VIRGINIA HEALTH OUTCOMES PARTNERSHIP

A demonstration project

The Virginia Health Outcomes Partnership

Reducing the use of health care services and their associated costs by educating pharmacists, physicians, and nurses on communication techniques and new advances in clinical practice.

Participants:

The Williamson Institute
The Schools of Pharmacy,
Medicine, and Nursing
of the
Medical College of Virginia
Virginia Commonwealth University
Richmond, Virginia

The Virginia Department of Medical Assistance Service
Richmond, Virginia

The Degge Group, Ltd.
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COMSORT
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Sponsored by:
The National Pharmaceutical Council
Reston, Virginia

EXECUTIVE SUMMARY

Virginia Health Outcomes Partnership (VHOP) is a model program in which the state partnered with its health professionals to improve health outcomes for Virginia Medicaid patients. VHOP was implemented as part of Virginia Medicaid's Medallion program, a fee-for-service, primary care case management program; the enrollees consisted mostly of children and women of childbearing age. The Medallion program was implemented under a waiver granted by HCFA.

Cost containment of pharmaceutical expenditures usually involves various efforts to control drug utilization. These efforts typically are aimed at physician providers, pharmacist providers, or the pharmaceutical industry. They have included the establishment of drug formularies and prior authorization programs. Federal legislation has had an important role in shaping these efforts.

A relatively new approach to cost containment is disease management. The goal of disease management programs is to optimize therapy. Optimizing therapy should improve outcomes and decrease overall expenditures associated with a disease.

The VHOP approach involves a patient-centered disease management strategy. With this approach, better disease management results from patients' optimal adherence to prescribed therapies. Increasing providers' communications skills, as well as their disease-specific knowledge, can result in better choice of treatments and improved patient compliance, leading to improved outcomes and lower costs.

This publication provides general background information on: 1) the methods used in the disease selection process; 2) the choice of asthma as the first disease to be studied; and, 3) implementation of the intervention and research components of VHOP. VHOP did not have an *a priori* disease selected for intervention. One challenge for the investigators was determining what diseases to select initially for intervention since the selection would shape the content of the medical treatment guidelines taught to health care providers.

The first disease selected was asthma, and its selection was based primarily on the prevalence and cost of the disease to Virginia Medicaid, but also on the potential for improving patient outcomes in Medicaid managed care programs. The disease selection process incorporated empirical claims data from Virginia Medicaid and a theoretical framework to identify relevant disease candidates. Additionally, multiple procedures were used to ensure that the most appropriate diseases were selected for the program.

This publication describes the disease selection process and the implementation of the pilot component of VHOP in general terms. A manual outlining how to implement a project like VHOP in a state will be available in late 1997.

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ABBREVIATIONS

AHCPR	Agency for Health Care Policy and Research
CME	Continuing Medical Education
COPD	Chronic Obstructive Pulmonary Disease
DMAS	Department of Medical Assistance Services (i.e., Virginia Medicaid)
DUR	Drug Utilization Review
FY	Fiscal Year
HCFA	Health Care Financing Administration
NIH	National Institutes of Health
PA/VHOP	Prior Authorization/Virginia Health Outcomes Partnership (i.e., Virginia Medicaid's Prior Authorization/Virginia Health Outcomes Partnership Committee)
UTI	Urinary Tract Infection
VCU	Virginia Commonwealth University
VHOP	Virginia Health Outcomes Partnership

INTRODUCTION

In early 1996, approximately 7.8 million people across the country (23% of all Medicaid recipients) were enrolled in managed care programs (Physician Payment Review Commission, 1996). Nearly 3 million people were enrolled in primary care case management systems. In most of these systems, physicians are paid case management fees (typically $3 per recipient per month) in addition to their regular fee-for-service payments for the primary care services they provide.

Virginia established the Medallion program, its primary care case management program, in the early 1990s. This program was implemented under a waiver granted by HCFA in an effort to control costs. By 1996, nearly 500,000 recipients were enrolled with primary care physicians as case managers in Virginia Medicaid statewide. As the primary care case management program was being implemented in the early 1990s, the state also was looking for ways to control rising drug costs in the Medicaid program.

Although a number of mandatory prior authorization programs were already in place in other states, no voluntary prior authorization program had been implemented. Mandatory prior authorization programs have been shown to be expensive to administer and have not proven to result in overall Medicaid cost savings. Virginia had some success with a voluntary prior authorization program in conjunction with the Virginia Pharmacy Association to reduce the utilization of H_2-antagonists and save costs (American Pharmacy, 1994).

VHOP is a voluntary prior authorization program in which the physician self-authorizes prescriptions. This program has helped Virginia Medicaid decrease service utilization, as well as maintain and invest in its relationship with Medicaid health care providers.

VHOP PROGRAM HISTORY

In May 1993, VHOP was proposed by Virginia's Department of Medical Assistance (DMAS), also commonly known as Virginia Medicaid. The project was directed at health care providers and patients enrolled in Virginia Medicaid's Medallion program.

The Medallion program was developed to offer a primary care physician to each enrollee in the hopes of improving access while lowering Medicaid costs (Physician Payment Review Commission, 1996; Wilson, 1995). The primary care provider agrees to become the case manager or gatekeeper for the enrollee. Included in this responsibility is the obligation to be available to provide and/or authorize all nonemergency care for the enrollee.

