Public Health
INFORMATICS
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APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES

Research Brief

Towards Measuring Value:

An Evaluation Framework for Public Health Information Systems

The integration of public health newborn screening laboratory information management systems (LIMS) with child health program information systems promises to protect the health of children by assuring comprehensive follow-up and notification of screening results to the medical home. No method exists, however, for assessing the value produced by integrating systems. A nine-dimension framework was developed for assessing the value of integrating newborn screening LIMS with child health information systems. The evaluation framework represents an important first step toward developing metrics that can be consistently applied in the evaluation of public health information systems.

Of the four million babies born in the United States each year, 97% are screened in state public health laboratories—high-level laboratories charged with protecting the health of all state residents. Using a small blood sample, genetic and other congenital disorders can be diagnosed, saving thousands of children from a lifetime of disability or preventable death. With expanding use of new and emerging technologies, public health laboratories will be able to detect a greater number of disorders in which early detection will improve health outcomes.

Newborn screening programs have developed information systems to support their programmatic efforts because of the significant health consequences of not identifying an at-risk child or a child with an abnormal genetic screen. In addition, federal government and healthcare industry initiatives are guiding the evolution of interoperable health information systems with the goal of improving the quality of care, as well as greater efficiencies. To assure that new generations of systems have the desired impact, public health needs to systematically assess every possible dimension where interoperability can improve process and outcomes.

The integration of public health newborn screening laboratory information management systems (LIMS) with child health program information systems promises to protect the health of children by assuring comprehensive follow-up and notification of screening results to the medical home. It is well recognized that failure to identify a child with a metabolic or genetic disorder through newborn dried blood spot screening—which can happen when screening results are not reported or are lost—has substantial human and financial costs. We also know that integrating information systems provides other kinds of value—more reliable data, error reduction, and speed, to name a few.

Assessing Value

Public health, however, has not applied a comprehensive framework to assess the value of electronic linkage between public health LIMS and other health information systems. The Association of Public Health Laboratories (APHL), the APHL Informatics and Newborn Screening Committees, the Rhode Island Department of Health (RI DoH), and the Public Health Informatics Institute (the Institute) joined together in August 2004 to develop "A Framework for Assessing the Value of Integrating Newborn Screening Laboratory Information Management Systems with Child Health Information Systems." The result is an important step toward developing metrics for evaluating public health information systems.

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Applying a comprehensive evaluation framework to the interface between newborn screening LIMS and newborn screening program (e.g., case management, surveillance, etc.) information systems offers an opportunity to advance our understanding of where interoperability delivers significant impacts on health outcomes, as well as the processes of lab testing and programmatic case management and follow-up.

Researchers at the Public Health Informatics Institute developed a nine-dimension framework through review of published literature and evaluation of 16 state public health agency proposals to establish or expand integrated child health information systems. The review of proposed projects provided insights as to which components of the framework were considered important in the justification of an integrated child health information system and suggested additional dimensions relevant to public health practice. The resulting framework incorporates the major parameters of information quality, system quality, and service quality, as well as individual, organizational and economic impacts, and health and health services impacts.

