NHS

Screening Programmes

Fetal Anomaly

Measuring the NT and CRL as part of combined screening for Trisomy 21 in England

Manual for ultrasound practitioners

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Contents

Authorship

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Intended audience

This resource is aimed at ultrasound practitioners undertaking the measurement of Nuchal Translucency (NT) and Crown Rump Length (CRL) as part of combined screening for Trisomy 21.

Examples of the obstetric ultrasound practitioner:

- sonographers
- midwife sonographers
- practitioners in ultrasound
- radiologists
- obstetrician sonographers
- fetal medicine consultants
- student sonographers
- doctors in training
- any other professional who undertakes NT measurements

1 Introduction

Screening for Trisomy 21 (T21) is offered to all pregnant women in England and the main aims and objectives have been set out as a policy by the Department of Health since 2003. The remit to implement this and ensure that screening achieves its targets is directed from the NHS Fetal Anomaly Screening Programme (NHS FASP) under the auspices of the UK National Screening Committee (UK NSC).

The standard to be achieved is that the test should reach a greater than 90% detection rate for a 2% screen positive rate and the main method recommended is combined screening.[1] Combined screening includes measuring the human chorionic gonadotrophin (hCG) and Pregnancy Associated Plasma Protein–A (PAPP-A) in the maternal blood along with the measurement of the NT at the nape of the fetal neck and the fetal CRL.[2] The NT is performed between 11 weeks and 2 days and 14 weeks and 1 day of pregnancy, which equates to a CRL measurement of 45.0mm to 84.0mm.[1]

The key aim of the programme is to direct and assist with improvements to the screening test so that an optimum screening service can be provided. The standard that has been set is high and with this premise it is imperative that the ultrasound measurements are as accurate as possible. To assist the service in achieving the key aim this manual sets out:

- the practical process of obtaining accurate measurements
- the education and training process
- continuous professional development
- support recommended for those practitioners whose measurements fall within the red flag bias range
- the Down's Syndrome Screening Quality Assurance Support Service (DQASS)
- documentation to assist ultrasound departments with record keeping

From October 2010 to April 2012 NHS FASP funded a national education and training structure for England to support the ultrasound element of combined screening. The aim was to assist obstetric ultrasound practitioners to obtain the requisite theoretical and practical skills to contribute to a high quality local T21 screening programme for women. Improvements to the ultrasound measurements and therefore the screening test were clearly demonstrated during this time period. The Regional Obstetric Ultrasound Screening Coordinators (ROSCOs) were able to offer practical, hands-on assistance in the workplace to the local Screening Support Sonographers (SSS). This improved their knowledge and expertise to continue to improve and develop the ultrasound service further. The Regional Antenatal and Child Health Screening Team (RACHST) remain in place and available to support the SSSs on several levels, including the commissioning of any additional external training should this be necessary.

1.1 Consultation with practitioners

In January 2010, three large SSS workshops were held on consecutive days in the South, Midlands and North of England. A consultation exercise was undertaken to obtain the collective views of the SSSs attending the meeting. The consultation focused specifically on the feasibility of the proposed training and support structure and the amount of practical training required to develop competency in the measurement of NT. The SSSs present at the workshops welcomed the new structure and their collective comments assisted in the refinement of the original training and support model as well as the new training requirements.

In local organisations where an SSS has not been nominated, it is the responsibility of the superintendent to take on the role of the SSS of the department to ensure that staff have sufficient training and support to undertake T21 screening.

1.2 Pre-requisite training requirements

Ultrasound practitioners undertaking NT and CRL measurements for the combined screening test must hold a minimum of a Postgraduate Certificate in Medical Ultrasound (Pg. Cert.) or the academic equivalent.[2] For those health professionals who wish to undertake the measurement of NT and CRL as part of the combined screening test, a period of training and certification of competency in first trimester ultrasound scanning, which includes the measurement of NT and CRL, is acceptable. However, the focused course should be taught at masters level and externally assessed and must be provided by a university accredited by the Consortium of the Accreditation of Sonographic Education (CASE).

2 The NHS model for training in NT and CRL measurements

There are two components:

1. A theory component
2. A practical component

2.1 NHS model for training: theory component

Two online resources have been developed on behalf of NHS FASP which contain current recommendations on NHS policy and guidance on screening for T21. The theoretical modules include:

- Condensed Education Modules for Trisomy 21 (CEMT21) – for all health professionals involved in the screening pathway (this constitutes 60–90 minutes of learning time)
- NT training resource – a course for practitioners who wish to perform NT and CRL measurements as part of a local organisation combined screening programme for T21 (this constitutes 60–90 minutes of learning time).

Both resources must be undertaken prior to starting practical training and are available from: www.fetalanomaly.screening.nhs.uk/combinedscreeningresources.

It is recommended that these resources be reviewed as part of continuous professional development to ensure ultrasound practitioners remain abreast of any changes to guidance.

- CEMT21 resource reviewed 18–24 months
- NT training resource reviewed 12–18 months

2.2 NHS model for training: practical component

This training will be delivered by your local SSS or superintendent. Table 1 sets out recommendations from the consensus view from an SSS workshop and the ROSCO group for the minimum practical training requirements. Documentation to support this process is available in Appendix 1.

Table 1: Number of scans required

Number of scans/images/measurements	Action
1–5 scans	Observational practice
10–20 scans	Supervised/assisting performed with the SSS or deputy
3–5 images	Independently performed NT and CRL images jointly reviewed with the SSS against the FASP criteria
25 paired measurements	Sent to DQASS on the Excel diagnostic plot via SSS for assessment*

*Please see section 6 (page 15) for a full explanation of the DQASS function.

Documentation to support this is available to download at: www.fetalanomaly.screening.nhs.uk/sssresources.

A diagnostic plot self-assessment tool can be found on www.fetalanomaly.screening.nhs.uk/sss for practitioners to enter their 25 paired measurements. The ideal bias range to aim for is less than or equal to 0.10mm. However, measurements less than or equal to 0.40mm from the FMF reference curve are considered acceptable in terms of screening test performance. Ultrasound practitioners measuring within this range may commence screening independently. It is recommended that the training process should not take longer than six months. Diagram 1 (page 8) demonstrates an overview of the NHS FASP NT training cycle.

It is important to stress that competency to undertake NT scans cannot be assessed by DQASS alone. Competency requires the review of images and assessment of paired NT and CRL measurement distributions against the Fetal Medicine Foundation (FMF) reference curve; therefore a partnership between DQASS and the SSS and/or superintendent is vital to ensure a high quality T21 screening service.

2.3 How to obtain a DQASS training code

To commence practical training an ultrasound student or ultrasound practitioner new to performing NT measurements will require a unique identification (ID) number from DQASS. The SSS or superintendent should complete the DQASS notification form available at: www.fetalanomaly.screening.nhs.uk/sssresources and in Appendix 11. The completed DQASS notification form should be emailed to DQASS@plymouth.co.uk. They will issue a unique ID number with the suffix:

- "T" to indicate an ultrasound practitioner in training, e.g. 12345T or
- "X" for an ultrasound student in training, e.g. 23456X

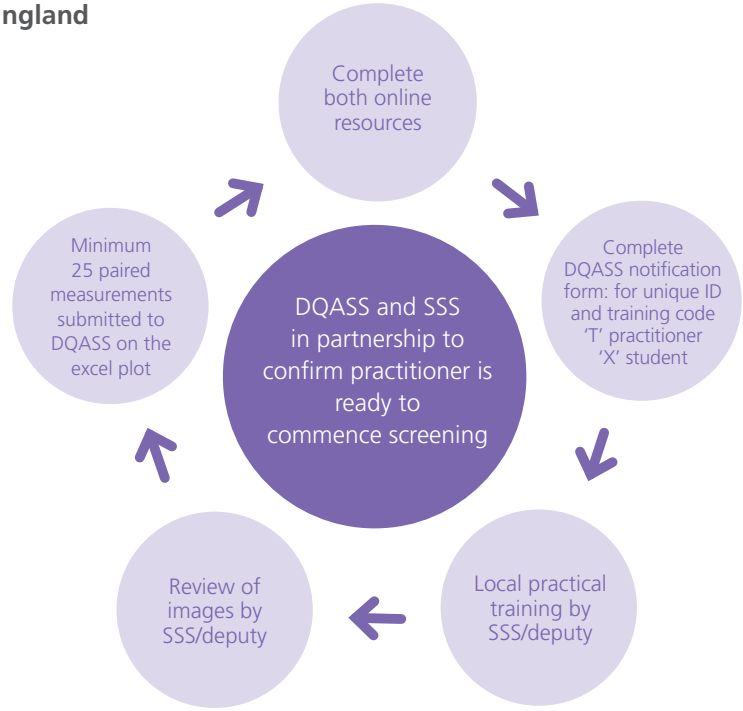
This unique ID number will be emailed to the SSS or superintendent. The additional training code "T" and "X" will remain valid for six months until the ultrasound practitioner being supervised has achieved satisfactory measurements assessed by:

1. The local SSS using the NHS FASP image guidance tool
2. Satisfactory distributions when assessed by DQASS against the FMF reference curve

This constitutes a partnership between DQASS and the SSS in the assessment of competency to undertake the NT and CRL measurements. Ultrasound students or practitioners new to performing NT measurements should use their unique ID and training code on the biochemistry form if their measurements are used to assess the risk of the pregnancy being affected by T21. **It is not necessary for the supervising practitioner to use their unique ID number on the biochemistry form, unless they have re-measured the NT and CRL**. It is recommended that the qualified practitioner supervising the scan should document their name on the ultrasound report along with the practitioner undertaking the measurements; however, this is at the discretion of the local screening provider.

Ultrasound students who achieve a satisfactory bias during their PG. Cert. course must continue to use the training code "X" and have supervised practice until they have gained their obstetric ultrasound qualification.

Diagram 1 Training cycle for practitioners new to NT measurement in England



2.4 Guidance for practitioners from overseas

Practitioners joining ultrasound departments from oversees who may be FMF accredited **will not** be able to use their FMF ID number in England. The FMF do not give their permission to use an FMF number in England obtained from a different country.

All practitioners from overseas must undertake the NHS training route to competency (see Section 2.0). This is to ensure delivery of a high quality screening test to women. To commence practical training in the measurement of NT as part of the combined screening test in the NHS, the ultrasound practitioner will require a unique ID number from DQASS (see Section 2.3).

