

Guide to Run RPMS

Electronic Diabetes Audit



Produced by
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Great Lakes Inter-Tribal Council, Inc.

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About this Guide

This guide is provided by the Great Lakes EpiCenter and funding is provided through Bemidji Area Diabetes Surveillance grant from the Indian Health Service (IHS). The purpose of the project is to assist and empower Tribes in Michigan, Wisconsin, and Minnesota in the collection, analysis, and interpretation of diabetes care data across Bemidji Area.

This guide has been developed for physicians, mid-level practitioners, nurses, case managers, and diabetic coordinators responsible for the care of Native Americans with diabetes. It provides step by step instructions for the diabetes team to generate electronic diabetes audit from the established RPMS Diabetes registry. This guide will facilitate the Indian Health Service Diabetes Management System User Manual.

We welcome your interest in learning the Diabetes Management System and also hope you will find it very useful for generating electronic Diabetes Audit reports to make diabetes surveillance more meaningful and practical for your diabetes program.

We appreciate your feedback on how we can better serve your tribal health care facility to improve the quality of Diabetes Care, please do not hesitate to call us at 1-800-472-7207.

DIABETES MANAGEMENT SYSTEM (DMS)

INTRODUCTION

This instruction manual describes the **RESOURCE AND PATIENT MANAGEMENT SYSTEM (RPMS)** of Diabetes Management System (DMS) Diabetes Audit report generator and provides a step by step approach.

This document has been designed primarily as an instructional guide for Diabetes Coordinators/Diabetes team working in the Diabetes Management System. We hope you will find it a very useful guide for generating electronic Diabetes Audit reports.

What do Diabetes Audits measure?

Diabetes Audits monitor the use of particular interventions, or the care received by diabetic patients, against agreed standards. Any departures from "best practices" can then be examined in order to understand and act upon the causes. We will recommend simple methods that health professionals/ diabetes teams can use to monitor how they follow the guidance offered by the Indian Health Service.

Why is Diabetes Audit important?

Effective diabetes audit is important for health professionals, health directors, diabetes team managers, patients and the public.

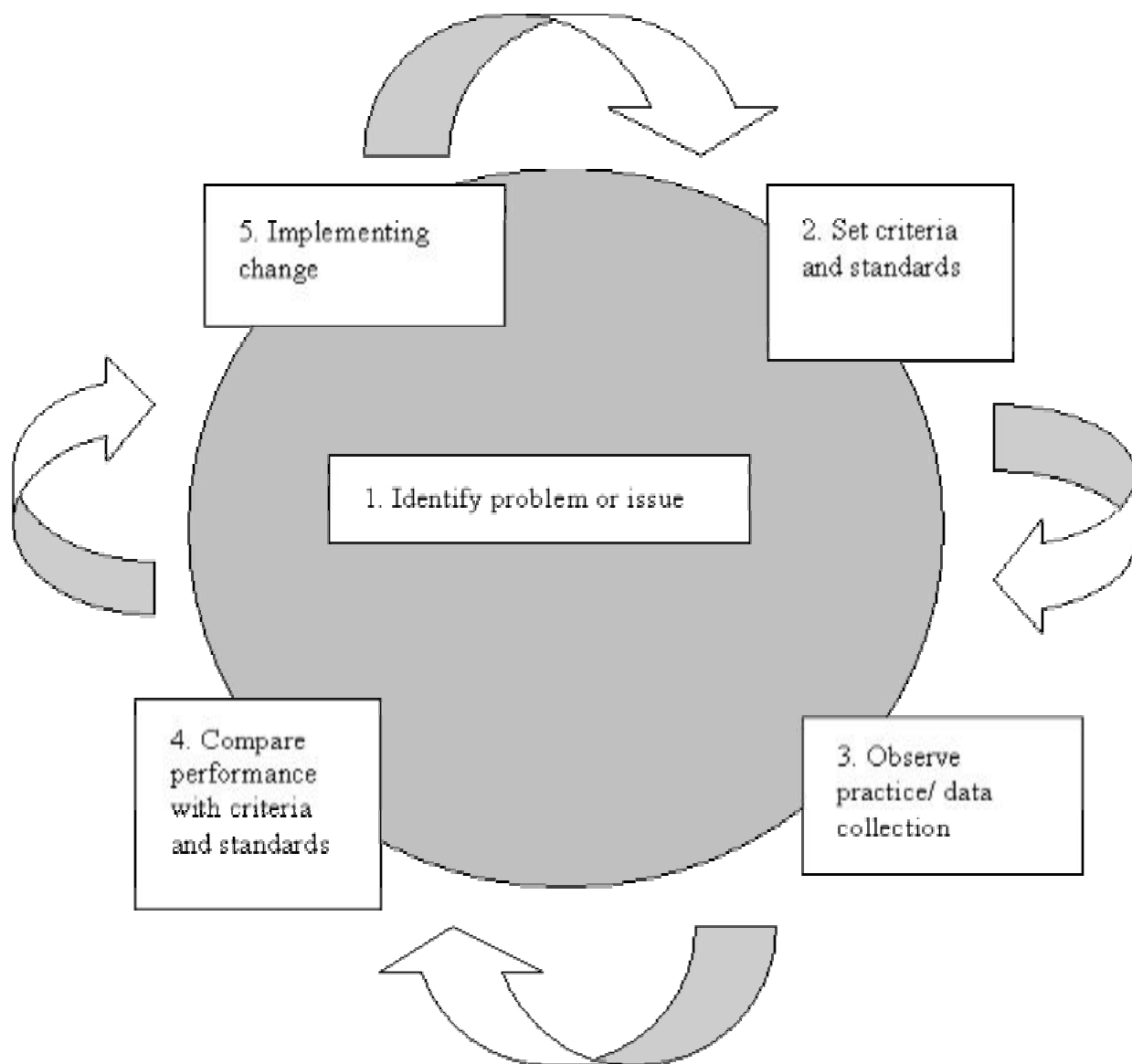
- It supports health professionals in making sure their patients receive the best possible care.
- It can inform diabetes teams about the need for organisational change, or new investment to support health professionals in their practice.
- It helps to ensure that patients are given the best possible care and provides the public with confidence in the quality of the service as a whole.

Diabetes audit allows an opportunity to update the diabetes register. Audit should include review of the diagnosis and whether the patient is still registered with the practice. Audit data will also provide a practice with prevalence data, which may indicate if numbers of patients on the register are accurate for a given population. Diabetes audit data will also provide data on process and outcome measures being achieved for people with diabetes.

The Diabetes Audit Cycle

The diabetes audit cycle (also referred to as the audit spiral, audit loop, etc) sets out the various steps that must be undertaken to ensure that an audit project is systematic and successful.

