Ultrasound 2017

49th Annual Scientific Meeting of the British Medical Ultrasound Society

6th - 8th December

Final Programme

Cheltenham Racecourse
Introducing the new Aplio i series

Designed with our customers in mind

The Aplio i-series **intuitive** technology provides unprecedented image clarity for routine and challenging patients.

The **Intelligent** workflow enables you to make faster diagnoses, with more confidence.

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**Come and visit us at Stand 3 for a live demonstration**

We are delighted to announce that we have scheduled live demonstrations of our newest ultrasound systems; the Aplio i-series. These private demonstrations are free to all BMUS delegates to attend and offer a first look at some of the advances within ultrasound delivered by our Clinical Applications Specialist. Attending one of these sessions will automatically enter you into a free draw to win a Canon camera!

CPD points have been applied for.

For more information visit us at: http://www.toshiba-medical.eu/uk/bmus-book-a-meeting
We are delighted to welcome you to the 49th British Medical Ultrasound Society Annual Scientific Meeting at Cheltenham Racecourse. Cheltenham is a beautiful city with a strong scientific and medical heritage and the racecourse offers a wonderful venue for the meeting this year.

The meeting follows what is becoming the established format of themed days and streams, with integrated training sessions complementing the lecture sessions. Sessions are built around an excellent range of invited speakers.

Two of the highlights of the meeting this year will be the Donald, MacVicar and Brown lecture delivered by Prof Jeffrey Bamber from the Institute of Cancer Research, London and the Peter Twining lecture delivered by Dr Tim Overton from University Hospitals NHS Trust, Bristol.

In addition there are sessions in memory of Professors David Cosgrove and Peter Wells who both sadly died this year.

The exhibition is fully booked and should be lively, with all major manufacturers represented as well as many other exhibitors with products and services to offer the ultrasound community. We are grateful in particular for the support of this year’s Platinum Sponsor, Hitachi Medical Systems who are supporting both the Welcome Reception at the end of Day One and the Gala Dinner and Awards Ceremony being held at the beautiful Pittville Pump Rooms.

I should like to thank the stream leads and members of the Scientific and Education Committee. Their hard work and dedication ensure that the Annual Scientific Meeting (and other study days run for BMUS) are of consistently high quality.

I should also like to thank Joy Whyte and her team in the BMUS Office; their dedicated organisational efforts and hard work ensuring that the meeting actually happens.

Enjoy the meeting and welcome to Cheltenham!

Peter Cantin.
Chair, Annual Scientific Meeting
Organising Committee 2017.

BMUS would like to thank the following members of the Science & Education Committee, 2017 session leads and staff for their contribution to the delivery of this meeting and educational days during 2017.

<table>
<thead>
<tr>
<th>Dr Nick Dudley, Lincoln</th>
<th>Dr Carmel Moran, Edinburgh</th>
<th>Prof Gail ter Haar, London</th>
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<tr>
<td>Mrs Alison Hall, Stafford</td>
<td>Dr Mary Moran, Dublin</td>
<td>Mrs Emma Waldegrave, London</td>
</tr>
<tr>
<td>Ms Therese Herlihy, Dublin</td>
<td>Dr Caroline Overton, Bristol</td>
<td>Mrs Rachel Wilson, Hull</td>
</tr>
<tr>
<td>Mrs Terry Humphrey, Leeds</td>
<td>Dr Tim Overton, Bristol</td>
<td>Mrs Tracey Clarke (BMUS Office Administrator)</td>
</tr>
<tr>
<td>Mr Gerry Johnson, Manchester</td>
<td>Mrs Pamela Parker, Hull</td>
<td>Mrs Mandy Cove (BMUS Events &amp; Marketing Co-ordinator)</td>
</tr>
<tr>
<td>Mrs Catherine Kirkpatrick Lincoln</td>
<td>Mr Steven Rogers, Manchester</td>
<td>Miss Emma Tucker (BMUS Development Manager)</td>
</tr>
<tr>
<td>Prof Adrian Lim, London</td>
<td>Mrs Borsha Sarker, Darlington</td>
<td>Mrs Joy Whyte (BMUS Executive Officer)</td>
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<tr>
<td>Mrs Alison McGuinness, York</td>
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  ◆ Peter Twining Memorial Lecture

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The Ultrasound 2017 App

Download The Ultrasound 2017 app to enhance your conference experience.

The app is freely available and will help you get the most out of your time at Ultrasound 2017.

The Ultrasound 2017 app includes:

- Interactive scientific programme
- Details on the Exhibition and the company’s in attendance
- Ability to create personalised agendas
- Ability to download posters and abstracts
- An exhibition floorplan
- Access to BMUS Twitter and Facebook feeds
- Access to the feedback survey

The app aims to support you to make the most of your time at Ultrasound 2017 and enhance your learning experience.

ASM delegate Feedback and CPD Points

This year BMUS will be collecting Delegate feedback through Survey Monkey. You can access this either through the BMUS Conference app or via an email that will be sent to you during the conference. We are keen to collect feedback on all aspect of the Annual Scientific Meeting and have produced a comprehensive set of questions covering each session. Please take some time to complete this as it will be used to inform future events.

Once we have received your feedback survey your CPD certificate will be issued from the BMUS office. CPD certificates will only be issued to surveys that are fully complete. You should receive your CPD certificate by the end of January. The Feedback survey will close midnight on 27th January 2018.

The feedback we receive will help us to:

- Prepare for future events,
- Provide constructive feedback to our speakers,
- Feedback to the venue,
- Measure the success and value of the ASM

Thank you in advance for taking the time to complete the feedback questionnaire. If you have any problems regarding this please contact emma@bmus.org
General information

**Venue address**
Cheltenham Racecourse
Evesham Rd,
Cheltenham
GL50 4SH

**Conference times**
**Wednesday 6th December**
09:30 - 17:00 Scientific Sessions
17:00 Welcome reception,
Ground Floor Exhibition Hall

**Thursday 7th December**
09:00 - 17:00 Scientific Sessions
19:00 BMUS Annual Dinner & Awards Ceremony,
Pitville Pump Room, E Approach Dr, Cheltenham
GL52 3JE

**Friday 8th December**
09:00 - 16:00 Scientific Sessions

**Delegate badges**
Attendees are required to wear their badges at all times to gain access to any part of the event. Access to the practical training sessions is via the appropriate wristband which will be in your delegate pack.

Please leave your badges at the registration desk at the end of your meeting attendance.

**Continuing Professional Development (CPD)**
The meeting has been awarded the following BMUS CPD credits and Category I RCR CPD credits-

- All 3 days - 21 credits
- Day 1 - 7 credits
- Day 2 - 7 credits
- Day 3 - 7 credits

CPD certificates will be provided in an e-format by 31st January on completion of the online feedback form.

**Catering and refreshments**
Lunches and refreshments are included in the registration fee. Catering and coffee points are located in the Exhibition Hall.

**Cloakroom**
A manned cloakroom is located on the ground floor of the Centaur before entry into the Exhibition Hall. Please do not leave bags or personal items unattended. While every effort is made to keep your belongings secure, neither the Cheltenham Racecourse or BMUS can be held liable for any loss of damage.

**WiFi**
Free WiFi is available throughout the venue via the venue’s network Cheltenham Racecourse free Wifi. This can be accessed by entering brief details into a login page.

**Social Media**
We will be updating our social media throughout the conference.

Our hashtag is #Ultrasound2017 - feel free to get tweeting and posting!

Our Twitter handle is @BMUS_Ultrasound

Our Facebook page is BMUS (British Medical Soc)

**2017 Conference App**
Please download the conference app from the App Store for Apple devices and Google Play store for Android devices by searching ‘Ultrasound 2017’. The app has free access to make the experience simple and quick.

**Video Footage**
The lectures in Plenary 1, 2 & 3 of the conference will be recorded. However please note that the footage will be available on the BMUS website to BMUS members only.

**Personal Recording of Lectures**
As the invited speakers have the option to refuse being included in the conference recording, personal recording of any lectures during the conference is strictly forbidden.
2017 Keynote Lectures

Donald MacVicar Brown Lecture

The Donald MacVicar Brown Lecture has been a fixture of the Annual Scientific Meeting since 1996. This keynote lecture commemorates and celebrates the origins of medical ultrasound.

This plenary keynote lecture honours the 1958 publication of the Ian Donald, John MacVicar and Tom Brown paper in the British journal ‘The Lancet.’ Their paper—‘Investigation of Abdominal Masses by Pulsed Ultrasound’ which is credited with transforming maternity care. The lecture is delivered by an invited speaker, recognised by BMUS for their inspirational work and contribution to medical ultrasound practice.

This year the lecture is delivered by Professor Jeffrey Bamber from the Institute of Cancer Research and is entitled ‘Future reverberations from past reflections: A glimpse at the full capabilities of ultrasound’.

Jeff Bamber has been head of Ultrasound and Optical Imaging Physics at The Institute of Cancer Research and The Royal Marsden NHS Foundation Trust since 1986. He has contributed to a wide range of research areas and had sabbaticals at the University of Western Australia, Tokyo Institute of Technology, Japan, and Hewlett-Packard’s Medical Products Group, Andover, USA.

Jeff’s work has increased our understanding of medical ultrasound, improved ultrasound technology and enhanced its effective use for patient benefit. Several of his inventions have been translated to become widely available on commercial ultrasound systems.

He has developed methods to quantify sub-resolution structures in tissues, improved ultrasound image quality by introducing adaptive speckle noise reduction, initiated the quantitative use of colour Doppler ultrasound for diagnosis and evaluation of tumour response, brought in microbubble kinetic analysis (now known as DCE-US) for assessing tumour vasculature, applied bubbles to gene and drug delivery, pioneered elastography and created the first freehand tissue elasticity image based on speckle tracking, developed new breast and skin cancer diagnostic criteria, introduced tissue motion tracking for ultrasound guided radiotherapy and advanced the field of photoacoustics which enables molecular imaging with ultrasound.

He is past president of the International Association for Breast Ultrasound, past vice-president of the International Society for Skin Imaging, past chair of the BMUS Science and Education Committee and serves as scientific advisor to a number of companies.

Professor Bamber will deliver his talk ‘Future reverberations from past reflections: A glimpse at the full capabilities of ultrasound’ on Day 1, Wednesday 6th December at 16.00 in Plenary 1 - Gold Cup Suite.
Peter Twining Memorial Lecture

This lecture has served as an ongoing tribute to Dr Peter Twining, who had a longstanding close affiliation with BMUS and worked tirelessly for the Society for many years. For the past 9 years a ‘memorial obstetric lecture’ has been presented by an outstanding individual in the obstetrics field of practice selected by BMUS. Hitachi Medical Systems UK has kindly sponsored this award since its inaugural year in 2009.

