

Asthma Self-Management Patient Education

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Summary

Asthma self-management education involves a collaborative partnership between the education provider and the patient. An asthma action plan facilitates asthma self-management and improves patient outcomes. The 2007 asthma guidelines from the National Asthma Education and Prevention Program emphasize that respiratory therapists, nurses, pharmacists, and physicians should teach and reinforce asthma self-management education at every opportunity and in all settings. Key words: asthma, self-management, patient education. [Respir Care 2008;53(6):778–784. © 2008 Daedalus Enterprises]

Introduction

As stated in the 2007 asthma guidelines from the National Asthma Education and Prevention Program (NA-

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EPP), "The ultimate goal of both expert care and patient self-management is to reduce the impact of asthma on related morbidity, functional ability and quality of life."¹ Essential components of asthma management include treatment appropriate to the severity of the asthma (determined during diagnosis) and the level of control achieved (determined during subsequent visits) (Table 1). Asthma control can be achieved by avoidance of triggers, patient adherence to controller medication, and the patient's ability to recognize asthma symptoms and respond appropriately. Other than the prescribing of medications, all components require patient involvement to monitor, recognize, and respond to asthma symptoms. The purpose of asthma education is, therefore, to help the patient to develop the knowledge and skills to know when asthma is worsening, to take

Table 1. Classification of Asthma Severity and Control

In patients who are not taking asthma-controller medication:
 Severity assessment is based on impairment and risk
 Severity level is based on the most severe category in which any feature appears

In patients who are taking asthma-controller medication
 Severity is based on the lowest dosage and number of medications that maintain asthma control
 Control assessment is based on impairment and risk
 Control level is based on the most severe impairment or risk category
 Validated questionnaires may be used with patients ≥ 2 years old

(Adapted from Reference 1.)

appropriate action, and to be motivated to avoid triggers and adhere to the management regimen.

Importance of Patient Self-Management Education

Self-management is important for any patient with a chronic disease.² Asthma self-management education is essential to the control of asthma. If asthma symptoms are controlled, the patient should have fewer exacerbations, a higher quality of life, lower costs, slower progression of airway remodeling from inflammation, less morbidity, and lower risk of death from asthma.

Education directed toward asthma self-management emphasizes patient participation in symptom monitoring and control. The asthma educator should use a collaborative education paradigm that encourages the patient to take responsibility for his or her own care.³

Regarding patient education, the 2007 NAEPP guidelines gave an evidence grade of A to the recommendation for asthma self-management education.¹ Asthma education should be provided at every patient encounter by all providers and at all points of care (evidence grade B). The guidelines also recommend written action plans that include specific treatments and actions to respond to changes in symptoms, especially for patients with moderate-to-severe asthma (evidence grade B). Various types of health professionals can be successful asthma educators, including respiratory therapists (RTs),⁴⁻⁶ nurses,⁷ physicians, and pharmacists.⁸ The most important attribute of the provider-patient relationship is partnership, in which the provider encourages open communication and allows for patient participation. A partnership exists when the patient's concerns, goals, and preferences are included in treatment; when there is regular review of control and treatment; and when asthma education is included in every encounter (evidence grade B).¹ There is general agreement that patients who understand how to manage their asthma symptoms have better outcomes. The role of patient education

Table 2. Components of Asthma Education

Regular review, by an informed clinician, of the status of the patient's asthma control is an essential part of asthma self-management education (evidence grade B)

Teach and reinforce at every opportunity:

- Basic facts about asthma
- What defines well-controlled asthma and the patient's current level of control
- Roles of medications
- Skills (eg, inhaler technique, use of a valved holding chamber or spacer, self-monitoring)
- When and how to handle signs and symptoms of worsening asthma
- When and where to seek care
- Measures to prevent or limit exposure to asthma triggers

Develop an active partnership with the patient and provide a written action plan

(Adapted from Reference 1.)

toward self-management is also not disputed. The challenge lies in identifying the best asthma-education strategies and models that fully engage the patient in managing the disease. The evidence is persuasive that the most important components of asthma education are (1) partnership between the patient and provider and (2) a written action plan that gives the patient some latitude in determining changes to the medication regimen, based on symptoms or peak flow measurements.⁹

