Asthma knowledge among primary and secondary school teachers in rural northern Costa Rica

Claire Pitstick
St. Olaf College, Northfield, MN, United States; claire.pitstick@gmail.com

ABSTRACT: Asthma is a chronic inflammatory disease of the airways characterized by bronchospasm, an inflammation of the smooth muscles in the bronchi. The main symptoms of asthma are difficulty breathing, wheezing, and chronic dry cough (Kline-Krammes, Patel & Robinson, 2013). Common triggers for asthma exacerbations include dust mites, animal dander, cockroaches, pollen, mold, and other allergens; air pollutants and tobacco smoke; viral respiratory infections; aspirin and other drugs; stress; and sometimes exercise (Murata & Ling, 2012). Additional risk factors include certain foods and area of residence, especially hot and humid areas (Soto-Martínez & Soto-Quirós, 2004).

Severe asthma can lead to respiratory failure if not treated quickly (Murata & Ling, 2012). The cost of treating asthma is high, especially because it can lead to one or more ER visits per year. It is the leading cause of missed school days and it can affect a child’s sleep and academics (Kline-Krammes et al., 2013). Asthma can be socially and emotionally harmful for a child due to reduced participation in recess, sports, vacations, and other activities (Gutiérrez & Chavarría, 2000; Williams et al., 2010).
Similarly, researchers in Chile suggest that educating a child’s teachers is essential for all of these efforts. (Kline-Krammes et al., 2013). The cooperation of an asthmatic child’s teachers is essential for helping parents detect asthma in their children, seek specialized assistance, and avoid unnecessary treatments for their children (Mallol et al., 2000).

Costa Rican schools generally do not have a school nurse, which is why the teachers play such an important role in the management of students’ asthma and other medical conditions. It is possible that many teachers might not recognize the symptoms of an asthma attack. This could have serious consequences for the children; a severe asthma attack may require intubation and can even be fatal. The teachers cannot be blamed, because this deficiency exists at the institutional rather than the individual level. There are few studies about teachers’ asthma knowledge in Costa Rica specifically. Most asthma studies in Latin America have been conducted in urban areas, where risk factors include extreme social inequalities and lack of access to basic infrastructure (Cooper et al., 2009), but these risk factors may apply to rural areas as well. I loosely based this study’s questionnaire on a previous asthma knowledge study that was conducted in a San José primary school (Angulo, 2013). To expand on this subject, I decided to research teachers’ asthma knowledge in rural Costa Rica.

By means of an asthma survey, I aimed to: a) measure the proportion of teachers that have witnessed an asthma attack in the classroom and investigate the actions that they took; b) determine teachers’ awareness about asthma attack prevention, triggers, symptoms, and medications; and c) gauge teachers’ interest in asthma training. The goal of this study is to contribute to an understanding of the current level of asthma knowledge in rural Costa Rican schools.

**METHODS AND MATERIALS**

**Study Area, Sample Size, and Participants:** Venecia and Aguas Zarcas are located in the canton of San Carlos, in the north-central province of Alajuela, Costa Rica. Their approximate populations are 6 000 and 13 000, respectively. These rural towns have a very warm and rainy climate. The mean annual temperature ranges from 17 to 24°C, with a mean annual rainfall of 3768 mm over an average of 226 days per year (Solano & Villalobos, 1996). Six public schools participated in this study: one secondary school and four primary schools in Venecia, and one secondary school in Aguas Zarcas.

The overall participation rate was 88.9%, providing a sample size of 185 teachers. Of these participants, 23% worked in a primary school (preschool through sixth grade) and 77% worked in a secondary school (seventh grade) and 77% worked in a secondary school.
through twelfth grade; 32% were men and 68% were women. Their ages ranged from less than 25 years to 59 years, but 67% were in their thirties or forties. Their teaching experience ranged from 1 to 20 or more years, but 62% had worked for 8 to 19 years. Some teachers held a high school, bachelor’s, or master’s degree, but 64% held a licenciatura degree (one to two years of technical training beyond a bachelor’s degree). About 11% of the teachers were asthmatic, and 23% lived with an asthmatic person.

