Public Health Information Infrastructure

Crisis in State and Local Health Departments with No Resolution in Sight

BY JOEL L. NITZKIN AND CHRISTOPHER BUTTERY

The public health infrastructure is a set of agencies and organizations whose mission is to create the environment in which we can be healthy. This broadest of definitions includes state and local health departments, selected federal agencies, and a wide range of other governmental, nonprofit, and for-profit agencies and organizations [1], [2]. This report will limit itself to state and local health departments and the federal Centers for Disease Control and Prevention (CDC), the nation’s foremost public health agency. With numerous exceptions, this public health infrastructure is in a state of crisis, incapable of meeting our collective needs for public health protections and services, and likely to get worse in the near-term future.

The Centers for Disease Control and Prevention

Our federal government has been involved in public health and the control of dangerous communicable diseases since the establishment of the first quarantine laws in the late 1700s. The CDC was founded in the 1940s as a malaria control agency. In the early 1950s, when it became clear that, for whatever reason, malaria was no longer a problem in the continental United States, the CDC transformed itself to a generalized communicable disease agency. It had an Epidemic Intelligence Service (EIS) to help control the outbreak of any communicable disease anywhere in the world and had a world-class laboratory facility. The CDC quickly developed operational units by categorizing major communicable diseases. During the Eisenhower years of the early 1950s, there was a discussion about converting the CDC into a national health department, with direct responsibility for the control of communicable and other dangerous diseases nationwide. For various reasons, including the constitutional division of responsibilities between federal and state governments, the decision was made to leave operational disease control programming at state and local levels and to restrict the CDC’s role to research and technical assistance. This division of responsibility endures to this day. Unlike its state and local counterparts, the CDC grew slowly and steadily from the 1950s through 1980s, and then underwent a huge expansion in response to the changing national and international perception of dangerous communicable diseases and expansion of its roles in preventable noncommunicable diseases. Since 2000, however, the CDC has been reorganized from its traditional pattern of academic-style centers of excellence to a corporate model that has given more attention to management, policy, and marketing and less emphasis on science and research. This resulted in more political and budgetary limitations but without any diminution in the CDC’s commitment to informatics.

One of the many examples of the CDC’s assistance to state and local health departments is the severe acute respiratory syndrome (SARS) preparedness checklist [3]. This checklist for resources, policies, procedures, and data management was developed in collaboration with the representatives of the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO). This checklist is one of the large number of guidance documents that were generated to address the public health needs related to a long list of emerging infectious diseases [4].

A brief history of public health informatics at the CDC was published by McNabb et al. of the National Center for Public Health Informatics (NCPHI) [5]. This article discusses the progress of public health informatics at the CDC since it acquired its first mainframe computer in 1964, through its various in-house and external surveillance and management systems, informatics training programs, and priorities for the near-term future. This article emphasizes the need for public health agency participation in healthcare delivery system development of electronic medical record systems and networks of such systems.

The Public Health Information Network (PHIN) is the CDC-sponsored national initiative to improve the capacity of public health to use and exchange information electronically by promoting the use of standards and defining technical requirements [6]. This program provides funding, technical support, facilitation of policy discussions, standards development, and assistance in harmonizing public health agency initiatives with those of other federal agencies. PHIN also sponsors five-day annual meetings to discuss and present concerns regarding every aspect of state and local public health agency informatics development.

In its most recent (Spring 2008) 16-page newsletter, PHIN [6] provides an update of its activities and progress regarding its various initiatives, educational programming, grants, etc.
One of the most interesting grant initiatives is a new US$8.75 million program to engage the regional health information organizations (RHIOs) with public health agencies for strengthening public health agency partnership with clinicians. Given this new grant program, much of the current newsletter is dedicated to the proposed RHIO public health interface, including the Healthcare Information and Management Systems Society (HIMSS) State Dashboard [7]. This is a virtual interface for tracking RHIOs and other state, federal, and private health information technology (HIT) initiatives. It provides access to information on more than 600 HIT initiatives in all 50 states. The dashboard database currently includes information on 390 active RHIOs, more than 90 proposed RHIOs, HIT projects funded by the Agency for Health Research and Quality (AHRQ), and relevant state legislation.

**State and Local Health Departments**

For those not familiar with the differences in style and orientation between the state and local public health agencies, the following notes might be helpful: 1) the state government carries the major role related to licensure, certification, and regulation so that most public health laws and regulations are established at the state level, whether directly enforced by the state agency or enforced on their behalf by the local health department; 2) usually, state public health agencies directly provide local public health services and protections to counties and towns too small to provide their own local health department; 3) every state public health system has a history of its own, and there is no common pattern defining how local agencies relate to the state. In some states (e.g., California and New York), the local health departments are totally independent of the state agency control, even though they get significant amounts of their funding from the state. In other states (e.g., Louisiana, Florida, and Virginia), local health departments are branches of the state public health agency. In some small states (e.g., Rhode Island and Delaware), there are no local agencies, and the state health department is the local health department. In yet other states, where the majority of the population is in one or two urban areas (e.g., Nevada and Arizona), the urban health departments are larger, better staffed, and more sophisticated than the state agency.

