

The Management Moment

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What Is “Informatics”?

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In previous columns^{1,2} in our Management Moment series, we have focused on the central role of informatics in the management and leadership of public health agencies. In this regard, we have suggested that leading the “informatics-savvy health department” should be a central practice for public health leaders and have outlined the vision, strategies, operations, and tactics needed to accomplish this goal.^{1,2} However, in doing so, we did not adequately address a central obstacle faced by leaders who wish to communicate this vision: many public health workers are unclear on the meaning of the term “informatics” and how this field integrates with public health practice more broadly to improve population health outcomes. In this column, we review recent work by the Public Health Informatics Institute and the FrameWorks Institute, which explores current usage and understanding and provides suggestions for how best to communicate about “informatics” to public health audiences.

The Public Health Informatics Institute is a nonprofit organization whose mission is to improve health by transforming health practitioners’ ability to use information effectively. The FrameWorks Institute, an independent nonprofit organization, designs and conducts original social science research to empirically identify the most effective ways of communicating about social and scientific issues.

● Definitions and Usage in the Scientific Literature

According to the Oxford English Dictionary,³ the term “informatics” can be traced back to its first usage in 1957, when it was coined as an amalgamation of “information” and “automatic” to describe automatically processing information. More recently, informat-

ics has been defined as “the science concerned with gathering, manipulating, storing, retrieving and classifying recorded information.”⁴ Those who practice informatics, often referred to as informaticians, design, develop, manage, and evaluate information systems. Public health informatics is then the effective use of information and information technology to improve public health practice and outcomes.⁵

A recent analysis⁶ of the usage of the term “public health informatics” in the scientific literature is revealing. Since the term first appeared in the scientific literature in 1995,⁷ “public health informatics” has been mentioned approximately 3000 times in scientific publications; 42% of the time the term was used in relation to core informatics concepts, 32% of the time in relation to the need to enhance workforce competency and composition, and 26% of the time in relation to use of information technology (IT).

● Toward an Understanding of Public Health Informatics

As a step toward understanding the term “informatics,” we suggest referring to the insights of T. S. Eliot and Harlan Cleveland as useful starting points. In *The Rock*,⁸ Eliot wrote:

Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in information?

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Cleveland went on to add the question—“Where is the information we have lost in data?” and also provided useful working definitions of these terms⁹:

- “Data are undigested observations, unvarnished facts.
- Information is organized data—organized by others, not by me.
- Knowledge is organized information, internalized by me, integrated with everything else I know from experience or study or intuition, and therefore useful in guiding my life and work.
- Wisdom is integrated knowledge, information made super useful by theory, which relates bits and fields of knowledge to each other, which in turn enables me to use the information to do something.”

Using this taxonomy, informatics can then be understood as playing an integrating role by collecting data and organizing it into useful information, thereby enhancing the knowledge and wisdom of professionals to guide public health action. To operationalize this intent, public health information systems must be designed to collect data efficiently, turn data into meaningful information (using the technical processes of data packaging and analysis), and then transport information in a useful form to enhance knowledge and wisdom.

● The Current State of Understanding of Public Health Informatics

Although the term “public health informatics” has been used for over 2 decades, the field itself—its core functions, principles, and contributions to public health practice—is not widely understood by public health professionals who are not experts in informatics. To better understand this communication challenge and others, and develop ways to address them, the Public Health Informatics Institute, with support from the Centers for Disease Control and Prevention, collaborated with the FrameWorks Institute whose researchers conducted in-depth interviews to explore how informatics experts, and public health professionals who are not informatics experts, understand public health informatics and its intersection with other public health fields and issues. The goal of this work was to determine how leaders can communicate more effectively about public health informatics, its work, and its value.¹⁰

The findings of this study highlight areas of shared understanding between experts in informatics and public health professionals, as well as important gaps.

