al., 2013).

The goal of this benchmark study is to improve the education and resources available to providers to reduce the number of antibiotic prescriptions written for acute bronchitis. If providers are more aware of the disease process and the information available about the symptoms of acute bronchitis, providers will be better equipped to inform patients and give them materials that can help to increase awareness. Patients will then be more aware of the risks

associated with antibiotic misuse. By creating a culture of antibiotic stewardship, patients will begin to gain the knowledge that antibiotics are not used for every illness, and thus will no longer expect an antibiotic at every visit. By educating the providers and staff about the treatment for acute bronchitis and appropriate antibiotic prescribing, a trickle-down effect may occur creating a better environment for antibiotic prescribing overall.

Literature Synthesis

Completing a literature search to determine the implications of antibiotics on acute bronchitis brought up many results. Researchers have been working on determining why antibiotics are still overprescribed and whether a difference in symptoms are seen with those who take antibiotics compared to those who go without. According to Link et al. (2016) the urgent care in the quality improvement study saw over 18,500 patients with acute bronchitis and treated them inappropriately with antibiotics in 96% of the cases, while Kroening-Roche et al. (2011) found that in the emergency room antibiotics are being prescribed for acute bronchitis between 57%-97% of the time, and Schroeck et al. (2015) in a retrospective chart review found that only 20.5% of patients with acute bronchitis were treated appropriately based on the recommendations from the CDC's Get Smart Campaign. Evertsen et al. (2010) found, in a retrospective chart review of 604 patients, that 93% with acute bronchitis were prescribed antibiotics, and Barnett and Linder (2014) found that the rate of prescribing had increased from 1996-2010, and was being prescribed 71% of the time. In contrast to other studies, a study looking into quality improvement in Denmark found that only 23% of patients with acute bronchitis were prescribed antibiotics (Saust et al., 2018), while this is an overuse of antibiotics for bronchitis, the findings suggest that Denmark has better control of the bronchitis prescribing rates than some other countries.

Some of the articles reviewed symptoms found in acute bronchitis and whether antibiotics decreased or improved these symptoms. In the 13-country observation study conducted by Butler et al. (2010), over 2600 people participated and the group who were not prescribed antibiotics felt recovered sooner than those taking amoxicillin, but not sooner than other classes of antibiotics. All classes of antibiotics and no treatment groups had a mean day felt recovered within 3 days of one another (Butler et al., 2010). Overall, this study showed that no class of antibiotics and no treatment was better at reducing symptoms for acute lower respiratory tract infections/acute cough illnesses over another (Butler et al., 2010). This study did not discuss the ill effects that can happen from taking inappropriate antibiotics. In the single blinded randomized placebo-controlled study done by Llor et al. (2013) patients were given amoxicillin-clavulanic acid three times daily, ibuprofen 600 mg three times daily, or a placebo three times daily for treatment of acute non-complicated bronchitis with discolored sputum. The study looked at 371 people and ibuprofen had the quickest resolution of frequent cough with a mean duration of 9, compared to 11 with amoxicillin, and 10 with the placebo, though no statistical significance was found (Llor et al., 2013). Little et al. (2013) conducted a similar placebo-controlled trial, utilizing amoxicillin in the treatment group and a placebo in the control group with similar results, “moderately bad” symptoms resolved one day sooner in the treatment group. In the study by Llor et al. (2013) Ibuprofen was shown to reduce the amount of symptom duration compared to antibiotic treatment and the placebo, which had the longest duration of symptoms, even though there was no statistical significance, which was in contrast to the study done by Butler et al. (2010), which showed there was no difference in symptom resolution between antibiotic treatment and no antibiotic treatment, while Evertsen et al. (2010) reports that antibiotics do decrease the duration of symptoms, but only by half a day in healthy adult patients

with acute bronchitis. The Cochrane Review had mixed results across the study with a few showing slight benefits for antibiotic treatments, though none were of clinical significance (Smith et al., 2017).