The primary goals of the VHOP–Medallion collaboration are:

- to improve patient health outcomes by improving the general and disease-specific communication skills of physicians and other health care providers; and
- to increase physicians' use of established practice guidelines and appropriate pharmacotherapy for specific disease states.

In 1994, the Williamson Institute for Health Studies of VCU was chosen by DMAS to administer the VHOP program. A working coalition was formed among DMAS; the Schools of Medicine, Pharmacy, and Nursing of the Medical College of Virginia; and the National Pharmaceutical Council. Early support was obtained from professional societies including the Virginia Academy of Family Physicians, the Medical Society of Virginia, the Old Dominion Pharmaceutical Association, and the DMAS–DUR Committee. Many of the major health professional societies in Virginia have expressed support for VHOP.

Potential disease candidates were systematically evaluated, and asthma was chosen as the first disease for the pilot program. The pilot intervention and research designs were completed in December 1994. The asthma intervention and research program were implemented in October 1995. The intervention for asthma was completed in Central Virginia in September 1996, and the data are currently being analyzed, comparing the intervention to the usual care in population centers outside of Central Virginia. The asthma intervention is expected to be implemented throughout Virginia by September 1997.

VHOP PROGRAM STRUCTURE

The VHOP program has three main components: the *disease selection* process, the *intervention*, and the *research* to determine the program's effectiveness. First a process was developed to identify the most appropriate diseases for the program. Once a disease is selected, an intervention is developed. The intervention is designed around the HUB and SPOKE model of health care provider-patient communications. The HUB consists of basic communication skills, and the SPOKE consists of treatment guidelines for a specific disease. The research component evaluates the economic, service utilization, patient and provider satisfaction, and outcomes of the intervention. Each of these three components is discussed in this publication.

THE DISEASE SELECTION PROCESS

A key element of VHOP was to develop a systematic process to identify the most appropriate diseases for the program. The process had to utilize both empirical data from the Medicaid Management Information System (i.e., DMAS's claims data) and clinical knowledge about the patterns of disease and treatment (i.e., a theoretical framework) to compare attributes of disease candidates for intervention.

Disease candidates were chosen by identifying sources of information about them and then developing standard methods for using this information. Primary source data were provided by DMAS, and the patient-specific information came directly from claims records and enrollment files. Information describing medical providers came from DMAS provider record files. All of this information was confidential and used for research purposes only. This highly specific information was the basis for most of the decisions related to selection of a disease SPOKE. When appropriate, the primary data were supplemented with data from other sources (e.g., other studies and surveys).

Information about disease treatment was obtained from national consensus-based sources (e.g., NIH, AHCPR). Reviews of treatment guidelines were sought at the state and local levels to ensure applicability to community practice. The expert opinions of the clinicians providing services to the Medallion patient population were used to assess community perceptions of the areas of need, problems, practical barriers, and potential for improvement.

Final disease selection was made by a group representing all parties working on the implementation of VHOP: the Williamson Institute, the Schools of Pharmacy, Medicine, and Nursing of the Medical College of Virginia, DMAS, the Degge Group, Ltd., and the National Pharmaceutical Council. The decision was based on the results of the many analyses described in this section; key factors were the prevalence and cost of the disease to Virginia Medicaid, and the potential for improving patient outcomes in Medicaid managed care programs. All representatives in the group agreed to the selection of asthma as the first disease in the pilot program.

The Value of Empirical Data to Measure Outcomes

Ideally, successful outcomes management requires detailed population-based data, data on health care service use, and clinical outcomes. Service use and cost data are typically available from medical claims information traditionally collected in Medicaid populations for the past 20 years or more. For each Medicaid recipient in Medallion, billing data include age, sex, race, county, inpatient hospitalization and outpatient diagnoses, outpatient drugs and procedures (e.g., laboratory, radiologic), and number and costs of physician office and emergency department visits. Pharmacy records—including prescription name, amount, dose dispensed, and estimated days of therapy—also are collected. In an internal analysis of pharmacy usage among Medallion recipients (n=2,399), 93% used only one or two pharmacies, whereas only 7% used three or more pharmacies (Miller, 1994). Matching patient data is facilitated by the lack of variance in the number of pharmacies, so assessing compliance with certain drug regimens is possible.

As is true for all claims data, these data are collected for billing and so are free of some biases (e.g., interview, recall, reporting). However, the data are of uncertain validity, espe-

cially for some diagnoses that may result in misclassifications when selecting individuals with particular disease states or identifying clinical outcomes. Longitudinal medical histories are available because of continuous data collection. However, this advantage only applies to those individuals who remain in the system; patients can be lost to follow-up because of eligibility changes. DMAS lacks data on variables that may be important mediators of treatment effects and potential confounding variables (e.g., smoking status, dietary intake, alcohol consumption). These missing data indicate the importance of accessing primary medical records. Some potentially important sources of medical information are missing as well, including inpatient medication use, use of over-the-counter drugs, blood pressure readings, air peak flow readings, and other signs of disease. Nevertheless, claims data do provide indirect information on outcomes through proxy measures.