If the ultrasound practitioner wishes to be FMF accredited they should complete the FMF online training and registration process with the FMF in England. If the ultrasound practitioner has decided to register with the FMF in England, this information, along with their England FMF ID code, should be made available to DQASS. This will avoid the practitioner being allocated two ID numbers (see Section 2.3).

2.5 Guidance for practitioners with a break in clinical practice

Experienced ultrasound practitioners will vary in experience, academic knowledge and previous level of training; it is acknowledged that training needs in relation to the acquisition of high quality NT measurements will vary.

It is recommended that ultrasound practitioners with a break in practice review both online theoretical resources upon return to work: CEM T21 and the NT training resource.

Practical support after a break in practice should be decided on an individual basis between the ultrasound practitioner and the SSS. This will be the normal process for any individual returning to clinical practice. It is best practice to document any discussion between the SSS and the ultrasound practitioner and decisions on training and support that may be required. Documentation to support this process is available at: www.fetalanomaly.screening.nhs.uk/sssresources and in Appendix 2.

2.6 Guidance for Screening Support Sonographers

It is desirable but not mandatory for the SSS to acquire and maintain FMF accreditation. It is best practice and advisable to maintain departmental records of any training delivered to colleagues, actions and outcomes of white, consecutive white and red flags. Documentation to support record keeping is available at: www.fetalanomaly.screening.nhs.uk/sssresources.

Table 2 Summary of training requirements

	Requirement	Desirable FMF online 11–13
Screening Support Sonographer (SSS)	1. Online NHS NT course. 2. Online NHS CEM T21 course 3. Image support with deputy SSS or superintendent 4. Use self-assessment diagnostic plot to monitor own distributions.	FMF online 11-13 week resource www.fetalmedicine.com/fmf/online-education/01-11-136-week-scan/
Practitioners experienced in NT measurement	1. Online NHS NT course. 2. Online NHS CEM T21 course. 3. Image support with SSS. 4. Use self-assessment diagnostic plot to monitor own distributions.	FMF online 11-13 week resource www.fetalmedicine.com/fmf/online-education/01-11-136-week-scan/
Practitioners experienced in NT measurement from overseas	1. Online NHS NT course. 2. Online NHS CEM T21 course. 3. A period of supported practical training. 4. Image support with SSS. 5. Use self-assessment diagnostic plot to monitor own distributions. 6. SSS to send 25 paired NT/CRL measurements to DQASS who will inform the SSS if the measurements are satisfactory in relation to FMF reference curve.	FMF online 11-13 week resource www.fetalmedicine.com/fmf/online-education/01-11-136-week-scan/
Practitioners new to NT measurement	1. Online NHS NT course. 2. Online NHS CEM T21 course. 3. A period of supported practical training. 4. Image support with SSS. 5. Use self-assessment diagnostic plot to monitor own distributions. 6. SSS to send 25 paired NT/CRL measurements to DQASS who will inform the SSS if the measurements are satisfactory in relation to FMF reference curve.	FMF online 11-13 week resource www.fetalmedicine.com/fmf/online-education/01-11-136-week-scan/
Ultrasound Student *	1. Online NHS NT training course. 2. Online NHS Condensed Education Module for T21 course (CEM T21). 4. Supported practical training. 5. Use self-assessment diagnostic plot to monitor own distributions. 6. SSS to send 25 paired NT/CRL measurements to DQASS who will inform the SSS if the measurements are satisfactory in relation to FMF reference curve. 7. Continual supported practice until qualification is completed.	

* Many English University Pg. Cert. CASE courses already contain the NHS FASP online theory resources as part of the student curricula. It is suggested as useful extra reading for those students who do not cover this within their core curriculum.

3 The Screening Support Sonographer role

The SSS role is pivotal to the success in meeting the national targets set out in the Model of Best Practice.[1] As well as supporting local training in ultrasound departments the SSS can assist their peers and colleagues with ongoing support to ensure improvements in practice can be achieved and maintained. The SSS is primarily involved in the oversight, training and support of colleagues in relation to the measurement of NT and CRL and receiving summary measurements bias reports twice a year on all ultrasound practitioners within the department. It is recommended that it is the responsibility of the SSS to disseminate these findings to ultrasound practitioners in a timely manner.

If the SSS is aware that an ultrasound practitioner has been assigned a white, consecutive white or red flag from DQASS it is strongly recommended they inform the appropriate manager. It is a requirement that those ultrasound practitioners whose measurements are within the red flag bias range or those not undertaking sufficient NT measurements be informed and have a supportive action plan. The SSS should liaise with the RACHST regarding actions taken, progress made and resolution, so that the appropriate stakeholders can be kept informed.

The NHS FASP recommends three paired NT and CRL images are reviewed every three months for those ultrasound practitioners participating in the local screening programme. This should ideally be undertaken by the SSS, using the NHS FASP criteria, and the NHS FASP image guidance tool. This can provide a consistent framework to support local image review and service improvements by providing identification of a range of acceptable cross-section views necessary to accurately measure the NT and CRL. The image guidance tool is available at: www.fetalanomaly.screening.nhs.uk/sssresources. Documentation to support the image review process is available in Appendix 9.

4 The Fetal Medicine Foundation NT accreditation process

The FMF is a world-renowned institution for research with a reputation for quality standards. Their online model of training and annual re-accreditation is used widely, both nationally and internationally.

Some local organisations and Commissioners of services have made a local decision to use particular risk calculation software (e.g. Viewpoint or Astraia). The software licensing agreement requires practitioners to be FMF accredited. It is recommended that **any practitioner new to undertaking NT measurement in the NHS should follow the NHS training route to competency**. If a FMF licence is required the practitioner should register with FMF to obtain their ID number and gain accreditation if necessary alongside the NHS FASP training competency route. The practitioner's SSS should send the completed DQASS notification form, including the practitioner's FMF ID number, to avoid duplication of ID numbers (see Section 2.4 and Appendix 11).

Please check your local organisational policy to see if you require FMF accreditation. The FMF do not give their permission for practitioners from overseas to use their FMF ID number in England (see Section 2.4).

5 NHS FASP criteria for measuring NT and CRL

Definition of NT

The NT is seen on ultrasound as a collection of fluid under the fetal skin behind the neck, which can be measured when the head and upper thorax of the fetus is seen in a mid-sagittal section, unflexed and in a neutral position, horizontal to the ultrasound beam and has a CRL measurement of between 45.0mm and 84.0mm.

Table 3 Recommended criteria for measurement of NT[4,6]

Criteria for NT	Detail
Image magnification	1. Image magnification should be such that the fetal head and upper throrax occupy the whole screen
Fetal position	1. A midline sagittal section of the fetus should be obtained 2. The fetus should be horizontal on the screen, either supine or prone*
Distinguishing between fetal skin and amnion	1. Care must be taken to distinguish between fetal skin and amnion
Fetal attitude	1. The fetus should be in a neutral position, with the head in line with the spine
Maximum nuchal thickness	1. The widest part of the translucency must always be measured 2. The umbilical cord may be around the fetal neck in about 5% of cases. In such cases... it is more appropriate to use the average of the two measurements
Calliper placement	1. Measurements should be taken with the inner border of the horizontal line of the callipers placed ON the line that defines the NT thickness. The crossbar of the calliper should be such that it is hardly visible as it merges with the white line of the border, not in the nuchal fluid 2. In magnifying the image (pre- or post-freeze zoom) it is important to turn the gain down 3. During the scan more than one measurement must be taken and the maximum one that meets all the criteria should be recorded 4. This image must be retained in the patient record

*This differs from FMF criteria as NHS FASP does not recommend screening for nasal bone absence or hypoplasia, thus allowing measurement of the NT with the fetus in the prone position.

Definition of CRL

A mid-sagittal section of the whole fetus, unflexed and in a neutral position, horizontal to the ultrasound beam, and measured using linear callipers, in which the end points of the crown and rump are clearly defined.

Table 4 Recommended criteria for measurement of CRL[3,5-7]

Criteria for CRL	Detail
CRL range in mm	45.0 - 84.0mm
Image magnification	The magnification of the fetus is made as large as possible before the image is frozen, to clearly demonstrate the entire crown rump length
Fetal position	A midline sagittal section of the whole fetus should be obtained, ideally with the fetus horizontal on the screen so that the line between crown or rump is at 90° to the ultrasound beam
Fetal attitude	Neutral position with fluid visible between fetal chin and chest. Neither hyper-extended nor flexed
Three measurements	The best of three measurements should be taken. Record/archive the image that meets all the criteria
Linear CRL measurement	Linear callipers should be used to measure the maximum un-flexed length, in which the end points of crown and rump are clearly defined
Calliper placement	Intersection of callipers (+) placed on the outer margin of skin borders of the fetal crown and rump

5.1 Measuring the NT and CRL to one decimal place

The NHS FASP has explored the feasibility and reliability of measuring and reporting the NT and CRL measurements to greater than one decimal place. A decision has been made taking into account all factors and in the interests of a consistent, standardised and safe practice, practitioners should follow the NHS FASP guidance to measure and report both the NT and CRL measurements to one decimal place. It is recommended that any ultrasound equipment with the capability to display measurements to more than one decimal place be set to display the measurements to one decimal place. Applications specialists from ultrasound companies will be able to assist with this. If it is not possible to set the ultrasound machine to display the measurement to one decimal place, practitioners should observe the following guidance if the rounding of numbers from decimal places of greater than one is necessary.

Table 5 Instructions on rounding decimal places

Actual NT measurement displayed	NT to report rounded to one decimal place
2.3634	2.4
2.34533	2.3
2.35	2.4
2.355	2.4

If the second decimal place (indicated in red) is less than 5 just drop the figures after the first decimal place. If it is 5 or more increase the first decimal place by 1 and then drop the figures.

6 Feedback to ultrasound practitioners from DQASS on NT and CRL measurements

In order to support continuous professional development (CPD) and maintain a high quality screening service, the NHS FASP works in collaboration with DQASS to provide practitioner specific information on the fetal biometry measurements used in combined screening. Documentation to log individual practitioner activity in relation to the DQASS summary reports is available in Appendix 10.