Components of Asthma Education

Table 2 shows the asthma education program components recommended in the NAEPP guidelines.¹ The written action plan is the single most important strategy of asthma education. Patients who recognize asthma symptoms and understand peak flow measurements and how to respond appropriately are more likely to maintain asthma control.¹⁰ Table 3 lists the recommended components of the action plan. The NAEPP guidelines include example action plans.¹

Patient asthma education can improve outcomes beyond symptom control, such as patient knowledge about asthma and patient satisfaction with the program. However, also important are patient-important outcomes such as good symptom control, fewer missed work days, fewer exacerbations, lower costs, and better patient confidence that symptoms are controllable and will not constrain normal activities. Therefore in assessing asthma self-management education strategies we should measure the outcomes that truly reflect symptom control, lung function, exacerbation risk, and costs, though for the health care system it will also be important to study certain clinical and financial outcomes as well.

Table 3. Components of a Written Asthma Action Plan

Daily Management
Medicine(s) to take daily (be specific about medication names and dosages)
Actions to take to control and avoid asthma triggers
Recognizing and Handling Worsening Asthma
Signs, symptoms, and (if applicable) peak-flow values that indicate worsening asthma
Medications and dosages to take in response to worsening symptoms
Signs, symptoms, and peak-flow values that indicate the need for urgent medical attention
Emergency telephone numbers for the physician, emergency department, and person or service to rapidly transport the patient to medical care

(Adapted from Reference 1.)

Asthma Self-Management Education for Adults

Asthma education must be focused on self-management, involve a collaborative relationship between the provider and patient, and include a written action plan. A Cochrane review of 36 trials that compared usual care to self-management plus regular review and an action plan found: (1) more regular physician visits, (2) fewer emergency-department visits and hospital admissions, (3) slightly better lung function and peak flow measurements, (4) fewer medications overall, and (5) less use of rescue medication.^{9,10} Studies that involved less intensive interaction and monitoring had less effect. Among the programs that looked at self-management options, written action plans that instructed patients how to self-adjust their medications had better outcomes.^{11,12} It did not matter if the action plan was based on peak flow measurements or symptoms. Programs that provided information only in the form of brochures or pamphlets did not significantly improve any outcome except basic asthma knowledge.⁹ The ability of a one-time asthma education intervention to influence self-management behavior beyond a year is limited, so an ongoing patient-provider relationship is needed, which should involve periodic review of symptom control and adjustment of treatment as necessary.⁹

Asthma Self-Management Education for Children

Teaching asthma self-management to young children must involve the parents as teachers, though the child should participate to the full extent possible and learn how to recognize symptoms and seek care. A Cochrane review of 32 studies of asthma self-management strategies for children found that interactive programs with written action plans slightly improved lung function, improved the feeling of self-control, and reduced school absences, re-

strictions on activities, and emergency-department visits.¹³ Interestingly, the studies did not find any difference in hospital utilization, and, though lung function improvement showed up at 6 months, the positive effects on health-care utilization did not become apparent until 7–12 months. Also, those with moderate-to-severe asthma had better outcomes. In children there was a slight benefit to an action plan based on peak flow measurements, versus symptom monitoring. A Cochrane review of 8 trials of emergency-department asthma education in children found no significant benefit overall.¹⁴ This calls into question the concept of emergency-department asthma education for children, but it is important to continue to look for emergency-department strategies that improve outcomes in children.

Patient Considerations When Planning Asthma Education

A plausible reason that patient-provider collaboration is more effective is that a highly engaged provider may detect and respond to various factors that can influence the patient's desire to participate and adopt effective self-management strategies. Consider the following factors when planning how to deliver asthma education: age, cultural influences on health beliefs, language differences and other communication barriers, health literacy, access to care, psychosocial issues, setting, and education method.