The following diagram graphically illustrates the Diabetes Audit Cycle.



In order to carry out a successful audit, the diabetes audit team should work round the various stages of the audit cycle.

1. Selecting an appropriate audit topic

The first stage of any audit is obviously to select an appropriate topic to be audited. However, selecting an appropriate audit topic isn't as straight-forward as it may appear. It is important that your audit topic focuses on a real problem and that it is also measurable and relevant to your field of work/practice.

2. Choosing appropriate criteria and standards

Criteria and standards are two audit terms which often confuse people. This is unfortunate, as criteria and standards are not difficult to understand. In essence, if we refer back to our definition of audit, criteria and standards relate to “what we should be doing”.

A criterion is essentially an item of care or an aspect of practice that we can use to assess quality. Each criterion should be recorded as a succinct statement. Therefore, an example of a criterion would be “The records show that patients with CHD are reviewed annually”.

A standard is a statement of the proportion of occasions or patients which must fulfil each criterion. Standards are expressed as percentages. For example, we may set a standard stating that 100% of CHD patients should have an annual review recorded in their records.

Criteria and standards should be based on the latest available research and evidence. If evidence is not available, it is acceptable to base criteria and standards on a consensus agreement by members of the team.

3. Collecting Data

Once you have set the criteria and standards for your audit (i.e. decided what you are going to measure against) you will need to collect audit data. There are a number of factors to consider at this point.

First, audit data must be representative and therefore you will need to ensure that enough patients are included in the audit to make sure that the data collected is valid and representative. Second, it is important to make sure that any data collection forms used are understandable, consistent and robust. If two people using the same audit data collection form interpret the questions and data differently, the audit will be prone to failure. Therefore, in order to make sure data collection forms are valid, it is advisable that teams pilot their data collection tools thoroughly.

In recent times, NHS staff have started to move from manual collection of audit data to the electronic capture of data. This is clearly more preferable as electronic capture of data is likely to be much quicker and more accurate. However, it is important that electronic audit tools are thoroughly checked, as problems can still emerge.

4. Analysing Data

Once audit data has been collected it needs to be analysed. Often staff assume that analysis of audit data is a highly scientific and mathematical process, but this is not the case.

In most instances, analysis of audit data simply involves calculating basic percentages. For instance, using our earlier example, the team would firstly focus on the actual percentage of CHD patients who had no record of an annual review in their notes. This calculation would inform the practice if they were meeting the expected standard or not.

Audit data should also be analysed to identify particular trends and problems. For example, using our CHD example once again, analysis of the audit data might reveal that a particular group of patients is not being reviewed annually (e.g. housebound patients), or that recently diagnosed CHD patients are not being invited back for a review after a year.

5. Implementing Changes

The penultimate stage of the audit cycle is one of the most crucial and often also one of the most difficult.

Once all audit data has been analysed and the audit results calculated, the audit team need to decide what changes need to be implemented. Obviously, changes should be designed to rectify any major problems that the audit has identified.

Implementing changes that will be effective and lead to improvements is complex. In some cases, subtle changes will lead to considerable improvements. However, in other instances, major changes will need to be set in place.

Whatever changes result from an audit, it is vital that the change process is not left to chance. In other words, a detailed audit action plan should be made stating exactly who, when, what and how changes are to be implemented. Further, all members of the team should be informed of the proposed changes and someone should take a lead role in overseeing that the changes take place.

6. Re-Audit

The final phase of the audit cycle is to undertake a re-audit, i.e. recollect audit data and analyse this. The main purpose of the re-audit phase is to find out if the changes that were implemented have led to an improvement.

Section 1

SOFTWARE REQUIREMENTS

In order to run electronic diabetes audit first you need to have installed and use the following Diabetes Management System software:

Case Management System V 2.0 patch 2
PCC Management Reports V 3.0 through patch 7
Health Summary V 2.0 through patch 5
Q-Man V 21.0 through patch 16
PCC Data Entry V 2.0 through patch 3

Menu Options and Security Keys required:

DMS Menu: BDMMENU
DMS Keys: BDMZMENU
 BDMZ REGISTER MAINTENANCE
Q-Man Menu: AMQQMENU
Q-Man Keys : AMQQZMENU AMQQZCLIN AMQQZRPT
 AMQQZEMAN
Reports Menu: APCLMENU
Reports Keys: APCLZMENU
Case Management System Menu: ACMZMENU
Case Management System Keys: ACMZMENU ACMZ DELETE PATIENT
 ACMZ TRANSFER PATIENT

[Note: If any of the above options and the security keys are not installed or missing, please contact Chuck Tudor, Computer Systems Specialist, at the Rhinelander Field Office and his contact telephone is 715-365-5106 or you may also contact Dennis Yost, Systems Analyst, MIS at the Bemidji Indian Health Office and the contact telephone is 218-444-0539.]

Section 2

THE IHS DIABETES REGISTER

The standard IHS Diabetes Register is a tool for maintaining a list of your diabetes patients, their disease type, complications, family members, and case review dates. The Diabetes Register facilitates the addition, inactivation, and removal of patients from the list; entry of data to be monitored for patients on the list; printing of case summaries; generation of reports; and retrieval of virtually all clinical data entered into the PCC for patients on the register.

The Standard IHS Diabetes Register is installed automatically with installation of the Diabetes Management System (BDM Version 1.0). It provides a core set of data items with predefined lists and standard definitions. It also permits you to establish your own lists and definitions in support of these data items. The IHS Diabetes Register helps to simplify the process of creating a Case Management-based register, but you are in no way limited to this core set of data items and the lists that accompany them. Remember that you always have access to all existing PCC demographic and clinical data without keeping these items in the Diabetes Register.

You may wish to create additional registers. Using the **Create Register** option in the Case Management System, you can create new registers or change the name of the existing register, perhaps to maintain multiple registers for communities or facilities within a single service unit. However, in order for the new Diabetes Management software to work with a register, the word “DIABETES” must be in the name of the register. If you change the name of an existing register, You must answer “YES” when you are asked if you wish to re-index files.

The following data items are included in the IHS Diabetes Register:

Patient Status	Complications
Active	CVA (Stroke)
Inactive	End Stage Renal Disease
Transient	High Risk Foot
Unreviewed	Hypertension
Deceased	Laser Tx for Retinopathy
Non-IHS Care	Major Amputation(s)
Diagnosis	Microalbuminuria
Gestational DM	Minor Amputation(s)
Type 1	Myocardial Infarction
Impaired Glucose Tolerance	Retinopathy
Type 2	
Entry Date:	Last Edited Date:
Date entered in Register	Date data last updated
Last Review Date:	Next Review Date:

The main advantage of using the IHS Diabetes Register is its link to all of the data in the PCC. This link eliminates redundant entry of visit-related data; for example, lab values, measurements, patient education topics, and health factors. Also, the IHS Register provides for standardization of data elements.

