Medical Imaging, Physics & Illustration CSU

Ultrasound Guidelines
(Excluding Interventional, Breast, Medical Physics, Cardiology, Obstetrics and Paediatric Ultrasound)

SECTION 1
PROCEDURAL INFORMATION

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Section 1 Contents

Section 1 Appendices

Section 2 Contents

1. INTRODUCTION

It has been advised as a result of national guidance (BMUS, 2015) that each individual Trust develop locally agreed clear guidance on the use of Medical Ultrasound, hence the development of this document. This document has been produced with support/advice from Consultant Radiologists, Gynaecologists, Surgeons and Urologists all working within The Rotherham NHS Foundation Trust (TRFT) at the time of the document production.

2. EVIDENCE

There are National Standards and Guidance for the use of Medical Ultrasound to support improved patient safety and a high quality of service.

The evidence is provided by the National Institute for Health and Care Excellence (NICE), Society and College of Radiographers (SoR), Royal College of Radiologists (RCR), British Medical Ultrasound Society (BMUS), British Thyroid Association, European Society of Musculoskeletal Radiology (ESSR) and the International Ovarian Tumour Analysis (IOTA) group.

3. DEFINITIONS AND ABBREVIATIONS

3.1. Definitions

N/A

3.2. Abbreviations

Abbreviation	Full text
2WW	2 Week Wait
AAA	Abdominal Aortic Aneurysm
ABPI	Ankle Brachial Pressure Index
AKI	Acute Kidney Injury
AMU	Acute Medical Unit
AP	Anterior Posterior
ASU	Acute Surgical Unit
BMUS	British Medical Ultrasound Society
CASE	Consortium for Sonographic Education
CBD	Common Bile Duct
CCA	Common Carotid Artery
cm	Centimetres
CMU	Certificate of Medical Ultrasound
CPD	Continual Professional Development
CSU	Clinical Support Unit
CT	Computed Tomography
DMU	Diploma of Medical Ultrasound
DOB	Date of Birth
DVT	Deep Vein Thrombosis
ECA	External Carotid Artery
EDV	End diastolic Velocity

EPR	Electronic Patient Record
ESSR	European Society of MusculoSkeletal Radiology
FNA	Fine needle Aspiration
FNAC	Fine needle Aspiration Cytology
GCA	Giant Cell Arteritis
GI	Gastrointestinal
GP	General Practitioner
HCC	Hepatocellular Carcinoma
HEI	Healthcare Environment Inspectorate
ICA	Internal Carotid Artery
ICE	Integrated Clinical environment
IMB	Intermenstrual bleeding
IOTA	International Ovarian Tumor Analysis
IUS	Intra Uterine System
IVC	Inferior Vena Cava
KUB	Kidneys, ureters and bladder
LS	Longitudinal section
mm	Millimetres
MSK	Musculoskeletal
NHS	National Health Service
NICE	The National Institute for Health and Care Excellence
PACS	Picture Archiving and Communication System
PASA	Purchasing and Supply Agency
PCO	Polycystic Ovaries
PCOS	Polycystic Ovarian Syndrome
PGCert	Post Graduate Certificate
PMB	Post-Menopausal Bleeding
PSV	Peak Systolic Velocity
RCCG	Rotherham Care Commissioning Group
RCR	Royal Collage of Radiologists
RIS	Radiology Information System
SOR	Society of Radiographers
SCoR	Society and College of Radiographers
SOP	Standard Operating Procedure
TA	Transabdominal
TRFT	The Rotherham Foundation Trust
TS	Transverse section
TV(S)	Transvaginal Scan
US(S)	Ultrasound Scan
VR	Voice Recognition

4. PURPOSE

This guidance relates to procedures performed by Sonographers or Radiologists with qualifications as detailed in section 2 – Implementation and training plan, under “training requirements”.

The procedures are performed on patients who are deemed applicable for an ultrasound examination after being correctly assessed and referred by a Medical/Health Care Professional and the request vetted by a practitioner undertaking medical ultrasound.

The purpose of the guideline is to outline the following:

- Pre scan preparation, consent, criteria for performing each type of examination and safety issues specific to ultrasound.
- How scan results should be reported
- The qualifications required to perform medical ultrasound as recommended by BMUS, RCR and NICE
- How the guidance will be implemented and monitored.

This guidance does not include:

- Interventional
- Breast ultrasound
- Obstetric examinations including early pregnancy scans
- Ultrasound performed in Medical Physics or Cardiology
- Ultrasound performed by staff outside of Medical Imaging

5. SCOPE

This guidance applies to all Practitioners undertaking and reporting ultrasound examinations in the Clinical Radiology Department at The Rotherham NHS Foundation Trust (TRFT). This document will be read in conjunction with Medical Imaging, Physics & Illustration CSU's "Issuing of reports: Fail safe alerts and safety net procedure", "SOP for Sonographers reporting Non-obstetric (General Medical) Ultrasound examinations" and "Guidelines for reporting and image interpretation".

6. GUIDANCE

6.1 Pre-scan Preparation of Equipment

- Purchasing ultrasound equipment
- Maintenance of ultrasound equipment
- Care of ultrasound equipment
- Cleaning of ultrasound equipment
- Pre-scan preparation of the ultrasound equipment (encompassing ancillary equipment necessary to perform the examination)

List of equipment needed for performing an ultrasound examination

6.1.1 Purchasing Ultrasound Equipment

Ultrasound equipment used at TRFT must be fit for purpose and should be purchased in line with recommendations from the NHS Purchasing and Supply Agency (PASA) and conform to HEI 98 regulations. A formal review

of equipment before purchase should occur every four years following installation.

Ultrasound equipment must be assessed and evaluated in line with the recommendations set out by the Royal College of Radiologists (RCR). Ultrasound equipment must be considered for replacement every five years (new purchase or leasing), or have hardware, or software upgrades such that the equipment functionality is equivalent to a new machine.

A trial of equipment should be carried out prior to purchase.
Ultrasound machinery purchased for any aspects of medical ultrasound examinations must be capable of producing images of diagnostic quality and include the following features as a minimum:

- Adequate display/screen size for sufficient clear visualisation
- Magnification facility
- Cine loop function
- Callipers that have a precision to one decimal point in millimetres i.e. 2.1mm
- Adjustable signal processing facilities
- Tissue specific pre-sets for individual clinical applications
- Sector/linear/curve-linear probe relevant to examination.
- Doppler and Harmonic Function

6.1.2 Maintenance of Ultrasound Equipment

All ultrasound equipment must have a full service and maintenance programme; as a minimum this must include annual servicing by the Manufacturer.

Staff using the equipment must immediately report any faults, or issues which may result in inadequate imaging, to the Ultrasound Modality Lead or if unavailable, discontinue using the equipment until appropriate checks can be completed. Whenever possible the service desk for the equipment manufacturer must be contacted to report the fault and arrange an engineer visit. Details of how to do this will be found in the Ultrasound Department in the Department of Clinical Radiology.

6.1.3 Care of Ultrasound Equipment:

- Ultrasound equipment must be cared for, to ensure maximum life of the equipment.
- Transducers must be placed in the machine holders when not in use to avoid damage from accidentally dropping the probe. Transducer cables should be hung on the machine ensuring they do not trail on the floor or get caught in the wheels of the machine (this is especially important when transporting the machine).
- When an ultrasound machine is transported, ensure the monitor is stowed in the fixed/locked position.

- Ultrasound machines should be wiped clean and dried at the end of each scanning session using a mild detergent wipe and soft cloth/tissue.
- Ultrasound machines must be switched off (using the power button on the machine) at the end of each scanning session and definitely at the end of the working day. Machines must be switched off at the mains plug in cases of generator testing.
- The ultrasound machine hard drive should be cleared periodically ensuring the hard drive does not reach full capacity (displayed as a % capacity on the monitor). This will be monitored by the sonographers.

6.1.4 Cleaning of Ultrasound Equipment

Refer to Medical Imaging, Physics & Illustration CSU's Cleaning and Disinfection of Ultrasound Probes (Transducers) within the Clinical Radiology Department SOP, for more information.

6.1.5 Pre-scan Preparation of Ultrasound Equipment (encompassing ancillary equipment)

The Ultrasound Operator needs to ensure that they have all the appropriate equipment prepared prior to scanning the patient to ensure an efficient and thorough examination, e.g.

1. Select the patient's details from the work-list (available on all ultrasound equipment) and check name, DOB and address for accuracy.

2. Select and prepare the appropriate transducer and initial scanning parameters for the individual and the site under examination.

3. Disposable tissue can be used on scan couches to protect the scan couch and to minimise infection risk. It must be replaced after each patient and the scan couch must be cleaned between patients and at the end of each scanning session using detergent wipes or Tristel Fuse.

4. The Operator must ensure the scan couch is at a suitable height to allow the patient to position themselves on the couch.

5. To ensure ergonomic practice the height of the couch and height adjustable seating should be adjusted according to the needs of the professional performing the scan.

6. Variable or dimmed lighting must be available to optimise viewing conditions.

7. Ultrasound transmission gel should be used as a coupling medium.

8. Non-sterile gloves and plastic aprons can be worn by the Ultrasound Operator when necessary.

9. Transabdominal (TA) examinations – disposable tissue should be placed over the patient's clothes to protect them from the ultrasound gel.

10. Transvaginal (TV) examinations:

    a. Disposable tissue or a hospital gown should be provided for the patient, to cover their lower half to preserve dignity during the examination.
    b. The lower third of the scan couch should be removed, where possible to aid transvaginal scanning, this may be left in place if patient mobility is reduced, in which instance a pillow or sponge wedge may be used to elevate the pelvis.
    c. Latex free probe covers (pre-filled with ultrasound transmission gel) should be applied to the probe, and sterile aqua lubricating gel on top of the probe cover at the tip of the probe.
    d. On completion of the examination, the probe cover, gloves, tissues and wipes should be disposed of in the appropriate clinical waste bin and the probe cleaned and decontaminated, as per the cleaning and disinfecting of USS probes SOP.

6.1.6 List of Equipment Needed for Performing any Ultrasound Examination

- Ultrasound machine and transducers
- Scan couch
- Tissue for the scan couch
- Tissue for the patient
- Probe covers
- Ultrasound transmission gel
- Sterile Aqua lubricating gel
- Non-sterile gloves
- Plastic Apron
- Detergent wipes or Tristel Fuse
- Cleaning cloths
- Soft cloths/tissue for probes
- Tristel pre-clean wipes, Tristel Duo ULT and Tristel dry wipes for high level decontamination

6.2 Patient Preparation

6.2.1 Vetting of Requests

Ultrasound referrals will be received by the Clinical Radiology Department electronically (Ordercomms) via the MEDITECH Electronic Patient Record (EPR) system, Integrated Clinical Environment (ICE), or in rare cases paper requests. All requests will be vetted by the Sonographer (or in some cases a

Radiologist) and booked by the Clerical team. For detailed guidance on the vetting of Ultrasound requests please see Guideline for Vetting Ultrasound Requests (Excluding Interventional, Breast, Medical Physics, Cardiology, Obstetrics and Paediatric Ultrasound).

6.2.2 Ultrasound Examinations – Patient Preparation

The appointment letter (see **Appendix 1**) or verbal communication to patients will explain what preparation is required for their particular examination. The patient may be required to do either or both of the following:

- Starve for 6 hours and only drink clear fluids/black tea or coffee

Diabetic patients are also asked to fast, but their appointment is organised for the first appointment of the day to minimise the length of time without food. Diabetic patients are encouraged to contact the department if they have concerns regarding fasting for their scan, and alternative arrangements can be made.

- Full urinary bladder.

Patients are asked to drink 2 pints of water 1 hour before their appointment. If patients have concerns regarding filling/holding a full bladder, they are advised to attend the department 1 hour before to sit and fill their bladder whilst in the department.
Patients with ? hydronephrosis or ?renal retention will not be asked to fill their bladder to avoid any further renal complications.

