ROAD2H China explainer briefing

What is ROAD2H?

ROAD2H is a collaborative research project led by Imperial College London, UK, with China National Health Development Research Center as the key partner in China. The other collaborators are King's College London, UK, and University of Belgrade, Serbia. The project is funded by the British government through the Engineering and Physical Sciences Research Council – Global Challenges Research Fund.

By the end of April 2020, the project will have developed methods and tools for *Learning Health Systems*, whereby routine healthcare data are utilized to generate continuous improvement in healthcare delivery. The ROAD2H project will focus on healthcare systems that are making great strides towards universal health coverage (UHC) through national health insurance schemes and integrated care. China and Serbia are collaborating as pilot sites.

The specific project objectives are to develop prototype, smart clinical decision support systems that integrate individual patient data with local, national and international clinical guidelines and pathways. These prototype systems will help to improve clinical decision making (diagnosis and treatment), initially for chronic obstructive pulmonary disorder (COPD) and chronic kidney disease (CKD), two major causes of death and ill health in China.

For the first time, ROAD2H combines cutting edge computing techniques such as argumentation (artificial intelligence) and optimization (operations research) – allowing conflicting clinical guidelines recommendations to be resolved whilst taking into account resource implications and patient preferences – together with the integration of hospital electronic health record (EHR) data and health insurance claims data, such as those from the National Rural Cooperative Medical Scheme in China. The project findings could have important policy implications in terms of harnessing the potential of eHealth and personalized medicine in China, whilst accelerating its transition towards UHC.

What ROAD2H means for policymakers and payers (health insurers)

ROAD2H will model key decision points within the disease pathways for COPD and CKD, incorporating cost-effectiveness considerations as well as broader, non-financial policy and other constraints. Whereas health technology assessment (HTA) traditionally compares the relative cost-effectiveness of two individual interventions (e.g. smoking cessation versus a specific drug for COPD), ROAD2H could be seen as a "macro HTA", whereby efficiency and quality are being optimized at various critical decision points for the given disease.

Since ROAD2H will provide optimised clinical decision support and collect realtime data on actual clinical decisions taken, clinicians will also be to encouraged to track deviations from the recommended course of action. Thus ROAD2H will provide a transparent way for policymakers and payers to monitor and benchmark healthcare provider and clinician performance against evidence-informed quality standards, ensuring that healthcare delivery is efficient and produces the greatest benefit for citizens.

What ROAD2H means for EHR vendors and healthcare providers

ROAD2H will *not* replace existing EHR systems in China healthcare settings. Indeed, ROAD2H depends on there being EHR architectures and routine collection of patient data. ROAD2H will

operate as an extension of EHR and clinical billing systems, matching knowledge extracted from patient data against a central knowledge base of clinical concepts, which will then be evaluated by explainable argumentation and optimization algorithms. No identifiable individual patient data will leave the local sites.

A similar system (TRANSFoRm) has already been developed and is being researched by Imperial College London for the purposes of improving clinical diagnosis in primary care. ROAD2H will extend that work by building in smart and explainable clinical decision support targeted at diagnostics and treatments for COPD and CKD in hospital settings.

The findings and methods of ROAD2H will be made publicly available, thus providing an opportunity for various vendors to utilize the project outputs and enhance their offering to their broader partners.

What ROAD2H means for clinicians and patients

ROAD2H will provide clinicians and patients with truly intelligent decision support systems. These will provide contextual guidance based on synthesizing all relevant data from evidence-based guidelines and pathways, experiences and outcomes of earlier patients receiving different treatments, contextual constraints (e.g. local policies, resource considerations), patient characteristics and history.

Many current automated decision support tools offer solutions without providing any insight into how the solution was generated and why it is best. Furthermore, current approaches to health economic modelling and optimization tend to focus on maximizing cost-effectiveness for the whole population, without justifying how such decisions would be meaningful at the individual level. It is critical that the clinician as well as the patient understands the reasoning behind computerized recommendations, so that a more informed choice can be made. Crucially, the decision support provided by ROAD2H will be *explainable* with a clear *provenance* trail, so that clinicians and patients can have confidence in why the decision support tool may recommend a particular course of action.