Upon installation of the Diabetes Management System, the Case Management System is no longer required for entry of the Diabetes-related data items in the list above. However, if you elect to maintain data elements that are not contained in the list above, you must enter those data elements using the data entry option in the Case Management System.

Section 3

DIABETES PROGRAM AUDIT

Each year since 1986, the IHS Diabetes Program has conducted a medical records review of a sample of diabetic patients from the local diabetic registry. The audit measures 87 different items, some reflecting the process of diabetes care and others reflecting diabetic outcomes. The **DA Diabetes Audit** option in the Diabetes Management System allows you to either partially or fully automate the process of compiling the official IHS Diabetes Quality Assurance Audit Report. This section contains instructions for running the electronic diabetes audit report from the RPMS Diabetes registry.

Please note that the examples given in this manual reflect the standards of care and audit tools developed from the National Diabetes program.

Step 1

```
THIS SYSTEM CONTAINS CONFIDENTIAL PATIENT INFORMATION COVERED
BY THE PRIVACY ACT.  UNAUTHORIZED USE OF THIS DATA IS ILLEGAL
```

```
*****
```

```
**                DIABETES MANAGEMENT SYSTEM                **
```

```
*****
```

```
                VERSION 1.0
                RHINELANDER TRAINING CENTER
                CURRENT USER: AREA ADAM
```

```
                MAIN MENU - IHS DIABETES
```

```
PM      Patient Management
RP      Reports ...
RM      Register Maintenance ...
DEL     Delete Patient from the Register
LM      ADD/EDIT DMS Letters
SR      Switch to another DIABETES Register
BHS     Browse Health Summary
DA      Diabetes QA Audit Menu ...
DMU     Update Diabetes Patient Data
HS      Generate Health Summary
MHS     Generate Multiple Health Summaries
QMAN    Q-Man (PCC Query Utility)
```

```
Select Diabetes Management System Option:
      DA  Diabetes QA Audit Menu
```

Step 2

```
*****  
**      PCC Management Reports      **  
**      Diabetes Audit Report Menu  **  
*****  
Version 3.0
```

```
DM02 2002 Diabetes Program Audit ...  
DM01 2001 Diabetes Program Audit ...  
DM99 1999 Diabetes Program Audit ...  
DM96 1996 Diabetes Program Audit ...  
TS    Taxonomy Setup  
FS    Flow Sheet Setup  
PLDX  Patients w/no Diagnosis of DM on Problem List  
NDOO  DM Register Pts w/no recorded DM Date of Onset  
DAL   Display Audit Logic  
APCL  List Patients on a Register w/an Appointment  
DMV   DM Register Patients and Select Values in 4 Months  
DPCS  Display a Patient's DIABETES CARE SUMMARY  
HSRG  Print Health Summary for DM Patients W/Appt
```

Select Diabetes QA Audit Menu Option: **DM02 2002 Diabetes
Program Audit**

Step 3

```
*****  
**      PCC Management Reports      **  
**      2002 Diabetes Audit Report Menu  **  
*****  
Version 3.0
```

```
DM02 2002 Diabetes Program Audit ...  
Tc21 Check Taxonomies for 2002 Diabetes Audit  
DAL   Display Audit Logic
```

Select Diabetes QA Audit Menu Option: **DM02 2002 Diabetes
Program Audit**

Run 2002 Diabetes Program Audit

Step 4

Checking for Taxonomies to support the 2002 Audit ...
All Taxonomies are present.

[Note: Before running electronic diabetes program audit report needs to establish Medication and Lab test Taxonomies in the existing IHS Diabetes Registry]

Step 5

ASSESSMENT OF DIABETES CARE, 2002

PCC DIABETES AUDIT

Enter the Official Diabetes Register: IHS DIABETES//<Enter>
Enter the date of the audit. This date will be considered the ending date of the audit period. For most data items all data for the period one year prior to this date will be reviewed.

Enter the Audit Date: 12/31/2002 (DEC 31, 2002)

[Note: The audit goes back one year from the date entered.]

Select one of the following:

- P Individual Patients
- S Search Template of Patients
- C Members of a CMS Register

Step 6

```
Run the audit for: P// Search Template of Patients
Enter Search Template Name: IHS DIABETES REGISTER-2
(Sep 27, 1999) User #605 File #2
There are 162 patients in the IHS DIABETES REGISTER-2
template/cohort.
You have selected a register or template/cohort of patients.
You can run the audit just for the subset of patients in the cohort
or register who live in a particular community or have a particular
primary care provider.

Limit the audit to a particular primary care provider ? N// <Enter>

Limit the patients who live in a particular community ? N// <Enter>

There are 162 patients selected so far to be used in the audit.

[Note: You may change your responses to the above questions
depending on your preferences at the time the audit is run.]
```

Step 7

```
Select one of the following:

A ALL Patients selected so far
R RANDOM Sample of the patients selected so far

Do you want to select: A//<Enter>

Select one of the following:
1 Print Individual Reports
2 Create EPI INFO file
3 Cumulative Audit Only
4 Both Individual and Cumulative Audits

Enter Print option: 1//4 <Enter>
```

[Note: Be sure to request the cumulative report so that it will be easy to spot deficiencies in data recording, data entry or procedures. For example, if the audit reports 0% compliance on the DM Foot exam, and you know that almost all patients get an annual DM foot exam, it may be a recording issue in which providers are not documenting the exam properly or perhaps data entry personnel does not recognize what is recorded as an exam.]

Step 8

If you select option 2: //2 <Enter>

Enter the name of the FILE to be Created (3-8 characters):
DMCY02

I am going to create a file called dmc902.rec which will reside in the C:\EXPORT directory.

Actually, the file will be placed in the same directory that the data export globals are placed. See your site manager for assistance in finding the file after it is created. PLEASE jot down and remember the following file name:

******* dmc902.rec *******

It may be several hours (or overnight) before your report and flat file are finished. The records that are generated and placed in file dmc902.rec are in a format readable by EPI INFO. For a definition of the format please see your user manual.

Is everything ok? Do you want to continue?? Y// <Enter>

THE DIABETES QUALITY ASSURANCE AUDIT REPORT

To run this report, select the **DA Diabetes Audit** option menu. The system defaults to the IHS Diabetes Register that was installed when the Diabetes Management System was installed at your facility. (You can change the name of the Register to that used at your facility.)

When prompted, enter the date of the audit. For most data items all data for the period one year prior to this date will be reviewed.