We are pleased that, for its final year, this memorial lecture will be presented by Dr Timothy Overton who is a passionate supporter of BMUS and for the last 5 years has organised the obstetric stream for the annual scientific meeting.


He undertook his MD degree at Imperial College researching into the feasibility of identifying fetal cells in the maternal circulation. He completed subspecialty training in Fetal Medicine at Queen Charlotte’s Hospital London before being appointed as a consultant at the Norfolk and Norwich University Hospital in 1999.

He is currently Consultant in Fetal Medicine and Obstetrics at the regional Fetal Medicine Unit, St Michael’s Hospital, Bristol, part of University Hospital’s Bristol NHS Foundation Trust. He sat on the NICE Routine Antenatal Care Guideline development group in 2006 and was part of the committee that produced the Fetal Anomaly Screening Guidelines for the 20 week scan in 2010. From 2014-2017 he was the President of the British Maternal and Fetal Medicine Society. He currently chairs the Expert Clinical and Scientific Advisory Panel for the National Congenital Anomaly and Rare Diseases Registration Service.

Dr Overton will deliver his talk ‘The Future of Fetal Medicine’ on Day 2, Thursday 7th December at 11.00 in Plenary 1 - Gold Cup Suite.
List of Exhibitors

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<th>Company</th>
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<td>Hitachi Medical Systems</td>
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<td>GE Healthcare</td>
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<td>3</td>
<td>Toshiba Medical Systems Ltd</td>
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<td>Philips</td>
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<td>Siemens Healthineers</td>
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<td>MIS Healthcare</td>
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<td>Physiological Measurements Ltd</td>
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<td>8 &amp; 9</td>
<td>Esaote</td>
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<td>MedaPhor</td>
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<td>Carestream</td>
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<td>RH Logistics</td>
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<td>Mermaid Medical UK</td>
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<td>Bracco International SpA</td>
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<td>Casmed International Ltd</td>
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<td>Diagnostic Healthcare Ltd</td>
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<td>BK Ultrasound</td>
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<td>Humimic Medical</td>
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<td>31</td>
<td>Society of Radiographers</td>
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<td>Hilditch Group</td>
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<td>Infinit UK</td>
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<td>39</td>
<td>Bowen Therapy</td>
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Floor Plan

Poster Exhibition

CATERING

BMUS STAND

WAY IN

FOYER & REGISTRATION

TO PLENARY SESSIONS

TO PLENARY SESSIONS
## At a Glance DAY 1

### DAY 1 - WEDNESDAY 6th December 2017

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<thead>
<tr>
<th>Session Starts</th>
<th>LECTURES</th>
<th>PRACTICAL TRAINING</th>
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<tbody>
<tr>
<td>09.15</td>
<td>Presiden’t’s Welcome</td>
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<tr>
<td>09.30</td>
<td>General Imaging 1 Abdominal</td>
<td>MSK 1 Fundamental Physics 1 Modern Scanner Controls</td>
</tr>
<tr>
<td>09.45</td>
<td>Morning Refreshment Break – Exhibition Hall Ground Floor</td>
<td></td>
</tr>
<tr>
<td>11.15</td>
<td>General Imaging 2 Abdominal</td>
<td>MSK 2 Fundamental Physics 2 A Tribute to Professor Peter Wells Carotid Masterclass</td>
</tr>
<tr>
<td>12.45</td>
<td>Lunch Break – Exhibition Hall Ground Floor</td>
<td></td>
</tr>
<tr>
<td>13.45</td>
<td>General Imaging 3</td>
<td>Professional Issues Meeting and Managing Demand Physics 3 Vascular Ultrasound MSK Fundamental Practical Session</td>
</tr>
<tr>
<td>15.30</td>
<td>Afternoon Refreshment Break – Exhibition Hall Ground Floor</td>
<td></td>
</tr>
<tr>
<td>16:00</td>
<td>Donald MacVicar Brown Lecture Professor Jeffrey Bamber <em>Future reverberations from past reflections: A glimpse at the full capabilities of ultrasound</em></td>
<td>MSK Fundamental Practical Session (cont)</td>
</tr>
<tr>
<td>17:00</td>
<td>End of Day 1</td>
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</tr>
</tbody>
</table>

17.00 Welcome Reception – Ground Floor Exhibition Hall
Scientific Programme 2017

Day 1 – Wednesday 6th December

Plenary 1 – Gold Cup Suite

**Opening and Presidential Address**

09.15  
Dr Simon Freeman, BMUS President

**General Imaging 1**

09.30 – 10.45  
Chairs – Dr Oliver Byass, Hull and East Yorkshire Hospitals NHS Trust, Dr Peter Rodgers, Leicester Royal Infirmary

This session will give the audience an overview of the common incidental lesions found on routine abdominal scanning, some advanced applications as to how to characterise them and an algorithm on how to manage these lesions with further imaging if required. In addition, a guide for improving sonographic assessment of bowel pathology will also be highlighted.

09.30  
David Cosgrove Memorial Lecture, Prof Adrian Lim, Imperial College Healthcare NHS Trust

09.45  
Renal ultrasound, Dr Simon Burbidge, Leeds Teaching Hospitals NHS Trust

10.05  
Update to renal pathology, Dr Greta Rodrigues, Hull and East Yorkshire Hospitals NHS Trust

10.25  
Nephron sparing surgery, Mr Andy Myatt, Hull and East Yorkshire Hospitals NHS Trust
### General Imaging 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.15</td>
<td>What to do with the incidental liver lesion</td>
<td>Dr James Pilcher, St Georges Hospital</td>
</tr>
<tr>
<td>11.40</td>
<td>What to do with the incidental renal lesion</td>
<td>Dr Christopher Harvey, Hammersmith Hospital</td>
</tr>
<tr>
<td>12.05</td>
<td>Tips and tricks for bowel imaging</td>
<td>Dr Anthony Higginson, Portsmouth Hospital</td>
</tr>
<tr>
<td>12.30</td>
<td>Contrast enhanced Ultrasound in the assessment of renal lesions</td>
<td>Asha Omar, Catherine Gutteridge, Plymouth Hospitals NHS Trust</td>
</tr>
</tbody>
</table>

### General Imaging 3

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.45</td>
<td>General ultrasound – Which parts are those and common pathologies</td>
<td>Dr Peter Rodgers, Leicester Royal Infirmary</td>
</tr>
<tr>
<td>14.10</td>
<td>Ultrasound of the chest</td>
<td>Dr Manish Gautam, Royal Liverpool Hospital</td>
</tr>
<tr>
<td>14.35</td>
<td>Breast ultrasound for the general sonographer and sonologist</td>
<td>Dr Keshthra Satchithananda, King’s College Hospital</td>
</tr>
<tr>
<td>15.00</td>
<td>Early post-operative ultrasound for renal transplant: What not to miss</td>
<td>Karis McFeely¹, Thomas Davies¹, Matthew Murphy¹, Catherine Gutteridge², ¹Peninsula Radiology Academy, ²Derriford Hospital</td>
</tr>
<tr>
<td>15.10</td>
<td>Sonographic appearances of mid and long term renal transplant</td>
<td>Thomas Davies¹, Karis McFeely¹, Matthew Murphy¹, Catherine Gutteridge², ¹Peninsula Radiology Academy, ²Derriford Hospital</td>
</tr>
<tr>
<td>15.20</td>
<td>Endocavitary Contrast Enhanced Ultrasound (CEUS): A novel technique for problem solving</td>
<td>Gibran Timothy Yusuf, King’s College Hospital</td>
</tr>
</tbody>
</table>
**Donald MacVicar Brown Keynote Lecture**

**16.00 – 17.00**

**Chairs** – Dr Simon Freeman, Derriford Hospital, Plymouth, Dr Peter Cantin, Derriford Hospital, Plymouth

**16.00**

*Future reverberations from past reflections: A glimpse at the full capabilities of ultrasound*, Prof Jeffrey Bamber, Institute of Cancer Research of Sutton and Surrey

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**Plenary 2 – Insurance Suite**

**MSK Fundamental 1**

**09.30 – 10.45**

**Chairs** – Dr Russell Young, Gloucestershire Hospitals NHS Foundation Trust, Mrs Alison Hall, Keele University

This session is aimed at those with an interest in Musculoskeletal ultrasound, but little practical experience.

These lectures are designed to provide a ‘how to..’ session and will cover the most common joints scanned – shoulder, hand/wrist and ankle/foot. Experienced musculoskeletal sonographers and Radiologists will introduce basic anatomy, technique and common pathologies which may be helpful as a precursor to the optional afternoon ‘hands on’ sessions. The lectures will also include hints and tips on reporting MSK scans.

**09.30**

*Hand and wrist - anatomy, common pathologies and ultrasound appearances including live demo*, Mrs Sophie Cochran, Pilgrim Hospital, Mrs Lynn Bradley, Diagnostic Ultrasound Coventry

An interactive presentation combining a live demonstration and PowerPoint presentation. The presentation and live demonstration will focus on the normal anatomy of the hand and wrist, particularly the ultrasound appearances and assessment of this anatomy. The presentation will also cover some of the more commonly encountered pathologies relating to the hand and wrist, and their ultrasound appearances.

**10.00**

*Foot and ankle - anatomy, common pathologies and ultrasound appearances including live demo*, Miss Katie Simm, Whiston Hospital, Mr Gerry Johnson, Tameside Hospital NHS Foundation Trust

**10.25**

*Plantar Fibromatosis: Getting to the foot of the problem*, James Moran, Saint James’s Hospital

**10.35**

*Ultrasound evaluation of rectus abdominis and lumbar multifidus muscles in individuals with postural changes*, Rute Santos, Ruben Barreiro, IPC, Coimbra Health School, Portugal
Musculoskeletal disease is one of the major causes of morbidity and mortality in the equine population and providing an accurate diagnosis is important with regards to specific treatment and management as well as for prognostication.

Ultrasonography for the diagnosis of musculoskeletal disease in the horse has been used since the 1980s and our ability to diagnose pathology has grown with increasing knowledge and skill as well as with improvements in technology. It is now as important as radiography for the diagnosis of musculoskeletal disease in the horse with the two imaging modalities used in everyday practice and often complimenting each other in many cases.

