

Digitization of Perioperative Surgical Flowsheets
(Technical Report)

**An Evaluation of the Socio-Political Interactions of Health
Data Architecture to Inform Ethical Data Governance**
(STS Research Paper)

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Sociotechnical Synthesis:

Perioperative mortality rate (POMR) is a metric widely used to describe the quality of treatment in hospitals. Perioperative data, or data collected during surgery, can be used to calculate POMR and determine factors that lead to adverse surgical outcomes. Access to such data is essential for decreasing POMR and improving medical treatment. In low- and middle income countries (LMICs), perioperative data is often manually recorded on paper flowsheets. While these flowsheets capture essential information, their non-digital format leads to difficulty in analysis of perioperative data, as aggregating data and observing trends is a time-consuming and tedious task. The goal of this project is to design a system to digitize the information contained in surgical flowsheets that have been in use for six years at the University Teaching Hospital of Kigali in Rwanda. To accomplish this goal, the research team has done the following: 1) Designed a wooden scanning structure, SARA (Scanning Apparatus for Remote Access), to capture flowsheet images in a standard format, 2) Developed a web application to upload images and securely transfer them to UVA for processing, 3) Developed image processing programs to digitize medication, blood pressure, heart rate and logistical data, and 4) Created a PostgreSQL database system to store the digitized flowsheet data. Additional testing and validation of this system is needed to evaluate the accuracy of each processing technique in the fully integrated system.

Medical data analytics support strong patient care, but using data in the developing health systems of low- and middle-income countries (LMIC) risks compromising patient privacy rights. My research team is designing an end to end system for the digitization of the paper flowsheets used during surgery in Rwanda to record anesthesiologic data. They detail a patient's private medical background and conditions, information that can cause harm if accessed by unauthorized parties or used in a malicious way. Policy in high-income countries detail robust standards of data governance to protect patient information, and LMIC look to follow suit in developing their own. Techno-politics will provide a framework for understanding the inherent politics of data. Sensitive data cannot exist in a vacuum of policy; it requires transparent and intentional management for responsible usage. Further, the social construction of technology will be used to understand how patient needs are shaping the development of LMIC health systems, this provides a lens for understanding how users indirectly shape data policy. A policy analysis of Rwanda and three other LMIC will examine the political architecture created in response to medical data usage, and a complementary rubric will evaluate the health systems of the four countries to examine how the care needs of patients are driving a need for data. This analysis will cohesively consider current policy implementation, health system technology and the direction of medical data analytics. I expect to find current policy to be vague and outpaced by the rate of care innovation. LMIC should re-focus on developing robust data governance standards to support the safe deployment of digital medical systems that prioritize evolving patient needs without risking the violation of patient rights.