You can audit individual patients, a search template of patients, or members of a Case Management System register. For a large register, you may select to generate the audit for a random sample of the patients in the register. You can enter individual patients by name or chart number or the name of a template of patients created with Q-Man or one of the Register Reports options. Instructions for generating an audit template follow the sample reports at the end of this section. In addition, you may select a subset of patients to audit based on the particular community where they live or a primary care provider.

You can obtain three types of audit reports: (1) a printed report for each individual patient, (2) a printed cumulative report that summarizes the results for all patients, or (3) a data file readable by the Epi Info software program. You must specify which type of report you want to generate from the list provided on the screen. To generate printed reports, you can choose the individual report, cumulative report, or both. Each patient's individual report takes at least 10 seconds to run. When running the Audit Report for a large number of patients, it is recommended that you queue the report to a printer to generate after regular hours.

A sample computer dialogue of setting up an audit report for the 2002 calendar year is displayed below. The dialog demonstrates the **Creating an Epi Info File** option and uses the entire IHS Diabetes Register. The directory where the file is created varies depending on the kind of computer system used at a facility.

When generating Audit reports, keep in mind that certain patient clinical data, for example, lab results and EKG data, may not currently be available from the PCC at your site. This report is generated from the PCC database; if the clinical information needed for generating this report was not entered into the PCC, the report cannot recognize that the clinical event occurred. Both the individual and cumulative printed reports provide space for the DM auditor to manually enter that data directly from the patient record. Additional data may be added to the Epi file using the Epi Info software, as described below.

When making additions or modifications to the data file, you may find it helpful to print out individual audit reports on the same cohort of patients that you named to create the Epi file. The individual audit reports are printed in the same order that they appear in the data file. You may use the individual printed reports for recording additional data from chart reviews. Once you have obtained the necessary additional data, these data items can be added to the Epi file in the appropriate places using the Enter Data option of the Epi Info software. For further instructions regarding the Epi Info DM audit program, consult Chandra Reddy, Medical epidemiologist, at the Great Lakes Inter-Tribal Council.

Section 4

DIABETES AUDIT SAMPLE

Cumulative Audit report :

Jan 10, 2003

*** HEALTH STATUS OF DIABETIC PATIENTS ***
 RHINELANDER TRAINING CENTER
 Reporting Period: Jan 10, 2002 to Jan 10, 2003

	n	Percent
50 patients were reviewed		
Gender		
Female	25	50%
Male	25	50%
Age		
<15 yrs	2	4%
15-44 yrs	22	44%
45-64 yrs	19	38%
65 yrs and older	7	14%
Diabetes Type		
Type 1	1	2%
Type 2	49	98%
Unknown	0	0%
Duration of Diabetes		
Less than 10 years	5	10%
10 years or more	1	2%
Diagnosis date not recorded	44	88%
Weight Control (BMI) - does not add up to 100%		
Overweight or Obese (BMI>85%ile)	0	0%
Obese (BMI>95%ile)	0	0%
BMI could not be calculated	50	100%
Blood Sugar Control - uses last HGB A1C value		
HbA1c <7.0	0	0%
HbA1c 7.0-7.9	0	0%
HbA1c 8.0-8.9	0	0%
HbA1c 9.0-9.9	0	0%
HbA1c 10.0-10.9	0	0%
HbA1c 11.0 or higher	0	0%
Undocumented	50	100%

*** HEALTH STATUS OF DIABETIC PATIENTS ***
 RHINELANDER TRAINING CENTER
 Reporting Period: Jan 10, 2002 to Jan 10, 2003

	n	Percent
50 patients were reviewed		
Blood Pressure Control - based on mean of last 3 bp's		
Ideal BP Control (<120/<80)	0	0%
Target (120/80-<130/<85)	0	0%
Adequate (130/85-<140/<90)	0	0%
Inadequate (140/90-<160/<95)	0	0%
Markedly Poor (160/95 or higher)	0	0%
BP Control Undetermined	50	100%
Tobacco use		
Current Tobacco User	23	46%
Counseled - Yes	0	0%
Counseled - No	23	100%
Not a current tobacco user	4	8%
Tobacco use not documented	23	46%
DIABETES TREATMENT		
Diet and Exercise Alone	50	100%
Insulin	0	0%
Oral Med (monotherapy)		
Sulfonylurea	0	0%
Metformin	0	0%
Acarbose	0	0%
Troglitazone	0	0%
Combination of Oral Meds	0	0%
Combination of Oral Meds+Insulin	0	0%
Refused or Undetermined	0	0%
CHRONIC ASPIRIN THERAPY		
Yes	0	0%
No	50	100%
Undetermined	0	0%
ACE INHIBITOR (OR ARB) USE		
Use in pts with overt proteinuria	0	
Use in pts with known hypertension	0	0%
LIPID LOWERING AGENT USE		
Use in pts with total chol >=240	0	
Use in pts with LDL chol > 160	0	

Enter RETURN to continue or '^' to exit:

*** HEALTH STATUS OF DIABETIC PATIENTS ***
 RHINELANDER TRAINING CENTER
 Reporting Period: Jan 10, 2002 to Jan 10, 2003

```

-----
---
50 patients were reviewed                                n  percent (%refused)

EXAMS - Yearly
  Foot Exam - Neuro & Vasc                             0      0% (0% )
  Eye Exam - Dilated                                   0      0% (0% )
  Dental Exam                                          0      0% (0% )
  Pap Smear (Females Only)                             0      0% (0% )

DIABETES-RELATED EDUCATION - Yearly
  Diet Instruction                                     0      0% (0% )
  Exercise Instruction                                 0      0% (0% )
  Other Diabetes Education                             0      0% (0% )
  Any of the above topics                             0      0%

IMMUNIZATIONS
Flu Vaccine - yearly                                  0      0% (0% )
  Pneumovax - once                                    7     14% (0% )
  Tetanus/Diphtheria (q 10 yrs)                       12    24% (0% )

LABORATORY EXAMS

Urinalysis in the past 12 months                     0      0%

Proteinuria present                                  0      0%
Proteinuria absent                                   0      0%
Proteinuria result unknown                           0      0%
Proteinuria test not done                            50    100%

  Of the      0  without proteinuria:
    Microalbuminuria present                          0
    Microalbuminuria absent                           0
    Microalbuminuria not tested                       0

Creatinine obtained in the past 12 months             0      0%
  Creatinine >= 2.0 mg/dl                             0      0%
  Creatinine < 2.0 mg/dl                              0      0%
  Unable to determine result                           0      0%
  Creatinine not tested/unknown                       50    100%

Total Cholesterol obtained in the past 12 months      0      0%
  Desirable (<200 mg/dl)                              0      0%
  Borderline (200-239 mg/dl)                          0      0%
  High (240 mg/dl or more)                            0      0%
  Unable to determine result                           0      0%
  Not tested                                           50    100%
  
