# Comparison of tools to calculate cardiovascular risk in a Birmingham HIV population

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## Background

HIV infection has been associated with increased relative risk for cardiovascular disease (CVD). The North American Framingham equation overestimates cardiovascular risk (CVR) on a systematic basis in contemporary northern European populations. Whilst the same is true for HIV patients not on antiretroviral therapy, Framingham has been shown to underestimate CVR in HIV patients on antiretroviral therapy[1], women, former smokers and diabetics[2]. QRISK, which has been derived from a British cohort, who are younger and from a more diverse ethnic mix than Framingham, has not been assessed in the HIV population.

## Aims

To assess CVR in local HIV population and determine level of agreement between QRISK and JBS2 CVR tools.

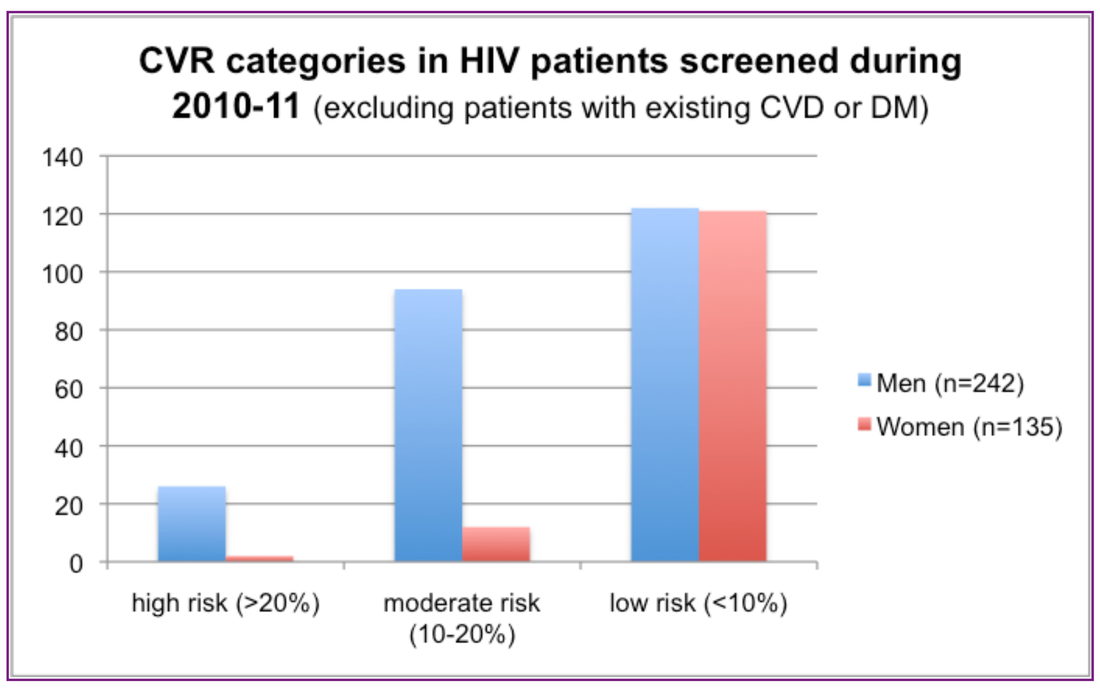
## Methods

Dietitians screened a convenience sample of 377 patients attending our HIV service for routine clinical care between 2010 and 2011 for risk of cardiovascular disease. Children, pregnant women, diabetics (n=10) and those with existing CVD (n=10) were excluded. Demographic and clinical data were collected. JBS2 (based on Framingham) and QRISK scoring systems were used for each patient to predict the 10-year risk of CVD. JBS2 calculated at age 50 years, rather than actual age, was trialled (pre DAD equation) as an adjustment factor in an attempt to account for underlying CV risk from HIV and antiretroviral therapy. Statistical analysis and Bland-Altman plots were performed using Stata (version 11.2).

