West Virginia State Health Plan
*Coordinated Health: Related Information Networks**
(Systems)

I. BACKGROUND

Reliable information is the key to understanding community and personal health and the workings of the health care system. The size and complexity of the health care system are such that the information needed is now found in a number of large, disparate databases. One must repeatedly consult multiple sources to assess system and provider performance and accountability, measure patient satisfaction, monitor and improve quality, guide health policy development, make purchasing decisions, and allocate resources. These disparate sources include, among others, databases describing service area populations; resource location, supply, and use; service demand, cost, and quality; clinical data; financial data; disease incidence and prevalence; and service eligibility files.

The value of individual data sets is increased, often multiplied, when they are combined or linked into integrated systems. More sophisticated analyses of the health care system, and of community health, are possible when data are connected to form a functioning information system. This is not done often, however, because coordinating disparate data sets maintained by governmental agencies, hospitals, payers, physicians, insurers, accrediting organizations, and others is usually a tedious, complex, and expensive process. It is understandable that there are relatively few truly integrated health information systems functioning today.

Technical, legal, financial, and administrative issues affect coordination efforts. The practical difficulty of developing a coordinated system in West Virginia may be illustrated by posing several simple but basic questions:

- What data elements are now collected and reported by which providers statewide?
- How frequent are the reporting periods?
- What are the definitions of the data elements collected and the reporting format?
- Are unique identifiers for patients, providers, payers, and health plans available and used consistently statewide?
- What provisions and safeguards are in place to protect patient confidentiality?
- Who has access to the data, in what form, and under what circumstances?
- What data are reported electronically, and by whom?
- How much would a coordinated information network cost and how could these costs be defrayed?

All of these questions, and many others, will need to be addressed as West Virginia undertakes the effort to develop a unified, consistent, and cost-effective health information system.

II. SYSTEM ASSESSMENT

West Virginia maintains many health and health-related databases. The West Virginia Health Care Authority (WVHCA) requires hospitals to supply detailed hospital discharge and detailed financial data (HCFA Uniform Bill, UB-92). It also surveys home health providers, nursing homes, and hospitals for selected data.

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*Note: tables and maps referenced but not contained here may be viewed and obtained in their entirety at the West Virginia Health Care Authority.

The West Virginia Department of Health and Human Resources collects and maintains data on vital events, behavioral risk factor surveillance information, cancer registry data, morbidity data for required reportable diseases, HIV/AIDs data, primary care clinic data, professional health manpower shortage area and medical underserved area information, a trauma registry, injury data, Medicaid program information, family planning data, and Older Americans Act service data. The Public Employees Insurance Agency (PEIA) has data on the enrollees, payments, and use of services for covered public employees and their dependents, and the Department of Commerce, Labor and Environment Resources maintains the Workers' Compensation medical case management files. The various boards of examiners maintain data on the supply of licensed physicians, nurses, physical therapists, dentists, pharmacists, nursing home administrators, and other health professionals. The West Virginia Research Institute maintains population and other demographic data.

Private sources of data in West Virginia include, but are not limited to, the West Virginia Hospital Association, Mountain State Blue Cross and Blue Shield Plan, managed care plans, other insurers, physicians, ambulatory surgical centers, hospitals, home health agencies, and nursing homes. Other states such as Pennsylvania, Virginia, Maryland, Ohio, and Kentucky may have data on West Virginia residents that receive care at hospitals, nursing homes, and other providers in their states. Federal data sources such as the Veteran's Administration, Health Care Financing Administration (Medicare), and Department of Defense are other repositories of data of interest to West Virginia health officials.

As these listings indicate, there is a large number of databases in West Virginia. Their utility, and hence their value, are reduced by gaps in the data, limited comparability, lack of comprehensiveness, mismatched timelines, and inconsistent quality. There are extensive data on hospital and nursing home use and cost, for example, but little or no information is publicly available on the use, costs, and quality of ambulatory surgery, hospital outpatient department, outpatient clinic, hospital emergency department, freestanding urgent care center, and physician office services.

