

# The Public Health Community Platform, Electronic Case Reporting, and the Digital Bridge

Mary Ann Cooney, MPH, MSN, RN; Michael F. Iademarco, MD, MPH; Monica Huang, MPH; William R. MacKenzie, MD; Arthur J. Davidson, MD, MSPH

## ABSTRACT

At the intersection of new technology advancements, ever-changing health policy, and fiscal constraints, public health agencies seek to leverage modern technical innovations and benefit from a more comprehensive and cooperative approach to transforming public health, health care, and other data into action. State health agencies recognized a way to advance population health was to integrate public health with clinical health data through electronic infectious disease case reporting. The Public Health Community Platform (PHCP) concept of bidirectional data flow and knowledge management became the foundation to build a cloud-based system connecting electronic health records to public health data for a select initial set of notifiable conditions. With challenges faced and lessons learned, significant progress was made and the PHCP grew into the Digital Bridge, a national governance model for systems change, bringing together software vendors, public health, and health care. As the model and technology advance together, opportunities to advance future connectivity solutions for both health care and public health will emerge.

**KEY WORDS:** data exchange, Digital Bridge, electronic case reporting, electronic health record, knowledge management, public health data, technology

As technology advances and electronic data proliferate, public health departments are challenged to leverage the data opportunities. Public health agencies face costly and technically demanding problems that require developing complex solutions to address multiple monitoring and reporting needs.<sup>1</sup> Many agencies have scars from failed or unsuccessful informatics investments. New, more strategic approaches are needed, and in fact, promoting newer technologies for disease surveillance has been a focus of Centers for Disease Control and Prevention (CDC) for more than 10 years. At the intersection of technology, policy, and fiscal constraints,

public health agencies seek to leverage modern technical innovations and benefit from a more comprehensive and cooperative approach to transforming public health, health care, and other data into action.

While public health information systems remain fragmented and in siloes, public health is concomitantly being called to integrate with clinical health by leveraging electronic health record (EHR) data.<sup>2,3</sup> This engagement would result in a broader learning health system that uses data to inform quality improvement.<sup>4</sup> The Office of the Assistant Secretary for Health's Public Health 3.0 program outlines a direction for public health where informatics promotes significant enhancements to modern public health practice for collaborative, cross-sector environmental-, policy-, and systems-level actions to address social determinants of health.

Digital Bridge is a partnership led by the Robert Wood Johnson Foundation (RWJF) that brings together high-level leadership in health care, the software industry for EHR systems, and public health. It is focused on a demonstration phase to connect the EHR to public health for a select initial set of notifiable conditions. The overall vision and Digital Bridge partnership are an outgrowth of the Public Health Community Platform (PHCP), a project that simultaneously represented innovative technology

**Author Affiliations:** Center for Population Health Strategies, Association of State and Territorial Health Officials, Arlington, Virginia (Ms Cooney); US Centers for Disease Control and Prevention, US Public Health Service, Rockville, Maryland (Drs Iademarco and MacKenzie); National Association of County & City Health Officials, Washington, District of Columbia (Ms Huang); and Denver Public Health, Denver, Colorado (Dr Davidson).

The authors declare no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (<http://www.JPHMP.com>).

**Correspondence:** Mary Ann Cooney, MPH, MSN, RN, Center for Population Health Strategies, Association of State and Territorial Health Officials, 2231 Crystal Dr, Ste 450, Arlington, VA 22202 ([mcooney@astho.org](mailto:mcooney@astho.org))

Copyright © 2018 Wolters Kluwer Health, Inc. All rights reserved.

DOI: 10.1097/PHH.0000000000000775

solutions and the required governance framework to build community support.<sup>5</sup> The PHCP was led by the Association of State and Territorial Health Officials (ASTHO) and funded through a cooperative agreement with CDC. This article briefly documents the process of creating PHCP, along with the progress made and the successes and lessons learned during the first 3 years of the PHCP project. This description is a critical input for Digital Bridge success. The work has and will continue to inform future work on public health community governance and technology development.

## Process and Progress

Modern health information technology evolution and adoption have rapidly accelerated because of the EHR Incentive Programs (“Meaningful Use”) authorized by the HITECH Act (Title XIII of the American Recovery and Reinvestment Act of 2009, Pub L 111-5). By 2015, 84% of US hospitals had an EHR system, a 9-fold increase since 2008.<sup>6</sup> This created an unprecedented opportunity for public health agencies needing to adjust priorities to invest in information systems capable of receiving and processing data from thousands of health care facilities using dozens of different certified EHR systems.