## Results

The sample was found to be representative of the HIV cohort attending Heartlands HIV service with regard to demographic characteristics.

| Summary characteristics of study population, n= 377 | Mean, median, number | ±SD, (IQR), percent |
|---|---|---|
| Age (years) | 41 | ±9 |
| Male | 242 | 75% |
| Caucasian | 205 | 54% |
| African | 137 | 36% |
| CD4 (n=132) | 490 | (384, 675) |
| Family history of CVD | 79 | 21% |
| Current smokers | 99 | 26% |
| Total cholesterol (mmol/l) | 5.1 | ±1.0 |
| HDL cholesterol (mmol/l) | 1.3 | ±0.6 |
| Chol:HDL >6 | 57 | 15% |
| Cholesterol >5mmol/l | 199 | 53% |
| Triglycerides >1.7mmol/l | 152 | 40% |
| Systolic blood pressure (mm of Hg) | 129 | ±15 |
| sBP >140mm of Hg | 97 | 25.7% |
| BMI >30 | 70 | 19% |
| Not on ART | 107 | 28% |



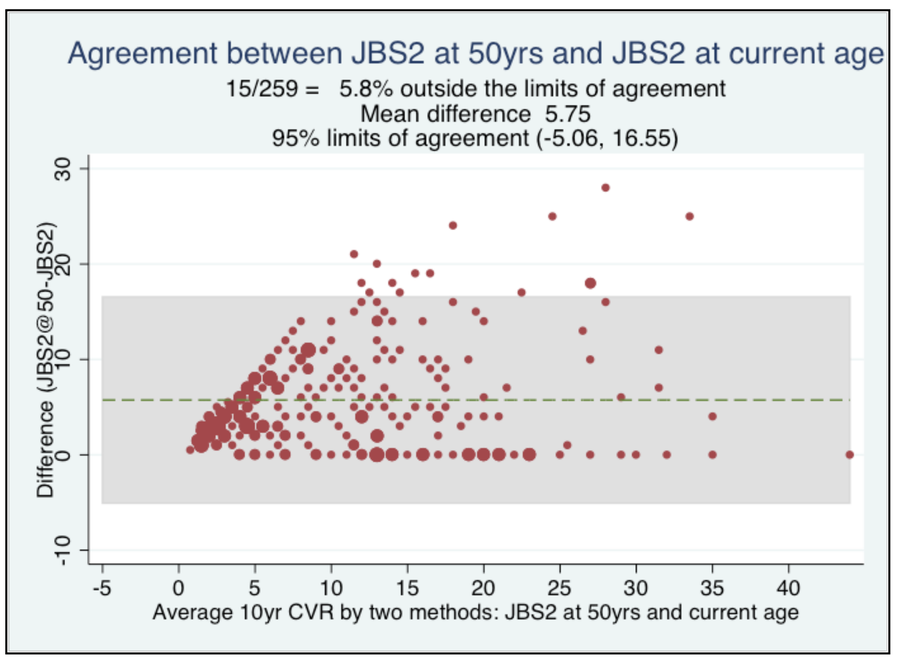

Prevalence of different CVR definitions

| CVR Score | Mean ± SD | CVR ≥10% n (%) | 95% CI |
|---|---|---|---|
| QRISK | 4.6 ± 6.1 | 59 (15.7) | 13.6 to 17.8% |
| JBS2 | 8.5 ± 7.8 | 133 (35.3) | 34.2 to 36.4% |
| JBS2 @ 50yrs | 13.7 ± 8.7 | 151 (61.4) | 60.2 to 62.6% |

Prevalence of high CVR (≥10%) varied between scores from 16-62%.

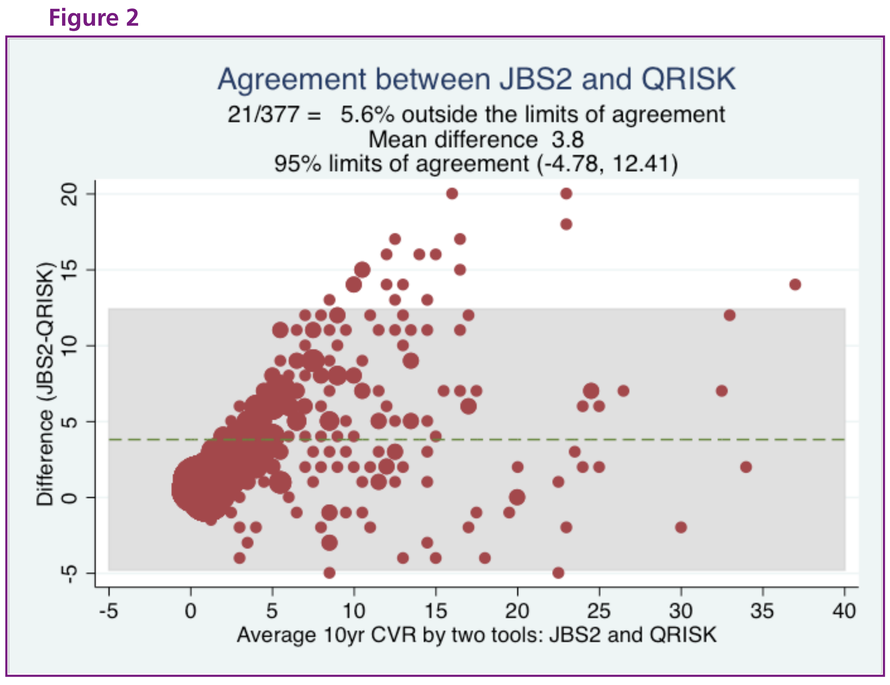
Bland-Altman plots revealed that the QRISK score predicted lower CVD risk as compared with the JBS2 equation at actual age or adjustment at 50 years. On average, the QRISK score was 3.8% lower than the JBS2 score and 9.3% lower than the JBS2 score at 50 years. The limits of agreement showed that the QRISK score could be as high as 12.4% above or as low as 4.8% below the JBS2 Score, with 94.4% of values within the limits of agreement, and as high as 5.2% above or as low as 23.8% below the JBS2 Score at 50 years, with 95% of values within the limits of agreement.

