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Effects of Computer Assisted Management of Diabetes in a Rural American Indian Community

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Abstract

There is substantial evidence that the ideal treatment practices for patients with diabetes mellitus incorporate consistent, comprehensive, and individualized management of medical therapy according to research-supported recommendations. Such treatment improves both patient and provider compliance with current recommendations for diabetes care, and this compliance results in improved long term outcomes for diabetic patients. The author attempts to demonstrate that rural primary care management of medical therapy is more likely to approximate this ideal therapy by using computer-assisted diabetes management and that such a management technique can be used at minimal cost even in small populations and with limited resources. The author evaluates the effectiveness of the first year of computer assisted patient management in a Native American population that relies on a three-provider clinic for a majority of its health care.

Introduction

In the general population, over 16 million Americans have diabetes mellitus, and an estimated 50% of these individuals have not yet been diagnosed. Over 800,000 new cases are diagnosed each year.[1,2] Diabetes is the seventh leading cause of death, and the leading cause of end-stage renal disease in the United States.[3,4] It is also the seventh leading reason for patient visits to a primary care physician, and the primary care complaint most likely to impact community mortality rates.[5] The national annual expenditure for diabetes-related health care tops $100 billion, or 14.7% of the nation's health expenditures.[2]

The statistics are even more sobering for American Indians, who suffer a rate of diabetes four to eight times higher in than in nonNative American populations, with mortality rates 166% higher among Native American diabetic patients than the general population. This disparity in prevalence between Native American and nonNative American populations is attributable to a combination of genetic susceptibility and diet and exercise practices that have accompanied the shift from traditional Indian lifestyles to a western lifestyle.[6]

The Annette Island Service Unit is the only source of medical care in Metlakatla, Alaska, on Annette Island in the far southeast of the Alaskan panhandle. Medical referrals for urgent or routine specialty care are made to facilities located three to six hours away by commercial airliner, with initial transportation off the island by float plane or fishing vessel. This facility serves a population of approximately 2,000

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persons, of whom 99 percent are of Tsimshian Indian ancestry, and 5 percent of whom have diabetes. The economy is based on timber and fishing, with a primarily working class population. This small, rural population has the highest age-adjusted prevalence rate of diabetes in the state of Alaska. In 1994 the age-adjusted prevalence rate was 31.1 per thousand,[7] whereas the all Alaska Native rate for that same time period was 17 per thousand.[6] By 1999 the age-adjusted prevalence rate for Metlakatla had risen to 71.5 per thousand.[7]

Problem

Despite a stable population and the high prevalence of diabetes among members of the community, intervention has, in the past, been sporadic and problem-oriented, rather than prevention-oriented. Recent attempts to increase prevention efforts have met with limited success due to logistic and personnel problems common in isolated, rural communities like Metlakatla. When the clinic was established as an Indian Health Service facility in 1976, direct diabetes management was the sole responsibility of the providers employed by the service unit in Metlakatla. Diabetes management at the Annette Island Service Unit was strictly encounter-based; a patient's status with regard to diabetes was reviewed, and adjustments were made when patients appeared for related or unrelated appointments.

Starting in 1989, this encounter-based management system was supplemented by an annual visit by the Alaska Native Medical Center Diabetes Team, a traveling team consisting of a physician, a nurse practitioner, and a dietician. While the interventions provided by this management team have been effective in improving the intensity of care at the clinic and the level of medical intervention for acute diabetic illness, their effectiveness in basic prevention and control is severely compromised by the limitations of time and distance; they visit the community once a year for three days and they follow up with community members who have diabetes when they present to the hospital in Anchorage, usually for severe and unrelated inpatient treatment.

Beginning five years ago, all diabetic patients were assigned to one provider/case manager, usually a physician assistant or nurse practitioner, to assure continuity of care and comprehensive management, with annual chart audits, patient physicals, and supplemental therapeutic intervention provided by the Anchorage Diabetes Team. However, this diabetes case manager was not dedicated solely to diabetes management, inasmuch as he or she maintained responsibility for significant amounts of clinic coverage shared with the other providers. In addition, turnover has been frequent during this five years, with the average diabetes coordinator serving 1.6 years before relocating.

Compared to management practices that existed prior to 1989, this model has been more effective in improving the intensity of care provided to patients, especially to those patients with acute illnesses who are transported to Anchorage for interventions. It has not, for logistical and staffing reasons, been adequate for providing comprehensive, targeted patient care for those with the fewest complications and the most to gain from tight control of their diabetes.

While the management of diabetes is clearly within the usual scope and purview of primary care providers, a review of the literature clearly demonstrates that care of diabetic patients in primary care settings often fails to provide adequate management of this complex, chronic condition. The literature demonstrates that attentive, comprehensive, personal management of diabetic patients increases patient compliance and decreases the ultimate individual and societal cost of diabetes within a population.[4,5,8,9,10,11,12,13] Comprehensive management requires time and resources often unavailable to providers and facilities serving small, rural populations. These constraints also tend to limit the impact of chronic, ongoing care on the long term morbidity and mortality of diabetes in these settings.[9,14]