Prior to commencing the scan:

Position the patient and adjust their clothing according to the protocols for the examination to be performed in a manner which allows an optimal outcome to be achieved while:

- recognising the patients need to retain dignity, self-respect and privacy
- ensuring their comfort as far as possible
- ensure that there is a safe environment for the patient and staff e.g. electrical safety, lone working, knowledge of infection control
- minimising the risk of work-related disorders to yourself (the Operator)
- Continually risk assess the working environment to ensure the safety of yourself and the patient

In-patients

In the interest of scanning acutely ill patients in a timely manner, full preparation may not be achieved. Patients may be scanned who have not fasted for 6 hours or consumed 2 pints of water. Attempts will be made to complete examinations under these constrains, and repeat scans with full preparation may be organised by the referrer if required.

6.2.3 Transvaginal Examinations

After explanation of the procedure, seek verbal consent for a transvaginal scan and document in the ultrasound report.

As per Trust policy, a chaperone (another Healthcare Professional) must be *offered* (but not enforced), and if declined by the patient this must be documented on the ultrasound report.
Report Documentation:
Transvaginal scan with patient verbal consent and chaperone offered NAME & TITLE (of chaperone)/chaperone declined.

- Ensure the patients' bladder has been emptied.
- Give the patient an appropriate area in which to undress (either in the scan room or changing room) and provide tissue, or a gown to cover their lower half.
- Request the patient to lie supine with their feet supported.
- Ensure the scan room door is closed and locked and explain to the patient that the door will be locked to maintain privacy and dignity during the examination.
- Ensure all appropriate equipment is available and in working order.
- A supply of tissues, wipes and sanitary products should be available for the patient after the scan.
- The standard examination gloves and probe covers used at TRFT are both latex free.
- Ensure that the transvaginal probe has been cleaned and decontaminated using Tristel pre-clean wipe and Tristel Duo ULT prior to the examination and the LOT number and expiry date of both the pre-clean wipe and Duo ULT are documented in the ultrasound report. The Transvaginal probe should then also be decontaminated after the examination and this is valid for 3 hours. If not used for 3 hours the clean and decontamination process needs to be repeated.

6.2.4 During the Scan

During all ultrasound examinations the Operator must:

- Observe the patient's condition and well-being at all times, and take appropriate action in response to any signs of patient deterioration, discomfort and/or distress.
- Make adjustments to the equipment controls to optimise the image quality and identify the appearance of ultrasound artefacts.
- Maintain appropriate communication with the patient to facilitate their understanding and co-operation with the examination.
- Extend the procedure as appropriate to confirm/supplement any initial findings.
- Seek advice from appropriate others if unexpected images or unusual findings are observed out of their area of personal competence.

6.2.5 Interpreters

If English is a second language and communication difficulties are expected, where ever possible, a trained interpreter should be present with the patient's consent. The arrangements for an interpreter should be made in

advance. Exceptions to this may be an emergency situation when a family member or friend may have to act as the interpreter. Please refer to the Trust "Interpreter – Translation services Policy".

6.2.6 Accompanying Friends and Family in the Scan Room

The purpose of setting limits on the number of accompanying people in the examination/scan room, and limiting children from attending is to create the optimum environment for the operator to concentrate during the examination so the maximum clinical information is achieved. An ultrasound examination has the potential to be upsetting/distressing depending on the findings, and so the presence of children is not advised. It will also assist with the monitoring of any potential photography or videoing during an examination.

In standard cases, where a patient does not require assistance, the Sonographer should discourage additional friends/relatives being in the room with the patient during the examination. If the patient requires support/assistance a maximum of one adult can accompany the patient into the scan room if the Sonographer feels this is appropriate.

If a patient attends with a child and no other adult, the child may accompany the patient into the scan room and the examination can be completed as long the child does not disrupt the scan. The scan may need to be suspended and rebooked at an alternative time when childcare has been arranged by the patient. In the instance of an intimate examination i.e. transvaginal or testes scan, the patient may need to be rebooked as other TRFT staff cannot supervise the child whilst the patient is having their scan.

No photography or videoing is allowed during any ultrasound examination. The Sonographer reserves the right to ask a patient or relative to cease photographing or videoing any aspect of the ultrasound examination. Any photographs or footage that has been obtained, the Sonographer reserves the right to ask for this to be deleted.

6.3 Patient Identification and Consent

Receive the patient and check their identification details (name, date of birth and address), and check these are correct on the patient's individual records and the work-list.

Introduce yourself (name and role) and confirm the status of "other people" in the room, explain their role and seek the patients consent for them to be present.
Briefly explain what the examination will involve and how the results will be received.

Answer any questions from individuals accurately and promptly, consistent with your professional roles and responsibilities, and refer any questions you cannot answer to the appropriate person.

6.4 RIS Examination Codes

Code	Explanation	Areas to include within report for this code
ULTRASOUND ABDOMEN		
UABDO	Abdomen	Upper abdominal structures including liver, aorta, pancreas, spleen, kidneys, gallbladder, bile ducts.
UABPE	Abdomen and pelvis	Upper abdominal structures including liver, aorta, pancreas, spleen, kidneys, gallbladder, bile ducts. Pelvic structures including bladder, prostate (male), uterus, ovaries, adnexae (female)
UABRE	Abdomen and renal tract	Upper abdominal structures including liver, aorta, pancreas, spleen, kidneys, gallbladder, bile ducts. Pelvic structures including bladder, prostate (male).
UABTEST	Abdomen and testes	Upper abdominal structures including liver, aorta, pancreas, spleen, kidneys, gallbladder, bile ducts. Testes and epididymides
UKIDS	Renal tract	Kidneys, urinary bladder, prostate (male).
UAORT	Aorta	Abdominal aorta +/- iliacs
UDIAP	Diaphragmatic region	Diaphragm
UMES	Mesenteric	Mesenteric artery
UABDA	Anterior abdominal wall	Anterior abdominal wall (Musculoskeletal - MSK)
UBUTT	Buttock	Buttock (MSK)
UBACK	Back - Para spinal	Back (MSK) or Please see paediatric ultrasound guidelines
UABDP	Paediatric abdomen	Please see paediatric ultrasound guidelines
UKIDP	Paediatric renal	Please see paediatric ultrasound guidelines
UBL	Bladder	Do not use please see UKIDS
UGB	Gallbladder	Do not use please see UABDO
ULIVR	Liver	Do not use please see UABDO
UPORT	Doppler liver / portal system	Do not use please see UABDO
ULTRASOUND CHEST		
UAXILL/R	Axilla left / right	Axilla
UCHES	Chest / Pleural cavity	Chest (MSK)
UCORA	Intracoronary	Not Used in Clinical Radiology

ULTRASOUND PELVIS		
UGPELV	Gynae pelvis	Pelvis either TA and TV please state in report) to include uterus, endometrium, ovaries, adnexae, urinary bladder +/- kidneys
UPETV	Pelvis (Transvaginal)	Pelvic structures to include uterus, endometrium, ovaries and adnexae.
UIUCD	Pelvis for IUCD	Pelvic structures to include uterus, ovaries, adnexae +/- Transvaginal +/- kidneys
UPEND	Doppler Penile	Radiologist only
UPEPR	Trans rectal Prostate	Trans rectal prostate and biopsies
UTEST	Testes	Scrotal contents to include testes and epididymides.
UHIPR/L	Adult Hip	Used only for MSK
UHIPP	Neonatal hips both	Please see paediatric ultrasound guidelines
UINGU	Groin / Inguinal region	Affected groin to include inguinal canal (MSK)
USPIN	Spine	Used only for MSK soft tissue
USPNA	Adult spine	Used only for MSK soft tissue
USPNP	Neo natal spine	Used only for paediatrics
UPELA	Pelvis (Transabdominal)	Do not use please see UGPELV
UHIPPS	Neonatal hips both (screening)	Do not use please see UHIPP
UANAL	Anal	Not Used in Clinical Radiology
ULTRASOUND NECK		
UCARO	Doppler carotid arteries	Carotids
UNECK	Neck	Neck to include thyroid, submandibular gland, parotid gland, lymph node chains +/- parathyroid
UDTAB	Temporal arteries	Used only for ?giant cell arteritis
UPTHY	Parathyroids	Do not use please see UNECK
UTHYR	Thyroid	Do not use please see UNECK
ULTRASOUND UPPER EXTREMITIES		
UCLAL / R	Clavicle left / right	Clavicle/sternoclavicular joint
UFINL / R	Fingers left / right	Specific query relating to the finger(s)
UHANB / L / R	Hand both / left / right	Hand structures (MSK)
USHLL / R	Shoulder left / right	Shoulder structures (MSK)
USRLJ / RJ	Guided injection shoulder left / right	Radiologist only
USULL / R	Upper limb left / right	Soft tissue structure upper limb (MSK)
UTHUL / R	Thumb left / right	Specific query relating to the thumb
UULVL / R	Doppler veins arm left / right	Doppler veins arms

ULTRASOUND UPPER EXTREMITIES (Continued)		
UWRB / L / R	Wrist both / left / right	Wrist structures (MSK)
UELBL/R	Elbow left / right	Elbow structures
USOTI	Soft tissue	Any superficial area of concern.
UVMAP	Vein mapping	Not used in Clinical Radiology
ULTRASOUND LOWER EXTREMITIES		
UACHT	Achilles tendon	Achilles tendon
UAILF	Doppler iliac and femoral	Iliac and femoral veins
UALLB	Doppler arteries femoro-popliteal	Femoral and popliteal arteries
UANKL / R	Ankle left / right	Ankle structures (MSK)
UCALL / R	Calcaneum left / right	Calcaneum and associated structures (MSK)
UFOOL / R	Foot left / right	Foot structures (MSK)
UKNEL / R	Knee left / right	Knee structures (MSK)
ULIMBL / R	Lower limb left / right	Soft tissue structure lower leg (MSK)
ULLVB / L / R	Doppler veins leg both / left / right	Doppler veins legs
ULVIL / R	Doppler veins legs – insufficiency left / right	Venous insufficiency
UMLSL / R	Marking long saphenous vein left / right	Not used in Clinical Radiology

6.5 Guidance on Examinations, Pathology, Onward Referral, imaging and Reporting

The following guidance is designed to support the performing Practitioner and referrers with common and frequently encountered pathology. This is not an exhaustive list and therefore additional pathology may need discussion with a Sonographer colleague, or Radiologist to help formulate an appropriate report and any onward referral / further investigation. The "additional recommendations" column may be used by the referring Clinicians to support patient management. The Sonographers may also include this information in their report to aid referring Clinicians.

In instances where the report states that a particular finding is 'of doubtful clinical significance' or 'does not require follow up', this advice should be taken after considering the patients full clinical picture. Sonographers may issue guidance or recommendations following an ultrasound examination but ultimately the patient management lies with the referring Clinician.

If professional clinical judgement or patient presentation sits outside of the following guidance, advice should be sought from a Radiologist or appropriate Clinician. In situations where clinical support is not readily available i.e. evening and weekends or during busy periods, reports can be issued advising the referrer to discuss the findings directly with the Radiologist. Justification for non-discussion at the time of the scan or report must be documented in the report.

It is important for all Practitioners to be aware of the limits of their knowledge and experience and seek appropriate advice accordingly. It is also important for Practitioners to be aware of the clinical presentation and clinical information on the request and gather any further relevant clinical information either upon discussion with the patient or through review of previous imaging / investigations. This is particularly important on the discovery of abnormal findings to determine if this is new.

It is the Sonographers professional responsibility to ensure that appropriate images are taken, which are representative of the examination performed and any pathology identified. Images will be stored on the Radiology Picture Archiving and Communication System (PACS).

The Issuing of Reports: Fail Safe Alerts and Safety Net Procedures SOP should be applied to all **new** significant, urgent or unexpected findings and previous imaging reviewed prior to issuing the report. A report alert may not be necessary if the pathology or condition seen is known or on-going. If the

patient is due to be immediately reviewed post scan a report alert may not be necessary.

There may be occasions where an outpatient is deemed medically unfit to be discharged from ultrasound and may need a medical or surgical opinion. In these cases please refer to **Appendix 2** for clarification on which team to contact. This will be via the on call Registrar for that given area.

