

## CURRICULUM VITAE

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**Place of Birth:** Irvine, Scotland, UK

### EDUCATION

Edinburgh University	Medical Science	B.Sc.	1984
Edinburgh University	Medicine	MBChB	1986
Edinburgh University	Knowledge Based Systems	MSc	1991

### POSTDOCTORAL TRAINING (Clinical, UK)

Western General Hospital and The Royal Infirmary, Edinburgh	Internship	Medicine/Surgery	1986-1987
Falkirk and District Royal Infirmary	Senior House Officer	Medicine	1987-1988
Stirling Royal Infirmary	Senior House Officer	Medicine	1988-1989
Northern General Hospital Sheffield	Senior House Officer	Medicine	1989-1990
Edinburgh Royal Infirmary and Falkirk and District Royal Infirmary	Career Registrar	Cardiology	1992-1995

## POSTDOCTORAL TRAINING (US)

- New England Medical Center Fellow Clinical Decision Making/Cardiology 1995-1999
- MIT Lab for Computer Science Research Affiliate Clinical Decision Making 1995-2005

## PROFESSIONAL LICENSES AND BOARD CERTIFICATION

- General Medical Council, UK Medical registration 1986 - present
- Royal College of Physicians Medical boards MRCP Diploma 1990

## FACULTY ACADEMIC APPOINTMENTS

- Harvard Medical School Instructor Department of Pediatrics 2000 – 2015
- Harvard/MIT Affiliated Faculty Health Science and Technology 2005 – 2014
- Harvard Medical School Assistant Professor Department of Medicine 2005 – 2015
- University of Leeds Associate Professor Yorkshire Ctr. Health Informatics 2013 – 2018
- University of Leeds Head Yorkshire Ctr. Health Informatics 2017
- University of Leeds Visiting Assoc. Prof. Yorkshire Ctr. Health Informatics 2017 – 2020
- Brown University Associate Professor BCBI 2017 - present

## APPOINTMENTS AT HOSPITALS/AFFILIATED INSTITUTIONS

- 2000 – 2015 Research Affiliate Informatics Program Children’s Hospital Boston
- 2005 – 2007 Associate Physician Division of Social Medicine Brigham & Women’s Hospital and Health Inequalities
- 2007 – 2015 Research Associate Div. of Global Health Equity Brigham & Women’s Hospital

## OTHER APPOINTMENTS AND LEADERSHIP ROLES

- Director of Informatics and Telemedicine Partners In Health 2000 – 2012
- Founder, co-leader OpenMRS project 2004 – present
- Founder, co-owner OpenMRS LLC 2007 – 2010
- Organizer and co-leader EMR track Bellagio meeting on eHealth in Developing Countries, Rockefeller Bellagio Center, Italy 2008
- Originator, organizer, co-leader The Bellagio Meeting “Creating a Framework for Global eHealth Evaluation” Rockefeller Bellagio Center, Italy 2011

- Organizer and co-leader “6th Annual OpenMRS Developers and Implementers Meeting”, Kigali, Rwanda 2011
- Co-Leader eHealth “Evaluation Framework Workshop” University of San Francisco, USA 2012
- Organizer and Leader Workshop Process Evaluation for eHealth Systems Leeds, UK 2017

## ACADEMIC COMMITTEES

- 1996 – 1999 Boston Informatics Research Trainees joint lectures Harvard/MIT/Tufts
- 2001 – 2002 Informatics working group for MDR-TB Harvard/WHO/CDC
- 2001 – 2002 Working group on DOTS-PLUS WHO/CDC/HMS
- 2002 – 2009 Curriculum committee Medical Informatics MS program University of KwaZulu Natal, Durban, South Africa
- 2004 – 2010 Executive committee, Informatics for Global Health, Durban, South Africa University of KwaZulu Natal,
- 2005 – 2007 Working group on HIV data monitoring and HL7 WHO
- 2006 – 2007 NLM 10-year planning project, Committee for Underserved Populations National Library of Medicine
- 2008 - 2015 International Affairs Committee member American Medical Informatics Association
- 2020 – 2024 CDT AI Advisory Board – PhD program University of Leeds, Leeds, UK

## PROFESSIONAL SOCIETIES

- British Medical Association Member and representative 1987 – 2001
- Royal College of Physicians, Edinburgh Collegiate member 1990 – present
- American Medical Informatics Association Member 1996 – present
- The American College of Medical Informatics Elected Fellow 2009 – present
- AMIA Global Health Informatics Working Group, Elected Chair 2016 – 2018
- International Academy Health Science Informatics Elected Fellow 2019 – present

## GRANT REVIEW ACTIVITIES

- HIV Care in Africa CDC 2010
- Grant review NIH, DAIDS 2015

- Global eHealth Welcome Foundation 2013, 2019
  - Global eHealth Thrasher Foundation 2020
  - Study section NIH 2021
- CSR 202105 ZRG1 IMST U55

EDITORIAL ACTIVITIES

- Ad hoc Reviewer
  - British Medical Journal
  - BMJ Open
  - The Lancet
  - American Journal of Public Health
  - Journal of Telemedicine and Telecare
  - International Journal of Medical Informatics
  - Journal of the American Medical Informatics Association
  - BMC Medical Informatics and Decision Making
  - PLOS One

Other Editorial Roles

- Scientific Program Committee Helina2003/IMIA 2003
- Scientific Program Committee AMIA Annual Symposium 2009
- Moderator, GHDonline Health IT GHD program, Harvard Medical School 2009 - 2014
- Section Editor BMC Biomedical Informatics 2013 – 2015
- Editorial adviser BMC Biomedical Informatics 2015 – 2017
- Scientific Program Committee AMIA Annual Symposium 2016
- Track Co-Lead Hawaii International Conference on System Sciences 2021
- Section editor: Global Health PLOS Digital Health 2021 -

HONORS AND PRIZES

- Tech Museum Award for Innovation The Tech Museum, Partners In Health Electronic Medical Record System, November 2005
- The Homer R Warner Award American Medical Informatics Association Meeting, Best paper on the implementation and evaluation of a medical information system, October 2006
- Free Software Award for Projects of Social Benefit. Free Software Foundation Award, Received on behalf of the OpenMRS Project, March 2013

REPORT OF FUNDED AND UNFUNDED PROJECTS

## PREVIOUSLY FUNDED PROJECTS

1998 – 1999	NIH/NHLBI		Co- Investigator
“Informatics for the National Heart Attack Alert program”. PI Lucila Ohno-Machado To develop tools to provide early warning of myocardial infarction and alert patients to seek urgent care			
2000 – 2005	Gates Foundation	\$44M	Co- Investigator
“Project for the eradication of MDR-TB in Peru”. PI Jim J Kim To develop a web based medical record system to support the management of drug resistant tuberculosis in Peru.			
2001 – 2004	NIH	\$500,000	Co-Investigator
“ITMI Program in Sub-Saharan Africa”. PI Michael Bennish Training grant in medical informatics for international students			
2004 – 2009	NIH	\$500,000	Co- Investigator
“ITGH Program in Sub-Saharan Africa”. PI Christopher Seebregts Training grant in medical informatics for international students			
2005 - 2006	Rockefeller Foundation	\$17,688	Site PI
“Implementation of the AMPATH medical record system in East Africa”. PI William Tierney Initial development and implementation of the OpenMRS EMR system			
2007 – 2008	WHO	\$71,000	PI
“Development of an electronic recording and reporting system for MDR TB” To create a medical record system tailored to the management of drug resistant tuberculosis based on the OpenMRS system.			
2008 – 2009	CDC/PEPFAR	\$75,000	PI
“Evaluating the EMR rollout in Rwanda” To evaluate the impact of the OpenMRS medical record on clinical care for HIV patients in Rwanda.			
2008 – 2010	Rockefeller Foundation.	\$474,000	PI
“Managing Patient Data, Procurement, and Reporting Within Large-Scale Treatment Programs: The Potential of OpenMRS” To develop advanced reporting tools and a pharmacy management system for the OpenMRS EMR and to organize a conference on Electronic Health Records in Bellagio, Italy.			
2010 – 2012	Rockefeller Foundation	\$296,000	PI
“Strengthening technical capacity for the national EMR rollout in Rwanda” (2010 THS 312) To develop new software components for the OpenMRS EMR system being rolled out in Rwanda			
2009 – 2010	WHO	\$35,000	PI
“Further development of an electronic recording and reporting system for MDR TB”			

To extend a medical record system tailored to the management of drug resistant tuberculosis based on the OpenMRS system.