The following analysis of the effectiveness of computer assisted diabetes management assumes that comprehensive management of diabetes is advantageous to patients. Evidence supporting this is plentiful. Hertzel Gerstein provided an overview of ten large studies, including the much reviewed United Kingdom Prospective Diabetes Study, which demonstrated that intensive control of type 2 diabetes results in decreased risk of diabetes-related kidney disease, eye disease, cardiovascular disease, and cerebrovascular disease. Gerstein states "...intensive management of type 2 diabetes safely and effectively reduces the risk of the chronic complications of diabetes. Moreover, it adds to the growing consensus that the best possible management of diabetes' represents good preventative medicine."[15]

In 1993 the Diabetes Control and Complications Trial concluded that "intensive therapy effectively delays the onset and slows the progression of diabetic retinopathy, nephropathy, and neuropathy in patients with IDDM."[16] The authors of that study were cautious about generalizing their findings to type 2 diabetes. However, later studies have clearly shown the benefits of intensive therapy in private practice settings for both type 1 and type 2 diabetes.[12]

Although most patients in primary care outpatient settings are not candidates for intensive insulin therapy, the same regular, scheduled, attentive, individualized care required to achieve notable success in intensive therapy provides similarly improved outcomes in patients kept on so-called "tight control" regimens.[13] Frequent intervention even in patients who refuse or cannot tolerate tight control encourages greater patient compliance and more frequent interactions with medical providers, with resulting improvements in control of both diabetes and its comorbidities. Even moderate improvements in glucose control, blood pressure, and lipid status have been shown to result in significant reductions in the complications of uncontrolled hyperglycemia.[3,4,5,8,17]

The second assumption of this analysis is that intensive management in a primary care facility can, or should, approximate the quality of care and superior outcomes provided to

patients in larger hospitals and diabetic centers. A number of studies support the superior performance of patients attending diabetic treatment centers and large hospitals with superior resources,[14,18] an option not available to many rural patients. The lack of such resources for rural patients does not, however, relegate the patients to inferior care. Many studies have demonstrated that although dedicated, well-staffed centers can provide superior care for diabetic patients, this does not exclude the delivery of such care in primary care offices. Griffen's metaanalysis of general practice diabetes trials demonstrated that general practice providers could manage diabetic patients with the same or superior outcomes as large hospitals if these general practice facilities had shared care schemes with larger facilities or centralized diabetes programs. The transfer of responsibility for diabetes care from hospitals to general practice without such support was associated with a significant increase in adverse outcomes among diabetic patients.[14] The Verona Diabetes Study and the Hoskins study both produced evidence that cooperative arrangements between larger hospitals and primary care facilities provided far superior diabetic care than did primary care facilities alone, with higher levels of patient satisfaction when these arrangements allowed patients to remain closer to home.[18,19] The evidence is strong, however, that outcomes are clearly inferior when primary care centers attempt to manage diabetics in isolation.[14,18,19]

The burden of proof, then, is on small facilities like that on Annette Island to bridge the gap between hospital care, which is available only distantly and at high cost, and clinic care, which is available locally and is preferred by patients. Some literature does exist demonstrating that computer programs designed for diabetic populations can help bridge this gap. Griffen's metaanalysis demonstrated that general practice facilities with computerized prompting systems had better patient outcomes than did general practice facilities without such systems.[14] Meneghini, et al demonstrated in a small study of 184 patients that an electronic case manager providing on-demand electronic feedback, including insulin dosage adjustments, could significantly decrease average hemoglobin A_{1c} by 0.9 percent in one year while simultaneously decreasing episodes of hyper- and hypoglycemia threefold.[20] Streja, et al demonstrated that the primary reason providers fail to implement accepted preventative care measures is oversight by the provider, with oversight more common among busier providers. Their conclusion was that computerized reminder systems might be a solution.[21] Nilasena, et al demonstrated that computer reminder programs improved provider compliance without increasing the time required with each patient. The author was unable to locate examples of computerized systems that serve as both provider reminders and also provide cohort identification for targeted interventions and data analysis for quality control.

In Metlakatla, continuity and consistency of care have been hampered primarily by time and staffing limitations, compounded by staff turnover and the common use of *locum tenens* providers and residents to supplement full time staff. This has resulted in the inconsistent application of therapeutic interventions between patients, the recurrent redirecting of therapy for individual patients by different providers with resulting patient dissatisfaction, and the failure to realize the advantages of continuity of care for many patients whose provider of diabetic care changes frequently.[9] Although the cooperative model between the Anchorage diabetes team and the local clinic staff is a model that approximates the cooperative arrangements that proved so successful in the Verona Diabetes Study[18] and Griffen's metaanalysis,[14] in communities as remote as Metlakatla the distance factor compromises the effectiveness of the hospital-based partner in the cooperative arrangement, and staff turnover and time constraints compromise the efforts of the clinic partner. This model fails to assure that patients benefit from the known advantages of cohesive, consistent diabetic care, since care for the diabetic cohort remains dominated by on-the-spot interventions and problem-directed care by multiple providers with differing levels of training and expertise. Unfortunately, this situation is not uncommon in small, rural, primary care facilities with limited staff and resources, and this particular scenario is repeated in a large number of remote Alaskan villages where diabetes care is limited entirely to the annual visit by the Anchorage diabetic team.