Logic Model

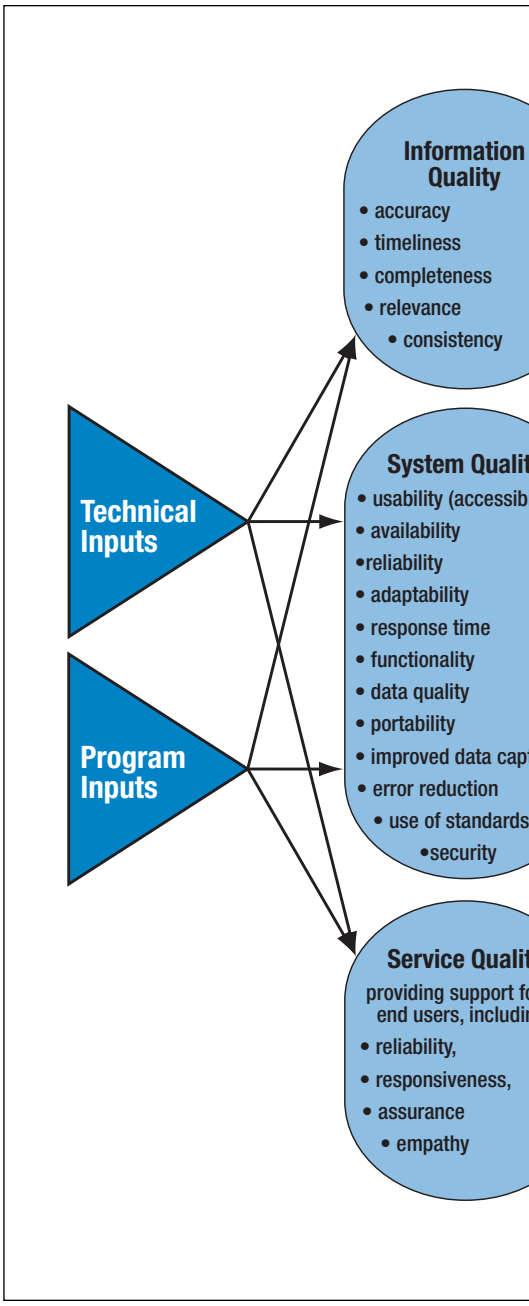
A logic model for the framework (Figure 1), which relates characteristics of the system to health outcomes, was also developed. It depicts the logic of translating the technical and programmatic inputs of the integrated information system; how these inputs produce quality through better information and better service to stakeholders; how these quality improvements relate to the impact individuals make in doing their jobs or the overall impact a public health agency has in fulfilling its mission; and how all of these impacts taken together result in improvements to health outcomes.

The framework was vetted by using it to evaluate the Rhode Island integrated child information system, KIDSNET, which encompasses an interface with the New England Newborn Screening Laboratory's LIMS. A case study of the integration of the New England Newborn Screening Laboratory information system with KIDSNET provided a rich description of how the nine dimensions of the framework and the attributes of those dimensions can be used to examine where and how an integrated child health information system creates valuable efficiencies and program effectiveness.

Conclusions

While acknowledging the limitations of a study based on application of the evaluation framework to one instance of integration of a public health LIMS with child health information systems for a limited period of time, the report draws several conclusions and makes recommendations for next steps.

The evaluation framework provided a logical and convenient method to investigate and isolate specific aspects of the integration of the newborn screening laboratory with KIDSNET. It identified where value accrued to both newborn screening laboratories and newborn screening programs. It also highlighted how integration changes the organization, and conversely, how the organization changes the integration. Finally, the evaluation framework brought into focus those areas where organizations and processes have not changed with the technology, underscoring the notion that change in complex organizations with complex processes occurs slowly.



Recommendations

The report makes several recommendations based on its findings. First, proven evaluation metrics must be developed for public health agencies to apply, in a consistent manner, to their information systems. Second, the evaluation framework is a foundation: it needs to be refined by using it in multiple locations, focused on both single