2006 – 2011	NIH		Co-Investigator
The epidemiology of drug resistant TB in Peru. PI Mercedes Beccera To investigate the transmission of MDR-TB in high burden communities in Lima, Peru.			
2006 – 2012	NIH	\$14,000,000	Co-Investigator
“Epidemiology and Transmission Dynamics MDR/XDR Tuberculosis” PI Megan Murray To investigate the transmission of MDR-TB in high burden communities in Lima, Peru including the genetic fingerprints of mycobacterium strains. Led development of information systems using OpenMRS			
2008 – 2011	IDRC 104862	\$691,000 CAN	PI
“Strengthening Medical Records and Technical Capacity in Rwanda through Mentorship and International Collaboration”. To develop a training program for computer programmers to implement, build and extend the OpenMRS medical record system in a developing country.			
2009 – 2010	Rockefeller Foundation	\$304,000	Site PI
“Evolution of OpenMRS from a Loosely Structured Collaborative Into a Formal Organization” To strengthen and extend the OpenMRS EMR systems and build the capacity of the OpenMRS organization to manage the growing project.			
2011 – 2012	Rockefeller Foundation	\$300,000	PI
Creating a Global eHealth Evaluation Agenda To determine barriers, and develop tools and training materials to strengthen eHealth and mHealth evaluation in developing countries			
2010 – 2013	IDRC	\$520,000CAN	(PI)
Strengthening Health Information Systems to Support Post-Disaster Healthcare in Haiti To extend a EMR systems developed by both PIH (OpenMRS) and I-Tech (I-Sante) to cover surgery and primary care, and link these system to cell phone data management and to evaluate the impact of these systems.			
2009-2013	CDC	\$719,000	(PI)
Supporting the rollout of the OpenMRS in Rwanda. Developing software tools to support the rollout of the OpenMRS EMR system in Rwandan government clinics.			
2012 – 2014	Rockefeller Foundation	\$300,000	(PI)
Supporting software components, implementation tools and evaluation for the OpenMRS EMR rollout in Rwanda and beyond” (2010 THS 312)			
2015 – 2017	European Community 2020 program, Marie Skłodowska-Curie Fellowship	€195,000 (\$228,000)	(Fellow)
“Global eHealth” Focusing on the Evaluation of OpenMRS in Rwanda, OpenMRS generally, and improving decision support in cardiology.			

- 2015 – 2017 HSRI (Oxford University Prime), £96,397.60 (Co-Invest)  
 “Open Source solutions and Information for Health Service Improvement, Kenya”  
 Improving the development, implementation and evaluation of eHealth solutions to improve quality of care and secondary use of data for clinical research
- 2016-2018 Yorkshire Cancer Research £300,000 (Co-Invest)  
 “Reducing inequalities in care for people with cancer and palliative care needs”
- 2016-2017 CDC/PEPFAR to U. Washington \$550,106 (Consultant)  
 “GH15-1535, HQ: building effective health information systems under the PEPFAR”  
 Co-Investigator and steering committee member – eHealth evaluation framework
- 01/2014 – 12/2017 Centers for Disease Control and Prevention \$954,238 (Co-PI)  
 GH000782 *(still in completion stage)*  
 “Evaluation of the clinical impacts and costs of eHealth in Rwanda using innovative frameworks and local capacity building”  
 The overall goal is to carry out a comprehensive evaluation of performance, data quality, usage, costs and clinical impact of an enhanced EHR with decision support (built with OpenMRS) in 112 clinic sites in Rwanda.  
 Umubyeyi, Aline (PI)
- 07/2020 – 12/2021 Dept. of Medicine Chair’s Research Program(Warren Alpert Medical School)  
 Co-Investigator  
 “Observational study of patients’ use of a digital diagnosis app in a primary care office same day clinic”  
 Hilliard R, (PI) \$30,000

### CURRENT GRANTS

- 11/01/2021 – 10/31/2026 NIH/NIAID R01-1R01AI167694  
 Role: Co-PIs, Hogan J, **Fraser H**, Wangi A  
 “Data Science for Decision Support in the HIV Care Cascade”  
 \$2,479,027 direct costs
- 01/01/2022 – 12/31/2022 OVPR Seed grant, Brown University  
 Role: PI  
 “Observational study of the safety, accuracy and usability of a digital diagnosis App for primary care and stroke patients”  
 \$39,000  
*Awarded January 2022*
- 7/1/18 – 6/30/2022 Biomedical Informatics Global Health Fund  
 Role: PI  
 This grant funds research on maternal and newborn care, and the role of clinical decision support in a range of clinical areas in low income settings.  
 \$250,000

1/1/2022 – 6/30/2022 Framework in Global Health, Brown University  
 Sudheesha Perera PI. Role: Senior faculty advisor  
 A pilot study of the feasibility, accuracy and acceptability of the use of Optical Mark Recognition technology to collate data in a low income neonatal unit.  
 \$3500

PENDING GRANTS

07/01/2023 – 6/30/2028 NIH – NINDS R01  
 Role PI  
 Diagnostic decision support systems for patients in urgent primary care or with stroke: evaluation of safety, usability and effectiveness for diagnosis, triage and patient decision making  
 Submitted to AHRQ October 5<sup>th</sup> 2022

SUBMITTED GRANTS (not funded)

12/1/2022 – 11/30/2024. MIT SOLVE- Gates Foundation  
 Role PI  
 Novel Measurement for Performance Improvement Challenge: OpenMRS Primary Care EHR  
 Submitted August 2022

09/01/2022 – 31/8/2027 NIH – NINDS R01  
 Role PI  
 Diagnostic decision support systems for patients in urgent primary care or with stroke: evaluation of safety, usability and effectiveness for diagnosis, triage and patient decision making  
 Submitted February 2022 (not funded)

09/01/2022 – 31/8/2027 NIH – NIGMS R01  
 Eickhoff PI, Role CoI  
 Recall-centric Information Retrieval Methods for Primary Care Diagnostic Decision Support  
 Submitted February 2022 (not funded)

7/2021 – 6/2025 NIH NIBIB R01  
 Role PI  
 “Electronic health records to optimize clinical care, case management and rapid research for COVID-19 in low and middle income countries” Requested budget (direct costs) \$1,951,389  
 Submitted 10/2020

NIH training grant  
 Asefa S (PI), Fraser HS (CoI)  
 “DASH. Data Science for Healthcare: Preparing the Next-Generation of Healthcare Professionals in Ethiopia.”  
 Submitted 12/2020



## REPORT OF TEACHING AND TRAINING

### **Formally Supervised Trainees**

#### PhD and MPhil students

2005-2009 Joaquin Blaya, PhD Harvard Medical School & MIT HST

Primary supervisor

“Developing, implementing, and evaluating tuberculosis laboratory information systems for resource-poor settings” Dr. Blaya created and evaluated two medical information system tools for MDR-TB in Peru showing major improvements in quality and timeliness of data, leading to six journal articles and two prizes during his PhD.

2006-2009 Gerald Douglas, PhD. University of Pittsburgh

PhD committee member

“Engineering an EMR system in the developing world: necessity is the mother of invention”

Mr. Douglas carried out pioneering work in the development of point of care medical information systems in Malawi now used to care for more than 20,000 HIV patients there.

2010 Louis Fazon. Yale University

PhD committee member:

Louis defended his PhD proposal and received a distinction

2012 -2013 Christian Munyaburanga National University of Rwanda

MPhil Supervisor

2014 - 2020 Mathew Mndeme

“Effectiveness of mHealth interventions for communicable-diseases surveillance in low-income setting: the case of Tanzania”,

University of Leeds

Lead supervisor (committee member after I left Leeds)

2015 - 2017 Alaa Abd-alrazaq

“Factors determining patient use of personal health information systems”

University of Leeds

Lead supervisor (handed over to colleague after leaving Leeds Nov. 2017)

2020 - 2021 Katherine Brown Brown University PhD student

Supervisor for elective project on clinical diagnostic decision support

#### Masters students supervised

- 2002 Darius Jazayeri, MEng MIT, “*TeleMedMail: A Store-and-Forward Telemedicine System for Developing Countries*”, published in Proc. Medinfo 2001.

