2009
Chapter 10
Public Health Informatics

One of the most pressing issues for public health departments is keeping accurate, detailed, accessible records, reducing record duplication among human service agencies and making better use of computerized databases for financial management, benefit eligibility, developing patient data, tracking clients across clinics and within human service systems, and for epidemiologic studies of their communities. No health department activity is too small to benefit from Informatics, use and training. Data systems can be used to make patient appointments, keep patient histories, link eligibility data in the health department with the social service, Medicaid, and mental health systems, and to send bills. Data on clients can be aggregated to build activity summaries, or to plot maps showing the distribution of services within the community. An ideal public health informatics system will start with the first citizen contact.

The electronic examination room.

In a "state-of-the-art" clinic examining room, you walk in to see a patient and carrying a wireless linked laptop to review the patient's current clinical record. All examination and interview rooms are connected by a wireless network so that all patient and family information is at your fingertips. A list of the patient's current problems will appear on the screen in SOAP format. When you ask to review the first problem, a summary of the patient's problem history to date, and results of recent laboratory tests or x-rays will appear. Before you examine the patient the computer can display an outline of the patient's body on the screen. A touch of the light pen to the appropriate part of the body image on the terminal will provide an enlarged view of the area to be examined. While examining the patient you will enter data on the electronic chart communicating with the computer using a touch stylus. As the information is entered, it will appear on the screen. The information system will be programmed to compare the data entered with a database to abstract expected clinical patterns for comparison. The system will suggest additional physical examinations, laboratory tests, or request more history. It also will suggest options for diagnosis and treatment. After the appropriate diagnosis is entered into the system, you will select a course of treatment, or consider one suggested. If you need to order drugs, the computer will check your order against an pharmacopeia to ensure the dose is correct for age, weight, sex, and concurrent conditions (such as pregnancy), at which time it will forward the prescription to the pharmacy to be filled. The system will scan the clinic appointment subsystem to make the next appointment and will also arrange the patient's transportation if necessary. A message may be sent to the district public health nurse (case manager) responsible for the patient's care to request a home visit. The medication will be waiting for the patient at the pharmacy. A few clinics, hospitals in the U.S. and many in Japan and Europe can do all this today. Public health departments can be expected to show that funds provided for clinical services are in fact used for those services and peers can review clinical services. State of the art electronics makes all this possible today. State government and many medical institutions in 2009 are still 10 or more years behind the state of the art in use of informatics. See Chapter 3 (page 131 [toward the bottom of the page] and following pages) of the Future of Public Health in the 21st Century. The Federal Government expects all medical resources to have automated system in place by 2014. See the HHS Health Information Technology web site

Audit Trails.

The medical record will provide an audit trail of a patient's attendance and the service provided. The patient records are stored on a network server. For security purposes, copies of the medical records should be stored for at least ten years after a patient becomes inactive. All records systems should have multiple backups performed daily. One copy of records should always be stored at a site remote from the active network while a second copy should be stored on a separate disk within the active network. The medical network should provide record access for staff in the clinic or doctor's office, a hospital nursing station, and the patient's bedside, as well as the laboratory, pharmacy, admissions office, radiology center and other related sites. The hospital/clinic nursing staff should

be allowed access to the department's database after the department has closed. Then, when a patient appears in a hospital emergency room their records are available to the physician treating the patient. The next major steps in use of data systems will require expansive education of health personnel as well as the public at large. There is great concern about security. Most of the security issues that concern the public, as well as doctors and nurses, are the results of misperception and the visibility given to hackers. As security improves and the health care users, both patients and professionals, understand and believe that records are secure and cannot be viewed without a patient's agreement, we can move forward. The ability to produce a flash card that contains a patient's history, carried by the patient, would be invaluable in emergencies. Such cards could improve access to, and improve the quality of emergency care, especially when the patient is unable to respond to questions. Such information is in its infancy with the Medic-alert bracelets worn by some with chronic diseases. The ability to develop a lifetime medical history starting at birth is possible today, but will never occur until security issues are resolved. Such a historical record could remind parents when to obtain periodic check-ups for children and when to return for immunizations. Such a record could interact with home computer systems and health institutions to ensure that individuals are reminded of appropriate preventive interventions and need for checkups for conditions such as PKU, or diabetes. While conceptually and practically simple the concerns about 'big brother' and invasion of privacy are delaying institutionalization of systems that can save life, promote health, reduce disability, delay premature death, and minimize costs of care. Microsoft and Google are starting to provide repositories for electronic health records which patients can have medical personnel access.