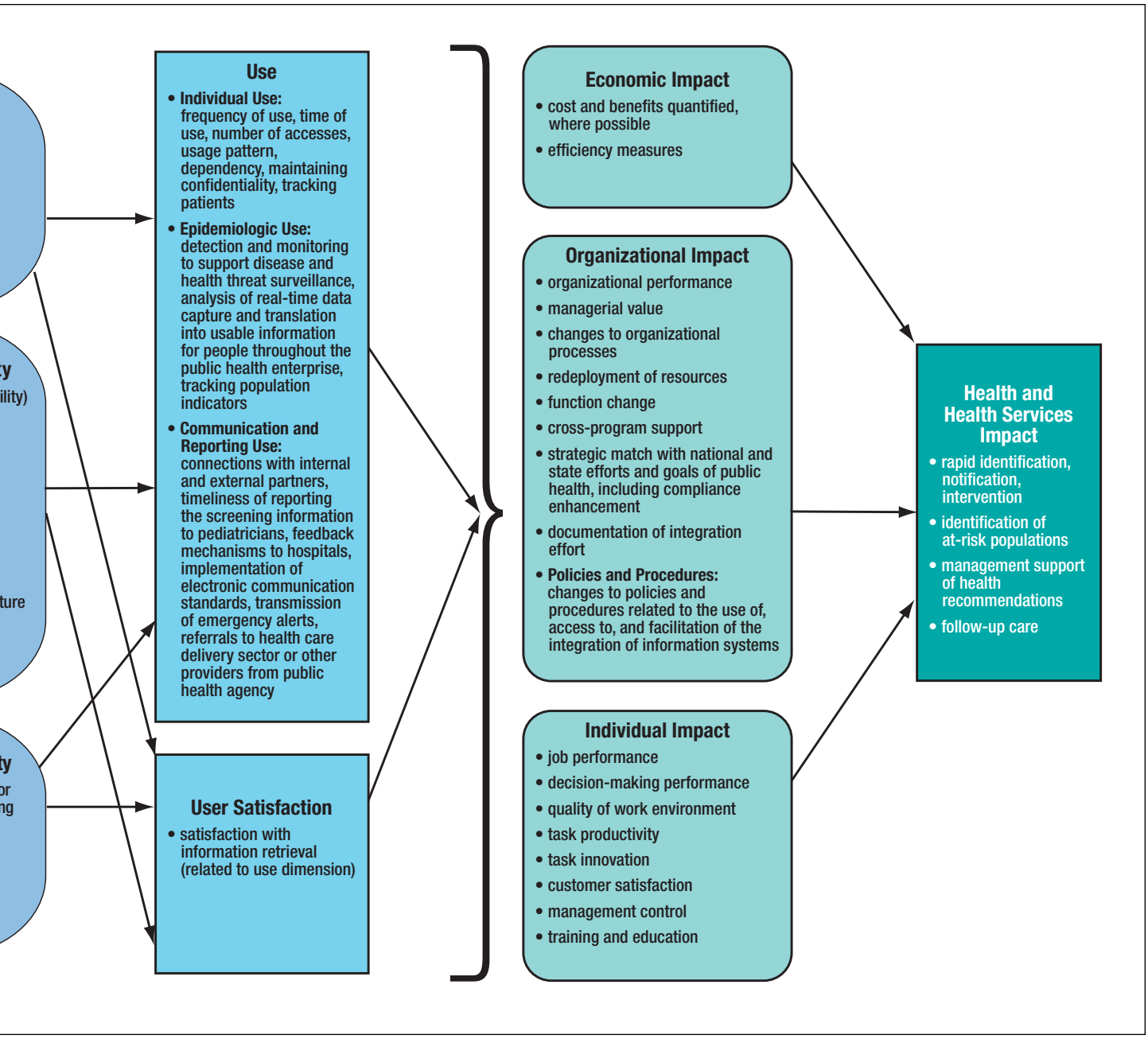


Figure 1: *Logic model for the nine-dimension evaluation framework to assess public health information systems*

systems such as LIMS, and also on larger integrated systems similar to KIDSNET. Third, the framework can assist public health agencies that are planning information systems by serving as a guide to thinking through the business case, that is, how an information system improves process efficiencies, skills and abilities of users, and health outcomes. Finally, the evaluation framework should be disseminated to public health agencies broadly to engage them in dialogue about the value of integration and the metrics for measuring that value.

Specific to PHLs and newborn screening laboratories, the report also suggests that APHL's Newborn Screening Committee and Informatics Committee promote the translation of the concepts in the evaluation framework into quantifiable metrics that could be used to track the performance of LIMS and newborn screening LIMS over time.

Resources

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About Public Health Informatics Institute

The Public Health Informatics Institute is dedicated to advancing public health practitioners' ability to strategically apply and manage information systems.

The Institute assists federal, state, and local public health agencies and other public health stakeholders that are grappling with information systems challenges. We use a four-step methodology to answer: How can information systems infrastructure improve health outcomes? How does the work get done? What are the requirements for the system? How will success be measured? We encourage our customers to work collaboratively and to think logically before thinking physically.

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