6.5.1 Upper Abdomen

Examination of the upper abdomen will include the assessment of the solid organs as well as checking for the presence of intra-abdominal free fluid, enlarged lymph nodes, intra-abdominal masses not necessarily associated with the solid organs i.e. bowel/gastric masses.

Liver

Examine the size, contour, and parenchymal characteristics of all segments, appearance of intra-hepatic and extra-hepatic vessels and ducts.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Fatty Liver Report fatty infiltration of the liver and note areas of focal fatty sparing. If able to obtain, comment on direction of flow within the portal vein.		
Chronic/ Diffuse Liver Disease Report the parenchymal texture and the contour of the capsule. If able to obtain, comment on direction of flow within the portal vein.		*Consider referral to a Gastroenterologist.*
Haemangioma If the appearances are typical of haemangioma, there is no history of malignancy stated on the referral (even if there is more than one but less than four). If the appearances are not typical of haemangioma or there are multiple possible haemangioma's seen.	*Report as most likely haemangioma.* *Discuss with a Radiologist if available for further management.* *+/- Significant report alert procedure.*	*No follow-up required.*

New suspicious focal liver lesion	*Discuss with a Radiologist if available for further management.* *+/- Significant report alert procedure.*	
Calcified focal area	Report as calcified focal area with no associated soft tissue lesion.	*Most likely to be a granuloma* *In the absence of any other related clinical suspicion or change in clinical picture, this is of doubtful clinical significance.*
Hepatic Cysts Report the presence of simple cysts Cysts containing thin septations or complex cysts	 *Discuss with a Radiologist if available for further management.*	 *In the absence of any other related clinical suspicion or change in clinical picture, this is of doubtful clinical significance - decline at follow-up stage.*
Hepatic Metastases. Report the appearance, number (i.e. 1, 2, multiple), location and dimensions of the largest lesion in each lobe (R/L).	*Significant report alert procedure required.*	
Hepatocellular Carcinoma (HCC) Surveillance Report the appearance, number, location and dimensions of the largest lesion in each lobe (R/L).	*Significant report alert procedure required.*	

Portal Vein (specific request from Consultant). Report direction of flow only i.e. ante grade or retrograde.	*If there is any uncertainty, settings are optimised and flow still cannot be obtained then the advice of a Sonographer colleague or Radiologist is recommended.*	

Gallbladder and Biliary Ducts

Subjectively assess the gallbladder, the gallbladder wall characteristics and the nature of any content.

Note peri-gallbladder region.

The wall should be thin (no more than 3mm), smooth and well-defined.

The normal common duct should have a diameter of less than 6 mm in the adult, but this can increase in the post-cholecystectomy patient and in an older adult due to loss of elasticity of the duct wall. The measurement parameters quoted here are with callipers placed inner lumen wall to inner lumen measured at the porta hepatis. The duct measurements should be taken in clinical context with reference to previous history, including previous cholecystectomy, and liver function tests. In ducts with luminal diameters over 6 mm, assessment of intrahepatic biliary dilatation should be made. Intrahepatic duct dilatation is an abnormal finding. A duct of over 6 mm diameter should be considered abnormal in a **symptomatic** patient of any age and every effort made to examine the lower end for the cause of obstruction. Recent stone passage will also leave the duct temporarily dilated. A dilated duct should always be correlated with the LFTs and clinical history. (BMUS 2019).
Typical diameter of a Common Bile Duct (CBD) with a post cholecystectomy may be up to 10mm.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Cholecystectomy Note this in the report.		
Gallbladder calculi Report gallbladder calculi as single or several, with largest dimension. Comment if located in the gallbladder neck. Report presence of oedematous or thick walled gallbladder or pericholecystic fluid.	*Acute cholecystitis.* *Significant report alert procedure required.*	
Gallbladder Polyp Incidental finding ≤ 6mm (not previously seen)	*For follow up scans, refer to the flow chart and*	

Incidental finding > 6mm (not previously seen) Known gallbladder polyps- As directed by TRFT Consultants to follow the new pathway. For multiple gallbladder polyps measure the largest and base the flow chart upon that. State in report if sessile in nature (risk factor) State the location i.e. anterior, posterior, or fundal. See **Appendix 3** for flow chart and pro forma.	*complete the surveillance pro forma **(Appendix 3).*** *Refer patient to Acute Surgical Unit (ASU) for risk assessment on same day as scan (see flow chart **Appendix 3**).* *For follow up scans, refer to the flow chart and complete the surveillance pro forma. **(Appendix 3).***	*For follow up scans, refer to the flow chart. **(Appendix 3).***
Contracted Gallbladder If the clinical question is ? gallbladder pathology and the gallbladder remains contracted after the recommended fast. If the original scan was following an overnight fast or the prolonged fasting scan and gallbladder is still contracted.	*Advise in the report that the patient should be re-referred for a gallbladder scan and to specify in the referral an overnight fast and first appointment of the day.* *Comment if still contracted after prolonged fast.*	*Patient should be re-referred for a gallbladder scan and to specify in the referral an overnight fast and first appointment of the day.* *Referral to Upper Gastrointestinal (GI) (Surgical) team due to clinical question.*
Gallbladder non prep If the clinical question is ? gallbladder pathology and the patient has not completed prep for the scan and the gallbladder cannot be adequately assessed.	*Advise in the report that the patient should be re-referred for a gallbladder scan as prep was not followed and therefore*	*Patient should be re-referred for a gallbladder scan with prep followed.*

	the clinical question could not be answered.	
Dilated Common Bile Duct post cholecystectomy (>10mm) No other relevant pathology	*If no content is seen, then comment that this may relate to the patient's previous surgery +/- patient age and is unlikely to be clinically significant as long as the patient's liver function tests are normal.*	*Correlate with LFT's/clinical picture.* *If the liver function tests are abnormal then refer to Upper GI (Surgical) team.*
Dilated common bile duct without cholecystectomy If the CBD is dilated and no cause for the obstruction identified, this is considered abnormal irrespective of age.	*Advise correlation with biochemistry and clinical picture.*	*If the liver function tests are abnormal then refer to Upper GI (surgical) team.*

Pancreas, Spleen, Aorta and Diaphragm.

For the pancreas note the contour and ultrasound characteristics of the parenchyma. Note the region surrounding the pancreas and the calibre of the pancreatic duct.

For the spleen note the size and characteristics of parenchyma.

For the aorta subjectively assess the calibre from proximal portion to bifurcation, note the para-aortic region.

Assess the diaphragmatic region.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Pancreas Pancreatic duct dilatation ≥ 3mm		
Dilated pancreatic duct with no cause identified	*Discuss with a Radiologist if available for further management.*	
If there are any pancreatic lesions note size, location and the effect on the pancreatic duct	*Significant report alert procedure required.*	
Spleen		
Splenomegaly (Maximum spleen size is 13cm – 15cm dependant on patient build.)	*Quote the size within the report.* *Significant report alert procedure required.*	
Calcified focal area	*Report as calcified focal area with no associated soft tissue lesion.*	*In the absence of any other related clinical suspicion or change in clinical picture, this is of doubtful clinical significance.*
Simple cysts, report as for liver.		*In the absence of any other related clinical suspicion or change in clinical picture, this is of doubtful clinical significance.*

Report the presence and size of a splenunculum Focal lesion	*Discuss with a Radiologist if available for further management.* *Significant report alert procedure required.*	*Normal Variant*
Aorta Incidental finding of AAA quote dimensions (inner to inner) and report alert Please refer to the SOP Abdominal Aortic Aneurysm Surveillance.	*Dependant on size-* *Significant report alert procedure required.* *Advise referral to Vascular team.*	
Diaphragm Presence of adjacent fluid above or below the diaphragm. Presence of mass or collection adjacent to diaphragm.	*Significant report alert procedure required.* *Discuss with a Radiologist if available for further management.* *Significant report alert procedure required.*	

Renal tract

For the kidneys note the shape, size, echogenicity and position / orientation. The normal bipolar length is 9-13cm. Also note characteristics of the cortex, medulla and collecting system. Examine the perinephric regions.

Ureters will only be visualised with associated pathology, see below.

For the urinary bladder examine the structure and outline of the urinary bladder wall.

For the prostate examine the size and any associated bladder indentation.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Normal variants Duplex Ectopic Horseshoe Extra renal pelvis	*Comment in the report if no associated pathology 'This is a normal anatomical variant and does not require follow up.'*	*No ultrasound follow-up required.* *Consider urological referral/advice if clinically indicated.*
Acute Kidney Injury (AKI) Assess for cortical thinning and scarring, corticomedullary differentiation, outline of the kidney and any presence of hydronephrosis.	*In the presence of hydronephrosis suggest Urology referral (if not a Urology / inpatient).*	*Ultrasound only justified for AKI stage 3 or unexplained progressive AKI. See Ultrasound vetting document for more information.*
Hydronephrosis Observe and state within the report if mild, moderate or severe, including the measurement of the AnterioPosterior (AP) diameter of the renal pelvis and any hydro ureter. In addition, an obvious cause for the hydronephrosis must be searched for. Post micturition scan is required to assess for chronic retention.	*Significant report alert procedure required for all persistent hydronephrosis regardless of severity.*	

Angiomyolipoma All **new** echogenic lesions (possible angiomyolipoma) report and quote size and location. If increasing in size compared to previous scan	*State within the report 'As this is a new finding, recommend Computerised Tomography (CT) to confirm findings regardless of lesion size or patient age'.* *Advise CT regardless of patient age.*	
Renal or ureteric calculi Describe the position of calculi and measurement with note of any obstruction. (Kidneys, ureters and bladder – KUB X-Ray is not routinely required as CT is now considered the gold standard)	*In the presence of obstruction Significant report alert procedure required.*	
Renal Cysts Measure and report with location. Note if the cysts are simple or contain a single septation. Complex cysts (Bosniak classifications not used in ultrasound).	*Simple cyst/s or with a single, thin septation require no follow up regardless of size.* *Discuss with a Radiologist if available* *+/- Significant report alert procedure required.*	
Polycystic Kidneys Quote overall dimensions of kidney.	*If a new finding proceed to full abdominal examination to assess for the presence of cysts within other organs, particularly the liver. Significant report alert procedure required.*	
Urinary Bladder	*For any masses or bladder calculi Significant report alert procedure required.*	*Refer to Urology if not already under Urology.*

Note any contents within the bladder and any bladder wall masses. Complete post micturition volume when the patient has: • Prostate symptoms or enlargement • Urinary frequency • Nocturia • Recurrent urinary tract infections. The upper limit of normal post-micturition residual volume is 50mls.	*For residual volumes of greater than 50mls Significant report alert procedure required.*	*Refer to Urology if not already under Urology.*
Prostate Where the prostate appears enlarged, state this within the report along with a comment of any urinary bladder indentation.	*When enlarged prostate is identified complete post micturition residual volume.*	

6.5.2 Pelvis

Unless under gynecological referral, all women should attend with a full bladder however a Trans-vaginal (TV) ultrasound scan may also be undertaken. In some instances, where a Transabdominal (TA) scan has been performed and pelvis assessed adequately a TV may not be necessary.

An explanation of the TV procedure should be given at the time of attendance and consent obtained. The patient should always be offered (but not enforced) a chaperone for all intimate examinations. This should be documented in the report, if accepted with the chaperone name or if declined.

Where a male Sonographer undertakes a Trans-vaginal ultrasound examination; a female chaperone **must be** present.

Exceptions to (TV) scanning include;
- Virgo intacta
- Children
- Patients with severe vaginismus, if known.
- If patient declines consent (although prior to this stage the Sonographer should have explained to the patient that in most cases TA scan can be less sensitive for the detection of gynecological pathology).