Purpose

The intent of this study was to evaluate the effectiveness of computer-based population analysis and its use in targeted diabetes management in a population of Native American diabetics. Additionally, the aim of this study was to provide evidence that a computerized management system that meets specific operating criteria can allow small, rural clinics with limited resources to manage diabetic patients with clearly demonstrated increases in both provider and patient performance measures as a result. The specific criteria are:

- Requires limited resources to run
- Operates using inexpensive, available technology
- Operates effectively with a small patient base
- Provides dynamic data generation on request
- Provides written, personalized feedback to each patient
- Allows targeting of specific patient subgroups based on current clinical status

Research Design and Methods

The Diabetic Management System. A customized computer program was developed using visual basic and sequential query language modules directed through a Microsoft Access 97 user interface. Epidemiological data generation and graphing were done using visual basic modules and a Microsoft Excel 95 user interface. System beta-testing was in an open-case series (n = 95) with termination of beta-testing following verification of data integrity and calculations. The system is designed for use only by the primary diabetes

manager, with no patient interface. It has not been evaluated by the Food and Drug Administration (FDA) as an "expert system" and it does not recommend treatment or provide rule-based evaluation of patient care. Therefore, the system is primarily a data management system with supplemental analysis functions and appropriate report generating capability. It functions as a computerized reminder system to encourage provider compliance with recommendations, as a cohort generator for isolating and targeting specific patients with high risk factors or poor health indicators, and as an outcome analyzer to provide feedback to providers about what areas of provider performance and patient care require attention.

Data Entry. Specific patient data were entered throughout the first year the program was online. The number of data items per patient entered at each quarter varied depending on the number of interventions required for each patient. The minimum number of data items entered per quarter per patient was 8, the maximum 88. Quarterly chart audits required three to five days of data entry for 100 patients and were performed by a part-time employee paid hourly specifically for data entry.

Quarterly Reports. Periodic reports were printed identifying which patients still required specific procedures or interventions, at which time these patients were contacted directly and given appointments for completion of the required interventions. Reports of patients whose data indicated clinically significant noncompliance or abnormal health indicators (blood pressure, hemoglobin A_{1c}, cholesterol, liver function tests, etc.) were also used for immediate intervention. Each quarterly chart audit was followed by repeated report generation of patients to be targeted for interventions in the next quarter. Targeting lists were distributed to those needing such information (medical providers, Papanicolaou smear and mammogram tracking personnel, dietician, laboratory, and pharmacy) facilitating a team approach to patient care, with those personnel most responsible for a given intervention informed of its delinquency. Only 50 percent of the 88 data items were online during the first two quarters of the year, so no patient targeting was done during the first two quarters of the 1999 audit year. Patient friendly summaries were printed out as required and sent to those patients with specific compliance issues.

Annual Reports. At the end of the first full calendar year, annual reports were generated with statistical analysis of both 1998 and 1999 data, as well as comparative analytical reports. The 1998 data were entered from chart audits, although no targeted management was done during the 1998 audit year. The data analysis reports demonstrate net and percentile change in 110 specific treatment categories, while the comparative reports demonstrate percentile change between years in 105 specific treatment areas. The comparative reports are divided into patient and provider performance measures, allowing the diabetes management team to compare the performance of both patients and providers over time in those areas for which they are primarily responsible. Table 1 lists those measures assigned to each area of responsibility.

Table 1. Performance report items

Patient Performance Report Items	Provider Performance Report Items
Weight Control	Yearly Diabetic Physical
Blood Sugar Control	Yearly Dietician Consult
Tobacco Use	Yearly Dental Exam
Blood Pressure Control	Yearly Diabetes Education
Renal Function	Yearly Diabetic Foot Exam
Urinalysis	Yearly Diabetic Eye Exam
Lipids (HDL/LDL/Total Cholesterol/Trig)	Yearly Pap
	Yearly Mammogram
	Yearly PSA
	Pneumovax up-to-date
	TD up-to-date
	Hep B up-to-date
	Flu Shot up-to-date
	EKG up-to-date
	Hypertensives and ACE Inhibitor Use
	Current Diabetes Treatment Regimen
	TB Status Documented

The system also prints patient friendly summary reports for each patient, which were mailed to them along with diabetes information most relevant to their particular clinical picture, facilitating ongoing patient education and involvement in treatment decisions and their outcome.

Study Design. The study design is a closed case series (n = 88 in 1998, n = 95 in 1999), with all cases closed on May 31st of the audit year. Records are audited for twelve month periods running from June 1st to May 31st.

Study Questions. The specific questions addressed by this study are:

1) Does computer assisted diabetes management of diabetic patients in our population improve the performance of clinic providers in 17 defined provider performance categories? (Table 2).
2) Does computer assisted diabetes management of diabetic patients in our population improve the performance of our diabetic patients in 10 defined patient performance categories? (Table 3).
3) Does computer assisted diabetes management of diabetic patients in our population demonstrate significant improvement in meeting 10 long range goals towards better management of diabetic patients? (Table 4)[22].
4) Does computer assisted diabetes management of diabetic patients in Metlakatla decrease the documented prevalence of diabetes in our population?