Recent legislation (Senate Bill 458, 1997) expanded WVHCA's role in statewide health information collection, analysis, and dissemination. WVHCA will develop a consolidated health-related information system (CHRIS), which will include public and private sector databases. CHRIS is in the planning stage; decisions will be made about the type of databases to include in CHRIS, data-sharing agreements, provisions and techniques to ensure confidentiality and data security, data access policies, and ways to disseminate useful information. WVHCA's goal is to gather all data electronically using web-based transmissions from providers. The agency is surveying hospitals in mid-1999 to determine their capacity to use electronic data submissions; nursing homes will be surveyed next. It also will soon begin collecting ambulatory data. The initial phase will seek data from hospital-based ambulatory surgery centers, outpatient departments, and emergency departments. A second phase will begin collection from free-standing ambulatory surgery centers and physicians' offices.

Locating disparate databases in a single location (or a virtual location) moves West Virginia closer to having an integrated statewide health information system. Developing the ability to link effectively different data sets is foremost among the technical considerations in developing an integrated system. Increasingly, databases are being linked for evaluation, outcome measurement, and quality improvement. Consequently, linkage and system formation raises a number of concerns about privacy and confidentiality, and challenges WVHCA to simultaneously provide incentives for all parties to participate and protect linked data.

Successful linkage requires a unique linking number or identifier for each individual. The identifier could include a person's social security number, date of birth, and other definitive variables used in combination and coded (encrypted) to protect the individual's identity. This key (or linking variable) permits hospital discharge data to be linked with birth and death records or to emergency department records and vehicle crash data, for example.

Unique identifiers and effective linkage permit, but does not assure, population-based planning, service delivery, and assessment. This greatly enhances the value of all information gathered and is potentially highly cost-effective.

Currently, there is no universal patient identifier for West Virginia residents. Each service provider--hospital, insurer, plan, physician--typically assigns its distinct number to patients, which could be but is not necessarily the patient's social security number. WVHCA plans to develop a unique patient identifier to promote linkages of databases. Implementation of the Health Insurance Portability and Accountability Act (HIPAA) requires the US Secretary of Health and Human Services to adopt unique identifiers for individuals, providers, plans, and employers. WVHCA, and those it works with, should seek consistency between national initiatives and their state efforts.

WVHCA will meet the different needs of its different audiences by developing several data products for dissemination in print and electronic form. Hospital discharge data will be accessible through **WVHCA Health IQ**, an interactive query system on Internet. Users will be able to download reports and data sets. The data will not contain confidential or restricted data elements. Other states, Arkansas, Utah, and Wisconsin, for example, have built similar tools for use with their hospital discharge data. The West Virginia Hospital Association includes a data center at its web site (http://www.wvha.com) that contains selected hospital profile data, as well as county health profile data and selected health care rankings that are accessible by the public.

Integrated health information systems are being developed in two regions of West Virginia, within two rural provider networks. The Eastern Panhandle Integrated Delivery System (EPIDS), which serves nine counties in eastern West Virginia, and the Southern Virginia Rural Health Network (SVRHN), which serves three counties in southern West Virginia, received federal grants to develop integrated medical information systems. Both networks are vertically integrated, including hospitals, local health departments, primary care centers, social services agencies, physicians, and the services of other entities.

The EPIDS information system includes a central repository for claims submissions by all network members, a systemwide encounter tracking data system, performance review and quality assurance data, and data to permit cost-efficiency determinations. The SVRHN also centralizes claims processing and submission, including electronic claims submission, encounter data to permit patient and physician profiling, and performance and quality assurance data. Although similar in terms of overall objectives, and in many operational aspects, there is no indication that the systems themselves are sufficiently compatible to be easily integrated into a comprehensive statewide network.

III. PROBLEM STATEMENT

There is general recognition that having specific, more complete, information about personal and community health status and the costs and quality of services provided permits the better analysis, planning, and decision-making necessary to improve quality and access to care. Many health and health-related databases exist in West Virginia. State agencies, hospitals, physicians, nursing homes, home health agencies, ambulatory surgery centers, insurers, and managed care organizations maintain hundreds of data sets. This information describes and quantifies public health surveillance and monitoring; health education; supply and use of programs, services, equipment, and facilities; financial information; clinical information; quality of care information; and disease, illness, disability, and death data within the population.