Figure 1



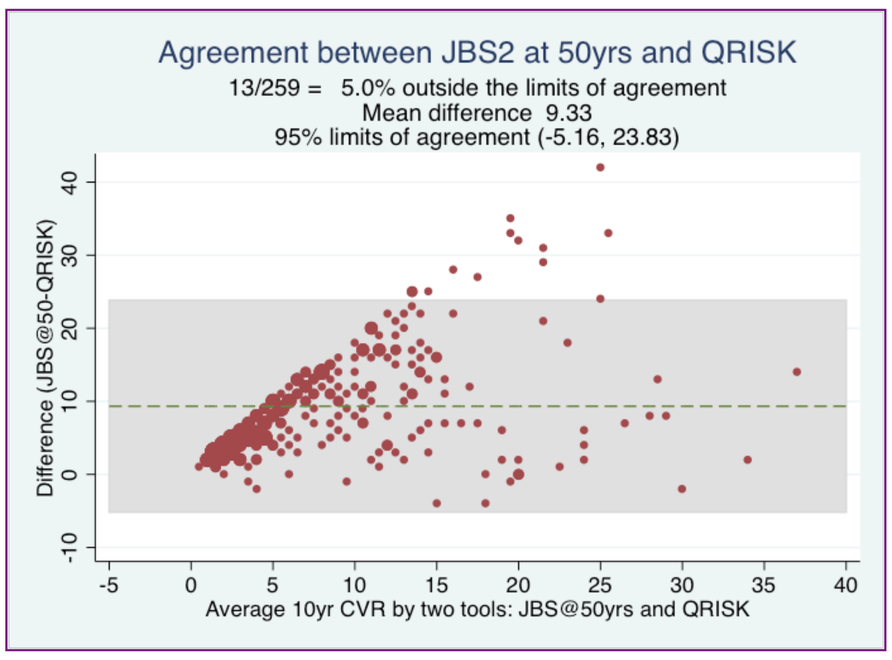

The Bland Altman plot shows the difference between the two CVR tools against their average, with the limits of agreement set at ±2 SD of the mean difference. In this plot, the values displaying difference between scores at zero indicate patients who are older than 50 years, and do not require age adjustment as their CVR is calculated at their current age. The outliers in the upper region are young patients aged between 20 and 30 years, who have many risk factors. Lifetime risk calculators may be useful for them.

Figure 2




The outliers in this plot tend to report either a low HDL-cholesterol or a very high cholesterol to HDL ratio. JBS2 appears to be weighted for low HDL cholesterol and produces a score considerably higher than QRISK when HDL is low or Chol:HDL is very high.

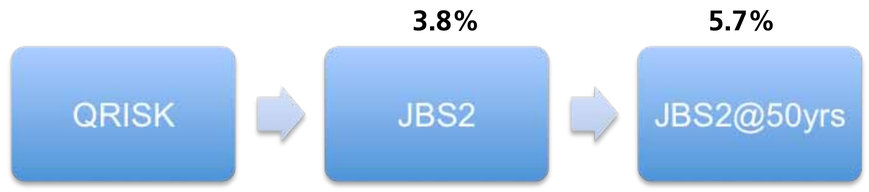
Figure 3




## Conclusion

**In this cohort 19% of men and 6% of women had JBS2 CVR of >20%, this is comparable with the general population in the UK where 20% of men and 6% of women have JBS2 CVR of >20%.[3]**

**The risk scores predicted by QRISK and JBS2 demonstrated moderate agreement, but differences were pronounced at high CVR. Comparison of these risk scores with the DAD calculator and CVD incidence is needed to validate their use.**

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