Advanced imaging modalities are now becoming more available at specialist equine practices and the use of nuclear scintigraphy, MRI and CT in standing, sedated horses as well as under general anaesthesia has become more common. However the more standard imaging modalities of radiography and ultrasonography still play a vital role for the diagnosis of musculoskeletal disease and this presentation aims to look at the advantages and disadvantages of each and how these imaging modalities can compliment each other.

Many of the musculoskeletal structures in the horse lend themselves well to being evaluated ultrasonographically due to their close proximity to the skin and are considerably larger than that of their small animal and human counterparts. Ultrasonography was initially used for evaluation of tendonous and ligamentous structures and this was followed by the use of ultrasound for evaluation of muscular, synovial and bony abnormalities. However there are certain anatomical locations that are not amenable to easy ultrasonographic evaluation, such as within the hoof capsule or the proximal palmar metatarsal region, and this is where more advance imaging, such as MRI, becomes more beneficial and/or provide complimentary information.

Reporting of MSK ultrasound, Dr Russell Young, Gloucestershire Hospitals NHS Foundation Trust

Professional Issues – Meeting and Managing Demand

Without question demand for diagnostic imaging is relentlessly increasing, often without a reciprocal increase in staffing or capacity. The drive towards 7-day and extended working practices is influencing many aspects of service delivery and with limited resources this can be difficult to achieve. This session aims to explore new and alternative methods of demand management. Topics include intelligence data to review capacity through to creatively managing demand in a flexible and joined up approach. In addition we will review whether quality assessment is useful and whether this can help in managing services.
### SCIENTIFIC PROGRAMME

**Wednesday**

<table>
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<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>13.45</td>
<td>Peer review – reliability and usefulness? Can this aid demand</td>
<td>Dr Peter Cantin, Derriford Hospital, Plymouth</td>
</tr>
<tr>
<td>14.15</td>
<td>Optimising your existing radiology service</td>
<td>Mrs Lesley Wright, Lesley Wright Improvement Ltd</td>
</tr>
<tr>
<td>14.45</td>
<td>Ultrasound referrals: Good, bad, does it matter?</td>
<td>Kim Gregson¹, Pamela Parker¹, Kirsty Godson², 'Hull and East Yorkshire Hospitals NHS Trust, ²University of Leeds</td>
</tr>
<tr>
<td>14.55</td>
<td>Demand management – intelligent referring and flexible working in secondary care</td>
<td>Dr Oliver Byass, Hull and East Yorkshire Hospital Trust</td>
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**Plenary 3 – Sovereign Suite**

**Physics – Modern Scanner Controls**

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<tr>
<th>Time</th>
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<th>Speaker(s)</th>
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<tbody>
<tr>
<td>09.30</td>
<td>Chairs</td>
<td>Dr Nick Dudley, Lincoln County Hospital, Mrs Heather Venables, University of Derby</td>
</tr>
<tr>
<td>09.30</td>
<td>The principles of modern ultrasound scanner controls</td>
<td>Dr Nick Dudley, Lincoln County Hospital</td>
</tr>
<tr>
<td>10.00</td>
<td>The clinical use of modern scanner controls</td>
<td>Mrs Heather Venables, University of Derby</td>
</tr>
<tr>
<td>10.30</td>
<td>A simple method for measuring ultrasound beam slice thickness with depth to assess changes in lens properties</td>
<td>Steven Jackson, Stephen Russell, Christie NHS Foundation Trust</td>
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### Physics – A Tribute to Professor Peter Wells

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<tr>
<th>Time</th>
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<th>Presenter(s)</th>
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<tbody>
<tr>
<td>11.15</td>
<td><em>Chairs</em> – Dr. Nick Dudley, Lincoln County Hospital, Dr Kumar Ramnarine, Leicester Royal Infirmary</td>
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</tr>
<tr>
<td>11.15</td>
<td><strong>Peter Wells: A celebration of the man, his life, his legacy</strong></td>
<td>Dr Mike Halliwell, St Michael's Hospital</td>
</tr>
<tr>
<td>11.45</td>
<td><strong>Effective QA – What does it mean?</strong></td>
<td>Mr Stephen Russell, Christie Hospital</td>
</tr>
<tr>
<td>12.15</td>
<td><strong>Ultrasound stimulation of immune response – pre clinical studies</strong></td>
<td>Prof Gail ter Haar, Royal Marsden Hospital</td>
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### Physics – Vascular Ultrasound

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter(s)</th>
</tr>
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<tbody>
<tr>
<td>13.45</td>
<td><em>Chairs</em> – Dr. Nick Dudley, Lincoln County Hospital, Mr Stephen Russell, Christie Hospital</td>
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<tr>
<td>13.45</td>
<td><strong>Elastography in carotid disease</strong></td>
<td>Dr Kumar Ramnarine, Leicester Royal Infirmary</td>
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<tr>
<td>14.15</td>
<td><strong>Contrast Enhanced Ultrasound (CEUS) of the abdomen vasculature</strong></td>
<td>Dr Gibran Timothy Yusuf, Kings College Hospital</td>
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<tr>
<td>14.45</td>
<td><strong>Arterial biomechanics in healthy and diseased arteries</strong></td>
<td>Prof Peter Hoskins, University of Edinburgh</td>
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<tr>
<td>15.15</td>
<td><strong>The reliability of echocardiographic measurements in clinical research</strong></td>
<td>Judith Lowry, Leeds Teaching Hospitals Trust</td>
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This talk will explore key concepts concerning the role of biomechanics in healthy and diseased arteries. Biomechanics is the field concerned with an understanding of the relationship between forces, structure and function of tissues. The first part of the talk will start with details of the structure of arteries, the mechanical design of arteries, and explain pressure and flow waveforms in terms of simple models. The second part will explore how the arterial system adapts to maintain its mechanical environment within a narrow bound. Arteries sense their mechanical environment and will respond to changes in this environment. Arteries are subject to 3 main stresses; wall shear stress, the viscous drag of blood on the endothelial surface, which arises from blood flow; circumferential stress which arises from blood pressure, and longitudinal stress. Medium term (weeks) increase in wall shear stress (eg. during growth) leads to increase in diameter, increase in circumferential stress (eg. as a result of hypertension) leads to increase in wall thickness and increase in longitudinal stress leads to arterial lengthening. Some (not all) of these effects are reversible. The final part of the talk will explore biomechanics in disease. It is increasingly recognised that major diseases such as atherosclerosis and aneurysms develop as an interplay between local biology and the local mechanical environment. Recent progress in understanding of these areas will be explored.
Practical Workshop Session – Festival Suite

Carotid Master Class

11.15 – 12.45  Led by – Mrs Borsha Sarker, gECHO Ultrasound Solutions Ltd, Prof Neil Pugh, University Hospital of Wales, Mrs Tracey Gall, MIS Healthcare

The session will focus on the more difficult pathologies that may be encountered when scanning the carotid arteries. These include dissection, near occlusion/ trickle flow and non-atherosclerotic disease.

Combining hands-on practical and live demonstration with short lectures the aims of this session are to improve the optimisation of machine controls and build confidence in assessing and reporting difficult cases.

MSK Fundamental Practical

13.45 – 17.00  Led by – Mrs Alison Hall, Keele University

The practical workshops will build on information gained from the morning lectures on a ‘how to scan’ basis.

Stations will be divided into 3 sections – shoulder, hand/wrist and foot/ankle where experienced sonographers/Radiologists will be on hand to help delegates practice basic patient positions and ultrasound techniques

Faculty

Miss Lynn Bradley, Diagnostic Ultrasound Coventry
Mrs Sophie Cochran, Pilgrim Hospital
Mr Mark Maybury, Heart of England NHS Foundation Trust
Mrs Sara Riley, Leeds Teaching Hospitals
Miss Katie Simm, Whiston Hospital
Dr Adzira Thahal, Great Western Hospital, Swindon
Ms Rachel Wilson, Hull Royal Infirmary
Dr Russell Young, Gloucestershire Hospitals NHS Foundation Trust
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Young Investigator Session

The young investigator session is a show-case of the best abstracts submitted by authors who are 39 years old or younger. The best presentation from this session wins the BMUS Young Investigator of the year award and is given the opportunity to present their work on behalf of BMUS at the 2018 Euroson Meeting being held in Poznan, Poland. on 6th – 9th September 2018.

Sarah Mason

**3D spatial compounding improves ultrasound image quality in gynaecological image-guided radiotherapy**, Sarah Mason, Joint Department of Physics and Imaging Institute of Cancer Research

Sarah Mason is a PhD student at the Institute of Cancer Research under the supervision of Dr Emma Harris, Dr Tuathan O’Shea, and Professor Jeff Bamber. After receiving her BSc in bioengineering at Rice University in the USA in 2013, she moved to the UK to study medical imaging. In 2014, Sarah began investigating methods of using ultrasound to localize radiotherapy targets to enable more accurate treatment for cancer patients. This has included the development of ultrasound acquisition, post-processing, and segmentation techniques. Sarah is passionate about her research, and hopes to continue exploring the use of ultrasound to guide treatment in a variety of clinical settings.

Caroline Banahan

**Brain tissue pulsation measurements for diagnosis of acute stroke: A pilot study**, Caroline Banahan123, Mintu Nath12, Sara Venturini1, Jyoti Nath1, Kirk W. Beach4, M. Oura, P. Turner1 Kumar V. Rammarine1,2,3, Mark Moehring4, Asanka Dewaraja6, Amit K. Mistri7, Thompson G. Robinson1,2, Emma M.L. Chung1,2,3

1Dept. of Cardiovascular Sciences, University of Leicester, UK, 2National Institute for Health Research Leicester Biomedical Research Centre, University of Leicester, UK, 3Dept. of Medical Physics, University Hospitals of Leicester NHS Trust, UK, 4University of Washington, Seattle, WA, USA, 5Nihon Kohden, Japan, 6Broadview Laboratories, Seattle WA, USA

I am a clinical scientist based in the Medical Physics Department at University Hospitals of Leicester NHS Trust. I am also a member of CHiASM (Cerebral Hemodynamics in Aging and Stroke Medicine), a research group based in Cardiovascular Sciences at the University of Leicester. My main research interests are development of novel Doppler ultrasound techniques, in particular developing new techniques to detect stroke and head trauma injury.