State and local public health departments, as we know them today, were developed in the mid 1800s to protect the people from yellow fever, smallpox, typhoid, and other then-current epidemic diseases. The progenitors of their isolation, quarantine, surveillance, and hygiene-related activities date back to biblical times.

The late 19th and early 20th centuries were the periods of rapid development of the germ theory of disease, improved sanitation and hygiene, pasteurization, and the development of ways to better assure the survival and health of pregnant women and infants. Each of these new developments was translated into new public health laws, regulations, and programming.

From the 1920s through the 1950s, roles of the health department underwent further expansion to address yet additional food, water, sanitation, housing, and related environmental health concerns. The advent of antibiotics resulted in major programs to deal with tuberculosis, rheumatic fever, and sexually transmitted diseases. During this period, its services also expanded to address the primary care needs of indigent and minority populations, in parallel with the development of public hospital systems in many states and large cities. During this relatively golden age for state and local public health agencies, most of the hospitals were run by physicians, under the protection of local and state boards of health, which made it possible for them to take politically unpopular action to protect the health of the public without risking their jobs in the process.

One personal anecdote is worthy of mention at this point. When I was the director of health for the Monroe County Health Department (Rochester, New York) in the late 1970s, I explored the historical archives of the then Rochester City Health Department. What I discovered were files and newsletters from the mid 1920s with daily tabulations of new cases of tuberculosis, typhoid, infant death, and other then-current public health problems in a level of accuracy and detail, and with a quality of interpretation far beyond what I could do half a century later. In terms of what we now call public health informatics, they were doing a much better job with their staff, pencils, and graph paper than I could do with my skilled, but limited staff, and the calculators and computer technology available then. The respect then given to public health and the more generous staffing of the agency more than made up for their lack of information technology.

**History of State and Local Informatics**

Things began to change in the 1960s when the public inaccurately believed that antibiotics had now eliminated the scourge of dangerous communicable diseases. This came at the same time when the newly created Medicaid program began to divert large portions of state and local budgets for the care of the medically indigent. During this period, and extending into the mid 1990s, the leadership of many state and local public health agencies transitioned from physicians to nonphysician administrators. Health departments, while retaining their traditional environmental health and personal health programs, became repositories for a variety of other health-related programs that did not fit anywhere else. Budgets were constrained to feed the ever-growing Medicaid program. (Medicare was not an issue at the local and state level because Medicare is and always has been totally federally funded.) The 1960s also saw the earliest stages of computer and scanner technology being used for vital records, disease control, and program management within state and local health departments. IBM pasteboard cards, the size of No. 10 envelopes, AMIA has teamed up with several academic centers and set a goal of training 10,000 professionals in applied health and medical informatics by the year 2010.
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came into common use as cards that could be both written upon and keypunched for a variety of uses and giant card-sorting machines were commonly seen in public health agencies. Later in the 1960s, mark sense technology also came into common use as people could fill in 8.5 × 11-in. paper forms and fill in circles with No. 2 pencils that could then be read and tabulated by a machine.

In the mid 1980s, with the emergence of dangerous new communicable diseases (Ebola, AIDS, drug-resistant TB, and, later, SARS and others), things again began to change. This created the need to redevelop the capacity of state and local health departments to protect against major chronic diseases and environmental threats. In the early years of the 21st century, yet another issue emerged relative to the need for protection against bioterrorism and ever-more-common natural disasters. Unfortunately, many state and local public health agencies found themselves in a time warp, with the expanded need for public health services and protections not being recognized by state and local elected leadership, as the public health agencies remained buried in the shadow of the now financially monstrous Medicaid program.

NACCHO

In July 2007, the NACCHO issued a policy statement urging the development of a public health informatics workforce, a cadre of skilled computer professionals to help address the informatics needs of public health agencies. NACCHO urged training and certification programs, continuing education, and education of public health professionals in computer science. This policy statement specifically references and encourages working with federal, state, and local partners and with Health Information Exchange (HIE) and RHIO initiatives [8]. Among the multiple items referenced on the NACCHO informatics page are the multiple issues of the IBM-sponsored Government Health IT newsletter, which discuss the importance of and progress made by state and local health departments in the IT arena, with special emphasis on preparedness for public health emergencies [9].