```

*** HEALTH STATUS OF DIABETIC PATIENTS ***
 RHINELANDER TRAINING CENTER
 Reporting Period: Jan 10, 2002 to Jan 10, 2003

	n	Percent
50 patients were reviewed		
LDL Cholesterol obtained in the past 12 months	0	0%
LDL <100 mg/dl	0	0%
LDL 100-129 mg/dl	0	0%
LDL 130-160 mg/dl	0	0%
LDL >160	0	0%
Unable to determine result	0	0%
Not tested	50	100%
HDL Cholesterol obtained in the past 12 months	0	0%
HDL <35 mg/dl	0	0%
HDL 35-45 mg/dl	0	0%
HDL 46-55 mg/dl	0	0%
HDL >55	0	0%
Unable to determine result	0	0%
Not tested	50	100%
Triglycerides obtained in the past 12 months	0	0%
TG <150 mg/dl	0	0%
TG 150-199 mg/dl	0	0%
TG 200-400 mg/dl	0	0%
TG >400 mg/dl	0	0%
Unable to determine result	0	0%
Not tested	50	100%
EKG		
Performed in past 3 years	1	2%
Performed in past 5 years	1	2%
Ever performed	1	2%
Tuberculosis Status		
PPD +, INH treatment complete	1	2%
PPD +, untreated/incomplete or tx unknown	3	6%
PPD -, placed since DM dx	0	0%
PPD -, placed before DM dx or date unknown	14	28%
PPD status unknown	32	64%
Self monitoring of blood glucose documented		
Yes	0	0%
No	50	100%
Refused	0	0%
Participating in SDM		
Yes	0	0%
No	50	100%
Undetermined	0	0%

End of report. Press ENTER:

Section 5

SOME NOTES ON MEDICAL TERMINOLOGY

[Note: the following is provided for the benefit of non-medically qualified personnel working on data quality improvement schemes. While every effort has been made to be accurate, some simplifications have inevitably been made. They are no substitute for more precise clinical definitions. If in doubt, consult a clinically-qualified person.]

Angina [pectoris]

Chest pain on exercise, caused by an inadequate supply of oxygen to the heart muscle. Often attributable to obstructive disease of the coronary arteries.

Blood pressure [BP]

Blood pressure is measured by reference to the sounds (the “Korotkoff sounds”) heard through a stethoscope placed over the brachial artery as the pressure from a cuff around a patient’s arm is reduced. It is expressed in two numbers, which describe the *systolic* pressure and the *diastolic* pressure respectively. The systolic pressure derives from the contraction of the heart driving the blood outwards; the diastolic measures the pressure during the relaxed state of the heart. The systolic is therefore the larger of the two numbers. The units of measurement are millimetres of mercury – generally written “mm Hg”.

Body mass index [BMI]

The ratio of a person’s weight (in kilogrammes) to the square of his/her height (in metres). As a rough guide a person whose BMI is less than 20 is considered underweight; a BMI between 20 and 25 is normal; over 25 and less than 30 is overweight; a BMI of 30 or over defines obesity.

Example: A woman whose weight is 59 kilos (approximately 9 st 3 lbs) and whose height is 1.63 metres (approximately 5 feet 4 inches) has a BMI of: $59/(1.632) = 22$ (to the nearest whole number).

Work out your own BMI! For those still steeped in Imperial measure:
1 inch = 2.54 cm and 1lb = 0.45 kilos.

Cardiovascular disease

In many countries cardiovascular disease (disease of the circulatory system) is the leading cause of death among people with diabetes. Smoking, hypertension, high cholesterol and obesity are significant risk factors that can cause cardiovascular disease. Recognition and effective management of these risk factors can prevent cardiovascular disease in people with diabetes.

Cerebrovascular

Relating to the supply of blood to the brain.

Cerebrovascular accident (CVA)

See *stroke*.

Cerebrovascular disease

A morbidity in which either the supply of blood to the brain is inadequate because of arterial narrowing (“atherosclerosis”) or other obstruction of the blood supply to the brain.

Dementia

A progressive *organic* mental disorder characterised by memory loss, chronic personality disintegration, confusion, etc.

Diabetes [mellitus]

A disorder of glucose metabolism. Primarily a result of relative or complete lack of insulin secretion or defects of insulin receptors. Classified into Type I (also known as *insulin dependent diabetes mellitus*– *IDDM* – and occasionally referred to as *juvenile-onset diabetes*) and Type II (also known as *noninsulin dependent diabetes* – *NIDDM* – and occasionally referred to as *late- or maturity-onset diabetes*). Diabetes can lead to a number of complications, including peripheral *ischaemia*, neuropathy (disease of the nervous system), kidney disease (nephropathy) and eye problems. Peripheral *ischaemia* may lead to the necessity for an amputation of part of the lower limbs. The eye problems may lead to blindness. Early detection and good control of diabetes are believed to be significant in minimising the incidence and severity of these complications. NIDDM may sometimes be controlled by diet alone. If medication is required, the class of drugs used is known as *hypoglycaemics*.

Diastolic [pressure]

See *blood pressure*.

Dyslipidaemia

It indicates abnormalities of the lipid metabolism and is often associated with insulin resistance in Type 2 diabetes

Epidemiology

The branch of medicine which deals with the incidence, distribution and possible control of diseases and other factors relating to health.

Foot ulceration

Foot ulceration and amputation are among the most costly diabetic complications. Diabetes is the most common cause of amputation that is not the result of an accident. Diabetic neuropathy (nerve disease) can reduce sensation in the feet and, especially when combined with microvascular disease (disease of the small blood vessels), can result in foot ulceration and amputation. Regular inspection and good care of the foot by healthcare professionals and people with diabetes themselves can prevent foot ulceration and amputation.

Gestational diabetes mellitus (GDM)

A carbohydrate intolerance of varying degrees of severity with onset or first recognition during pregnancy. Gestational diabetes develops during some cases of pregnancy, but usually disappears when pregnancy is over. However, women who have had gestational diabetes are at greater risk of developing Type 2 diabetes at a later stage in their lives.

Glucose

Also called dextrose. The main sugar the body produces from proteins, fats and carbohydrates. Glucose is the major source of energy for living cells and is carried to each cell through the bloodstream. However, the cells cannot use glucose without the help of insulin.

Haemoglobin A1c (HbA1c)

Shorthand for glycosylated haemoglobin: a measure of the level of blood glucose, which provides an indication of the average level over several weeks. Used as an indicator of control in *diabetes*. See also *serum fructosamine*.

