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Informatics as a Strategic Priority and Collaborative Processes to Build a Smarter, Forward-Looking Health Department

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● Background

Health information plays a pivotal role in informing and supporting many local health department (LHD) functions and services.[1] For example, health information is critical to surveillance and assessment of public health threats, population and disease trends, management of clinical services, completion of immunizations, identification of disease trends, and communication with community partners.[2-4] In addition, LHDs are increasingly focusing on "health in all policies" and the elimination of health disparities. To support these efforts, LHDs must collaborate with other community partners. Such collaborations require communication and data exchange.[5-7]

Some LHDs use public health informatics, or the systematic application of information, analytics, computer science, and technology to support the day-to-day work of public health, to improve decision making, and to compensate for lost infrastructural capacities.[8-10] Evidence-based strategies and information systems can facilitate improvements in LHD services, administrative and management capacities, and governance.[11] A centralized interoperable data system can serve LHDs well by improving communication, efficiency, and accuracy of information exchanged with other programs and partners.[11] Such a system can save time and money by, for example, eliminating the need for multiple logins for professionals pulling information from multiple databases and for duplicate entry of common elements such as demographics.

LHDs need to strategically build informatics programs that advance their mission and vision and enable them to detect and address strategic issues.[11] However, decreases in public health funding, coupled with mandates for essential public health services, have led some LHDs to underresource informatics.[12] Still, LHDs keeping abreast of the changing environment and the demands for data-driven decision making and interventions understand information systems' benefits. Building and maintaining robust information systems and informatics requires a shared departmental understanding of the importance of these system capacities. It also requires incorporating informatics into the strategic plans to assure stakeholders that informatics capacity is supported by the organization, backed by leadership, and is slated for resource allocation.[13] The purpose of the case study described in this article was to explore how a medium-sized LHD using best practices in informatics could implement and use informatics to improve the practice of public health.

● Methods

Rationale for case studies

In 2015, the National Association of County and City Health Officials (NACCHO) partnered with Georgia

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Southern University to conduct the *2015 NACCHO State of Informatics Capacity and Needs Assessment Study (2015 NACCHO Informatics Study)*. Along with the quantitative survey of a representative sample of LHDs across the country, 3 qualitative case studies of LHDs were conducted to better understand how LHDs implemented/used these systems. The case studies aimed to explore factors, not currently available in quantitative data, that may be associated with LHD adoption and use of informatics. Case studies have some advantages over experimental or quasiexperimental designs in the study of local initiatives that are heavily influenced by contextual factors. Because we had little control over the phenomenon studied, the case studies allowed us to focus on the unique, particular aspects of what was happening locally and to understand the "how" and "why" some LHDs implemented informatics within important circumstances.[14]

Site selection

The informatics team at the NACCHO and the study advisory group, composed of national public health informatics experts, served as key informants to identify LHDs that were part of the survey sample and were known for their informatics capacity. Because most US LHDs serve jurisdiction sizes of fewer than 500 000 people, the advisory group recommended choosing 1 LHD serving a small jurisdiction (≤50 000 people) and 2 LHDs serving medium-sized jurisdictions (∼50 000 to 500 000 people). The NACCHO Program Analyst in Public Health Informatics contacted each of the selected LHDs, requested, and secured their participation.

Interview questions

The 2 case study investigators, Drs Lovelace and Shah, along with input from the advisory group, adapted questions previously used in a study of the implementation of public health informatics in LHDs.[15] Questions were finalized and organized into the following topic areas: (1) the role of the interviewee regarding development and use of the LHD's informatics, (2) history of informatics implementation, (3) use of information systems and databases, (4) successes and challenges in the implementation and use of informatics, (5) the value of informatics to the health department and the community, and (6) lessons for other health departments. The study and interview protocols were reviewed and approved by the Georgia Southern University Institutional Review Board.

Procedure

In each LHD, we identified persons who were responsible for informatics development and use. Their potential roles included the health director/departmental administrator, the information systems director/manager (if one existed), a clinical and/or epidemiology program director, and an office administrator. From May to June 2015, the first author conducted and digitally recorded 1-hour telephone interviews with 3 to 4 key informants from each LHD. Interviews were coded with NVivo 10 software using the question topics listed earlier as codes; text was also marked with these codes whenever these topics arose in the discussion. In addition, the authors reviewed documents available on each agency's Web site. Finally, the first author consulted with the interviewees to obtain more information about issues that needed further elaboration. Participants reviewed the initial reports for accuracy.

The agency described here, Spokane Regional Health District (SRHD), was selected as an example of a medium-sized jurisdiction LHD that extensively uses informatics. The first author interviewed 4 SRHD employees: the agency administrator, the program manager for information systems, the program manager for treatment services, and the program manager for the Opioid Treatment Program (OTP). The latter 2 employees were interviewed together.