ASTHO

ASTHO shares both the concerns and sense of urgency to upgrade public health agency information management capacity at state and local levels. ASTHO maintains an active public health informatics project, holds meetings, shares news, and generates reports in a manner similar to NACCHO and CDC’s PHIN. Their documents and reports can be found online [10].

Given the differences in orientation between the state and local health departments, the ASTHO concerns about public health IT tend to focus on intergovernmental and public or private issues involving communication and data sharing. In recognition of the gap between the well-documented needs and the available resources, greater attention is given to setting priorities, and one of their models had four levels of priority: code red (immediate need), no-brainer (not as important, but relatively easy to address), wicked problems (politically and/or technically complex to resolve), and code black (should be unplugged) [11].

Workforce and Training Needs

Another interesting report on the ASTHO Web site is the July 2006 report on the public health informatics workforce. This report defines public health informatics as “the systematic application of information and computer science and technology to public health practice, research and learning,” and “the science and practice of transmitting, collecting, and using the right information in the right form to help make the right decisions for the Nation’s public health” [12]. Current public health informatics initiatives include, but are not limited to, the following: 1) PHIN (in collaboration with the CDC), 2) HIE (largely with clinical partners and RHIOs), 3) Integrated Child Health Information Systems (a high priority category of HIEs), 4) biosurveillance, 5) Laboratory Information Management Systems (LIMS, now in 26 states, connecting in-state labs for biosurveillance and other concerns), and 6) vital statistics electronic systems to address the need for health information and to detect and curtail terrorist and fraudulent activities. Much of this report is devoted to training needs and activities, with a note that only a handful of academic centers now offer master’s-level public health informatics training programs, most of which are fewer than five years old, with cohort sizes usually in the range of 10–20 students per year [12]. The American Medical Informatics Association (AMIA) has teamed up with several academic centers and set a goal of training 10,000 professionals in applied health and medical informatics by the year 2010, who will address the clinical or health care, public health, and translational bioinformatics. To complement this seemingly impossible mission, there is the experience of the CDC Public Health Informatics Fellowship. To date (as of July 2006), 58 graduates have completed this fellowship, only seven of whom are currently employed in state or local public health agencies. The others went on to jobs in academia, the federal government, international health agencies, the private sector or they entered into doctoral training programs [12].

Federal Efforts

Yet, additional insight into the current status of the state and local public health agency infrastructure is provided in two other recent issues of the Government Health IT Newsletter. In the 18 September 2007 issue, Mike Levitt, secretary of the federal Department of Health and Human Services (DHHS) and chair of the American Health Information Community (AMC), noted that funding in recent years to equip state and local health departments with new data systems has largely been targeted to specific program areas such as reporting HIV
and food-borne illness. This resulted in siloed systems that cannot communicate with each other. This article went on to quote others involved with AHIC as noting that the dollar resources needed to fully and properly develop the needed state and local public health systems is currently well beyond the scope of both state and local agencies and the dollars currently available to support public health IT at the national level [13]. An article in the 2 January 2008 newsletter notes that there are still 12 states that do not have a disease surveillance system that is compatible with the CDC’s National Electronic Disease Surveillance System (NEDSS) [14].

Root Causes
The root causes of the problem of inadequate public health informatics relates to the many barriers facing state and local health departments.

1) Public health has been given a low priority within many state and local governments. In Virginia, the public health budget has been reduced from 2% of the state budget to 1% in the last three years. Elected and appointed officials tend to think of priorities in terms of the size of the agency budget and the visibility of the programming to the electorate. Also with state and local agencies, public health budgets, even for well-funded agencies, are very small. In addition, the programming tends to be invisible. The benefits of an outbreak that never happened or an improvement in the quality of the environment also tend to be invisible.

2) Many still believe that antibiotics and other technical innovations create a situation in which health departments are not as important as they used to be.

3) Political fallout because of the occasional need for a health department to take action against building contractors, politically prominent restaurant owners, or other politically active figures has cost some health department to take action against building contractors, politically prominent restaurant owners, or other politically active figures has cost some health departments political capital. The political fallout is often so intensive that departments are hesitant to act. This can lead to a lack of coordination and a failure to act quickly when needed.

4) Many elected and appointed officials and, often, even the leadership of state and local medical societies fail to recognize that health departments should have technical expertise related to disease control, environmental health, and disaster preparedness, which are not otherwise available in the community. For example, a locally appointed public administrator may rely on a local infectious disease clinician for advice on how to manage problems related to local communicable diseases without realizing that surveillance, community control of infectious diseases, and imposition of isolation and quarantine require professional skills other than the clinical management of individual patients suffering with bacterial and viral illnesses.

5) Many think that public health means provision of free health care to the medically indigent. For these voters and taxpayers, public health agency services are of no relevance to their health or safety.