The FrameWorks Institute research found that the most salient overlaps in understanding included:

- “Experts and professionals understand that public health informatics involves the use of technology to collect and manage data, and they see the difference between informatics and the IT field.
- Experts and professionals are attuned to the need to integrate data systems, recognizing that public health practice depends on the right people having the right information at the right time.”¹⁰

In addition, the research uncovered a number of important gaps in understanding:

- “Public health informatics is not understood as a scientific discipline with a particular body of knowledge and unique areas of expertise. As a result, the knowledge, skills, and expertise provided by public health informaticians are poorly understood and not adequately valued.
- Public health professionals do not recognize the importance of studying how people interact with data systems. As a result, the role of public health informatics in addressing user experience and design for user needs is poorly understood.
- Public health professionals do not understand the informatics processes needed to ensure that data systems meet people’s needs, nor do they understand the role played by public health informaticians in the design and integration of information systems. As a result, support is limited for needed elements of successful system development and integration.
- Public health professionals’ thinking is laced with *fatalism*—the belief that the challenges faced by the field of public health are intractable and solutions are unrealistic. This fatalism prevents professionals from seeing long-standing problems in public health as solvable and impedes full engagement with—and investment in—public health informatics.”¹⁰

● Addressing the Gaps

On the basis of these findings, we recommend that leaders adopt a structured communication strategy organized as a “Core Story of Public Health Informatics.”¹⁰ The core story strategy requires consistency and repetition—including the explicit, frequent use of the term “public health informatics” across communications. This core story approach should address several central questions:

1. *Why is public health informatics important?* Public health leaders should explain why the field matters, namely by focusing on *values*, which are powerful

communication tools for shifting attitudes and orienting people toward productive action. In that regard, we recommend 3 core values: (1) progress and (2) ingenuity, which highlight how informatics generates innovations that help public health meet its mission; and (3) pragmatism, which emphasizes that informatics as a field is not unrealistic and idealistic, but rather results in practical solutions to real-world problems.

2. *What is public health informatics?* To provide well-framed messages about what the field of informatics is and what it is about, the FrameWorks Institute recommends that leaders develop and use concise and consistent terminology while avoiding jargon; this approach to communications emphasizes the centrality of “framing,” or the choices we make as communicators that influence how people interpret new information and appreciate its importance.¹¹

An effective description of public health informatics has the following key ingredients:

- Public health informatics is a discipline and a field of practice.
 - Informaticians design, develop, manage, and evaluate information systems.
 - Informaticians meet the needs of those who use information.
 - Informatics supports the larger public health mission.
3. *How is public health informatics practiced and who practices it?* On the basis of our research and these best practices, we recommend that public health leaders should develop and consistently use:
 - a. A strong *explanatory example* of public health informatics that leads to a more complete understanding of the field and clearly shows how public health informatics is practiced.
 - b. *Explanatory chains* to show how public health informatics can help improve public health. These clear explanations of cause and effect highlight key informatics operations and demonstrate that problems have informatics solutions.
 - c. *Explanatory metaphors* to explain key aspects of public health informatics through a comparison to something that is highly familiar to public health professionals. Metaphors can be powerful tools for connecting new ideas to existing mental frameworks.

(Further research is now underway by the FrameWorks Institute to empirically test explanatory metaphors for public health informatics to determine whether the conceptual links between the familiar and unfamiliar function as anticipated, and whether the knowledge and values that the metaphor is intended to impart are communicated reliably.)

4. *What problem does public health informatics address?* In order for public health practitioners to gain a firmer grasp of how informatics can address public health problems, we suggest that leaders invoke a familiar problem. For example, most public health practitioners are aware that the lack of integrated information systems results in inefficiencies and creates barriers. Leaders should point to this widely understood problem and explicitly position public health informatics as the essential solution.
5. *What health outcomes does this improve and how does this work?* We suggest that the core story should end with public health informatics success stories. Positive outcomes as described should clearly connect to the public health mission to emphasize the role of informatics within public health.