6.1 Down's Syndrome Screening Quality Assurance Support Service

DQASS is a statistical support service to improve T21 screening. It achieves this by supporting and assisting local screening programmes in assessing and providing feedback on practice and, where appropriate, recommending improvements. All ultrasound practitioners measuring NT as part of the combined screening test must participate in external QA using DQASS.[1,2,3]

Ultrasound practitioners undertaking NT measurements as part of T21 screening must register with DQASS using the DQASS notification form (see Section 2.3 and Appendix 11).

The CRL, NT and serum analyte data are submitted by the T21 screening laboratory to DQASS. This occurs every six months with the cycles running from April to September and October to March. There are currently 23 NHS T21 screening laboratories providing data to DQASS. Data is usually submitted at the beginning of the specified month. Table 6 demonstrates which month T21 screening laboratories should submit all data to DQASS. This should assist ultrasound practitioners to ensure they acquire the minimum number of paired CRL and NT measurements. DQASS reports on the data in approximately four to six weeks from receiving the data.

Table 6 T21 screening laboratories DQASS submission months

T21 screening laboratory	Calendar month submit data
Addenbrookes NHS Hospital	January/July
Birmingham Women's Hospital	April/ October
Broomfield Hospital	April/October
Gloucestershire Royal Hospital	May/November
Hull Royal Infirmary	May/November
Kettering General Hospital	May/November
King George Hospital	May/November
Kings College Hospital	January/July
Norfolk & Norwich University Hospital	April/October
Northern General Hospital	January/July
Nottingham University Hospital	April/October
Queen Alexandra Hospital	February/August
Royal Bolton Hospital	April/October
Royal Cornwall Hospital	May/November
Royal Devon & Exeter Hospital	February/August
Royal Sussex County Hospitals	May/November
Royal Victoria Infirmary	March/September
Southmead Hospital	March/September
St James University Hospital	March/September
The John Radcliffe Hospital	May/November
University College Hospital	January/July
University Hospital	March/September
Wolfson Institute of Preventative Medicine	February/August

DQASS undertakes a range of statistical analysis on the data provided and produces reports summarising activity and performance. Laboratories receive information on serum analyte performance and ultrasound practitioners receive information on their paired NT and CRL distributions in relation to the FMF reference curve. These reports are produced every six months and are outlined in Table 7.

Table 7 DQASS reports circulated

Report	Recipients	Explanation: What is included within the report
Ultrasound practitioner distribution plots	Ultrasound practitioner via the SSS NHS FASP	Practitioner ID and the number of NT measurements within the time period covered Flag status of the NT/CRL measurements in relation to the FMF distribution curve Percentage of measurements above and below the FMF reference curve The bias, trend and spread relative to the FMF reference curve
Ultrasound departments summary report	SSS RACHST NHS FASP	The region and time period covered by the data submission The T21 screening laboratory Practitioner's ID numbers, number of scans, median NT, median CRL, median bias Deviations in spread or trend Estimated bias relative to the FMF reference curve 95% confidence intervals for practitioners within the data set Flag status of the NT/CRL measurements in relation to the FMF distribution curve Previous cycles flag status
DQASS laboratory summary report	NHS FASP Laboratory NHS Trust Chief Executive to which the laboratory is accountable RACHST	The number of pregnancies covered in the data set. The number of pregnancies with a risk given The DQASS modelled screening performance (DR, FPR, SPR)* The data collected, the ultrasound measurements and the algorithm parameters used The first trimester marker performance with reference to the NT comparison to the FMF reference curve, the NT MoM diagnostics, the PAPP-A MoM and Free Beta HCG MoM estimated median values.

*

Detection rate = DR

False positive rate = FPR

Screen positive rate = SPR

6.2 Evidence underpinning flag status

The flags assigned depend on the magnitude of the measurement deviation from the FMF reference curve. Bias deviations can be positive or negative and there have been significant improvements demonstrated in the measurement accuracy for NT and CRL. The NHS FASP has reviewed the bias deviation ranges against the programmes quality agenda. In Cycle 11, 54.7% of 1st Trimester screening tests were performed by ultrasound practitioners assigned a green flag and 0.3% by those assigned a red flag. Therefore the NHS FASP recommends the following changes to take effect from the 1st April 2012, to coincide with analysis of DQASS cycle 12 data:

- bias deviations less than or equal to 0.10mm from the reference curve are assigned a 'green flag'
- bias deviations between 0.11mm and 0.40mm are assigned an 'amber flag'
- bias deviations greater than 0.40mm are assigned a 'red flag'
- white flags are assigned when the minimum number of required NT and CRL measurements in the six-monthly QA cycle have not been achieved. Individuals and clinical leads must ensure that those undertaking NT and CRL measurements meet the minimum requirement of 25 paired measurements as part of the six-month QA cycle (which equates to 50 paired measurements per year)[1,2]

This change is to maintain and improve NT and CRL measurements against the FMF reference curve, thereby enhancing the performance of the screening test in England. Whilst the new bias deviation ranges are embedded into practice it is unlikely that further improvements will be seen before the end of DQASS Cycle 12 (October 2012).

The evidence used to develop the flag status has been derived from the impact on screening performance seen in Table 8.[8] For positive biases greater than 0.40mm the false positive rate exceeds 5% leading to unnecessary psychological harm and increases the number of pregnancies exposed to the potential risks associated with invasive diagnostic procedures. For negative biases with magnitudes of 0.40mm or greater, there is a loss of 5% or more in detection rate. DQASS communicates directly with the nominated SSS to inform them of the 'flag' status of each ultrasound practitioner in their department, this information is also shared with the RACHST.

Table 8 Effects on bias

Bias (mm)	FPR	DR
-0.5	1.7%	78%
-0.4	1.8%	79%
-0.3	1.9%	80%
-0.2	2.0%	82%
-0.1	2.2%	83%
0	2.6%	85%
0.1	3.1%	86%
0.2	3.7%	87%
0.3	4.6%	88%
0.4	5.7%	90%
0.5	7.0%	91%

Table 9 Flag status and recommended actions

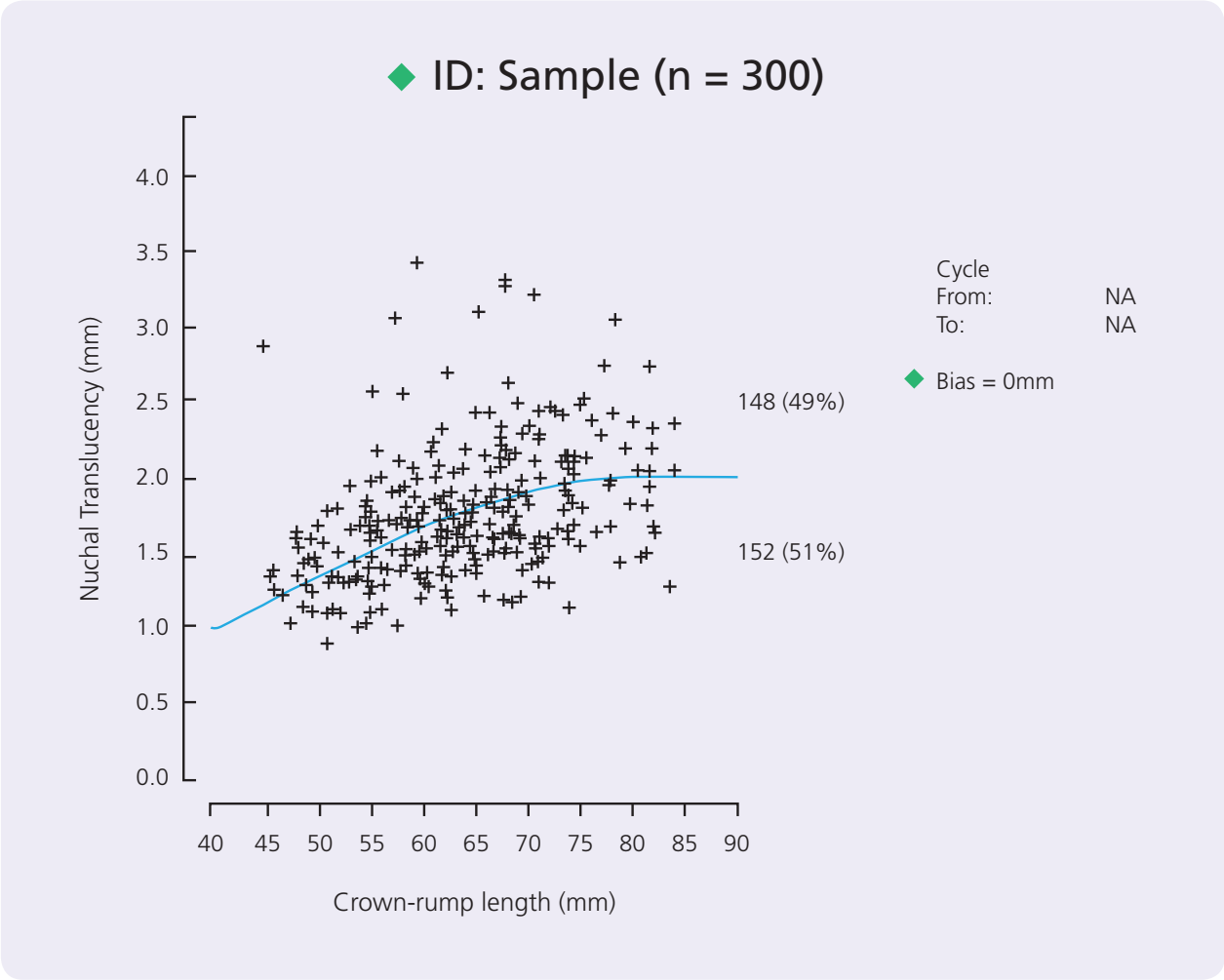
Flag type	Bias	Recommended actions
Green flag	A green flag is assigned when NT bias relative to the FMF reference curve is **less than or equal to 0.10mm**	• no action required • continue screening
Amber flag	An amber flag is assigned when NT bias relative to the FMF reference curve is **between 0.11mm and 0.40mm**	• continue screening as measurements are within the satisfactory range • discuss with local SSS to identify areas where adjustments could be made to further improve practice • **PLEASE NOTE: for bias between 0.31mm and 0.40mm the SSS should consider offering additional support and training** • document discussions and action plan clearly
Red flag	A red flag will be assigned when NT bias relative to the FMF reference curve is **greater than 0.40mm**	• DQASS will provide statistical support to the SSS • practitioners will be immediately informed of their bias results • the SSS offers support and advice as soon as is practical • a period of further training in the measurement of NT and supervised practice is recommended until measurements improve to within the amber or green range as assessed by DQASS • the RACHST is officially notified by the NHS FASP when a red flag has been assigned • the RACHST will expect a copy of the individual training plan using the appropriate documentation. They can be contacted for additional external support if required
White flag:	A white flag will be assigned when data for less than 25 paired measurements are received within a six-month period*	• SSS to review possible reasons for failure of practitioner to meet the minimum requirement a. Consider allocating more clinical time to perform NT scans where appropriate b. Discuss reasons for white flag assignment with RACHST for monitoring purposes c. SSS to provide the RACHST with assurance, using the appropriate documentation, that this issue will be managed immediately. The RACHST are available to advise and support. d. Following a review of circumstances, withdrawal of that individual from contributing to the NT service must be considered by the local organisation if the working situation is unlikely to change sufficiently to meet the standard • The RACHST are officially notified by the NHS FASP when a white flag is assigned in consecutive DQASS cycles for monitoring purposes