Incorrect antibiotic prescriptions were more likely to be seen in patients with cough and penicillin allergies, while tonsillar exudate, lymphadenopathy, and fever were associated with appropriate treatment (Schroeck et al., 2015). Ebell et al. (2013) found that patient expectations for cough duration were way lower than the average duration of cough during an acute cough illness, and could help to explain the expectation of an antibiotic prescription during follow-up care. Fleming-Dutra et al. (2016) utilized the NAMCS and NHAMCS to review statistics of antibiotic prescribing for all ambulatory care visits reported, finding that half of the antibiotics prescribed for acute respiratory conditions may have been inappropriate. The same study in a review of literature found that the United States prescribed almost 550 more antibiotics per 1,000 people than Sweden, with Sweden not increasing in side effects of the illness (Fleming-Dura et al., 2016). Nausea, rash, and diarrhea was found to be more frequent in patients prescribed antibiotics (Little et al., 2013; Smith et al., 2017). Overprescribing antibiotics, or using them for inappropriate diagnoses, can cause gastrointestinal issues, eliminate antibiotic susceptible organisms which allow the resistant organisms to expand, and can pass the genes for antibiotic resistance between the bacteria (Fiore et al., 2017). Lesser known is that antibiotic prescriptions can affect the stress response, increase the chances of childhood obesity in children younger than 24 months, and may have an effect on the immune tolerance of those with asthma (Fiore et al., 2017). According to the Cochrane Review completed by Smith et al. (2017), all of the studies reviewed with the exception of four, showed more adverse events with antibiotic treatment than

patients receiving a placebo. All adverse events were mild, but enough to cause providers pause in the need to prescribe antibiotics (Smith et al., 2017).

Stakeholders

The main people affected by this change process are the patients. Patients in the military practice setting come to the clinic to be seen and to feel better. Patients want to ensure that the provider is listening to the concerns and issues brought by the patient, and is working to correct them. Patients tend to already know what they want to be done and providers either have to spend time trying to explain why that is not necessary or face the pressure to order treatment that is not necessary.

Additional stakeholders in the organization are the providers, technicians, and staff working in the clinic. Each member of the team will be responsible for answering questions about why antibiotics were not prescribed and how this affects each patient. Leadership may receive phone calls from work centers as to why patients are not improving and why treatment has been refused. Leadership will also see the benefits from the project with decreased antibiotic prescribing rates. The insurance companies will be stakeholders due to paying for the antibiotics and possibly reporting the data from these prescriptions and diagnosis to HEDIS measurements.

Implementation

The location for the plan is the Operational Medicine Clinic (OMC) of Mountain Home Air Force Base, located in Mountain Home, ID. This clinic incorporates the Warrior Operational Medicine Clinic (WOMC), Flight Operational Medicine Clinic (FOMC), and the Base Operational Medicine Clinic (BOMC). Between these three clinics the entire population of active duty members, as well as Guard and Reserve members on the base, are seen. It will be

implemented in order to ensure that all members are receiving the same type of care no matter which clinic or provider seen for treatment of acute bronchitis.

Permission from the Medical Treatment Facility Director and Executive Staff will need to be received prior to the planning and implementation stage of the project. An important step in planning is ensuring that all staff and leaders who may be affected in this change are involved in the process (Hockenberry et al., 2015). The changes will impact the clinic mostly, but may have some impact on pharmacy and radiology as well.

Once approval is received, a team will need to be compiled to complete the change project. Project boards are located in each clinic in order for staff to see what the clinic is working on, and to help out with suggestions. Working with different specialties will create an impediment to project meetings due to the schedules of those involved. Creating a time for meetings that works between every member will need to be determined.