Uterus

Examine the uterus commenting on the orientation. The thickness of the endometrium should be measured and evaluated in relationship to age and the phase of the menstrual cycle where appropriate.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Normal variants of the uterus Bicornuate Didelphic Unicornuate Septate	*A renal scan must be completed due to the high association with uterine and renal variants i.e. horseshoe, duplex, absent kidney etc.*	

Fibroids Position, number (i.e. 1, 2, multiple), size and echogenicity should be recorded and the position of the fibroid in relation to the endometrium (indenting, deviating or distorting). Classify if intramural, submucosal, subserosal or pedunculated. With a fibroid uterus also include overall uterine measurements.		*Not routinely followed up.* *If symptomatic consider referral to Gynaecology.*
Thickened post-menopausal endometrium Endometrial thickness over 4mm should prompt Gynecology referral in patients with or without Post-menopausal bleeding (PMB).	*Advise Gynaecology referral Significant report alert procedure required.*	
Endometrial polyp Endometrial polyp(s) should be measured and site stated.	*Post-menopausal suggest Gynaecology referral.* *Premenopausal & symptomatic i.e. Intermenstrual bleeding (IMB), menorrhagia suggests Gynaecology referral.* *Premenopausal & no symptoms on referral or when questioning patient – suggest General Practitioner (GP) to correlate findings with clinical symptoms and refer to Gynaecology if appropriate.*	*Correlate findings with clinical symptoms and refer to Gynaecology if appropriate.*

Intrauterine System (IUS) not in situ. If the IUS is not seen trans-abdominally; proceed to a trans-vaginal scan. An abdominal x-ray is indicated if: • not visualised transvaginally • The patient reports no loss of IUS vaginally.	*X-ray to be completed following referral through Meditech or paper request by appropriate referrer. Patient referred to the X-ray department.*	
Post-Menopausal Bleeding See additional guidance for PMB at the end of this section.		
Recurrent miscarriage Patients will be referred from the Gynaecologists for a TVS following three or more miscarriages for assessment of uterus, ovaries and adnexae. For any normal variants of the uterus.	*Proceed to scan the kidneys, comment on any normal variants with the uterus or kidneys.*	
Infertility Patients will be referred from the Gynaecologists for a TV assessment of uterus, adnexae and ovaries including ovarian volumes and comments of any appearances in keeping with Polycystic ovaries (PCO). With any normal variants of the uterus.	*Proceed to scan the kidneys, comment on any normal variants with the uterus or kidneys.*	

Post-Menopausal Bleeding

Referrals for PMB directly from GP's should be redirected immediately to the PMB gynaecology team, in line with the 2 week wait (2WW) pathway, by declining the referral and asking the Clerical team to send the request back urgently to avoid any delay. This will therefore ensure that all patients with these clinical indications receive the same investigations and clinical review within a timely manner.
The PMB gynaecology pathway includes:

- GP sends referral to the contact centre under 2WW referral.
- Clinical Nurse Specialist orders TV ultrasound.
- Referral received by the Clinical Radiology Department.
- TV Scan arranged and performed
- USS report reviewed by the gynaecologist
- Hysteroscopy examinations arranged as necessary based on the USS findings and clinical picture.

Ultrasound reports are produced using the Picture Archive and Communication System (PACS), Voice Recognition (VR) software with RIS integration, which at present does not have a report template built for use for PMB reports. To ensure consistency of reports for this category of referral the following points **must** be included on the report as a minimum:

- State transvaginal scan with patient consent and a chaperone offered / declined.
- State the decontamination process used.
- State in the report if TVS is declined or not possible and if a TA scan is performed in addition to the TV Scan.
- Document the state size, shape and orientation of uterus.
- For fibroids – the position, number, size and echogenicity should be recorded and the position of the fibroid (s) in relation to the endometrium (indenting, deviating or distorting). Classify if intramural, submucosal, subserosal or pedunculated. With a fibroid uterus also include overall uterine measurements.
- Interrogate the endometrium and measure in the sagittal plane at the fundus or at any point of focal thickening, also record an image of the endometrium in the transverse plane.
- If the measurement obtained is not at the fundus, state this within the report.
- If the entire or part of the endometrium cannot be visualised, state why this cannot be seen and that further evaluation may be required.
- State the overall appearance of the endometrium regardless of the thickness.
- State the presence, size and location of any focal lesions noted within the endometrial cavity.
- State the presence of any fluid in the endometrial cavity and if this is sonolucent or echogenic. Measure the depth of fluid making sure that the endometrial thickness does not include this.

- Assess the ovaries and adnexae, following the ovaries and adnexae guidance below.

Ovaries and adnexae

The ovaries should be evaluated in at least two planes using the bladder as an acoustic window.
If the ovaries are not visible, proceed to a TV scan if clinically concerned. If a TV scan is declined, it may be beneficial to ask the patient to empty her bladder, and the ovaries imaged using compression in both iliac fossae.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Ovarian cyst State the size in mm and location and appearance of the cyst. Do not state an individual subjective remark on size e.g. large.	**All cysts to be reported to International Ovarian Tumor Analysis (IOTA) Simple Rules: (See Appendix 4).**	

B1: Unilocular cyst	M1: Irregular solid tumour
B2: Presence of solid components, with largest diameter <7mm	M2: Presence of ascites
B3: Presence of acoustic shadows	M3: At least four papillary structures
B4: Smooth mutilocular tumour, with largest diameter <100mm	M4: Irregular mutilocular solid tumour with largest diameter ≥100mm
B5: No Blood flow (colour score 1)	M5: Very strong blood flow

Blood flow assessment:
Set colour flow Doppler velocity between 2 and 4cm/sec. Use appropriate gain.

If the features fall into the above categories, report: “As per IOTA Simple Rules the features are suggestive of a benign/malignant/indeterminate* lesion “.
*as appropriate

Premenopausal Functional or **Unilocular ovarian cysts (Benign)** (thin-walled cysts without internal structures): **Cysts ≤30mm**: Normal physiologic findings, report as dominant follicle. **Cysts >30 and ≤50 mm**: **Cysts >50 and ≤70 mm**: **Cysts >70 mm**:	 *No follow-up needed.* *Rescan in 10 weeks, if persisting, rescan in 6 months, if still persistent, suggest Gynaecology referral.* *Rescan in 10 weeks, if persisting, suggest Gynaecology referral.* *Suggest Gynaecology referral.*	 *No follow-up needed.* *Please re-refer.* *Please re-refer.*
Haemorrhagic cysts (Benign) **< 50mm**: **>50mm:** Assess using colour Doppler.	 *Rescan in 10 weeks.* *Suggest Gynaecology referral.*	
Complex cysts (Indeterminate / malignant) Benign and malignant or malignant features.	 *Urgent Gynaecology referral.* *Significant report alert procedure required.*	
Dermoid cysts (Benign) Regardless of size. Assess using colour Doppler.	 *Suggest Routine Gynaecology referral.*	

Endometrioma (Benign) State the size in mm and location and appearance of the cyst.	*Suggest Routine Gynaecology referral.*	
Post-menopausal cysts **Unilocular cyst >10mm and <50mm** **Unilocular cysts >51mm:** **Complex cysts (Indeterminate / malignant)** Benign and malignant or malignant features.	Require Ca-125 level assessment. If normal, then patient needs 4-monthly Ultrasound scan and Ca-125 assessment for 1 year. *See **Appendix 5** for statement to be used in report and guidance for monitoring/referral.* *Suggest Gynaecology referral.* *Suggest urgent Gynaecology referral.* *Significant report alert procedure required.*	
Polycystic Ovarian Morphology The Rotterdam consensus definition for diagnosis of polycystic ovaries states polycystic ovaries are present when: (a) one or both ovaries demonstrate 12 or more follicles measuring 2–9 mm in diameter, or (b) the ovarian volume exceeds 10 cm^3. Only one ovary meeting either of these criteria is sufficient to establish the presence of polycystic ovaries.		*These results are not a definitive diagnosis of Polycystic Ovarian Syndrome (PCOS) and should be considered in conjunction with biochemistry and overall clinical symptoms.*

Family History of ovarian Cancer monitoring Patients may be referred from the Gynaecologists or GP. These patients require a TV scan assessment of uterus, ovaries and adnexae as gold standard, however TA may be used if both ovaries can be adequately assessed.	*If ovarian pathology seen report as per IOTA classification.*	
Clomid Patients will be referred from the Gynaecologists for a TV scan assessment of the uterus, ovaries and adnexae between day 10 – 14 of the menstrual cycle. The report should include: • Ovarian volumes • Presence of dominant follicles including site and size • Presence of ovarian cysts including site and size • Presence of ovarian hyperstimulation	*For ovarian hyperstimulation - Significant report alert procedure required.*	

6.5.3 Scrotum

Pathology	Post scan Sonographer recommendations	Additional recommendations
Testicular mass Report the size, texture and vascularity of the mass.	*Urgent Urology referral (ideally same day via the Urology Registrar)* *Significant report alert procedure required.*	
Varicocele Subjectively assess for severity, use colour Doppler and Valsalva technique where appropriate. Where varicoceles are present a renal scan should also be undertaken to exclude an occult renal tumour.		*No Follow up required*
Epididymal cyst Report number, site and measurements of largest.		*No Follow up required*
Testicular microlithiasis Follow up is not routinely needed as it is no longer considered as an increased risk for malignancy.	*No Follow up required*	*Advise regular self-examination*
Torsion **Cannot decline these referrals** Should come from the Urology Registrar or Consultant only.	*State, even with vascularity present, "USS cannot fully exclude torsion."*	*Correlate with clinical findings*

6.5.4 Neck

When imaging the neck, the seven sweep technique should be followed. Thyroid, isthmus, submandibular glands, parotid glands, lymph node chains and submental space should all be included within all neck examinations.

Pathology	Post scan Sonographer recommendations	Additional recommendations
Thyroid nodules See 'Assessment of nodules guidance' **Appendix 6**		*Ultrasound appearances that are indicative of a benign nodule (U1-2) should be regarded as not requiring fine needle aspiration cytology (FNAC), unless the patient has a statistically high risk of malignancy. If the US appearances are equivocal, indeterminate or suspicious of malignancy (U3-5), an US guided FNAC should follow. Any abnormal lymph node in the neck should undergo FNAC to facilitate accurate diagnosis / staging.*
Cervical lymph nodes – see guidance below Typical appearance/no sinister features. Reactive/ indeterminate features. Atypical/sinister features.	*Report as "most likely benign".* *Require rescan in 4 weeks.* *Lymph nodes with a higher risk/ ultrasound features of malignancy – Significant report alert procedure required.*	

Submandibular / parotid obstruction State the cause and size of obstruction e.g. mass or calculus, commenting on duct dilatation and resulting sialadenitis if visualised.	*Significant report alert procedure required.*	

Cervical lymph nodes

No single criterion can be used to determine whether a lymph node is benign (reactive) or malignant. However, a combination of findings will allow the sonographer to alert the clinician to an increased likelihood of malignancy, see table below:

Lymph node size	The larger the node, the more likely it is to be malignant. Nodes less than 1cm in short axis are usually benign.
Lymph node shape	Normal lymph nodes are oval. The description “taller than wide” identifies a rounded or abnormally shaped node that is more likely to be malignant.
Echogenic Hilum	An echogenic hilum is taken as a feature of a benign lymph node. In early tumour infiltration the hilum may be preserved and therefore this is not an absolutely reliable feature. Absence of the hilum implies replacement with tumour. Similarly, distortion or irregularity suggests tumour involvement.
Cortical Morphology	Irregular thickening of the cortex is a feature of malignancy. While uniform thickening implies benign disease this is not an absolute parameter. Furthermore, even with uniform thickening the thicker the cortex, the more likely a malignant diagnosis (see size of lymph node).
Echogenicity	Benign nodes are typically homogeneous while malignant lymph nodes are typically heterogeneous. Heterogeneity can occur in benign nodes as a result of haemorrhage. Some malignant processes can produce a homogeneous appearance. This is particularly the case in lymphoma where nodes may even demonstrate a pseudo-cystic appearance with hypoechogenicity and posterior acoustic enhancement.
Node margins	These are poor predictors of the nature of the disease process although irregularity of outline is more commonly

	seen in malignancy.
Vascular Patterns	Normal and reactive lymph nodes may be avascular or have only hilar vascularity. Mixed hilar and increased peripheral vascularity is suggestive of lymphoma; pure peripheral vascularity is more suggestive of metastatic disease.