The substance of red blood cells that carries oxygen to the cells and sometimes joins with glucose (sugar). As the glucose stays attached for the life of the cell (about four months), a test to measure HbA1c shows what the person's average blood glucose level was for that period of time.

Heart attack

See *Myocardial infarction*.

Hyperglycaemia

Too high a level of glucose (sugar) in the blood; a sign that diabetes is out of control. Many things can cause hyperglycaemia. It occurs when the body does not have enough insulin or cannot use the insulin it does have to turn glucose into energy. Signs of hyperglycaemia are a great thirst, a dry mouth and a need to urinate often. For people with Type 1, or insulin-dependent, diabetes hyperglycaemia may lead to diabetic ketoacidosis.

Hypoglycaemia

A complication of *diabetes* characterised by a deficiency of glucose in the blood, leading to muscular weakness, mental confusion and sweating. In severe cases, it can lead to hypoglycaemic coma and death. Hypoglycaemia may result from inadequate intake of carbohydrate or over-treatment with hypoglycaemic drugs (see below)

Hypoglycaemics

Drugs used to control *non-insulin dependent diabetes*.

Hypertension

Persistent high blood pressure, where “high” is determined by reference to a patient’s age and sex; “persistent” usually refers to high BP readings on three distinct occasions. Can sometimes be associated with an *organic* cause, but if not is referred to as “essential hypertension”. Uncontrolled hypertension can lead to heart and *cerebrovascular* disease, and to other complications including kidney disease.

Impaired Glucose Tolerance (IGT)

Blood glucose levels that are higher than normal, but below the level of a person with diabetes.

Ischaemia

Localised diminution of the blood supply due to partial or complete obstruction of the arteries which may be due to a variety of causes. Hence the terms *ischaemic heart disease*, and

peripheral ischaemia, the latter being a reduction of the blood supply to the lower limbs and a complication of *diabetes*.

Incidence

It indicates how often a disease occurs. More precisely, it corresponds to the number of new cases of a disease among a certain group of people for a certain period of time.

Insulin

A hormone that enables cells to absorb glucose from the blood and use it for energy. Insulin is produced by the beta cells of the islets of Langerhans in the pancreas.

Islets of Langerhans

Named after Paul Langerhans, the German scientist who discovered these clusters of cells located in the pancreas in 1869. They produce and secrete hormones that help the body break down and use food. There are five types of cells in an islet: alpha cells, which produce glucagon; beta cells, which produce insulin; delta cells, which produce somatostatin; and PP cells and D1 cells, about which little is known.

Ketones

Chemicals that the body produces when there is not enough insulin in the blood and breaks down fat for its energy. Ketones can poison and even kill body cells. Without insulin, ketones build up in the blood and then pass into urine so that the body can dispose of them. See also: diabetic ketoacidosis.

Ketosis

A condition of having ketones build up in body tissues and fluids. The signs of ketosis are nausea, vomiting and stomach pain. Ketosis can lead to ketoacidosis.

Myocardial infarction (MI)

Popularly known as a “heart attack”. More precisely, necrosis – localised tissue death – of a part of the cardiac (heart) muscle, caused by obstruction in a coronary artery.

The term “old MI” refers to the evidence that a patient has suffered an MI at some time in the past.

Macrovascular disease

Disease of the large blood vessels that may occur in people who have had diabetes for a long time. Fat and blood clots build up in the large blood vessels and stick to the vessel walls. Three kinds of macrovascular disease are: coronary disease, cerebrovascular disease and peripheral vascular disease.

Microvascular disease

Disease of the smallest blood vessels that may occur in people who have had diabetes for a long time. The walls of the vessels become abnormally thick but weak. They, therefore, bleed, leak protein and slow the flow of blood through the body.

Nephropathy

Diabetes is also the leading cause of nephropathy (kidney disease). The progress of nephropathy can be slowed down by control of hyperglycaemia, control of hypertension and restriction of protein in the diet. Nephropathy can be detected by testing for traces of protein in the urine.

Neuropathy

Diabetic neuropathy (nerve disease) is the most common diabetic complication of a microvascular nature. Hyperglycaemia is a significant risk factor which can cause diabetic neuropathy. Diabetic neuropathy is a major cause of impotence in men with diabetes.

Oral hypoglycaemic agents

Drugs taken to lower the level of blood glucose. The drugs work for some people with Type 2 diabetes. They can help the body in several ways such as causing the cells in the pancreas to release more insulin. All oral hypoglycaemic agents belong to a class of drugs known as sulfonylureas.

Organic

An organic disease is one associated with detectable or observable changes in body organs or metabolism.

Prevalence

The number of people in a given group or population who are reported to have a disease at any point in time.

Peripheral circulatory disease

See *peripheral ischaemia* under *Ischaemia*

Retinopathy

Retinopathy (eye disease) is the leading cause of blindness and visual impairment in adults in developed societies.

Sequela (plural: sequelae)

A morbidity occurring as a result of another, earlier disease.

Serum fructosamine

A measure of the level of blood sugar. Used as an indicator of control in *diabetes*. See also *HbA1c*.

Stroke

Also referred to as a “cerebrovascular accident” (CVA).

Interruption of the blood supply to the brain caused by arterial obstruction or haemorrhage, leading to some loss of functionality, e.g. movement, speech etc. which may be permanent. The primary cause is in the heart or the blood vessels; the effect on the brain by which the disease is manifest is a consequential effect.

Systolic [pressure] See *blood pressure*.

Transient ischaemic attack (TIA)

The result of a temporary disruption of the blood supply to the brain. Symptoms similar to *stroke* but last less than 24 hours.

Type 1 or insulin-dependent diabetes mellitus (IDDM)

Type 1 or insulin-dependent diabetes mellitus develops most frequently in children and adolescents, but is now also increasingly found in adults. About 10% of people with diabetes have Type 1. The symptoms vary in intensity and include excessive thirst, excessive passing of urine, weight loss and lack of energy.

Insulin is a life-sustaining medication for people with Type 1 diabetes. They require daily insulin injections for survival. Diabetes education, a controlled diet and physical exercise are all important components of the management of Type 1 diabetes.

Type 2 or non-insulin-dependent diabetes (NIDDM)

Type 2 or non-insulin-dependent diabetes is much more common than Type 1, and occurs mainly in adults. The symptoms of Type 1, in a less marked form, may also affect people with Type 2 diabetes. Some people with Type 2, however, have no early symptoms. These people are only diagnosed several years after the onset of the condition, when various diabetic complications are already present. People with Type 2 diabetes may require oral hypoglycaemic drugs and may also need insulin injections. As with the treatment of Type 1 diabetes, diabetes education, a controlled diet and physical exercise are all important components of the management of Type 2 diabetes.