In order to evaluate the education of the providers a test will be completed in order to determine their level of education regarding antibiotic prescriptions for acute bronchitis. The same evaluation will be completed after training on why antibiotics should not be prescribed for acute bronchitis and scores will be compared. Questions have not been written at the time of this benchmark study but will be completed during the planning stage of the project. Providers will be presented with a 30-minute PowerPoint on the evidence-based guidelines for acute bronchitis and treatment options, created by the Project Leader with help from Team Members. The PowerPoint presentation will also discuss the different studies showing little to no improvement in symptoms or time before returning to baseline with antibiotics versus placebos. The studies showing increase in side effects from the antibiotics will be discussed, as well as the side effects

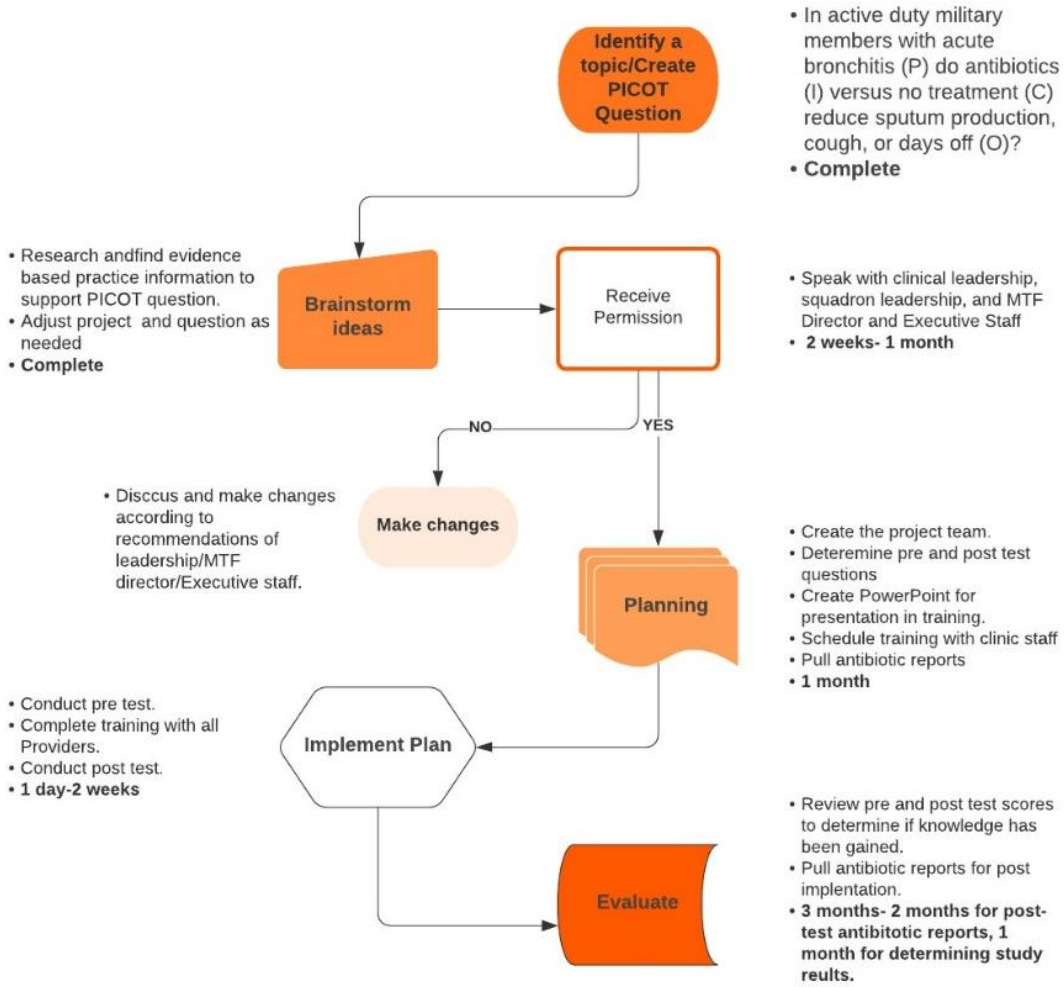
found. Team members will need to create the pre-and-post test, as well as refine the PowerPoint to ensure it catches and keeps the attention of the providers in attendance.