Inclusion Criteria. Entrance criteria were unrestricted with respect to age, duration of diabetes, Native or nonNative status,

Table 2. Provider performance categories

Diabetic patients completing their yearly diabetic physical
Diabetic patients completing their yearly dietician consult
Diabetic patients completing their yearly dental exam
Diabetic patients completing their yearly diabetics education
Diabetic patients completing their yearly diabetic eye exam
Eligible female diabetic patients completing their yearly pap
Eligible female diabetic patients completing their yearly mammogram
Eligible male diabetic patients completing their yearly PSA
Eligible diabetic patients with their Pneumovax up-to-date
Eligible diabetic patients with their TD up-to-date
Diabetic patients with their Hep B up-to-date
Diabetic patients with their flu shot up-to-date
Diabetic patients with their EKG up-to-date
Eligible diabetic patients with hypertension placed on an ACE inhibitor
Eligible diabetic patients with TB status documented

Table 3. Patient performance categories

Obese or morbidly obese diabetic patients
Diabetics with fair or good Hemoglobin A_{1c}
Patients currently using tobacco
Diabetics with controlled or normal BP
Diabetics with positive microalbumin testing
Patients with positive UA protein
Diabetics with total cholesterol levels below 200
Diabetics with total cholesterol levels above 35 (males) and 45 (females)
Diabetics with LDL cholesterol levels below 100
Diabetics with triglyceride levels below 150

Table 4. Long range performance categories[22]

Reduce diabetes annual incidence to no more than 2.5 per 1000
Reduce diabetes prevalence to no more than 25 per 1000
Reduce the annual incidence of amputation due to diabetic neuropathy by 5%
Reduce the annual incidence of blindness due to diabetic retinopathy by 5%
Increase to 80% the proportion of diabetic patients with a BP < 140/90
Increase to 80% the proportion of hypertensive diabetic patients on an ACE inhibitor
Increase to 80% the rate of annual dilated eye exams for diabetic patients
Increase to 85% the rate of annual complete foot exams for diabetic patients

diabetes type, method of treatment, or history of compliance. Restrictive criteria included the following:

1) Annette Island Service Unit patient during the audit year
2) Documented history of Gestational Diabetes, Suspected Insulin Resistance Syndrome, Insulin Resistance Syndrome, Type 1 Diabetes, or Type 2 Diabetes
3) Nonrefusal of care. Known diabetic patients who refused all treatment for diabetes from AISU were included in prevalence calculations only and excluded from performance measures calculations. (n = 0 in 1998, n = 3 in 1999)

Results

Question 1. Does computer assisted diabetes management of diabetic patients in our population improve the performance measures of clinic providers in 17 defined provider performance categories?

As can be seen in Table 5, of the 17 monitored provider performance measures for 1999, 16 demonstrated significant improvement when compared with those same measures for 1998. Some improvements can be credited to specific prevention measures taken in 1999 that had not been taken before, such as the diabetic eye examination increase of 330 percent. In 1999 an optometrist was contracted to provide one dilated eye exam to all registered diabetic patients. Only one measure, the percentage of hypertensive patients on an acetylcholinesterase (ACE) inhibitor, declined slightly, indicating that more hypertensives have been identified and treated with nonACE medications, or else known hypertensive patients were taken off of ACE inhibitors. In fact, at least two patients were switched from an ACE inhibitor due to medication side effects, and one patient was started on atenolol by a *locum tenens* provider and later refused to switch to an ACE inhibitor. In all 17 provider performance measures, documentation bias is likely to be present, but is unlikely to be highly significant.

Table 5. Provider performance results

Category	% Change between 1998-1999	Result
Yearly diabetic physical	54.53%	Improved
Yearly dietician consult	100.26%	Improved
Yearly dental exam	183.70%	Improved
Yearly diabetes education	84.02%	Improved
Yearly diabetic foot exam	108.04%	Improved
Yearly diabetic eye exam	330.80%	Improved
Yearly pap as required	20.00%	Improved
Yearly mammogram as required	0.31%	Improved
Yearly PSA as required	35.80%	Improved
Pneumovax up-to-date	40.88%	Improved
TD up-to-date	16.49%	Improved
Hep B up-to-date	7.05%	Improved
Flu shot up-to-date	36.87%	Improved
EKG up-to-date	24.02%	Improved
Hypertensives on an ACEI	-9.84%	Declined
TB status documented	21.58%	Improved

Since all the provider performance measures except TB Status Documented and Hypertensives On An ACE are billable items, a higher compliance rate with documentation is likely. Nonetheless, the significant increase in attention to documentation of performed procedures in 1999, for the purposes of data entry into the system, is likely to have resulted in the proper documentation of more performed procedures in 1999 than in 1998.

Question 2. Does computer assisted diabetes management of diabetic patients in our population improve the performance measures of our diabetic patients in 10 defined patient performance categories?

As can be seen in Table 6, of the 10 patient performance measures, four showed improvements and six showed a decline in performance between 1998 and 1999. A 28.5 percent improvement in the number of diabetics with a fair or good hemoglobin A_{1c} is partly accounted for by the addition of 5 new diabetics, all with elevated hemoglobin A_{1c} but none with a hemoglobin A_{1c} above 9. While obesity as a percentage of our diabetic population increased by 6 percent over the previous year, a look at the percentages of obese patients in our population by weight shows that this increase results primarily from an increase in documentation of obesity, rather than from an actual increase in the number of obese patients. This also appears to be the case for the data on the number of patients using tobacco, where the number of cases lacking documentation of tobacco use fell by 50 percent. The significant decrease in patients with well controlled blood pressure does not appear to be related to improved documentation but in fact reflects a shift in blood pressure control of a significant number of our patients from normotensive, controlled, and borderline status to uncontrolled and severely uncontrolled status. Microalbumin and urine protein testing also suffer from documentation bias, with a 50 percent decrease in undocumented cases of microalbumin testing and a 60 percent decrease in undocumented cases of urine protein testing. Cholesterol testing also suffered from significant documentation bias with a 20 percent increase in testing and documentation in 1999 compared to 1998. The percentage change in each lipid level in each lipid category was actually minimal between 1998 and 1999, with an 89 percent increase in the number of patients with triglycerides above 400 mg/dl accounted for by an increase in poorly controlled patients from two to four.