Urine protein

A diagnostic test performed on urine samples. The presence of protein in urine may be an indicator of kidney disease.

Appendix A

Standards of Care for People with Diabetes

(Based on ADA Clinical Practice Recommendations)

Recommendations for Glycemic Control

Glycemic Control Normal Goal Action Suggested

Whole Blood Calibrated Meter

Fasting/preprandial glucose <100 mg/dl 80-120 <80 or >140

Bedtime glucose <110 mg/dl 100-140 <100 or >160

Plasma Calibrated Meter

Fasting/preprandial glucose <110 mg/dl 90-130 <90 or >150

Bedtime glucose <120 mg/dl 110-150 <110 or >180

Hemoglobin A1c <6% <7% >8%

*These values are for nonpregnant adults. "Action suggested" depends on individual patient circumstances. Such actions may include enhanced diabetes self-management education, comanagement with a diabetes team, referral to an endocrinologist, change in pharmacological therapy, initiation or increased SMBG, or more contact with the patient. HbA1c is referenced to a nondiabetic range of 4.0-6.0% (mean 5.0%, SD 0.5%).

Lipid and Blood Pressure Goals (for nonpregnant adults)

Blood Pressure (mmHg) Lipids (mg/dl)

Systolic <130 Cholesterol <200

Diastolic <85 LDL <100

HDL >45

Triglycerides <200

For patients with an isolated systolic hypertension of ≥ 180 , the goal is a blood pressure < 160 . For those with systolic blood pressures of 160-179, the goal is a reduction of 20 mmHg. If these goals are achieved and well tolerated, further lowering to 140 may be appropriate.

Without CHD, PVD, and CVD, drug therapy is suggested for LDL levels ≥ 130 . For diabetic patients with multiple CHD risk factors, some authorities recommend initiation of drug therapy when LDL levels are between 100 and 130 mg/dl. (MNT should be attempted before starting drug therapy).

Key Tests/Exams

Test/Exam Frequency

HbA1c Quarterly if treatment changes or not meeting goals

2 times/year if stable

Dilated eye exam- yearly

Foot exam Inspection - every regular diabetes visit

Complete exam – yearly

Lipid profile yearly, if stable

Microalbumin/creat. ratio Yearly

Blood pressure Each regular diabetes visit

Weight Each regular diabetes visit

EKG Every 1-5 years, as needed

Dental exam Every 6-12 months

Serum creatinine - yearly

Vaccination update - yearly

Nutritional counseling -yearly, more often as needed

Appendix B

Resources

Great Lakes Inter-Tribal Council, Inc.
Great Lakes EpiCenter
Nancy Miller-Korth, Project Coordinator
Chandra Reddy, Medical Epidemiologist
Jingnan Mao, Epidemiologist
Kimmie Pierce, Epidemiologist
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(715) 588-3324

Bemidji Area Office
Indian Health Service
Federal Building
522 Minnesota Ave.
Bemidji, MN 56601
(218) 759-3440

Epidemiology Branch
Indian Health Service
5300 Homestead Dr., NE
Albuquerque, NM 87110
(505) 248-4226

Health & Diabetes Websites

A. Government agencies

1. National Institute of Diabetes & Digestive & Kidney Diseases, locate at: <http://www.niddk.nih.gov/>.
2. NIDDK: National Diabetes Education Program, located at: <http://ndep.nih.gov/>.
3. NIDDK: National Diabetes Information Clearinghouse, located at: <http://www.niddk.nih.gov/health/diabetes/ndic.htm>.
4. National Kidney and Urologic Diseases Information Clearinghouse, located at: <http://www.niddk.nih.gov/health/kidney/nkudic.htm>.
5. Weight-control Information Network, located at: <http://www.niddk.nih.gov/health/nutrit/win.htm>.
6. Diabetes Research and Training Centers, located at: <http://www.niddk.nih.gov/health/diabetes/pubs/drtc/>.
7. National Eye Institute, located at: <http://www.nei.nih.gov/>.

8. National Heart, Lung and Blood Institute, Health Information, located at: <http://www.nhlbi.nih.gov/health/index.htm>.
9. Centers for Disease Control and Prevention, Diabetes Public Health Resource, located at: <http://www.cdc.gov/diabetes/>.
10. Indian Health Service, Medical and Professional Programs, located at: http://www.ihs.gov/MedicalPrograms/Medical_index.asp.
11. Office of Minority Health (U.S. Dept. of Health & Human Services), located at: <http://www.omhrc.gov/omhhome.htm>.
12. USDA: Food and Nutrition Information Center, located at: <http://www.nal.usda.gov/fnic/>.
13. Code Talk, located at: <http://www.codetalk.fed.us/>.

B. Professional, corporate & private associations

1. American Association of Diabetes Educators, located at: <http://www.aadenet.org/>.
2. American Diabetes Association, located at: <http://www.diabetes.org/main/application/commercewf>.
3. American Dietetic Association, located at: <http://www.eatright.org/>.
4. International Diabetes Federation, located at: <http://www.idf.org/home/>.
5. Juvenile Diabetes Foundation, located at: <http://www.jdrf.org/>.
6. National Certification Board for Diabetes Educators, located at: <http://www.ncbde.org/>.
7. Joslin Diabetes Center, located at: <http://www.joslin.org/>.
8. American Heart Association, located at: <http://www.americanheart.org/>.
9. American Podiatric Medical Association, located at: <http://www.apma.org/>.
10. American Council on Exercise, located at: <http://www.acefitness.org/>.
11. American Optometric Association, located at: <http://www.aoanet.org/>.
12. Becton Dickinson, located at: <http://www.bd.com/diabetes/>.
13. Bristol-Meyers Squibb Company, located at: <http://www.bms.com/>.
14. Diabetes.com, located at: <http://www.diabetes.com/>.
15. National Kidney Foundation, located at: <http://www.kidney.org/>.
16. Roche, located at: <http://www.roche-diagnostics.com/>.
17. World Health Organizations, located at: <http://www.who.int/en/>.
18. Taking on Diabetes, located at: <http://www.takingondiabetes.org/>.
19. Diabetesatwork.org, located at <http://www.diabetesatwork.org/>.

C. Native American organizations and diabetes and health programs

1. University of Oklahoma, Health Promotion Programs, located at <http://hpp.ou.edu>
2. Indian Health Service, Medical and Professional Programs, located at: http://www.ihs.gov/MedicalPrograms/Medical_index.asp.
3. Northwestern Portland Area Indian Health Board: The Western Tribal Diabetes Data Project, located at: <http://www.npaihb.org/epi/diabetes.html>.
4. The Native American Prevention Research Center, located at: <http://w3.ouhsc.edu/coph/CophSub/PRC.htm>.
5. Univ. of Arizona: Native American Research and Training enter, located at: <http://www.ahsc.arizona.edu/nartc/>.
6. Center for American Indian Health Research (University of Okalahoma, Health Sciences Center), located at: <http://w3.uokhsc.edu/coph/CophSub/CAIHRtxt.htm>.