The Framework for Disease Selection

Based on the DMAS claims data, various attributes were developed for: 1) selection of diseases; 2) selection of patients for the study group; and, 3) characteristics of the population from which the study group is selected. These attributes helped identify the most appropriate diseases.

Disease Attributes

Selection of a disease includes consideration of the following:

- Existence of treatment guidelines
- Range of treatment modalities
- Consensus about the level of appropriateness and effectiveness of care for the disorder
- Health care service utilization and factors affecting it
- Natural course and progression of the disease

Study Group Attributes

These attributes pertain only to the group of patients that will benefit from the intervention, in this case, all patients enrolled in the Medicaid Medallion program. In anticipation of expanding the VHOP pilot to the entire Virginia Medicaid population, attributes of this larger group (population attributes) also were needed. Study group criteria were developed based on 1993–1995 DMAS claims data and enrollment projections. They include the following:

- The study group patients must be homogenous (e.g., similar diagnoses, similar socioeconomic and demographic factors).
- The eligibility requirements must be stable (i.e., no major changes had occurred or were expected to occur in the eligibility requirements for that study group).
- The study group patients must have a significant claims history before implementation of intervention.
- The study group patients should remain enrolled in the program after the intervention has been implemented so that long-term impact can be observed and documented.

Population Attributes

The selection of appropriate target diseases for the project also depends on attributes of the overall population (i.e., all Virginia Medicaid patients with claims). For an effect to be demonstrated in this large, complex social population, the following attributes of the population must be present:

- There must be a large number of patients with the disease, whose therapy can be improved (*population characteristics*).
- There must be disease outcomes that can be significantly modified by application of appropriate therapy (as outlined in treatment guidelines) and measured in the population (*therapy characteristics*).
- There must be no intervening or confounding factors that would interfere with interventions and/or assessment (*outcomes characteristics).*

These population attributes are further delineated in Table 1.

Other intervening factors critical to the success of a multidisciplinary program aimed to alter health care professionals' behavior are: 1) the credibility of the effort; and, 2) a consensus within the health care community regarding the need for improvement.

Three Key Procedures

Three procedures were used in a systematic effort to identify the most appropriate diseases for the pilot program:

1. Attributes identified in the theoretical framework were applied to the DMAS data.
2. A weighted algorithm was used for ranking the prospective disease candidates in terms of their overall need for intervention.
3. A qualitative needs assessment (i.e., survey) was completed by the Virginia Medicaid DUR Committee.

These procedures are tools to help identify the potential disease candidates. They were performed sequentially, and each procedure relied, in part, on the results from the previous procedure. The results from all three procedures were drawn upon in ranking diseases for final selection.

Procedure 1: Using Medicaid (DMAS) Data to Identify Disease Selection Candidates

The attributes identified in the theoretical framework for disease selection were applied to sorted, ordered, and merged data from DMAS. This process yielded asthma, congestive heart failure, epilepsy, otitis media, smoking cessation, urinary tract infection, and diabetes as disease candidates. The results were then presented to the DMAS Prior Authorization/Virginia Health Outcomes Partnership (PA/VHOP) Advisory Committee for consideration and evaluation. This Committee identified an expanded disease list based on the theoretical framework and their expert opinion. This list included arthritis, dementia, depression, dyslipidemia, hypertension, respiratory ailments, and peptic ulcer disease.

When the disease candidate pool was restricted to the Medallion population (i.e., the study population), asthma, epilepsy, urinary tract infection, diabetes (during pregnancy), and otitis media formed a subset disease candidate pool. These diseases reflected the demographics of Medallion patients (i.e., mainly mothers with dependent children). In the overall non-Medicare–Medicaid population, additional candidates included congestive heart failure, respiratory ailments, dyslipidemia, and smoking cessation.

Several diseases and a risk factor were identified as the final candidates for intervention by VHOP investigators. These included asthma, arthritis, otitis media, epilepsy, smoking cessation, hypertension, and urinary tract infection. Because the Medallion program focuses on women and children, diabetes was substituted for arthritis. See Appendix for a detailed evaluation of specific diseases using actual data in Virginia.

Procedure 2: Weighted Scoring of Diseases

After candidate diseases were identified by using Procedure 1, the disease selection attributes were simplified and weighted by the Degge Group, Ltd. The attributes were then analyzed in a matrix form (Table 2). Expert clinicians providing services to Medallion patients were asked to rate the final disease candidates for specific attributes using the following scoring system:

Scoring values:

4	Meets attribute easily
3	Meets attribute with some difficulty
2	Meets attribute with great difficulty
1	Unable to meet attribute

A sample matrix is presented in Table 2. In this example, pediatric asthma is the disease most in need of intervention.

Procedure 3: Survey of Medicaid DUR Committee Members

Virginia Medicaid's DUR Committee members (n=13) were surveyed regarding their opinions on the disease selection candidates. They were asked to answer the survey questions as they pertained to the study population (i.e., the Medallion population).

