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Innovative Software Links Microsoft Excel[®] and Access[®] to RPMS Databases for Clinical and Epidemiological Applications

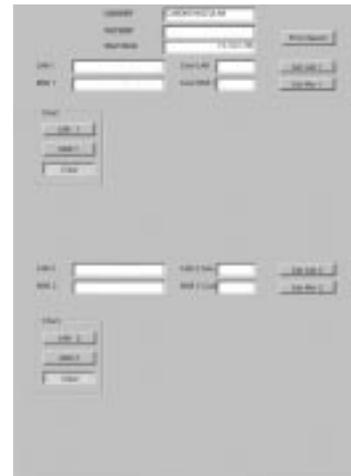
CDR Randy W. Burden, PharmD, CPS, Director, Cardiovascular Clinic, Santa Fe Indian Hospital, Santa Fe, New Mexico; Paul D. Wesley, MSEE, McKinley Enterprises; and LTCDR James Lando, MD, MPH, Medical Epidemiologist

The Santa Fe Indian Hospital Cardiovascular Clinic (CVC) has been in existence for almost two years. Since its inception, health care providers have felt a need for easier access to, and applicability of clinical Resource and Patient Management System (RPMS) data. In October 1997, the CVC obtained a grant from the McCune Charitable Foundation to support the expansion of the clinic, as well as the development of methods that would make the RPMS database more user-friendly.

An innovative software program was created that allowed the direct linkage of Microsoft's Excel[®] and Access[®] (spreadsheet and database software) to the RPMS databases. This program consists of a small portion of original "M" or RPMS programming, combined with a major portion of two commercial off-the-shelf applications: KB-Systems' SQL-ODBC[®] and Fileman Mapper[®].

CVC clinicians are now able to request in graphical form any laboratory or anthropometric data (such as weight or blood pressure) over time by completion of an Access[®] "window" (see Figure 1). Therapeutic goals can be entered to aid the patient's understanding of their progress. Figure 2 depicts an example of an LDL cholesterol profile of a patient with coronary artery disease for whom a goal of 100 mg/dl has been set. Figure 3 is a graphic display of blood pressure readings. Figure 4 is an example of a glycosolated hemoglobin (HgA1c) profile with a goal of 7%. Figure 5 is a graph of weight with a goal of 108 pounds.

Figure 1. Microsoft Access "window" used to obtain data



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Figure 2. LDL Cholesterol profile display

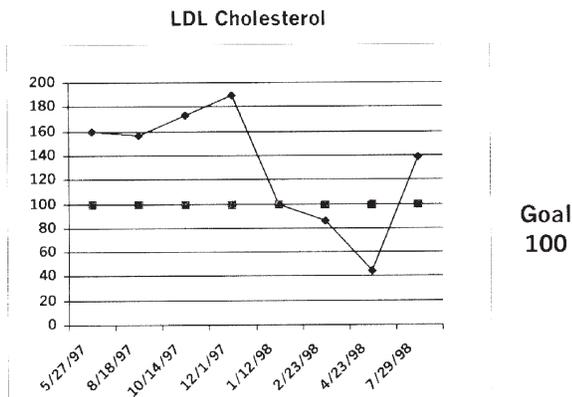


Figure 5. Weight display

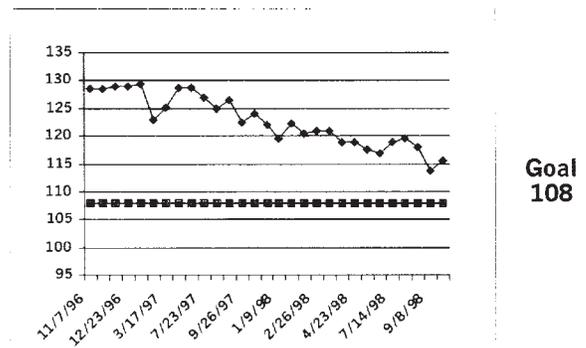


Figure 3. Blood Pressure display

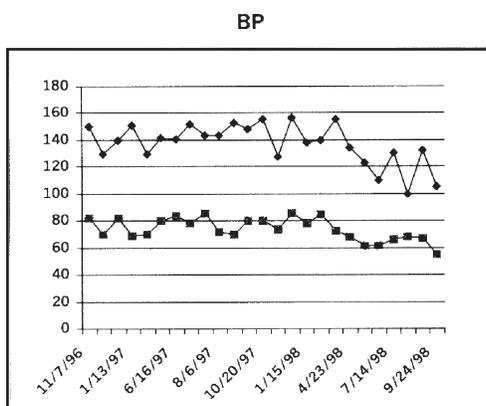
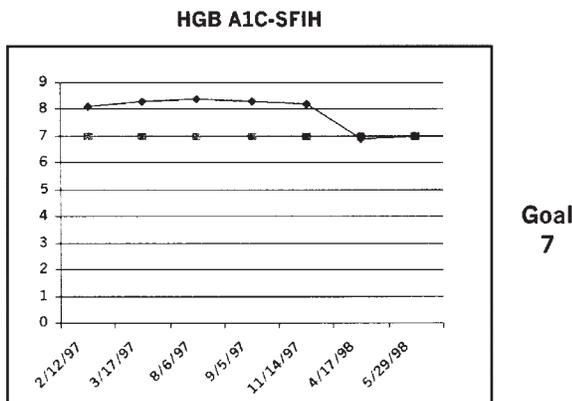