Public health moved forward by adopting cloud-based shared services and infrastructure. Prior technology successes formed a foundation for exploring what a community-owned and governed PHCP might offer. The Association of Public Health Laboratories (APHL) expanded its use of “route-not-read” hubs, which were originally designed to route electronic laboratory reports between public health laboratories into the APHL Informatics Messaging Service (AIMS).<sup>7</sup> The AIMS platform, built on Amazon Web Services, handles tens of thousands of transactions a month for various public health business needs.<sup>8</sup> In cooperation with CDC’s National Syndromic Surveillance Program, ASTHO manages the BioSense platform, another Amazon Web Services–based system that provides 68 state and local public health agencies with a national syndromic surveillance solution.<sup>9</sup>

Building on existing collaborative models to form a stakeholder community, ASTHO initiated a PHCP governance approach. Since 2008, one important model of public health enterprise-wide collaboration has been the Joint Public Health Informatics Taskforce (JPHIT), a coalition of 9 professional associations that represents governmental public health agencies to build trust and broad consensus on national informatics and health IT policy issues.<sup>10</sup> Member representatives and staff from the JPHIT organizations, plus other special advisors and non-JPHIT

organizations, formed the PHCP Steering Committee to advise ASTHO and guide development of PHCP (see Supplemental Digital Content Appendix A, available at <http://links.lww.com/JPHMP/A442>).

The PHCP Steering Committee worked with and advised ASTHO on identifying needed solutions to real-world public health problems.<sup>11</sup> The committee then developed a vision, mission, and strategic map (see Supplemental Digital Content Appendix B, available at <http://links.lww.com/JPHMP/A443>) to lead continued PHCP development focused on the central challenge of building PHCP into a community-driven, valued, and sustainable entity. The committee produced background materials covering technology, governance, and communications and proposed and vetted individual public health use cases that could benefit from shared PHCP services. After more detailed conversations, the committee developed a detailed requirements and implementation roadmap for defining and describing use cases, proposed functionalities, and their relation to sustainable service delivery. Importantly, PHCP emerged as a shared service entity that aimed to address the technology challenges that the spectrum of public health agencies faced.

The PHCP Steering Committee identified a need to create a strategy to transition to a more community-driven governance model. Stakeholders formed an interim executive committee (IEC) (see Supplemental Digital Content Appendix C, available at <http://links.lww.com/JPHMP/A444>), with members elected by the PHCP Steering Committee and cochairs appointed by ASTHO and the National Association of County & City Health Officials. Governed by a formal charter, IEC became the main decision-making body overseeing subcommittees focused on specific PHCP use cases (eg, electronic case reporting [eCR]) or crosscutting topics (eg, legal and policy issues, technology, and sustainability).<sup>12</sup> IEC was modeled on the functions and role of a nonprofit board, with the goal of creating a nonprofit PHCP-hosted entity. An IEC evaluation conducted in June 2016 highlighted key PHCP successes, including public health community engagement, acceptance of shared services, and centralized, cloud-based infrastructure.<sup>13</sup>

With strong encouragement from CDC, IEC chose eCR as the first use case for PHCP. IEC provided critical community input and an informatics perspective for the initial eCR technical framework. IEC formed a PHCP eCR workgroup to help map out how health care providers report disease cases today and what would be needed to enhance public health surveillance as mandated by state and local laws.

The current disease case reporting process is labor-intensive and largely paper-based, resulting in underreporting, errors, and delayed and incomplete

information. The PHCP eCR use case discussed using shared services to receive, evaluate, and route reports of patient encounters from EHRs to public health agencies (Figure). IEC selected eCR as the primary use case in part because of the Centers for Medicare & Medicaid Services' proposed inclusion of eCR from an EHR as a measure for Meaningful Use stage 3 criteria.<sup>14</sup>

Public health agencies recognized the opportunity to improve upon the current case reporting process with a more unified approach that established a common set of needs across jurisdictions. Just as implementing electronic laboratory reporting has improved the timeliness, completeness, and accuracy of the reportable disease information that public health agencies receive, eCR is expected to provide agencies with additional useful patient and clinical data.<sup>15</sup> With eCR, these underreported, paper-based cases would be reported, improving public health efficiency for evaluation and follow-up.