Tracking of the project success will be completed by the pre- and post-test scores, as well as a report on the antibiotic prescriptions pre- and post-implementation. Implementation of the project facility wide can be discussed after results from OMC are received. Changes may need to be made for facility wide implementation due to difference in patient population and acuity levels.

Timetable/Flowchart

The project can be completed in 4-6 months depending on the start schedule due to certain meetings only occurring monthly, and others only quarterly. Project length will need to be adjusted depending on the season of the year, as bronchitis isn't as common in summer months. Getting approval to begin may take the longest as it needs to be presented through multiple channels before receiving the approval of the Director and Executive Staff. The Executive staff meet weekly so getting on the schedule to present can happen, after approval from clinical leadership and Squadron Leadership. Every approval will take about a week to get in order to schedule meetings, present, and then get on the schedule for the next level approval, as long as extenuating circumstances are not present. Recruiting staff from clinic, as well as support staff from radiology and pharmacy can take up to one month to recruit and then plan the questions for the pre- and post-test. PowerPoint creation will take 2 weeks, and scheduling for the presentation can vary from the following week up to 6 weeks later, due to meeting times. Running of reports prior to implementation will be completed one week prior to implementation and for a 2-month timeframe, if available, and length of report may be changed based on season of the year. Pre-test, PowerPoint, and post-test will take an hour during a scheduled meeting.

Antibiotic prescriptions will be reviewed for a 2-month period after implementation, adjusting for seasons as needed. Manual chart reviews, if needed, will be reviewed for the 2 months post training, and will take up to 2 weeks depending on the number of patients diagnosed and staff reviewing.



Data Collection Methods

Data collection will be completed through reports compiled through the pharmacy on the antibiotic prescribing practices of the providers individually and as a group. The charting system

used in the military treatment facility is Genesis. Genesis reports will be pulled, if able, to determine patients with the diagnosis of acute bronchitis and the treatment plan completed. Pre and post test results will be calculated and evaluated by the project team. Discussions will be help on a one-by-one basis between team members and staff on the impact the project has had on the workflow of the clinic.

Cost/Benefit

There will be little cost to this project. Overall, the cost involved would be time away from work centers for the project team members, as well as costs involved with taking the providers away from their work centers while doing the training. Providers may have little time away from patients due to an implemented training day once a month in the morning that may be able to be used for the training time.

The benefits of this project are numerous. Implementing this evidence-based project can create reduced costs associated with antibiotics. By not ordering as much antibiotics, the pharmacy can reduce the amount it keeps on hand, thus reducing storage overhead. Since the facility is small, this will only result in a small decrease in costs. Eliminating the risks of adverse events from antibiotic prescriptions can reduce costs to the facility. Since this project will be implemented in the clinic working with active duty members, no cost savings will be felt by the patients as well, since insurance for active duty members is fairly all-encompassing.

The benefit from this project will not be in cost savings, but rather in education savings. Providers will now be better informed on antibiotic stewardship for acute bronchitis and will be passing this information on to patients. Patients in turn may tell others, which can create a conversation about antibiotics. The reduction in antibiotic prescriptions will be shown in the results of each provider which is reported at the pro-staff meeting, which is a meeting for all

credentialed, privileged staff. This reduction will also reflect highly on the facility in reports to Tricare, the military health insurance.