The basic issue is how to develop a comprehensive, cost-effective, readily accessible source of the health and health-related information needed to help improve health and to provide insight when grappling with complex health issues. The strategy being considered involves enhancing the value of existing databases by developing integrated information systems for collecting, analyzing, and disseminating information, while protecting individual privacy. Increasingly, innovations in information technology make it easier to collect, store, process, and analyze large amounts of data and to disseminate information to users of varying degrees of interest and technical sophistication. Collaboration among the public and private sectors will be needed to coordinate existing databases in a cost-effective manner, collect additional data to fill gaps, and distribute information in ways that meet users' different needs.

IV. ANALYSIS

Electronic health-related commerce usually has been the impetus for developing integrated information networks where the attempt has been made. The Minnesota Health Data Network strengthened the local information infrastructure by creating MedNet, a network that links enterprise-level networks developed by integrated delivery systems, provider networks, health plans, and others in the community. Similarly, the Affiliated Health Network of New England, part of the Massachusetts Health Data Consortium, is in the process of building an information infrastructure to link systems across the region. These approaches are likely to be replicated in a number of other regions. Their experience is instructive.

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) includes provisions that are expected to have substantial positive effects on the development of the health care information infrastructure. The goal of simplifying the administration and management of health care organization and financing, often referred to simply as "administrative simplification," should result in improved health system efficiency and effectiveness by standardizing the electronic data interchange of certain administrative and financial transactions, while protecting both the security and the privacy of the information transmitted.

HIPAA requires the Secretary of the U.S. Department of Health and Human Services (DHHS) to adopt uniform, national standards for the electronic exchange of administrative and financial data. Standards must be adopted for the following electronic transactions:

- health claims or equivalent encounter information;
- health claims attachment information;
- enrollment and disenrollment in a health plan;
- eligibility for a health plan;
- health care payment and remittance advice;
- health plan premium payments;
- first report of injury;
- health claim status, and
- referral certification and authorization.

DHHS has already published Notices of Proposed Rule Making (NPRM) for a national provider number, standards for electronic transactions and code sets, national employer identifiers, and security and electronic signatures. The more difficult question of a universal (national) health identifier for individuals remains unresolved. DHHS has prepared a "white paper" on the issue that discusses the options being considered.

The President's Advisory Commission on Consumer Protection and Quality in the Health Care Industry (CCP&QHCI) recently summarized the need for, and the status of, health information systems nationwide:

Health care information systems of the 21st century must be able to guide internal quality improvement efforts; generate data on the individual and comparative performance of plans, facilities, and practitioners; help improve the coordination of care; advance evidence-based health care; and support continued research and innovation . . . While many health care organizations recognize the considerable long-term benefits of expanding their investments in this area, a number of barriers still remain. Reducing or eliminating these barriers will require a comprehensive plan, long-term commitment, and significant and sustained investment over time. (***Final Report to the President of the United States**, **PCCP&QHCI**,* Chapter 14)

The Commission noted that existing health care information systems are inadequate to meet the diverse tasks the health care industry is being asked to address, particularly the divergent demands of a larger and larger number of parties. It concluded that improvements will be predicated upon:

- significant investment in information technology;
- increased attention to improving data quality;
- improved linkages among information systems;
- assurance that personal health care information is protected, and
- adoption of industrywide standards.

According to the Commission, progress toward computerization and then system integration has been slower than expected because the health care market has not been structured to reward significant investments in information technology. Several structural barriers to integration remain. They include:

- uncertainty, inherent in the restructuring of the health care system, which may discourage investing in health information systems;
- absence of comprehensive industrywide standards for the structure, content, definition, and coding of health information;
- fear that improved information systems may be used as a tool of judgment rather than learning, even though information systems are used to support the efforts of health professionals to improve training and quality, and
- disproportionate financial burdens on providers for collecting and supplying information that others (e.g., consumers, health plans, accreditation agencies, government) demand and use.