An issue with use of electronic records is a fear by many individuals that someone will hack into their records and blackmail them, or distribute information about them on the Internet. Another concern is that employers will use such data to deny them jobs or to remove them from a current job as posing an unacceptable expense to the company. There are also concerns that insurance companies will gain access to medical information and deny them insurance. While these fears are real there is little evidence to show that such actions have taken place. There has been increased action by federal and state legislators to restrict access to personal records and disallow exchange of information without permission of the individual whose information is requested.

There is increasing evidence that the best historical data results in the best diagnoses and best treatments. There is enhanced software available today that allows a doctor or pharmacist to improve medication use, to avoid adverse effects between medications when more than one medication is used. Pharmacy programs will match the best and least expensive medication to the history and results of laboratory tests found in electronic records.

As more diagnosis and treatment becomes 'evidence based', good patient records will ensure more rapid diagnosis and treatment, particularly for chronic diseases.

Another problem remaining is the agreement on language for health related databases. While a human knows that male and man are similar, computer systems do not, This mean that just as we have an ICD(A) code for diagnoses we have to have a common terminology for health and human services. This is lacking today and may cause as much difficulty as security.

Communications.

Local health departments need to exchange information with regional, state and federal health agencies. The Public Health Foundation (PHF), a non-profit arm of the Association of State and Territorial Health Officers (ASTHO), has developed an electronic bulletin board. The PHF gives a health department that applies an identification code that allows it to receive and return messages from other local and state health departments and ASTHO. This bulletin board can act as a gateway to the CDC, EPA, FDA and other health related agencies in the federal government. All you need is a modem, and communications software such as MS Outlook, either the 'express' or full version. Ideally you need a local Internet Service Provider. The CDC has developed an electronic link for tracking epidemiologic data from local to state to federal centers.

Local health departments can obtain the CDC's MMWR weekly by email rather than waiting for paper copies. They can also have access the JAMA, BMJ and other medical periodicals over the internet through local hospital and university libraries. Increasingly the articles in these journals have hyperlinks to references on the Internet saving the reader time searching for references. There are also CME programs available using streaming video and Power Point from schools of public health such as UNC at Chapel Hill, GWU and UCLA, as well as from the CDC. These programs are particularly useful to rural health departments that do not have access to satellite TV services.

Local Health Department Computerization

In Loudon County, Virginia, the environmental staff tracks septic tank locations and problems electronically. Each lot can be located on a county or city-planning department plat map. After the septic tank and drain field site has been approved, the environmentalist uses a network connection to obtain a picture of the lot from the planning department's computer, and then draws the location of the drainfield with a light pen. The planning department uses this data to decide when to provide central sewer or water services, rather than installing additional septic tanks. Such systems are now being developed by cities and counties as part of their Geographic Information System (GIS) infrastructure.

In Henrico County, Virginia, the county manager bought portable PCs and printers for all the environmentalists. Each one records the results of a restaurant inspection on the portable PC and prints out a copy for the restaurant. At the end of the day the portable unit's data is downloaded to the office PC and from there to the state's restaurant inspection database. The department's software programs provide monthly reports of environmental activities by environmental district and census tract. The individual inspections are recorded by name of place and type of food service. The food service program, using the standard federal food inspection point system, automatically calculates the inspection score. This stimulates competition among the environmentalists, and embarrasses business places that do not want to see their name show up on a public list with a low score. A similar program in Corpus Christi, Texas also enables the department to bill more than 1400 food service places each December and to send permits automatically, once the fee has been received and entered into the database. An activity that used to take two people three weeks now takes one person an hour. In return for the fee, the department agreed to inspect each food service place at least four times a year and report results quarterly to the restaurant association. More recently the Virginia Department of Health has developed the first statewide consolidated food service reporting system that is open to the public.

