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## ARTICLES

# Klompas et al. Respond: Automated Public Health Reporting—Possible with a Coalition of the Willing

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Professor Hripcsak rightly points out some of the challenges inherent in disseminating and sustaining robust information systems to automate the detection and reporting of notifiable diseases using data from electronic medical records (EMR). New York City's experience with automated tuberculosis identification and notification is a salient reminder that sophisticated technology alone is not enough to ensure broad adoption of automated electronic reporting systems. Substantial resources and ongoing active support by a wide range of public health stakeholders are also essential ingredients. We have attempted to engineer the Electronic medical record Support for Public health (ESP) system to make it suitable for widespread adoption but the ultimate success of this endeavour will depend upon sustained collaboration between many parties including commercial EMR vendors, clinical administrators, state health departments, the Centers for Disease Control and Prevention (CDC), the Council of State and Territorial Epidemiologists (CSTE), and others.

Broad adoption will clearly be simplest if EMR vendors integrate ESP into their products. Capability to report notifiable diseases ought to become a standard for state-of-the-art EMRs certified by the Health Information Technology Standards Panel (HITSP). Bundling ESP with EMR systems will shift the burden for ESP installation and basic software maintenance from individual practices to vendors (bundling will have to be done, however, in a manner that still permits individual practices to opt out of automated reporting). To facilitate integration of ESP with commercial EMRs, we have made the source code of ESP freely available to developers under a license compatible with commercial use and creation of derivative products.

Until the political and technical steps towards bundling ESP with commercial EMRs are completed, the most likely future sites for ESP will continue to be large group practices or communities with central data warehouses that can host a standalone ESP server. Installation and maintenance of these servers will require technical expertise and commitment from the host practice as well as the target public health authority. We hope, however, that our experience thus far can inform this process to ease implementation.

Responsibility for developing and maintaining ESP notifiable disease case definitions lies most logically with state and/or national public health offices. The CDC and CSTE have already created a joint taskforce to develop standardised electronic nomenclature and reporting elements for notifiable diseases. Ideally these parties will also accept responsibility for the design and testing of new electronic case definitions. Once new case definitions have been developed and validated, we envision CDC or health departments making electronic patches with updated case definitions available to all ESP machines under their jurisdiction.

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In contrast to case definition support, maintaining an accurate list of local test codes corresponding to the ESP case definitions will almost certainly have to be decentralized on account of substantial intersite variability in local coding practices. Whether ESP is bundled with an EMR system or established as a standalone server, new tests for notifiable diseases will have to be added to ESP laboratory test tables and mapped to health departments' favoured Logical Observation Identifiers Names and Codes (LOINC) codes. ESP does have tools to facilitate this process. ESP includes a simple natural language processor that constantly scans incoming data for new codes that might be relevant to case definitions. When a new code is detected, ESP sends an e-mail alert to ESP administrators, asking them to review and possibly add the new test to ESP's laboratory test tables. For small practices with bundled EMR and ESP products, the ESP administrator might be the commercial vendor; for large practices, the ESP administrator would likely be a member of the infection control or IT department. If EMR test coding evolves over the long-term to become more uniform between different practices, it might one day also become feasible to centralize this task at the state or national level.

The utility of natural language analysis for code maintenance recently underwent a rigorous field test when ESP's present host practice merged its EMR system with two independent Boston area practices, both of which had different test types and codes for their Chlamydia and Gonorrhea assays. The natural language processor seamlessly identified the new tests thereby allowing us to incorporate their codes into ESP's case identification logic. Case checking against manual case reports independently received by the Massachusetts Department of Health confirmed that we had successfully identified all pertinent codes from the new practices. ESP employs a similar system of basic natural language processing to maintain ESP's logic for identifying relevant prescriptions despite regular changes in practices' National Drug Codes as their formularies evolve. Maintaining correct code mapping will always require dedicated resources, but much of the vigilance is already automated and working well in ESP.

Professor Hripcsak also expressed concern that decoupling ESP from the EMR requires the duplication of case identification logic within the EMR in order to notify clinicians when patients are found to have notifiable conditions and to support their decision making. To avoid this inefficient redundancy, we are currently working on enabling ESP to send clinical messages back into the secured clinical interface of the EMR.

In summary, we thank Professor Hripcsak for raising important questions regarding the generalizability and maintenance of automated notifiable condition reporting systems. We have tried to engineer ESP with these challenges in mind but strongly concur that realising the ultimate vision of universal, efficient, accurate, and sustained notifiable disease reporting from EMRs will only be possible with broad commitment from a coalition of public health stakeholders. These will necessarily include state and national public health authorities, professional societies, regulators, providers, commercial EMR vendors, and academia. We hope that cooperation amongst these parties can help us all to meet our shared goal of widespread, sophisticated, and timely systems to support public health.