Is biennial screening safe for people with type 1 diabetes without evidence of diabetic retinopathy

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Background

In 2016, the UK National Screening Committee and the American Diabetes Association changed their recommendations for the interval required between screening events for diabetic retinopathy (DR) from annual to biennial for those without evidence of DR at two consecutive screening events.[1,2] However, most of the evidence has been derived from mixed populations predominantly of type 2 diabetes.[3-5] In contrast, the evidence base for a change in screening intervals is more limited for those with type 1 diabetes.[6]

Aims

To assess the safety of changing the screening intervals from annual to biennial in people with type 1 diabetes without evidence of DR.

Methods

Diabetic Eye Screening Wales (DESW) is a community based National screening programme. DESW uses standardised and quality assured image capture and grading protocols. Following visual acuity testing, 2x45° digital retinal photographs per eye are captured after mydriasis with 0.5% Tropicamide. Data was extracted from the DESW (up to March 2013), anonymised and transferred to the Secure Anonymised Information Linkage (SAIL) databank. Once data is within SAIL it is available for linkage with other health and social care databases from primary and secondary care.

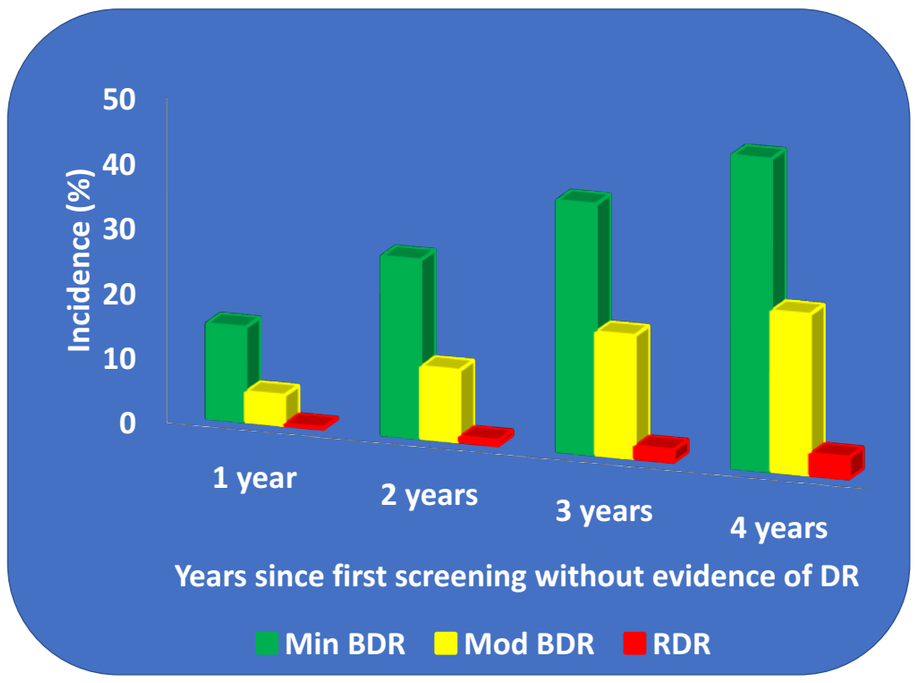
We conducted two studies, study (1) involved 3,525 persons with type 1 diabetes attending the Diabetic Eye Screening Service Wales (DESW) for the first time without evidence of DR with at least two screening events recorded. Study (1) extracted 1,232 subjects from study (a) having both DR grading and routinely collected primary care data i.e. glycaemic management (HbA_{1c}) and duration of diabetes.

The incidence of DR in these subjects was estimated using parametric survival analysis.

Results

Study (a) the estimated incidence of minimum background DR (BDR) was 14.5% at 1 year, 27.4% at 2 years, 38.5% at 3 years and 48% at 4 years (Figure 1). The corresponding results for moderate BDR were 4.6%, 11.0%, 18.9% and 24.7% and for referable DR were 0.2%, 0.8%, 1.9% and 3.3% respectively.

Figure 1: Incidence of minimum (min) and moderate (mod) background DR and Referable DR (RDR)



Study (b) for those with a HbA_{1c} of 6.0% incident referable DR at 2 years was <1.0% regardless of the duration of diabetes (Table 1). In those with HbA_{1c} of 8.0% the two year cumulative incidence of referable DR was <2%, the threshold considered safe for extending screening intervals. However, after a duration of 12 years the 3 year cumulative incidence of referable DR was higher than the threshold at 3.12%. Finally for those with HbA_{1c} of 10.0% and with a duration of diabetes >5 years the 2 year incidence of Referable DR exceeded the 2% threshold. In all HbA_{1c} subgroups the cumulative incidence of Referable DR increased with duration of diabetes over the 4 year period of observation.

Table 1: Incidence of Referable DR (RDR) by glycaemic management and duration of diabetes

		Cumulative incidence of RDR %			
HbA_{1c}	Duration of diabetes (years)	1 year	2 year	3 years	4 years
6.0%	0-5	0.03	0.09	0.17	0.28
	6-12	0.08	0.26	0.50	0.81
	>12	0.17	0.53	1.03	1.65
8.0%	0-5	0.09	0.27	0.53	0.86
	6-12	0.25	0.79	1.53	2.44
	>12	0.52	1.61	3.12	4.97
10.0%	0-5	0.27	0.83	1.62	2.59
	6-12	0.77	2.38	4.60	7.28
	>12	1.57	4.84	9.23	14.01

Discussion

In persons with type 1 diabetes with HbA_{1c} of 6% regardless of duration of diabetes, and those with a HbA_{1c} of 8% and a duration of diabetes ≤12 years, or a HbA_{1c} of 10% with a duration of diabetes ≤5 years the screening interval can safely be extended beyond annual.

However, in those with type 1 diabetes with a HbA_{1c} of 8% and a duration of diabetes of >12 years, or a HbA_{1c} of 10% and a duration of diabetes >5 years the screening interval should not be extended beyond two and one year respectively.

References

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