● Findings

Site description

The SRHD is nationally accredited by the Public Health Accreditation Board. It serves urban and rural areas of eastern Washington State, including the City of Spokane, the City of Spokane Valley, and Spokane County, the fourth most populous county in the state. A board of health governs SRHD; membership includes county commissioners, city councilors, representatives of the small cities, and citizens. With an annual budget of $22 440 808, SRHD's 220 staff members are employees of local government. SRHD's programs and services include health promotion (cancer screenings and access to treatment, Healthy Communities, nutrition education, The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), treatment services (OTP and tuberculosis), vital records, public policy, community and family services (eg, access to child dentistry, early intervention, nurse-family partnership, and school health nursing), disease prevention/response (eg, epidemiology, HIV/STD services, immunization, preparedness, and data center), and environmental public health (including water protection, food safety, living environment protection, and on-site sewage). SRHD's former clinical services, except OTP and WIC, have transitioned to other community organizations.

The Information Systems (IS) Program, as part of SRHD administration, has 6 specialized full-time equivalent employees (FTEs) that support other functions in SRHD. The IS program manager, a database administrator, a desktop support person, an audiovisual engineer/support person, a network administrator, and a custom program/application development person comprise the program. Information technology (IT) and systems are used on a daily basis, including systems for administration, document and financial management, internal collaboration, and for environmental public health, medical records, and surveillance/reporting. The agency uses IT for individual timekeeping/payroll, budget management, purchasing, program performance monitoring, regular communication, records management, and detailed client management in the Nurse Family Partnership, Weaving Bright Futures, Opioid Treatment, HIV/AIDS, WIC, Healthy Communities, Access to Baby and Child Dentistry, Neighborhoods Matter, Infant and Toddler Network, TB, Communicable Disease Epidemiology, Immunization Outreach, Emergency Preparedness and Response, and environmental public health inspection arenas. The data center uses IT for data acquisition, analysis, and reporting and as assistance to the quality council and for program-specific needs and the publication of reports. The Table shows examples of the systems and data used on a daily basis.

This case study briefly addresses the rationale and processes for the implementation and use of information systems in 4 areas: the data center, opioid treatment, medical records, environmental health, and administration. We conclude with lessons for other LHDs.

Developing and implementing the data center

After the 1988 Institute of Medicine report that identified assessment as 1 of 3 public health functions,[16] SRHD started an assessment center (now called the Data Center) to collect data to inform public health practice. It was started by the current department administrator (who was the program director for the HIV/AIDS program) in collaboration with the IS unit director. They began to strategize: "How do you keep these data [electronically]? How do you utilize the data effectively? Nearly 100 percent of recordkeeping at that time was done in hard copy (T. Smith, personal communication, June 2015)." At that time, SRHD made building informatics capacity a strategic priority to forward the agency's work. To further their work, they participated first in the Robert Wood Johnson Multistate Learning Collaborative, then in the Communities of Practice for Public Health Improvement, a program of the National Network of Public Health Institutes, and in the Public Health Informatics Institute. In

TABLE ● Examples of Information Systems and Data Used/Collected on a Daily Basis

Information systems used
  Internal systems
    ● Microsoft SharePoint
    ● Microsoft Dynamics Great Plains, financial management and accounting software
    ● ACCELA, environmental public health system currently being implemented
    ● MyEvolv, an electronic medical record system for the opioid treatment program and for the TB program
    ● DocuWare, a program for scanning old records and holding them electronically rather than in paper files
  CHARS (Comprehensive Hospital Abstract Reporting System), the comprehensive hospital discharge data system
  EDIE system, a system across the state that notifies clinicians about the frequency of emergency department visits. Users can share patient guidelines and view patient treatment plans.
  TARGET, the Treatment and Assessment Reports Generation Tool, a system used to track confidential information about client's mental health and alcohol or drug treatment
  WA DOH CAREWare application for tracking of HIV/AIDS patients
  EDRS/EBC for the electronic death record system and the electronic birth certificates that WA maintains for access from the SRHD's vital records department
  Other statewide public health data systems
Data used and/or collected on a daily basis
  Clinical data
    ● Data from the opioid treatment program
  Communicable disease data
  Environmental health data
  Food safety data
  Health equity and disparities data
  HIV/AIDS and Ryan White
  CHARS data—hospital system data—these data go from hospitals to the state, SRHD accesses the data from the state
  Provider notification
  Immunization registry
  Emergency preparedness response registry
  School absenteeism data
  YRBS
  BRFSS
  STD data
  Data necessary for accreditation
  Social media (Facebook, Twitter)

Abbreviations: EDIE, Emergency Department Information Exchange; SRHD, Spokane Regional Health District; STD, sexually transmitted disease; TB, tuberculosis.

addition, access to the NACCHO, on whose board of directors the current department administrator sits, informs SRHD's informatics practice.

