

Computer-Generated Intervention for Asthma Population Care Management

Objectives/Goals

In 1995, Health Care Plan (HCP), Buffalo, New York, implemented a computer-generated reminder system for adult patients with asthma. This work was done as part of a grant-supported project to develop computer-generated reminders in preventive health services and in chronic disease. The goal of the Asthma Program was to improve patients' quality of life and to reduce hospitalizations and emergency department visits. Patient education efforts designed to encourage self-care were a central component of the program. It was hypothesized that automated reminders, accompanied by a care plan focused on self-management, could improve the consistency and efficiency of asthma care. Similar integrated systems of chronic illness care have been shown to improve outcomes for chronically ill patients (1).

The key elements of the program were an automated patient-provider reminder system and a clinical guideline. A computer-generated reminder system was first implemented for preventive health services and then applied to chronic disease, beginning with asthma. An inhouse computer programmer developed all programming for this systematic approach to managing populations. The computer-supported Asthma Program was designed to complement the clinical guideline, which had been developed by the physician group.

Program Details

Population Identification

The first challenge in managing any population is to correctly identify patients in need of care. The Asthma Program used HEDIS (National Committee for Quality Assurance's Health Plan Employer Data Information Set) criteria to identify the HCP asthmatic population. Following are the HEDIS criteria for patient identification:

- **Encounters:** Any adult member (≥ 18 years of age) with two face-to-face encounters in an ambulatory setting (primary care, specialty, or emergency department) or one face-to-face encounter in an inpatient setting with an International Classification of Diseases, ninth revision, code of 493.00 in the past 2 years.

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- **Medications:** Members who in 1996 had the following prescriptions or combination of prescriptions dispensed during the year on an ambulatory basis (because of the number of false-positive results experienced during the pilot phase, this criterion was dropped at the end of 1996):

One or more prescriptions for cromolyn sodium or an aerosolized corticosteroid

or

One prescription for a bronchodilator *and* at least one prescription for cromolyn sodium or at least one prescription for an aerosolized corticosteroid

or

Two prescriptions for a bronchodilator

or

Two prescriptions for theophylline.

After the population was identified, the reminder system was programmed to identify asthmatic patients who received medical care that suggested that the patient was having an exacerbation (e.g., emergency department visit, urgent care call, extra medication). Reminders were generated for patients at every office visit, regardless of the reason for the visit, and were used to check the status of patient education and to trigger a clinical response for patients with exacerbations.

Clinical Guideline for Practice

Health Care Plan developed the “Asthma Game Plan,” a protocol for treatment approved by the physician guideline committee to be used by patients and providers. Providers at the two test sites received instruction on the use of the Asthma Game Plan from a colleague who was board-certified in internal medicine and allergy.

The Game Plan was disseminated to the physicians in December 1994. The computer-generated reminder system was implemented in one medical center in March 1996 and at a second medical center in July 1996. The remaining six HCP sites served as a control for measuring the impact of the computer-supported intervention.

Routine Office Visit Reminders

The automated reminders are used to support both the office practice and the member. At the point of service, providers are reminded of issues related to the manage-

ment of asthma. The asthma reminders are provided along with reminders for preventive health services. The asthma reminders provide up-to-date information on the patient’s status with regard to the following questions:

- Is the patient on the Asthma Game Plan?
- Has the patient received pneumonia and influenza vaccines?
- Does the patient have a peak-flow meter?
- Has the patient been taught proper inhaler technique in the past year?

Patient Reminder

The patient reminder is sent as a birthday card during the month of a member’s birthday. The information in the birthday card lists the last dates of the preventive health services and the appropriate time for the next services. The birthday card for asthmatic patients includes information on whether the patient has an Asthma Game Plan, inhaler, and peak-flow meter and on the status of influenza immunization.

Acute Episode Trigger

Each practice can access, by computer, a list of patients who may require follow-up on the basis of these criteria:

- A recent emergency department visit
- An urgent care call
- A visit to the urgent care facility at HCP
- A request at an HCP pharmacy for more medication than prescribed.

When a patient exceeds a threshold for medication use according to the protocol, the pharmacy receives a trigger to query the patient. If the patient is not feeling well and uses excessive medication, the pharmacist activates the computerized asthma system to add the patient’s name to the primary care physician’s nurse list. If the patient has lost medication or needs extra medication for a trip, for example, the reminder to the nurse advice system can be turned off.