Figure 4. Glycosolated Hemoglobin display



Indian Health Service Evaluation and Research funds are supporting an evaluation project in which interventions made through the CVC are compared to usual care of patients over time. In order to evaluate the effects of these interventions, a rapid data retrieval process was needed for statistical analysis. The Excel® spreadsheet program is being used to access the RPMS patient cohorts, sub-divide patients into specific treatment cohorts, and retrieve requested information according to the evaluation format (see Figure 6).

Figure 6. Microsoft Excel® spreadsheet display of patient data

1	COHORT	PATIENT_ID	LAB TEST	VISIT	RESULTS
2	CARDIOVASCULAR	112	TRIGLYCERIDE	3/14/98 20.40	170
3	CARDIOVASCULAR	112	TRIGLYCERIDE	7/21/98 9.11	114
4	CARDIOVASCULAR	192	TRIGLYCERIDE	7/23/98 9.22	261
5	CARDIOVASCULAR	244	TRIGLYCERIDE	5/18/98 8.51	269
6	CARDIOVASCULAR	585	TRIGLYCERIDE	3/23/98 12.00	106
7	CARDIOVASCULAR	585	TRIGLYCERIDE	4/21/98 12.00	56
8	CARDIOVASCULAR	585	TRIGLYCERIDE	6/23/98 16.24	91
9	CARDIOVASCULAR	585	TRIGLYCERIDE	9/21/98 12.00	182
10	CARDIOVASCULAR	645	TRIGLYCERIDE	3/17/98 9.28	962
11	CARDIOVASCULAR	645	TRIGLYCERIDE	6/18/98 13.07	2243
12	CARDIOVASCULAR	645	TRIGLYCERIDE	6/18/98 17.45	2322
13	CARDIOVASCULAR	645	TRIGLYCERIDE	6/18/98 12.00	1934
14	CARDIOVASCULAR	645	TRIGLYCERIDE	6/11/98 12.00	257
15	CARDIOVASCULAR	645	TRIGLYCERIDE	10/19/98 12.00	293

This software program was developed because of the need to present graphs with treatment goals to patients for feedback, as well as the need to access data for epidemiological purposes. Our experience with this approach has been positive, and is supported by excellent patient reception. □

IHS Research Conference Addresses Genetic Research Observations of One Participant

*Virginia Hood, MB, BS, MPH, University of Vermont,
Burlington, Vermont*

“The Promises and Perils of Genetic Research” was the topic for the forum that occupied the first day of the 10th Annual Indian Health Service (IHS) Research Conference held in April 1998 in Albuquerque, New Mexico.

The purpose of the annual Research Conference is to provide a forum for researchers, health care providers, community members, administrators, and students to share information and ideas about research projects involving Native American people, including ways to ensure the benefits and reduce the risks of the research to both individuals and communities. In recent years, in addition to individual presentations describing specific recent investigations, sessions addressing the benefits and risks of research in general have been introduced. In previous years, topics such as developing partnerships in science and research, and establishing guidelines for presentation and publication of research findings have sparked lively discussions and useful exchanges of approaches. This year’s forum topic was particularly pertinent for Indian communities whose members and cultures have long been favorite subjects for researchers, but who have become appropriately cautious about involvement with any research initiatives that have not originated within their communities or with their input.

The daylong program consisted of formal presentations from representatives of the Human Genome Project (HGP), the IHS, Native American researchers, and community members, as well as small group discussions among all participants at the conference. There was an interesting discussion of the differences between the HGP, designed to map the human genome, and supported by National Institutes of Health, and the Human Genome Diversity Project, an independently funded project devoted to the genetic characterization of racial, ethnic, or other defined groups.

Support for the benefits of genetic research rests on the assumption that defining genes will lead to better understanding of disease. This can be translated into actions that will lead to better health through advances in prevention, with earlier diagnosis for those at risk, and therapy, with specific gene, gene product, or drug therapy. There followed an outline of what is currently understood about the genetic and environmental influences on the development or expression of human disease and the complexity of their interactions. It was stated that even those excited by the prospects of understanding the

genetic determinants of disease acknowledged that the current emphasis on investigation of genetic rather than environmental factors may be more related to their being simpler to unravel than to their being of greater importance. Many of us present agreed with this analysis, feeling that, especially with respect to disorders such as diabetes and vascular disease, greater efforts should be made to examine lifestyle influences, as they are most likely to be amenable to treatment or prevention.