- 2002 Agnieszka Szot, Harvard-MIT Health Science and Technology Program, “Evaluation of the diagnostic accuracy of a system for digitizing and transmitting CXRs for TB management”  
Published in IJMI
- 2003 Sharon Choi, University of Colorado, “*A Web-based Nurse Order Entry System for Multidrug-Resistant Tuberculosis Patients in Peru*”, published in Proc. Medinfo2004
- 2004 Elsie Hartley, City University, London, “Needs assessment for telemedicine in rural KwaZulu-Natal, South Africa”
- 2008 Foster Kerrison, University of Bath, UK, with distinction “*The impact of uncertain diagnostic results on responses to a decision support system for TB drug prescribing*”  
Published as a poster at AMIA Fall Symposium 2008
- 2014 Nseyo Kipilyango, University of Leeds, with distinction, “*User experience of electronic medical records in Tanzania*”
- 2016 Rodreck David, University of Leeds, with distinction, “*Modelling Prenatal Care Pathways at a Central Hospital in Zimbabwe*”, published in Health Services Insights (now junior Faculty)
- 2016 Alam Nafisa Muntaha, University of Leeds, “*Current Status of Electronic Health Record Systems in Public Healthcare Facilities in Dhaka Division, Bangladesh*” (now PhD graduate)
- 2016 Oscar Agoro, University of Leeds, with distinction, “*Barriers to using an electronic system for submission of pharmacovigilance reports to the national pharmacovigilance centre in Kenya. A survey among Pharmacists*”, published in JAMIA.
- 2017 Dea Indria, University of Leeds, with distinction, “*Clinicians perceptions of a telemedicine system: a mixed method study of Makassar City, Indonesia*”, published in BMC Medical Informatics and Decision Making.

#### Undergraduate thesis at Brown

- 2020 Sasha Raman, Brown University, *The Evaluation of Diagnostic Apps on Chest Pain: Informing Patient Use*. Poster presented at Society to Improve Diagnosis in Medicine annual meeting, Oct. 2021.

#### Current students supervised at Brown

- Gregory Cohan (MD’ 23) scholarly concentration biomedical informatics, working on the RIH Ada Symptom checker study (co-author on recent paper in JMIR mHealth, uHealth)
- Christopher Koehler (MD’ 22) working on RIH Ada Symptom checker study with Dr Ranney (co-author on recent paper in JMIR mHealth, uHealth)
- Ishaani Khatri (Undergraduate) TA for BIOL1575 working on symptom checkers
- Katie Brown (PhD program) working on diagnostic accuracy of Isabel diagnosis system for MI, (Poster presented AMIA Fall Symposium 2021)
- Chloe Kim (Undergraduate) studying information systems supporting maternal and newborn health in low income countries.
- Keyana Zahiri (Undergraduate) working on design of EHRs for neonatal care in low income countries
- Niki Kim (Undergraduate) working on a systematic review of studies of clinical prediction models in use in the care of HIV patients
- Daven Crossland (MPH student) will be working on the Ada symptom checker evaluation studies.

### Current PhD students at University of Leeds

I am acting as an external advisor for two PhD students at University of Leeds studying the OpenMRS EHR open source community.

- Sarah Bostan, thesis title: *“Contextual issues affecting the adaptation and implementation of OpenMRS eHealth systems in low and lower-middle income countries”*
- Matthew Knight, thesis title: *“Understanding Governance and Decision-Making in an Open Source Electronic Medical Record Development Community”*

### **Report of Local, National and International Invited Teaching and Presentations**

#### **National**

- 2000 Invited to present ideas for the use of information systems in healthcare in developing countries World Bank President James Wolfenson and the staff of the “Infodev” program. Washington, DC
- 2001 “eHealth in Developing Countries, the Future of Health Care?”, Conference chair  
Harvard International Development Group, Cambridge, MA
- 2001 The Future of Health Technology Meeting, Invited lecture  
MIT Media Lab, Cambridge, MA
- 2004, “Improving healthcare in developing countries with good information”, Invited lecture  
Harvard/MIT Hippocratic society meeting on International Health, Cambridge, MA
- 2004, “Essential features and functions of Electronic Patient/Health Care Information Systems for HIV Treatment, Invited speaker  
Global AIDS Program, HRSA HIV-AIDS Bureau , HRSA, Washington DC
- 2005, “Telemedicine in developing countries”, Invited plenary lecture  
Broadmed Conference, Telemedicine over Broadband, Boston, MA
- 2005, NLM Long Range Planning Panel 2; Health Information for Underserved and Diverse Populations in the 21st Century, Invited panelist and group leader  
National Library of Medicine, Washington DC
- 2006 “Using evaluation as a tool in scale up of ARV treatment”, Invited lecture  
Harvard School of Public Health, Boston, MA
- 2006 “Evaluation of medical information systems in developing countries”, Workshop organizer and lecturer  
Harvard University, Cambridge, MA

- 2008 “OpenMRS”, Invited lecture  
Decisions Systems Group, Brigham and Women’s Hospital, Boston, MA
- 2008 “OpenMRS electronic medical record system”, Invited lecture  
LDS Hospital, Salt Lake City, Utah , University of Utah, Utah
- 2008, "Open MRS: Components and Connections to Integrated Health Information Systems", Invited lecture  
Public Health Informatics Network Conference, Seattle, Washington
- 2009 ‘Role of collaborative development in eHealth in Africa’, Invited lecture  
7th Annual Public Health Information Network Conference, Atlanta, Georgia
- 2009 ‘AMIA Global Partnership for medical informatics training’, Workshop participant  
AMIA GPP Meeting, Washington, DC
- 2009 HST 939: ‘Designing and Sustaining Technology Innovation for Global Health Practice’, Invited lecture  
Harvard Medical School, Boston, MA
- 2009 “OpenMRS in Rwanda”  
“OpenMRS vision”, Conference organizer, speaker  
OpenMRS Developers and Implementers meeting, Harvard Medical School, Boston, MA
- 2009 “EMR systems to support healthcare improvement in developing countries and the role of OpenMRS”, Invited lecture  
Harvard School of Public Health, Boston, MA
- 2009 “The role of health facility based data collection in improving quality of care in developing countries”, Invited lecture  
Harvard Initiative on Global Health, Harvard Medical School, Boston, MA
- 2010 “The Role of Technology in Crisis Response: Lessons Learned from Haiti”,  
Invited plenary lecture  
Global Public Health and Technology conference, Harvard, Boston, MA
- 2010 “Should we implement eHealth systems in developing countries, what are the impacts?”,  
Invited plenary lecture  
Alumni Weekend, Harvard School of Public Health, Boston, MA
- 2010 Evaluation of ehealth systems in developing countries, Invited lecture  
Health Affairs Journal, National Press Club, Washington, DC (Rockefeller Foundation)
- 2010 ‘Telemedicine & mHealth in Haiti’, Invited lecture  
American Medical Association, Washington, DC, (AMA)

- 2010 Panel: ‘Biomedical informatics for global Health Information Exchange’, Invited panelist  
AMIA Annual Symposium, Washington DC
- 2010 Panel: ‘Open Source Solutions for Public Health Practice and Research’, Invited panelist  
AMIA Annual Symposium, Washington DC
- 2012 “Mobile Disease Detection, Invited lecture  
Digital Disease Detection Conference, Harvard School of Public Health, Boston, MA
- 2012 “Surveillance in resource poor settings”, Invited lecture  
Public Health Surveillance Course, Harvard School of Public Health, Boston, MA
- 2012 ‘Developing and strengthening the global supply chain for second-line drugs for multidrug-resistant TB: A workshop’, Invited speaker and panelist  
Institute of Medicine, Keck Center, Washington DC
- 2012 ‘Role and impact of eHealth systems in developing countries’, Invited speaker  
CDC Global AIDS Program, Atlanta, Georgia.
- 2013 “Mobiles for Public Health”, Invited speaker  
TechChange online course, Mobile Health Alliance, Washington DC
- 2013 “International Outreach to Low-income Nations and Crisis Sites”, Invited lecture  
Association of Medical Directors of Information Systems Fall Symposium, Boston, USA
- 2015 “Global eHealth Evaluation”, Lecture  
Global eHealth Course, MIT, Cambridge, MA, USA
- 2017 OpenMRS EHR, Invited plenary speaker  
University of Pennsylvania, Philadelphia, PA
- 2020 Global eHealth, Invited speaker  
Yale University, New Haven, CT (cancelled due to COVID-19)

### **International (2010 onwards)**

- 2010 “Using the OpenMRS electronic medical record system to strengthen health care delivery in Rwanda”, Invited lecture  
McGill University Global health Conference, Montreal, Canada
- 2010 “OpenMRS-TB”, Invited lecture  
WHO workshop on Recording and Reporting of MDR TB, Manilla, Philippines
- 2011 “Information systems to support MDR-TB management”, Invited lecture  
Seminar on Recording and Reporting of MDR TB, WHO, Geneva

