

School of Health Information Science Seminar Series: **Advancing Learning Health Systems: What Machine Learning Can Learn from Healthcare Data - Challenges and Opportunities**



Speaker:

Jonas Bambi

Assistant Professor, School of Health
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April 10 on Zoom
12:00pm PT

Jonas Bambi, PhD is an Assistant Professor in the School of Health Information Science at the University of Victoria. With over 20 years of experience in healthcare Information Management and Information Technology (IMIT), he has held roles ranging from clinical application analyst to systems integration architect, project manager, and co-director of Applied Health Data Analytics. This breadth of experience enables him to bridge technical, clinical, and organizational perspectives to support health system transformation.

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Advancing Learning Health Systems: What Machine Learning Can Learn from Healthcare Data - Challenges and Opportunities

Healthcare is often described as data-rich but insight-poor. Clinicians experience this as fragmented patient journeys; informatics professionals see it as disconnected datasets. At the center of both perspectives lies a shared question: what can we truly learn from the data we collect? Learning Health Systems (LHS) offer a compelling answer: creating a continuous cycle where data becomes knowledge, knowledge informs practice, and practice generates new data.

This presentation traces how learning unfolds across the layers of healthcare. At one end, data reflects biological processes that inform disease risk and personalized medicine. At the bedside, it captures symptoms, diagnoses, and treatments that guide individual care. Beyond that, it reveals how cohorts of patients move through complex care pathways, and ultimately how populations experience health and healthcare systems. As we move across these layers, context becomes increasingly important to interpreting and acting on data.

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Biography

Jonas Bambi is an Assistant Professor in the School of Health Information Science at the University of Victoria. With over 20 years of experience in healthcare Information Management and Information Technology (IMIT), he has held roles ranging from clinical application analyst to systems integration architect, project manager, and co-director of Applied Health Data Analytics. This breadth of experience enables him to bridge technical, clinical, and organizational perspectives to support health system transformation.

His research focuses on the intersection of health informatics, machine learning, and health systems improvement, with a particular emphasis on advancing Learning Health Systems (LHS). He studies how complex healthcare data can be leveraged to uncover patterns of service utilization across the continuum of care, especially for individuals with complex conditions. His doctoral work developed novel methodologies for analyzing longitudinal healthcare data, contributing to the design of feedback loops that transform data into knowledge, knowledge into practice, and practice into improved outcomes.

A key dimension of his current work is the development of target information architectures (TIA) that enable machine learning to learn effectively from healthcare data within context. This includes designing systems that integrate cross-continuum data and support continuous learning and quality improvement in real-world settings.

Jonas also explores how digital technologies can support safe aging at home, guided by the Ubuntu philosophy emphasizing community and interdependence. Through collaborations with health authorities, academia, and industry, he emphasizes knowledge translation and real-world impact.

He holds an MSc in Computer Science, an MBA in Technology Management, and a PhD in Health Informatics

Abstract

Healthcare is often described as data-rich but insight-poor. Clinicians experience this as fragmented patient journeys; informatics professionals see it as disconnected datasets. At the center of both perspectives lies a shared question: what can we truly learn from the data we collect? Learning Health Systems (LHS) offer a compelling answer: creating a continuous cycle where data becomes knowledge, knowledge informs practice, and practice generates new data.

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Yet, one critical layer remains underexplored: the cohort level, where quality of care is shaped by how real-world patient journeys align with clinical practice guidelines. Using longitudinal, cross-continuum data, our work applies machine learning to uncover patterns of service utilization, making visible where care aligns, and where it diverges.

This is only the beginning. Realizing LHS requires a Target Information Architecture that integrates data and context across all layers. Guided by public health and health systems theories, this approach connects clinical practice with system-level understanding — enabling healthcare systems not only to generate insights, but to learn, adapt, and continuously improve care