

QDiabetes® 2013

Annual Update Information

Revision History

Revision date	Document Version	Summary of Changes
01 May 2013	V1.0	First issue.

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1 Purpose of document

This document details the annual update for QDiabetes (2013) which are the 10 year Type 2 Diabetes risk prediction algorithms derived from the QResearch® database.

The annual update will be released in May 2013 and will go live on the QDiabetes related websites www.QDiabetes.org and www.qintervention.org on 01 May 2013.

Suppliers are invited to synchronise their implementation of QDiabetes (2013) on 01 May 2013 for consistency of implementation across the NHS and to minimise support calls regarding discrepancies.

For any questions please email support@clinrisk.co.uk

2 Rational for annual updates

Annual updates are required because of:

- **Changes in population characteristics** - for example, incidence of Type 2 diabetes is rising; prevalence of obesity is rising; smoking rates are falling;
- **Improvements in data volume and quality** - for example the recording of exposures and also clinical outcomes becomes more complete over time. This is especially true for recording of ethnicity data which is becoming more complete – it has almost doubles between 2009 and 2011.
- **Changes in requirements** for how the risk prediction scores can be used (such as the age range which it might be applied over or variables which might be included in the underlying model).

These factors require us to remodel the QDiabetes to the latest version of the QResearch® database each year to ensure the algorithm keeps up to date. If the algorithm is not re-calculated, then its performance would gradually decay and its clinical value would diminish as a result.

We have therefore re-fitted the algorithm using a two thirds sample of the QResearch® database (2012) and incorporated this into the annual update of the software.

3 Summary of Changes to QDiabetes (2012)

3.1 Change in age range

In 2011, the age range for QDiabetes changed from 25-79 years (which was used for the original model in 2009) to 25 to 84 years. The age range is now 25-84 years.

3.2 Re-calculation of coefficients

We have updated the coefficients for the QDiabetes (2013) algorithm using the latest version of the QResearch database (version 32). The main change to the coefficients is for ethnic minority groups where there is now more data on self assigned ethnicity available for modelling. For example, the previous model was based on data from 13,257 Indians compared with data from 31,136 Indians available for the 2012 model. The numbers of patients in each ethnic group are shown in the Appendix below. The more patients in each ethnic group available for modelling, the better the estimates will be. The overall effect has been to increase the weightings for ethnic minority groups so that risk estimates for patients in ethnic groups will tend to be higher than with the previous version of QDiabetes.

3.3 Change in categorisation of smoking status

In 2011, we changed the input parameter for smoking from a binary input (current smoker vs. not a current smoker) to 5 levels as follows

- Non smoker
- Ex-smoker
- Light smoker (<10/day)
- Moderate smoker (10-19/day)
- Heavy smoker (20+/day)

The precise definitions of smoking status are included in the accompanying revised search definition document and are the same as used in QRISK2[®]. The new categorisation of smoking status allows the score to give better risk estimations for patients especially ex-smokers (who were previously assumed to be the same as non-smoker) and also distinguish between current smokers as heavy smokers have higher risks than light smokers.

In practical terms, then the latest QDiabetes[®] (2013) algorithm will tend to give marginally higher scores for individuals who are heavy smokers and ex smokers compared with the same individuals using QDiabetes[®] (2011). It will also give marginally lower scores for non-smokers and light smokers.

3.4 Postcode table

We have included the annual update to the postcode-deprivation table.

4 Appendix:

4.1 Ethnicity

The next table shows the numbers of individual patients within each ethnic group available for deriving the original model and the annual updates. For most groups, the numbers had approximately doubled in 2012 compared with the original model published in 2009. Overall, there were 2.5 million patients in 2009 with 78,081 incident cases of diabetes arising from 16.4 million person years of observation. By 2012, there were 3.3 million patients, with 121,268 incident cases of diabetes arising from 24 million person years of observation. In 2009, there were 13,257 Indians with 445 of these patients developing type 2 diabetes arising from 59,662 person years of observation. By 2012, there were 32,136 Indians with 2,097 incident cases of diabetes and 161,784 person years of observation. Recording of ethnicity increased from 24% to 45% between 2009 and 2012.