Age

The education methods and materials should be age-appropriate. A meta-analysis of asthma self-management education programs for children and parents found improved asthma control.¹⁵ In adolescents, asthma education can be more challenging. Adolescents often do not seek health care unless their symptoms are severe. Fear of being labeled "sick" by their peers and a general lack of asthma knowledge also can contribute to poor adherence to medications and poor asthma-trigger avoidance. Education methods effective with adolescents include peer-led asthma education¹⁶ and computer/Internet-based programs.¹⁷ In older adults comorbid conditions and literacy problems are more prevalent than in younger patients. In one study, 81% of patients over 60 years old in 2 public hospitals could not read or did not understand important materials such as prescription labels.¹⁸ With patients of all ages, the verbal and written instructions should use the simplest terms that correctly and fully explain the concepts and instructions.¹⁹

Culture and Health Beliefs

Much of the burden of asthma is found among African-American and Hispanic populations in economically dis-

advantaged areas.²⁰ Culturally based health beliefs can affect the patient's and/or the family's ability to manage asthma. Try to learn the parents' beliefs about and level of understanding of asthma and their feelings about management of their child's asthma.²¹ Misconceptions about the cause of asthma or the effect of medications could make some parents reluctant to adhere to a treatment plan. One study showed that in immigrant Hispanic populations, adults caregivers who strongly believed in folk medicine tended to have poor asthma-self-management skills.²¹ It is important to create and maintain open communication regarding how patients and parents deal with asthma. Practices that do no harm can be incorporated into the asthma treatment plan. However, it is essential to emphasize and reinforce the importance of sound medical treatment and to explain to parents and patients why some practices may be harmful. If the provider does not speak the same primary language as the patient or family, it is important to have a qualified interpreter to aid in asthma education and avoid miscommunication. It is usually poor practice to use a family member as an interpreter.

Health Literacy

Studies of the reading levels of adults seeking health care have been alarming. It is now recommended that all health-education materials be written for a 5th or 6th grade reading level.²² Low literacy is associated with low asthma knowledge and self-management skills.²³ Patients with lower literacy²⁴ also are less likely to want to participate in their health-care decisions.²⁵ Many patients prefer one-on-one, verbally delivered asthma education (compared to education via reading), and with those patients, verbally delivered education can increase the patient's desire and ability to participate in decision-making and to self-manage their asthma, especially if time is allowed for the patient to ask questions, and the provider can explain complex ideas in simple terms.^{19,24}

Access to Care

Lack of access to asthma care, education, and medications is an important issue in the United States. Medications and health care visits are expensive, and without insurance (or with a high co-payment) patients with asthma may try to do without their medications or decrease their use of the medications to make them last. The federal government estimates that 47 million individuals lacked health insurance in 2006.²⁶ Eighty percent of those were from working families, and 20% were children.²⁶ Co-payments and premiums have increased dramatically.²⁷

The asthma burden is highest in economically disadvantaged areas, where poor access to care and medications causes poor outcomes, even in some patients who under-

stand asthma and the importance of adherence to asthma-controller medication. The clinician should determine if the patient needs assistance with the cost of medication. The Web site <http://www.needymeds.com> represents a non-profit organization that provides information about medication-cost-assistance programs. The site lists medications for which assistance is available from the drug manufacturers²⁸ and provides an application form and contact information for various sources of medication financial assistance. The amount of help depends on the pharmaceutical company and the patient's (or family's) financial status.

Providers must also be skilled in helping patients through the process of obtaining prior insurance-company authorization for medications if the preferred medications fail to control symptoms. Often a telephone call or letter explaining that the patient needs a medication not on the formulary and that all medications on the formulary have been tried will prompt the insurance company to grant authorization.

Psychosocial Factors

The burden of living with asthma can result in depression and anxiety for the patient and/or family, and these psychological changes can compromise asthma control.²⁹ Adolescents with asthma are more likely to smoke, and asthmatics who smoke are more likely to be depressed.³⁰ If the patient's family has a negative emotional climate, depression is more likely and asthma control less likely.³¹ If the parent's stress, social isolation, or anxiety increases, the likelihood of poor asthma control in the child increases.³² Screen for anxiety and/or depression and provide referrals and resources to assist with psychosocial factors.

Setting

There is evidence of positive asthma-education outcomes in multiple settings. Settings that lend themselves to follow-up visits, education-reinforcement, and ongoing asthma monitoring (as opposed to single encounters, such as an emergency department), tend to be associated with better asthma control. The NAEPP guidelines recommend asthma education at all points of care, so the patient has multiple opportunities to learn about asthma and develop self-management skills.¹ Results from clinic-based asthma-self-management education have been the most impressive (evidence grade A) for positive outcomes such as fewer hospitalizations, acute-care visits, and missed work days; and improved quality of life. It is intuitive that the clinic setting would allow the best opportunity for an ongoing collaborative relationship between the patient and the provider, and for better outcomes.