West Virginia should benefit from participating in the implementation of administrative simplification and by learning from the experiences of others as it begins the process of improving health information systems statewide. Recent legislation gives WVHCA a mandate to create a consolidated health-related information system (CHRIS). This moves West Virginia forward, but there are major challenges that need to be met in developing the system. The first question is to know as much as possible about existing health and health-related databases -- what data are collected and by whom. Learning what exists leads to the next logical step of identifying gaps in the existing databases that might be addressed by new data collection or modification to existing efforts. Many of these gaps are already known. It is well understood, for example, that the lack of data on ambulatory surgery center performance is a serious deficiency. WVHCA has established a Data Advisory Group composed of representatives of state agencies, the health care industry, payers, providers, and consumers to advise and guide its work.

Several years ago, the Hospital Research and Educational Trust of the American Hospital Association reported hospitals received, on average, 100 requests annually from external organizations to supply them with data on “quality.” Multiple requests come from local, state, and federal government agencies, employers, regulators, payers, researchers, media, vendors, licensing agencies, accrediting organizations, and many other legitimate parties. The absence of common measures for quality, performance, and accountability often results in several different responses by the hospitals.

Ad hoc preparation of these responses is costly and inefficient. Not having provider-specific information on quality also is costly to payers, providers, and consumers alike. Developing an efficient integrated statewide health information system should reduce the cost and difficulty of responding to these and other legitimate requests.

Uniform data standards and policies are the fundamental building blocks for an efficient and effective health care delivery system and for developing population-based information systems at the community, state, regional, and national levels. There is considerable collaboration under way nationally and internationally to define core data elements and sets for multiple applications, to develop and modify classification systems, to establish standards and guidelines for data quality, and to formulate standards for information dissemination. The U.S. Secretary of Health and Human Services is developing standards for electronic claims processing, electronic data interchange, data security, and data privacy that payers and providers will likely adopt. With the efforts recently initiated, West Virginia is poised to take advantage of these developments.

V. ACTION STEPS

Effective policy formulation and subsequent planning and operations require access to timely and reliable information. Development of the CHRIS will move West Virginia toward having a statewide integrated health information system. This and similar efforts to improve coordination among data sets should be encouraged and supported by public policy and health system planning decisions. Although information technology has the potential to lower some of the costs, database development is expensive. Additional costs will be incurred to modify existing information systems to capture and report new data, to provide standardized data, and to prepare products and reports. Reaching consensus on core data elements and measures will improve data standardization and thereby reduce collecting and reporting costs. These measures will need to be consistent with those used industrywide nationally to permit and encourage comparisons. Both public and private support will be necessary to sustain data collection, storage, processing, analysis, and dissemination and to take advantage of innovation and new applications in information technology. Cooperation and collaboration among interested parties is essential to develop coordinated health information networks.

Some stakeholders may be reluctant, or even unwilling, to help improve data coordination. They may anticipate loss of market share and revenue, unfavorable publicity, or other negative consequences from the public dissemination of information. Education about how the data can be used to improve performance and incentives to participate may allay some concerns. Developing trust among all interested parties as early as possible will go far to promote cooperation and collaboration.

Consideration should be given to the need to:

- document existing health and health-related databases in both the public and private sectors to illustrate the wide array of data and information that is already available in some form;
- address provider and personal privacy issues directly and early;
- identify gaps in existing databases and develop consensus plans for the missing information;
- develop consensus for a core set of performance, accountability, and quality measures, and the data needed to support those measures, to reduce redundancies and inefficiencies in data collection;
- incorporate HIPAA data standards use in West Virginia data collection and reporting;
- develop a unique record linkage number;
- document data standards now used in both the public and private sectors;
- review tools such as data use agreements, data release procedures, publications, use of information technology for data collection, and database linkage methodologies developed elsewhere for use in West Virginia;

- promote dissemination of health information in formats consistent with users' needs and abilities by establishing target audience user groups to identify data products, reports, and services useful to them;
- establish a review process to evaluate (approve and disapprove) requests to use data housed in CHRIS;
- coordinate data gathering and data exchange efforts with neighboring states to document migration for health care;
- develop incentives to promote data collection and reporting by linking participation in integrated health information systems to planning and regulatory protocols and decisions;
- assess feasibility of employing technology to capture and report data such as telemedicine for home health clients, and
- examine recent and current efforts elsewhere to develop combined statewide data clearinghouse and data warehouse functions.