- 2011 "Collaborative Development of Open Source Medical Record Systems in Developing Countries: The OpenMRS Experience", Invited lecture  
Unite for Sight Conference, Yale University, USA,
- 2011 2011 Public Health Informatics Conference, Global Workshop, Invited panelist  
Public Health Informatics Meeting, CDC, Atlanta, USA
- 2011 "Information systems to support MDR-TB management", Invited lecture  
WHO meeting on Recording and Reporting, Cairo, Egypt
- 2011 NIH consultative meeting on mobile health, Invited expert  
3rd Annual mHealth Summit, NIH , Bethesda, MD
- 2012 "A systematic review of eHealth systems in developing countries and practical examples", Invited lecture  
Oxford University, Oxford, UK
- 2012 "Role and impact of eHealth systems in developing countries", Invited speaker  
Unite for Sight annual conference, Yale University, New Haven, CT
- 2013 "Evaluation of mHealth systems", Invited session chair  
mHealth Alliance Evidence working group workshop, Zanzibar,
- 2013 "The OpenMRS open source EMR system", Invited lecture  
Leeds Institute of Health Sciences, University of Leeds, UK
- 2013 The Bellagio Call to Action on eHealth Evaluation, Invited lecture  
Medinfo2013, Copenhagen, Denmark
- 2014 "The Bellagio Call to Action on eHealth Evaluation", Invited lecture  
Dept. Population Health, Edinburgh University, Edinburgh, Scotland
- 2014 "Electronic Health Records", Invited session chair  
Leeds City Region International Health and Social Care Symposium, Leeds, UK
- 2015 "The OpenMRS EHR", Invited speaker  
Global Health Group, Oxford University, Oxford, UK
- 2015 "OpenMRS Ebola", Invited presentation  
Meeting on eHealth and Ebola, IRC, NY, NY, USA.
- 2015 "Global eHealth", Invited lecturer & panelist  
American Medical Informatics Association Symposium, San Francisco, CA

- 2016 Invited chair “Digital Healthcare Revolution: Harnessing NHS Technology”, Health technology conference, London, UK
- 2016 OpenMRS-TB, Invited speaker  
WHO Workshop on mHealth for TB-Tobacco in Egypt (declined due to teaching commitments)
- 2016 Invited attendee  
Opening meeting, All-Party Parliamentary Group on Personalized Medicine, Houses of Parliament, London, UK
- 2017 OpenMRS EHR, Invited speaker  
Imperial College of Medicine, MPH course, London, UK
- 2018 “Global eHealth Evaluation”, Invited speaker  
Tropical Medicine Group, University of Oxford, Oxford, UK (declined due to family health)
- 2019 EHRs for Maternal Child Health in Nigeria, Invited speaker  
Medinfo2019, Lyon, France
- 2019 Open source EHRs, Invited panelist  
Medinfo2019, Lyon, France
- 2019 “Collaborations in Global eHealth”, Invited panelist  
AMIA Fall Symposium, Washington, DC
- 2020 “Managing the Global COVID-19 Pandemic with Health Informatics – Successes and Challenges”, Invited speaker, American Medical Informatics Association International Webinar
- 2020 "Can electronic health record systems improve patient care, disease surveillance and research in low income countries?", Invited plenary lecture  
65th Annual Meeting of the German Association for Medical Informatics, Biometry and Epidemiology (GMDS). <https://www.youtube.com/channel/UCgunfQtV2Ba0tEdik2rRudw>
- 2020 “Role of evaluation in EHR implementation and use in low income settings”, Session organizer, speaker  
OpenMRS annual Meeting 2020, (virtual)
- 2021 “Data Science for Decision Support in the HIV Care Cascade”, Presenter  
OpenMRS annual Meeting 2021, (virtual)
- 2021 Setting up a community of practice for evaluation in EHR implementation and use in low income settings, Session organizer, speaker  
OpenMRS annual Meeting 2021, (virtual)

- 6/2022 “Performance, usability and safety of symptom checkers for emergency care”,  
Plenary speaker, CDT AI program annual meeting, University of Leeds, UK
- 10/2022 “The Legacy of Paul Farmer, the "World's Doctor": Health Information Technology in the  
Service of the Poor and Vulnerable”, Plenary speaker  
The Patient and the Practitioner in the Age of Technology, Providence, RI

## PUBLICATIONS LIST

Author order in biomedical informatics gives higher credit to first and last author positions. In some publications the level of responsibility for the work is evenly shared between several authors.  
*Key publications below are annotated for author responsibility or student involvement in italics.*

## BOOKS

**Global Health Informatics: Principles of eHealth and mHealth to Improve Quality of Care**  
Edited by Leo Anthony G. Celi, **Hamish S. F. Fraser**, Vipani Nikore, Juan Sebastián Osorio and  
Kenneth Paik. MIT Press, April 2017. ISBN: 9780262533201  
*I had equal responsibility for the editorial work, and co-authored two chapters.*

## BOOK CHAPTERS

1. **Hamish S F Fraser**, Darius Jazayeri, Patrice Nevil, Yusuf Karacaoglu, Fernee Léandre, Paul Farmer, Joia Mukherjee. [book chapter]. In: Joia S. Mukherjee, editor. The PIH Guide to the Community-Based Treatment of HIV in Resource-Poor Settings, Boston: Partners In Health; 2006 p. 155 - 169
2. Janise Richards, Gerald Douglas, **Hamish Fraser**. Global Public Health Informatics [book chapter] In Public Health Informatics and Information Systems, Editors J.A. Magnuson and Paul Fu, Jr. Springer, 2013.
3. “International Dimensions of Clinical Decision Support”, **Hamish Fraser**, Jeremy Wyatt. [Book Chapter] “Clinical Decision Support, 2nd Edition, The Road to Broad Adoption” Editor: Robert Greenes  
ISBN: 9780123984760, Academic Press, Elsevier, published April 2014
4. “Electronic Health Records”, Foster Kerrison and **Hamish Fraser**  
[Book chapter] Global Health Informatics: Principles of eHealth and mHealth to Improve Quality of Care, Celi, Fraser, Nikore, Sebastián, Paik, MIT Press 2017
5. “Monitoring and Evaluation”, **Hamish Fraser**  
[Book chapter] Global Health Informatics: Principles of eHealth and mHealth to Improve Quality of Care, Celi, Fraser, Nikore, Sebastián, Paik, MIT Press 2017
6. “OpenMRS the Open Medical Record System: Software, Community, Philosophy”, **Hamish Fraser**, Darius Jazayeri, Ellen Ball  
[Book chapter] Global Health Informatics: Principles of eHealth and mHealth to Improve Quality of Care, Celi, Fraser, Nikore, Sebastián, Paik, MIT Press 2017



7. Barry Bloom, Rifat Atun, Ted Cohen, Christopher Dye, Hamish SF **Fraser**, et. al. “Tuberculosis”. In: Disease Control Priorities (third edition): Volume 6, Major Infectious Diseases, edited by K. Holmes, S. Bertozzi, B. Bloom, P. Jha. Washington, DC, 2018: World Bank.
8. Janice Richards, Hamish SF **Fraser**, **Gerald** Douglas. Global Public Health Informatics [book chapter] In Public Health Informatics and Information Systems, Editors J.A. Magnuson and Brian Dixon, Jr. Springer, August 2020 ISBN 978-3-030-41215-9  
*I had the main role in updating this chapter*
9. **Hamish SF Fraser**, Taiwo Adedeji, Paul Amendola. “The importance of primary care records in low and middle income settings for care, resource management and disease surveillance” Chapter in ICT in Health 2021, Survey on the Use of Information and Communication Technologies in Brazilian Healthcare Facilities. p 273 – 295.  
[https://cetic.br/media/docs/publicacoes/2/20211124123911/tic\\_saude\\_2021\\_livro\\_eletronico.pdf](https://cetic.br/media/docs/publicacoes/2/20211124123911/tic_saude_2021_livro_eletronico.pdf)  
*This chapter in a national report reviews the state of primary care EHR systems as a key resource for improving primary care and disease surveillance.*
10. Jeremy C. Wyatt and **Hamish Fraser**. Health Information and Information Technology: The Path from Data to Decision. In: Making Health Systems Work in Low and Middle Income Countries. Sameen Siddiqi, Awad Mataria, Katherine D. Rouleau, Meesha Iqbal (editors) Cambridge University Press 2022 Dec 31:336.
11. Farah Magrabi, Kathrin Cresswell, and Hamish S.F. Fraser. International dimensions of clinical decision support systems. In: Clinical Decision Support and Beyond. Editors: Robert A. Greenes and Guilherme Del Fiol, Academic Press (Elsevier), February 2023, pp. 145-188

