National Disease Registration – Incorporation of Genetic Data

Dr Fiona McRonald, 4th July 2016
National Disease Registration (NDR) within PHE

- Chief Executive of PHE – Duncan Selbie
  - Chief Knowledge Officer (CKO) Directorate – Prof John Newton
  - National Disease Registration (NDR) Division – Dr Jem Rashbass

- National Cancer Registration and Analysis Service (NCRAS)

- National Congenital Anomalies and Rare Diseases Registration Service (NCARDRS)

- National Drug Treatment and Monitoring Service (NDTMS)
NCRAS

- Formed in 2013 by the merging of 8 regional cancer registries as part of a wider re-organisation of services into Public Health England.
- Made up of approximately 230 staff
Importance of Cancer Data

“We have the largest, most comprehensive and sophisticated national cancer registration service in the world: we collect data on cancer referrals, cancer screening, diagnosis and treatment, patient experience and outcomes and prevention activities such as the stop smoking campaigns and Be Clear on Cancer.”

Dr Jem Rashbass, Head of National Disease Registration and Cancer Analysis, May 2016

“Data is precious, and for many cancer patients is the only legacy they can leave behind. It should be of high quality, it should be stored carefully, and it should be available for researchers, to help ensure that it can bring maximum benefit to future generations.”

David Ardron, Chair, National Cancer Research Institute Consumer Liaison Group.
Uses of NCRAS Data

Incidence and survival statistics

Information dashboards to support NHS service commissioning

Reports to inform policy makers

Family history confirmation to support regional genetic counselling services
ENCORE: English National Cancer Online Registration Environment

- National Feeds (inc COSD indirect)
  - Chemotherapy Dataset (SACT)
  - ONS - Cancer and non-cancer deaths
  - Cancer screening programmes - Bowel, Cervix and Breast
  - National PET-CT imaging
  - National cancer audits - Lung, Head and Neck, Upper GI and Colorectal
  - Hospital Episode Statistics (HES)

- Cancer Waiting Times
- Radiotherapy Data (RTDS)
- Data from MDT software systems
- Pathology full-text reports

- Local Feeds (COSD direct)
  - Local imaging systems
  - Patient Administration Systems

- National Pilots
  - CRUK Stratified Medicine (Sept 2011)
  - Local clinical data systems
  - Recurrent / Metastatic Breast Audit Pilot

Registration Officers
NCARDRS and Rare Diseases

- Rare Diseases affect five people or fewer in 10,000 (EU definition)
- Collectively not rare (~1 in 17 people affected over lifetime)
- Estimated numbers ~ 3.5 million over entire UK, although no systematic efforts to collect these data
- Over 80% have a known genetic origin
- Diverse conditions (n=6000-7000); common difficulties:
  - delays in diagnosis
  - lack of clear care pathways
  - barriers to co-ordination of care between different specialities and agencies
  - transitioning from paediatric to adult care services
  - Current NHS clinical IT systems are not well set up to capture rare disease-specific information
The UK Strategy for Rare Diseases

- Published by UK Government in November 2013
- Developed by the UK Rare Diseases Stakeholder Forum
  - experts from government, healthcare, industry, research and academic sectors
  - representatives from charities and patient advocacy groups (Unique, Genetic Alliance, Rare Disease UK, Specialised Healthcare Alliance)

51 specific commitments, grouped into five themes:

- empowering those affected by rare diseases
- identifying and preventing rare diseases
- diagnosis and early intervention
- co-ordination of care
- the role of research

NCARDRS cuts across all these themes
NDR, PID and Section 251 Support

- Under Section 251 of the NHS Act 2006, the Secretary of State for Health can permit collection of patient identifiable data (PID) without first gaining specific consent from patients, as long as data transfer is for a defined medical purpose, in the public interest, and obtaining consent is impossible or impractical.
  - The Confidentiality Advisory Group (CAG) of the NHS Health Research Authority (HRA) advises the Secretary of State when to grant this permission
  - Data transfer is first agreed with each providing organisation’s Information Governance (IG) Team and Caldicott Guardian
  - PHE has very stringent IG arrangements in place for data security
  - Individual patients can opt out.
Section 251 consent model for NCARDRS

18. We believe that a consent based approach to collection of data for NCARDRS is not appropriate, and support an approach enabled by Section 251 of the NHS Act 2006.