Asthma education in the school is important because of the potential for reaching a large number of children, but

studies of in-school asthma-education programs have had mixed results, depending on the complexity and intensity of the education program. Comprehensive school-based asthma programs can improve symptom control and reduce acute-care utilization.³³⁻³⁵ Many children and adolescents do not have regular access to primary care or asthma specialists, so programs to identify at-risk children and provide ongoing monitoring and education at school are a high priority for implementation and study. Home-based education programs can significantly impact allergen control (evidence grade A).¹ Decreasing allergen exposure reduces exacerbations, and should be a component of asthma education when allergens are an important trigger.

Emergency-department and hospital education programs have had mixed results. Patients who regularly utilize the emergency department obviously have self-management problems, which might suggest a need for asthma education at the time of care, but at present there is a paucity of evidence to support this. A meta-analysis of randomized controlled trials in the emergency department, with children, found no significant effect on health status or readmission.¹⁴ Of the studies in the meta-analysis that did have positive outcomes, one was a nurse-led discharge program with a 20-min education session and a written action plan; that strategy significantly reduced acute-care utilization over 12 months.³⁶ The other positive study included an out-patient follow-up visit, and that strategy significantly decreased emergency-department readmission.³⁷ More recent studies showed success with programs that included out-patient follow-up after the emergency-department visit, though the duration of improvement is uncertain. The acute-care setting does not facilitate an ongoing relationship between the patient and provider, but for many patients the emergency department is their primary point of care, so it is important that we continue to research asthma-education strategies, and, at the very least, during the visit, to reinforce correct metered-dose-inhaler technique, develop written action plans, and recommend follow-up care. Settings that encourage and support provider-patient interaction and follow-up visits provide the best outcomes.

Provider Factors

Unfortunately, there is still a gap between physician knowledge of the NAEPP guidelines and implementation.³⁸ Many physicians underestimate the severity of asthma symptoms and underutilize written action plans, despite the evidence that supports written action plans.^{39,40} In most institutions there is inadequate incentive for physicians to make the time to develop collaborative partnerships with patients and to provide high-quality asthma-self-management education, and there is considerable financial pressure to see as many patients as possible during a clinic day. Asthma specialists are more likely to utilize action plans,⁴¹

so consultation with a specialist should be considered for patients who have moderate or severe asthma.

Does Asthma Education Reduce the Cost of Asthma Care?

Self-management education can decrease the cost of care in high-risk patients.⁴² Nurse-led asthma education provides positive outcomes and cost savings.⁴³ A study with 212 pediatric patients compared 3 education designs (individualized education vs reinforced asthma education vs reinforced asthma education with case management) and found that all 3 designs statistically decreased hospitalizations and emergency-department visits. There was no statistically significant difference between the education designs, but all three significantly decreased the cost of asthma care by decreasing health-care utilization.⁴⁴

Asthma Education by Respiratory Therapists

RTs have an important role in asthma education in various settings. There have been no randomized controlled trials in which RTs were used exclusively as asthma educators, but RTs are definitely valuable members of the asthma-education team in out-patient asthma programs. A pediatric asthma disease-management program provided by RTs significantly reduced hospitalizations and emergency-department visits, duration of stay, missed school days, and costs.⁵ RTs have also made important contributions to multidisciplinary asthma-education programs in rural⁴⁵ and urban areas.³⁴ RT expertise in demonstrating and reinforcing metered-dose-inhaler technique in a pediatric asthma clinic resulted in sustained technique improvement in some patients, and improved lung function.⁴ RT administration of an asthma treatment protocol in the emergency department improved the quality of care and reduced costs.⁴⁶

Summary

Asthma self-management education is an essential component of asthma disease management. The evidence is strong that there should be a collaborative relationship between the patient and provider, and that the patient should be an active participant in establishing the self-management goals and the asthma action plan. All types of health-care providers, at every point of care, should establish and maintain a patient-provider partnership that emphasizes education and education-reinforcement that encourages self-management.