* The recommendation within the Working Standards for Down's syndrome screening (2007) page 57, standard 11.5 states: "To ensure satisfactory performance each sonographer must perform a minimum of 50 nuchal translucency measurements per year". www.fetalanomaly.screening.nhs.uk/standardsandpolicies

The flag system is designed to help the SSS to identify where to focus training efforts. It is extremely important that all factors affecting the acquisition of high quality images (see Section 6.4) are considered when agreeing an action plan to support ultrasound practitioners. Below are examples of distribution plots with flags assigned and how to interpret them.

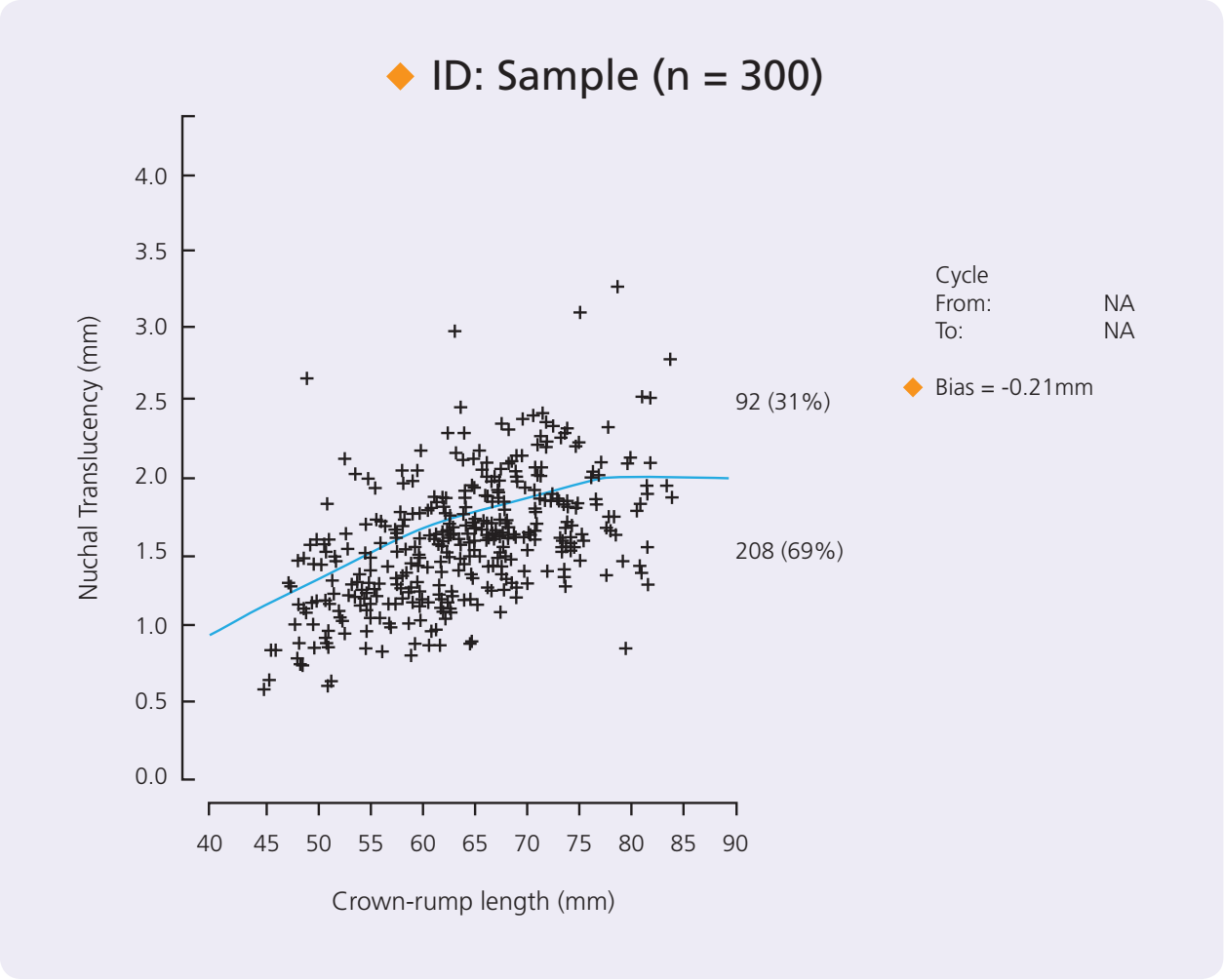
6.3 Examples of distribution plots

An example of 'green flag' distribution plot (continue screening)



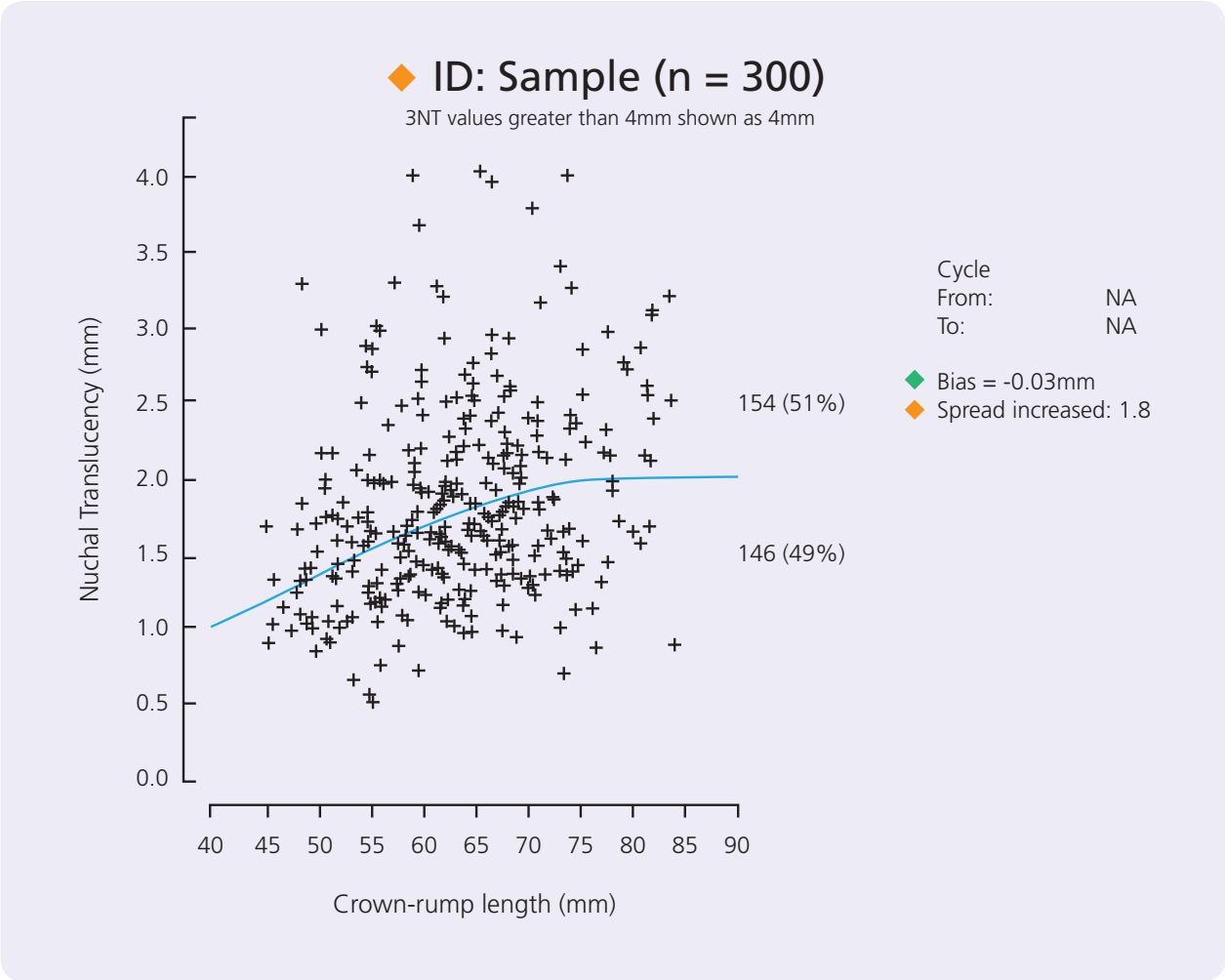
The report includes the ultrasound practitioner's ID code at the top with how many measurements have been submitted to DQASS from the T21 screening laboratory. The report demonstrates the NT and CRL measurements relative to the FMF reference curve. Bias describes the number of measurements above and below the FMF reference curve. The bias is either negative in terms of under-measurement (below the FMF reference curve) or positive which refers to over-measurement (above the FMF reference curve). This report indicates a bias of 0.00mm relative to the FMF reference curve, therefore this satisfies the criteria for a green flag.

