Current state of the art research in screening – using real screening data

Steve Aldington
Irene Stratton

Gloucestershire Retinal Research Group

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This presentation:

- 25 minutes
- 25 slides
- 5 projects, studies or trials
- 2 presenters

Why do we need more research?

- Over 3 million people with diabetes in the UK
- Although not the leading cause of vision loss in people of working age in the UK - it's still at least 2nd!
- Number of people with diabetes is increasing
  - Lifestyle risk factors
  - People (with diabetes) living longer
  - Children of women with gestational diabetes are at increased risk T2DM

Why do we need more research?

- Need to use money available for screening in more cost-effective ways
- Hospital Eye Services are increasingly over-worked
- How can surveillance clinics lessen the burden on HES?
- Grading thousands of ‘no-DR’ cases is boring
- Costly, time consuming and difficult (for those at low risk) to attend for yet another diabetes related appointment …

And or But

- Patients now at lower risk
  - Implementation of UKPDS and DCCT guidelines
  - Lower blood pressure and glucose levels (in UK at least)
  - Opportunistic screening for diabetes means some are getting diagnosed early
  - BP and glucose control not necessarily as good elsewhere
- Ethnicity
  - Research mostly done on white Caucasians
  - BME population appear to be at higher risk

Qualitative research

- Reasons for not attending
- Differences between GP practices
  - Things you can measure
    - Deprivation
    - Access to screening venues
    - Diabetes-related reasons (poor glucose or BP control)
  - Things you can’t reliably measure
    - Staff attitudes
    - Availability and effectiveness of patient (and staff!) education

Over to Irene for a while…

Some important examples of ‘real world’ screening data being used to inform research, which in turn should inform and improve screening provision

GP2DRS

What is it?

What the pilot found..?

National provision?

Local programmes using own methods

GP2DRS Board were assured that Glos and Kent pilots will happen at end of November

‘Two eyes twice’ model

i.e. 2 consecutive screens with no R2, R3 or M1

Group	First screen	Second screen
Lowest risk	R0 both eyes	R0 both eyes
	Mild NPDR one eye	R0 both eyes
	Mild NPDR both eyes	R0 both eyes
	R0 both eyes	Mild NPDR one eye
Intermediate risk	Mild NPDR one eye	Mild NPDR one eye
	Mild NPDR both eyes	Mild NPDR one eye
	R0 both eyes	Mild NPDR both eyes
	Mild NPDR one eye	Mild NPDR both eyes
High risk	Mild NPDR both eyes	Mild NPDR both eyes

Stratton IM, Aldington SJ, Taylor DJ, Adler AI, Scanlon PH.
A Simple Risk Stratification for Time to Development of Sight-Threatening Diabetic Retinopathy *Diabetes Care March 2013;36(3):580-585. Published ahead of print November 12, 2012, available from*: 10.2337/dc12-0625

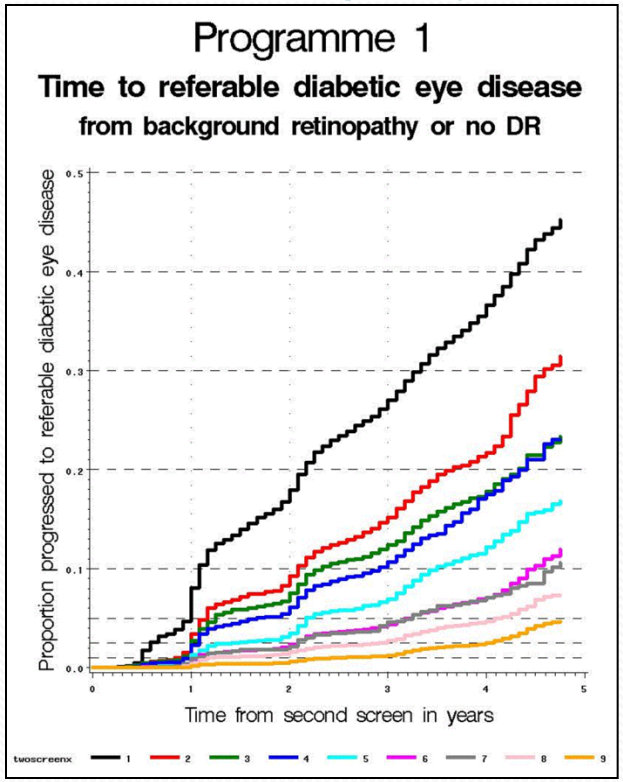
The ‘Four Nations’ Study

- Collaboration between UK four nations team
- Data from Scotland, Wales & NI plus 4 English programmes
- Grading results between 2005 and 2012
- Patients with R0 or R1M0 followed up for progression to referable and treatable retinopathy
- ~355,000 patients observed for up to 4 years during which ~16,000 patients progressed to referable retinopathy