Rute Santos

**Optic nerve sheath evaluation by ultrasound**, Rute Santos, Helena Ferraz, Medical Imaging and Radiotherapy department, IPC - Coimbra Health School

Rute Santos, MSc, Radiography Assistant Professor of Medical Imaging and Radiotherapy Department at Coimbra Health School of the Polytechnic Institute of Coimbra, Portugal. Research interests on ultrasound. She is author and co-author of a large number of scientific oral communications, conference abstracts and papers in ultrasound.
Marcia Costa

Combined focused ultrasound and radiotherapy for the treatment of hypoxic tumours, using photoacoustic imaging as a planning tool, Márcia Costa, Dr. Anant Shah, Dr. Ian Rivens, Dr. Tuathan O’Shea, Dr. Carol Box, Dr. Jeffrey Bamber, Dr. Gail ter Haar, Radiotherapy and Imaging, The Institute of Cancer Research

Márcia graduated with a Masters in Biomedical and Biophysics Engineering from the University of Lisbon, in 2012. During her degree, she completed two internships at the University of Virginia, USA, where she was firstly introduced to focused ultrasound in cancer treatment. She then moved to London, to pursue her PhD at The Institute of Cancer Research. She has been investigating the potential benefit of combining focused ultrasound and radiotherapy in the treatment of hypoxic tumours.

Jonathan Delf

Use of small bowel ultrasound to identify small bowel crohn’s disease compared with magnetic resonance enterography, Jonathan Delf, Syed Umair Mahmood, Ratan Verma, Steve Jepson, Vikas Shah, Joe Mullineux, Peter Rodgers, James Stephenson, Gastrointestinal Imaging Group University Hospitals of Leicester

Jonathan is currently working as a Foundation Year 1 doctor at University Hospitals of Leicester, having recently started a rotation in clinical radiology this December. After undertaking a 6-week elective in clinical radiology earlier this year, he is determined to pursue a career in radiology after his foundation training. He is currently undertaking projects on interventional and clinical radiology with a hope to learn more about the specialty and gain further academic insight.

Philip Carvil

The effect of 4-hour SkinSuit induced partial axial reloading upon stature elongation and anterior intervertebral disc height as assessed by ultrasound after 8-hour hyper-buoyancy flotation, Philip Carvil¹, Susan Halson Brown², Thais Russomano¹, David A Green³, ¹Centre for Human and Aerospace Physiological Sciences, King’s College London, ²Women’s Health King’s College London, ³King’s College London

Phil is a doctoral student at King’s College London, his specialist field is human space flight countermeasures and investigating ways to support the body in space. His PhD which is funded by the European Space Agency, has been contributing to the development of the SkinSuit Project. The SkinSuit is a wearable garment for astronauts, which loads the body vertically through elastic material tension and has flown twice to the International Space Station. His research is examining the effects of the SkinSuit on the spine, using imaging techniques including ultrasound, with the view to mitigate spinal issues experienced in space.

Grigorios Kyriazis

Magnetic Resonance Imaging (MRI)/Ultrasonography (US) fusion-guided transrectal biopsy is equally effective with MRI/US fusion-guided transperineal biopsy in detecting anteriorly located prostate cancer, Grigorios Kyriazis, Matthew Simms, Sachie Siriwardena, Pam Parker, Radiology Hull and East Yorkshire Hospitals, Andy Hunter, Oliver Byass, Hull and East Yorkshire Hospitals

My name is Grigorios Kyriazis, I am from Greece and I am working as a clinical fellow in Urology, in Castle Hill Hospital.
## At a Glance DAY 2

### Day 2 – THURSDAY 7th December 2017

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<td>Head &amp; Neck 1</td>
<td>Vascular 1</td>
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<td>Plenary 1 Gold Cup Suite</td>
<td>Plenary 2 Insurance Suite</td>
<td>Plenary 3 Sovereign Suite</td>
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**10.30 Morning Refreshment Break – Exhibition Hall Ground Floor**

| 11.00          | Obstetrics 2 Peter Twining Lecture Dr T Overton The Future of Fetal Medicine | Head & Neck 2 | Vascular 2 | MSK Advanced Practical Session (cont) | THUGS Therapy Ultrasound Group Meeting |

**12.30 Lunch - Exhibition Hall Ground Floor**

| 13.30          | Obstetrics 3 | MSK 1 Advanced | Young Investigator 2017 Session | Head & Neck Practical Session | THUGS Therapy Ultrasound Group Meeting |

**15.00 Afternoon Refreshment Break - Exhibition Hall Ground Floor**

| 15.30          | Obstetrics 4 | MSK 2 Advanced | Professional Issues CASE | Head & Neck Practical Session (cont) | THUGS Therapy Ultrasound Group Meeting |

**17:00 End of Day 2**

**19.00 BMUS 2017 Gala Dinner & Awards Ceremony at the Pittville Pump Room, Cheltenham**
Scientific Programme 2017

Day 2 – Thursday 7th December

Plenary 1 – Gold Cup Suite

Obstetrics 1

**09.00 – 10.30**  
**Chairs** – Dr Tim Overton, St Michael’s Hospital

This session aims to examine the current comment pitfalls in routine ultrasound, their potential significance and practical suggestions as to how they may be avoided.

The session is aimed at sonographers, midwives, obstetricians, radiologists and nurses who have an interest in routine obstetric ultrasound.

**09.00**  
**Introduction and welcome**, Dr Tim Overton, St Michael’s Hospital

**09.10**  
**Ultrasound assessment to prevent still births**, Ms Katie Morris, University of Birmingham

**09.50**  
**Routine ultrasound surveillance in twin pregnancies**, Ms Asma Khalil, St George’s Hospital

Obstetrics 2: Peter Twining Lecture

**11.00 – 12.30**  
**Chairs** – Dr Peter Cantin, Derriford Hospital, Plymouth, Dr Simon Freeman, Derriford Hospital, Plymouth

**11.00**  
**Peter Twining Lecture**  
**Sponsored by Hitachi Medical Systems**

**The future of fetal medicine**, Dr Tim Overton, St Michael’s Hospital

The application of ultrasound technology to obstetrics in the 1970s laid the foundation for the birth of a new medical specialty - fetal medicine. With the change in millennium came the introduction of novel techniques which have re-invigorated the specialty resulting in a renaissance in fetal medicine. Non-invasive prenatal genetic testing, minimally invasive surgical instruments and increasing refinements in imaging modalities are beginning to enable major advances in our specialty paving the way for a bright future.

**12.00**  
**Assessing the accuracy of ultrasound estimation of gestational age during routine antenatal care in In-Vitro Fertilization (IVF) pregnancies**, Aaron Brereton, Helen Liversedge, Bridget Knight, Roy Powell, Royal Devon and Exeter NHS Foundation Trust

**12.15**  
**Identifying factors which influence the antenatal detection of congenital heart defects**, Angie Hobbs¹, Rita Phillips², 'North Bristol Trust, ‘University of the West of England
Obstetrics 3

13.30 – 15.00  Chairs – Dr Tim Overton, St Michael’s Hospital

The “Halve-it” campaign aims to reduce the number of stillbirths by 2030. This session will discuss ways in which routine pregnancy ultrasound can help achieve this ambitious goal.

13.30  What to look for in the big fetus, Mr Myles Taylor, The Royal Devon and Exeter NHS Foundation Trust

14.00  What to look for in the small fetus, Dr Victoria Bills, University Hospital Bristol

14.30  Should we be screening for Vasa Praevia, Dr George Attilakos, University College Hospital London

Obstetrics 4

15.30 – 17.00  Chairs – Dr Tim Overton, St Michael’s Hospital

Advances in fetal therapy are made each year. An overview of current techniques will help the ultrasound practitioner understand what is possible and what is not.

15.30  Ultrasound as a tool for first and second trimester prediction of pre-eclampsia, Prof Fabricio Costa, Royal Women’s Hospital, Melbourne, Australia

16.15  Case Based Discussion, Dr Tim Overton, St Michael’s Hospital

Plenary 2 – Insurance Suite

Head and Neck 1

09.00 – 10.30  Chairs – Prof Rhodri Evans, Swansea University, Mrs Catherine Kirkpatrick, Lincoln County Hospital

The session will provide in depth insight into the speciality of head and neck ultrasound scanning and reporting by experts in their field.

The aim is to give confidence in reporting and will include an in depth examination of lymph nodes, extra thyroidal pathologies including the tongue, oral cavity & oropharynx and insight into cutting edge advances in the head and neck ultrasound field.

09.00  Ultrasound assessment of the head and neck lymph nodes, Dr Chris Greenall, Morriston Hospital and Royal Glamorgan Hospital

The enlarged cervical lymph node is a common presenting complaint to General Medical Practitioners. While the vast majority are due to benign disease, malignancy needs to be excluded.

Recently updated NICE guidelines on the management of upper aerodigestive tract cancer recommend the use of ultrasound in the assessment of a ‘neck lump’. This has created greater demand for access to specialist neck ultrasound, which is met by radiologists and, increasingly, sonographer-led services.
This lecture will describe the fundamental differences between benign and pathological cervical lymph nodes. Useful sonographic features that can help differentiate between metastatic, lymphoproliferative and inflammatory disease will be demonstrated. Particular attention will be paid to the anatomical distribution of lymph nodes in the head and neck region, highlighting the various anatomical classifications and how the features of lymph nodes differ according to which anatomical subsite they occupy.

09.30  **Tongue, oral cavity and oropharynx – a new perspective**, Dr Tim Beale, University College London

The talk will demonstrate the clinical role of ultrasound in the tongue, oral cavity and oropharynx.

The technique of intraoral and external ultrasound will be demonstrated and the relevant ultrasound anatomy described. A number of clinical cases will be used to highlight the diagnostic capabilities and clinical role of ultrasound in this region.

10.00  **Ultrasound of neck – A surgeon’s point of view**, Mr Laysan Pope, Morriston Hospital

**Head and Neck 2**

11.00 – 12.30  **Chairs** – Prof Rhodri Evans, Swansea University, Mrs Catherine Kirkpatrick, Lincoln County Hospital

A continuation of the earlier session

11.00  **Ultrasound head and neck services, a sonographer’s perspective and lessons learned**, Mrs Catherine Kirkpatrick, Lincoln County Hospital

The pearls and pitfalls of setting up sonographer led services (with particular reference to head and neck services) and where to start. This presentation will offer an insight into mistakes to avoid, challenges which may be faced and suggest training programmes for those wishing to undertake sonographer led advanced practice in a hospital setting.

11.25  **“Old dog – new tricks” lessons learned**, Prof Rhodri Evans, Swansea University

This presentation will look at three aspects of “traditional” ultrasound imaging in the head and neck and assess recent innovations, developments and identify the lessons learned. The session will highlight valuable tips that can help in assessment and identify potential future paths of travel for the head and neck ultrasound practitioner.