Where reactive lymph nodes are suspected, a repeat scan in 4 weeks may be of use to check the reactive nodes have resolved.

6.5.5 Musculoskeletal

TRFT adopts the guidance produced by the 'European Society of Musculoskeletal Radiology' (ESSR) for MSK ultrasound examinations.

The following guidance documents should be adopted for clinical practice to include Ankle (including Achilles tendon & Plantar fascia), Knee, Hip, Wrist, Elbow and Shoulder ultrasound examinations with additional guidance also provided below for superficial soft tissue masses and Rheumatology.

Ankle https://essr.org/content-essr/uploads/2016/10/ankle.pdf
Knee https://essr.org/content-essr/uploads/2016/10/knee.pdf
Hip https://essr.org/content-essr/uploads/2016/10/hip.pdf
Wrist https://essr.org/content-essr/uploads/2016/10/wrist.pdf
Elbow https://essr.org/content-essr/uploads/2016/10/elbow.pdf
Shoulder https://essr.org/content-essr/uploads/2016/10/shoulder.pdf

Pathology	Post scan Sonographer recommendations	Additional recommendations
Hernia Reports to include: • Site of defect • Size of defect • If fully reducible or not • If direct or non-direct • Contents shown to pass through the defect. If the bowel is noted state if peristalsing.	*If the bowel is noted within the defect and not peristalsing* *Critical report alert procedure required.* *If no hernia is seen, but a mass is present in the region of interest (either solid or cystic), advise CT to clarify nature of mass.*	

If the linear alba has a measurement of 25mm or over report at diastasis recti	*Significant/Urgent report alert procedure required.(Subject to patient condition/presentation).* *For Diastasis recti state in report, "No abdominal wall defect noted associated with hernia".*	
Superficial soft tissue masses The following points should be recorded; • Whether the mass is cystic, solid or of a mixed appearance. • Whether the mass is vascular in appearance on colour Doppler. • The nature of the tissue in which the mass arises e.g. Intra-muscular, subcutaneous or boney.	*If the ultrasound appearances do not confidently confirm a benign diagnosis then the report should include:* *'referral for further investigation advised on an urgent suspected cancer pathway referral' Significant report alert procedure required.*	
Rheumatology hands / wrists / feet The wrists/ ankle, Metacarpal Phalangeal Joints (MCPJ)/Metatarsal Phalangeal Joints (MTPJ) and Proximal Interphalangeal Joints (PIPJ) should be examined with power Doppler at each joint. **Appendix 7** Must be used when diagnosing grades of inflammatory synovitis.	*Report using the grading below stating which joints are affected.*	

6.5.6 Vascular

Carotid ultrasound

Duplex ultrasound examination is used for the assessment of the extra-cranial carotid and vertebral arteries to detect the presence of carotid disease. Referrals include symptomatic carotid disease, pre-cardiac surgery and familial history.
In the longitudinal section (LS) and transverse section (TS) examine the Common, Internal and External carotid arteries (CCA,ICA,ECA) to assess the anatomy in grey scale and with the use of pulsed and colour Doppler. Assess direction of flow in the vertebral arteries.

Pathology	Post scan Sonographer recommendations	Additional recommendations
Atherosclerotic plaque Report the type (calcific, fibrous or soft), location and extent of disease including the estimation of the degree of significant stenosis.	*If a significant stenosis is identified, refer the patient back to clinic.* *(Stenosis dependant)* *Significant report alert procedure required.*	
Reversed flow in the vertebral artery Report side or if bilateral.		
Aneurysmal Report size and position	*Significant report alert procedure required.*	

Refer to **Appendix 8** Table for the evaluation of the degree of stenosis from velocities and velocity ratios – carotid arteries

Care should be used in applying these velocity guidelines:

- With significant contralateral disease where flow compensation is suspected priority to the velocity ratio should be given over the absolute Peak systolic velocity (PSV) and End Diastolic Velocity (EDV) values
- In the case of stenosis approaching subtotal occlusion, the absolute stenotic velocities will reduce as overall flow drops. Low velocity flow will be evident in the distal ICA and velocity ratios with respect to the distal ICA will be elevated.

- In cases of severe ICA stenosis enhanced flow may be evident in the ECA, suggesting collateralisation via the ECA. In this case ICA/CCA ratios should be used with caution.

Lower limb venous study for Deep Vein Thrombosis (DVT).

Duplex ultrasound examination of the deep veins of the lower limb to include the Common femoral, superficial femoral and popliteal veins. Indications are for ? DVT in line with the NICE guidelines.
The vessels are compressed every 2-3 cm and imaged using colour Doppler from the groin to popliteal.

Pathology	Post scan Sonographer recommendations	Additional recommendations
Deep Vein Thrombosis Report the position and proximal extent of a DVT. Consider examining the Iliac vessels and Inferior Vena Cava (IVC) when the DVT extends into the pelvis.	*Standard report text on the Picture Archiving and Communication System (PACS) must be used for all DVT reports* *Report alert not necessary as this cohort have immediate review by Acute Medical Unit (AMU)*	
Bakers cyst Report size		
Thrombophlebitis Report the position and extent of the thrombus in particular the position relative to the deep venous system at the Sapheno-femoral or Sapheno-politeal junctions.		
Oedema Report the presence and location		

Upper limb venous study for DVT

Duplex examination of the deep and superficial veins of the upper limb to include the Subclavian, Axillary, Brachial, Cephalic and Basilic veins. The vessels are assessed using colour Doppler and compression every 2-3 cm.

Pathology	Post scan Sonographer recommendations	Additional recommendations
Deep Vein Thrombosis Report the position and proximal extent of a DVT.	*Report alert not necessary as this cohort have immediate review*	

Lower limb venous study for Venous Insufficiency.

Duplex ultrasound examination is used for the assessment of the deep and superficial veins in the lower limb to detect the presence or absence of venous insufficiency. Clinical indications include varicose veins, venous eczema and ulceration to identify reflux in the deep and superficial systems.

The common femoral, superficial femoral, popliteal, long saphenous and short saphenous veins are assessed for patency and reflux by compression and augmentation with the use of colour and pulsed Doppler.

Pathology	Post scan Sonographer recommendations	Additional recommendations
Incompetence Site of incompetence and reflux greater than 5 seconds Reflux time 1-5 seconds No significant reflux		
Varicosities State the source of the varicosities	*Suitability for Laser treatment i.e.* *Linearity of the vessel, patency and vessel calibre > 3mm AP diameter*	

Abdominal aortic Aneurysm (AAA) Surveillance.

Surveillance of known abdominal aortic aneurysms under the care of the Vascular Surgeons at Sheffield Teaching Hospitals NHS Trust (not for GP patients). Some patients are referred for surveillance via their GP in conjunction with the Vascular Surgeons.

The abdominal aorta should be assessed in Transverse Section (TS) and Longitudinal Section (LS) from the xiphisternum to the aortic bifurcation. An AAA will be diagnosed when there is a focal dilatation of the aorta with a maximum AP diameter of ≥ 3.0cm. The vessel should be imaged perpendicular to the ultrasound beam, measuring the maximum Anterior Posterior (AP) diameter of the aneurysm, **inner border of vessel wall to opposite inner border of vessel wall** in both TS and LS to ensure accuracy of measurement.

The maximum AP diameter of the LS image MUST be quoted in the report.

An image with calliper measurements, demonstrating the maximum AP diameter of the AAA **must** be recorded. If the AAA extends into / beyond the bifurcation, the iliac arteries **must** also be assessed, measured and the appropriate images recorded.

See Medical Imaging, Physics & Illustration CSU's SOP for Ultrasound 'Abdominal Aortic Aneurysm' (AAA) surveillance scan.

Pathology	Post scan Sonographer recommendations	Additional recommendations
AAA Incidental finding of AAA.	*Dependant on size- Critical / Urgent/ Significant report alert procedure required* *Advise referral to Vascular Surgeon.*	

Lower limb arterial

Lower limb arterial studies are generally performed in the Medical Physics department along with Ankle-Brachial Pressure Index (ABPI's). However, some patients may be examined within the Department of Clinical Radiology.

Duplex examination is performed on patients with a history of intermittent claudication, rest pain, non-healing ulcers or gangrene to ascertain the presence and site of stenotic or occlusive lesions affecting the lower limb arteries. The common femoral, profunda femoris, superficial femoral and popliteal arteries are assessed using grey scale, colour and pulsed Doppler.

See **Appendix 9** for the table showing degree of stenosis in lower limb arterial studies.

Reports should include:

- Summary of findings
- State if the vessel is patent or occluded
- Comment on waveform detected
- Presence of significant disease, site and extent with relevant peak systolic velocity ratios
- Comment on any recanalization of any occlusion
- Comment on and measure aneurysmal vessels
- Summary of the findings within each vessel

Upper limb arterial

The subclavian, axillary, brachial, radial and ulna arteries are assessed using greyscale, pulsed wave and colour Doppler. Clinical indications include Thoracic outlet syndrome, atherosclerosis and Reynaud's disease. Thoracic outlet syndrome examination includes assessment of the subclavian artery in neutral, abduction techniques.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Occlusion	*Urgent referral to the Vascular team.* *Significant report alert procedure required.*	
Stenosis	*Significant report alert procedure required.*	
Significant disease including aneurysm	*Significant report alert procedure required.*	

Reports should include:

- Summary of findings
- State if the vessel is patent or occluded
- Comment on waveform detected
- Presence of significant disease, site and extent with relevant peak systolic velocity ratios
- Comment on any recanalization of any occlusion

- Comment on and measure aneurysmal vessels
- Summary of the findings within each vessel

Upper limb arterial assessment prior to harvesting of the Radial artery for Reconstructive Surgery.

The radial artery of the non-dominant hand is usually harvested, both limbs are assessed to determine suitability.

The subclavian, axillary, brachial, radial and ulna arteries of both upper limbs are assessed using greyscale, pulsed wave and colour Doppler.

The calibre of the radial artery is measured (outer wall to outer wall) in the proximal, mid, and distal segments. The vessel diameter ranges from 2.3 – 5 mm with a calibre of > 2mm optimal for surgery.

The ulna artery is assessed using pulsed wave Doppler during compression of the radial artery at the wrist to ensure sufficient flow distally post-surgery.

Reports should include:

- Summary of findings
- State if the vessel is patent or occluded
- Comment on waveform detected
- Presence of significant disease, site and extent with relevant peak systolic velocity ratios
- Comment on any recanalization of any occlusion
- Comment on and measure aneurysmal vessels
- Summary of the findings within each vessel
- Radial artery AP diameter
- Confirmation of the ulna artery patency on compression of the radial artery

Temporal artery assessment for Giant Cell Arteritis.
See **Appendix 10** for background information and imaging.

A patient with suspected Giant Cell Arteritis (GCA) must be referred by a Rheumatologist to the Clinical Radiology department, and a subsequent duplex ultrasound examination +/- temporal artery biopsy, performed **as soon as possible, ideally within 24-48 hours but no later than 1 week after suspected diagnosis**, as per the NICE accredited guidelines 2020.

Referrals should be accompanied by an email to the Ultrasound Lead and temporal artery sonographers to ensure an appointment is allocated as soon as practicable.

The right and left axillary arteries are assessed for a large vessel vasculitis employing grey scale and colour/power Doppler. The vessels are assessed in longitudinal and transverse section.

The right and left common temporal, frontal and parietal branches are visualised and assessed in grey scale and colour/power Doppler.

Pathology	**Post scan Sonographer recommendations**	**Additional recommendations**
Hypoechoic intima-media thickening (IMT) of the vessel wall (halo sign). Non-compression of the vessel (compression sign). Stenosis and possible vessel occlusion.	No post-scan Sonographer recommendations as the patient should already have had a specialist referral and treatment for GCA. No additional recommendations.	Correlation of the ultrasound and temporal artery biopsy results should be made retrospectively for further patient management/audit.

Reports should include:

- The date the symptoms started or the referral date.
- State whether the above vessels were visualised/not visualised.
- The intima media thickness for all the above vessels.
- State if the vessels are compressible.
- Conclusion – GCA: state positive/negative/equivocal. If positive, state the site.
- State whether large vessel vasculitis (LVV) present in the axillary arteries, if present assess the abdominal aorta.

