One of the key recommendations from the CDC for achieving Public Health 3.0 is access to timely, reliable, granular-level, and actionable data. An organization must build its informatics capacity to bridge the clinical and technological aspects of health for the 21st century. This is an evolving realm of technology and will continue to have public health and health care implications.

In “Public Health 3.0: A Call to Action for Public Health to Meet the Challenges of the 21st Century,” the Centers for Disease Control and Prevention (CDC) recognizes that local public health is beginning to “pioneer a new Public Health 3.0 model in which leaders serve as Chief Health Strategists, partnering across multiple sectors and leveraging data and resources to address social, environmental, and economic conditions that affect health and health equity” [1]. These efforts require health department leaders to think differently about the needed skills of their workforce and the needed resources of their departments.

The five areas of specific action that are required for the 3.0 efforts to have the intended positive effects on the health of the community include embracing the role of chief health strategist; structured and cross-sector partnerships; enhanced accreditation requirements to support the 3.0 principles; timely, reliable, granular-level, and actionable data with clear metrics; and support and funding for the right leadership and prevention initiatives. Some of the key challenges to 3.0 for local public health are both federal and state regulatory requirements; absence of nonproprietary tools for data, analytics, and metrics; the lack of expertise and skills in the current workforce; and often the current organizational structure and resource use within local health departments.

Mecklenburg County Public Health (MCPH) is similar to most local health departments in North Carolina, working to meet the state’s statutory requirements of public health, the needs of the community, and North Carolina accreditation requirements. At the same time, the department is intentionally evolving through a transformation process to improve its efficiency, effectiveness, and responsiveness to Mecklenburg County’s needs, including the social determinants that most directly impact the health of residents. The Public Health 3.0 model is a template for the future work of MCPH and its staff.

Benefits of Informatics

Without improvements in the availability, analysis, and interpretation of high-quality data, Public Health 3.0 will be challenging for local health departments. Public health informatics has been defined as the systematic application of information and computer science and technology to public health practice, research, and learning [1]. The potential opportunity provided by a strong system of informatics is the enhancement of surveillance, identification of challenges and opportunities, and the development of actions to improve efficiency and effectiveness of programs and efforts. Having staffing support and technology systems providing real-time data that is integrated, well-analyzed, and strategic will provide the basis for the work of Public Health 3.0.

Creation of MCPH Public Health Informatics Program

MCPH redesigned an informatics program in late 2017 to provide high-level guidance for improvement efforts already underway. These efforts have focused on organizational development, clinical services, laboratory services, and improvements in or replacement of the electronic medical record system. In order to manage the work of this effort, report the impact, and continue to improve the operations of the department, MCPH developed an informatics program in late 2017. Executive leadership understood the critical importance of a strong informatics program and the need for access to data if we were going to develop into a department focused on 3.0 efforts. There are five components that contribute to the success of an informatics program: 1) access to data, 2) a skilled informatics team, 3) leadership buy-in, 4) a trained organization, and 5) access to technology (see Figure 1).

Access to data includes timely updates and understanding of what data is available to the organization. An inventory of applications and data sources is the essential first
step in the development of a data-driven organization. The basics of data dictionaries, data-flow diagrams, and entity relationship designs are instrumental in mapping out the success of an informatics program.

A highly diverse and skilled informatics team is necessary at the onset of this effort. Though such a team is difficult to build, it is not necessarily impossible with the right resources. A good team possesses various talents that should include, but are not limited to, skills in the following areas: clinical (eg, nurse informatics, medical technologist), technical (eg, database analyst, electronic medical record [EMR] specialist), analytical (eg, financial analyst, business analyst), and organizational (eg, project manager, scrum master). An in-depth understanding of health informatics, health IT, and traditional IT is needed as all three work independently for the success of the organization. Informatics in public health is a fairly new field. It is challenging to find staff with informatics expertise and experience as well as an understanding or experience in public health. This is a public health field of expertise that needs to be developed.

While executive support is the first step, senior leadership and management buy-in is the next requirement. This effort should include training and education on how strategy and decisions should be guided by data. Developing a data governance committee is an essential strategy for engaging leadership and management in this approach. Informatics should be at the table in most, if not all, meetings of the organization. They can be a great resource for bridging technology, process, regulations, and people. Leadership buy-in is most often achieved through the experience of having access to real-time data or data that has previously been unavailable, and then seeing the impact of that data on improved decision-making and/or enhanced reaction to a public health event. At times, simulating an incident could help in framing the importance of such data and increasing appreciation for the informatic efforts.