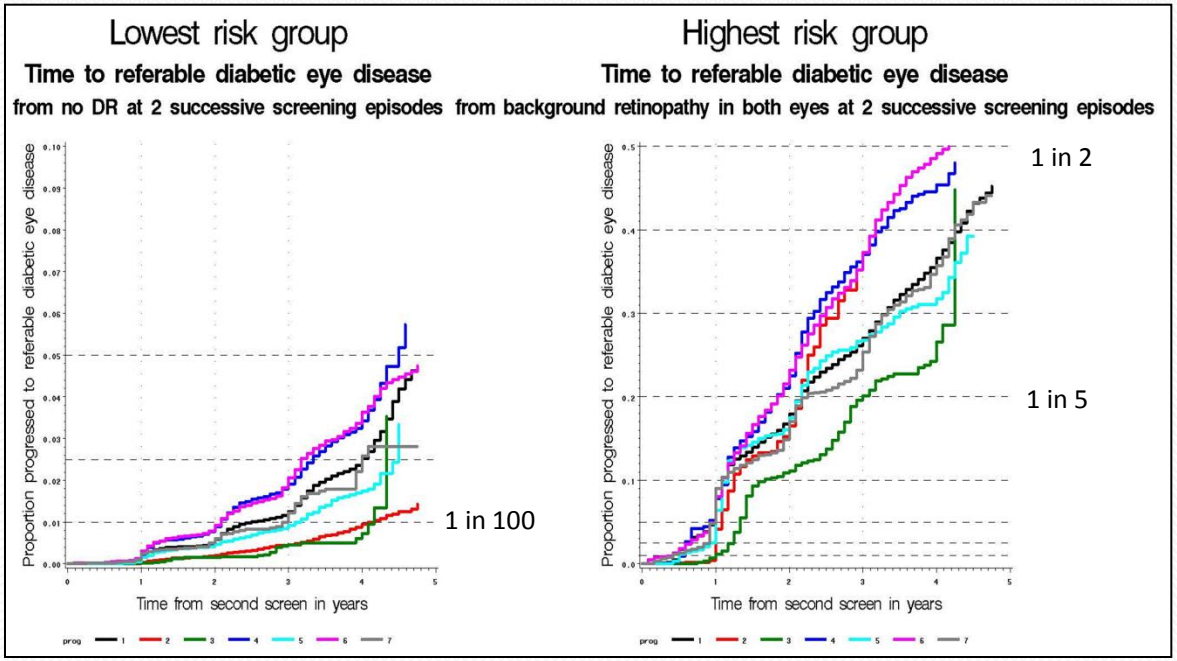
Leese GP, Stratton IM, Land M, Bachmann MO, Jones C, Scanlon P et al. Progression of diabetes retinal status within community screening programs and potential implications for screening intervals. *Diabetes Care. 2015 Mar;38(3):488-494. Available from:* 10.2337/dc14-1778

What did we find from 4-Nations Study?

