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iPhronesis: A big data analytics platform for personalized and precision medicine

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Healthcare and life sciences are generating BigData. Rising costs of healthcare has presented an opportunity for developing newer, robust healthcare models for efficient treatment, likelihood prediction such as patients presenting with vague symptoms, disease prevention by pre-clinical identification and personalized treatment options for patients. iPhronesis™ is an advanced BigData Analytics platform, built to address specific patient centric functions. iPhronesis™ delivers the true power of biomedical BigData by integrating disparate data sources such as EMR/EHR/genomics/imaging/scientific literature etc., both structured & unstructured, applying powerful analytics, some which are based on machine learning and Bio Natural Language Processing (Bio-NLP) tools enabling better understanding of data, discovering hidden relationships and presenting results with real evidences. iPhronesis™ allows users to choose from a series of domain specific workflows & processes, customizing each step and integrating with custom algorithms. Every workflow is publishable as APIs or presented to the user interface. When data such as EMR/EHR are combined with images or with genomics, it allows for generating patient longitudinal views, representing a complete patient/cohort profile, identifying patterns, which help identify risk factors, predict disease progression, accurate disease classification and efficacy of treatment such as drug dose modification, adverse side effect identification and effects with comorbidity, to name a few. As a platform, iPhronesis™ also integrates with mobile applications increasing patient engagement, retention and enabling organizations to proactively reach a wider audience with analytics based evidences.

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Pharmacogenetics (PGx) testing can help medical practitioners with drug prescription or treatment procedures in regards to more accurately predicting the starting dose, therapeutic dose, reduction in side effects and complications. It was demonstrated that PGx testing prior to prescribing psychotropic medication is associated with faster improvements in symptoms, reduction in adverse effects and health service costs. However, despite the accumulating facts that the implementation of PGx and personalized medicine can deliver effective therapy through prescriptions based on genetic profile, low acceptance and often complete rejection by medical practitioners are the main factors in preventing PGx clinical implementation. Blacktown Molecular Research Laboratory (former DHI) was established in 2005 and since that time has been involved in a broad array of projects in personalized medicine. Our experience in Pharmacogenetic implementation and data from the key current projects will be discussed: The 'General practitioners' awareness about individual responses to drugs' survey was conducted by WSU year 3-4 medical students. The results demonstrate the low awareness about drug interactions, individual responses to drug and PGx application between Western Sydney general practitioners. Metabolic outcome in patients attending a Clozapine clinic study is a cooperative project between the laboratory, endocrinologists and psychiatrists. The associations found between several genetic polymorphisms and clinical data will be discussed. Our data indicates that Norclozapine is probably involved in treatment outcome more than previously considered.

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