A nurse trained in asthma education and the use of the Game Plan can access the computer list of identified patients. The nurses call patients, using a formal algorithm that is embedded in the computerized telephone management system. The algorithm is used to document the call and to help the nurse determine whether the patient needs to be seen by a provider or needs self-care education. The algorithm was developed with assis-

tance from the peer-reviewed literature on processes for formatting clinical algorithms (2). A computer screen for telephone management contained asthma-specific questions, such as the following:

- Is the patient on the Asthma Game Plan?
- Does the patient meet the criteria for moderate or severe asthma?
- Do the patient's symptoms indicate an asthma attack?
- What services does the patient now need to manage his or her asthma?

Once this information is obtained by the nurse, the patient's primary care physician is notified of the reason for the identification and the actions are recommended to the patient. The patient is asked to see a provider when a medication change is needed.

Evaluation

Other research has shown that computer-generated reminder systems can improve patient outcomes by changing patient and physician behavior (3). The Asthma Program was evaluated against the stated goals. The program goals were to improve the ability of asthmatic patients to manage their own care, to show improvement in the patients' reported quality of life, and to reduce hospital admissions and emergency department visits.

Improvements in Patient Self-Management and Quality of Life

The first two goals were assessed by the asthma quality-of-life survey developed by the Health Outcomes Institute (Bloomington, Minnesota), specific to asthma (Asthma TyPE). Questions on patient self-management were appended to the survey to measure changes in educational status in addition to perceived quality of life.

A paired *t*-test, used to compare the intervention group between baseline and 6 months, revealed a statistically significant increase in the number of responders who reported having peak-flow meters and an Asthma Game Plan ($P < 0.01$). An independent *t*-test also showed a significant difference between the intervention and control groups ($P < 0.01$) for peak-flow meters and use of an Asthma Game Plan. These changes were considered to indicate improvement in the asthmatic population's ability to use self-management tools. The change is attributed to both early identification of exacerbations resulting from the acute-episode activation and regular

reminders to providers at the time of visits from the office computer-generated reminders.

Improvements in Hospitalization and Emergency Department Visits

From 1995 to 1996, the number of asthma-related hospitalizations in the intervention sites decreased by more than 60%. The admission rate decreased from 0.08/1000 to 0.03/1000 members at these sites while remaining stable at the control sites. At the intervention sites, the total cost of admissions per 1000 members correspondingly decreased by more than 70%, from \$176.13/1000 members in 1995 to \$48.38/1000 members in 1996. At the control sites, the decrease was a modest 3%.

Visits to the emergency department decreased by 50% at both intervention and control sites, and emergency department costs/1000 decreased by 57% for both groups. The probable reason for decreases in emergency department visits and costs for both groups was that HCP implemented a new urgent-care facility that offered weekend and other hours for emergent care. This intervention reduced the overall number of visits to area emergency departments.

Expenses Related to Program Development

Health Care Plan invested in staff resources to program, design, and implement the computer-generated reminder system. Some of this investment was supported by a New York State Department of Health Quality Improvement grant. In addition to incurring development costs, HCP experienced an increase in asthma-related office visits and pharmacy use. It is thought that the increase in visits did not represent a shift in total cost because some of the visits were with nurses for education purposes.

Approximately half of the increased costs associated with development and implementation of the Asthma Program were recovered in the first year from savings in hospital admissions. Most of the cost was incurred in the first year of the program; only modest costs will be needed to maintain the system, although savings and improved patient quality of life are expected to continue.

Recommendations to Others

The HCP Asthma Program has been successful in improving patient self-management of asthma and in reducing hospitalizations for asthma. The computer-generated point-of-service reminder and annual birthday card reminders mailed to patients improve education and self-management.

A related but distinct benefit is the education associated with implementing reminders in a chronic disease population. The Asthma Program allows the opportunity to test the use of computer-generated reminders for a chronic disease. Agreement exists that national guidelines for asthma, if consistently applied, can improve quality of life in an identifiable population. Expansion to other chronic disease areas is under way and is not expected to require the same level of resources as did the startup of the Asthma Program.

On the basis of experience with this project, HCP recommends the adoption of reminder systems to improve the care of chronic diseases. We recommend a system based on point-of-service and annual birthday card reminders. It is anticipated that the cost associated with the development of computer-generated reminders for patients with chronic disease will decrease as the reminders are extended to other chronic diseases.

References

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Arthritis Foundation Launches **POSITIVE STEPS In Arthritis Management**

The Arthritis Foundation has announced the launch of **POSITIVE STEPS In Arthritis Management**, a training program for health care professionals. Training will be provided by members of the Arthritis Foundation POSITIVE STEPS advisory panel during 1-hour workshops in 40 cities nationwide; workshops will be held on various dates through September. Health care professionals

interested in attending should call 800-981-4623. The program is designed to help health care professionals educate their patients, individually or in groups, to enable them to take an active role in managing their arthritis.

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