Building the data center increased SRHD's analytic capability. Data center employees include a data center

manager, 3 epidemiologists, a senior research scientist, and an assessment/evaluation assistant. Now, PhD-level researchers are able to examine health data in ways not within reach when the data were in hardcopy form. "Now that it's electronic, you can do a lot of data crunching and learn so much more (T. Smith, personal communication, June 2015)." Collaboration between the data center and the IS program is still critical. For example, an epidemiologist established a data-sharing agreement with the school system to study factors that would lead to high school dropout. Through a very detailed process, IS worked with the epidemiologist to put the data into an SQL database and develop PowerPivot tools that allowed the epidemiologist to assess the quantity and quality of the data and to use it more quickly than it would be possible through existing software.

Implementing improved electronic medical records for the OTP

SRHD originally used server-based electronic medical records for its OTP. Having treatment services data and billing information handled in different databases led to data entry duplication, errors across the databases, and employee frustration. The capacity of the internal, server-based, electronic medical records database was a growing concern as was the need for continuity of operations in times of disruption or lack of access to the facility. In January 2015, the agency decided to move to myEvolv, a program housed on a cloud-based server, for counseling and care coordination for methadone dispensing. The IS program connected clinical records housed in one software program with billing system data housed in another software program into an Access database. The Access database was imported into myEvolv, an electronic health record system that included both clinical and billing information. OTP managers, who developed user-friendly forms and easy navigation, handled the interface with program counselors. A month before going live, counselors participated in training programs where they entered data into "the development site." When the system went live, the counselors knew how to use it. MyEvolv is not a meaningful-use certified electronic health record (EHR) because OTP confidentiality requirements prevent a live connection to a health information exchange. To obtain information about clients' use of services, clinicians in the OTP still have access to the state Emergency Department Information Exchange system for these clients' treatment plans and for monitoring their use of services, thus enhancing client safety.

The new OTP records system has several benefits. Charts can be reviewed online, saving time previously spent filing, looking for paper records, and finding space for paper storage (J. Albright and J. Timoney, personal communication, June 2015). There is off-site remote access to client data, a critical feature for continuity of operations if the building became inaccessible. It connects client and billing information communication between nurses and billing employees before delivery of services. Still, the department administrator reports that the department is newly challenged as the state is merging mental health and substance use treatment into a unified behavioral health system that requires that billing information be separately entered into a county billing system.

Building a single environmental health data system

To increase efficiency and customer service in the field, as well as employee satisfaction, SRHD needed to have portable, secure data and connections to e-mail and calendars during field inspections. Having 30 to 40 different databases for all the Environmental Public Health (EPH) programs also became difficult to support. The IS Program worked with EPH to identify a single system that would replace the current databases. Together, they chose a relational database system designed for government agencies, ACCELA, where location is the single key. With a single location entered in the database, entry of inaccurate location data in different systems is avoided: "At the core will be the location and then there will be different tables to support the program. You might have a restaurant inspection set of tables that links to that central location ID (T. Miller, personal communication, June 2015)." All EPH databases were expected to be cleaned and imported into ACCELA by the end of 2015. The system will allow inspectors to: "bring a secured offline version of the data that they need access to for that particular restaurant … but they will also have the actual signed inspection reports through a software program called DocuWare. The two together mean that the inspectors will have a much more mobile platform to work with (T. Miller, personal communication, June 2015)." The department found decreased costs in a cost analysis of staff time, travel, and follow-up, with employees having data, tablets, and printers remotely on-site compared with the former databases.

Incorporating informatics into departmental administration

The aforementioned efforts are supported through administrative information systems. To address scattered data storage that made sharing of data challenging and significant IT staff time for administrative

information systems, SRHD started using Microsoft SharePoint in 2007 as a business portal and for team sites for document and workflow collaboration. The system now includes an intranet linking all agency employees. It also includes sections for each division, individual personnel files, sites for specific projects, accreditation, awards and recognition, cross-divisional work collaboratives, accounting software, the equity toolkit, the executive leadership team, the SharePoint governance group, the joint Management-Leadership Spokane, Living Well, Policies, IS Support Requests, and Quality Improvement Initiatives. Four important features have improved workplace efficiency: a workflow process for approvals including alerts to the next person, document sharing and versioning to reduce duplication, and the ability to add metadata into documents.