An example of 'amber flag' distribution plot (continue screening – may wish to consider a range of interventions to improve further)



The report includes the ultrasound practitioner's ID code at the top with how many measurements have been submitted to DQASS from the T21 screening laboratory. The report demonstrates the NT and CRL measurements relative to the FMF reference curve. Bias describes the tendency of measurements to fall above or below the FMF reference curve. This report indicates a negative bias of 0.21mm relative to the FMF reference curve; therefore this satisfies the criteria for an amber flag. This bias is within a satisfactory range, but training intervention should be considered and offered to improve measurement accuracy even further.

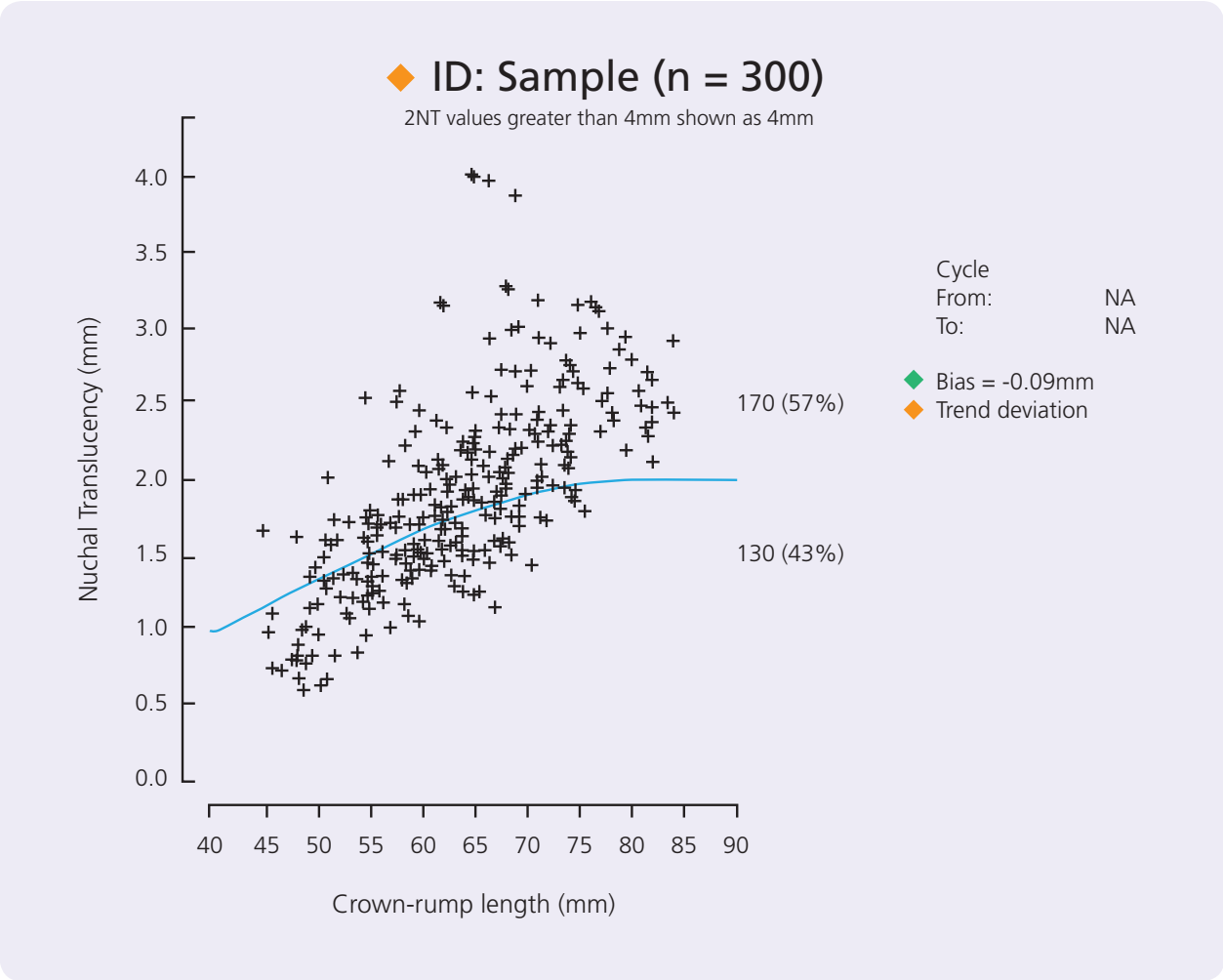
An example of 'amber flag' distribution plot with a spread deviation



The report includes the ultrasound practitioner's ID code at the top and how many measurements have been submitted to DQASS from the T21 screening laboratory. The report demonstrates the NT and CRL measurements relative to the FMF reference curve. Bias describes the number of measurements above and below the FMF reference curve. This indicates a very small positive bias of 0.03mm which satisfies the criteria for a green flag. However, a spread deviation is indicated by the amber flag. The spread is increased by a factor of 1.85mm relative to what is expected from measurements taken, according to the FMF reference criteria. In this case the degree of scatter about the FMF reference curve is almost double that expected. Therefore the ultrasound practitioner will be assigned an overall amber flag.

Increased spread can usually be reduced by developing a thorough understanding of the factors affecting bias, spread and trend (see section 6.4) and addressing those over which the practitioner has some control. Taking part in three-monthly image review with the SSS, not sharing your DQASS or FMF code, and consulting the document entitled 'A guide to getting the most from the ultrasound equipment when measuring Nuchal Translucency' can also address increased or reduced spread. This document can be downloaded here: www.fetalanomaly.screening.nhs.uk/sssmeeting2012.

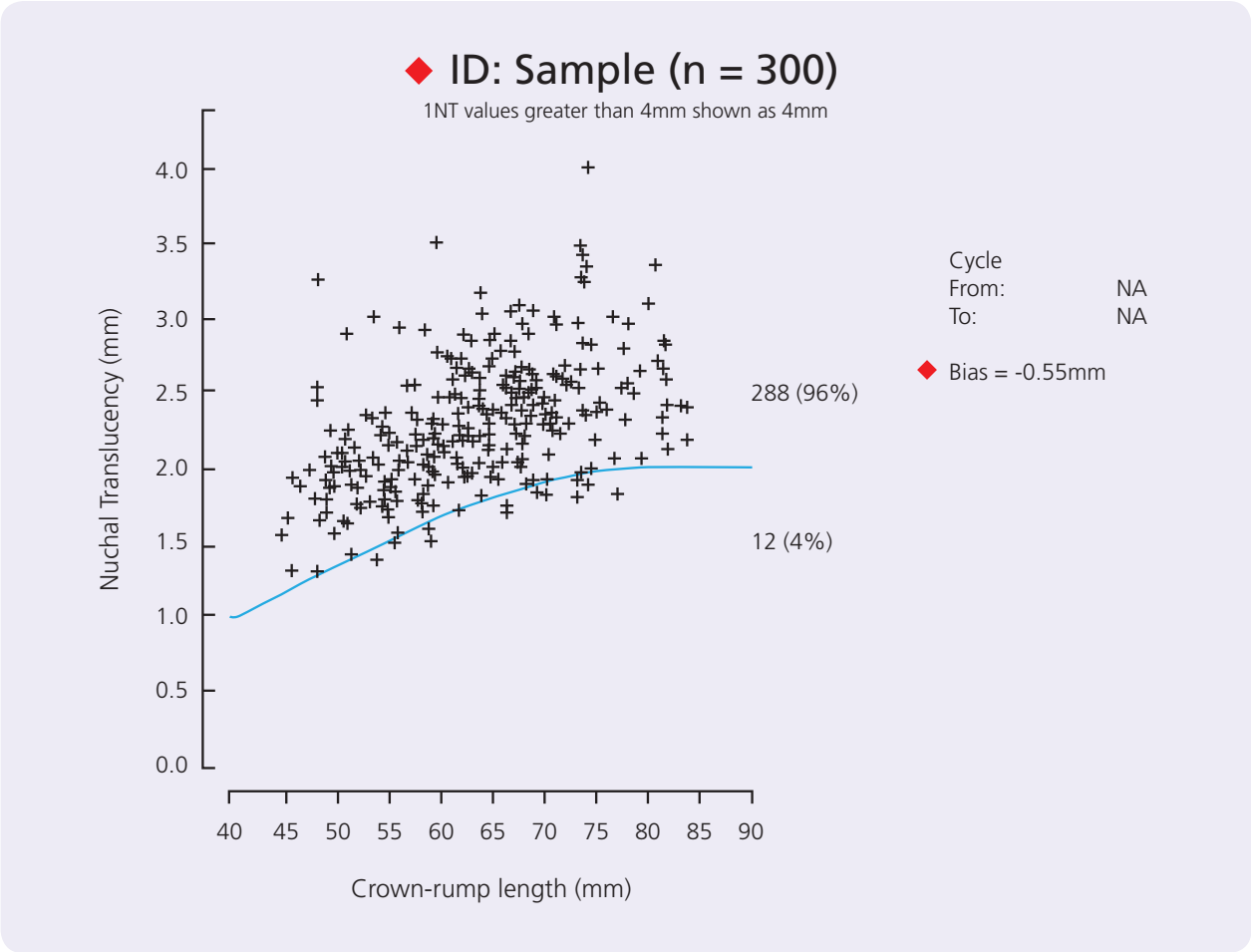
An example of 'amber flag' distribution plot with a trend deviation



The report includes the ultrasound practitioner's ID code at the top and how many measurements have been submitted to DQASS from the T21 screening laboratory. The report demonstrates the NT and CRL measurements relative to the FMF reference curve. Bias describes the number of measurements above and below the FMF reference curve. This indicates a positive bias of 0.09mm which satisfies the criteria for a green flag. However, a trend deviation is indicated by the amber flag. Instead of being evenly scattered above and below the reference curve, there is a tendency for NT measurements to fall below the curve for the lower CRL measurements and above the curve at the higher CRL measurements. Therefore the ultrasound practitioner will be assigned an overall amber flag.

Trend deviation can usually be reduced by developing a thorough understanding of the factors affecting bias, spread and trend (see section 6.4) and addressing those over which the practitioner has some control. Taking part in three-monthly image review with the SSS and consulting the document entitled 'A guide to getting the most from the ultrasound equipment when measuring Nuchal Translucency' can also address trend deviation issues. This document can be downloaded here: www.fetalanomaly.screening.nhs.uk/sssmeeting2012.

