

Researchers develop secure protocol for linking data registries for HPV surveillance

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Monitoring the effectiveness of the HPV vaccine in Canada requires that data from multiple registries and other data sources be combined. Linking registries can be problematic, however, since they are often managed by unrelated organizations. Privacy legislation may also restrict the sharing of data for such linkages. To address these challenges, Dr. Khaled El-Emam and his team at the CHEO Research Institute have developed a secure protocol that allows the linking of individual patient records without revealing personal information, which has been published in *PLoS ONE*.

According to Dr. El Emam, previous protocols were not secure or did not protect privacy; this new evidence-based protocol, however, is the strongest on record. It can be generalized for use in monitoring other conditions or diseases, or vaccination programs.

"There is a need to do long-term evaluations of vaccines, and to monitor [vaccination rates](#) and how they vary by individual and family characteristics. Access to data to perform such surveillance is often challenging because of legitimate privacy concerns. Our protocol addresses these concerns directly and facilitates rapid data sharing," explained Dr. El Emam.

HPV, or the [human papillomavirus](#), is one of the most prevalent sexually transmitted viral infections in the world, causing symptoms that range from [genital warts](#) to increased risk of cervical cancer. An effective preventative quadrivalent vaccine has been available in Canada since

2007 (and a second, bivalent vaccine was approved for use in 2010) and is regularly administered to girls through publicly funded school-based programs. The vaccine can potentially reduce [health care costs](#) and HPV-related illnesses and death, but the long-term effectiveness of the vaccine is not yet known. Further research is required to gauge the vaccine's lasting impact on health and to inform policy decisions concerning the allocation of health resources.

The new protocol uses a number of cryptographic techniques, including a commutative hash function and homomorphic cryptosystem. The secure computation allows registries to match records on identifiers such as SIN, health card number and date of birth without revealing these values to anyone, and then perform analytics on the linked data without that linked data being disclosed. The protocol provides end-to-end privacy protection for surveillance programs and eliminates many concerns about sharing data.

"We set out to assess the impact of the [HPV vaccine](#) by creating a secure protocol to link simulated databases on cancer, cervical screening, health care services and immunization. Such linkage can only be done in an environment that is responsive to patient privacy concerns," explained Dr. El Emam. "The protocol we created would allow any public health unit to link databases from multiple sources and compute relevant statistics from linked data without revealing personal information, and hence, still provide strong patient privacy guarantees."

Provided by Children's Hospital of Eastern Ontario Research Institute

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