IMT – Cut Off Values

- Common Temporal artery – 0.42mm.
- Frontal branch – 0.34mm
- Parietal branch – 0.29mm
- Axillary artery – 1.0mm

7. RELATED DOCUMENTS AND GUIDANCE

BMUS, 2020, *https://www.bmus.org/static/uploads/resources/2020_Guidelines_for_Professional_Ultrasound_Practice.pdf*

Haar EG, Duck FA (2012) 3rd Edition The safe use of Ultrasound in Medical Diagnosis. British Medical Ultrasound Society.

Venous thromboembolic diseases: diagnosis, management and thrombophilia testing Clinical guideline [CG144] Published date: June 2012 Last updated: November 2015

Varicose veins: diagnosis and management .Clinical guideline [CG168] Published date: July 2013

Myers K, Clough AM. ((2014) Practical Vascular Ultrasound An Illustrated Guide. CRC Press.

Thrush A, Hartshorne T (2010) Peripheral Vascular Ultrasound How, When and Why. Churchill Livingstone.

Habib J, Baetz L, Bhagwan S (2012) Assessment of collateral circulation to the hand prior to radial artery harvest. Vascular Medicine 17 (5) 352-361

Quantitive grading system for Doppler US signals in synovial tissue https://doi.org/10.1093/rheumatology/kev205 Published: 10 June 2015

Weerakkody,Y.et al. Ultrasound assessment of carotid arterial atherosclerotic disease. Radiopaedia [online]. https://radiopaedia.org/articles/ultrasound-assessment-of-carotid-arterial-atherosclerotic-disease Accessed 25.09.2019

Wolfgang A Schmidt, Ultrasound in the diagnosis and management of giant cell arteritis, *Rheumatology*, Volume 57, Issue suppl_2, February 2018, Pages ii22–ii31, https://doi.org/10.1093/rheumatology/kex461

Ultrasound Appointment letter

DEPARTMENT OF CLINICAL RADIOLOGY

NHS
The Rotherham
NHS Foundation Trust

Patient No:
NHS No: 9990005249

The Rotherham NHS Foundation Trust
Moorgate Road
Rotherham
S60 2UD

Wednesday 17 April 2019

Mickey Mouse
88 Moorgate Road

ROTHERHAM
S602UD

Dear Mickey Mouse

An appointment has been made for you to attend for the following examination(s), at the request of your Physician **Dr**

on: **Wednesday 17 April 2019 at 23:00 PM**

for: **ULTRASOUND ABDOMEN & PELVIS**

On arrival at Rotherham General Hospital, please report to the Main X-ray reception within the X-ray Department on Level B, 10 minutes prior to your appointment time. Please note if you are travelling by car, parking facilities are limited.

If unable to attend or you have any queries, please contact the Ultrasound Appointments Clerk on Telephone No. 01709 426380.

If you are intending to bring along any children with you whilst attending your appointment, please note that children are not allowed to accompany you into the Ultrasound room for your examination. You are therefore advised to bring along another responsible adult to care for your child.

Please be advised that your Ultrasound scan may be performed by a male or female sonographer/radiologist.

An Ultrasound scan is a special examination using an Ultrasound scanner. A special gel is put onto your skin and an ultrasound probe moved over it. This is a painless examination and there are no side effects. The examination takes approximately 10-20 minutes.

IMPORTANT: PREPARATION
1. Six hours before the scan please have **NOTHING** to eat and only water or fruit juice to drink.
2. Drink at least 2 pints of water 1 hour before your scan and do **NOT** empty your bladder.
If you cannot drink this amount of fluid, please arrive 1 hour early to drink your water the department.

Should you suffer from diabetes, please inform the Ultrasound Department prior to your appointment on 01709 426380.

Rotherham Foundation Trust is now smokefree; smoking is prohibited in all buildings and grounds. If you would like help to stop smoking contact Rotherham NHS Stop Smoking Service on 01709 422444 for free and confidential support.

Yours sincerely

Appointments Manager

V2 RGH US Adult Stone & Full Bladder Letter

14

Urgent Care Referrals: Who Goes Where?

NHS The Rotherham NHS Foundation Trust

Safe & Sound

This list represents guidance as to what conditions should be referred to which specialty – it does not take the place of common sense, clinical acumen & considered communication. **However**, if a referring team/UECC refer to a specialty in line with this WGW, the referral should be accepted.

MEDICINE

- Chest Pain
- Cardiac Arrhythmia / Palpitations
- Shortness of Breath
- Haemoptysis
- UGI Bleed
- Coma
- Seizures & Collapse requiring admission
- Headache
- Dysphagia
- Lower/Upper Limb DVT
- DKA (16+)/Hypoglycaemia (16+)
- Non Specific Deterioration in an Elderly Patient (including simple pubic rami fracture)
- Overdose requiring admission
- Renal Failure (NOT obstructive uropathy or bladder outflow obstruction)
- Painless Jaundice
- Lower limb cellulitis & Diabetic Foot
- Simple UTI without Abdominal pain
- Osteoporotic wedge #
- Neck breathers – tracheostomy patients and laryngectomy patients (admit to RSU via AMU)

GYNAECOLOGY

- PV Bleeding
- PV Bleeding in Pregnancy up to 18 weeks
- Menorrhagia leading to anaemia
- Pelvic Pain (suspected Gynae pathology)
- Suspected Ectopic Pregnancy
- Gynaecological Malignancy
- Abdominal pain with positive pregnancy test (inc ectopic)
- Abdominal Pain already awaiting Gynae laparoscopy
- Abdominal Pain + PV discharge

OBSTETRICS

Any pregnant patient and/or those up to 6 weeks post-partum admitted outside of maternity, please contact the obstetric team on call for advice

PALLIATIVE CARE

Palliative care/end of life patients should be referred directly to palliative care (either directly on 7180 or via switchboard) 7-days a week 0800-1800. Where an OOH admission is required, such patients should be referred to the most appropriate specialty, but please ensure PC are notified of all such admissions. PC can assist with non-medical prescribing, DNA-CPR completion & access to non-hospital care settings

CANCER OF UNKNOWN PRIMARY (CUP)

For patients with a known or incidental finding of Cancer Of Unknown Primary, please refer to the Cancer of Unknown team (either directly on 7180 or via switchboard), 7-days a week, 0800-1800

ACUTE ONCOLOGY SERVICE (AOS)

For patients presenting with Acute Oncological emergencies, please refer to the Acute Oncology Service (either directly on 7180 or via switchboard), 7-days a week, 0800-1800. For out-of-hours support, please refer to the Trust's acute oncology guidelines

HAEMATOLOGY

On-call Haematologist should be contacted for advice about any patient with a haematological malignancy who is currently on active treatment

CRITICAL CARE / ANAESTHETICS

Will assist resuscitation if required, but patient should be referred to most appropriate specialty & detailed management plan completed by UECC/receiving team

VASCULAR

Refer directly to NGH (limb ischaemia, AAA). Where temporary overnight admission is required for non-critical referrals, patient to be admitted under general surgery

STROKE/SUSPECTED STROKE

Any new focal neurological symptoms - suspect stroke (FAST symptoms) and:

- Contact Stroke Nurses on 8228, 24/7
- Complete online stroke referral on Meditech

During weekdays, stroke consultants are available 0900 to 1700 via switchboard.

Please don't wait for MRI head for confirmation before making referral.

UROLOGY (8am-4pm; OOH refer to general surgery)

- **Pyelonephritis**
- **Obstructive Uropathy**
- **Renal colic**
- **Urinary retention**
- **Priapism**
- **Torsion of testis**

ENT

- **Epistaxis**
- **Stridor**
- **Tonsillitis and Quinsy**
- **ENT Malignancy**
- **Vertigo**
- **Periorbital Abscess / Cellulitis** (and Ophthalmology)
- **Ear Infections**
- **Fractured nose**
- **Neck Abscess**

OPHTHALMOLOGY

All Ophthalmology patients requiring admission must be referred to Ophthalmology; if non-surgical reason for admission, patient to be admitted under joint care with adult medicine

ORTHOPAEDICS

- **Fractures** (including greater trochanter # and those that then lead to the need for social admission, except simple pubic rami #)
- **Suspected #NOF**
- **Hip injury with no # & unable to WB**
- **Limb Trauma**
- **Back Pain** (including cauda equina / spinal cord compression)
- **Upper Limb Cellulitis / abscess**
- **Hand Injuries / Infections**
- **Soft Tissue Infections close to a joint**
- **Dislocations**
- **Spinal Injuries**
- **Septic Arthritis**
- **Thigh & Lower limb abscess**
- **Traumatic & Acute Joint pain**
- **Osteomyelitis / discitis**

HIV/SEXUAL HEALTH

- **For admissions of all patients with HIV,** please inform Integrated Sexual Health Service (ISHS) on ext 7777, irrespective of the reason for which they are admitted.
- **If out-of-hours and urgent advice needed,** contact the Sheffield ID on-call HIV service (via switchboard), but please still inform ISHS the next working day

PAEDIATRICS

- **Young People aged 16 up to their 18th Birthday**
  To be given a choice of where they want to be admitted
- **Abdominal pain**
  Refer to Appendix 2 of the Trust's Internal Professional Standards
- **Suspected surgical pathology requiring admission**
  Refer to the most appropriate surgical specialty & admit to Children's Ward (unless patient choice & > 16)
- **Ex-premature baby**
  (<34 weeks at birth) & under 1 year from DoB – senior review in UECC; advice to be sought from paediatric medial team if required
- **Any child with suspected sepsis**
- **All P1 children & young people**
  Must be physically reviewed by paediatric medical team
- **Safeguarding**
  If needs CYPS clinical review, refer to Paediatric Registrar &/ or if needs >4hours from referral for social care input to be completed, patient should be admitted under CYPS
- **Mental health**
  If needs CYPS clinical review, refer to Paediatric Registrar and / or if needs further input from CAMHS that will take >4hours from referral for CAMHS input to be completed, patient should be admitted under CYPS (after direct UECC duty-consultant to Paediatric on-call consultant discussion)

EATING DISORDERS

- **Eating Disorder patients aged up to their 16th birthday** - Admit under Paediatrics
- **Eating Disorder patients aged 16 up to their 18th birthday** - If admitted to children's ward then Young Person must remain under named care of both Paediatrics & Adult Physician (Adult Physician as primary lead)
- **Eating Disorder patients aged 18 and above requiring admission** - Admit to an adult medicine ward

