From Programme Development Grant to Programme Grant

Example of the ISDR programme

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University of Liverpool
Development Phase

• Funded by NIHR Programme Development Grant
• Preparatory work towards a 5 year NIHR Programme for Applied Research grant (£1.8M)
Burden of diabetes
The next “pandemic”

Diabetes Mellitus

currently  170 million
by 2030  366 million

More than 75% of patients who have had DM for more than 20 yrs will have some form of DR.

VISION 2020: The Right to Sight
Globally 75% of blindness is avoidable (preventable or treatable)
Screening

- digital photography through dilated pupils; grading by accredited technicians; 18,000/annum (Liverpool)
- large reduction in intermediate and advanced disease
Diabetic maculopathy

Clinically significant macular oedema

Advanced
Maculopathy treatment

macular grid laser  intraocular antiVEGF or steroid therapy
Background

• Currently all people with diabetes (PWD) are invited annually to photographic screening for sight threatening diabetic retinopathy (STDR)

• Most are at very low risk of developing STDR between appointments; a few are at high risk

• Replacing annual screening intervals with personalised risk-based intervals could cut costs and target resources more efficiently
Main Programme Grant Objectives

• Collate primary and secondary care patient data on diabetic retinopathy and its known risk factors in a data warehouse
• Use data to:
  – produce a ‘risk engine’ to calculate individual risks of developing sight threatening diabetic retinopathy (STDR) by defined time periods
• Use calculated risks to allocate risk-based screening intervals
• Undertake clinical trial comparing risk-based screening intervals with usual annual interval (safety and cost-effectiveness)
• Conduct qualitative research on the views of patients and professionals
• Undertake health economics analysis and modelling
Programme Development Grant
Objectives

• **Work Package 1:** Pilot the necessary data collection and linkage
• **Work Package 2:** Pilot the proposed risk engine
• **Work package 3:** Develop economic models for use within the main programme
• **Work package 4:** Undertake initial qualitative research on the acceptability to patients and professionals of risk-based screening intervals
Results of Programme Development Phase

Katharine Abba
Research Associate
Work Package 1 – data linkage between primary and secondary care

RLBUHT Dept Clinical Engineering and University of Liverpool Dept Eye and Vision Science
Data Flows – main programme

EMISweb (PCT)
- Practice, demographic and systemic risk factors

CIS-ORION (N=15,000) (Screening Programme)
- Demographic and Retinopathy grading (photography)
- Visual acuity

DIABOLOS (N ≈ 1,000) (Assessment Clinic)
- Demographic and Retinopathy grading (photographic and biomicroscopy)
- Visual acuity
- Systemic risk factors

Risk Factor Database (N=1,000) (Assessment Clinic)
- Retinopathy grading (biomicroscopy)
- Visual acuity
- Treatment

GUI interface N ≈ 4,000) (Hospital Eye Service)
- Treatment codes
- Clinic lists

Patient Management System (N ≈1,000) (Hospital Eye Service)

Data Warehouse

Interactive Risk Analysis
- Recommended Screen Interval

GP practices

Hospital Eye Service

Screening programme
Pilot Data Warehouse

- EMISweb, CIS-Orion and Diabolos linked for individuals by NHS number (checked with DOB).
- Patients were provided with information about the project through GP practices and offered the opportunity to opt-out.
EMIS Web

• Most Liverpool practices have EMIS Web
  – Data streamed to Liverpool PCT
  – Data shared with formal data sharing agreements
• 4 large GP practices participated in pilot
• 3% to 7% of patients opted out
• PCT provided data as c.s.v. files
• Sample size around 1,000 patients
Web Graphical User Interface (GUI)

• In design stage (TF)
• Records:
  – specific retinopathy and maculopathy features
  – logMar visual acuity
  – whether loss of visual acuity is due to DR
• Calculates retinopathy grades
• Links with database of St Paul’s patients, to automatically populate patient details based on RQ6 number
### Patient details:
- **NHS Number**
- **Surname**
- **Forename**
- **Date of birth**
- **Clinic date**

### Visual Acuity (logMAR)

<table>
<thead>
<tr>
<th></th>
<th>Right Eye</th>
<th>Left Eye</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unaided</strong></td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td><strong>Glasses</strong></td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td><strong>Pinhole</strong></td>
<td>+/-</td>
<td>+/-</td>
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<tr>
<td><strong>Best</strong></td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td><strong>Snellen Equiv</strong></td>
<td></td>
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</table>

### Liverpool Retinopathy Grading

<table>
<thead>
<tr>
<th></th>
<th>Right Eye</th>
<th>Left Eye</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>M</strong></td>
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<td></td>
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<tr>
<td><strong>P</strong></td>
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</table>