Three topics will be covered:
1. Parathyroid – brief refresh on fundamentals and a look at newly described colour flow techniques
2. Tattooing – is this the preventative cure to avoid the disaster scenario of the surgeon failing to remove an identified metastatic node in the neck? An assessment of the state of play, causative factors and potential solutions currently being used. Is tattooing with charcoal the answer?
3. Alcohol – many centres are now turning to the use of ultrasound guided ethanol injection in the management of patients with recurrent papillary carcinoma of the thyroid. The technique should be no more complex than a ultrasound guided FNA. Review of literature and a demonstration of the technique in practice. A brief outline of the potential for travel/developments in radio-frequency ablation will be featured.

This talk will provide a “refresh” review and a stimulus to innovate.
### Recent advances in head and neck scanning, Dr Andrew McQueen, Newcastle upon Tyne Hospitals

### Case study: Ultrasound detection of a left supraglottic tumor, Jean Bainbridge, Hull and East Yorkshire Hospitals NHS Trust

#### MSK Advanced 1

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<td>13.30</td>
<td><strong>Chairs</strong> – Mrs Alison Hall, Keele University, Mr Gerry Johnson, Tameside Hospital NHS Foundation Trust</td>
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<tr>
<td>13.30</td>
<td><strong>Ultrasound of hand injuries</strong>, Dr Chintu Gademsetty, Royal Surrey County Hospital NHS Foundation Trust</td>
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<tr>
<td>13.55</td>
<td><strong>High volume injections in ankle and shoulder</strong>, Dr Russell Young, Gloucestershire Hospitals NHS Foundation Trust</td>
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<tr>
<td>14.20</td>
<td><strong>A framework for requesting, performing, and reporting should diagnostic ultrasound scans, incorporating a novel approach to quantifying tendinopathic findings</strong>, Mike Smith¹, Alison Hall², ¹Cardiff University, ²Keele University,</td>
</tr>
<tr>
<td>14.30</td>
<td><strong>Adult meningocele – An uncommon ultrasound finding</strong>, Denise Choong¹, Colette Sheehan², Marie Stanton¹, Therese Herlihy¹, ¹University College Dublin, ²Connolly Hospital Blanchardstown</td>
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<tr>
<td>14.40</td>
<td><strong>Soft tissue sarcoma masquerading as a haematoma</strong>, Mark Charnock, Sheffield Teaching Hospitals</td>
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<td>14.50</td>
<td><strong>A simple lipoma – not so simple after all! A case of myxoid liposarcoma</strong>, Michele Cunningham, University College Dublin</td>
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MSK Advanced 2

15.30 – 17.00

Chairs – Mrs Alison Hall, Keele University, Mr Gerry Johnson, Tameside Hospital NHS Foundation Trust

A continuation of the earlier session

15.30

Regional anaesthesia and the nerves in the upper limb, Dr Tom Perris, Gloucestershire Hospitals, NHS Foundation Trust

Anaesthesia is a late adopter of all that ultrasound has to offer but we are catching up fast. This presentation will provide an overview of the current use in anaesthesia and critical care with a focus on the identification of peripheral nerves. To demonstrate the current techniques several images and videos of nerve blocks of the upper limb will be presented.

16.00

Ultrasound of the hip and groin with live demo, Dr Russell Young, Gloucestershire Hospitals NHS Foundation Trust, Mrs Nicki Delves, Royal Surrey County Hospital NHS Foundation Trust

16.30

Diagnostic ultrasound in the premier league – help or hindrance, Dr Mark Gillett, West Bromwich Football Club

Plenary 3 – Sovereign Suite

Vascular 1

09.00 – 10.30

Chairs – Mrs Jo Walker, Leicester Royal Infirmary, Mrs Emma Waldergrave, Lewisham and Greenwich NHS Trust

This vascular session will focus on all aspects of carotid duplex scanning. Organised in conjunction with the Society for Vascular Technology of Great Britain and Ireland, the session will take a walk down memory lane exploring how velocity criteria was developed as a tool for assessing carotid disease. It will in addition review innovative new technologies in contrast such as 3D ultrasound for the measurement of plaque volumes, and how this may be changing the way we think about plaque vulnerability.

09.00

Understanding velocity criteria for grading carotid disease, Mr Crispian Oates, Newcastle

The presentation will cover the history of velocity measurements made to assess the degree of carotid stenosis and focus on how we arrived at the criteria recommended in the “Joint Recommendations for Reporting Carotid Ultrasound Investigations in the United Kingdom”.

09.20

Future of carotid disease assessment, Mr Steven Rogers, University Hospital of South Manchester

09.40

Plaque characterisation and grey scale median assessment, Mr Richard Simpson, Nottingham University

10.00

Doppler velocity accuracy, Mr Nick Dudley, United Lincolnshire Hospitals NHS Trust

10.20

Ultrasound Shear-Wave Elastography (SWE) of the carotid arteries in patients with Spontaneous Coronary Artery Dissection (SCAD) vs. healthy volunteers, Fahad Farhan Almutairi, University of Leicester
### Vascular 2

#### 11.00 – 12.30

**Chairs** – Mr Steven Rogers, University Hospital of South Manchester, Mr Richard Simpson, Nottingham University

With the first vascular session dedicated to all things carotid, this session is open to all other vascular issues. This session will explore the less common vascular disorders found in athletes and the best way to assess popliteal entrapment syndrome. Have you had an interesting vascular case lately? Please consider sharing your case study in this session.

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<tr>
<td>11.05</td>
<td>Iliac endothelial fibrosis, Mr Fabrizio D’Abate, St Georges Hospital</td>
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<td>11.20</td>
<td>Popliteal entrapment – overview and assessment, Mr Andy Kindon, Gloucestershire Hospitals NHS Foundation Trust</td>
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<td>11.35</td>
<td>DVT Assessment and NICE Guidelines, Mr Lee Smith, University Hospital South Manchester</td>
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<td>11.50</td>
<td>Duplex assessment of the diabetic limb, Mrs Jo Walker, Leicester Royal Infirmary</td>
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<td>12.05</td>
<td>Budd-Chiari Syndrome: A rare but important cause of raised liver function test, Marita O’Neill¹, Gillian McCrea², Therese Herlihy¹, ¹University College Dublin, ²Cork University Hospital</td>
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Young Investigator Session 2017

13.30 – 15.00 Chairs – Dr Carmel Moran, University of Edinburgh, Mrs Terry Humphrey, Leeds Teaching Hospital

Seven chosen presenters, under 39 years of age, will battle it out to become the UK representative at Euroson 2018 in Poznan, Poland

13.30
3D spatial compounding improves ultrasound image quality in gynaecological image-guided radiotherapy, Sarah Mason, Institute of Cancer Research,

13.45
Optic nerve sheath evaluation by ultrasound, Rute Santos, Helena Ferraz, IPC, Coimbra Health School, Portugal

14.00
Brain tissue pulsation measurements for diagnosis of acute stroke: A pilot study, Caroline Banahan1,2,3, Mintu Nath1,2, Sara Venturini1, Jyoti Nath1, Kirk W. Beach4, M. Oura, P. Turner1, Kumar V. Ramnarine1,2,3, Mark Moehring6, Asanka Dewaraja6, Amit K. Mistri1, Thompson G. Robinson1,2, Emma M.L. Chung1,2,3, 1Dept. of Cardiovascular Sciences, University of Leicester, UK, 2National Institute for Health Research Leicester Biomedical Research Centre, University of Leicester, UK, 3Dept. of Medical Physics, University Hospitals of Leicester NHS Trust, UK, 4University of Washington, Seattle, WA, USA, 5Nihon Kohden, Japan, 6Broadview Laboratories, Seattle WA, USA

14.15
Magnetic resonance imaging (MRI)/Ultrasonography (US) fusion guided transrectal biopsy is equally effective with MRI/US fusion guided transperineal biopsy in detecting anteriorly located prostate cancer, Grigorios Kyriazis, Matthew Simms, Sachie Siriwardena, Pam Parker, Andy Hunter, Oliver Byass, Hull and East Yorkshire Hospitals,

14.30
Combined focused ultrasound and radiotherapy for the treatment of hypoxic tumours, using photoacoustic imaging as a planning tool, Márcia Costa, Anant Shah, Ian Rivens, Tuathan O’Shea, Carol Box, Jeffrey Bamber, Gail ter Haar, Radiotherapy and Imaging The Institute of Cancer Research

14.45
Use of small bowel ultrasound to identify small bowel crohn’s disease compared with Magnetic Resonance Enterography, Jonathan Delf, Syed Umair Mahmood, Ratan Verma, Steve Jepson, Vikas Shah, Joe Mullineux, Peter Rodgers, James Stephenson, Gastrointestinal Imaging Group University Hospitals of Leicester,

15.00
The effect of 4-hour SkinSuit induced partial axial reloading upon stature elongation and anterior intervertebral disc height as assessed by ultrasound after 8-hour hyper-buoyancy flotation, Philip Carvil, Susan Halson-Brown, Thais Russomano, David A Green, King’s College London

Professional Issues – Education in conjunction with CASE

15.30 – 17.00 Chairs – Mrs Pamela Parker, Hull and East Yorkshire Hospitals NHS Trust, Dr Peter Cantin, Derriford Hospital, Plymouth

Are financial pressures driving a ‘dumbing down’ of the role of the sonographer? How will the reality of student debt affect recruitment? What will the sonography career framework look like in the years ahead? Are we ready for a return of band 5 non-reporting sonographers?

The aim of this session is to explore some of the political and financial drivers for change in ultrasound education and training and how these are being addressed.
15.30  Sonographer Career Framework – A view from above, Mrs Shelagh Morris, NHS England

15.55  Developing the imaging apprentice, Mrs Alison McGuinness, Mid Yorks Hospital NHS Trust

16.15  Training the next generation of sonographers. Why this is a bad idea...., Mrs Heather Venables, University of Derby

Sonography remains a UK shortage profession. Demographic data suggest that this is likely to worsen as demand continues to rise and the current workforce ages. In recent years there has been intense high level focus on alternative models of sonographer training, renewed debate around the need for professional registration and uncertainty about future funding options.

While national debate continues, unrelenting pressure on clinical departments has an inevitable impact on the quality of student experience and staff morale. Despite this, approaches to sonographer training in the clinical setting have been largely unchanged over several decades. In this talk we will consider why this might be a bad idea...... and how we might do things differently.