The discussion of the perils of genetic research highlighted issues in two areas; those affecting the individual and those affecting the community. Consideration of the consequences of research for the community, as well as for the individual, has always been a critical concern for Native American people. The need for community, as well as individual consent for any research is always emphasized. In both these areas the adverse effects resulting from loss of confidentiality, discrimination in private life or the workplace because of identifiable individual characteristics, or reinforcement of stereotypes were causes for concern.

Also at issue were the possible adverse legal and political consequences of defining cultural groups by genes. The greatest concern for many individuals was the concept of using personal biological material to generate “for profit” products (genetic patenting). Perhaps the strongest sentiment expressed in opposition to pursuing genetic research was the lack of currently available, demonstrable benefit to communities. People certainly felt that they did not need genetic information to know who they are or from where they have come. As stated by one distinguished speaker, although in recent years researchers have increasingly “allowed” Indians to participate in research and “allowed” them to object to aspects of a project, Indians are asking why they should be involved at all in research, particularly research that does not benefit them directly.

When considering approaches to these complex issues, attitudes varied from those who were totally opposed to any kind of genetic research to those who felt that specific questions relevant to the tribe and potentially beneficial to the community, families, and individuals could be considered for investigation. However, all emphasized that the basis for any investigation must be honesty and respect among all those participating so as to ensure genuine safeguards for the use of all materials and information collected, examined, or retained.

One issue not raised was the consequences of siphoning resources from other important investigations to accommodate the insatiable appetite for genetic research. Such efforts seem particularly futile when seeking understanding of disease by

genetic characterization of racial or ethnic populations. Given the lack of homogeneity in such populations in North America, there is likely to be more variability within than among the groups.

The discussion of the benefits and perils of genetic or any other research in communities is still in its infancy, and we all

have a great deal to lose if we don't continue and foster it. We have much to learn from those who have been taught repetitively by history and experience that even researchers with good intentions do not always do what is right for individuals or communities. □

Optimal Medication Dosing in Older Adults

Lu Del White, RPh, Assistant Chief Pharmacist, Zuni PHS Indian Hospital, Zuni, New Mexico

Providing appropriate therapy for older adults and avoiding adverse drug reactions is becoming a greater problem as the percentage of elders in the population increases. In 1986 51% of adverse drug reactions (ADRs) resulting in death occurred in patients over 60 years of age; 39% of hospitalizations resulting from ADRs occurred in the same age group.

One of the most important ways to assure optimal therapy for older adults is to adjust medication dosage based on renal function. The easiest way to do this is to calculate an estimated creatinine clearance (CrCl) based upon the serum creatinine, using the Cockcroft and Gault equation, as follows:

$$\text{CrCl (males)} = \frac{(140 - \text{Age}) \times \text{IBW}}{72 \times \text{SCr}}$$

$$\text{CrCl (females)} = \text{CrCl (males)} \times 0.85$$

Where: CrCl is the creatinine clearance in ml/min
Age is the age in years
IBW is the ideal body weight in kilograms
SCr is the serum creatinine in gm/dl

Renal function generally declines with age, but it is extremely important to remember that serum creatinine, by itself, is not a reliable indicator of renal function in the elderly; age and weight must be taken into consideration. This is due to a decrease in lean body mass in the elderly and a resultant decrease in the daily production of endogenous creatinine. Thus, although the serum creatinine remains within the "normal range," in fact, creatinine clearance is falling. In some cases it may be necessary to obtain a 24-hour urine collection when a more exact value is needed, but in most cases the

calculated CrCl will suffice as a starting point as a guide for therapy.

Figure 1 clearly illustrates the decline of CrCl with age for a variety of individuals with a "normal" serum creatinine.

Figure 1. Variation in creatinine clearance as a function of age and sex

Age (years)	Sex	SCr	IBW (Kg)	CrCl (ml/min)
65	M	1.2	75	65
	F	1.2	52	38
75	M	1.2	75	56
	F	1.2	52	33
85	M	1.2	75	47
	F	1.2	52	28

All of these patients described in Figure 1, with the exception of the 65-year-old male, should have doses of, for example, ticarcillin, ticarcillin/clavulanate, and cefixime adjusted. At a CrCl below 50 ml/min, dose adjustments for cefixime and ciprofloxacin (and all the newer fluoroquinolones) are recommended. A CrCl below 40 would require reductions in the dosages of cefaclor, cefazolin, and cephalixin. Below 30 ml/min ampicillin/sulbactam and cotrimoxazole dosages need adjustment. Of course, aminoglycosides levels must be monitored regardless of what the renal function is. Antiviral agents such as acyclovir, famcyclovir, and valcyclovir require dosage adjustment, and hydrochlorothiazide is not effective at CrCl less than 35 ml/min, just to give a few more examples of drug dosages affected by decreased renal function.