Asthma self-management education improves asthma outcomes and saves money. Reimbursement for asthma education has not yet become routine. To develop and expand programs that provide effective and ongoing col-

laborative care, third-party payers must recognize the value of asthma self-management education in improving various outcomes and provide payment to recognized asthma educators and programs. More study is needed in all settings to explore education strategies to improve self-management skills. All asthma educators should utilize written action plans that encourage and facilitate patient participation. Randomized controlled studies are needed to determine whether utilizing RTs as principal asthma educators improves symptom control or reduces costs.

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Discussion

Stoloff:* The cost of one month of HFA [hydrofluoroalkane] rescue inhaler plus inhaled corticosteroid can be more than \$10 a patient who needs the highest dose. The cost to the patient can be enormous. One of the concerns of the NAEPP guideline group was that the change from CFC [chlorofluorocarbon] to HFA caused a 300% cost increase in rescue inhalers, but the NHLBI [National Heart, Lung, and Blood Institute] made it very clear early on that we were not allowed to look at or comment on cost.

The average wholesale price for a generic CFC albuterol was approximately \$13. The HFA albuterol inhaler is 300% more. We as a group and as individual clinicians are very concerned that patients will not purchase rescue inhalers because of the cost. Even if they have insurance, the co-pay is prohibitive for many people. I'm acutely aware day-to-day of what the population I care for has to face. And many older people also have other

diseases, such as diabetes, and their medication cost is enormous.

Jones: Yes, even with insurance, if your co-pay is \$50 and you have a prescription for Advair and Singulair, the price will be prohibitive for many people. It isn't unusual for me to provide samples to my insured patients as well as to those without insurance. It's a huge problem.

Sorkness: I want to point out the "downstream effect" of the cost of medication. The group that is impacted the most is inner-city residents and economically disadvantaged people. The Asthma Control and Evaluation (ACE) Trial¹ results are remarkable, because they show that good control can be achieved in inner-city residents, who suffer much of the asthma morbidity and mortality.

During the ACE trial there was education reinforcement by the study coordinators at the sites, available asthma counselors from various disciplines, reinforcement of adherence to therapy, and all the medications were provided. Participants were told that adherence would be monitored, and the Diskus inhaler was used throughout. There was a whole package of good care, study coordinators at the sites, and

good education reinforcement. And the estimated adherence to therapy was 87% over a year. That's remarkable. Yes, it's a success in the context of a clinical trial, but I think it can be done.

1. Inner-City Asthma Consortium. Evaluation of an asthma treatment strategy based on exhaled nitric oxide measurements in adolescents: the Asthma Control and Evaluation (ACE) trial. <http://clinicaltrials.gov>. Accessed April 22, 2008.

Jones: And it would probably save money if they would reimburse for the medications for chronic disease. I was once at a meeting with the head of the Centers for Medicare and Medicaid Services, and it was about reimbursement for home respiratory therapists (RTs) under the Home Health Guidelines. The comment by the man in charge was, "Prevention never saves money; they only live longer and stay insured." I think that's an attitude that we're kind of in denial about. We want to do the best, but a lot of folks are strictly looking at the dollar signs. Those are huge battles.

Enright: Let me give you a positive example that worked in at the El Rio Community Health Center in Tucson, Arizona, which serves primarily Hispanic and Native American people.

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About 8 years ago we hired a full-time RT for asthma education of children and their parents. How has it been sustainable? They charge medical insurance for both pre- and post-bronchodilator spirometry and for a small battery of indoor allergen skin tests, which are indicated for any child with asthma. The 12 pediatricians love the RT and her services. She provides all the other education on asthma and chronic disease management.

I think RTs today need to grab onto the idea of becoming disease managers for asthma and COPD [chronic obstructive pulmonary disease]. RTs are the best equipped. Nurses, physician assistants, and pharmacists are responsible for knowing about dozens of other diseases and thus do not have as much knowledge and skill as RTs in managing lung diseases.

I think the AARC [American Association for Respiratory Care] should organize and fund outcome measurements of the effectiveness of such community services, because the outcomes must be measured, but clinicians in those settings can't do it. Effectiveness should be assessed by a professional organization, such as AARC, that knows how to gather and analyze the outcome data appropriately, so it can be published.