Model discriminates well between risk groups



There are differences between screening programmes



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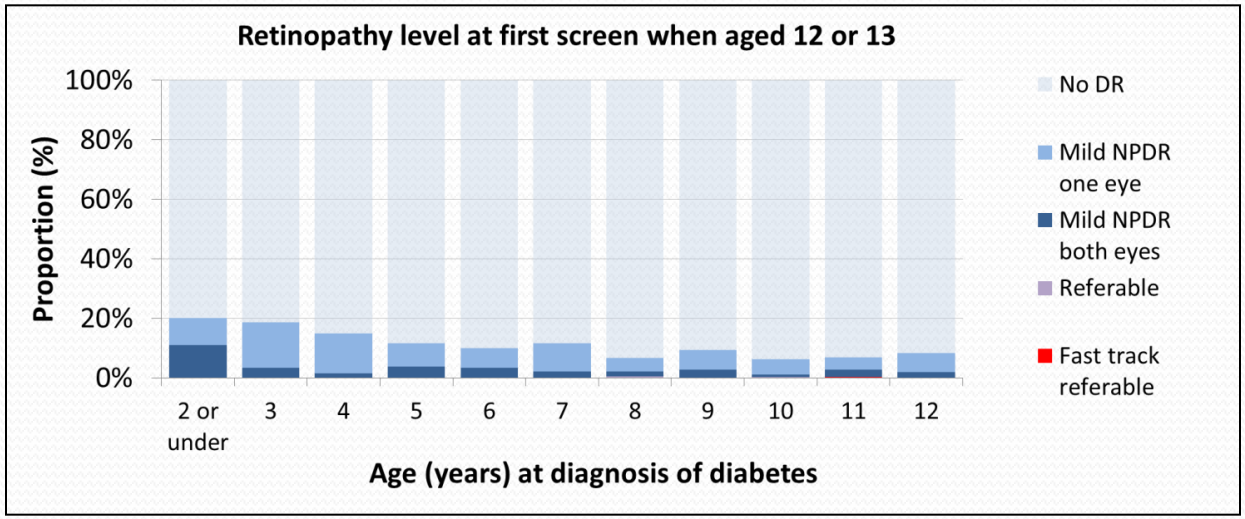
What else from 4-Nations Study?

- Delay in screening increases risk of DR
  - The people who fail to come for screening aren't same as those who attend
- Children and young people at very low risk



HTA 'Extended Screening Intervals' project

- HTA-funded 3-year project (10-66-01) looking at cost-effectiveness of 3 models to extend DR screening intervals:
  - One screening + clinical risk factor data
  - Two screenings
  - Two screenings + clinical risk factor data
- Data from Gloucestershire, Nottinghamshire, South London, East Anglia [and Chennai (India)]:
  - Data on 12,790 people with diabetes with known risk factors to derive the risk estimation models
  - From 15,877 to inform uptake of screening
  - From 17,043 to inform healthcare resource-usage costs

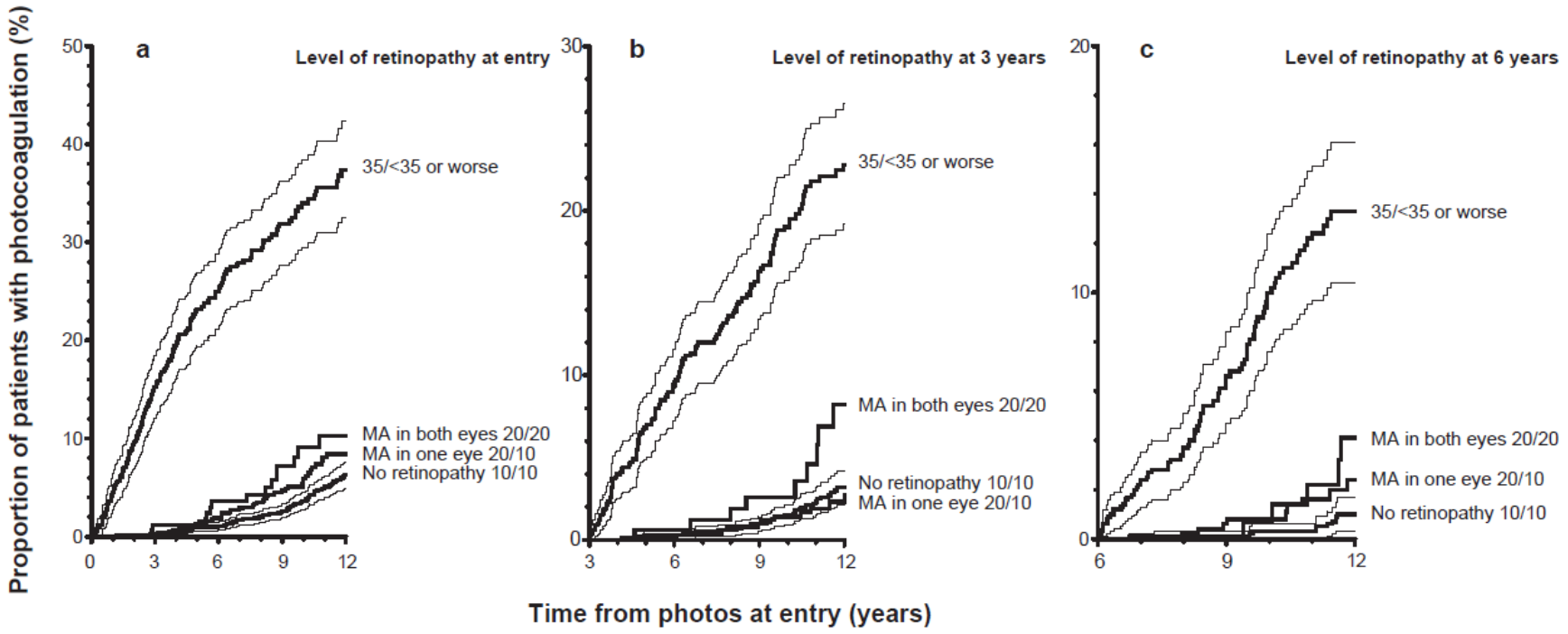
Scanlon PH, Aldington SJ, Leal J, Luengo-Fernandez R, Oke J, Sivaprasad S, Gazis, A, Stratton IM. Development of a cost-effectiveness model for optimisation of the screening interval in diabetic retinopathy screening. *Health Technol Assess 2015;19(74). Available from:* 10.3310/hta19740