Evaluation

The evaluation for this evidence base project will consist of a pre-and-post test for the education portion of the project, and comparing antibiotic prescription rates for acute bronchitis prior to project implementation and after. Providers will be handed a 10-question multiple choice and true/false test to take on acute bronchitis etiology, symptoms, and treatment prior to educational session. While providers will have signed in, in order to get credit for attending the session, color-coded tests will be used to keep the test anonymous. Two tests will be provided to each provider, so that scores can be calculated and determined based on pre and post test scores. These tests will be evaluated using a paired t test. Test questions have not been prepared during this benchmark project, but will be completed once leadership approval is granted during the planning phase. Data will be collected for 2 months prior to education session and for two months after, depending on the season of implementation. All diagnosis related to acute bronchitis will be reviewed and included or excluded based on inclusion criteria. We will determine the number of patients seen with acute bronchitis, as well as the number of patients where antibiotics were prescribed, looking at the antibiotic prescribed for patients with any of the diagnosis of acute bronchitis. Data for whether antibiotics were prescribed or not will be analyzed using the Fisher's exact test. Success will be determined by all providers having a score of 80% or greater on the post test for the education portion and antibiotic prescription rates decreasing by at least 50% for acute bronchitis. Pharmacy will need to be involved in running the antibiotic reports, as well as in determining if it can be run by certain diagnosis only. Genesis coordinators may be involved in determining how records can be pulled to review medications

ordered on acute bronchitis. Due to the smaller scale of the clinic, manual reviews of charts, based on diagnosis, can be completed to determine treatment plan and medication prescribed if necessary.

Evaluation Steps

1. Compare pre and post test scores from the test each provider completed at the education session.
2. Determine if each provider increased their knowledge, and if everyone passed with at least 80% on the post test.
3. Complete a paired t test on the scores.
4. Compare antibiotic prescription data from prior to implementation and after.
5. Determine significance by performing Fisher's exact test.
6. Determine whether results were significant.

Conclusion/Recommendations

Working to reduce the impact of antibiotic resistant infections is a goal set forth by the White House to be achieved prior to 2020 (Fleming-Dutra et al., 2016). While 2020 is past, it is still a topic that needs addressed. By working to reduce the antibiotics prescribed by providers within the Operational Medicine Clinic for acute bronchitis, the Military Treatment Facility is making a step to reducing inappropriate antibiotic prescribing. Education and evaluation can be performed at a minimal cost to the facility, in both time and manpower, if utilizing already set training times. If this project is a success, recommendations would be to expand it facility wide. If vast improvements are seen, enlarge this project to encompass the Defense Health Agency military facilities.

References

Barnett, M. J., & Linder, J. A. (2014). Antibiotic prescribing for adults with acute bronchitis in the United States, 1996-2010. *JAMA, 311*(19), 2020-2021.

Butler, C. C., Hood, K., Kelley, M. J., Goossens, H., Verheij, T., Little, P., Melbye, H., Torres, A., Mölstad, S., Godycki-Cwirko, M., Almirall, J., Blasi, F., Schaberg, T., Edwards, P., Rautakorpi, U., Hupkova, H., Wood, J., Nuttall, J., & Coenen, S. (2010). Treatment of acute cough/lower respiratory tract infection by antibiotic class and associated outcomes: a 13 European country observational study in primary care. *Journal of Antimicrobial Chemotherapy, 65*, 2472-2478. doi: 10.1093/jac/dkq336

Centers for Disease Control and Prevention. (2020). *Antibiotic prescribing and use in doctor's offices.* Retrieved on April 16, 2021 from https://www.cdc.gov/antibiotic-use/community/programs-measurement/measuring-antibiotic-prescribing.html#f2

Ebell, M. H., Lundgren, J., & Youngpairoj, S. (2013). How long does a cough last? Comparing patients' expectations with data from a systematic review of the literature. *Annals of Family Medicine, 11*(1), 5-13. doi: 10.1370/afm.1430

Evertsen, J., Baumgardner, D. J., Regnery, A., & Banerjee, I. (2010). Diagnosis and management of pneumonia and bronchitis in outpatient primary care practices. *Primary Care Respiratory Journal, 19*(3), 237-241. doi: 10.4104/pcrj.2010.00024

Fiore, D., Fettic, L., Wright, S., & Ferrara, B. (2017). Antibiotic overprescribing: Still a major concern. *The Journal of Family Practice, 66*(12), 730-736.