Future

SRHD is starting to use social media for research. "As an example, we're trying to figure out how do we better encourage those families that are eligible to access WIC, but currently don't. How do we touch base with them, to understand why not, even though they qualify for it (T. Smith, personal communication, June 2015)?" Although the SRHD expects to learn a lot through social media, the department administrator spoke of the work ahead in terms of understanding security, confidentiality, and broadening the use of social media. More evaluation of the OTP is planned. The OTP hopes to track different outcome measures through the myEvolv system; these include employment rates, childcare, criminal records, and improvement of family relationships.

● Discussion: Successes, Challenges, and Other Lessons

Public health informatics is the systematic application of information, analytics, computer science, and technology to support the day-to-day work of public health and to improve public health practice, research, or education. It is both the IT infrastructure and how information is used in public health work.[10] As described earlier, SRHD has used strategy, leadership, technology, and personnel resources to implement information systems that have increased SRHD's effectiveness and efficiency. "Program data, surveillance data, and financial data are now all electronic, virtually all electronic. Access to that information can be controlled carefully, and it is very easy to access if you have the rights to see certain data. So I think it has improved our efficiencies and effectiveness. It has improved documentation. It

has improved our accountability. I think it has also created a different level of employee, with knowledge and ability to move forward into new systems and ways of managing data. ... As public health funding has just lagged for at least 15 years, we are asked to do the same or more, with fewer resources. I think that electronic systems have really provided the ability for us to stay up with that workload (T. Smith, personal communication, June 2015)." Also, streamlining data systems, as in the OTP and in EPH, has been an important factor in improving SRHD's effectiveness and efficiency. Rather than dealing with multiple systems for the same clients, combining systems into one (as in myEvolv and ACCELA) has provided single location keys specific to the particular client.

The department has strategically considered the resources needed for the changes that they have initiated: "For all of our technological changes, we seek to understand the economies of each option to include the system costs, employee utilization, and time used under different platforms and the ongoing utilization of the data. Our hardware costs have gone down significantly and are replaced by costs of transition which reduce over time (T. Smith, personal communication, May 2016)."

Still, there are the ongoing *challenges* of keeping the technology current and not getting so far ahead of the staff that everything seems foreign and new all the time. For example, before the agency went to SharePoint, employees stored data on different file servers. Over time, that became an access and storage challenge because it slowed recovery times. To address issues with a new interface, SRHD conducted incremental rollouts and trainings that mimicked many of the things that people would do online. The principle was to make what needed to be done to navigate the system an obvious choice. Still, SRHD faced the issue of having staff with a wide variety of skills. The challenge became "how do you move a system forward so that you don't leave part of your population behind (T. Smith, personal communication, June 2015)?" A system governance team meets to discuss issues that arise and division site administrators take feedback from their staff and design sites optimized for them. And then, "You coax, you educate, provide support (T. Smith, personal communication, June 2015)."

Strong, stable leadership with focused strategy is critical for building informatics capacity and for using it in sophisticated ways to accomplish the public health mission.[17] In the examples described earlier, SRHD was able to do more work in a more effective way because of this capacity. SRHD benefitted from the administrator's leadership as well as from leaders in IS and other program areas. Internally, lateral organizational structures such as cross-divisional teams, with IS and the program

area, have been critical in the development of informatics capabilities. The examples described in the findings demonstrate the effectiveness of this collaborative work for planning, obtaining resources, implementing, and using information systems. Communication between IS and other divisions promotes incorporation of informatics needs into grant proposals before programs are developed. An IT/communications team with communications and IS employees handles projects such as developing Web sites and delivering public health messages. A team involving IS and administration will work on records retention policies and procedures, an effort that will be supported by existing DocuWare software. Dedicated and knowledgeable informatics employees have been critical for all these efforts.

Increasing informatics capacity builds a better health department, one that is more flexible, efficient, and that can better meet the needs of the community. Increased efficiency pays off in freeing more time for employees to do core public health work. Public health problems are increasingly complex. These systems, and the analytical capacity that they provide, allow health departments such as SRHD to identify problems and patterns and to use this knowledge to address organizational and public health issues. This use makes informatics a powerful multiplier. It allows SRHD to have more range of action and to accomplish more work, more effectively. In this way informatics can be seen as a means to a very powerful end, a means that still requires a well-trained, competent workforce.

This case study shows examples of innovation in informatics capacity building and use by a medium-sized LHD. The description of factors associated with challenges and successes may provide general guidance for other LHDs with similar population health issues (eg, OTP) that currently lack information systems to provide program and services coordination. Our study may also provide direction regarding the payoffs of strong relationships and collaboration among IS and other program areas.

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