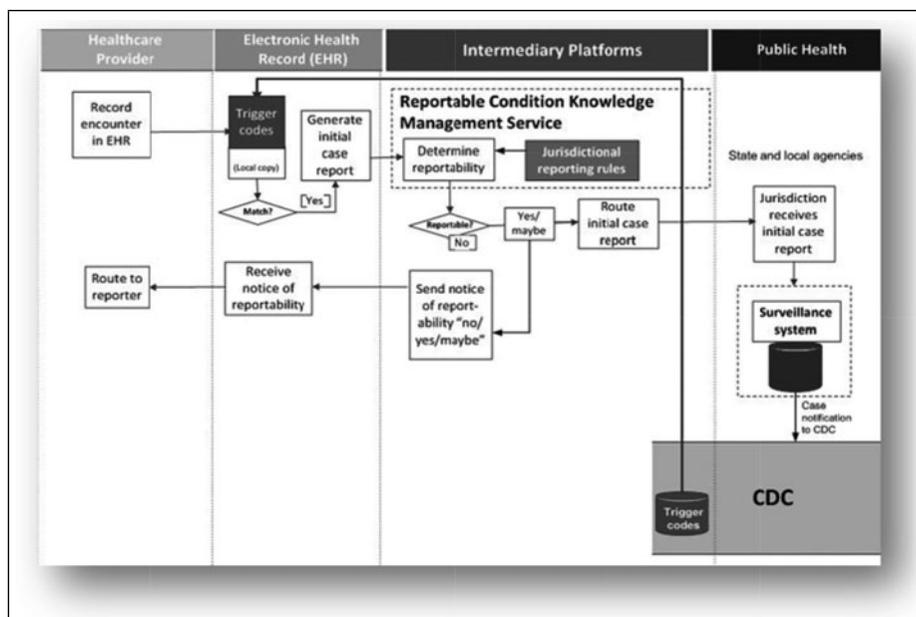
Potential benefits of eCR were explored in an ASTHO-sponsored economic analysis of PHCP's proposed centralized approach for routing and decision support.<sup>15</sup> The analysis was limited to a study of efficiency gained at public health agencies by using the centralized PHCP eCR services as compared to current paper-based practices or whether individual jurisdictions developed their own localized eCR solution. According to the analysis, centralizing the eCR components would provide \$2.5 million in increased efficiency per jurisdiction over 15 years compared

with maintaining the status quo of manual reporting. Analysis results also showed that a centralized eCR solution represented a better investment than a localized eCR solution, which would provide \$310 000 of net benefits over 15 years compared with the status quo.

### Successes

ASTHO partnered with APHL to develop and host the necessary components for eCR on APHL's AIMS platform. APHL built AIMS to leverage a suite of shared services for security and access control and is capable of securely transporting protected health information and hosting third party applications. A key component of the eCR process was integrating the Council of State and Territorial Epidemiologists' Reportable Condition Knowledge Management System (RCKMS) to serve as the decision support tool that would determine whether EHR recorded events (eg, selected diagnoses or laboratory test orders and results) were reportable in specific public health jurisdictions.<sup>16</sup> ASTHO and APHL partnered to pilot test the eCR information flow with several EHR vendors (Cerner and Epic), clinical providers and intermediaries (North Shore University Health System and Michigan Health Information Network Shared Services), and state and local public health agencies (in Illinois, Michigan, Utah, Virginia, Washington State, Houston, and southern Nevada).

The defined eCR pilot scope included:



**FIGURE** PHCP eCR Diagram Model, Association of State and Territorial Health Officials, 2016  
 Abbreviations: CDC, Centers for Disease Control and Prevention; eCR, electronic case reporting; PHCP, Public Health Community Platform.

1. Integrating reportable condition trigger codes into EHR systems.
2. Having EHR systems generate standardized electronic initial case reports (eICRs).<sup>17</sup>
3. Transferring eICRs to AIMS.
4. Evaluating and routing eICRs from AIMS to the appropriate state or local public health agencies.

The PHCP team tested the eCR information flow at several pilot sites: a public health agency, a clinical provider, and an EHR vendor. Recruiting health care providers and eCR technology vendors to participate during the available time frame proved challenging. Early adopters cited competing priorities, varied vendor development schedules, and no direct financial incentives for either the public health departments or the health care providers as engagement barriers. ASTHO recruited 2 pilot sites that included all 3 actors, along with 2 public health sites with participating health information exchanges, and 5 stand-alone state or local public health agency sites.

All pilot sites succeeded in connecting with AIMS, but progress in testing other steps of the eCR process was delayed awaiting publication of eICR standards (eg, HL7 eICR standard for trial use, published in June 2016), the reportable condition trigger codes, and the implementation guide. Despite these impediments, PHCP was successful in building trust within pilot sites to enable in-kind participation.