What did we find from our HTA project?

- Each of the 3 risk models was similarly effective
- Important risk factors:
  - Baseline DR (and this is a 'whenever' baseline) – *see UKPDS*
  - HbA_{1c}
  - Duration of diabetes
- Annual screening was not cost-effective
- If everyone were to be screened at same frequency then 3-yearly was most cost-effective
- If variable (risk-based) frequency:
  - 2-yearly for high risk patients
  - 5-yearly for low risk patients

Brief aside to show one UKPDS slide…

Proportion of UKPDS patients who received laser treatment by DR at entry, 3 & 6 years



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ukpds

Kohner EM, Stratton IM, Aldington SJ, Holman RR, Matthews DR. UK Prospective Diabetes Study (UKPDS) Group. Relationship between the severity of retinopathy and progression to photocoagulation in patients with Type 2 diabetes mellitus in the UKPDS (UKPDS 52). *Diabetic Med 2001; 18(3):178-184*

What else from our HTA project?

- Grading errors can’t be ignored and influence how screening referrals work
- Most patients were white Caucasian but model seemed equally effective in programmes which included BME patients

Other recent publications identified from quick scan of literature

- Greater drops in HbA_{1c} in women during pregnancy associated with greater worsening of DR
- Those with R3 (PDR) more likely to have foot problems
- People with learning disabilities don't come for screening
- People with CFRD (40-50% of CF adults develop diabetes) – one third don't come for screening yet high rates of DR

Back to Steve…

We have showcased some important large projects and studies but more is being done and indeed needs to be done

Other avenues of research in DR

- Automated detection and grading in DR
- Vessel tortuosity
- Branching angles
- Contrast sensitivity
- Colour perception
- Multi-focal electroretinography (mfERG) changes
- New OCT (high-res, OCT-A, normative db for layers..)
- Adaptive optics
- Proteomics
- …..

Automated detection and grading

- Increasing number of software products
- They do work on standard and/or local test sets
- But almost always fail to work on routine images
- HTA study led by Adnan Tufail is comparing products on routine images from one London programme
- Crowd-sourcing?
- Neural networks: Kaggle competition & Benjamin Graham

Problems getting research done

- Incomplete demographic data:
  - Gender
  - Date of diagnosis of diabetes
  - Ethnicity and type of diabetes both poorly recorded
- Linkage with primary care data:
  - GP2DRS?
  - Though this has been achieved by ISDR project in Liverpool
- Linkage to HES and outcomes data

Problems getting research implemented

No system in place to scan papers and make new research visible to DESP / PHE or to local programmes

No system in place for sharing local initiatives with other programmes

Programmes do not have resources to follow research or horizon-scan

Programme staff may consider research to be ‘not real world’

Four Nations Research Group meets infrequently

Future

What do we clearly still not know?

- Acceptability of changing screening intervals
- Why do DR levels vary so much between programmes?
- Effectiveness of patient education
- What makes a good grader?
- Effects of increased uptake
- What do patients understand about ‘risk’?
- What would be the effect of removing need for mydriatic drops?

Thank you for listening

We may have any time for a quick question –

or grab us over lunch

(we lied – there were only 24 slides…)