Table 1.
Attributes Necessary for Intervention Effects to be Demonstrated in a Patient Population

ATTRIBUTE	VALUE OF ATTRIBUTE	LIMITATION OF ATTRIBUTE
Population Characteristics		
Prevalence of disease	Identifies population with sufficient numbers for study	Does not necessarily identify a homogeneous population with respect to either therapy or interventions
Prevalence of drug use	Same as above	High drug use may not always imply feasibility of education or other interventions, or any need for changes
Population is a high-risk group with measurable, common, serious outcomes	Potential for demonstrated effects is higher	Populations within many health care systems are smaller
Receipt of other health care benefits from outside programs	May ensure likelihood of more complete care and better outcomes	Utilization, outcomes are not always detectable unless data are available from both Medicaid and Medicare
Therapy Characteristics		
Presence of generally agreed upon treatment protocols or guidelines	Represents a useful basis for interventions	Some guidelines or treatment protocols have not been validated as to their positive effect health outcomes in large populations
Presence of generally recognized problems in therapy, well documented in the medical literature	Helps with general acceptance by partners	None
Self-authorization of guidelines	Represents a useful attribute for prior authorization program initiatives	May not be essential
Outcomes Characteristics		
Measurability: Morbidity (health)	Comes closest to measuring achievement of program goal	Health outcome may be affected by factors other than changes in drug use
Measurability: Utilization	Represents a tool to characterize both type and cost factors in outcomes	Some interventions may increase some types of utilization and/or not correlate well with medical outcomes
Outcomes due to nonoptimal therapy usually lead to measurable and problematic outcomes (e.g., intervention has potential for high yield)	Increases the likelihood of measuring changes	At present, there are limited data on which outcomes meet this attribute
Outcomes should be preventable in a sufficient number of cases if therapy is improved	Would make effort more generally accepted	Data are limited at present
Other Intervening Factors		
Therapeutic area is the target of other intervening factors in the program and/or in the political environment	Positive environment may assist in the acceptability of the program to all partners	Conflicted environment may result in outcomes poorly correlated with interventions

Source: The Degge Group, Ltd.

The survey (a qualitative analytic instrument) asked for information relating to the following four parameters:

- Prevalence of disease
- Prevalence of drug use
- Incidence of the disease within the population
- Availability of a viable intervention

Otitis media was the disease most often cited by the committee members, followed by asthma and epilepsy, then hypertension and urinary tract infection. Most comments by the respondents were associated with otitis media. Four reviewers pointed to the high occurrence of otitis media in the Medallion population.

Asthma was the second most cited disease and also was noted in terms of the frequency of occurrence, particularly the increase in emergency room visits and hospitalizations. It also met many of the other attributes identified in the theoretical framework. During the initiation of the pilot study, summary data from the Virginia Medicaid program led to the conclusion that asthma was the most useful disease to serve as a model for the pilot development. Asthma is increasing in frequency, has been the subject of NIH and other guidelines, and accounted for $6.9 million of the $159 million total Virginia Medicaid expenditures.

THE INTERVENTION: HUB AND SPOKE MODEL

The VHOP model is designed around the HUB and SPOKE model; the HUB consists of basic communication skills, and the SPOKE consists of a clinical treatment plan for a specific disease. VHOP was developed as an educational intervention that would improve both HUB and SPOKE skills in health care providers. This training is intended to decrease inappropriate prescribing patterns and to increase patient adherence to the treatment plan, both of which contribute to improved patient outcomes (Kaplan, Greenfield & Ware, 1989; Soumerai & Avorn, 1990).

The curriculum was designed to be offered as a course suitable for CME Category I accreditation; course accreditation was provided by the Medical College of Virginia. Both the HUB and the SPOKE materials were developed with the assistance of COMSORT, an independent company specializing in educational program development for health care professionals.

Having curricula of sufficient rigor for CME certification is a critical incentive to encourage providers' receptivity and participation. Because it is not feasible for a state-level agency to become accredited to provide CME, it is necessary for an accredited university or an educational organization to be incorporated into the program and to be responsible for developing the content of the intervention.

The expertise required to develop the HUB curricula is not likely to be found in state government agencies. It is appropriate to outsource this part of the program. Many private organizations and university programs have developed curricula that can be used.

However, some agencies in state government (e.g., health departments) can develop SPOKE curricula. In some cases, depending on the workload of the department and the ease of arranging interagency contracting agreements, this may not be feasible. It also is appropriate to outsource this part of the program. In either case, the input of both the primary care and the specialty care medical communities is important when developing guideline materials. Pharmaceutical companies also may be willing to provide demonstration materials, such as asthma inhalers and spacers. Written materials from pharmaceutical companies also can be helpful when developing SPOKE curricula; however, care must be taken to avoid using marketing materials for specific products.