Finally, PHCP was featured in the Public Health Informatics Conference Interoperability Showcase on August 22–23, 2016, where the team demonstrated the shared services it had developed and deployed to accept, transform, route, and deliver structured case reports. Continued work on the processes is needed to integrate initial case reports with a standardized electronic format, called structured data capture, which would allow public health agencies to ask for more detailed condition- and jurisdiction-specific data elements from clinical providers.

## Lessons Learned

### *Technology flows*

Although the initial eCR was the starting point for this ASTHO-facilitated effort, the efficiencies and benefits of PHCP's eCR will not be fully realized until EHRs and public health agencies establish comprehensive, bidirectional information. ASTHO made significant headway in incrementally addressing large informatics challenges through its PHCP development process, but the PHCP pilot efforts identified many unanswered eCR implementation questions. For example, to create a production-ready eCR solution, vendors and health care providers will need to clarify wherein the workflow case reports will be automatically

generated from EHRs. More detailed business requirements from health care providers will inform that work.

### *Processes improved*

The PHCP pilot members made an underlying assumption that public health agencies will direct health care reporters to use a shared “intermediary” eCR application as a unifying entity. State and local jurisdictions will need to assess and determine whether a PHCP-like solution is the appropriate and approved method for health care providers when using eCR in their jurisdiction. In addition, variations in how jurisdictions implement RCKMS will have implications for how EHR vendors and health care providers engage and streamline their messaging. For example, how will out-of-state cases be handed, especially for states not participating in a common platform? Automatic forwarding to other public health jurisdictions connected to the PHCP will require a more enterprise-wide perspective where governance drives operations to establish pathways to address varying participation across jurisdictions.<sup>18</sup>

### *Workforce and culture*

Implementing eCR through a PHCP will require cultural changes in public health business practices and for health care providers. The staff from the pilot sites reported that they experienced new opportunities and challenges during the PHCP eCR pilots beyond those required to build the technological elements. Although the PHCP team expected the platform to improve staff efficiency through reduced time at data collection, it found that eCRs may require public health staff to have greater data analytic and infrastructure skills in managing complex systems. Staff will need to be trained on interfacing with a PHCP-like service (eg, setting jurisdictional reporting rules in RCKMS) or the multiple activities related to effective bidirectional communication. The PHCP team anticipates that with greater reliance on standardized, shared services, the pool of eCR qualified public health practitioners should increase. This should lead to greater potential for shared methods, innovations, and interoperability. State reporting regulations may need to be revisited or changed to recognize inherent differences between real-time electronic reporting methods and paper-based reporting methods (eg, timeliness and frequency of reports).

### *Sustainability*

PHCP's vision for sustainability was predicated on its ability to become an independent, self-governing “utility” capable of charging fees for service,

managing funds, and demonstrating accountability for risk management through legally binding agreements, such as business associate and data use agreements. Discussions with the PHCP legal committee and pilot sites found that responsible parties and their roles needed to be more clearly identified and defined to move forward with the legal agreements required for states to use PHCP to receive protected health information.<sup>19</sup> To become an independent entity, PHCP would have needed a business plan with diversified funding sources to develop a pipeline of shared services and applications that benefit public health practice. Future efforts toward this end will require sustainable funding beyond federal sources to further develop the concept of a valuable utility guided through community-based governance.

### Next Steps

ASTHO made significant progress in leading eCR efforts through PHCP. A call to action is needed to advance future work toward a national eCR solution. This work will include building on existing relationships and lessons learned. The public health community will need a clear path toward a sustainable national solution for eCR that all public health agencies can utilize.

PHCP project successes have brought together the public health community to unite around a common vision and mission for shared technology and governance (<http://www.astho.org/Informatics/Documents/Promise-of-eCR-PHR-2016/>). Building trust with community and stakeholder leadership, this ASTHO work now serves as a foundation for the RWJF Digital Bridge public health information exchange initiative to support greater EHR vendor and health care provider involvement.<sup>20</sup>

To create a durable governance structure for an integrated and interoperable public health enterprise, clear value propositions need to be established for all stakeholders. Public health continues to devote limited resources to create a real business case focused on pooling resources. With RWJF-supported governance initiatives underway, the PHCP team believes that a collaborative initiative can create value for all stakeholders to accelerate sharing of Web-based services that support public health jurisdictions across the country in improving health for their constituents.