VI. POTENTIAL SOLUTIONS

Building integrated health information systems will require cooperation and collaboration among all interested parties. The following are included among the major principles and policy questions upon which these parties must reach agreement if the effort is to succeed:

- Improving the quality of existing databases and comprehensiveness of available data is fundamental to improving the provision of health care.
- Incorporation of unique identifiers for patients, providers, plans, payers, and facilities is essential to permit linkages among databases and meaningful analyses.
- Using common measures for quality, performance, accountability, and access is necessary.
- Maximum public access to all data, in all formats, consistent with privacy protections is essential to enhance system value and credibility.
- Sustaining consistent data collection and reporting statewide to permit longitudinal studies and evaluations is essential and therefore more valuable than episodic efforts.
- Incremental movement toward implementation of the electronic medical record statewide should be built into the system as it is developed.
- The value of gathering additional data and information must be balanced against the cost of gathering and reporting it.
- Developing linkages between health, health-related, and other data (e.g., transportation, social services, corrections, housing, etc.) by using geographic information systems (GIS) for data analysis has special value, given the distinct demography and topography of the state.

VII. RECOMMENDATIONS

Integrating existing health databases and health information networks would lead to better understanding of the health status of West Virginia's populations and how the health care system is responding to their needs. Information on use, cost, and quality of services and programs, as well as the supply, location, and financial condition of providers and the extent and type of illness, disability, and causes of death experienced by the residents statewide, is critical for the effective and efficient allocation of resources.

Not all interested parties will support these initiatives to improve information exchange. Self-interest, economic interests, public scrutiny, and privacy concerns may diminish or threaten participation and the willingness to contribute data. Equitable information exchanges and database linkage are inherently public policy questions. The

WVHCA, as the manager of CHRIS, should take the lead in conducting an inventory of databases in the public and private sectors. The inventory should identify the data elements collected, coding schemes and formats used, access and release provisions, and other characteristics of the data. With this inventory, gaps in existing data collection can be identified and documented for all potential participants. Before additional data are collected and reported, those managing the planning process should take the lead in developing a consensus plan for data collection and reporting. The plan should address how existing data are used and provide a rationale for additional data collection.

Those responsible for the process should monitor data standardization activities among other states, the federal government, and the voluntary standardization organizations. Considerable work is under way elsewhere, and West Virginia should take advantage of and try to be consistent with these efforts. Experience in the establishment of public data clearinghouses and data warehouses is growing; these resources should be consulted. Attachment RIN-1 is a summary description of a currently developing public data warehouse project being supported by the National Institutes of Health. It is one of many efforts that those charged with developing and implementing CHRIS might benefit from following.

VIII. FEASIBILITY

Technical, administrative, economic, legal, and social factors affect the collection, integration, and dissemination of health data. Data integration can be expensive and time consuming. Fortunately, innovation in information technology and electronic data processing is lowering the cost of data gathering and processing, analysis, and dissemination. Integrated information systems are now feasible, are becoming more practical, and should become less costly both to develop and to operate. Moreover, it is likely that the cost of not having efficient integrated information systems will soon greatly outweigh the cost of developing and operating them, if that is not actually the case already.

Differences in data definitions, coding schemes, reporting periods, and formats affect standardization and the ability to merge or integrate databases. Moving forward, West Virginia needs to develop common reporting requirements and data dictionaries, as well as unique identifiers to be used for database linkages.

The multiplicity of demands that data providers and other data sources must satisfy could be addressed by developing core data sets and measures. This should reduce data requests while providing uniform, comparable measures for providers. The public sector could employ a combination of incentives and regulations to implement needed changes. Implementation would be long term and sequential. It will require the resolve and support of all interested parties to be successful.