Methodology: The asthma questionnaire (Appendix A) consisted of 19 questions regarding demographics, personal experience with asthma, classroom experience with asthma, asthma knowledge, interest in an asthma training program, and comments. For the four knowledge questions (regarding asthma attack prevention, triggers, symptoms, and medications), more than one answer choice was allowed, and each question included one or two incorrect options. During March and April 2014, I distributed the questionnaires to the teachers during the school day, aiming to sample all teachers at the six schools. The participants also signed an informed consent form. Collection of the questionnaires and forms was performed later in the day or week, depending on the teachers’ availability. I used a code system to separate the participants’ names from their questionnaires. This study was approved by the ACM Ethics Panel and followed a specific plan for the protection of human research subjects.

Using the knowledge questions about asthma attack prevention, triggers, symptoms, and medications, I summed the correctly identified items and subtracted the incorrectly identified items to generate a Knowledge Score (KScore), which could range from -6 to +18. The levels of interest in asthma training (none, low, or high) were translated into a Training Score (TScore) of 0, 1, or 2, respectively.

Differences in mean KScores and TScores among teachers’ various characteristics or experiences were estimated by parametric, one-way ANOVA. A posteriori comparisons between means were carried out with Least Significant Difference (LSD) and Scheffe tests. Some comparisons were accompanied by Chi-Squared tests. Dependency of “training interest” levels with “asthmatic family member” and “interest in asthma training” (Table 1).

The TScore ranged from 0 to 2 with a mean of 1.84 and a standard deviation of 0.41. Teachers who knew they had asthmatic students were more interested in asthma training than the other teachers (X²=9.14; df 4; p=0.058). Teachers who reported that they could not recognize an asthma attack had the highest mean TScore (2.00), followed by those that had witnessed an asthma attack (1.86), then those who had not (1.85), and finally those who could not remember (1.43) (Table 2). Thus,
the teachers with the least interest in training were those that could not remember whether they had witnessed an asthma attack ($X^2 = 13.72; \text{ df } 6; p = 0.033$).

**DISCUSSION**

**Areas for Improvement in Asthma Knowledge:** It is alarming that so many teachers did not know whether they had asthmatic students in their class or not. This lack of awareness was higher for the secondary school teachers, who generally have more students than the primary school teachers, thus making it more difficult to keep track of their students’ medical conditions. Several teachers wrote in the comments that it should be the institutions’ responsibility to provide each teacher with a list of the asthmatic students. The need for better communication among students, parents, teachers, and administrators has been suggested in previous research (Rodriguez et al., 2010; López-Silvarrey Varela, 2011). Most teachers who witnessed an asthma attack did not help administer the salbutamol inhaler to the student. Although calling an ambulance or the student’s parents is important, this should not be the first action. The medication must be administered as quickly as possible, because every minute counts during a severe asthma attack (Dr. Anabelle Alfaro, Emergency Medicine Specialist, 2014).

Overall, the results of the four knowledge questions paralleled those from a San José elementary school (Angulo, 2013). The teachers were generally aware of the main strategies to prevent asthma attacks in the classroom, with the exception of avoiding sharp temperature changes. This is difficult in Costa Rican schools since most classrooms are open to the air and the weather can change rapidly. Although asthma attack triggers differ among individuals, teachers should be aware of respiratory viruses, cold air, certain foods, some medications, and stress in addition to the commonly identified...
air pollution and allergens. Most teachers recognized wheezing and rapid breathing as symptoms of an asthma attack, but they need to be more attentive to dry coughing and anxiety as well. It is excellent that almost all of the teachers recognized the salbutamol inhaler as an asthma medication, but they might not know how to use it correctly.

Fortunately, there was a high interest in asthma training, especially a lecture or workshop, which is consistent with studies in San José and Spain (Rodríguez et al., 2010; Angulo, 2013). An educational asthma intervention program for teachers should be individualized to the type of teacher and should emphasize recognition of symptoms and inhaler administration (Rodríguez et al., 2010). The Caja Costarricense de Seguro Social (The Costa Rican Social Security Administration) has already published a detailed guide for asthma exacerbations in children (Román Ulloa & Sáenz Campos, 2010). This guide can be used to design a training program, with the help of a health professional.