Table 1 Numbers of patients in each ethnic minority group available for modelling, numbers of new cases of diabetes and person years.

	patients 2009	person years 2009	incident cases 2009	patients 2011	person years 2011	incident cases 2011	patients 2013	person years 2013	incident cases 2013
white	2,460,825	16,077,114	76,105	2,832,872	19,831,093	94,387	3,173,274	23,367,555	112,950
Indian	13,257	59,662	445	30,641	162,235	2,164	32,136	161,784	2,097
Pakistani	8,804	38,369	353	14,826	75,800	1,173	18,495	89,437	1,417
Bangladeshi	3,433	13,627	165	5,706	26,275	481	12,715	55,576	882
Other Asian	7,397	22,644	113	16,737	66,646	629	19,602	72,343	662
Caribbean	10,430	61,636	382	13,839	91,788	1,077	14,809	100,848	1,158
Black African	17,057	51,695	226	24,065	88,835	585	30,027	111,439	767
Chinese	4,328	16,150	54	7,541	31,925	203	10,280	41,241	219
Other	15,222	56,612	238	28,124	120,319	965	34,628	145,395	1,116
total	2,540,753	16,397,509	78,081	2,974,351	20,494,916	101,664	3,345,966	24,145,618	121,268

4.2 Trends in incidence rates of type 2 diabetes over time

The next table shows the trends in incidence of diabetes over time in men and women.

The highest rate was in 2004 for women and 2009 for men

	incident cases women	rate per 1000 women	95% CI	incident cases men	rate per 1000 men	95% CI
overall	54,448	4.39	(4.35 to 4.43)	66,820	5.69	(5.65 to 5.74)
1993	518	3.30	(3.03 to 3.60)	566	3.85	(3.55 to 4.18)
1994	595	2.71	(2.50 to 2.94)	661	3.22	(2.98 to 3.47)
1995	689	2.46	(2.28 to 2.65)	800	3.06	(2.85 to 3.28)
1996	820	2.37	(2.21 to 2.54)	1,071	3.30	(3.11 to 3.51)
1997	1,095	2.36	(2.23 to 2.51)	1,375	3.15	(2.98 to 3.32)
1998	1,484	2.78	(2.64 to 2.92)	1,817	3.60	(3.44 to 3.77)
1999	1,981	3.21	(3.07 to 3.35)	2,333	3.97	(3.82 to 4.14)
2000	2,871	3.96	(3.82 to 4.11)	3,432	4.98	(4.82 to 5.15)
2001	3,457	4.25	(4.11 to 4.40)	4,364	5.65	(5.48 to 5.82)
2002	4,284	4.94	(4.79 to 5.09)	5,038	6.10	(5.93 to 6.27)
2003	4,639	5.20	(5.05 to 5.35)	5,488	6.45	(6.28 to 6.62)
2004	4,821	5.40	(5.25 to 5.56)	5,692	6.70	(6.53 to 6.87)
2005	4,405	4.95	(4.80 to 5.09)	5,293	6.25	(6.09 to 6.42)
2006	4,160	4.74	(4.59 to 4.88)	5,132	6.16	(5.99 to 6.33)
2007	4,376	5.07	(4.92 to 5.22)	5,382	6.58	(6.41 to 6.76)
2008	4,051	4.77	(4.62 to 4.92)	5,141	6.40	(6.23 to 6.58)
2009	3,971	4.91	(4.76 to 5.06)	5,310	6.98	(6.80 to 7.17)
2010	3,734	4.86	(4.70 to 5.01)	4,784	6.65	(6.46 to 6.84)
2011	2,497	4.64	(4.46 to 4.82)	3,141	6.26	(6.05 to 6.49)

4.3 Validation statistics

We validated the QDiabetes® (2013) algorithm using a one third sample of the QResearch® database and found the statistical measures of accuracy (i.e. discrimination and calibration) are equivalent to those obtained QDiabetes® 2011 algorithm. The table shows measures of the performance of the scores i.e. how accurate the scores are at identifying high risk patients and distinguishing them from low risk patients and how much of the 'variation' in risk is explained by the scores themselves. High values for these measures are better than low values.

Table 2: Validation statistics for QDiabetes® for patients applied to the validation cohort.

		Women	Men
		Mean	Mean
QDiabetes (2010)	R ² (%)	49.9	47.5
	D statistic	2.04	1.94
	ROC value	0.852	0.836
QDiabetes (2011)	R ² (%)	50.4	48.1
	D statistic	2.07	1.97
	ROC value	0.853	0.837
QDiabetes (2013)	R ² (%)	50.5	48.1
	D statistic	2.08	1.97
	ROC value	0.854	0.838