#### ORIGINAL PUBLICATIONS IN PEER-REVIEWED JOURNALS

*In health informatics first and last author position carries most weight.*

- 1) Kennedy RL, Burton AM, **Fraser HSF**, McStay LN, Harrison RF. Early Diagnosis of Acute Myocardial Infarction Using Clinical and Electrocardiographic Data at Presentation: Derivation and Evaluation of Logistic Regression Models. European Heart Journal, Vol. 17, August 1996, p1181 – 91
- 2) Kennedy RL, Harrison RF, Burton AM, **Fraser HS**, Hamer WG, MacArthur D, McAllum R, Steedman DJ, An Artificial Neural Network System For Diagnosis Of Acute Myocardial Infarction (AMI) In The Accident And Emergency Department: Evaluation And Comparison With Serum Myoglobin Measurements. Comput Methods Programs Biomed 1997 Feb;52(2):93-103
- 3) **Fraser HSF**, Kohane IS, Long WJ, Using the Technology of the World Wide Web to Manage Clinical Information. British Medical Journal, No 7094 Volume 314 Saturday 31 May 1997 P 1600-4
- 4) Long WJ, **Fraser HSF**, Naimi S, Reasoning Requirements for Diagnosis of Heart Disease. Artificial Intelligence in Medicine 10 (1997) pp. 5 – 24
- 5) Tsien CL, **Fraser HS**, Kohane IS. LRTree: a hybrid technique for classifying myocardial infarction data containing unknown attribute values. Research and Development in Knowledge Discovery and Data Mining. Wu X, Kotagiri R, Korb KB, Eds., Lecture Notes in Artificial Intelligence 1394. Berlin Heidelberg: Springer-Verlag 1998: 409-411.
- 6) Hauskrecht M, **Fraser HS**. Planning treatment of ischemic heart disease with partially observable Markov decision processes. Artificial Intelligence in Medicine, vol. 18, pp. 221-244, 2000
- 7) Wang SJ, Ohno-Machado L, **Fraser HS**, Kennedy RL. Using Patient-Reportable Clinical History Factors to Predict Myocardial Infarction. Comput Biol Med. 2001 Jan 1;31(1):1-13.

- 8) Lober WB, Karras BT, Wagner MM, Overhage MJ, Davidson AJ, **Fraser HSF**, Trigg LJ, Mandl KD, Espino JU, Tsui FC. Roundtable on Bioterrorism Detection: Information System-based Surveillance. *J Am Med Inform Assoc.* 2002 Mar-Apr;9(2):105-15.
- 9) Marques EP, Marin HF, Massad E, **Fraser H**, Ohno-Machado L. Training in health informatics in Brazil. *Stud Health Technol Inform.* 2002; 90:757-60
- 10) **Fraser HSF**, Long WJ, Naimi S. Evaluation of a Cardiac Diagnostic Program in a Typical Clinical Setting. *J Am Med Inform Assoc.* 2003; Jul-Aug;10(4):373-81
- 11) Fine AM, Wong JB, **Fraser HSF**, Fleisher GR, Mandl KD. Is It Influenza or Anthrax? A Decision Analytic Approach to the Management of Patients with Influenza-Like Illnesses. *Ann. of Emerg. Med.* 2004; 43(3): 318-328
- 12) Szot A, Jacobson F, Munn S, Jazayeri D, Nardell E, Harrison D, Drosten R, Ohno-Machado L, Smeaton LM, **Fraser HSF**. Diagnostic Accuracy of Chest X-rays Acquired Using a Digital Camera for Low-Cost Teleradiology. *Int. J. Med. Inform.* 2004; 73(1): 65-73
- 13) **Fraser HSF**, Jazayeri D, Nevil P, Karacaoglu Y, Farmer PE, Lyon E, Smith-Fawzi MK, Leandre F, Choi S, Mukherjee JS. An information system and medical record to support HIV treatment in rural Haiti. *BMJ* 2004 329;1142-6.
- 14) Laserson KF, Thorpe LE, Leimane V, Weyer K, Mitnick C, Riekstina V, Zarovska E, Rich ML, **Fraser HSF**, Alarcon E, Cegielski JP, Grzemska M, Gupta R, Espinal M. Speaking the Same Language: Treatment Outcome Definitions for Multidrug-Resistant Tuberculosis. *Int J Tuberc Lung Dis* 2005; 9(6):640-645.
- 15) **Fraser HSF**, Biondich P, Moodley D, Choi S, Mamlin B, Szolovits P. Implementing electronic medical record systems in developing countries. *Informatics in Primary Care* 2005;13:83-95
- 16) **Fraser HS**, Allen C, Bailey C, Douglas G, Shin S, Blaya J. Information systems for patient follow-up and chronic management of HIV and TB: a life saving technology in resource poor areas. *J Med Internet Res* 2007;9(4):e29
- 17) Blaya JA, Shin SS, Yagui MJA, Yale G, Soares CZ, Asencios L, Cegielski P, **Fraser HSF**. A web-based laboratory information system to improve quality of care of tuberculosis patients in Peru: design, implementation and evaluation methodology. *BMC Med Inform Decis Mak.* 2007 Oct 28;7(1):33
- 18) Blaya JA, Gomez W, Rodriguez P, **Fraser HSF** "Cost Analysis, Time-Motion Study, and Implementation Method of a PDA System for TB Laboratory Data Collection" *International Journal of Tuberculosis and Lung Disease*, 2008 Aug;12(8):921-7.
- 19) Mitnick CD, Shin SS, Seung KJ, Rich ML, Atwood SS, Furin JJ, Fitzmaurice GM, Alcántara F, Appleton SC, Bonilla C, Chalco K, Choi S, Franke MF, **Fraser HSF**, Guerra D, Hurtado RM, Jazayeri D, Joseph K, Llaro K, Mestanza L, Mukherjee JS, Muñoz M, Palacios E, Sánchez E, Bayona J, Becerra MC. Extensively Drug-Resistant Tuberculosis: A Comprehensive Treatment Approach. *N Engl J Med*, 359(6):563-74
- 20) Clifford GD, Blaya JA, Hall-Clifford R, Fraser HS Medical information systems: A foundation for healthcare technologies in developing countries *BioMedical Engineering OnLine*, 2008, June 11; 7:18
- 21) Blaya JA, Cohen T, Rodríguez, P, Kim J, **Fraser HSF** PDAs to collect tuberculosis bacteriology data in Peru reduce delays, errors, workload, and are acceptable to users: Cluster randomized controlled trial. *Int J Infect Dis.* 2009 May;13(3):410-8.
- 22) Seebregts CJ, Mamlin BW, Biondich PG, **Fraser HSF**, Wolfe BA, Jazayeri DG, Allen C, Miranda J, Baker E, Musinguzi N, Kayiwa D, Fourie C, Lesh N, Kanter A, Yiannoutsos C, Bailey C, The OpenMRS Implementers Network. *Int J Med Inform.* 2009 Nov;78(11):711-20].