There was no clear relationship between the teachers’ KScore and their age, experience, or education. Also, the trend that women had a higher KScore than men is consistent with a study in Istanbul, where asthma knowledge was greater for women, but was not related to age, education level, or length of tenure (Ones, Akcay, Tamay, Guler & Dogru, 2006). This indicates that teachers are not learning about asthma as a result of their career itself. However, teachers who lived with an asthmatic person had a higher KScore than those who did not, likely because caring for an asthmatic family member would increase familiarity with asthma attack prevention, triggers, symptoms, and medications. The influence of personal experience also increased the KScore for asthmatic teachers in comparison to non-asthmatic teachers, but the relationship was not as strong. The importance of personal experience is evident in previous studies (Getch & Neuharth-Pritchett, 2009; Rodríguez et al., 2010).

The teachers with higher KScores were highly interested in training, which is excellent, but the teachers with lower KScores were more likely to express little or no interest in training. This could lead to very negative consequences for their asthmatic students. The average TScore was higher for teachers who knew they had asthmatic students, as well as for the teachers who had either witnessed or could not recognize an asthma attack. It would be even better if the other groups expressed higher interest as well. A proactive approach is always better than a reactive approach, especially in the case of a life-threatening disease (Bruzese et al., 2010).

Recommendations: It is important to consider the limitations of this study. Primarily, my questionnaire did not undergo a validation procedure, which hinders comparisons to other studies. Also, asking for numerical values, rather than ranges, for teachers’ age and years of experience would have allowed more precise statistical tests, such as regression. To gain insight into teachers’ attitudes about asthma, I should have included a question about the perceived danger of an asthma attack. Lastly, since I did not always monitor the participants, they may have shared answers or used online resources to answer the knowledge questions.

Training for teachers should focus on the prevention of asthma attacks in the classroom, recognition of symptoms, and the correct administration of a salbutamol inhaler while waiting for the ambulance or parents to arrive. A local pediatrician, asthma specialist, or public health official could provide training. To ensure that teachers are aware of asthmatic students in their classes, administrators should use the students’ medical files to create and distribute a list of asthmatic students to each teacher. It is also advisable to include an inhaler in each classroom’s first aid kit.

It would be beneficial to research current laws worldwide regarding teachers’ abilities to care for students’ medical needs, as well as teachers’ comfort levels in administering medications like inhalers. Furthermore, interviews with parents and pediatricians of asthmatic children would reveal their concerns about asthma management at home and at school. When asthma training is provided to teachers, a follow-up study will be essential. If the results are satisfactory, then the training program should be extended to other schools in Costa Rica and Latin America.

ACKNOWLEDGMENTS

I am very grateful for the cooperation of the principals, faculty, and staff of CTP Venecia, CTP Aguas Zarcas, and the primary schools of José María Vargas Arias, San Martín, Pueblo Viejo, and Los Alpes. Special thanks to Daisy Esquivel Vargas for approving the asthma questionnaire, allowing the participation of the CTP Venecia teachers, and listening to my presentation. I would also like to thank my research advisor, Anabelle Alfaro, for her extensive public health knowledge and for her guidance throughout the project. Lastly, I am extremely thankful for the support of the ACM faculty and staff, both of my host families, and my St. Olaf professors and classmates.
REFERENCES


APPENDIX A


Cuestionario

1. Los últimos cuatro números de su cédula: _____________ (Su identidad será protegida)

2. Nombre de su institución educativa: ______________________________________________________

3. Hombre □    Mujer □

4. Escoja el rango en que se encuentra su edad.
   a. Menos de 25 años
   b. 25-29 años
   c. 30-39 años
   d. 40-49 años
   e. 50-59 años
   f. 60 años o más