16.40  Direct entry undergraduate education for sonographers: A case study, Rachel Barker, Anushka Sumra, Birmingham City University

Practical Workshop Session – Festival Suite

Advanced MSK Practical

09.00 – 12.30  Led by –Ms Rachel Wilson, Hull Royal Infirmary, Mrs Sara Riley, Leeds Teaching Hospitals

The advanced practical workshops are aimed at those with current MSK ultrasound skills wishing to increase their knowledge of the more advanced techniques.

The more complex areas of hip and groin, knee and elbow will be covered as well as ultrasound guided MSK interventions and scanning for inflammatory arthritis.

Experienced sonographers/Radiologists will be on hand to help delegates get the maximum benefit from hands on, small group tutoring.

Faculty

Mrs Nicki Delves, Royal Surrey County Hospital
Mrs Alison Hall, Keele University
Dr Chintu Gadamsetty, Royal Surrey County Hospital NHS Foundation Trust
Mr Gerry Johnson, Tameside Hospital NHS Foundation Trust
Mr Mark Maybury, Heart of England NHS Foundation Trust
Mr Tom Perris, Gloucester Hospitals NHS Foundation Trust
Dr Adzira Thahal, Great Western Hospital, Swindon
Dr Russell Young, Gloucestershire Hospitals NHS Foundation Trust
Head and Neck Practical

09.00 – 12.30  Led by - Mrs Catherine Kirkpatrick, Lincoln County Hospital

This session will follow the same successful format as in previous years workshops. The anatomy of the head and neck will be taught in small groups. It will be delivered by the teaching of a series of standard sweeps through the neck, each sweep being initially demonstrated by live scanning to the whole group. Following each demonstration the delegates will then scan the models under the supervision of a member of the head and neck faculty in their respective small groups. The neck will be systematically covered outlining the key structures that need to be identified, starting from the submental region and ending with the larynx. Tips and pitfalls will be highlighted allowing a comprehensive scanning technique of the neck to be mastered under the guidance of the faculty. This workshop will allow the delegate to have confidence in neck scanning through a systematic approach.

Faculty

Dr Rhodri M Evans, Swansea University
Dr Rhian Rhys, Royal Glamorgan Hospital
Dr Andrew McQueen, Newcastle upon Tyne Hospitals
Mrs Jean Bainbridge Hull and East Yorkshire Hospitals NHS Trust
Mrs Amy Barnes, Leicester Royal Infirmary
Dr LoI Berman, Cambridge University
Dr Chris Greenall, Morriston Hospital
Dr Dave Salvage, Hull and East Yorkshire Hospitals NHS Trust

Satellite Session - Istabraq Suite

Therapy Ultrasound Group (Thugs)

10.20 – 12.50  Chair - Prof Constantin Coussios, BUBBL, Institute of Biomedical Engineering, Oxford

10.20  Speckle-free attenuation estimation and compensation with passive acoustic mapping
Dr Michael Gray, BUBBL, Institute of Biomedical Engineering, Oxford

10.45  A disturbance-free device for the exposure of cells –preliminary study, Dr Piero Miloro,
National Physical Laboratory, London

11.10  Time reversal based beamforming of a modular 3D HIFU array for targeting of
intervertebral discs, Ms Erasmia Lyka, BUBBL, Institute of Biomedical Engineering, Oxford

11.35  Focused ultrasound mediated hyperthermia in vitro – design, optimization and calibration
of an experimental set-up, Ms Sarah Brueningk, Institute of Cancer Research, London

12.00  Modelling large-volume hyperthermia in the liver for ultrasound-enhanced drug delivery
from thermosensitive carriers, Mr Brian Chu, BUBBL, Institute of Biomedical Engineering, Oxford

12.25  Improved drug distribution to the brain in vivo using Rapid short-pulse (RaSP) sequences,
Sophie Morse, Imperial College London
### Lunch

**12.50 – 13.40**  
BMUS Technical Exhibition

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### Therapy Ultrasound Group (Thugs)

**13.40 – 16.15**

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<th>Time</th>
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<tr>
<td>13.40</td>
<td><strong>Chair</strong> - Prof Steven Freear, University of Leeds</td>
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<tr>
<td>13.45</td>
<td>TARDOX: results of a Phase I 10-patient study of targeted drug delivery from thermo-sensitive liposomes by ultrasound-guided FUS-mediated hyperthermia, Prof Constantin Coussios, BUBBL, Institute of Biomedical Engineering, Oxford</td>
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<tr>
<td>14.10</td>
<td>Investigation of the ability of gas-filled nanobubbles to deliver drug-mimics to the brain by disruption of the blood brain barrier using focused ultrasound, Dr Julie McNairn, University of Edinburgh</td>
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<tr>
<td>14.35</td>
<td>Nonlinear Detection of Therapeutic Microbubbles with Ultrafast Plane-wave Imaging, Prof Steven Freear, University of Leeds</td>
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<tr>
<td>15.00</td>
<td>Patient Specific Models for Renal Ablation, Ms Magda Abbas, BUBBL, Institute of Biomedical Engineering, Oxford</td>
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<td>15.25</td>
<td>Therapeutic ultrasound increases the infiltration of pancreatic tumours by CD8+ lymphocytes, Dr Petros Mouratidis, Institute of Cancer Research, London</td>
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<td>15.50</td>
<td>Development of a device for large volume sonication of the brain, Mr Luke Richards, BUBBL, Institute of Biomedical Engineering, Oxford</td>
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<tr>
<td>16.15</td>
<td><strong>End of meeting</strong></td>
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Premium just got better
Samsung RS85
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BMUS ANNUAL GALA DINNER & AWARDS CEREMONY

7th December 2017
Pittville Pump Room, Cheltenham

19:00 Pre-Dinner Drinks

19:45 Gala Dinner & Awards Ceremony
The evening’s festivities will include a three course deluxe menu, entertainment and disco.

An evening not to be missed, we have London’s premier a capella group, The Buzztones, performing, a fun-filled photo-booth where you can really let your hair down and a DJ to help you dance the night away.

The winners of this year’s prizes will be announced after dinner.

Carriages at 12.30

A wonderful opportunity to begin your Christmas Festivities with old & new acquaintances, come and join us for yet another fun packed BMUS event!

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### At a Glance DAY 3

#### Day 3 – FRIDAY 8th December 2017

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<td>Plenary 1 Gold Cup Suite</td>
<td>Plenary 1 Insurance Suite</td>
<td>Plenary 1 Sovereign Suite</td>
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<td>09.00</td>
<td>Gynaecology 1</td>
<td>Professional Issues 1</td>
<td>Paediatrics 1</td>
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<td></td>
<td>Professional Issues 1</td>
<td>Discrepancy, Mistakes and Negligence – learning from practice</td>
<td>Elastography Masterclass</td>
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<td>Paediatrics 1</td>
<td>Translational Ultrasound Imaging Meeting</td>
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#### 10.50 Morning Refreshment Break – Exhibition Hall Ground Floor

#### 11.20 Gynaecology 2

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<th>Professional Issues 2</th>
<th>Paediatrics 2</th>
<th>DVT Practical Session</th>
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<td>Discrepancy, Mistakes and Negligence – learning from practice</td>
<td>Paediatrics 2</td>
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#### 13.10 Lunch Break- Exhibition Hall Ground Floor

#### 14.00 Early Pregnancy

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<th>General Imaging</th>
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#### 17.00 CLOSE
Day 3 – Friday 8th December

Plenary 1 – Gold Cup Suite

**Gynaecology 1**

09.00 – 10.50 **Chairs** – Dr Caroline Overton, St Michael’s University Hospital, Dr Jo Ficquet, Royal United Hospital, Bath

This session on gynaecology and early pregnancy is highly topical following the publication of the report from the Women’s All Parliamentary group in March 2017 highlighting the importance of informed choice and giving women control of their healthcare.

The emphasis of this session is on the combination of ultrasound and clinical features that assist in the diagnosis and management of clinical conditions.

This session aims to

- Highlight features that influence clinical management and update you on management
- Provide you with simple tools to assess ovarian cysts and fibroids
- Examine the ultrasound features of pelvic infection.

09.00 **Ultrasound assessment of fibroids**, Dr Caroline Overton, St Michael’s University Hospital

Fibroids, also known as uterine myomas, fibromyomas or leiomyomas are benign, hormone-dependent tumours of uterine smooth muscle and connective tissue. One in four women will develop fibroids during their lifetime. They can be single or multiple, and vary in size from that of a pip to a watermelon. They may be pedunculated, suberosal, intramural, submucosal, or cervical.

Presentation of surgical and ultrasound images with description of the clinical symptoms of fibroids. Together with guidance on useful information to include in the report to assist in managing a woman’s care.
**Fertility assessment to include; endometrial assessment, adenomyosis, follicular counting and fallopian tube pathology**, Dr Amanda Jefferys, St Michael’s University Hospital

Pelvic ultrasound is an essential part of the assessment of the subfertile couple, and some have argued that a complete fertility assessment can be made with just a pelvic ultrasound scan and semen analysis. Scanning as part of the fertility assessment allows the clinician to gain a wealth of vital information on the myometrium, endometrium, ovaries, in particular ovarian reserve and tubal pathology, allowing diagnosis and development of a management plan. Pelvic ultrasound also plays a pivotal role in monitoring treatment response and success. This talk will explore the applications of ultrasound in the fertility setting.

**Simple tools to assess ovarian cysts**, Dr John Hughes, Bristol Royal Infirmary

**Infection and tubo-ovarian abscesses**, Dr Davor Jurkovic, University College London

---

**Gynaecology 2**

**11.20 – 13.10**

**Chairs** – Dr John Hughes, Bristol Royal Infirmary, Dr Caroline Overton, St Michael’s University Hospital

The emphasis of this session is on the combination of ultrasound and clinical features that assist in the diagnosis and management of clinical conditions.

This session aims to:

- Highlight features that influence clinical management and update you on management
- Update you with the latest on the diagnosis and management of endometriosis due to be published by NICE in September 2017.
- Case review of rare and difficult cases.
- Examine the current role of ultrasound in gynaecology oncology

**Prevention of ultrasound-associated infections in obstetrics and gynaecology**, Mr John Burdach, Nanosonics Limited

**Ultrasound in the diagnosis of endometriosis**, Dr Davor Jurkovic, University College London

**The weird and the wonderful**, Dr Jo Ficquet, Royal United Hospital, Bath

**Ultrasound in gynaecology oncology**, Dr Alexandra Lawrence, Royal London Hospital

**Mimics of ovarian masses**, Tobi Aderotimi, Victoria Birkett, Katherine Kingston, York NHS Teaching Hospital

**An unusual ovarian lesions: Benign vs malignant**, Michele Keenan, University College Dublin
Early Pregnancy

14.00 – 16.00  
**Chairs** – Ms Abigail Oliver, St Michael’s University Hospital, Dr Emma Kirk, Royal Free Hospital

This session on early pregnancy is highly topical following the publication of the report from the Women’s All Parliamentary group in March 2017 highlighting the importance of informed choice and giving women control of their healthcare.