- 23) Blaya J, **Fraser HS**, Holt B. E-health technologies show promise in developing countries. *Health Aff (Millwood)*. 2010 Feb;29(2):244-51.
- 24) Blaya JA, Shin SS, Yagui M, Yale G, Suarez C, Asencios L, Contreras C, Rodriguez P, Kim J, Cegielski P, **Fraser HSF**. “Electronic lab system reduces errors in National Tuberculosis Program: Cluster randomized controlled trial” *Int J Tuberc Lung Dis*. 2010 Aug;14(8):1009-15
- 25) Seebregts CJ, Mamlin BW, Biondich PG, **Fraser HSF**, Wolfe BA, Jazayeri D, Miranda J, Blaya J, Sinha C, Bailey CT, Kanter AS. Human factors for capacity building: lessons learned from the OpenMRS implementers network. *Yearb Med Inform*. 2010:13-20
- 26) Tierney B, Kanter A, Fraser HS, Seebregts C. A Toolkit For eHealth Partnerships in Low-Income Nations. *Health Affairs* 2010, 29;2: 268-273
- 27) Blaya JA, Shin S, Contreras C, Yale G, Suarez C, Asencios L, Kim J, Bayona J, Rodriguez P, Cegielski P, **Fraser HSF**. Full impact of laboratory information system requires direct use by clinical staff: Cluster randomized controlled trial. *J Am Med Inform Assoc*. 2011 Jan-Feb;18(1):11-6
- 28) Mitchell M, Hedt BL, Eshun-Wilson I, **Fraser HS**, John MA, Menezes C, Grobusch MP, Jackson J, Taljaard J, Lesh N. Electronic decision protocols for ART patient triaging to expand access to HIV treatment in South Africa: A cross sectional study for development and validation. *Int J Med Inform*. 2012 Mar;81(3):166-72
- 29) **Fraser HS**, Thomas D, Tomaylla J, Garcia N, Lecca L, Murray M, Becerra MC. Adaptation of a web-based, open source electronic medical record system platform to support a large study of tuberculosis epidemiology. *BMC Med Inform Decis Mak*. 2012 Nov 7;12(1):125. Epub
- 30) Piette JD, Lun KC, Moura LA, **Fraser HSF**, Mechael PN, Powell J, Khoja SR Impacts of eHealth on Outcomes of Care in Low and Middle-Income Countries: Where Do We Go from Here? *Bull World Health Organ*. 2012 May 1;90(5):365-72. Review.
- 31) Mirza M, Kratz M, Medeiros D, Pina J, Richards D, Zhang X, **Fraser HS**, Bailey C, Krishnamurthy R Building the Foundations of an Informatics Agenda for Global Health - 2011 Workshop Report *Online Journal of Public Health Informatics* Vol.4, No. 1, 2012: 1 – 20. Review
- 32) Mitnick CD, Franke MF, Rich ML, Alcantara Viru FA, Appleton SC, Atwood SS, Bayona JB, Bonilla CA, Chalco K, **Fraser HSF**, et al Aggressive Regimens for Multidrug-Resistant Tuberculosis Decrease All-Cause Mortality. *PLOS One*, March 2013, 8 (3): e58664
- 33) Kwan GF, Bukhman, AK, Miller AC, Ngoga G, Mucumbitsi J, Bavuma C; Dusabeyezu S, Rich M, Mutabazi F, Mutumbira C, Ngiruwera JP, Amoroso C, Ball E, **Fraser HS**, Hirschhorn LR, Farmer PE, Kamanzi E, Bukhman G. A Simplified Echocardiographic Strategy for Heart Failure Diagnosis and Management at District Hospital Level for sub-Saharan Africa. *J Am Coll Cardiol HF* 2013;1:230–6
- 34) Catalani, C., Philbrick, W., **Fraser, H.**, Mechael, P. and Israelski, D.M., 2013. mHealth for HIV treatment & prevention: a systematic review of the literature. *Open AIDS J*, 7, pp.17-41.
- 35) **Fraser HS**, Habib A, Goodrich M, Thomas D, Blaya J, Fils-Aime JR, Jazayeri D, Seaton M, Khan A, Choi S, Kerrison F, Falzon D, Becerra M. E-Health systems for management of MDR-TB in resource poor environments: A decade of experience and recommendations for future work. *Stud Health Technol Inform*. 2013;192:627-31.
- 36) Blaya JA, Shin SS, Yagui M, Contreras C, Cegielski P, Yale G, Suarez C, Asencios L, Bayona J, Kim J, **Fraser HS**. Reducing communication delays and improving quality of care with a tuberculosis laboratory information system in resource poor environments: a cluster randomized controlled trial. *PLOS ONE*. 2014; 9(4): e90110

*I am senior author on this study which was one of the largest and most rigorous randomized, controlled trials of an eHealth system in a low income country*

- 37) Kingkaew P, Glidewell L, Walwyn R, **Fraser, HS**, Wyatt JC. “Identifying effective components for mobile health behavior change interventions for smoking cessation and service uptake: protocol of a systematic review and planned meta-analysis.” Systematic Reviews journal (BMC) October 2017, SYSR-D-16-00350R1
- 38) Oza S, Jazayeri D, Teich JM, Ball E, Nankubuge PA, Rwebembera J, Wing K, Sesay AA, Kanter AS, Ramos GD, Walton D, Cummings R, Checchi F, **Fraser HS**. Development and Deployment of the OpenMRS-Ebola Electronic Health Record System for an Ebola Treatment Center in Sierra Leone. J Med Internet Res 2017;19(8):e294 doi:10.2196/jmir.7881  
*I am senior author on this key study of the very rapid development and deployment of OpenMRS for very high risk infectious disease.*
- 39) Agoro O, Kibira S, Freeman J, **Fraser HS**. Barriers to the Success of an Electronic Pharmacovigilance Reporting System in Kenya. An Evaluation Three Years Post Implementation. Journal of the American Medical Informatics Association 12<sup>th</sup> October 2017, DOI: 10.1093/jamia/ocx102  
*I am senior author on this study of pharmacovigilance in Kenya which on publication triggered a national discussion in the media in Kenya.*
- 40) Muinga N, Magare S, Monda J, Kamau O, Houston S, Fraser HS, Powell J; English M, Paton C. Case Study: Implementing an Open Source Electronic Health Record (EHR) System in Kenyan Healthcare Facilities. JMIR Med Inform. 2018 Apr-Jun; 6(2): e22.  
*This study assessed a version of OpenMRS developed for hospitals in India when implemented in Kenya and identified challenges and areas for improvement.*
- 41) Muinga N, Magare S, Monda J, English M, **Fraser HS**, Powell J, Paton C. Survey of Electronic Health Record (EHR) Systems in Kenyan Public Hospitals: A mixed-methods survey. BMC Med Inform Decis Mak. 2020 Jan 6;20(1):2. doi: 10.1186/s12911-019-1005-7.  
*This survey with colleagues from Kenya and Oxford revealed a highly active ecosystem of EHR development and implementation.*
- 42) Indria D, Alajlani M, **Fraser HS**. Clinicians Perceptions of a Telemedicine System: A Mixed Method Study of Makassar City, Indonesia. BMC Medical Informatics and Decision Making. 2020 Aug; 20(1), pp.1-8.  
*I am the senior author of this study on an important issue highly relevant today, carried out by a former MSc student from Indonesia*
- 43) Gilbert S, Mehl A, Baluch A, Cawley C, Challiner J, **Fraser HS**, Millen E, Multmeier J, Pick F, Richter C, Taylor P, Türk E, Upadhyay S, Virani V, Vona N, Wicks P, Novorol C. How accurate are digital symptom assessment apps for suggesting conditions and urgency advice?: a clinical vignettes comparison to GPs. 2020 Dec; BMJ Open, 10(12), p.e040269. doi: 10.1136/bmjopen-2020-040269  
*I was one of the designers of this large study of 8 symptom checkers by the Ada Health clinical research team. I acted as an independent guarantor of the study with full access to the data and analyses and the opportunity to revise and sign off on the final version.*
- 44) Kobayashi S, Falcón L, **Fraser H**, Braa J, Amarakoon P, Marcelo A, Paton C. Using Open Source, Open Data, and Civic Technology to Address the COVID-19 Pandemic and Infodemic. Yearbook of Medical Informatics. 2021 Apr 21.  
*The review with colleagues from the AMIA Open source working group highlights the importance of open source and open systems in the response to the COVID-19 pandemic. Each author highlighted specific areas – in my case use of OpenMRS and EHRs.*

- 45) David R, Evans R, **Fraser HS**  
Modelling Prenatal Care Pathways at a Central Hospital in Zimbabwe.  
Health Services Insights 2021; Volume 14: 1–13  
*A project by a former MSc student.*
- 46) Bai E, Song SL, **Fraser HS**, Ranney ML. A Graphical Toolkit for Longitudinal Dataset Maintenance and Predictive Model Training in Health Care.  
Applied Clinical Informatics. 2022 Jan;13(01):056-66.  
*This study includes two Brown undergraduate students*
- 47) **Fraser HS**, Mugisha M, Remera E, Ngenzi JL, Richards J, Santas X, Naidoo W, Seebregts C, Condo J, Umubyeyi A. User Perceptions and Use of an Enhanced Electronic Health Record in Rwanda With and Without Clinical Alerts: Cross-sectional Survey. JMIR Medical Informatics. 2022 May 3;10(5):e32305.  
*A key publication from the CDC funded evaluation study in Rwanda which I led*
- 48) Paton C, Braa J, Muhire A, Marco-Ruiz L, Kobayashi S, **Fraser H**, Falcón L, Marcelo A. Open Source Digital Health Software for Resilient, Accessible and Equitable Healthcare Systems. Yearbook of Medical Informatics. 2022 Jun 2.  
*I wrote a section on OpenMRS and role in disease surveillance and management*
- 49) Adedeji TA, **Fraser HS**, Scott PJ  
Implementing electronic health records in primary care using the theory of change: A Nigerian case study.  
JMIR Med Inform 2022;10(8):e33491. doi: 10.2196/33491  
*Work by a PhD student I supported which used the OpenMRS EHR system. I worked with him on the project and paper from 2019*
- 50) **Fraser HS**, Cohan G, Koehler C, Anderson J, Lawrence A, Pateña J, Bacher I, Ranney M. Evaluation of diagnostic and triage accuracy and usability of a symptom checker in an emergency department: observational study  
JMIR mHealth and uHealth. 2022;10(9):e38364  
*Key publication on the symptom checker work at Brown and Lifespan with 2 Brown Medical students as co-authors*
- 51) **Fraser HSF**, Zahiri K, Kim N, Kim C, Craig S  
The Global Health Informatics Landscape and JAMIA  
JAMIA 2023 *in press*  
*Keyana Zahiri is an undergraduate PLME student, Nichole Kim and Chloe Kim are undergraduate students at Brown*