Using Physician Focus Groups for Feedback on the Intervention

After the pilot intervention component was developed and before its implementation, physician focus groups were conducted. The purpose of these groups was to determine what factors were important to physicians in choosing CME

Table 2.
Sample Matrix of Weighted Population Attributes Applied to Virginia Medicaid Data on Selected Diseases

DISEASE		PEDIATRIC ASTHMA		ADULT ASTHMA		ARTHRITIS	
	Total Weight[1]	Scoring Value	Weighted Score	Scoring Value	Weighted Score	Scoring Value	Weighted Score
Population Characterisitics							
Prevalence of disease	10	4	40	3	30	3	30
Prevalence of drug use	10	4	40	4	40	4	40
Population is a high-risk group with measurable, common, serious outcomes	20	4	80	4	80	2	40
Population receives other health care benefits (e.g., Medicare)	-10	0	0	0	0	4	-40
Therapy Area Characteristics							
Presence of generally agreed upon treatment protocols or guidelines	10	4	40	4	40	2	20
Presence of generally recognized problems in therapy, well documented in the literature	15	4	60	4	60	4	60
Potential for self-authorization of guidelines	8	3	24	3	24	3	24
Measurability: morbidity (health)	10	4	40	4	40	4	40
Outcomes Characteristics							
Measurability: utilization of services	8	4	32	4	32	4	32
Outcomes due to nonoptimal therapy usually lead to measurable and problematic outcomes (e.g., intervention has potential for high yield)	20	3	60	3	60	2	40
Outcomes should be preventable in a sufficient number of cases if therapy is improved	15	4	60	4	60	2	30
Other Intervening Factors							
Therapeutic area is the target of other intervening factors in the program and/or in the political environment	-10	0	0	0	0	0	0
Overall Score			**476**		**468**		**316**

1. The total weight assigned to each attribute in each of the disease examples is multiplied by the scoring value (1–4) assigned by the respondent.

courses and how they would respond to the proposed VHOP program (Alan Newman Research, 1995). The participants were community-practice, Medallion primary care providers from the Richmond area. Important findings from the physician focus groups included the following:

Positive Motivational Factors for CME Participation

- Schedule outside of normal office hours for one-day courses, preferably on Saturdays
- Free courses
- CME Category I credits
- Convenient locations with plentiful parking
- Materials to take back to the physicians' practices
- Identities and credentials of presenters

Reactions to Proposed VHOP Intervention

- Distrust and other negative attitudes towards Medicaid officials
- Negative perceptions of the intellect and personalities of Medicaid patients
- No perceived need to improve communication skills
- Suspicion of "cookbook medicine"

The information from these sessions assisted the VHOP researchers in recruiting physicians for the educational program. The focus group results also were useful in helping tailor the program to the individual needs of physicians, although the needs related to participation in CME were easier to address than the deeper concerns about Medicaid and about intervention validity. Some of the reported findings probably would be replicated in other samples of physicians nationwide, but there are unique needs and perspectives that would be best determined by querying members of each target practitioner population.

Recruiting Physicians

Recruitment was targeted to Medallion primary care physicians who had at least one Medallion patient with asthma and preferably at least one patient with an emergency room visit for asthma. A multiple-contact recruitment strategy was used, as follows:

- The first contact was a letter endorsed by one of the principal investigators and a primary care physician with an established practice in the recruitment community.
- After the first letter, a glossy 4-page color brochure promoting the program was mailed.
- After the brochure, a third letter was mailed that contained copies of program endorsement letters from professional societies.
- The final recruitment contacts were telephone calls and faxes for nonresponders who had a high volume of patients who visited emergency rooms for asthma treatment.

The course was 6 hours long and was offered on 6 occasions. The average lead time for recruitment was 3 to 4 weeks. The participation incentives offered to physicians were free CME Category I credits, free asthma education teaching kits and materials, and mandatory prior authorization waivers.

The response rate was 17% for the physicians who had patients with emergency room visits for asthma, and 15% of the physicians whose asthma patients did not have emergency room visits also participated in the program. Physicians with a higher volume of patients who made emergency room visits were somewhat more likely to participate in the program. The response was much better for community physicians than for academic physicians. Approximately 20% of the community participants responded, but only 3% of the academic physicians responded.

Evaluation forms were provided to participants immediately after the classes. There were questions on the factual knowledge of the HUB and SPOKE curriculum, on global ratings of the effectiveness and probable impact of the workshop, and on specific components of the classes. Responses were obtained from approximately 85% of the participants. Analysis of the data revealed that the respondents had acquired an excellent knowledge of the factual content of the curricula. Most of the respondents predicted that the program would have a positive impact on their prac-

tices and that they would recommend the program to a friend. Participants expressed interest in training in additional SPOKEs.

Insights on the Recruitment Process

Participants received a follow-up contact letter that identified Medallion asthma patients in their practices who had emergency room visits or hospitalizations. There was a 1- to 2-month interval between class attendance and the contact letter. Finding ways to shorten this interval would benefit the participants.

The overall response indicates that there is significant provider interest in these types of classes. The extra efforts to recruit physicians with higher numbers of asthma patients did have some success.

If this program is to be funded as standard policy for a state, it would be desirable to maximize the percentage of eligible physicians participating in sessions. A number of potential approaches can be used to increase participation rates. These include the following:

Recruitment

- More aggressive recruiting of physicians (e.g., making in-person visits to practices, multiple letters from different sources per mailing)
- Increasing the number of opportunities to take the class, being careful to avoid scheduling conflicts with professional society meetings

Logistics

- Offering classes at more attractive locations (such as local resort areas although these may be difficult to budget for a Medicaid agency)
- Having site-based classes for academic physicians
- Altering the timing of the class (e.g., making it shorter or making it into an overnight activity and including activities for families)

Incentive

- Incorporating a refundable registration deposit to increase physicians' commitment to attend the class

The effort to recruit additional health care professionals to teach the class was of limited success. Discomfort with the HUB communication skill curriculum appeared to be a major barrier to participation in teaching. For a statewide program requiring multiple faculty, it would be useful to consider having communication professionals teach the HUB skills, while reserving the participation of health professionals for the SPOKE skills.

