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An Example of eResearch: The Australian Schizophrenia Research Bank - ASRB

Schizophrenia, one of the most severe of mental illnesses, is characterized by complex clinical symptoms, cognitive deficits, and subtle structural brain changes that are only evident with sophisticated image analysis techniques. Twin, adoption and family studies suggest that there is a genetic contribution to the development of the disorder, but the physiological causes of schizophrenia are largely unknown [1]. With a prevalence of 4 per 1,000 [2], significant advances in the genetics of schizophrenia have been limited by the difficulty in achieving sufficiently large samples of patients and case-matched unaffected individuals, who have been well characterised in terms of clinical, cognitive and neuro-anatomical evaluations.

To overcome this limitation, a national coalition of researchers led by scientists based at the University of Newcastle and with the support of an NHMRC Enabling Grant is establishing the Australian Schizophrenia Research Bank (ASRB) [3]. This initiative is collecting clinical and cognitive assessments, genetic data and MRI brain scans in 4,000 individuals from NSW, VIC, QLD and WA: 2,000 subjects diagnosed with schizophrenia, and 2,000 healthy controls matched for age, gender and ethnic profile. This will enable research questions that require large sample sizes to be addressed by Australian researchers, particularly those who would not normally have ready access to clinical populations.

Active data collection, including the collection of clinical and neuropsychological data, MRI scans, and blood samples, commenced approximately 12 months ago (Q4, 2007) and will continue until Q4, 2011. Currently there are over 600 individuals in the database with 3,400 yet to be collected and entered. The ASRB has been implemented on a Sun Server with 14 terabytes of storage, using Globus style grid computing [4]. A rudimentary portal is provided through Globus (asrb.newcastle.edu.au), which permits clinical assessment data to be uploaded in XML form and stored in a POSTGRES database on the server [5]. It provides a simple tool for downloading a CSV file of clinical assessment data, but there is currently no way for researchers to obtain, for example, a spreadsheet of completed data sets or images held in the ASRB.

The project is currently working to make the ASRB more usable by providing a better web interface and additional data analysis tools. The web interface capabilities will include giving researchers access to MRI image data and the ability to tag the data with metadata for better search capability. Desirable data analysis tools include tools to define cohorts and perform statistical analysis.

Additionally, researchers are currently using time-consuming manual processes to prepare data and MRI images for analysis. The steps undertaken include removing identifying information from textual data, and for MRI images removing any identifying data, normalisation, determining the gyral pattern for the subject, mapping anatomical landmarks, and annotation. The ability to use automated processes, where available, to assist in data and image processing would be highly desirable, and provision for these capabilities is being built into the new infrastructure.

Development of the new ASRB central web presence, incorporating the web site, underlying database management system, and with accompanying re-working of the tablet-based Clinical.Assessment Software system, has commenced as a major development project conducted by the Intersect group (www.intersect.org.au). Intersect is the peak eResearch group for N.S.W Universities; its Foundation Members are The University of Sydney, The University of New South Wales, Macquarie University, The University of Technology Sydney, The University of Newcastle, Southern Cross University, and SIRCA Ltd.

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