#### ORIGINAL ARTICLES IN PEER REVIEWED CONFERENCE PROCEEDINGS

- 1) Long WJ, **Fraser HSF**, Naimi S, A Web Interface for the Heart Disease Program. Proc AMIA Symp, 1996, p. 762-6
- 2) Tsien CL, **Fraser HS**, Long WJ, Kennedy RL. Using Classification Tree and Logistic Regression Methods to Diagnose Myocardial Infarction. MEDINFO98, Seoul, Korea, Aug. 1998; Pt1:493-7.
- 3) **Fraser HSF**, Long WJ, Naimi S. Differential Diagnoses of the Heart Disease Program have better Sensitivity than Resident Physicians. Proc AMIA Symp; 1998, p 622-26

- 4) Ohno-Machado L, **Fraser HS**, Ohrn A. Improving Machine Learning Performance by Removing Redundant Cases in Medical Data Sets. Proc AMIA Symp.1998; p 523-27
- 5) **Fraser HSF**, Long WJ, Naimi S. New Approaches to Measuring the Performance of Programs that Generate Differential Diagnoses using ROC Curves and Other Metrics. Proc AMIA Symp. 2000;:255-9.
- 6) **Fraser HS**, Jazayeri D, Bannach L, Szolovits P, McGrath SJ. Telemedmail: free software to facilitate telemedicine in developing countries. Medinfo. 2001;10(Pt 1):815-9.
- 7) **Fraser HSF**, Jazayeri D, Mitnick CD, Mukherjee JS, Bayona J. Informatics Tools To Monitor Progress And Outcomes Of Patients With Drug Resistant Tuberculosis In Perú Proc AMIA Symp. 2002: 270-274
- 8) Choi S, Jazayeri D, Mitnick C, Chalco K, Pachao F, Bayona J, **Fraser HSF**. A Web-based Nurse Order Entry System for Multidrug-Resistant Tuberculosis Patients in Peru. Proc. Medinfo2004, 11: 202-206
- 9) **Fraser HSF**, Blaya J, Choi SS, Bonilla C, Jazayeri D. Evaluating the impact and costs of deploying an electronic medical record system to support TB treatment in Peru. Proc AMIA Symp 2006: 264-268. (**Recipient of the Homer Warner Award**)
- 10) Blaya J, **Fraser HSF**. Development, implementation and preliminary study of a PDA-based tuberculosis result collection system. Proc AMIA Symp 2006: 41-45
- 11) Mamlin BW, Biondich PG, Wolfe BA, **Fraser HSF**, Jazayeri D, Allen C, Miranda J, Tierney WM. Cooking Up An Open Source EMR For Developing Countries: OpenMRS – A Recipe For Successful Collaboration. Proc AMIA Symp 2006: 529-533
- 12) Allen C, Jazayeri D, Miranda J, Biondich PG, Mamlin BW, Wolfe BA, Seebregts C, Lesh N, Tierney WM, **Fraser HS**. Experience in implementing the OpenMRS medical record system to support HIV treatment in Rwanda. Stud Health Technol Inform. 2007;129(Pt 1):382-6.
- 13) Berger L, Jazayeri D, Sauveur M, Manasse J, Plancher I, Fiefe M, Laurat G, Joseph S, Kempton K, **Fraser HSF**. Implementation and evaluation of a web based system for pharmacy stock management in rural Haiti. Proc. AMIA SYMP. 2007:46-50
- 14) Blaya J, Yagui M, Contreras CC, Palma B, Shin SS, Yale G, Suarez CZ, **Fraser HS**. Using the e-Chasqui, web-based Information System, to Determine Laboratory Guidelines and Data Available to Clinical Staff. AMIA Annu Symp Proc. 2008 Nov 6:881.
- 15) Chiang CY, Mitnick CD, Bayona JN, **Fraser HS**, Shin SS, Becerra MC. Outcome of extensively drug-resistant tuberculosis. Int J Tuberc Lung Dis. 2009 Jun;13(6):794-5
- 16) Amoroso C, Akimana B, Wise B, **Fraser HSF**. Using Electronic Medical Records for HIV Care in Rural Rwanda. Stud Health Technol Inform. 2010;160:337-41
- 17) Waters E, Rafter J, Douglas GP, Bwanali M, Jazayeri DJ, **Fraser HSF**.
- 18) Experience Implementing a Point-of-Care Electronic Medical Record System for Primary Care in Malawi. Stud Health Technol Inform. 2010;160:96-100
- 19) Seymour RP, Tang A, DeRiggi J, Munyaburanga C, Cuckovitch R, Nyirishema P, **Fraser HSF**. Training Software Developers for Electronic Medical Records in Rwanda. Stud Health Technol Inform. 2010;160:585-9
- 20) **Fraser HSF**, Blaya J. Implementing medical information systems in developing countries, what works and what doesn't. Proc. AMIA Symp. 2010: 232-236.
- 21) Kobayashi S, Hannan T, Mun SK, Falcon L, Paton C, Marcelo A, **Fraser HS**, Phommavong C, Braa J, Lazuardi L. Free/Libre/Open Source Software and Open Data Workshop for Open Science. Proceedings of Medinfo2019, Lyon, France, 2019.
- 22) Adedeji T, Scott P, **Fraser HS**. How can we deliver the vision of electronic medical records to improve maternal and child healthcare in low- and middle-income countries? Proceedings of Medinfo2019, Lyon, France, 2019.

- 23) Eickhoff C, Floran Gmehlin F, Patel AV, Boullier J, **Fraser HS** DC3 -- A Diagnostic Case Challenge Collection for Clinical Decision Support ICTIR '19: Proceedings of the 2019 ACM SIGIR International Conference on Theory of Information Retrieval Sep. 2019 Pages 141–144 <https://doi.org/10.1145/3341981.3344239>
- 24) Craig S, Hübner U, Orenstein E, Mengchun G, Cullen T, **Fraser HS**. Global Health Informatics Collaborations: Practical Steps Towards Successful and Sustainable Partnerships. Proc. AMIA Symposium 2019
- 25) Li C\*, Chen E, Savova G, **Fraser H**, Eickhoff C. Mining Misdiagnosis Patterns from Biomedical Literature. AMIA Jt Summits Transl Sci Proc. 2020 May 30;2020:360-366. PMID: 32477656; PMCID: PMC7233073.

#### OTHER PEER REVIEWED PUBLICATIONS

- 1) **Fraser HSF**, McGrath JD. Information Technology and Telemedicine in Sub-Saharan Africa [editorial] BMJ. 2000 Aug 19-26;321(7259):465-6
- 2) **Fraser HS**, Coiera E, Wong D. Safety of patient-facing digital symptom checkers Lancet November 6th 2018.  
*This is a peer reviewed research letter in which I am lead author and includes a supplement providing a detailed analysis of the target research paper. This was a high profile publication in the UK, with 103 citations to date. Also quoted in a BBC Horizon documentary and many articles in the press.*

#### OTHER NON-PEER REVIEWED PUBLICATIONS

- 1) **Fraser HS**. Academic medicine: who is it for? Academic physicians are affected by specific failures of postgraduate training. BMJ. 2005 Feb 12;330(7487):363; discussion 363-4. [Letter]
- 2) Johnson OA, **Fraser HS**, Wyatt JC, Walley JD. Electronic health records in the UK and USA. Lancet. 2014 Sep 13;384(9947):954. doi: 10.1016/S0140-6736(14)61626-3. [Letter]
- 3) **Fraser HSF**, Wilson C, Clamp S. Limitations of Study on Symptom Checkers. JAMA Internal Medicine May 2017, Vol. 177, Number 5: P 740 [Letter]
- 4) **Fraser, H.** and Keshavjee, S.. Video-observed therapy for tuberculosis: strengthening care. 2019. The Lancet, 393(10177), pp.1180-1181.