Table 6. Patient performance results

Category	Change between 1998-1999	Result
Obese or morbidly obese patients	6.02%	Declined
Diabetics with fair or good Hb A_{1c}	28.46%	Improved
Patients using Tobacco	41.85%	Declined
Diabetics with controlled or normotensive BP	-64.51%	Declined
Diabetics with positive microalbumin testing	415.22%	Declined
Diabetics with positive UA protein	39.36%	Declined
Diabetics with total cholesterol levels below 200	-7.80%	Improved
Diabetics with HDL cholesterol levels above 35 (male) and 45 (female)	6.69%	Improved
Diabetics with LDL cholesterol levels below 100	8.08%	Improved
Diabetics with triglyceride levels below 150	-18.94%	Declined

Question 3. Does computer assisted diabetes management of diabetic patients in our population demonstrate significant improvement in meeting 10 long range goals towards better management of diabetic patients?

Table 7. Long range performance results [22]

Category	Result	Result
Reduce diabetes annual incidence to no more than 2.5 per 1000	1.5 Change of -2.33% since 1998	Goal achieved Improved
Reduce diabetes prevalence to no more than 25 per 1000	45.6 Change of 4.6% since 1998	Goal not achieved Declined
Reduce the annual incidence of amputation due to diabetic neuropathy by 5%	0% Change of 0% since 1998	Goal achieved No change
Reduce the annual incidence of blindness due to diabetic retinopathy by 5%	0% Change of 0% since 1998	Goal achieved No change
Increase to 80% the proportion of diabetic patients with a BP < 140/90	53.26% Change of 5.05% since 1998	Goal not achieved Improved
Increase to 80% the proportion of hypertensive diabetic pateints on an ACEI	83.87% Change of -10.9% since 1998	Goal achieved Declined
Increase to 80% the rate of annual dilated eye exams for diabetic patients	44.57% Change of 76.8% since 1998	Goal not achieved Improved
Increase to 85% the rate of annual complete foot exams for diabetic patients	59.78% Change of 51.9% since 1998	Goal not achieved Improved

As can be seen in Table 7, of the 8 long range performance goals established by the Anchorage diabetes team for Alaska Native communities, four demonstrated improvement over 1998, with the rate of dilated eye exams and annual foot exams increasing most significantly. Although the ACE inhibitor use goal was met in 1999, the 1999 rate of ACE inhibitor use by hypertensive patients decreased from 1998, again indicating a problem with our management of our diabetic, hypertensive patients. Since we had a zero rate of amputation and blindness in both 1998 and 1999, these measures provided no useful information.

Question 4. Does computer assisted diabetes management of diabetic patients in Metlakatla decrease the documented prevalence of diabetes in our population?

As can be seen in Table 7, the age-adjusted prevalence in

1999 was 71.1 per thousand, and the absolute prevalence was 45.6 per thousand in 1999. The absolute prevalence in 1998 was 43.5. There is no indication that one year of computer assisted diabetic management had any positive impact on the prevalence of diabetes among the diabetic population studied.

Discussion

The current data compare an audit year when no comprehensive management program was in place (1998) to one when a comprehensive program was in place (1999). The improvements, although large, may be partially attributable simply to the change in management practices and not to the use of computerized management practices. Ongoing computerized management will allow comparison of the effect, if any, of computerization over management style. Of equal importance in interpreting the significance of these findings is the increase in attention to documentation of performed procedures in 1999. The lack of such attention in 1998 may have artificially lowered performance data for 1998 and thus created artificially high percentile changes when comparing 1998 and 1999. Most categories of care demonstrated significant decreases in the level of undocumented data. Future comparisons should allow a comparison of data collected under the same intensity of documentation as the current year and thus allow a more accurate quantification of change.

Despite its limitations in identifying any but the most marked trends, the results strongly suggest that the addition of computer assisted diabetic management with targeted cohort interventions increases the intensity of care provided. There are impressive percentile increases in all but one provider performance measure, indicating that provider reminders and targeting of patients needing recommended interventions did increase the completion of these recommendations in this population. The percentile changes in patient performance measures are much less impressive, and documentation bias in this small sample makes meaningful conclusions impossible. Even with credible increases in provider performance measures it is too early to identify any increase in glycemic control as a result of this increase in provider-directed interventions. This disparity is not unexpected however, given that the selected provider performance measures do not require time to demonstrate improvement, whereas the selected patient performance measures may not show significant change for months after a successful intervention.

Clearly, longer term data analysis is required before concluding that computer assisted diabetic management in rural communities can have a measurable impact on patient outcomes or disease prevalence, either in the short term or the long term. As a vehicle for facilitating recommended provider performed interventions and for targeting noncompliant or poorly controlled patients for regular intervention, computer assisted diabetic management seems a minimally labor-intensive adjunct to provider directed care. This would seem especially appropriate in a rural primary care setting, like that found at the Annette Island Service Unit, where limited time and resources may result in disparities in the quality and quantity of care provided to diabetic patients

Conclusions

Computer assisted diabetes management in this stable patient population appears to increase provider compliance with national standards of care for diabetics. The mechanism by which it does this appears to be as both a reminder system and as an organizational tool that promotes comprehensive patient management even when providers change frequently. Computer assisted diabetes management also appears to increase patient compliance with some measures where reminders by clinic staff can increase compliance (getting laboratory tests drawn, keeping appointments). It is too early, however, to draw any meaningful conclusions concerning the effects of computer assisted management on health markers like glucose control, cholesterol levels, or blood pressure, or on outcome measures such as disease prevalence, stroke, heart attack, nephropathy, or neuropathy development.