Informed consent is the fundamental principle governing the use of patient identifiable information within health or social/community care research. It is recognised that there are situations where informed consent cannot be obtained. In England and Wales, Section 251 of the NHS Act 2006 (originally Section 60 of the Health and Social Care Act 2001) provides the statutory power to ensure that NHS patient identifiable information needed to support essential NHS activity can be used without the consent of patients. The power can be used only to support medical purposes that are in the interests of patients or the wider public, where consent is not a practicable alternative and where anonymised information will not suffice. Caldicott Guardians in Scotland and Medical Directors in Northern Ireland make decisions on the same basis.\(^3\)

Medical Research Council
Vision for NDR in the Genomic Era

Integration of genotype and phenotype data

ENCORE Local Feeds (from NHS Trusts)
- PAS
- Radiology
- Audit
- Pathology Reports
- COSD / MDT

ENCORE National Feeds
- Radiotherapy
- Chemotherapy
- Cancer Waiting Times
- ONS Deaths

Data Extraction
- Patient ID and Tumour Data
- Family history confirmation

NEW DATA FEEDS

Somatic Mutation Data

Germline Mutation Data

Molecular Pathology Labs

Regional NHS Cytogenetics and Molecular Genetics Labs

Regional NHS Clinical Genetics Services

(A similar set-up is also envisaged for NCARDRS)
Main genetic data work streams

• Somatic oncology testing for personalised medicine (e.g. EGFR mutations and ALK fusions in NSCLC; KRAS / NRAS mutations in colorectal ca; BRAF in melanoma etc.)
  • Look at provision, equity of access, commissioning structures (with CRUK)

• Cytogenetic data from prenatal diagnosis, and postnatal testing (and takeover of NDSCR)
  • Monitor accuracy / outcomes from Fetal Anomaly Screening Programme (FASP)

• BRCA1/2 germline mutation testing data
  • Support the BRCA Challenge, and establish a National Hereditary Cancer Registry (+ pilot for other rare disease molecular data)
Molecular Diagnostics in Oncology

• Increasing use of molecular diagnostics in the era of genomic medicine / personalised therapies

• Increasing need to audit and monitor the use of molecular diagnostic tests

• Access is currently patchy across the country – need to ensure equity

• Independent Cancer Taskforce report 2015:
  • molecular diagnostic tests should be offered on a more equitable basis, and should be nationally commissioned by NHS England.
  • use of molecular diagnostic tests should be added to the COSD dataset
  • Wider access to germline testing for BRCA1/2 mutations and Lynch Syndrome (HNPCC)
Cytogenetics data (NCARDRS)

- Trisomy data (old NDSCR): T21, 18, 13
  - Linkage with data from prenatal screening biochemistry labs
  - Data will enable calculations of false positives / false negatives from prenatal blood screening tests, and provide vital outcome data to the NHS Fetal Anomaly Screening Programme (FASP)
- Other cytogenetics* data
  - Microarray
  - Rapid aneuploidy testing (FISH, qPCR etc).
  - Specific FISH for microdeletion syndromes etc.
  - Other aneuploidies / chromosomal rearrangements
  - Will enable calculation of more accurate figures of the contribution of chromosomal aberrations to congenital anomalies

*(Including molecular techniques applied to cases that would have traditionally been studied by a cytogeneticist)
The BRCA Challenge

UNESCO HQ, Paris, May 2014

Aim: global, open sharing of data to facilitate BRCA variant interpretation

PHE have secured funding to develop algorithms for ‘pseudonymisation at source’, in order to support England’s contribution to the BRCA Challenge

Will enable mutation data to be collected on all BRCA-tested individuals. Data from people who are unaffected but have had a positive predictive test will remain anonymous. Data that matches a registered cancer patient will be re-identified and linked to the patient’s phenotypic record. All variant data will be submitted to the BRCA Exchange.
Collection of Genetic Data from Labs

- Data transfer via secure channels: NHS.net to NHS.net secure email transfer, or secure file transfer (SFT) protocols
- We will send a case definition and suggested data fields… but don’t worry about the finer details – just send us what data you have!
- We can accept data in any format (e.g. Excel, CSV, XML, text…). We will standardise data fields from different labs / different systems, using YAML mapping
- Mutation-focused approach – not looking to store WGS data… but which variant classes (pathogenicity scores) to include? (All, 1-5, for BRCA)
- Use of standard terminology / language: HGVS nomenclature for genetic mutation data. ISCN for cytogenetics. (Clinical Genetics – Universal deep phenotyping descriptors – HPO?)
- Somatic mutation data not always annotated well / consistently by mol path labs
Question for ACGS members…

• What data would you like to see in PHE’s National Disease Registers, and what questions might the registers help you to answer?

• What sort of feedback would you like from PHE regarding your data?

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