SURGERY

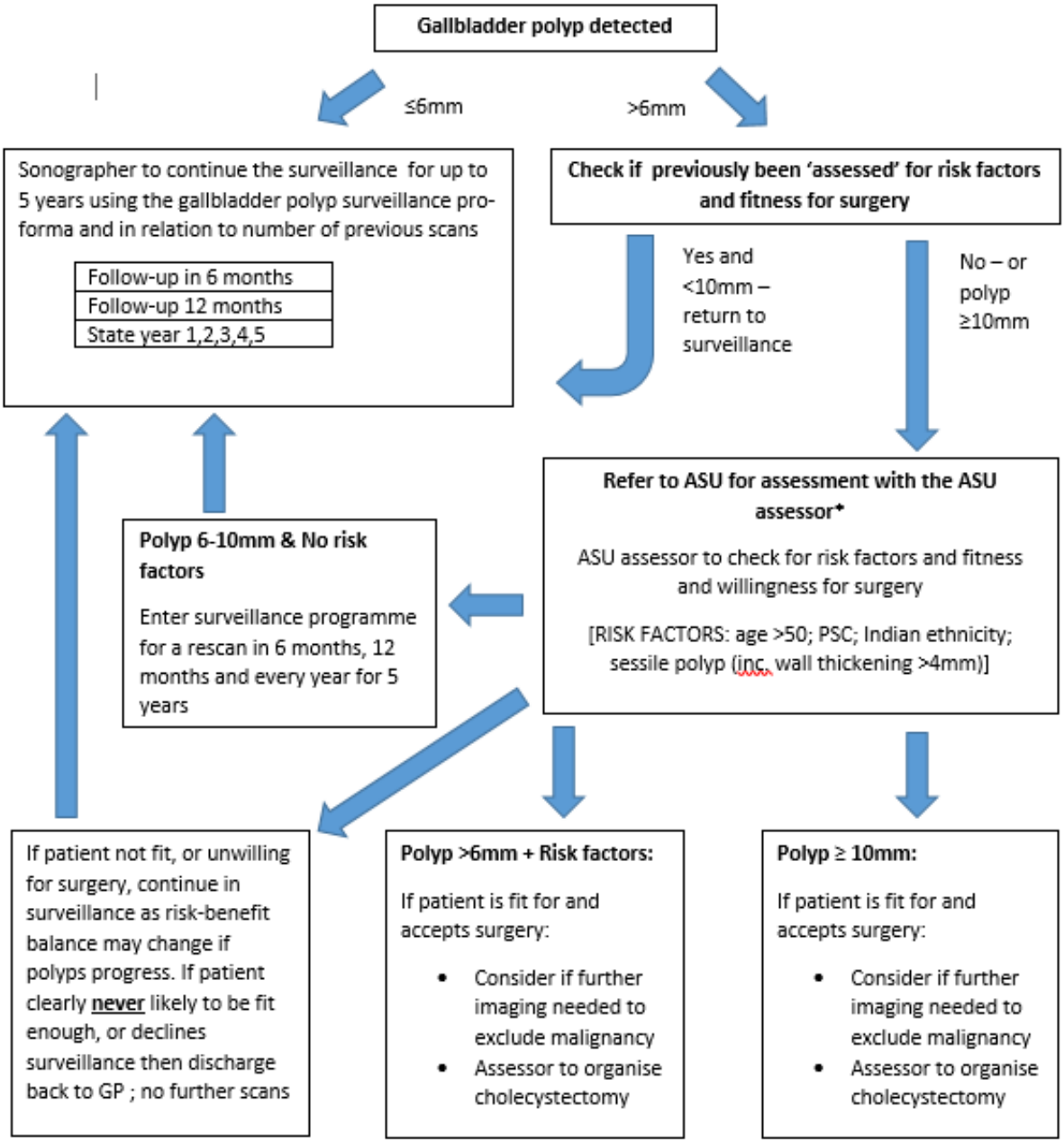
- **Abdominal Pain** (including previous history of IBD and acute and chronic pancreatitis)
- **Epigastric pain** (after exclusion of cardiac causes)
- **Abdominal Trauma**
- **Chest injury** (see separate pathway)
- **Lower GI bleed**
- **Groin / Axillary abscess**
- **Head Injuries** (Facial #'s - refer to OMFS too)
- **Post Op surgical problems** (PE etc to Medicine)
- **Psoas abscess**

OMFS

- **Intra - oral / facial abscess**
- **Facial trauma**
- **Intra - oral malignancy**

TRFT Graphic Design 01709 426352 / JS 06/21

Gallbladder polyp flow chart and Surveillance pro forma



NOTES

*If ASU assessor not available i.e. evening or weekends please, ask for report to be sent to the surgical team for an appointment and review on ASU

- If symptoms present attributable to gallbladder (in absence of other causes) and polyps present irrespective of size → consider cholecystectomy if fit
- If during follow up, polyp increases by 2mm or more → refer ASU as cholecystectomy is advised
- If during surveillance polyp disappears → discontinue follow up

Based on: Wiles R et al. Management and follow-up of gallbladder polyps : Joint guidelines between the European Society of Gastrointestinal and Abdominal Radiology (ESGAR), European Association for Endoscopic Surgery and other Interventional Techniques (EAES), International Society of Digestive Surgery - European Federation (EFISDS) and European Society of Gastrointestinal Endoscopy (ESGE). Eur Radiol. 2017 Sep;27(9):3856-3866.

TRFT GALLBLADDER POLYP SURVEILLENCE: FOLLOW-UP PRO-FORMA

For all patients with a gallbladder polyp <6mm or low risk patients as advised by the Surgical team for surveillance – abdominal ultrasound at each attendance

Patient Name	
Hospital No.	
Date of Birth	
GP/Consultant	
Date of scan	

All patients: If Polyp < 6 mm

Follow-up in 6 months	
Follow-up 12 months	
State year 1,2,3,4,5	

Low risk patients as identified by the surgical team with polyps >6 mm and <10 mm

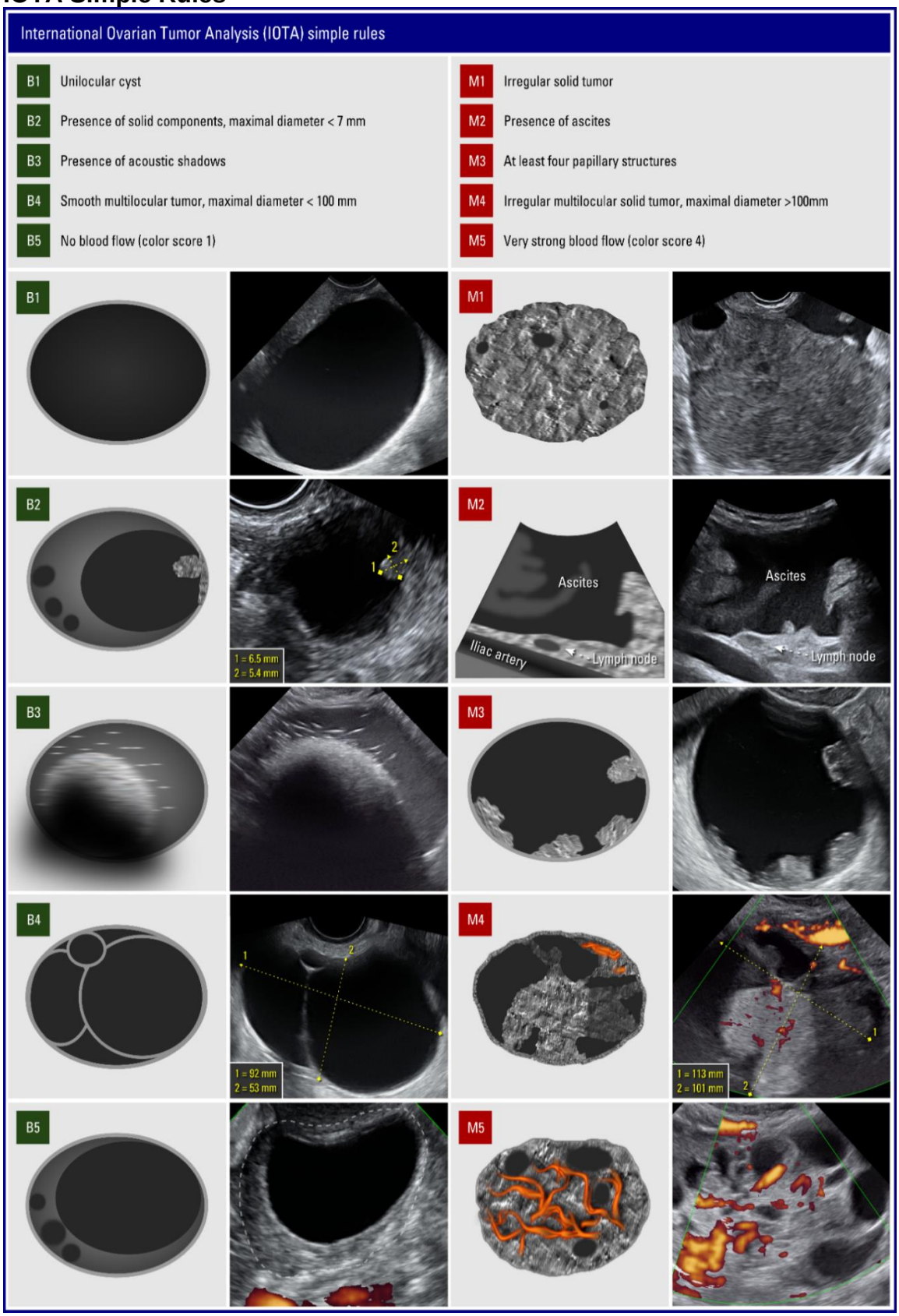
Follow-up in 6 months	
Follow-up 12 months	
State year 1,2,3,4,5	

FAO SONOGRAPHERS

NB Please include in the ultrasound report the follow-up action, i.e. “A follow-up scan has been arranged in X months”

Sonographer Signature…….....
Ultrasound Clerk……

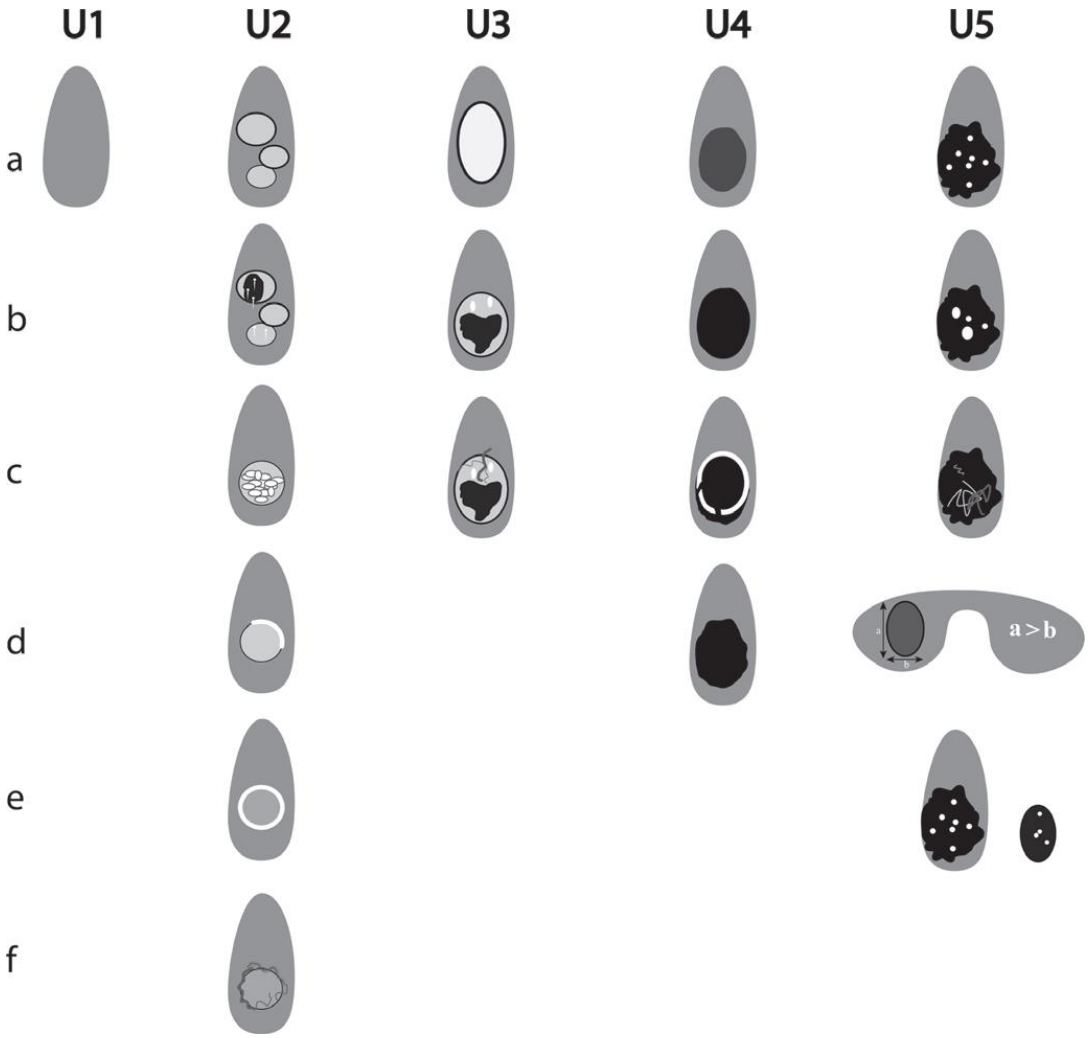
IOTA Simple Rules



Suggested text for reports of Post-menopausal simple ovarian cysts.