Recommendations

The computer assisted management program should be continued with this patient population to validate the hypothesis that computer assisted, targeted diabetes management improves not just provider performance measures but also patient performance measures, and that these improvements correspond with identifiable improvements in patient outcomes (decreased mortality from heart disease and diabetic renal disease, decreased complications such as retinopathy, blindness, and amputation, increased patient compliance with provider recommendations). Longer term use with annual data comparison should be done to demonstrate that such intensive data collection is truly beneficial for patients and cost effective for organizations. Additional data collection, such as patient surveys, should be done to identify whether such targeted intervention also improves patient interest in their own care or results in changes in individual patient risk factors. □

References

1. Centers for Disease Control and Prevention. National Diabetes fact sheet: National Estimates and General Information on Diabetes in the United States. US Department of health and Human Services, Centers for Disease Control and Prevention. 1997
2. Einhorn D et al. Type II diabetes: New tools, new strategies. *Family Practice Recertification*. August 1997;19(8):83-104
3. Poirier S et al. Preserving the diabetic kidney. *The IHS Primary Care Provider*. August 1997; 22(8):125-129
4. Peterson KA, et al. Strategies to improve diabetes care delivery. *The Journal of Family Practice*.1998;47(5):S55-S62
5. Kerr CP. Improving outcomes in diabetes: a review of the outpatient care of NIDDM Patients. *The Journal of Family Practice.* January 1995; 40(1):63-75
6. Roubideaux Y. Diabetes In American Indians, University of Oklahoma College of Medicine Office of Continuing Medical Education, 1998
7. Annual Diabetes Survey for Metlakatla, Alaska Native Medical Center Diabetes Management Program, 1998
8. Glasgow RE. Effects of a brief office-based intervention to facilitate diabetes dietary self-management. *Diabetes Care.* August 1996; 19(8):835-842

9. O'Conner PJ, et al. Is having a regular provider of diabetes care related to intensity of care and glycemic control?
10. Daniel M, et al. Effectiveness of community-directed diabetes prevention and control in a rural Aboriginal population in British Columbia, Canada. *Social Science & Medicine* 1999;48:815-832
11. Kinmonth AL, et al. Randomised controlled trial of patient centred care of diabetes in general practice: impact on current wellbeing and future disease risk
12. Hellman R, et al. Effect of intensive treatment of diabetes on the risk of death or renal failure in NIDDM and IDDM. *Diabetes Care.* 1997;20(3):258-264
13. Brown DF, Jackson, TW. Diabetes: >tight control= in a comprehensive treatment plan. *Geriatrics.* June 1994;49(6):24-36
14. Griffin, Simon. Diabetes care in general practice: meta-analysis of randomized control trials. *British Medical Journal.* August1998;317: 390-395
15. Gerstein HC. Preventative medicine in a diabetes clinic: an opportunity to make a difference. *The Lancet.* February 1999;353:606-608
16. The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *The New England Journal of Medicine.* September 1993; 329(14):976-985
17. McKenzie SB, et al. A primary intervention program (pilot study) for Mexican American children at risk for type 2 diabetes. *The Diabetes Educator.* March/April 1998;24(2):180-187
18. Verlato G, et al. Attending the diabetes center is associated with increased 5-year survival probability of diabetic patients, The Verona Diabetes Study. *Diabetes Care.* March 1996;19(3):211-213
19. Hoskins PL et al. Sharing the care of diabetic patients between hospital and general practitioners: does it work? *Diabetic Medicine.* 1993;10:81-86
20. Meneghini LF, et al. An Electronic case manager for diabetes control. *Diabetes Care*. April 1998;21(4):591-596
21. Streja DA, et al. Factors associated with implementation of preventive care measures in patients with diabetes mellitus. *Archives of Internal Medicine*. February 1999;159: 294-302
22. Long Range Health Surveillance Objectives, Alaska Native Medical Center Diabetes Management Program, 1997

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Menopause 2000: Cool Perspectives on a Hot Issue (60 minutes) As we approach the turn of the century, controversy still exists about how best to manage menopause and post-menopausal problems. Who needs to be treated? And who is better off without intervention? How can you individualize management to address not only the major issues surrounding menopause (e.g., osteoporosis and heart disease), but also those that mean a great deal in terms of quality of life (e.g., vaginal dryness, sexual function, and psychological effects)? Overall, do younger physicians rely on high-tech testing at the expense of the "hands-on" clinical expertise demonstrated by their older colleagues? Find out how two generations of experts in obstetrics and gynecology strike the balance in managing this often divisive medical issue.

NCME #755

Information Systems in the Physician's Office: Opportunities and Risks (60 minutes) Knowledge is power. And today, that power is being fueled by the continually evolving information revolution. Computers and the Internet have made information accessibility quicker and easier than ever before. Some physicians have readily embraced this new electronic world; others are taking a more wait-and-see attitude. Whichever camp you fall in, you'll find this program a compelling look at information technology as it relates to your practice now and in the future.