● Central Messages and Core Benefits of Informatics

In summary, we propose a set of key messages and themes of the core benefits of informatics, which should be translated through strategic communications:

1. *Public health informatics is key to enabling effective monitoring and surveillance.* Informatics makes the collection, packaging, and flow of massive amounts of data and information more reliable, efficient, and timely. While epidemiologists are generally responsible for analyzing surveillance data (eg, interpreting statistics and identifying trends), informaticians are responsible for designing, developing, managing, and evaluating the information systems that are crucial to surveillance practice. Thus, public health informatics is important for making surveillance activities and programs more effective.
2. *Public health informatics supports improved decision making.* To make well-informed decisions, health professionals need actionable, relevant, and timely information. Public health informaticians design and develop information systems to support effective decision making by public health leaders.
3. *Public health informatics seeks to support the public health enterprise and improve population health.* Public health informatics supports health interventions at the community level through the production of population-based information, leading to better health outcomes.¹⁰

● Conclusion

Despite gaps in understanding of the field of informatics among public health professionals, a clear path

exists for improving understanding and thereby enhancing progress toward building “informatics-savvy health departments.” Among other key points, leaders should emphasize that public health informatics is a scientific discipline committed to managing public health information. Leaders should use a definition that emphasizes these researched-based recommendations, such as the following version adapted from the FrameWorks Institute report¹⁰:

Informaticians are professionals who are trained to ensure that data are readily shareable by designing and implementing integrated systems for sharing health data that are crucial to public health practice and high-level decision making. Informaticians address the complex needs of public health professionals, who use these systems every day to collect, scrub, analyze, and share data in a safe and timely way. Public health informaticians solve problems by figuring out the best ways to apply technology to make sense of massive amounts of data and help other professionals see the stories that these data are telling. Their work supports other public health professionals by improving decision making and increasing the field’s ability to improve population health outcomes.

Informatics is central to the practice of public health in the 21st century, and by supporting the processes of surveillance and informed decision making for improving population health, informatics will be an essential feature of the public health enterprise for decades to come. Enhancing public health professionals’ understanding of this field through more effective communication—bridging the gaps in understanding that currently exist—can help engender a deeper appreciation of the field’s expertise and increase support

for its important contributions to population health outcomes.

REFERENCES

1. LaVenture M, Brand B, Ross DA, Baker EL. Building an informatics-savvy health department—part I, vision and core strategies. *J Public Health Manag Pract*. 2014;20(6):667-669.
2. LaVenture M, Brand B, Ross DA, Baker EL. Building an informatics-savvy health department—part II, operations and tactics. *J Public Health Manag Pract*. 2015;21(1):96-99.
3. “Informatics,” Oxford English Dictionary Online. http://www.oxforddictionaries.com/us/definition/american_english/informatics. Accessed February 2, 2016.
4. “Informatics,” The Free Dictionary. <http://www.thefreedictionary.com/informatics>. Accessed February 2, 2016.
5. Public Health Informatics Institute. Defining Public Health Informatics. <http://www.phii.org/defining-public-health-informatics>. Accessed February 2, 2016.
6. Public Health Informatics Institute. Perceptions and usage of “public health informatics.” <http://www.phii.org/resources/view/9358/perceptions-and-usage-public-health-informatics>. Accessed January 27, 2016.
7. Friede A, Blum HL, McDonald M. Public health informatics: how information-age technology can strengthen public health. *Annu Rev Public Health*. 1995;16:239-252.
8. Eliot TS. *The Waste Land and Other Poems*. NY: Harcourt Brace & World; 1955:81.
9. Cleveland H. *The Knowledge Executive*. NY: E. P. Dutton; 1989.
10. Fond M, Volmert A, Kendall-Taylor N. *Making Public Health Informatics Visible: Communicating an Emerging Field*. Washington, DC: FrameWorks Institute; 2015. <http://www.frameworksinstitute.org/public-health-informatics.html>.
11. The FrameWorks Institute. Strategic Frame Analysis®. <http://frameworksinstitute.org/sfa-overview.html>. Accessed February 2, 2016.