#### PROFESSIONAL EDUCATIONAL MATERIALS OR REPORTS

- 1) 2005 Course syllabus and lectures for master's degree program in Medical Informatics at the University of Kwa-Zulu-Natal, Durban, South Africa.
- 2) 2006 Co-wrote course syllabus for distance learning modules introduction to medical informatics at University of South Africa.
- 3) 2009 Developed course material for medical informatics training program in Rwanda as part of the *E-Health Software Development Initiative* for which I was PI
- 4) 2011 Co-Wrote the “*Call to Action on Global eHealth Evaluation*”. Consensus Statement of the WHO Global eHealth Evaluation Meeting, Bellagio, September 2011 <https://www.ghdonline.org/tech/discussion/the-role-of-evaluation-in-global-ehealth/#artifact-detail-13682252>

- 5) 2012 Celi, Leo, Hamish Fraser, Peter Szolovits, and Ken Paik.  
*HST.S14 Health Information Systems to Improve Quality of Care in Resource-Poor Settings*, Spring 2012. (Massachusetts Institute of Technology: MIT OpenCourseWare), <http://ocw.mit.edu> (Accessed 01 May, 2013). License: Creative Commons BY-NC-SA
- 6) 2013 Developed one day course “*Effective eHealth and mHealth Evaluations in Low Resource Environments*”, tutorial held at Medinfo2013 in Copenhagen, DK, August 2013 and AMIA Fall Symposium 2015.
- 7) 2014 Lead author and lecturer for MSc level distance learning course “*Introduction to Global eHealth*”, Department of Population Health, Edinburgh University, Scotland
- 8) Co-Wrote “*Clinical Knowledge Management and Decision Support*” MSc level course, University of Leeds, UK
- 9) 2017 MITx MOOC “*Global Health Informatics to Improve Quality of Care*” <https://www.edx.org/course/global-health-informatics-improve-mitx-hst-936x> | (accessed 02/10/2017) co–author, lecturer
- 10) 2018 Wrote a semester length course which I teach at Brown University: *BIOL1575/2075 Evaluation of Health Information Systems*.

#### ABSTRACTS (selected)

- 1) Blaya J, Shin S, Yagui M, Asencios L, Vargas J, Suarez C, Yale G, **Fraser H**: Implementing and evaluating a laboratory information system to optimize the treatment of tuberculosis patients in Peru. Poster presentation at Medinfo2007, August 2007. **Second prize, best poster award**
- 2) Blaya J, Shin S, Yagui M, Yale G, Suarez C, Asencios L, **Fraser H**: Assessing effects of the e-Chasqui laboratory information system on accuracy and timeliness of bacteriology results in the Peruvian Tuberculosis Program. Poster presentation at the AMIA Annual Symposium November 2007. **Second prize, best poster award**
- 3) Kerrison F, **Fraser HS**. The impact of uncertain diagnostic results on responses to a decision support system for TB drug prescribing. AMIA Annu Symp Proc. 2008 Nov 6:949
- 4) Uwayezu G, Munyaburanga C, Gakuba R, Fraser HS. National roll out of the Rwanda OpenMRS electronic medical record to improve healthcare delivery. Proc. AMIA Fall Symp. Nov. 2013
- 5) Design and development of an EMR for Ebola Treatment Centers in Sierra Leone using OpenMRS. Jazayeri D, Oza S, Ramos G, **Fraser HSF**, Teich JM, Kanter AS, Ball E. 2015 Proc Medinfo2015, p 916
- 6) Richards J, **Fraser HS**, Talmond J. Evaluation Methods and Frameworks for Measuring Effectiveness and Impact of eHealth Systems Implementations in Low Resource Environments. Tutorial: American Medical Informatics Association Fall Symposium, San Francisco 2015
- 7) Mndeme M, Clamp S, Mirzoev T, **Fraser HS**.  
Implementation of mHealth Interventions in Low Income Settings: Overcoming the Risk for Prioritizing scaling over evidence. Informatics for Health 2017 (EFMI), Manchester, UK 24th - 26th April 2017
- 8) Paton C, Mndeme M, **Hamish Fraser HS**.  
Implementing E-Health Systems in Low-Income Countries.  
Informatics for Health 2017 (EFMI), Manchester, UK 24th - 26th April 2017
- 9) Abd-Alrazaq A, **Fraser HS**, Gardner P.  
Factors affecting patients’ use of electronic personal health records.



Informatics for Health 2017 (EFMI), Manchester, UK 24th - 26th April 2017

**Nominated for best poster prize**

- 10) **Fraser HSF**, Mugisha M, Richards J, Chelliah W, Ngenzi J, Gaju E, Umubyeyi A. A System for Monitoring Stability, Usage and Data Completeness in OpenMRS Electronic Health Records in Rural Rwanda. *Poster* presented at the AMIA Fall Symposium 2017
- 11) **Fraser HSF**. Evaluating the performance of a general diagnostic decision support system on case data from urgent cardiology admissions.  
AMIA Annu Symp Proc. Nov 2019
- 12) Bacher I, Mankowski P, White C, Flowers J, **Fraser HS**. A New FHIR-based API for OpenMRS. Poster presented at AMIA Clinical Informatics Conference, May 2021
- 13) Raman S, **Fraser HS**. Evaluation of Diagnostic Apps for Myocardial Infarction and Other Causes of Chest Pain: Informing Patient Use. Poster presented at the 14th Annual International Conference on Diagnostic Error in Medicine, October 2021  
*Ms Raman is a Medical student at Warren Alpert Medical School*
- 14) Brown CA, **Fraser HS**. How accurate is the Isabel diagnostic decision support system with patients presenting with acute symptoms of heart disease? Poster presented at the 2021 AMIA Fall Symposium  
*MS Brown is a PhD candidate at Warren Alpert Medical School*
- 15) Bacher I, Faulkenberry G, **Fraser HS**, Rasmussen L. Connectathon: Making Open-Source Global Health Systems Talk to Each Other. Workshop, 2021 AMIA Fall Symposium
- 16) Khatri I, **Fraser HS**, Bacher I, Madsen T  
Prediction Of Acute Cerebrovascular Events Based On Patient Reported Symptoms.  
Submitted to the American Stroke Association International Conference 2023.  
*Ms Khatri is a Medical student at Warren Alpert Medical School*

PUBLICATIONS SUBMITTED OR IN PREPARATION

Forthcoming

*See sections on book chapters and Journal articles*

Revise and resubmit

Brown KA, **Fraser SF**. How accurate is the Isabel diagnostic decision support system with patients presenting with acute symptoms of heart disease?

*This paper is undergoing additional data collection and analysis for re-submission to a journal. It is with a BCBI PhD student.*

Submitted for initial review

Raman S, **Fraser HS**. Evaluation of Diagnostic Apps for Myocardial Infarction and Other Causes of Chest Pain: Informing Patient Use.

**To be submitted to BMC Biomedical Informatics and Decision Making**

*This is based on Ms Raman's senior thesis at Brown, she is now a medical student at Warren Alpert Medical School*

**Fraser HS**, Mugisha M, Bacher I, Umubyeye A

Factors affecting data quality in OpenMRS electronic health record systems in 50 clinics in Rwanda.

Submitted to the Global Digital Health Forum 2022

*in first stage of submission for CDC review and sign off*

Work in progress

Fraser HS, Bacher I, Ranney M, Hilliard R. Evaluation of the diagnostic and triage accuracy and usability of a symptom checker app in Urgent primary care: observational study

*Data collection completed in January 2023, to be submitted to JAMIA*

***The following papers have to undergo CDC review before submission:***

Mugisha M, Ngenzi J, **Fraser HSF**, Richards J, Santas X, Umubyeyi A.

A qualitative study of the use of OpenMRS in clinics in Rwanda.

**To be submitted to JMIR Medical Informatics, March 2023**

Dreisen J, Mugisha M, Ngenzi J, Richards J, Santas X, Umubyeyi A, **Fraser HSF**. A study of the costs of developing, implementing and deploying an enhanced EHR system for HIV care in Rwanda.

**To be submitted to JAMIA,**

**Fraser HSF**, Mugisha M, Chelliah W, Ngenzi J, Gaju E, Richards J, Umubyeyi A

Monitoring stability, usage and data completeness in large scale OpenMRS Electronic Health Records deployment in rural Rwanda: an approach to automate process evaluation

**To be submitted to Applied Clinical Informatics**