IX. ACCOUNTABILITY

Accountability requires that all interested parties accept, or at least acknowledge, that having a statewide integrated health information system is desirable and feasible and that significant changes are needed to achieve the desired level of integration.

Measurement is a critical tool for improving performance and ensuring accountability among all of those in the health care delivery system and for supplying the information the public and purchasers need to make informed choices. Existing mechanisms for measurement and reporting do not fully meet the needs of potential users in terms of performance, accountability, and quality. The lack of widely agreed upon priorities and standards for measurement has been a source of frustration and inefficiency. The President’s Advisory Commission on Consumer Protection and Quality in the Health Care Industry recommended a core set of quality measures for each sector of the health industry that should be identified for standardized collecting and reporting. A core measurement set would assist in tracking progress in addressing priority goals established for quality improvement.

Having common measures for accountability and performance and the data to evaluate them available in a central location, or in a fully integrated system, as is proposed for CHRIS in West Virginia, will help assess and promote accountability among all parties. Measures should be available for the health system generally, for public health, and for other substantial components of the health system. *Healthy People 2000: West Virginia Objectives* and *West Virginia Healthy People 2000: Midcourse Review 1995* include traditional public health and other health status measures. Other sources of measures include the HEDIS data set for managed care organizations. NCQA also offers HEDIS measures for Medicaid managed care plans. The Foundation for Accountability (FAACT) and the Consumer Assessment of Health Plans Study (CAHPS) are additional sources for measures of performance and accountability. Both the Maryland Hospital Association's Health Indicators Project and the Agency for Health Care Policy and Research (AHCPR) Quality Indicators Project are designed for hospitals.

Accountability will be improved if all interest parties have the opportunity to participate in the information system planning and decision-making process, and if the systems developed are structured to facilitate the accommodation of innovations in information technology. It is likely that innovation in information technology management and exchange will make data collection and reporting more cost effective.

X. ISSUES FOR THE FUTURE

The demand for information to assess the performance of the health care system and providers of care, the health of populations, the quality of care patients receive, and their satisfaction with that care will continue to grow. Data will be needed from the plans, physicians, hospitals, and other providers on use, cost, and measures of quality to address these complex issues. Some may be reluctant to make these data public for fear of being placed at a competitive disadvantage or because their information systems may not be able to supply the data easily or without significant additional expense.

The knowledge derived from these assessments is essential when attempting to respond to legitimate health care needs and to alter behavior in at-risk populations. Planning and regulatory changes may be required to ensure that providers and other sources of data collect and report, in acceptable form, the information needed. Planning policies and regulatory decisions, including certificate of need policies and decisions, should assure that all affected entities are committed to participation in integrated information systems and to implementation of the electronic medical record as the opportunity permits.

Planning policy and decisions should ensure that any health information system developed is designed to ensure that, to the maximum extent practical, population-based data element definition, collection, analysis, and publication are built into the system. The value of data from a managed care plan, for example, is greatly depreciated if it cannot be related (linked) to the underlying enrolled population and to the general public.

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World Wide Web sites

U.S. Department of Health and Human Services, Administrative Simplification	aspe.os.dhhs.gov/adminsimp
National Association of Health Data Organizations (NAHDO)	nahdo.org
Medical Records Institute	medrecinst.com
Agency for Health Care Policy and Research	ahcpr.gov
New York State Department of Health	health.state.ny.us/nysdoh
Utah Hospital Discharge Query System	161.119.100.19/had/hi_iq/ajrate
Wisconsin Office of Health Care Information	badger.state.wi.us/agencies/oci/ohci
Minnesota Health Data Institute	mhdi.org
Massachusetts Health Data Consortium	mahealthdata.org
Measurement Advisory Service	qmas.orgQuality

Attachment RIN 1

Public Health Data Management Initiative

Sponsored by
Medical Services Research Group, Inc.

Medical Services Research Group (MSRG), a Memphis-based consulting firm, has recently received a grant from the National Institutes of Health under their Small Business Innovative Research Program for the development and implementation of a data management system for use in public health settings. Richard K. Thomas, Ph.D., is the principal investigator for the project. The proposed data management system will take advantage of contemporary computer technology to create a data warehouse that can be used for a variety of public health research and planning functions. The design will allow for the integration of data from a variety of sources and their manipulation in the form of both summary and detailed data.