### Policy Implications

Without question, establishing bidirectional exchange capability between health care and public health for the purposes of expediting eCR is both cost-effective and valuable. Timeliness of reporting and increased access to these data are important to improving

population health. As Digital Bridge continues to mature and establish itself as an incubator of ideas, and as this technology grows and strong partnerships between health care and public health are established adding new use cases, such as chronic disease management and neonatal health management, greater integration of health care and public health will become the norm.

### References

- Rittel H, Webber M. Dilemmas in general theory of planning. *Policy Sci.* 1973;4(2):155-169.
- Davidson, AJ. Creating value: unifying silos into public health business intelligence. *EGEMS (Wash DC)*. 2015;2(4):1172.
- Institute of Medicine. *Primary Care and Public Health: Exploring Integration to Improve Population Health*. Washington, DC: The National Academies Press; 2012.
- Institute of Medicine. *Engineering a Learning Healthcare System: A Look at the Future: Workshop Summary*. Washington, DC: The National Academies Press; 2011.
- Jarris P, Soper P, Gordon G, Huang M, Rennick M. Shared technology infrastructure for the public health enterprise: the time is now. *J Public Health Manag Pract.* 2015;21(3):308-309.
- Henry J, Pylypchuk Y, Searcy T, Patel V. *Adoption of Electronic Health Record Systems Among U.S. Non-federal Acute Care Hospitals: 2008-2015*. Washington, DC: Office of the National Coordinator for Health Information Technology; 2016. ONC Data Brief No. 35.
- Zarcone P, Nordenberg D, Meigs M, Merrick U, Jernigan D, Hinrichs S. Community-driven standards-based electronic laboratory data-sharing networks. *Public Health Rep.* 2010;125(suppl 2):47-56.
- APHL AIMS Platform. APHL Web site. [https://www.aphl.org/programs/informatics/Pages/aims\\_platform.aspx](https://www.aphl.org/programs/informatics/Pages/aims_platform.aspx). Accessed October 14, 2016.
- National Syndromic Surveillance Program (NSSP). NSSP Web site. <http://www.cdc.gov/nssp>. Accessed October 14, 2016.
- Joint Public Health Informatics Taskforce. JPHIT Web site. <http://www.jphit.org>. Accessed October 14, 2016.
- Year 1 reports. PHCP Web site. <http://www.thephcp.org/PHCP-activity/year1-reports>. Accessed October 14, 2016.
- PHCP IEC Charter. PHCP Web site. <https://drive.google.com/file/d/0ByhGC05GLsqdOHZGWUFTQIFQdKk/view>. Published May 5, 2015. Accessed October 14, 2016.
- PHCP IEC evaluation report. PHCP Web site. <https://drive.google.com/file/d/0ByhGC05GLsqdZ0E1NfC5QWfUm8/view>. Published June 2016. Accessed October 14, 2016.
- CMS Medicare and Medicaid programs; Electronic Health Record Incentive Program-Stage 3 and modifications to Meaningful Use in 2015 through 2017. <https://www.federalregister.gov/documents/2015/10/16/2015-25595/medicare-and-medicaid-programs-electronic-health-record-incentive-program-stage-3-and-modifications>. Published October 16, 2015. Accessed October 14, 2016.
- Clark-Sutton K, O'Connor A, Pina J. Economic analysis of electronic case reporting. [https://drive.google.com/file/d/0BzE17x\\_8ybJ5OHBneGdTawoyRW8/view](https://drive.google.com/file/d/0BzE17x_8ybJ5OHBneGdTawoyRW8/view). Published 2016. Accessed December 18, 2017.
- CSTE Surveillance/Informatics: Reportable Conditions Knowledge Management Systems. CSTE Web site. <http://www.cste.org/group/RCKMS>. Accessed October 14, 2016.
- HL7 eICR standard. HL7 Web site. [http://www.hl7.org/implement/standards/product\\_brief.cfm?product\\_id=436](http://www.hl7.org/implement/standards/product_brief.cfm?product_id=436). Accessed October 14, 2016.
- CSTE eCR statement. CSTE Web site. [http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/2016PS/16\\_SI\\_02.pdf](http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/2016PS/16_SI_02.pdf). Accessed October 14, 2016.
- eCR pilot review and legal meeting report. <https://drive.google.com/file/d/0B-9apAWRHx56Ykt5aDZGNuXKazA/view>. Published 2016. Accessed December 18, 2017.
- Digital Bridge Initiative. PHII Web site. <http://www.digitalbridge.us/>. Accessed November 17, 2016.