Fleming-Dutra, K. E., Hersh, A. L., Shapiro, D. J., Barotces, M., Enns, E. A., File, T., M., Jr., Finkelstein, J. A., Gerber, J. S., Hyun, D. Y., Linder, J. A., Lynfield, R., Margolis, D. J., May, L. S., Merenstein, D., Metlay, J. P., Newland, J. G., Piccirillo, J. F., Roberts, R. M.,

Sanchez, G. V., … Hicks, L. A. (2016). Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits, 2010-2011. *JAMA, 315*(17), 1864-1873. doi: 10.1001/jama.2016.4151

Hockenberry, M. J., Brown, T. L., & Rodgers, C. C. (2015). Implementing evidence in clinical settings. In B.M. Melnyk & E. Fineout-Overholt (Eds.) *Evidence-based practice in nursing & healthcare: A Guide to Best Practice* (3rd ed, pp. 202-223. Wolters Kluwer.

Kroening-Roche, J. C., Soroudi, A., Castillo, E. M., & Vilke, G. M. (2012). Antibiotic and bronchodilator prescribing for acute bronchitis in the emergency department. *The Journal of Emergency Medicine, 43*(2), 221-227. doi: 10.1016/j.jemermed.2011.06.143

Link, T. L., Townsend, M. L., Leung, E., Kommu, S., Vega, R. Y., & Hendrix, C. C. (2016). Reducing inappropriate antibiotic prescribing for adults with acute bronchitis in an urgent care setting: A quality improvement initiative. *Advanced Emergency Nursing Journal, 38*(4), p. 327-335. doi: 10.1097/tme.0000000000000122

Little, P., Stuart, B., Moore, M., Coenen, S., Butler, C. C., Godycki-Cwirko, M., Mierzecki, A., Chlabicz, S., Torres, A., Almirali, J., Davies, M., Schaberg, T., Mölstad, S., Blasi, F., De Sutter, A., Kersnik, J., Hupkova, H., Touboul, P., Hood, K., …Verheij, T. (2013). Amoxicillin for acute lower-respiratory tract infection in primary care when pneumonia in not suspected: a 12-country, randomized, placebo-controlled trial. *The Lancet, 13,* 123-129.

Llor, C., Moragas, A., Bayona, C., Morros, R., Pera, H., Plana-Ripoll, O., & Cots, J. M. (2013). Efficacy of anti-inflammatory or antibiotic treatment in patients with non-complicated acute bronchitis and discoloured sputum: randomized placebo controlled trial. *BMJ, 347*. doi: 10.1136/bmj.f5762

Sanchez, G. V., Roberts, R. M., Albert, A. P., Johnson, D. D., & Hicks, L. A. (2014). Effects of knowledge, attitudes, and practices of primary care providers on antibiotic selection, United States. *Emerging Infectious Diseases, 20*(12), 2041-2047. doi: 10.3201/eid2012.140331

Saust, L. T., Bjerrum, L., Siersma, V., Arpi, M., & Hansen, M. P. (2018). Quality assessment in general practice: Diagnosis and antibiotic treatment of acute respiratory tract infections. *Scandinavian Journal of Primary Health Care, 36*(4), 372-379. doi: 10.1080/02813432.2018.1523996

Schroeck, J. L., Ruh, C. A., Sellick, J. A., Jr., Ott, M. C., Mattappallil, A., & Mergenhagen, K.A. (2015) Factors associated with antibiotic misuse in outpatient treatment for upper respiratory tract infections. *Antimicrobial Agents and Chemotherapy, 59*(7), 3848-3852. doi: 10.1128/aac.00652-15

Smith, S. M., Fahey, T., Smucny, J., & Becker L. A. (2017). Antibiotics for acute bronchitis. *Cochrane Database of Systematic Reviews 2017*(6), 1-46. doi: 10.1002/14651858.CD000245.pub4.