Insights on Multidisciplinary Training

In this pilot intervention, training of only one group of health care providers (physicians) was attempted. There are credible arguments for and against training multiple types of health care providers to achieve cost savings. A positive aspect of simultaneous multidisciplinary training is that it makes the system more fail-safe. In other words, if the pharmacist, the nurse, or the physician alters his or her behavior, the patient may change his or her behavior. It also reduces the likelihood of different groups working at cross-purposes (e.g., a pharmacist and a physician giving a patient conflicting information).

Negative aspects of simultaneous multidisciplinary training include creating a potentially unwieldy administrative structure and increased costs. An initial commitment to training multiple groups of professionals also makes it difficult or impossible to evaluate the marginal impact of training any particular group.

THE RESEARCH

Although mandatory prior authorization programs are in widespread use without proof of their cost-effectiveness (Soumerai et al., 1987), it is hoped that voluntary prior authorization programs such as VHOP will be able to produce evidence of decreased costs and/or improved outcomes.

If this program is to be replicated in other states, the extent of the research component should be determined early in the program. If the research component grows unexpectedly, the costs and complexity also will increase, and the original research design may impose restrictions on implementation of the program. It is vital to

plan the research component diligently, especially because the ability to provide tangible proof of effectiveness can strengthen providers' and legislators' receptivity.

Nevertheless, research needs can be modified as the educational intervention is implemented. Any new program designed to improve health care services should have a formal evaluation of its cost-effectiveness periodically.

The research component of VHOP measured the effectiveness of the program by measuring the health status of patients and medical care utilization. Different methods were used to measure the components of effectiveness.

In the pilot program, VHOP used the following measures of effectiveness:

- Patients' general health status
- Patients' asthma-specific health status
- Medical care utilization (inpatient hospital and emergency room) with Medicaid payments

These measures were assessed at baseline in the intervention and control communities. Health status was measured by household survey with standardized validated questionnaires (Landgraff, 1994; Ware et al., 1993) administered via telephone before the intervention and again 6 months after the start of the intervention. Medical care utilization is being measured by using DMAS claims data (Penberthy et al., 1994).

Measuring Health Status of Patients Using a Household Survey

The household survey did not reach as many patients as desired. In order for the data to be statistically valid for analysis, a 70% (minimum) response rate was targeted; the actual response rates were 45.7% for the Richmond area and 55.4% for the comparison area. A nonresponse bias analysis is being conducted to assess the significance and magnitude of the low response rate.

A variety of factors may have contributed to the poor household survey response rate, including the following:

- Medicaid populations usually are relatively mobile, which hampered attempts to locate potential respondents.
- Medicaid recipients may have been mistrustful of an official survey, fearing that the information they provided might be used for purposes other than the ones stated and might affect receipt of their benefits.
- A financial incentive of $5 was offered to respondents for completing the survey, but it was relatively modest even for a low-income group.

Although increasing the financial incentives should increase response rates, the first two factors may be more important and are not remedied easily. An intensive effort to conduct in-person interviews with respondents who do not participate in a telephone survey may improve the overall response rate, but it would dramatically increase the costs (completion of an in-person interview costs over $100). If patient data are going to be used as outcome measures in future programs, the costs and feasibility of acquiring those data must be carefully weighed against the utility of the information obtained and alternative means of obtaining information (Fisher et al., 1996).

Measuring Medical Care Utilization by Using Claims Data

The use of claims data to measure outcomes is appealing. There are no extra costs for data collection, and the data are directly relevant to policy decisions. In actual practice, the VHOP program has encountered some significant difficulties in the use of Virginia's DMAS claims data. Among them are the following:

- There are significant delays between the rendering of service and the availability of claims data.
- DMAS claims information and data set structures are geared toward optimizing reimbursement efficiency, not toward being used primarily as disease management and research tools. The storage formats of certain variables made them more difficult to use in

research, although the formats were cost-effective for storing billing data.

- Medicaid claims data sets are very large, and data analysis strained the technical capacities of the DMAS computer systems. DMAS stores most of its data on tapes, which results in slower processing.
- Researchers had limited access to the data due to competing demands for administrative and other research purposes. For example, access to DMAS storage tapes was limited to overnight hours.
- There has been no independent verification of the validity of the data.

VHOP is developing a comprehensive data dictionary and has migrated most of the relevant data to a supercomputer at VCU with adequate data storage capacities. There should be fewer problems with data analysis in the future. However, the time involved in structuring and programming data analyses should not change substantially in the future.

The use of Medicaid claims data in this type of research is probably feasible for other states, but the strengths and limitations of claims data must be considered so that appropriate measures are chosen. Each state's Medicaid claims system is unique. Ideally, data analysis should be performed by persons who have extensive experience using the data and have a firm grasp of the idiosyncrasies of the data set. The computer system capabilities should be assessed for their suitability for research data analysis. If it is financially feasible, investment in newer hardware technologies, such as disk drive systems with high storage capacity, should be considered if they are not already in place.