Small simple cysts are common in post-menopausal women and are most likely benign. However, The Royal Collage of Gynaecologists guidelines recommend that a serum Ca 125 level is checked and if this is normal, the patient should undergo follow up pelvic ultrasound scans and Ca 125 levels at 4 monthly intervals for 1 year. If the scans remain static or improves, and the Ca 125 level remains normal, then no further follow up is required. If the cyst enlarges or the Ca 125 level is abnormal, then a gynaecological referral is advised.

Assessment of thyroid nodules (latest guidance from the *British Thyroid Association; Feb 2014*);
Thyroid nodule characteristics can be assessed for benign or malignant appearances fairly reliably using the recognized system which categorises nodules into groups from U1 (normal) to U5 (Malignant).
This scoring classification methodology is required to grade the risk of malignancy and also to assess the need to progress to an FNA examination of the thyroid. The appearances for each classification from U1 – U5 are demonstrated below;



U1. Normal

U2. Benign;

A) Halo, hyper -/+ iso-echoic
B) Cystic change +/- ring down sign (colloid)
C) Micro – cystic / spongiform
D) Peripheral egg shell calcification
E) Same as D)
F) Peripheral vascularity.

U3. Indeterminate / Equivocal;

A) Homogenous, hyper-echoic (markedly), solid, halo (follicular lesion)
B) ? Hypo-echoic, equivocal echogenic foci, cystic change
C) Mixed/ central vascularity.

U4. Suspicious:

A) Solid, Hypo-echoic (in comparison to the echogenicity of strap muscle)
B) Solid, very hypo-echoic (in comparison to the echogenicity strap muscle)
C) Disrupted peripheral calcification, hypo-echoic
D) Lobulated outline.

U5. Malignant

A) Solid, hypo-echoic, lobulated / irregular outline, micro-calcification (? Papillary Cancer)
B) Solid, hypo-echoic, lobulated / irregular outline, globular-calcification (? Medullary Cancer)
C) Intra-nodular vascularity
D) Shape (taller>wide)
E) Characteristics associated with lymphadenopathy.

Selection of nodules for FNA

Ultrasound appearances that are indicative of a benign nodule (U1-2) should be regarded as not requiring fine needle aspiration cytology (FNAC), unless the patient has a statistically high risk of malignancy**.**

If the US appearances are equivocal, indeterminate or suspicious of malignancy (U3-5), an US guided FNAC should follow**.**

Any abnormal lymph node in the neck should undergo FNAC to facilitate accurate diagnosis / staging**.**

Quantitive grading system for Doppler US signals in synovial tissue

Grade	
0	No flow in the synovium
1	Single vessel signals (up to 3)
2	Confluent vessel signals in less than half of the area of synovium
3	Vessel signals in more than half of the area of the synovium

https://doi.org/10.1093/rheumatology/kev205
Published: 10 June 2015

Table for the evaluation of the degree of stenosis from velocities and velocity ratios – Carotid arteries

% stenosis	Grey scale Features	PSV cm/s ICA	EDV cm/s ICA	Ratio ICA/CCA
Normal	No plaque or intimal thickening	< 125	<40	< 2.0
<50%	Plaque or intimal thickening present	<125 cm/s	< 40	< 2.0
50-69%	Plaque is visible	125 - 230	40 – 100	2.0 – 4.0
≥ 70 % but less than near occlusion	Visible plaque and luminal narrowing	>230 cm/s	> 100	>4.0
Near Occlusion	Diagnosis is established primarily by demonstrating a markedly narrowed lumen at colour or power Doppler ultrasound (string flow).	Velocity parameters may not apply, since velocities may be high, low, or undetectable		
Occluded	No detectable patent lumen at grey-scale ultrasound and no flow with spectral, power, and colour Doppler ultrasound. There may be compensatory increased velocity in the contralateral carotid.			

Table showing degree of stenosis in lower limb arterial studies.

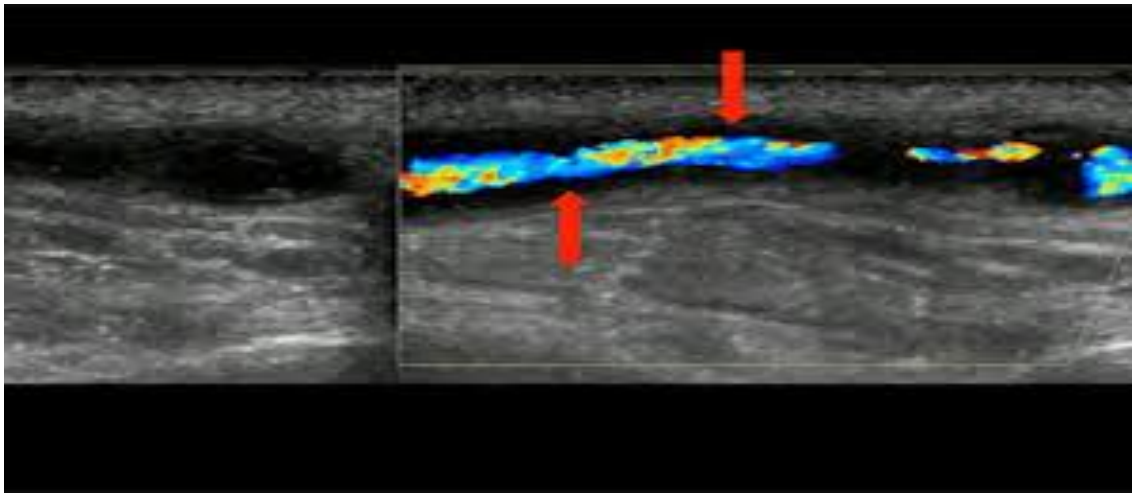
Diameter reduction	**Velocity ratio**	**Comments**
0-49 %	<2	Tri-phasic, mild spectral broadening and increase in EDV recorded as degree of narrowing approaches.
50-74%	>2	Bi – or monophasic waveform. Increase in EDV Spectral broadening +/- flow disturbance. Some damping distally.
75-99%	>3	Usually monophasic. Significant increase in EDV Marked turbulence+ spectral broadening. Damped flow distally.
Occluded	No flow detected	High resistance flow proximally.

Stenosis (%)	**PSV (cm/s)**	**V2/V1 Ratio**
30-50	150-200	1.5-2
50-75	200-400	2-4
>75	>400	>4
>90	-	>7

Ultrasound assessment of the temporal arteries for Giant Cell Arteritis.

Background

GCA is inflammation/thickening of the arterial wall of the temporal artery and its branches which can lead to sight loss if untreated, therefore, steroids are administered to the patient as soon as there is a suspicion of this diagnosis. If there is a delay in imaging, then this can lead to a false negative ultrasound examination.



IMT – Cut Off Values.

Common Temporal artery – 0.42mm.
Frontal branch – 0.34mm
Parietal branch – 0.29mm
Axillary artery – 1.0mm
(Schmidt, W., 2018).

Ultrasound Guidelines
(Excluding Interventional, Breast, Medical Physics, Cardiology, Obstetrics and Paediatric Ultrasound)

SECTION 2
DOCUMENT DEVELOPMENT, COMMUNICATION, IMPLEMENTATION AND MONITORING

8. CONSULTATION AND COMMUNICATION WITH STAKEHOLDERS

This document was developed in consultation with:

Ultrasound Advanced Practitioners, Radiologists, Gynaecologists, Urologists, Consultant Surgeons, Medical Imaging, Physics & Illustration CSU Quality Governance Committee

9. DOCUMENT APPROVAL

This document was approved by Medical Imaging, Physics and Illustration CSU Quality Governance Committee

10. DOCUMENT RATIFICATION

The document was ratified by Medical Imaging, Physics and Illustration CSU Quality Governance Committee.

11. REVIEW AND REVISION ARRANGEMENTS

This document will be reviewed every three years by the Ultrasound Modality Lead unless such changes occur as to require an earlier review.

12. DISSEMINATION AND COMMUNICATION PLAN

To be disseminated to	Disseminated by	How	When	Comments
Library & Knowledge Services via "policies" email.	Author	Email	Within 1 week of ratification	Remove watermark from ratified document and inform Policies Admin Support if a revision and which document it replaces and where it should be located on the Hub. Ensure all documents templates are uploaded as word documents.
All email users	Communication Team	Email	Within 1 week of ratification	Communication team will inform all email users of the policy and provide a link to the policy.
Key individuals Staff with a role/responsibility within the document	Author	Meeting / Email as appropriate	When final version completed	The author must inform staff of their duties in relation to the document.

To be disseminated to	Disseminated by	How	When	Comments
Heads of Departments / Matrons				
All staff within area of management	Heads of Departments / Matrons	Meeting / Email as appropriate	As soon as received from the author	Ensure evidence of dissemination to staff is maintained. Request removal of paper copies Instruct them to inform all staff of the policy including those without access to emails

13. IMPLEMENTATION AND TRAINING PLAN

What	How	Associated action	Lead	Timeframe
Inform Sonographers	Via email	Read through document & request read receipt	Authors	Within 1 week of ratification
Inform Sonographers	Via staff meeting/training	Work through document	Authors	Within 1 month of ratification
Evidence of training	Signed document to state all Sonographers have read and been trained on the new guidance	Document to be kept in Ultrasound Modality Lead training spreadsheet	Authors	Within 6 weeks of ratification
Key sections & appendices to be displayed in scan rooms	Printing and laminating of key information		Authors	Within 1 week of ratification
Inform Radiologists	Via email	Read through document & request read receipt	Authors to email, and the Clinical Lead Radiologist to follow-up	Within 1 week of ratification

Training requirements

Any Practitioner performing ultrasound within the Department of Clinical Radiology should have one of the following qualifications and should be registered on the “REGISTER OF COMPETENT ULTRASOUND PRACTITIONERS – DEPARTMENT OF CLINICAL RADIOLOGY TRFT 2010” held by the Ultrasound Modality Lead.

- Certificate/Diploma (as appropriate) in Medical Ultrasound (CMU/DMU) of the Society and College of Radiographers (SCoR) with evidence of appropriate continuous professional development (CPD).
- Postgraduate Certificate/Diploma in Medical Ultrasound (PGCert.MU/PG Dip.MU) approved and validated by a Higher Institute of education and accredited by the Consortium for Sonographic Education (CASE) with evidence of appropriate CPD. The qualification should be relevant to Obstetric Ultrasound practice.
- Sonographers who do not have a UK recognised ultrasound qualification, i.e. those trained overseas, should be registered under the voluntary register of Sonographers (the database is kept and controlled by the SCoR in association with BMUS).

Any Practitioner performing ultrasound within Clinical Radiology at TRFT must have received appropriate training in the electronic systems: RIS and PACS.

It is an individual's responsibility to remain up to date/obtain training in any additional/current systems introduced within the Clinical Radiology Department.

When new procedures are introduced within the department, where possible in house training will be performed. The Trust will support continuing professional development with the appropriate funding of courses/release of staff for training.

14. PLAN TO MONITOR THE COMPLIANCE WITH, AND EFFECTIVENESS OF THE TRUST DOCUMENT

14.1. Process for Monitoring Compliance and Effectiveness

Audit / Monitoring Criteria	Process for monitoring e.g. audit, survey	Audit / Monitoring performed by	Audit / Monitoring frequency	Audit / Monitoring reports distributed to	Action plans approved and monitored by
Peer Review	Audit	Sonographers	Annually	Feedback to Medical Imaging Quality Governance & Sonography team meetings	Authors
Referrer enquiries	Responding to queries	Sonographers	When required	Feedback to individual / Sonography team	Authors
Agenda item at staff meetings	Discuss issues / queries. Include in meeting minutes	Authors	Monthly	Meeting minutes distributed to Sonography team and included on monthly Quality Governance report	Authors

14.2. Standards/Key Performance Indicators (KPIs)

An incident arising from these procedures is not expected, but in the event of an incident occurring relating to these procedures, a Trust Datix incident report MUST be completed and the incident will be investigated fully.