Example of 'red flag' distribution plot (Recommend supervised practice)



The report includes the ultrasound practitioner's ID code at the top and how many measurements have been submitted to DQASS from the T21 screening laboratory. The report demonstrates the NT and CRL measurements relative to the FMF reference curve. Bias describes the tendency of measurements to fall above and below the FMF reference curve. This report indicates a positive bias of 0.55mm relative to the FMF reference curve; therefore the practitioner is assigned a red flag. As detailed above in Table 8, biases can directly impact on the T21 risk calculation women receive. The ultrasound practitioner's screening performance will have an impact on the detection rate (91%). The false positive rate is unacceptable and will amount to the potential for approximately a 5% increase in invasive procedures on unaffected pregnancies.

NHS FASP recommended that ultrasound practitioners check their NT and CRL distributions at least once within the six-monthly DQASS QA cycle by performing a 'self-assessment'. This acts as either reassurance or a very helpful early warning sign by increasing practitioner's awareness of their own performance and allowing them to take corrective action, if necessary, to improve their measurement technique.

Some software available in local organisations' IT systems, such as Viewpoint or Astraia, allow ultrasound practitioners to check their own distributions quickly and easily. For local organisations that do not have these IT systems, a simple excel spreadsheet has been devised by DQASS and entitled NT diagnostic plot (available at: www.fetalanomaly.screening.nhs.uk/sss and type NT diagnostic plot into the search engine). Ultrasound practitioners can input a minimum of 25 paired NT and CRL measurements and check their distributions.

6.4 Factors which can affect bias, spread and trend

1. Machine factors (level of sophistication, recent upgrades, servicing, local QC arrangements)
2. Ambient light levels within the examination room exceeding Lux level 15
3. Department workload and the time allocated to perform the scan
4. Departments where slave monitors are not available
5. Ultrasound practitioner eyesight
6. Ultrasound practitioners sharing the same unique ID DQASS or FMF numbers
7. Inconsistent measurements
8. Challenges measuring NT at the lower limit of the CRL range
9. Challenges measuring NT at the upper limit of the CRL range
10. Very low numbers (less than 25) of NT measurements performed in a six-month period
11. Practitioner under or over measuring the CRL
12. Practitioner under or over measuring the NT to maintain a bias within the FMF reference curve
13. Practitioner's improvements in measurement technique
14. High-risk caseloads
15. Demographic factors (e.g. high prevalence of women with raised BMI)

6.5 Recommendations on managing red flags

A red flag is assigned when an ultrasound practitioner's NT distributions are greater than 0.40mm from the FMF reference curve. A red flag indicates a bias that is extreme and unacceptable. Patient safety is one of the key considerations of the NHS FASP, therefore the recommendation is for the SSS to advise the practitioner promptly and devise an urgent supportive action plan. A period of immediate supervised practice is recommended until such a time as a further 25 paired measurement distributions are reassessed by DQASS and are within the acceptable target range of between 0.00mm to 0.40mm. It is recommended that this is achieved within a maximum of twelve weeks from commencing the training plan. Prior to screening unsupervised it is also advised that the SSS ensure they have assessed a minimum of three paired NT and CRL measurements against the NHS FASP criteria and image guidance tool. A quick reference guide on managing red flags is available in Appendix 3. Suggestions for an action plan for practitioners assigned a red flag is available in Appendix 8.

The RACHST are formally notified by the NHS FASP of any practitioner ID codes assigned a red flag for their measurements. The SSS will need to liaise with the RACHST, to keep them informed of any actions and progress achieved. NHS FASP maintains a national database of all ID codes assigned a red flag including training and intervention outcomes.

The local organisation providing T21 screening is responsible for ensuring the competency of their employees and should review the individual circumstances and training requirements.

6.6 Recommendations on managing single white flags

It is important that practitioners are aware that there is a minimum requirement when performing NT measurements within the NHS.[1,2] Practitioners must make an individual effort to ensure they meet the NHS minimum requirement of 25 paired NT and CRL measurements within the DQASS QA cycle (six monthly). This is to ensure individuals remain competent and achieve NT measurement distributions within the acceptable range. If an ultrasound practitioner does not meet the minimum number of measurements, a white flag will be assigned.

It is advised that the SSS review possible reasons for the low numbers (e.g. new to NT scanning, long-term sickness, RSI, maternity leave, etc.) and inform all the relevant managers and stakeholders. A quick reference guide on managing single white flags is available in Appendix 4. Suggestions for an action plan for practitioners assigned a single white flag is available in Appendix 6.

6.7 Recommendations on managing consecutive white flags (over two or more DQASS cycles)

The RACHST are formally notified by the NHS FASP of any practitioner ID codes assigned a consecutive white flag, as these practitioners have not met the minimum number of NT measurements over a 12-month period.[1,2] It is strongly recommended that local action be taken to address this matter. This may include allowing the ultrasound practitioner more clinical time to perform NT scans, or a withdrawal of the ultrasound practitioner from contributing to the NT service. The RACHST will need to be kept informed of any actions taken, progress achieved and resolution. The NHS FASP maintains a national database of all practitioner ID codes assigned a consecutive white flag and intervention outcomes. A quick reference guide on managing consecutive white flags is available in Appendix 5. Suggestions for an action plan for practitioners assigned consecutive white flags is available in Appendix 7.

6.8 Devising a supportive training plan

The SSS can consider including a range of educational and operational interventions when devising a supportive action plan for ultrasound practitioners who have been assigned a red flag. Some examples may include:

- a review of the theoretical NT online resource
- use of NHS FASP image guidance tool
- a practical session with the SSS, deputy SSS, or colleague assigned a green flag for their measurements
- reminder of how the bias can impact on the T21 risk calculation
- a session reviewing previous and current NT and CRL measurements against the NHS FASP criteria and image guidance tool
- 'buddying' alongside a colleague whose measurements have been assigned a green or amber flag to gain confidence
- a review of the working environment, process and equipment

Note: The RACHST can be contacted for information and support in obtaining external practical assistance if required.

Other local initiatives may also be considered.

7 Departmental review of NT and CRL images

Departmental review of practitioner images is as important as the DQASS statistical analysis of an individual's NT and CRL measurements.[1,2] This process is to encourage best practice and to assist ultrasound practitioners to make continuous improvements in their NT and CRL measurement technique for future practice. It is recommended that the SSS or superintendent should complete three monthly image reviews on all practitioners undertaking NT measurements.

Following consultation with the ROSCOs and SSSs, the NHS FASP recommends that the SSSs have a minimum of **one hour per ultrasound practitioner per month** to undertake their supportive role. Therefore an ultrasound department with 10 ultrasound practitioners will require the SSS to be allocated 10 hours a month to undertake these responsibilities.

7.1 Local image review

The requirement is to review three paired NT and CRL images and subjectively score these using the NHS FASP criteria and image guidance tool. All documentation should be securely stored according to local organisational policy.

To provide a consistent framework each component within the CRL and NT criteria can be reviewed using the NHS FASP image guidance tool. The CRL criteria has six components and the NT criteria has four components to review. The image guidance tool explains the specific image appearance required for each component to achieve an acceptable cross-section view of the fetus to assist ultrasound practitioners in obtaining accurate measurements.

Ideally practitioners should receive regular feedback from the SSS or their deputy on local image review; this will assist individuals to critically review their measurement technique to see where they may be able to make improvements to their practice. It is recommended that three randomly selected paired images (NT and CRL) are reviewed every three months for each practitioner. Further details on the NHS FASP image guidance tool and how to use it are available at: http://fetalanomaly.screening.nhs.uk/sssmeeting2012.

Below are the NT and CRL image components that should be analysed and scored using the following image guidance tool.

Table 10 Image guidance tool for the NT

NT component	How to assess the image appearance	Assigning score
Image magnification	Should include the following: A) Fill 60–98% of the screen B) The facial profile anteriorly C) The skin edge posteriorly D) The upper aspect of the heart inferiorly **Notes: Some will be vice versa if fetus is prone.** (The image does not need to include the top of the head superiorly but the whole of the translucent diencephalon should be visible)	Good: if A, B, C and D visualised Poor: if one of A, B, C or D not visualised
Mid-line sagittal section/Rotation	The following features should be seen: A) The mid-sagittal view of the face displaying at least two of the following: 1) The echogenic tip of the nose 2) The rectangular shape of the palate 3) The translucent diencephalon B) Frontal process of the maxilla not visible C) The head should be in line with the body displaying the following: The fetal skin line must be visible from the neck to the upper aspect of the heart	Good: if A, B and C visualised Acceptable: if two A and C visualised and frontal process of the maxilla visible (not B) Poor: one or none of A visualised, maxilla visible (no B) and no C visualised
Flexion and neutral position	The following features should be seen: A) A pocket of fluid, at least equivalent in size to the width of the palate, should be visible between the fetal chin and chest. B) The fetal palate angle should be 30^0-60^0 relative to the horizontal C) The nasal tip should be level or above the anterior chest wall, relative to the horizontal	Good: if A, B, and C visualised Poor: if one of A, B, or C not visualised
Calliper placement	The crossbar of the calliper should be such that it is hardly visible as it merges with the thin white line of the border of the skin lines. Callipers must be placed ON the line that defines the widest part of the NT thickness (see Diagram 2). A) Widest part of NT B) Callipers on the upper skin line C) Callipers on the lower skin line	Good: if A, B, and C visualised Poor: if one of A, B, or C not visualised

**Note the NT and CRL image guidance tool has been developed with the supine fetus in mind; however, it still applies to the fetus in prone position, with the understanding that an image scored 'good' cannot be achieved.

Diagram 2 Where to place callipers for the NT measurement

For NT measurements, the crossbar of the calliper should be such that it is hardly visible as it merges with the white line of the skin border, not in the nuchal fluid. The callipers should be placed with the inner border of the horizontal line of the callipers placed on the line that defines the NT thickness, illustrated in Diagram 2. The callipers must also be placed in the widest part of the NT.