The Effect of Patient Information on the Quality of Pharmacists' Drug Use Review Decisions

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The drug utilization review (DUR) provisions of the Omnibus Budget Reconciliation Act of 1990 (OBRA '90) require that pharmacists evaluate prescribed drug therapy prior to dispensing to ensure they are appropriate, medically necessary, and are not likely to result in adverse events. This responsibility is commonly referred to as "prospective DUR."

Purpose of Study

Specifically, two research questions were addressed in this study:

1. Do enhancements in patient information available to pharmacists improve the quality of their DUR-related decisions?
2. Do pharmacists who routinely practice in environments with enhanced access to patient information make better use of available information in their DUR-related decisions than those who do not?

Methods

Six clinical cases were created that contained known prescribing problems. Cases were divided into four levels of increasing patient information. Level 1 included only the information that is required on a legal prescription in Indiana. Level 2 added the patient medication profile and history. Level 3 added the diagnosis or reason for use of the prescribed medication. Level 4 added patient encounter information, including the patient's current complaints, findings of the physical examination, patient history, pertinent laboratory data, other current medical problems, and the physician's progress notes and therapeutic plan.

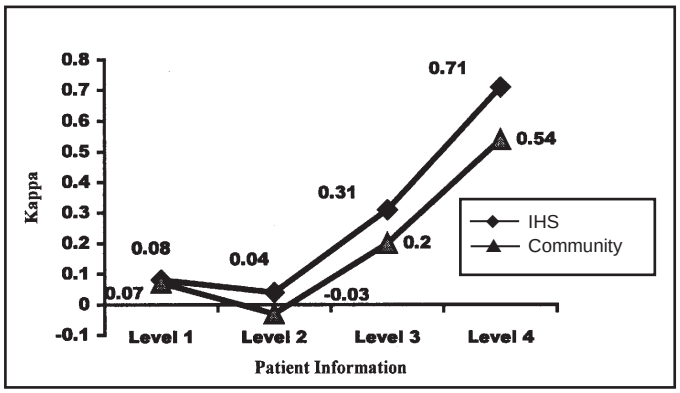
The effect of enhanced patient information was evaluated among two groups of pharmacists. Group 1 consisted of 28 community pharmacists in Indiana. Group 2 consisted of 32 Public Health Service pharmacists employed in the Indian Health Service (IHS). IHS pharmacists were tested because they practice in an environment in which pharmacists have routine access to virtually complete patient health care information. Pharmacists in both groups worked sequentially through each level of patient information for each case. At each level, the pharmacist evaluated the prescribed drug therapy on the basis of the available information using the prospective DUR criteria required by OBRA '90.

The quality of pharmacists' decisions were evaluated by comparing their evaluations for each level of each case with the consensus judgment of two clinical experts. Kappa coefficients of agreement were computed between each pharmacist and the expert judges for each level of each case. Kappa coefficients are interpreted much like a correlation coefficient, where 1 = perfect agreement, and 0 = no more agreement than would be expected by chance.

Results

The study found that the quality of the IHS pharmacists' DUR decisions improved significantly at each incremental level of patient information that was made available to them. Similarly, the quality of community pharmacists' DUR decisions improved significantly at every level of patient information except from Level 1 to Level 2. That is, community pharmacists did not, as a group, utilize the patent's medication profile to make better DUR decisions than they made with that which is legally required information on the prescription order. However, the addition of the patient's diagnosis (Level 3), and the encounter form (Level 4), significantly improved community pharmacists' DUR decisions. A graphic representation of these results appears in Figure 1.

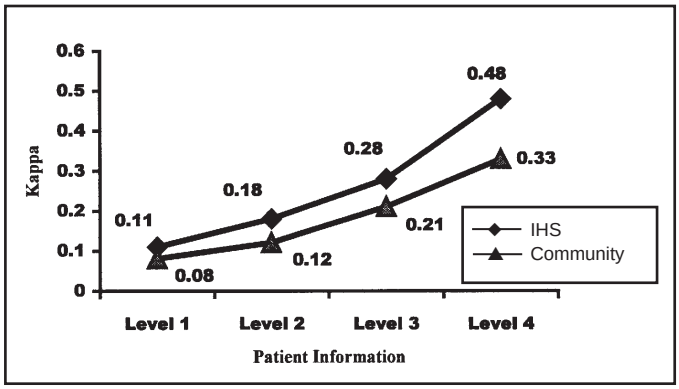
Figure 1. Agreement of pharmacists and experts at four levels of patient information



In addition to specific DUR-related questions, pharmacists were also asked at each level of each case whether they would have dispensed the prescription in question given the informa-

tion available. Pharmacists in both groups tended to reach higher agreement with the judges on this question as the level of available patient information increased. Statistical tests indicated that IHS pharmacists had a higher level of agreement with the judges on this net dispensing decision than did the community pharmacists. A graphic representation of these results appears in Figure 2.