7. Native American Diabetes Project: Strong in Body and Spirit, located at: <http://www.laplaza.org/health/dwc/nadp/>.
8. The Center for American Indian Health: The Johns Hopkins School of Public Health, located at: <http://ih.jhsph.edu/cnah/index.htm>.
9. Sandy Lake Health & Diabetes Project, located at: <http://www.sandylakediabetes.com/>.
10. Association of American Indian Physicians, located at: <http://www.aaip.com/home/index2.html>.
11. National Indian Health Board, located at: <http://www.nihb.org/>.
12. Cherokee Rural Health Network, located at: <http://www.cherokee.org/Services/Health.asp>.
13. Southeast Alaska Regional Health Consortium, located at: <http://www.searhc.org/>.
14. Healthy Nations Initiative (Univ. of Colorado Health Sciences Center), located at: <http://www.uchsc.edu/ai/hni/>.
15. Center for American Indian Research and Education (Univ. of California – Berkeley), located at: <http://www.caire.org/>.
16. National Native American AIDS Prevention Center, located at: <http://www.nnaapc.org/>.
17. Native Elder Health Care Resource Center, located at: <http://www.uchsc.edu/ai/nehcrc/>.
18. National Indian Child Welfare Association, located at: <http://www.nicwa.org/>.
19. Native American Cancer Research, located at: <http://members.aol.com/natamcan/>.
20. NAIP Health and Medical Path! “Information & Resources” (North American Indian & Indigenous People), located at: <http://www.yvwiiusdinvoohii.net/medinfo.html>.
21. Tribal Health Connections, located at: www.tribehealth.org.
22. “Tribal Homepages and Health Websites” Tribal Connections in the Pacific Northwest, located at: <http://www.tribalconnections.org/resources/tribalsites.html>.
23. National Resource Center on Native American Aging, located at: <http://www.und.edu/dept/nrcnaa/>.
24. Inter Tribal Council of Arizona, Inc., located at: <http://www.itcaonline.com/Programs.html>.

D. Community diabetes and health education programs

1. CDC: National Diabetes Education Program, located at: <http://www.cdc.gov/diabetes/projects/ndeps.htm> or <http://ndep.nih.gov/>.
2. American Association of Diabetes Educators: Continuing Education, located at: <http://www.aadenet.org/ce/eduoffer.htm>.
3. Joslin Diabetes Center: Continuing Medical Educational Programs, located at: <http://professionaled.joslin.org/CourseListing/LiveCourseListing.asp> and a description of classes, located at: <http://www.joslin.harvard.edu/jboston/classes.shtml>.
4. Diabetes Planner.com: Diabetes Education Classes – CDE, located at: http://diabetesplanner.com/diabetes_education/default.asp.
5. American Diabetes Association: Education Recognition Program, located at: <http://www.diabetes.org/education/eduprogram.asp>.
6. American Medical Association: Online Continuing Medical Education Programs, located at: <http://www.ama-assn.org/ama/pub/category/7537.html>.
7. National Certification Board for Diabetes Educators, located at: <http://www.ncbde.org/>

F. School-based diabetes and health education programs.

1. *HealthTeacher.com* (Owned by Health Strategies company). It is an online comprehensive K-12 school-based health education curriculum, located at: <http://www.healthteacher.com/default.asp>.
2. *Dole 5-A-Day* (Dole Food Company) offers free school health materials to elementary schools at: <http://www.dole5aday.com/>. Is part of the national "5 A Day for Better Health Program" described on the national Cancer Institute website at: <http://www.5aday.gov/>.
3. CDC - Centers for Disease Control - "Guidelines to Promote Health Lifelong Eating" at: <http://www.cdc.gov/nccdphp/dash/healthtopics/nutrition/guidelines/> and "Guidelines to Promote Lifelong Physical Activity" at: http://www.cdc.gov/nccdphp/dash/healthtopics/physical_activity/guidelines/index.htm and the *School Health Index*, located at: <http://www.cdc.gov/nccdphp/dash/SHI/index.htm> and "School Health Program Guidelines" located at: <http://www.cdc.gov/nccdphp/dash/healthtopics/guidelines.htm>.
4. *Pathways* (Univ. of New Mexico: Center for Health Promotion & Disease Prevention), a comprehensive school-based health promotion program available online at: <http://hsc.unm.edu/pathways/>. [Note: the entire issue of the *American Journal of Clinical Nutrition* for April 1999 was devoted to the *Pathways* program]
5. *SPARK* (San Diego State Univ. produced school-based physical activity program) information available at: <http://www.foundation.sdsu.edu/projects/spark/>.
6. *RISTRA* program - a school-based health program (good site not available)
7. *CATCH* school-based physical education program (University of Texas, school of Public Health), information located at: http://www.sph.uth.tmc.edu/catch/PHYSICAL_ED.HTML.
8. *Circle of Life* - a Native American school-based K-8 HIV/AIDS prevention education curriculum (Bureau of Indian Affairs - Office of Indian Education Programs), briefly described at: http://www.oiep.bia.edu/programs_prek12.html.
9. *Lifestyle Balance* curriculum produced by the University of Pittsburgh for the national DPP (Diabetes Prevention Program) but available for community use in its entirety at: <http://www.bsc.gwu.edu/dpp/lsmop.htmlvdoc>.
10. *Strong in Body and Spirit* (community-based program – Native American Diabetes Project) available at: <http://www.laplaza.org/health/dwc/prof/nadp/index.htm>.
11. *Awakening the Spirit: Pathways to Diabetes Prevention and Control* (American Diabetes Association), information available at: http://www.diabetes.org/main/community/outreach/native_americans/default2.jsp.
12. *EPEC – Exemplary Physical Education Curriculum Project* (Michigan – Council on Physical Fitness, Health and Sports) information available at: <http://www.michiganfitness.org/EPEC/default.htm>.
13. *Planet Health* (Harvard Univ. Prevention Research Center on Nutrition and Physical Activity) an interdisciplinary curriculum for 6th-8th graders, with information located at: <http://www.hsph.harvard.edu/prc/planet.html>.
14. *Kitchen Creations* (Cooking school program jointly supported by the New Mexico Diabetes Prevention and Control Program and New Mexico State Univ. Cooperative Extension Service) information located at: <http://www.nmdiabetes.com/programs/kitchen.html>.