Diagram 3 Example of scoring an NT image

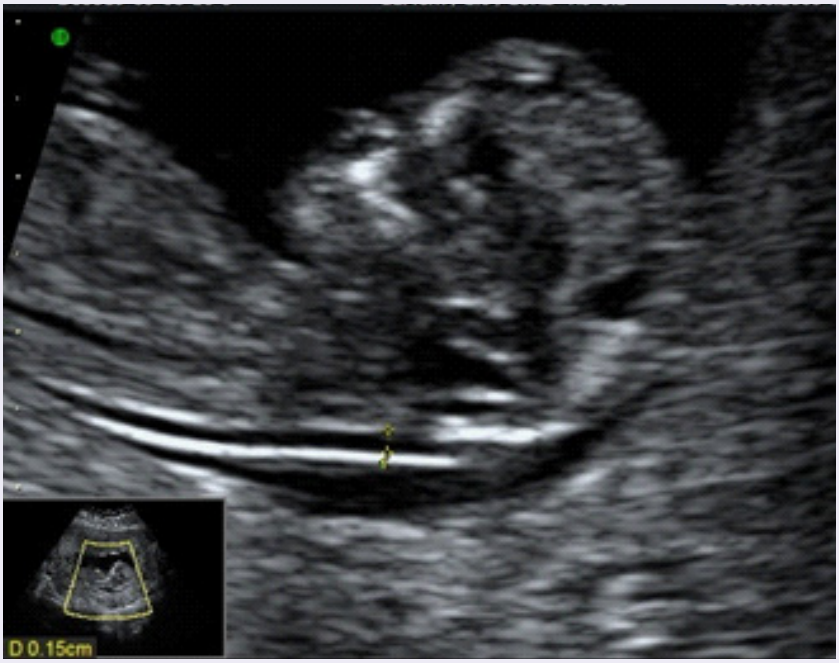


Table 11 Example of NT image score

Magnification				Rotation					Flexion			Callipers			Overall
A	B	C	D	A1	A2	A3	B	C	A	B	C	A	B	C	
√	√	√	√	√	√	√	x	√	√	√	√	√	√	√	
Good				Acceptable					Good			Good			Acceptable

Table 12 Image guidance tool for the CRL

CRL component	How to assess the image appearance	Assigning score
Image magnification	The fetus is as large as possible, to clearly demonstrate the entire CRL with a visible pocket of fluid at either end. The image should fill A) 60–98% of the screen.	Good: A is correctly visualised Poor: more or less than specified in A
End points of crown and rump	The parietal bone (crown) and skin inferior to the tip of the sacrum (rump) are the points which provide the longest measurement of the fetus and should be clearly defined. A pocket of fluid should be visible between these points and the uterine wall. A) Clearly defined crown B) Clearly defined rump C) Pocket of fluid at the crown D) Pocket of fluid at the rump	It should be noted that this assesses the endpoints of the fetus and not calliper placement. Good: if A, B, C and D visualised Acceptable: if A and B and one of C or D is visualised Poor: if one or neither A or B, or one or neither C or D is visualised
Horizontal	The lie of the fetus displayed should be such that the measured CRL axis is at 90^0 to the ultrasound beam. (You are not expected to measure the angle)	Angle to the horizontal Good: $\leq 10^0$ Acceptable: 11^0–30^0 Poor: $>30^0$
Mid-line sagittal section/rotation	The following features should be seen: A) The mid-sagittal view of the face displaying the following: 1) the echogenic tip of the nose 2) the rectangular shape of the palate 3) the translucent diencephalon B) the head should be in line with the full length of the body displaying: 1) full length of the body 2) full length of the spine, displayed as lines of echoes	Good: if all A and B visualised Acceptable: if two A and one or both of B visualised Poor: if one or no A and no B visualised
Flexion	The following features should be seen: A) A pocket of fluid, at least equivalent in size to the width of the palate, should be visible between the fetal chin and chest B) The palate angle should be 30^0–60^0 relative to the horizontal C) The nasal tip should be level or above the anterior abdominal wall D) The fetal cervical spine should not be extended	Good: if A, B, C and D visualised Poor: if any of A, B, C or D not visualised
Linear CRL measurement (calliper placement)	Intersection of the cross of the linear callipers should be placed on the outer border crown and rump, to provide the longest measurement of the fetus A) Correct calliper placement crown B) Correct calliper placement rump C) Longest measurement of the fetus	Good: if A, B and C visualised Poor: if any of A, B and C not visualised

Diagram 4 Example of scoring a CRL image

Table 13 Example of CRL image score

Mag	Crown + Rump				Horiz	Rotation					Flexion				Callipers			Overall
A	A	B	C	D	A	A1	A2	A3	B1	B2	A	B	C	D	A	B	C	
72%	√	√	√	√	10^0	√	√	X	√	X	√	√	√	√	√	√	√	
Good	Good				Good	Acceptable					Good				Good			Acceptable

7.3 Suggested management following image review

When two of the three paired images score either 'good' or 'acceptable' this demonstrates evidence of good clinical practice.

When more than one paired image scores 'poor' it is recommended that a further three paired images are reviewed. If a practitioner continues to score 'poor' when their images are reviewed it is recommended that the ultrasound practitioner has an individualised training plan to support improvements to their measurement technique.

Documentation to support the image review process is available at:
www.fetalanomaly.screening.nhs.uk/sssresources.

Images to support the image review process are available at:
www.fetalanomaly.screening.nhs.uk/sssresources.

8 Points to remember when undertaking the combined screening test

Recommended ten best practice points

1. Review the NHS online theory training annually/bi-annually as recommended
2. Participate in regular image review sessions with your SSS/deputy when invited
3. Monitor your own distribution plot for CRL and NT measurements between DQASS audit cycles
4. Contact your SSS/deputy for any queries regarding DQASS or NHS FASP
5. Follow NHS FASP's criteria and supporting image guidance tool for measuring CRL and NT
6. Ensure you know your local organisations' policy for: scanning time; and repeat visits
7. Ensure you confirm consent for combined screening from the woman on the day
8. Ensure the images of the NT and CRL measurements reported are stored
9. Know your ultrasound machine and how to obtain optimal image quality from it
10. Be aware that environmental factors may affect your bias

Ten points to remember

1. The minimum number of paired measurements in a six-month DQASS cycle is 25
2. Use the DQASS notification form to register with DQASS
3. Don't share your DQASS or FMF ID number
4. The NT can only be undertaken when the CRL is between 45.0mm and 84.0mm
5. The ambient light level in the ultrasound room should not exceed 15 lux
6. Use the CRL measurement for the combined screening test
7. The NT can still be measured if the fetus is in the prone position
8. If the fetus is not in an optimal position, try asking the woman to: empty her bladder, cough, shake her hips, you can always tilt the bed or consider a TV scan
9. Try changing yours or the woman's position and remember to try to relax the pressure on the probe to lessen the risk of developing RSI
10. If the NT is >3.5mm it is recommended the woman should complete the screening pathway for T21

Contact your SSS or deputy if you have any concerns or require any support.

9 References

1. NHS Fetal Anomaly Screening Programme (NHS FASP), Screening for Down's syndrome UK NSC Policy recommendations 2011-2014: Model of Best Practice (*2011*): www.fetalanomaly.screening.nhs.uk/standardsandpolicies.

2. NHS FASP (2007) Antenatal Screening: Working Standards document for Down's syndrome screening, NHS.

3 NHS FASP (2010) Programme Statement: the use of NT and CRL measurements in screening for Down's syndrome: www.fetalanomaly.screening.nhs.uk/standardsandpolicies.

4 NHS FASP The National Screening Committee: National Down's Syndrome Screening Programme (DoSySP) (2004), Standards for fetal nuchal translucency (NT) measurement for Down's syndrome Screening.

5. NHS FASP Condensed Education Module for Trisomy 21 resource and the NHS FASP NT resource www.fetalanomaly.screening.nhs.uk.

6. *http://fetalanomaly.screening.nhs.uk/programmestatements 11–13 weeks scan on line resource (2010) www.fetalmedicine.com/fmf/online-education/01-11-136-week-scan/.*

7. Loughna P, Chitty L, Evans T, Chudleigh T (2009) Fetal size and dating: charts recommended for clinical obstetric practice, *Ultrasound* 17:161–167.

8. Kagan et al (2009) Effect of deviation of nuchal translucency measurements on the performance of screening for Trisomy 21 Pub: *Ultrasound in Obstetrics & Gynecology* 33:657-664.

9. IPEM Report 91. (2005) Recommended standards for the routine performance testing of Diagnostic X-Ray Imaging systems. Pub: *Institute of Physics and Engineering in Medicine York.*

Appendix 1 Log-book of evidence for practitioners new to NT measurements

The following log-book of clinical experience can be printed out and used to document and evidence learning activity in relation to the acquisition of measurements of NT and CRL. It is accepted that learning needs will vary depending on ultrasound practitioner experience and previous level of training.

Documentation of evidence: for practitioners new to NT measurement

Name of ultrasound practitioner.....

Ultrasound practitioner ID number (DQASS/FMF).....

Name of Screening Support Sonographer.....

Name of local organisation / NHS trust.....

Documentation of completed theory training for combined screening

Resource	Requirement/ Desirable	Date completed
Condensed Education Module for Trisomy 21 (CEMT21) www.fetalanomaly.screening.nhs.uk	Requirement	
Nuchal Translucency training resource www.fetalanomaly.screening.nhs.uk	Requirement	
FMF online 11–13 week resource http://www.fetalmedicine.com/fmf/online-education/01-11-136-week-scan/	Desirable	

Documentation of observed / assisted / supervised scans

A minimum of 1–5 scans should be observed
A minimum of 10–20 scans supervised/assisted
A minimum of 3–5 scans independently performed reviewed against the FASP criteria
A minimum of 25 paired independent measurements required before data submission to DQASS

No	Date	Observed (√)	Assisted (√)	Supervised (√)	Supervisor's signature	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

No	Date	Observed (√)	Assisted (√)	Supervised (√)	Supervisor's signature	Comments
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

Documentation of independently performed, 25 paired NT and CRL measurements

No	Date	CRL (mm)	NT (mm)	Supervisor's signature
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

Once the SSS is satisfied with the image review, the paired NT and CRL data should be inputted into the **NT diagnostic plot** which is available at: www.fetalanomaly.screening.nhs.uk/sss and sent to DQASS at: DQASS@plymouth.ac.uk.