The initial objective of the project is to develop a "template" that can be applied in a variety of public health settings to allow the incorporation of the relevant agency data files into a data warehouse. The data warehouse will allow for subsequent data manipulation and reporting. A second phase would create a mechanism for interfacing agency data with data files from other government agencies and external sources of data (e.g., commercial data vendors). At the first two stages the emphasis will be on reporting, analysis and decision support. A third stage is envisioned that incorporates encounter-level data in a manner that supports real-time transactional operations.

The system will provide baseline data on the community in general and on its medically underserved population segments in particular. It will also establish a basis for setting priorities, making decisions with regard to funding, monitoring trends in health status, tracking the movement of its traditional population into managed care arrangements, etc. Further, the system will generate reports and other "hard" output to be used by public health personnel and/or distributed to the community. Advanced GIS capabilities will be an inherent component of the data management system.

The proposed information management solution is envisioned as a comprehensive data warehouse. A data warehouse, as utilized here, refers to a total system for processing, managing, and distributing health and health-related data. This concept encompasses a staging process for the acquisition and standardization of data obtained from a variety of sources, a process for extracting aggregate data for widespread distribution, advanced functionality for the simultaneous manipulation of multiple data sets, a variety of output capabilities, and Web-enabled access.

In the typical case, the data warehouse would involve the acquisition and processing of all relevant Department of Health data sets and the warehousing of them within a central repository. It would further involve the incorporation of additional data sets from other state agencies, along with appropriate "external" data sets. These could include data on housing, education, environment, and other health-relevant topics. The warehouse will also contain detailed demographic files, with the full range of demographic variables and geographic coverage from the state to the census block levels.

The functionality incorporated into the system will provide user-friendly capabilities for navigation through the warehouse and, at the same time, advanced techniques for data management. This will include the ability to aggregate data, create subsets, drill down through various levels of data, and perform a wide range of analytical techniques and other sophisticated forms of data management. Standard reports will be programmed into the warehouse for rapid report generation and custom reporting will be routine. SAS applications will be utilized for data warehousing and functionality development.

The warehouse will rely heavily on a sophisticated geographic information system (GIS) component. This will involve user-friendly mapping and advanced spatial analysis capabilities. The maps included will be interactive, in that clicking on a map will allow the user to perform additional functions such as displaying information or drilling down to lower geographic or data levels. The maps, in fact, will serve as a navigation tool for the warehouse.

The staging level will offer detailed record-level data for internal use for monitoring trends or carrying out epidemiological analysis. The aggregate data extracted from the Web-enabled level of the warehouse will allow lower-end users (including the general public as appropriate) access to adequate information for queries, searches, and data analysis.

The Web-compatible nature of the system will provide numerous advantages to those who adopt its use. The warehouse will be easily accessed, eliminating the possibility of users being constrained by equipment limitations. A Web-type interface will make the system exceptionally user-friendly. A sophisticated Web interface bolted onto a state-of-the-art data warehouse component will make the system extremely efficient.

The primary clients for a public health data management system are state health departments, large local health departments, and health planning agencies. Initial system work will focus on integrating internal data for participating organizations. Subsequent development work would extend the reach of the warehouse to include data from other government organizations and external sources (e.g., demographic data, economic data). While the initial public health data warehouse will concentrate on the aggregate data necessary for decision support activities, it will be possible in subsequent system releases to incorporate record-level data.

The intent of the grantee organization is to identify initially two “partners” each among state health departments, health planning agencies, and local health departments. These sites will serve as ‘laboratories’ for the development of the data warehouse. While some expense will be involved on the part of these development partners, most of the cost of development will be borne by the grant. Development partners must commit to a certain level of staff support, be willing to purchase appropriate hardware and software, and commit limited financial resources toward the development of the public health data management system. The identification of potential development partners is expected to be completed during the second quarter of 1999.

For more information on the project, interested parties can visit it at www.msrg.com.

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