The emphasis of this session is on the combination of ultrasound and clinical features that assist in the diagnosis and management of clinical conditions.

This session will update you on the ultrasound diagnosis of miscarriage and ectopic pregnancy including the green-top guideline on tubal ectopic pregnancy published by the RCOG in November 2016.

### 14.00

**Safe criteria to diagnose miscarriage**, Ms Abigail Oliver, St Michael’s University Hospital

The diagnosis of miscarriage is a common but devastating one for families to receive. It is therefore paramount that it is never wrong, to avoid potential termination of an ongoing planned pregnancy. In 2011, the Royal College of Obstetricians and Gynaecologists changed its guidelines for the criteria to diagnose miscarriage. This prompt action was in response to several studies published at that time which demonstrated that prior criteria was unsafe, and had the potential to diagnose miscarriage prematurely.

This lecture reviews recent evidence which informs about when it is appropriate to make the definitive call that a pregnancy has failed, and examines some of the potential errors that can occur in the ultrasound diagnosis of miscarriage.

### 14.27

**Ultrasound diagnosis of molar pregnancy**, Dr Jackie Ross, Kings College London

How good are we at detecting molar pregnancies? What are the ultrasound features of early molar pregnancies and the rare forms of malignant gestational trophoblastic diseases? This lecture will review the data and illustrate cases.

What are the ultrasound diagnostic criteria for the more rare forms of ectopic pregnancy? A review of difficult cases and how we avoid getting it wrong.

### 14.55

**Ultrasound diagnosis of tubal ectopics**, Dr Emma Kirk, Royal Free Hospital

### 15.23

**Ultrasound diagnosis of non tubal ectopics**, Dr Jackie Ross, Kings College London

### 15.50

**Case of live unilateral dichorionic twin ectopic pregnancy - A rare entity**, Denise McGrath¹, Sheila Brody¹, Therese Herlihy¹, Mary Moran¹, 'University College Dublin, ¹Midlands Regional Hospital, Mullingar, Ireland
Plenary 2 – Insurance Suite

Professional Issues – Discrepancy, Mistakes, and Negligence – learning from practice

09.00 – 10.50 Chairs – Prof Rhodri Evans, Swansea University, Mrs Pamela Parker, Hull and East Yorkshire Hospitals NHS Trust

Duty of Candour processes are becoming embedded into radiology and ultrasound practice. Established discrepancy meeting and governance meetings promote a culture of no blame practice whilst encouraging practitioners to learn from errors. However, when is a discrepancy an error and does every error mean a mistake? As professionals we can take opportunity to learn from our colleagues and peers to avoid future failing. Ultimately, however we want to be reassured that our patient care is safe and reasonable but to have this, we have to learn from our mistakes and avoid negligent practice.

09.00 Why we make mistakes and how it feels, Dr Giles Maskell, Royal Cornwall Hospital NHS Trust

9.30 Understanding discrepancies in radiology, why does it matter and what we have learnt, Dr Jonathan Smith, Leeds Teaching Hospitals NHS Trust

10.00 Common medical legal radiology themes, Mrs Farrah Mauladad, Crown Office Chambers, London

10.30 Peer Review – Underpinning safe practice, Deborah Beare, St Mary’s Hospital

10.40 A clinical audit to establish if Salisbury District Hospital is complying with its chaperone policy for testicular ultrasound, Farrah Elsaghir, Salisbury District Hospital

11.20 – 13.10 **Chairs** – Prof Rhodri Evans, Swansea University, Pamela Parker, Hull and East Yorkshire Hospitals NHS Trust

These two morning sessions aim to review errors that occur in radiology and why they happen. Our invited speakers will outline key issues that arise with a view to help delegates avoid making unnecessary errors in their own practice.

11.20 **The discrepancy meeting**, Dr Mary Roddie, Imperial College London

Group learning from discrepancy is advocated by the Royal College of Radiologists as a valuable educational process. When well run, learning from discrepancy meetings can be beneficial in identifying recurrent patterns of error and in improving diagnostic accuracy. This presentation will cover different ways to encourage a healthy learning from discrepancy process and how to avoid common pitfalls.

11.50 **Lessons learnt from the expert witness**, Dr Michael Weston, Leeds Teaching Hospitals NHS Trust

12.20 **Delegated practice, how to minimise risk and discrepancy**, Miss Hazel Edwards, East and North Hertfordshire NHS Trust

This presentation will explain what delegated practice means, how it has changed subtly over recent years, and how NHS trusts safely manage delegated contemporary practice. Today, UK NHS sonographers have greater autonomy than ever before and are totally accountable for their work and their actions. As a consequence, risk and discrepancy will be discussed along with its potential impact on patients and staff. Minimising risk and discrepancy is the duty of NHS trusts, radiology teams and individuals. Practical, common sense suggestions will be given on how to practise safely and effectively in order to minimise risk and discrepancy, and to maximise our ability to provide an accurate, valuable service. Finally, brief recommendations for behaviour and appropriate strategies will be offered for inevitable occasions when things go wrong.

12.50 **The role of preceptorship in the development of a newly qualified sonographer**, Úna Haren, Tameside and Glossop Integrated Care Hospital NHS
General Imaging - Pitfalls

14.00 – 16.00  Chairs – Dr Peter Cantin, Derriford Hospital, Plymouth, Mrs Pamela Parker, Hull and East Yorkshire Hospitals NHS Trust

This session aims to examine some of the difficulties and pitfalls in general ultrasound imaging. It will examine some of the clinical consequences of such pitfalls and look at strategies and tips to both recognise and avoid them.

14.00  Correlative ultrasound: Finding the difficult to image lesion, Mrs Pamela Parker, Hull and East Yorkshire Hospitals NHS Trust

14.30  Ultrasound management of the splenic lesion, Dr Simon Freeman, Derriford Hospital, Plymouth

15.00  Right iliac fossa pain: Pearl and pitfalls, Dr Tim Hoare, Newcastle upon Tyne Hospitals NHS Foundation Trust

15.30  Superficial lumps and bumps: Pearls and pitfalls and illustrative cases, Dr Robert Lavis, Derriford Hospital, Plymouth

Plenary 3 – Sovereign Suite

Paediatrics 1

09.00 – 10.50  Chairs – Mrs Terry Humphrey, Leeds Teaching Hospital, Dr Tom Watson, Great Ormond Street Hospital

This session will review common errors occurring in paediatric ultrasound imaging, highlighting why they occur and ways to avoid them. Guidance towards good ultrasound technique and a range of paediatric pathologies will be presented.

09.00  The acute abdomen in children – errors and pitfalls, Dr Tom Watson, Great Ormond Street Hospital

The talk will review the common pitfalls and errors which can occur in paediatric abdominal ultrasound.

The talk will review common acute conditions such as appendicitis, intussusception, NEC, and acute presentation of abdominal masses.

Examples from Dr Watson’s back catalogue of discrepancies (personal and otherwise) will be discussed and methods to ameliorate the pitfalls will be addressed.

09.35  Ultrasound of the urinary tract – errors and pitfalls, Dr Jim Carmichael, Evelina London Children’s Hospital
Cranial and spinal ultrasound – errors and pitfalls, Dr Judith Foster, Derriford Hospital, Plymouth

Both cranial and spinal ultrasound are considered to be rather specialist ultrasound examinations, performed in the neonatal and infantile period of life.

However as with all ultrasound they can be quick, easy and extremely useful studies, avoiding radiation and often more involved radiology investigations.

The basic principles of each will be outlined with some errors and pitfalls to avoid and some tips too.

A retrospective analysis of safety and cost implications of paediatric contrast enhanced ultrasound at a single centre, Gibran Timothy Yusuf, King’s College Hospital

11.20 – 13.10

Chairs – Mrs Terry Humphrey, Leeds Teaching Hospital, Dr Jeannette Kraft, Leeds Children’s Hospital

In this session we will review acute and long standing conditions affecting the pelvic organs, inguinal regions and hips in children. In particular guidance will be given for optimum technique when scanning children for assessment of the uterus and ovaries, suspected hernias and developmental dysplasia of the hips.

Ultrasound of female pelvis in children, Dr Caren Landes, Alder Hey Children’s Hospital

How to image the groin in children, Dr Kate Kingston, York Teaching Hospital

The hip joint in children – from birth to teenager, Dr Jeannette Kraft, Leeds Children’s Hospital

The aim of this talk is to review the sonographic imaging appearances of common conditions affecting the paediatric hip.

In the neonate, ultrasound has a well-established role in screening, diagnosis and management of children with developmental hip dysplasia (DDH) owing to its exquisite depiction of the immature skeleton. This lecture will review morphologic and dynamic ultrasound methods used to image the neonatal hip and introduce the hip screening protocol used at our institution.

In the older child, an irritable, painful hip is a common presentation which can be related to a variety of disorders including transient synovitis, septic arthritis, juvenile inflammatory arthritis or Perthes disease. The talk will discuss how ultrasound can help in the diagnostic workup when used in conjunction with clinical evaluation and laboratory parameters.

In the teenager involved in sporting activities, ultrasound may be used to detect injury such as pelvic apophyseal avulsion injury close to the hip.

The application of contrast enhanced ultrasound (CEUS) in tertiary paediatrics, Mariesa Taylor-Allkins, Martijn Verhagen, Paul Humphries, Tom Watson, Great Ormond Street Hospital
Practical Workshop Session – Festival Suite

Elastography Masterclass

09.00 – 10.50  Led by Prof Adrian Lim, Imperial College Healthcare NHS Trust and Dr Tina Fang, King’s College Hospital

This workshop will outline the different Elastography technologies available followed by a practical session on how to perform strain and shearwave Elastography using different scanners. Potential clinical applications will also be discussed.

The workshop is aimed at sonographers and sonologists who would like to start utilising Elastography in their routine clinical practice.

DVT Integrated Training

11.20 – 16.00  Led by Mrs Borsha Sarker, gECHO Ultrasound Solutions Ltd

The Easy Guide to Scanning for Deep Vein Thrombosis (DVT)

Does a DVT request make your heart sink? Don’t feel confident? Think calf veins are impossible? Give arm DVTs to someone else? Struggle to see iliac veins? Wonder when to do what and why?