5. ¿Cuál es su grado académico?
   a. Diplomado
   b. Bachillerato
   c. Licenciatura
   d. Maestría

6. Tiempo de servicio en la educación:
   a. 1 año o menos
   b. 2-7 años
   c. 8-13 años
   d. 14-19 años
   e. 20 años o más

7. ¿Es usted asmático/a?
   a. Sí
   b. No

8. ¿Vive en su casa alguien que sea asmático/a?
   a. Sí
   b. No

9. ¿Hay estudiantes asmáticos en su clase?
   a. Sí
   b. No
   c. No sé

10. ¿Ha presenciado usted una crisis asmática en el aula durante su tiempo en la educación?
    a. Sí
    b. No
    c. No recuerdo.
    d. Desconozco qué es una crisis asmática.

11. Si contestó sí (opción A) a la pregunta anterior, ¿Qué hizo usted la última vez que presenció una crisis asmática en el aula?
    a. Me asusté y no sabía qué hacer.
    b. Llamé una ambulancia para que llevara al estudiante a una clínica.
    c. Llamé un taxi para que llevara al estudiante a una clínica.
    d. Llamé a los padres del estudiante.
    e. Le administré un inhalador de salbutamol al estudiante.
    f. Otra acción: _____________________________________________________________

12. ¿Qué haría usted para prevenir el asma en el aula? (puede escoger más de una opción)
    a. Mantener un ambiente limpio y libre de polvo en el aula
    b. Usar una pizarra de tiza
    c. Usar una pizarra acrílica
    d. Eliminar el moho y olores fuertes en el aula
    e. Evitar alfombras y peluches en el aula
    f. Evitar los cambios bruscos de temperatura en el aula

13. Según su experiencia, ¿Qué puede desencadenar una crisis asmática? (puede escoger más de una opción)
    a. La gripe
    b. Contaminación del aire (humo, aerosoles, gases)
    c. Aire frío
    d. Alérgenos (como ácaros de polvo, gatos, cucarachas, polen)
    e. Ciertos alimentos
    f. Estrés
    g. Todos los medicamentos
14. ¿Cuáles considera usted que son algunos síntomas de una crisis asmática? (puede escoger más de una opción)
   a. Respiración ruidosa
   b. Sed
   c. Tos seca
   d. Respiración rápida
   e. Cara roja
   f. Ansiedad

15. Según su experiencia, ¿Cuáles son algunos medicamentos que se pueden utilizar para tratar el asma? (puede escoger más de una opción)
   a. Inhalador Salbutamol
   b. Pastillas Prednisolona
   c. Antibióticos
   d. Analgésico
   e. Jarabe de Salbutamol

16. ¿Le interesaría a usted entender mejor los síntomas y el manejo del asma?
   a. No tengo interés.
   b. Tengo poco interés.
   c. Tengo mucho interés.

17. ¿Tiene usted interés en alguna capacitación para aprender a ayudar a los estudiantes asmáticos?
   a. No tengo interés.
   b. Tengo poco interés.
   c. Tengo mucho interés.

18. ¿Qué tipo de capacitación preferiría recibir usted sobre el asma?
   a. Información escrita
   b. Charlas
   c. Talleres
   d. Un drama educativo

19. ¿Tiene usted otros comentarios que le gustaría compartir? Puede escribir en el otro lado de esta hoja si necesita más espacio.

---

(Cortar aquí para guardar esta parte)

Muchísimas gracias por participar en este estudio sobre los conocimientos y las actitudes con respecto al asma. Sus respuestas me ayudarán a entender la situación actual del manejo del asma en las escuelas rurales de Costa Rica. Su participación contribuirá a la mejora de la salud pública con respecto al cuidado de niños asmáticos.

Si usted tiene cualquier pregunta de este estudio, o si ha decidido retirar su participación, por favor avíseme. Además, si le gustaría leer mi informe final, avíseme y puedo mandárselo cuando esté listo.

Gracias otra vez.

Claire Pitstick

Correo electrónico (preferido): pitstick@stolaf.edu
Teléfono celular: 8316-1751