SUMMARY

The VHOP effort is designed to improve health outcomes among Medicaid patients enrolled in the Medallion program by improving the communication skills of physicians and other health care providers and by promoting recently established, innovative clinical guidelines through peer education. The pilot program trained physicians only on the treatment of asthma in Central Virginia. The next phase is being implemented, in which VHOP will: 1) expand the asthma training for physicians statewide; 2) incorporate pharmacists as part of the asthma training; 3) implement training on congestive heart failure for physicians statewide; and, 4) develop education materials for diabetes mellitus and schizophrenia.

The methods of the disease selection process involved weaving together empirical data and a theoretical framework to compare relevant disease-state candidates for intervention. Many attributes of a disease were considered simultaneously (e.g., the incidence of poor and costly outcomes, the availability of established guidelines, a structure for enacting the intervention, and a reliable and valid mechanism for evaluation). Therefore, in order to identify the most appropriate disease for the pilot program, three procedures were used: 1) attributes identified in the theoretical framework were applied to the DMAS data; 2) prospective disease candidates were ranked by their ability to meet key attributes; and, 3) opinions of the Virginia Medicaid DUR Committee members were determined by survey.

The results of these analyses indicated that asthma was an appropriate first choice for the pilot intervention. At the time this analyses was completed, it was thought that disease states warranting consideration for subsequent intervention included otitis media and epilepsy. However, subsequent analyses indicate that for the Virginia Medicaid population, congestive heart disease, diabetes mellitus, and schizophrenia are better candidates.

VHOP is a program where the state partners with its health professionals. This partnership not only builds a sense of trust between these parties but also relies on the model of professional responsibility for successful implementation. The VHOP researchers and Virginia Medicaid continue to test this partnership program and carefully evaluate its effects. Preliminary findings show significant improvements in relationships between the state and the health care providers and cost savings among a targeted group of patients to date. This partnership model may be useful to other states.

APPENDIX
Evaluation of Specific Diseases Using Actual Data in Virginia

Asthma

Prevalence and Associated Drug Use

Nationally, pediatric asthma appears to be on the rise, particularly among minority populations. Childhood asthma (i.e., asthma in individuals <21 years of age) in Virginia had a prevalence of approximately 5% in 1993 (Maish & Sagraves, 1993). For adult and childhood asthma, approximately 4.25% of Virginia's budget was directed to payment of pharmacy claims. Based on drug use, DMAS reimbursed $6,899,213 during FY 1993 for 294,142 claims made by 63,115 individuals (who had to have at least two claims for asthmatic drugs to be eligible). However, these drugs also are used in the treatment of COPD. In addition, these claims apply throughout the Medicaid system rather than being restricted to the Medallion program. Thus, there are problems in interpretation. More reliable is a diagnosis based on the ICD-9-CM codes appearing on the physician invoice. According to this criterion, 21,711 individuals were diagnosed with asthma. This discrepancy between asthmatic patients identified by drug use versus physician forms involves approximately 66% of the patients and points to the need for multiple criteria to ensure the valid selection of patients.

Asthma in the Medallion Population

The statewide population of asthmatic individuals in Medallion in FY 1994 was 6,405. There were 729 hospitalizations for asthma representing 630 individuals. The average payment per hospitalization was $1,964 (ranging from $394 to $12,409). The total amount paid during the year for hospital claims with a diagnosis of asthma was $1,431,802. There were 4,422 claims for outpatient asthma clinic services during FY 1994 for 2,851 Medallion patients. The total cost for outpatient visits was $582,194, which averages out to $132 per visit. These outpatient clinic services are not necessarily services rendered by emergency departments. There were 5,784 Medallion recipients with a diagnosis of asthma listed on physician claim forms, for a total of 12,737 claims. The total cost for these visits was $579,789, an average cost of $46 per office visit. Among the asthma patients, 2,782 had claims for laboratory services, for a total of 15,600 claims (about 5.6 claims per patient). The total cost was $179,062, an average cost of $64 per laboratory claim (DMAS, 1995).

Feasibility of Voluntary Authorization Guidelines

Part of the problem in treating asthma is related to a shift in the perceived cause of asthma by specialists. The conventional view was that asthmatic episodes were caused by bronchospasm (airway constriction) that progresses to airway obstruction. However, the recent approach is to view asthma as an inflammatory disease as well, in that inflammation is critical to airway hyper-responsiveness (Djukanovic et al., 1990). Therefore, anti-inflammatory agents are believed to contribute to the optimal care of such patients (Sheffer & Taggart, 1993); this view is reflected in current NIH and other guidelines.

Specific Measures for Assessing Asthma Interventions

Two categories of measures are available:

- Assessing quality of care (e.g., medical records abstraction for peak air flow readings or telephone interview assessing whether and to what extent patients were counseled and educated by physicians and pharmacists)
- Assessing actual clinical outcomes (e.g., emergency room visits or hospitalizations and/or length of stay)

Diabetes Mellitus

Prevalence and Associated Drug Use

Diabetes mellitus is the leading cause of peripheral neuropathy in developed nations. Peripheral neuropathy affects at least 15% of diabetic patients overall (Dyck & O'Brien, 1989) and 37% of persons 18 years and older with insulin-dependent diabetes mellitus (Maser et al., 1989).