### ENSPDR Grading

<table>
<thead>
<tr>
<th></th>
<th>Right Eye</th>
<th>Left Eye</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HMA</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>CWS</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>VB/VR/VL</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>IRMA</strong></td>
<td></td>
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<tr>
<td><strong>NVD</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>NVE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FVP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PRH/VH</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Scatter PRP</strong></td>
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</tbody>
</table>

### Retinopathy and Maculopathy Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Right Eye</th>
<th>Left Eye</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mac Exudate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mac Oedema</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mac Laser</strong></td>
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<td></td>
</tr>
</tbody>
</table>

### Poor VA predominantly due to diabetic retinopathy?
- **RE**
- **LE**

### Ophthalmologist (initials)
- **Date of examination**
Summary

• Patient opt-out system was acceptable to most patients
• EMIS web, Orion and Diabolos data are accessible.
• GUI designed for later implementation in SPEU clinics.
Work Package 2 – pilot risk engine

• Work in progress!!
Work Package 3 – Health Economics Modelling

University of Nottingham Dept Health Economics
Model Development: Markov Model

• Markov models
  – Collectively exhaustive and mutually exclusive states
• States
  – Defined by health state
• Transition probabilities
  – The likelihood of moving from one state to another
• Costs/outcomes
  – Associated with time in each state
Markov Model (states)

<table>
<thead>
<tr>
<th>Level 0</th>
<th>10M0 / 20M0</th>
<th>No DR / Background DR</th>
<th>Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>30M0</td>
<td>Mild pre-proliferative DR</td>
<td>Screening (6 monthly)</td>
</tr>
<tr>
<td>Level 2</td>
<td>40M0 / 50M0 / M1 / UG / P1 / P2</td>
<td>Referable eye disease</td>
<td>General Clinic / Medical Retina Clinic</td>
</tr>
<tr>
<td>Level 3</td>
<td>60 / 70 / 71 / 72 / CSMO</td>
<td>Treatable disease</td>
<td>Vitrectomy / Laser / Intraocular injections</td>
</tr>
</tbody>
</table>
Summary

• Model developed
• Data requirements known
Work Package 4 - Qualitative research: acceptability to patients and health care staff

University of Liverpool Department of Health Services Research
Projects

• In-depth interviews with 15 patients, all of whom attended screening or St Pauls regularly
• Focus group with 10 SPEU consultant ophthalmologists
• Focus groups with 4 screening technicians
Patient interviews

– All understood screening was to ‘catch problems early’
– However many:
  • Did not know what they were being screened for (glaucoma, general wear and tear)
  • Did not understand that treatment would be needed before vision was lost
  • Confused screening with opticians eye examinations, or other appointments at St Pauls
– People attending St Pauls did not know whether they had been screened or not (2/2)
Patient interviews

– Screening a hassle or nuisance to people who are working
– ‘Only one day’, or even ‘something to do’ for retired people
– Screening staff pleasant but ‘can’t tell you anything’
– Seems completely separate from other diabetes care
Patient Interviews

• If variable interval screening were introduced:

  – Many would just accept ‘doctors know best’
  – Many would be glad to go to screening less often
  – Two expressed concern that their eyes might deteriorate more quickly than expected, two years might be too long
  – Many thought they would be worried if they were called back in earlier than one year, wondering what was wrong
  – Importance of information, to all people when new system introduced, and then especially for people who were allocated shorter recall intervals
Focus groups - themes

• Biggest problem is patients who do not go screening
• Human nature to only go to appointments when there is a problem (like with dentist)
• Patients often do not understand what the screening is for, blamed lack of education by GPs
• Worry about missing cases if something changes - need to reassess risk factors at one year and also have system of alerts e.g. pregnancy
• Good thing to put systemic risk factors into the equation – but could this info be used for more?
• The process needs to be tested before implementing
• New system may lead to more telephone enquiries by patients, impacting on clerical staff
Overall Themes

• Patients often do not fully understand the reasons for screening, even those who attend regularly

• There does not appear to be great resistance to variable interval screening, if accompanied by
  – adequate safeguards
  – high quality information

• Shorter screen intervals can cause anxiety

• Patient DNA rates are a big problem
Output

- Report to HTA
- Full application for Programme Grant for Applied Research (RP-PG-1210-12016)
  - Introducing personalised risk based intervals in screening for diabetic retinopathy: development, implementation and assessment of safety, cost-effectiveness and patient experience
  - £1939601
Result??
Programme Grant Application
Successful!!
Messages

• Writing committee helps define research questions and collaborators
• Long process with several iterations but binds group together
• Lengthy HTA report and responses to reviewers
• Finances tricky:
  – Complex definitions of support and service costs
  – Overheads – little support for universities