All of these medications are frequently used in our facility, and since several of them are expensive, it is advantageous to

tailor dosages so that optimal therapy is achieved at the lowest possible cost.

The Zuni Hospital's Pharmaceutical Formulary now contains a listing of all formulary antibiotics with dosage adjustment for decreased renal function and dialysis. A calculated CrCl is done for all adult inpatients and for outpatients older than 65 years of age or those with renal insufficiency.

It is important to note, however, that while glomerular filtration rate generally declines almost linearly with age, approximately 1/3 of older individuals maintain normal renal function until late in life. This underscores once again the need to individualize therapy in this patient group more than any other.

It is also important to remember that elderly patients, as a general rule, have a low reserve capacity. A side effect or adverse reaction caused by an excessive dose that might have had minimal impact on a younger patient can cause major problems for elderly patients simply because their bodies cannot accommodate the additional stress.

Commonly used references list most of the dosing information needed to make adjustments for our elderly patients based on calculated CrCl. The majority of the information we used to develop our formulary came from *ASHP Drug Facts and Comparisons*, the *Handbook of Dialysis* by John Daugirdas and Todd Ing, and the *APhA Geriatric Dosage Handbook*. These are all references that I would recommend acquiring if they are not already in your reference library. □

FOCUS ON ELDERS □

Bruce Finke, MD, Staff Physician at the Zuni-Ramah Service Unit, and Director of the Elder Care Initiative, Zuni, New Mexico

In last month's issue of *The IHS Provider* we proposed marking May 1999, which is Older American's Month, in the International Year of the Older Person (IYOP), by developing and nurturing interdisciplinary elder care teams at our Indian Health Service, tribal, and urban program (I/T/U) sites. In this and next month's *Provider* we will discuss the function and composition of elder care teams.

Why teams?

The task of building the best possible elder care in our hospitals, clinics, and communities requires the consistency and long-term commitment only achievable through a team effort. Staff turnover and the pressure of competing demands often hamper change within our systems. The team approach allows us to proceed with our work without relying on the energy or efforts of a single individual.

Why interdisciplinary teams?

Elder care is, by nature, an interdisciplinary process. The elder's needs cross boundaries of profession and setting. We each bring our own expertise and perspective on the needs of the elderly and we can learn from each other. We each understand how to work within our part of the system to improve the care of elders, and we can help each other.

Who should be on these interdisciplinary teams?

The team make-up will vary from site to site, depending

upon the availability of personnel representing various disciplines and their own level of interest in elder care. Use whomever you may have. We would all think of the direct service clinical personnel (nurse, pharmacist, physical and occupational therapists, optometrist, audiologist, nutritionist, dentist, physician assistant, nurse practitioner, and physician). We need to think also of the many others who have specialized knowledge and who can help us better care for our elders (housekeeping and maintenance, ward clerk, business office representative, medical records and laboratory personnel).

We must also think of those in the community who work with elders. These again include the obvious direct service providers (CHRs, and those working in programs such as the Senior Center, Title VI/Meals on Wheels, Elder Day Care, Home Health, Social Services and others). It should also include the other agencies in the community that have impact on the elderly (housing, transportation, commodities, employment, and others).

Let's not forget the elders themselves. They can be a powerful source of wisdom, guidance, and inspiration for our teams.

Won't the group be too big?

Do we include all of these people?

These are your resources. Within these groups you will find the committed, passionate, and caring people who will join together to improve care for our elders.

Now is the time to commit to set aside an hour or two each week in May 1999 to build and nurture your interdisciplinary elder care team.

Next month: How to set up the Interdisciplinary Elder Care Team. □

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NATIVE AMERICAN MEDICAL LITERATURE □

The following is an updated MEDLINE search on Native American medical literature. This computer search is published regularly as a service to our readers, so that you can be aware of what is being published about the health and health care of American Indians and Alaska Natives.

The Clinical Support Center cannot furnish the articles listed in this section of The Provider. For those of you who may wish to obtain a copy of a specific article, this can be facilitated by giving the librarian nearest you the unique identifying number (UI number), found at the end of each cited article.

If your facility lacks a library or librarian, try calling your nearest university library, the nearest state medical association, or the National Library of Medicine (1-800-272-47887) to obtain information on how to access journal literature within your region. Bear in mind that most local library networks function on the basis of reciprocity and, if you do not have a library at your facility, you may be charged for services provided.

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