Sorkness: Paul, I am all for the concept of promoting RTs to do this, but I would argue against promoting only one health professional to do it. I think equal arguments can be made for involving nurses, pharmacists, and all people who are well trained and have an adequate knowledge base. I don't think we should advocate for only one health professional; there's more than enough room for others and lots of opportunities for lots of people in different settings. This should be about trying to help each other to achieve better asthma control, and there are a lot of diseases in addition to asthma and COPD that I could argue warrant involvement from more than one health professional, including obesity,

smoking cessation, and diabetes. The further we get away from treating "silo" issues (because of comorbidities), the better off we will be in treating chronic diseases. So I think we should advocate for multiple health professionals to deliver asthma disease management.

Stoloff: One of my main responsibilities in the NAEPP asthma guidelines panel was education. I did the 1997 NAEPP asthma guidelines with 2 other people. I think there's robust literature on education. We wrote everything we could, but we wrote it as points of care. We found that there are pharmacists who are doing this education, and there are school systems where they provide the medication in the school because it's the only place they could guarantee that kids could get their daily dose of controller medication.

We encourage all potentially involved people to help facilitate asthma education, because one size doesn't fit all. Clearly, the various competencies of different health care professionals—be they RTs, pharmacists, physicians, or other clinicians—can bring some advantages to everyone. I think it's important to look at "co-management" of asthma. People asked, can you do it? We thought we could but we didn't know how worthwhile it was to do education. We can't get paid for it, which is always the terms for education, so we do what we do.

With people who've gone to the emergency department or been hospitalized for asthma, in the period after the visit there's rarely a change in their medications, compared to the period before the visit. The emergency-department visit or hospitalization is often not perceived as a "red flag." We have an enormous opportunity and responsibility to do co-management, engaging all the different health professionals. We have to get out of the "silo" mentality.

The health plans that I deal with always tell me, "The life expectancy of an individual in our health plan is 18 to 36 months, and we're only interested in that short span to determine our cost of the medication—that's all, if we get them out of the system and they haven't incurred any additional costs." We need to move away from that, and we're only going to move away from that by utilizing the expertise of everyone involved. That's why we wrote points of care.

Myers: Yes, it's not about where it's done or who does it, but about patient outcomes and how the patient benefits from the education and other interventions. We've got to develop a system, and at each point of care we need to track and document those outcomes.

Referring back to the point that Chris [Sorkness] made about the ACE trial, I doubted they could get inner-city asthmatics into the facilities every 6 weeks for a year, but they did. The patients came in, and they adhered to their medications. These kids are high utilizers of emergency-department and hospital services, so even if you paid them \$25 to \$50 every 6 weeks, it would probably cost out that if you pay them to come in for the education and care that would be the same as the cost of care over a year for hospitalizations and emergency-department visits. We need to determine the cost benefits of these interventions.

Enright: Of course, the concept of multidisciplinary asthma care is like mother and apple pie. When we started this program, it was targeted at El Rio Community Health Center, because we determined the zip code of all the patients in the entire valley of Tucson that had emergency-department visits and hospitalizations for asthma and found they were concentrated near El Rio. We then had monthly meetings with the pediatricians, the social worker, the phar-

macist, the nurse that ran the outpatient clinic, the RT, and a local school nurse, and we determined the needs, barriers, and solutions to the high incidence of asthma emergency-department visits in that community.

Among other things, we found that patients (or their parents) want to consistently see the same person for chronic disease management. The patients identified with one person, not the institution, and they wanted to see the same person at each visit. So they make an appointment to see the RT,

and she often gets them in to see the pediatrician by the end of the visit. I'm afraid that if we spread what little money there is (often only one FTE [full-time equivalent]) among 4 or 5 people, and thereby diffuse responsibility, the continuity of care will be lost, and the effectiveness of the program diminished.

Jones: I agree. Of course, different models work in different places. There's good data¹ about folks going to the pharmacy and using a self-management intervention that was

excellent. Also school nurses—there's a good study² that demonstrated that. Again, it was with the medication provision and regular interventions by nurses that these kids started to do better in the inner city. It's exciting.

1. Laufenberg-Horstmann E, DeVore E, Bas-suener K. The Coulee region community pharmacy asthma intervention study. *J Am Pharm Assoc* 2006;46(6):738-746.
2. Taras H, Wright S, Brennan J, Campana J, Lofren R. Impact of school nurse case management on students with asthma. *J Sch Health* 2004;74(6):213-219.



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