Figure 2. Agreement of pharmacists and experts at four levels of patient Information



Conclusions

Pharmacists in this study made better quality decisions when they had more complete patient information on which to base their decisions. The results of this study also demonstrated that pharmacists who have routine access to more complete patient information make better quality prospective DUR decisions than those who do not. These results suggest that providing pharmacists with such information would significantly improve their ability to fulfill their legally mandated DUR responsibilities. □

LETTER TO THE EDITOR □

Accurate Classification of Childhood Deaths Essential

Editor:

I greatly appreciate the article "Fatal Injuries Among American Indian and Alaska Native Infants, 1992-1994" in the *July 1999 Provider* (Volume 24, Number 7, pp 109-114). Under the methodology section, the author states that "the data are subject to the degree of accuracy of the reporting by the states to the National Center for Health Statistics." I would add that the data are subject to the degree of accuracy of causes of death assigned by persons completing the death certificates.

It may surprise some providers to know that tribal police officers (as well as other nonmedical persons) serve as coroners in some jurisdictions served by the IHS. This means that SIDS (sudden infant death syndrome) can be assigned as a cause of death without a complete investigation (e.g., without an autopsy) in the event of child fatality. SIDS cannot, in fact, be established as a diagnosis without an autopsy, nor can homicide be uncovered in some cases of shaken baby syndrome (SBS) without an autopsy. As high as the rate of infant homicide is in Indian country, it may be even higher than we think, due to some fatal SBS cases misclassified as SIDS or other causes of death.

Those of us who care for children have a duty to call tribal agencies to accountability when it comes to child fatality investigations. State offices of medical investigators and the Federal Bureau of Investigation (FBI) have been instrumental in providing training and support to the tribes that desire thorough investigation for every child who dies. Child Fatality Review Teams at the state and county level can also be helpful to assure that every child fatality is scrutinized. The medical consultant for the Child Protection Team (CPT) at any IHS site should be vigilant of the news of child deaths to assure thorough investigations from the outset. Only by taking these steps can we uncover all child homicides and bring perpetrators to accountability, as well as protect future generations of children.

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Medical Consultant to the CPT
Gallup Indian Medical Center

Innovative Senior Programs on the Blackfeet Reservation

The Blackfeet Eagle Shields Senior Citizen Center serves the approximately 700 Blackfeet and other elders, 60 years of age and older, residing on the Blackfeet Reservation in Montana. Like many Senior Centers in Indian Country, they have been creative and innovative about finding funds to fulfill their mission to provide nutritional support and other services to the elders they serve.

They have developed the following special programs in addition to the nutritional support, social gatherings, and information and referral services funded by Title VI of the Older Americans Act.

Alzheimer's Demonstration Project

The goal of this program is to build the caregiving capacity of the Center by providing case management to elders with dementia, providing respite care to their caregivers, and educating community providers and agencies.

The Blackfeet Personal Care Attendant (PCA) Program

This program delivers personal care services to the elderly and disabled under the Montana Medicaid Disabled and Elderly programs. Qualified elders are Medicaid eligible and have conditions that limit their ability to care for themselves at home. The personal care attendants provide assistance with activities of daily living and personal hygiene, and help with meal preparation and household tasks, depending on the specific needs of the elder or non-elder disabled individual. The center provides training, as well, for the personal care attendants.

Elder Protection Team

The Center works with Tribal Social Services and Law Enforcement to deal with issues of elder neglect, abuse, and exploitation under the Tribal Elder Protection Code.

The Center is also actively exploring the development of expanded case management services for their elders and the construction of an assisted living facility. As is the case in many reservation-based communities, the Blackfeet Eagle Shield Senior Center has become the focus for providing services that allow elders to age safely in place in their homes and with their families.

For further information, contact Connie Bremner, Director, Eagle Shield Senior Citizens Center, PO Box 76, Browning, MT 59417; phone (406) 338-7257. □

INDIAN AGING CONFERENCE OF INTEREST □

Geriatric Medicine 2000
February 26-29, 2000; Boston, Massachusetts

Harvard Medical School offers this "…authoritative update on the specialized clinical management of elderly patients," entitled Geriatric Medicine 2000. For information, telephone (617) 432-1525; e-mail *hms-cme@hms.harvard.edu* or *www.med.harvard.edu/conted/*.

Health in Aging: The Challenge and Promise of the New Decade
May 17-21, 2000; Nashville, Tennessee

This is the Annual Meeting of the American Geriatrics Society. There is a series of Core Curriculum lectures covering the breadth of geriatric medicine, as well as research presentations and symposia on selected topics. A special interest group in Ethnogeriatrics meets at this time also. Most of the leaders in the field of geriatrics attend this annual event. While the majority of AGS members are physicians, the organization is trying to attract nursing interest and important contacts in the field of geriatric nursing can be made. This would provide an excellent update for physicians, advanced practice nurses and physician assistants. For more information, call (212) 308-1414; fax (212) 832-8646; or e-mail *info.amger@americangeriatrics.org* or *www.americangeriatrics.org.*

Rural Aging: A Global Challenge
June 7-11, 2000; Charleston, West Virginia

For information about this first international conference, to be held at the Charleston Civic Center, Charleston, WV, contact the West Virginia University Center on Aging, 1186 Health Sciences Center, PO Box 9129, Morgantown, WV 26506-9129; phone (304) 293-0628; fax (304) 293-0658; or e-mail *ruag2000@mail.hsc.wvu.edu.*

Ninth National Alzheimer's Disease Education Conference
July 16-18, 2000; Washington, DC

This meeting covers a broad range of topics relating to the care of persons with dementia. For more information, call (312) 335-5720.

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THE IHS PRIMARY CARE PROVIDER

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