Final checklist prior to entering the screening programme independently

Item	Completed	Comments	Supervisor's Signature and date
Two online theory courses			
DQASS notification form downloaded www.fetalanomaly.screening.nhs.uk/sssresources Completed and submitted to DQASS at: dqass@plymouth.ac.uk			
Log-book of observed / supervised scans /assessed scans completed			
25 paired NT and CRL measurements performed independently			
Image review completed			
DQASS diagnostic plot downloaded www.fetalanomaly.screening.nhs.uk/sssresources Data inserted and submitted to DQASS at: dqass@plymouth.ac.uk			
SSS signed declaration			

Signed declaration

The following ultrasound practitioner has completed the theory and practical components of the NHS model for training in NT and CRL and is therefore deemed competent to partake in the ultrasound aspect of the NHS T21 combined screening programme.

Name of ultrasound practitioner.....

Ultrasound practitioner ID number (DQASS/FMF).....

Initial DQASS bias.....

Signature of SSS.....

Date.....

Appendix 2 Log-book of evidence for practitioners established in NT measurements

Documentation of evidence: for practitioners established in NT measurement

Name of ultrasound practitioner.....

Ultrasound practitioner ID number.....

Name of Screening Support Sonographer.....

Name of local organisation / NHS trust.....

Documentation of theory training for combined screening

Resource	Requirement/ Desirable	Date completed	Date reviewed	Date reviewed
Condensed Education Module for Trisomy 21 (CEMT21) www.fetalanomaly.screening.nhs.uk	Requirement			
Nuchal Translucency training resource www.fetalanomaly.screening.nhs.uk	Requirement			
FMF online 11–13 week resource http://www.fetalmedicine.com/fmf/online-education/01-11-136-week-scan/	Desirable			

Documentation of observed / assisted / supervised scans

No	Date	Observed (√)	Assisted (√)	Supervised (√)	Supervisor's signature	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Appendix 3 Quick reference guide on managing red flags

- DQASS assign a practitioner a red flag
- SSS to inform the ultrasound practitioner and manager
- NHS FASP recommends that any ultrasound practitioner with red-flagged measurements should not screen unsupervised until bias distributions are within the acceptable range following reassessment by DQASS
- Review equipment, environment, working practices, measurement technique, training and CPD within the last 12 months
- SSS to devise a supportive training plan using the documentation provided in the appendices. The training plan should be completed within 12 weeks from commencement and it is recommended that this should include a period of supervised practice
- SSS to liaise with the RACHST for advice and support in gaining access to further expert external practical assistance if required
- SSS to send a copy of the training plan to the RACHST and keep them informed of progress made
- SSS to review bias distribution and if within acceptable range send to DQASS for analysis and confirmation. Local image review of paired measurements against the NHS FASP criteria
- Documentation of support, actions and progress to be maintained in accordance with local organisation policy
- SSS to keep the RACHST informed of actions, progress and resolution

Note: To avoid unnecessary intervention, if an ultrasound practitioner assigned a red flag is absent from clinical practice for a prolonged period, the RACHST will need to be informed.

Appendix 4 Quick reference guide on managing a single white flag

- DQASS to assign a single white flag
- SSS to inform the ultrasound practitioner and manager
- Review reasons why white flag assigned
- Consider strategy to increase the number of examinations performed
- SSS to send a copy of the action plan to the RACHST
- Documentation of support, actions, progress and resolutions to be maintained in accordance with best practice and local organisation policy

Note: To avoid unnecessary intervention, if an ultrasound practitioner assigned a red flag is absent from clinical practice for a prolonged period, the RACHST will need to be informed.

Appendix 5 Quick reference guide on managing consecutive white flags

- DQASS assign a consecutive white flag (two or more DQASS cycles)
- SSS to inform the ultrasound practitioner and manager
- Review reasons for consecutive white flags
- SSS/superintendent to document reasons and devise a strategy to increase the number of examinations or consider withdrawing the practitioner from the local screening service
- SSS can contact the RACHST for advice and support if required
- Documentation of support, actions, progress and resolution to be maintained in accordance with best practice and local organisation policy
- SSS to inform the RACHST of planned strategy, progress and resolution within four weeks of receiving the DQASS report

Note: To avoid unnecessary intervention, if an ultrasound practitioner assigned a consecutive white flag is absent from clinical practice for a prolonged period, the RACHST will need to be informed.

Appendix 6 Suggested action plan for practitioners assigned a single white flag by DQASS

Name of ultrasound practitioner.....

Ultrasound practitioner ID number.....

Audit cycle number.....

Name of Screening Support Sonographer.....

Name of local organisation / NHS trust.....

Date.....

The recommendation within the Working Standards for Down's syndrome screening (2007) page 57, standard 11.5 states: "To ensure satisfactory performance each sonographer must perform a minimum of 50 nuchal translucency measurements per year". http://fetalanomaly.screening.nhs.uk/standardsandpolicies

Action		Yes √	No √	Outcome/Action	Date
1	Ultrasound practitioner informed				
2	Relevant manager informed				
3	Reasons for less than the minimum required number of examinations explored and documented				
4	Appropriate measures to ensure adequate level of competency				
5	Liaised with the RACHST				
6	Sent a copy of the action plan to the RACHST				
7	Review of outcome within 12 weeks from commencement of plan				
	Additional elements				

SSS/Superintendent signature.....

Printed name.....

Appendix 7 Suggested action plan for practitioners assigned a consecutive white flag by DQASS

Name of ultrasound practitioner.....

Ultrasound practitioner ID number.....

Audit cycle number.....

Name of Screening Support Sonographer.....

Name of local organisation / NHS trust.....

Date.....

The recommendation within the Working Standards for Down's syndrome screening (2007) page 57, standard 11.5 states: "To ensure satisfactory performance each sonographer must perform a minimum of 50 nuchal translucency measurements per year". http://fetalanomaly.screening.nhs.uk/standardsandpolicies

Action		Yes √	No √	Outcome/Action	Date
1	Ultrasound practitioner informed				
2	Relevant manager, Head of Midwifery, Clinical Governance manager/team/board informed				
3	Reasons for less than the minimum required number of examinations explored and documented				
4	Review of previous justification and action plan				
5	Appropriate measures to ensure adequate level of competency				
6	Decision to withdraw ultrasound practitioner from screening until such time as they can maintain the minimum requirement to maintain competency				
7	Liaised with the RACHST				
8	Sent a copy of the action plan to the RACHST, Head of Midwifery, Clinical Governance manager/team/board				
9	Review of outcome within 12 weeks from commencement of plan				
	Additional elements				

SSS/Superintendent signature.....

Printed name.....

Appendix 8 Suggested action plan for practitioners assigned a red flag by DQASS

Name of ultrasound practitioner.....

Ultrasound practitioner ID number.....

Audit cycle number.....

Name of Screening Support Sonographer.....

Name of local organisation / NHS trust.....

Date.....

NHS FASP recommends that an individualised training plan be negotiated between the SSS/superintendent and the ultrasound practitioner. Below are some suggested elements that can form such an individualised plan.

Action		Yes √	No √	Outcome/Action	Date
1	Ultrasound practitioner informed				
2	Relevant manager, Head of Midwifery, Clinical Governance manager/team/board informed				
3	Screening unsupervised ceased until a new series of measurements obtained and the bias re-assessed by DQASS within acceptable range				
4	Review equipment, environment, working practices, measurement technique, training needs and CPD				
5	Supervised training with appropriate ultrasound practitioner				
6	SSS and practitioner to review previous paired images together				
7	Review of NHS FASP NT online education resources				
8	Liaise with the RACHST				

Action		Yes √	No √	Outcome/Action	Date
9	External practical support required				
10	Sent a copy of the action plan to the RACHST, Head of Midwifery, Clinical Governance manager/team/board				
11	Review of outcome within 12 weeks from commencement of plan: 1. Images 2. Bias using diagnostic plot				
12	SSS to send 25 paired measurements to DQASS for analysis and confirm within acceptable range				
13	SSS to review measurement technique and images to confirm NHS FASP criteria and guidance are being met				
	Additional elements				

SSS/Superintendent signature.....

Printed name.....

Appendix 9 Documentation for image review against NHS FASP criteria and the image guidance tool

Ultrasound practitioner's name.....

Ultrasound practitioner ID number (DQASS/FMF).....

SSS Name.....

Date.....

NT image review	Magnification				Rotation					Flexion			Callipers			Overall score
Image N.	A	B	C	D	A1	A2	A3	B	C	A	B	C	A	B	C	
1																
2																
3																
Score awarded																

It is advised three paired NT and CRL images are reviewed every three months using the image review scoring sheets.

CRL image review	Magnifi-cation	Crown + Rump				Horizontal	Rotation					Flexion				Callipers			Overall score
Image N.	A	A	B	C	D	A	A1	A2	A3	B1	B2	A	B	C	D	A	B	C	
1																			
2																			
3																			
Score awarded																			

NT: Overall score assigned Good/acceptable/poor
CRL: Overall score assigned Good/acceptable/poor

Appendix 10 DQASS summary report history for individual practitioners

Ultrasound practitioner's name.....

Ultrasound practitioner ID number (DQASS/FMF).....

SSS Name.....

Date.....

DQASS report date	Number of scans undertaken	DQASS report details				Action plan agreed if required (√)	SSS signature and date when action plan completed
		Flag assigned (green/ amber/ red)	Bias	Spread	Trend		

Appendix 11

DQASS Practitioner Notification Form

NHS

Screening Programmes

Fetal Anomaly

1. Ultrasound practitioner name:

2. Hospital Unit:

3. Do you wish to inform DQASS of an established practitioner in NT who has recently moved to your unit?

Yes	☐
Last hospital employed at:	
ultrasound practitioner ID number:	

No - Move to question 4	☐

4. Do you wish to register a practitioner with DQASS?

Please mark type of registration required or cross registration not required:

Student (A training DQASS code will be issued)	☐	**Qualified** (A DQASS code will be issued)	☐	**Registration not required**	☐

5. Does the practitioner have an existing FMF registration?

Please give FMF registration number or cross not registered box

FMF registration number	___ ___ ___ ___ ___	
Country registered in		
Has the ultrasound practitioner practised NT abroad using this FMF number?	Yes ☐	No ☐
Not registered		

6. Name of notifying Screening Support Sonographer:

Please e-mail completed form to dqass@plymouth.ac.uk

Notes

This information has been produced on behalf of the NHS Fetal Anomaly Screening Programme.

All of our publications can be found online at
www.fetalanomaly.screening.nhs.uk

To order copies please contact the Programme Centre at the address below:

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