Tailored Education May Reduce Health Literacy Disparities in Asthma Self-Management

Michael K. Paasche-Orlow, MD, MPH (1), Kristin A. Riekert, PhD (2), Andrew Bilderback, MS (2), Arjun Chanmugam, MD (3), Peter Hill, MD (3), Cynthia S. Rand, PhD (2), Fred L. Brancati, MD, MHS (2)(4), and Jerry A. Krishnan, MD, PhD (2)(4)

Online Data Supplement

METHODS

Health literacy was measured with the Short Test of Functional Health Literacy in Adults (STOFHLA).[E1] The test has a set of sentences from medical scenarios with key words missing. Subjects select words to complete the sentences from a list provided. There are 36 items and each correct response is awarded 1 point (range of possible scores 0 to 36).[E2] Based on published recommendations, subjects with a STOFHLA score ≤16 were classified as having inadequate health literacy.[E3] The Discharge study visit survey also included a 10-item asthma medication knowledge test was developed for this study (Table 2). An extensive review of the literature was conducted, however no existing measure met our criteria of being (1) updated for advances in asthma management, (2) appropriate for an inner-city adult populations, and (3) specific to the asthma medications. Therefore, the investigators (pulmonologists and psychologists) developed the 10 items based on modification of items from existing asthma knowledge scales, professional opinion, and the desire for each item to be directly related to asthma medication use.[E4]

Participants returned for a 2-week Follow-up visit. At the Follow-up visit, participant's MDI technique and knowledge of the asthma discharge regimen were re-evaluated. In addition, at follow-up, symptom control during the last 7 days was assessed based on the following items from the *Asthma Control Questionnaire©*[E5] (ACQ): frequency of 1) nocturnal awakening, 2) morning symptoms, 3) activity limitations, 4) dyspnea, 5) wheeze, and 6) use of short-acting β-agonist. Each item had 7 possible responses on an ordinal scale (0 (no symptoms, 0 puffs of short-acting β-agonist) to 6 (severe/frequent symptoms, >16 puffs of short-acting β-agonist most days)). A mean asthma symptom control score was calculated for each participant based on responses to individual items (0 (well controlled) to 6 (extremely poorly controlled)).

Statistical Analyses

As more that 2/3 of the subjects exhibited mastery of the discharge regimen after a single round of education, this variable was dichotomized according to whether participants achieved mastery after the first round of instruction. The number of rounds necessary to achieve mastery was used to measure the capacity to learn the discharge regimen and MDI technique. *Poor adherence to corticosteroid therapy* was defined *a priori* as electronically measured adherence to inhaled corticosteroids of less than 50% during the 2-week period after hospital discharge or electronically measured adherence to oral corticosteroid therapy of less than 50% from hospital discharge through day 7 (oral corticosteroids were prescribed for the first 7 days after discharge). Because hospitalized patients receive high doses of systemic corticosteroids and benefits of such therapy may carry over for several days, we selected a lower threshold for poor adherence than used in some previous studies (e.g., <70%,[E6] <85%[E7]). In a previous study in this population, we found that <50% adherence to either inhaled or to both inhaled and oral corticosteroid therapy was associated with a significantly worse asthma symptom control at the 2-week follow-up visit.[E8]

Instructional Script

The following text was used with all patients:

A. [**Discharge regimen instructions:** Read the following text the participant.]

Please take all the medications as prescribed below. Always use the spacer (Aerochamber) with your inhalers.

1. **FLOVENT inhaler,** 220 mcg, 2 puffs 2 times a day, EVERYDAY. Wait about one minute after taking the first puff before taking the second puff. Rinse out your mouth by gargling with water after taking the 2 puffs of Flovent.

3

2. **ALBUTEROL inhaler**, 2 puffs every 4 hours, only when needed to relieve shortness of breath, wheeze, or chest-tightness. Wait about one minute after the first puff before taking the second puff.

3. **PREDNISONE,** 20 mg/tablet, 2 tablets every morning for the next 7 days, then stop the Prednisone. If there are tablets left in the container at the end of the 7 days, do not take them or throw them out.

B. [**MDI technique instructions:** Read the following text and then demonstrate appropriate technique to participant.]

1: Shake the inhaler five times.
2: Attach the inhaler to the spacer.
3: Breathe out and empty your lungs.
4: Place the mouthpiece of the spacer in your mouth.
5: Close your lips tightly around the mouthpiece of the spacer.
6: Press down on the canister once for your first puff.
7: Breathe in slowly until your lungs are full. If there is a whistle, you are breathing in too fast.
8: Hold your breath for at least 5 seconds.
9: Breathe out.
10: Wait one minute. You should wait a minute so that the medicine reaches the deep parts of
     your lungs.
11: Repeat for your second puff.

E1.   Nurss JR, Parker RM, Williams MV, and Baker DW. 2001. Test of Functional Literacy in Adults, 2nd ed. Peppercorn Books & Press, Snow Camp, NC.

E2.   Baker, D. W., M. V. Williams, R. M. Parker, J. A. Gazmararian, and J. Nurss. 1999. Development of a brief test to measure functional health literacy. *Patient.Educ.Couns.* 38:33-42.

E3.   Nurss Joanne R., Parker RM, Williams Mark V, and Baker David W. Test of Functional Literacy in Adults. Available at Peppercorn Books and Press. [http://www.peppercornbooks.com/test_of_functional_health_literacy_in_adults.asp Last accessed 2/24/2004]. Peppercorn Books and Press, Inc, Greensboro, NC.

E4.   Ho, J., B. G. Bender, L. A. Gavin, S. L. O'Connor, M. Z. Wamboldt, and F. S. Wamboldt. 2003. Relations among asthma knowledge, treatment adherence, and outcome. *J Allergy Clin.Immunol.* 111:498-502.

E5.   Juniper, E. F., P. M. O'Byrne, G. H. Guyatt, P. J. Ferrie, and D. R. King. 1999. Development and validation of a questionnaire to measure asthma control. *Eur.Respir J* 14:902-907.

E6.   Apter, A. J., S. T. Reisine, G. Affleck, E. Barrows, and R. L. ZuWallack. 1998. Adherence with twice-daily dosing of inhaled steroids. Socioeconomic and health-belief differences. *Am J Respir Crit Care Med* 157:1810-1817.

E7.   Maenpaa, H., K. Javela, J. Pikkarainen, M. Malkonen, O. P. Heinonen, and V. Manninen. 1987. Minimal doses of digoxin: a new marker for compliance to medication. *Eur.Heart J* 8 Suppl I:31-7.:31-37.

5

E8.   Krishnan, J. A., K. A. Riekert, J. V. McCoy, D. Y. Stewart, S. Schmidt, A. Chanmugam, P. Hill, and C. S. Rand. 2004. Corticosteroid use after hospital discharge among high-risk adults with asthma. *Am J Respir Crit Care Med* 170:1281-1285.