In Richmond, VA immunization records were ideal for computerized databases. This freed up floor space previously used for filing cabinets. Record retrieval is simpler and faster. When personal information is entered and validated, the program calculates when patients should return, and can print out messages when appointments are missed. The program was linked to interactive mapping software and could follow annual cohorts of infants to determine how well they were immunized prior to two years of age. The program can print reminder cards for patients and messages for immunization aides to make a home visit, when a patient misses an appointment. It prints a new immunization certificate after a visit, and provides monthly summaries of activities, fees collected, and clinic costs. Also, it can be programmed to track the vaccine inventory and print an order for a new supply of vaccine each month. This program was developed as part of the Robert Wood Johnson Foundation's All Kids Count immunization tracking grant. Now all sates are developing or have developed immunization registries in cooperation with the CDC. Nurses can use portable computers when making home visits. With the advent of cellular phone systems and wireless cards nurses visiting homes with children can link to the local or state registry and determine if an immunization is necessary. There are many ways to use new technology to improve efficiency and effectiveness. Software is improving rapidly. The cost of hardware, particularly memory, is dropping rapidly.

Software

Some staff needs to be able to use graphics programs such as Power Point to develop a training and

information programs for other staff and the public. One or two should also be trained in the use of Geographic Information Systems (GIS) for epidemiologic analysis and enhancing community information. Each department should also develop a set of Web-pages for community information. The most used graphic (mapping) information systems (GIS) are marketed by ESRI of California. ATLAS, which manages all the needs of 98% of public health departments (local and state.) is the simplest effective GIS systems and is the system of choice by the HWO and many European countries. The most complex, with the highest learning cure is 'ARCVIEW' by ESRI and is now in use by many cities and counties need the ability of overlay photographic maps with geographic information, and integrate the pictures with large databases.

Data Exchange between programs

As the health and medical systems move to comply with the DHHS regulations so they can continue to receive payments from Medicare and Medicaid the exchange of data from clinical, epidemiologic, quality assurance and payment subsystems becomes critical. Further, there is great concern about maintenance or privacy of health records. There is not agreement yet on the terminology that will be used by various systems so that data can be transferred between doctor's offices, hospitals, laboratories, health agencies, and third party payers. At present the thousands of involved health systems, both multi-institutional and single are each developing their own systems while their representatives sit on national committees trying to make sense of the data structures necessary. Other countries have solved many of these problems but we seem destined to repeat all their errors rather than learning from them.

Back-Ups.

Despite everyone's best efforts Murphy's Law is still with us. Things still go wrong. **Back up** everything you do **often.** Always attach backup power supplies that allow the computers to shut down without losing data, if there is a power failure. When you want permanent storage of data consider using tape backups. There is nothing more infuriating than losing all your data to a power failure or surge during a thunderstorm, let alone the time and effort needed to recreate it.

Reading List:

1. Goldstein D, et Al: Medical Informatics 20/20, Jones & Bartlett, 200
2. HRQ National Resource Center Evaluation Toolkit
3. RWJ Health Informatics Reading List.
4. RWJ Informationlinks Grants for Public Health Agencies To Explore Use of Information Technology To Improve Health
5. CDC Prototype of Model HI System
6. Prototype Query Scenarios
7. Office of the National Coordinator for Health Information Technology
   This area of the Department of Health and Human Services focuses on the widespread implementation of electronic health records (EHRs).
8. "Change In Challenging Times: A Plan For Extending And Improving Health Coverage"
   This report proposes a way to improve America's health care crisis by bringing together employer-sponsored insurance and Medicaid; promoting prevention, research and information technology; and financing health care investments through a dedicated value-added tax.
   Health Affairs, March 23, 2005

9. Health Information Technology Report At-A-Glance
The report, "The Decade of Health Information Technology: Delivering Consumer-centric and Information-Rich Health Care," lays out the broad steps needed to achieve current, available electronic health records (EHR) for Americans.
HHS Fact Sheet, July 21, 2004

10. Webcast: Using Information Technology to Improve Healthcare Quality
This Alliance for Health Reform event addresses the problems associated with the use of information technology in healthcare.
kaisernetwork.org, May 7, 2004

11. "President Bush Touts Benefits of Health Care Information Technology"
Remarks by President Bush on the benefits of health care information technology.
The White House, April 27, 2004 1) Records, Computers and Civil Rights, Report of the Secretary's Advisory Committee on Automated Personal Data Systems. US Department of Health Education and Welfare, 1973