6) Frequent budget and hiring freezes, especially during economic downturns.

7) Personnel classification procedures make it all but impossible to classify nonsupervisory positions to a salary category high enough to recruit qualified candidates.

8) Salary rates are frequently noncompetitive.

9) Personnel hiring procedures that sometimes require months before a position can be offered to a qualified candidate.

10) Job applicants generally perceive public employment as unfavorable.

11) Bidding and purchase procedures in some states prohibit bid specifications that favor current contractors. This creates a situation in which every time an agency expands its computer capacity, it winds up purchasing a new system from a different vendor that is incompatible with existing legacy systems.

12) In some agencies, politically appointed agency leadership has no comprehension of public health’s need for specialized computer-related skills.

Conclusions
State and local public health agencies vary considerably in the professional qualifications of their key staff, roles, functions, funding, and staffing. Some are well led, staffed, and funded, whereas others are not. Individual agencies often have a mix of programs, some of which are strong and highly effective, whereas others are weak and relatively nonfunctional. There is no consistency from agency to agency or, often, from program to program within a given public health agency. On average, as estimated they are about 50% understaffed and will have about 25% of their current staff eligible for retirement within the next four years. Although the CDC is in better shape, they, too, are facing serious problems with the recent addition of major homeland security-related responsibilities not proportionately matched with the expansion of resources and an estimated 44% of CDC staff eligible for retirement within the next four to five years [15].

CDC leadership and the major national organizations representing state and local health departments recognize the value of information technology and the need to dramatically upgrade their current capabilities. Unfortunately, and despite multiple model systems, a complex set of barriers has largely prevented the progress in many jurisdictions to date. Lack of a clear understanding of how best to proceed, lack of standards, and lack of guidelines have also played major roles.

This situation, however, is far from hopeless. Substantial progress can be made at local, state, and national levels with...
assistance and partnership with the health care delivery and information delivery (ID) communities. If state and local elected and appointed officials get clear messages as to the importance of strengthening their public health agencies, they can and will respond. As they do, the informatics elements of their programming will be a high priority area.

Joel L. Nitzkin received his M.D. degree from Wayne State University, School of Medicine, Detroit, Michigan, in 1966, his master’s degree in public health (M.P.H.) from the University of California at Berkeley in 1970, and his master’s and doctorate degrees, both in public administration, from Nova University, Fort Lauderdale, Florida, in 1973 and 1974, respectively. Following medical school graduation, he spent one year as a rotating intern at Parkland Memorial Hospital, Dallas, Texas. From 1967 to 1969, he worked for the CDC as Epidemic Intelligence Service Officer assigned to the Kentucky Department of Health in Frankfort. Following his M.P.H. degree, he was chief of consumer protection for the Dade County Health Department in Miami, Florida. While there, he completed requirements for board certification in preventive medicine. After that, he served as a local health director in Rochester, New York, state health director in Louisiana, president of NACCHO, president of the American Association of Public Health Physicians (AAPHP), and policy consultant in the private practice of public health. He has served on the boards of directors and executive committees of several large hospital and health insurance enterprises. He has served on multiple federal advisory committees related to healthy people, objectives for the nation, HIV/AIDS policy, and others. Since the mid 1990s, he has been an active member of the Medical Technology Policy Committee of the IEEE.

Christopher Buttery received his M.B.B.S. degree in 1955 from Guy’s Hospital, University of London. He started private practice in Franklin County, Virginia, in 1958. He completed his M.P.H. degree in 1968 at Johns Hopkins University and then became the director of public health in Portsmouth, Virginia. While working as assistant professor of family practice at Eastern Virginia Medical School in Norfolk in 1978, he analyzed the first National Ambulatory Medical Care Survey dataset to examine family practice content. He worked as the public health director of Corpus Christi, Texas, in the early 1980s, as the commissioner of health in Virginia, from 1986 to 1991, and as the local health director in Richmond, Virginia in 1991–1995. Since 1995, he has been serving as an adjunct professor of public health at the Department of Epidemiology and Community Health, Virginia Commonwealth University, School of Medicine. His research interests include medical information systems, outcome evaluation for primary care, linkage of public and private systems of primary care, office-based medical information systems, development of environmental or occupational health work standards, and application of geo-mapping to health services. He authored “The Local Health Department” Chapter, 12th and 13th editions, of Maxcy Roseau’s Textbook of Public Health & Preventive Medicine edited by John Last in 1992 and the Handbook for Local Health Directors in 1991 and its Japanese edition in 1996. He is a fellow of American College of Preventive Medicine.

Address for Correspondence: Joel L. Nitzkin, 4939 Chestnut Street, New Orleans, LA, 70115-2941 USA. E-mail: jln@jln-md.com.

References

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