A data-driven organization needs more than buy-in from leadership. Training all staff on proper data collection, use of data, and quality improvement will help secure a data-driven culture and empower individuals to be proactive in problem-solving and quality/process-improvement initiatives. Developing data experts or champions within various divisions will allow these programs to grow and help build the data-driven organization.

Access to technology does not only mean access to the latest gadget available. It must include access to IT support, alignment of public health informatics and IT strategy, and allowing the business to dictate use of technology with technical guidance from IT. Shared data governance, access to databases and warehouses, business intelligence applications (eg, Tableau, R, SASS), and hardware accessibility (eg, computers, virtual machines) are vital components of the “access to technology” element of public health informatics. In some situations where information technology is a separate business from public health, decisions and strategies can misalign and hinder the growth of informatics within the health department. As technology and guidelines on health IT are rapidly changing, partnerships between management and the IT team are essential to the success of project implementations within the health department.

A Case Study: Big Shots 2018

In August of 2018, MCPH sponsored a community-wide immunization event to boost vaccination compliance of school-age children. Over 500 clients were expected to avail themselves of the services based on the previous year’s turnout. Through use of real-time data, the informatics team was able to provide an event dashboard that tracked clients at different points of the event (see Figure 2). This allowed close to real-time adjustments in staff re-deployment and response to client needs. The dashboard also provided the health department an overview of where the clients lived and the type of transportation they used to get to the event.

The informatics team used this opportunity to define and create the structure of a data-driven organization. The team conducted a process review with various groups involved in the event, which allowed them to understand data-entry processes and identify data pain points for the event. Data collection points were identified, and some were converted electronically to allow timely access to data during the event. A dashboard captured count of clients coming on the premises, count of clients receiving their vaccines, and count of clients completing the check-out process. This dashboard was shared and made available to the incident command team to guide in the decisions needed throughout the day.

The dashboard also included the count of services provided, type of vaccinations, and time needed to complete

![FIGURE 1. Five Components to A Successful Informatics Program](source: Ong J. Mecklenburg County Public Health Informatics Program)
data-entry as required by the North Carolina Immunization Registry (NCIR). These data points were instrumental in efficient delivery of services throughout the event for both clients and staff.

A surge in clients in the first three hours created a bottleneck at certain processing points. The incident command team decided to create another vaccination clinic area to increase the number of available nurses that could provide the vaccination. This allowed the health department to decrease wait time and improve patient flow. This not only provided better client satisfaction but allowed the health department staff to end the event at the planned time without requiring additional staff hours. This also allowed the informatics team to identify time of completion of all data entry requirements.

The data gathered during the event (a total of three days staggered over two months) allowed not only real-time insight to the event as it was happening, but has allowed the health department to re-strategize the delivery of immunization services to the community. Certain process improvement projects and service delivery models have been and are currently being re-designed as an outcome of this data-driven event.

Next Steps: MCPH to Informatics to Public Health 3.0

The work of the informatics program at Mecklenburg County Public Health has just begun. The program has started bringing in data from five of its clinical (EMR) systems, that including data from clinics, school health, dental, and case management services. Being able to analyze data across multiple programs strengthens strategic planning efforts and allows for improvements in efficiencies in service delivery. MCPH is also preparing for changes in the data requirements of meaningful use, the shift to merit-based incentive plans, and Medicaid managed care. Finally, as MCPH moves toward Public Health 3.0, a broader approach to data collection will be needed to focus the department on specific needs, including the social determinants of health, at both the county and neighborhood levels. These changes in the public health environment are increasing the need for access to data and data analysis, resulting in the need for training of both informatics team members and organization-wide staff in the areas of analytics, informatics, and workflow design. These are all crucial steps in our journey to Public Health 3.0.

Conclusion

Public Health 3.0 provides a framework for the future of local health departments. In this time of changing health care systems, managed care, and the need to improve the health of populations, local public health can position itself as a leader in the improvement of population health. A focus on social determinants and strong cross-sector partnerships will provide the direction for that work. Public Health informatics with a strong integrated system of data and a workforce that is trained to utilize that data will provide the infrastructure that will drive it. This transformation will take time. Public health must develop the informatics capacity, make the changes needed in our infrastructure, and train our workforce if we are to be effective and lead in this space.
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