Diabetes in the Medallion Population

Based on limited data in 1994, only 871 patients were diagnosed with diabetes statewide. Among these patients, there were 65 hospitalizations (involving 61 unique individuals), with an average payment per hospitalization of $3,151. There were 324 claims for outpatient hospital clinic

services representing 178 individuals for an average cost of $133. Among Medallion patients, 803 had at least one physician office visit with a diagnosis of diabetes appearing on the physician claim. The average cost of these visits was $38. Of all patients diagnosed with diabetes, 662 had claims for laboratory services for an average laboratory claim charge of $108.

Feasibility of Voluntary Authorization Guidelines

Intensive diabetes therapy is designed to achieve normal blood glucose values through the use of three or more insulin injections per day or insulin administration with an external pump. This therapy prevented development and retarded progression of diabetic retinopathy and neuropathy, albeit at the expense of a 3-fold increase in the number of severe hypoglycemic events (Diabetes Control and Complications Trial Research Group, 1993). Intensive therapy was guided by frequent self-monitoring of blood glucose levels, leading to systematic insulin dose adjustments (Diabetes Control and Complications Trial Research Group, 1993).

Specific Measures for Assessing Diabetes Interventions

- Rates of diabetic retinopathy
- Rates of cardiovascular disease

Otitis Media

Prevalence and Associated Drug Use

Otitis media (inflammation of the middle ear) is the most frequent primary diagnosis for children less than 15 years of age based on physician office recordings. Almost all children experience one or more episodes of otitis media by age 6 (Stool et al., 1994). The incidence of otitis media is highest in children between 6 months and 3 years of age. A smaller peak incidence occurs between 4 and 7 years. Infections are uncommon after age 8. It has been estimated that 76% to 95% of all children will suffer at least one episode during their childhood. Approximately 50% of children who have experienced otitis media have had 3 or more episodes, while 25% have had 6 or more episodes. Nationally, otitis media is estimated to be responsible for more than 30 million outpatient visits per year at a cost that exceeds $1 billion. Another $1 to $2 billion is spent annually on surgical treatments such as tube replacement (Kligman, 1992).

In Virginia, based on the ICD-9-CM codes (codes 381 and 382) for otitis appearing on the physician invoice, 73,608 separate individuals presented with otitis during FY 1993. The annual nonduplicated number of Medicaid recipients under the age of 21 during FY 1993 was 279,531. However, the number of claims and total cost of these claims were not available.

Otitis Media in the Medallion Population

The total number of otitis media patients in the Medallion population in FY 1994 was 18,469. Only 32 of these patients were hospitalized with this diagnosis at an average cost per hospitalization of $1,505. Claims for outpatient services (n=11,714) representing 7,969 individuals involved an average payment of $74. The average physician office visit cost $36, but with 31,940 visits from 16,434 Medallion recipients the total amount paid was more than $1.1 million.

Feasibility of Voluntary Authorization Guidelines

Pneumatic otoscopy is recommended for assessment of the middle ear because it combines the visualization of the tympanic membrane with a test of membrane mobility and results in an accurate diagnosis of otitis media in up to approximately 75% of patients.

Longitudinal studies of otitis media with effusion demonstrate high rates (>50%) of spontaneous resolution within 3 months of symptom onset. Surgery is recommended only for the child who has had bilateral effusion for 3 months and who has a bilateral hearing deficiency (defined as a 20-decibel hearing threshold level or worse in the better-hearing ear). In this case, bilateral myringotomy with tube insertion becomes an additional treatment option. Placement of tympanotomy tubes is recommended after a total of 4–6 months of bilateral effusion with a bilateral hearing deficit.

Antibiotic therapy resulted in a 14% improvement in clearance of effusion at 1 month. However, nausea, vomiting, and diarrhea are side effects 2% to 32% of the time, depending on the antibiotic type and dosage. Also, there is the potential for developing resistant strains of bacteria with this treatment.

Specific Measures for Assessing Otitis Media Interventions

The following are measures available to assess interventions in otitis media patients:

- Percent utilization of first- versus second- or third-generation of antibiotics in patients with no prior history of otitis (no diagnosis of otitis in the previous 6 months)
- Percentage of patients placed on prophylactic therapy after a diagnosis of 3 episodes of acute otitis media within a 6-month period or 4 episodes within a 12-month period
- Rates of follow-up office visits after treatment and relapse rates
- Rates and costs of tympanotomy tube replacement overall and among those treated prophylactically; significant medical complications and persistent symptoms of disequilibrium (vertigo or ataxia), validated by medical records; include documented developmental delays due to language difficulties
- Rates of medical complications: hearing loss, perforation of the eardrum, cholesteatoma (often requiring multiple surgical procedures), acute mastoiditis, atelectasis of the eardrum, retraction pockets, and ossicular discontinuity and fixation; other behavioral manifestations (e.g., irritability, disturbed sleep, decreased responsiveness, social withdrawal)
- Rates of referral for speech and language developmental lags
- Rates of side effects from medications

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