This popular training session provides 3 hours of practical training with experts in this field and is ideal for students and those wishing to improve their technique.

The session will cover DVT scanning in the arm, pelvis, fem-pop segment, calf veins and includes technique, pathology and reporting advice.

Delegates should complete the BMUS learning package to get the most from this educational session.

This friendly and informal workshop session supports core learning for all delegates from a Radiology and Vascular background with the core skills being transferable to other areas.

Faculty

Mrs Jean Bainbridge, Hull and East Yorkshire Hospitals NHS Trust
Mrs Tracey Gall, MIS Healthcare
Mr Gavin Hope, Queen Elizabeth Hospital
Ms Khalida Jan, City Hospitals Sunderland NHS Foundation Trust
Miss Jane Simmons, East and North Herts NHS Trust
Ms Rachel Wilson, Hull Royal Infirmary
### Satellite Session -

**Translational Ultrasound Imaging Meeting**

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<tr>
<td>09.30</td>
<td><strong>Chairs</strong> - Dr Carmel Moran, University of Edinburgh</td>
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<tr>
<td>09.30</td>
<td>Arrival and Registration</td>
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<tr>
<td>10.00</td>
<td>The performance of ultrasound scanners from clinical to preclinical, Dr Carmel Moran, University of Edinburgh</td>
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<tr>
<td>10.30</td>
<td>Advancing minimally – invasive orthotopic cancer models using ultrasound guided injections, Dr Nicola Ingram, University of Leeds</td>
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<td>11.00</td>
<td>Coffee Break</td>
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<td>11.30</td>
<td>Photoacoustic Imaging – technical validation and novel applications, Dr James Joseph, University of Cambridge</td>
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<td>12.00</td>
<td>Oxygen loaded microbubbles for sonodynamic therapy, Prof Eleanor Stride, St Catherine’s College Oxford</td>
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<tr>
<td>12.30</td>
<td>Lunch and access to technical exhibition (lunch served 13.10 – 14.00)</td>
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### Afternoon Session

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<td>Combined focused ultrasound and radiotherapy for the treatment of hypoxic tumors, using photoacoustic imaging as a planning tool, Dr Marcia Costa, Institute of Cancer Research</td>
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<tr>
<td>14.30</td>
<td>Investigation of the ability of gas-filled nanobubbles to deliver drug mimics to the brain by disruption of the blood brain barrier using focused ultrasound, Dr Julie McNairn, University of Edinburgh</td>
</tr>
<tr>
<td>15.00</td>
<td>New Ideas for diagnostic imaging in colorectal cancer, Dr Helen Mulvana, University of Glasgow</td>
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Introducing...

LOGIQ™ S8 XDclear™ 2.0 with Fibroscan

SUPERB IMAGING • SIMPLIFIED WORKFLOW • SCALABLE TO YOUR NEEDS

Managing Liver Care with Ultrasound
The LOGIQ S8 XDclear 2.0 system offers a range of capabilities that make it well suited to managing patients with liver disease, particularly obese patients who may be difficult to assess with conventional ultrasound systems.  

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BMUS

Head & Neck Ultrasound Training Day
26th April 2018 | Hull

The Hull Head and Neck Ultrasound Course – with practical hands-on scanning experience. To be delivered by a dedicated team of established Sonographers and Radiologists in the field of Head and Neck ultrasound in conjunction with the British Medical Ultrasound Society.

This course will outline the uses of Ultrasound in the head and neck by a series of practical live demonstrations and multiple “hands-on sessions”.

CPD Accredited | www.bmus.org
Each year, BMUS runs a varied programme of educational study days and courses across the country. In 2018, we will once again be running a full programme of study days as outlined above.

All courses carry BMUS CPD Points.
For programmes and registration, please visit www.bmus.org
1. **Is there a link between shoulder pain, shoulder capsule width and rotator cuff (RTC) pathology?**, Damien Laruelle, European School of Osteopathy, UK

**Background:**
Shoulder stability is dependent on active (RTC) and passive (capsule) stabilizers; pathology of one of them must affect the other. Aside from secondary adhesive capsulitis there is a paucity of studies investigating the pathogenic relationship between these structures and shoulder pain.

**Objective:**
To investigate whether there is a link between the capsule width, shoulder pain and RTC pathology.

**Design:**
Observational cross-sectional study

**Methods:**
Participants were recruited from the musculoskeletal ultrasound department of the European School of Osteopathy (ESO) clinic and ESO students, who met the inclusion and exclusion criteria. The outcome measures were, inferior glenohumeral ligament (IGHL) width, Oxford Shoulder Score (OSS) and Shoulder Pain and Disability Index (SPADI). The 13-point RTC scan was used to determine the severity of the pathologies. Data were analysed using Analyse-It; First Normality and variance were tested. Then all the data were analysed to determine whether they could be correlated for significance between the groups. The groups compared were symptomatic shoulder with contralateral control shoulder and a group with RTC tears compared to a group with no RTC tears but RTC pathology.

**Results:**
A total of 24 participants were recruited, of which seven dropped out through the process and 17 completed the study. Spearman’s test showed a correlation between IGHL versus OSS (rs = -0.43, p = 0.01, IGHL versus SPADI (rs = 0.37, p = 0.03) and OSS versus SPADI (rs = 0.97, p<0.0001). Wilcoxon Mann-Whitney test showed statistical significance difference between IGHL in the symptomatic group compared with the control group (p=0.02). However, no statistical difference was found between the group with RTC tear and the group with no RTC tear but RTC pathology (p=0.19).

**Conclusion:**
The results of this study support the idea that there is a possible link between shoulder pain,

2. **Ultrasound in rheumatology: A practical guide**, Katherine Smith1, Richard Wakefield2, Richard Craig1, 1Leeds Biomedical Research Centre, Leeds Teaching Hospitals, 2Leeds Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds

**Introduction**
Rheumatoid arthritis (RA) is a common, chronic disabling inflammatory arthritis. The accurate early identification of inflammation, for both diagnosis and disease monitoring is imperative in order to reduce structural damage and to maintain joint function1. Traditional methods of evaluating joints such as clinical examination and X-ray are limited with respect to sensitivity and specificity2. Consequently, ultrasound is increasingly being employed by clinicians to assess and to quantify joint inflammation (synovitis, tenosynovitis) and damage (bone erosion) in RA3.
This poster introduces the current EULAR ultrasound definitions and semiquantitative scoring systems employed at Leeds Biomedical Research Centre including images and scanning planes utilised, with a view to educating other health professionals and the standardisation of procedures.

Ultrasound Signs

Synovial hypertrophy

Hands, wrists, and feet are commonly assessed for signs of abnormal intra-articular tissue to make/exclude the diagnosis of synovial hypertrophy (SH) with or without power Doppler (PD)\(^4\). A recommended approach for scoring SH is a semiquantitative (SQ) grading of severity on a scale from 0 to 3, for both grayscale (GS) and PD imaging\(^4\).

Tenosynovitis

Tenosynovitis is one of the key features of the clinical pattern in patients with rheumatoid arthritis (RA), with the Extensor Carpi Ulnaris (ECU) and flexor tendons being commonly involved\(^5\). Established tenosynovitis may end in tendon damage resulting in tendon rupture with consequent disability\(^4\). A SQ grading of severity on a scale from 0 to 3 allows for monitoring\(^7\).

Erosions

Bone erosions are commonly found in RA and are considered one of the characteristic findings, and they appear in distinctive sites. They signify the destructive outcome of untreated synovitis \(^8\). A SQ grading of severity on a scale from 0 to 3 allows monitoring\(^1\).

Conclusion

The learning outcome of this poster will be to define and quantify inflammatory and structural pathology seen in RA to facilitate the early diagnosis and accurate monitoring of disease. It will also highlight high risk areas in joints for ultrasound evaluation.

References

5. Terslev L, How to image tendon involvement in RA. Do we need and early diagnosis?, http://ard.bmj.com/content/72/suppl_3/A19.1 accessed July 2017

The plantar plate is a fibrocartilaginous structure which stabilizes the plantar aspect of the metatarsophalangeal joint, preventing dorsi-extension of the toe. It is susceptible to partial or complete tears due to chronic overload, age or trauma. Tears typically present with burning, throbbing or tingling and are commonly misdiagnosed as a Morton’s neuroma, stress fracture or arthropathy.

Untreated tears can cause persistent pain and may progress to substantial deformity and dysfunction. Treatment involves strapping and NSAIDs, with surgery reserved for persistent symptoms.

A 66 year old female with metatarsalgia in the region of the 2nd toe was referred for ultrasound; a steroid injection was requested if a Morton’s neuroma was detected. A clinical examination was first performed using three specific tests for plantar plate tears, testing positive for medial toe drift, reduced plantar purchase and a positive dorsal drawer test. Ultrasound identified a hypoechoic defect on the lateral aspect of the plantar plate, consistent with a partial tear. There was also co-existing capsular disruption and osteoarthritis of the metatarsophalangeal joint.

Studies evaluating ultrasound in detecting plantar plate tears show it to be more sensitive than MRI and this, together with its low-cost and flexibility, suggest that ultrasound is suitable as the first line test. Ultrasound does however have a poorer specificity than MRI which may be too low to rely on for surgical planning, and follow-up MRI imaging may be required. Ultrasound performs well at identifying concomitant or other causes of metatarsalgia especially interspace lesions, notably Morton’s neuromas.

Accurate differentiation, particularly between a tear and a neuroma is advantageous as it indicates the correct treatment option and, in particular, it avoids the inappropriate administration of a steroid injection when the pathology is a tear.

4. Can Swindon foot and ankle questionnaire (SFAQ) be used to screen ultrasound requests?, Roopa Tekkatte, Hyeladzira Thahal, Lyn Williamson, Great Western NHS Foundation Trust, Swindon

Background:
Pressures on radiology ultrasound services include increasing requests from Rheumatologists to confirm early rheumatoid arthritis (RA). Feet pose particular problems. They are often affected in RA, but are excluded from the current standard clinical score DAS28CRP. We developed a simple scoring system for feet and ankles in inflammatory arthritis (SFAQ), validated against clinical measures¹, but not ultrasound (US). We compared US findings in early RA with SFAQ and looked at changes in early disease.

Method:
Early inflammatory arthritis patients completed the SFAQ, and DAS28CRP. Ultrasound (US) assessment of the feet and ankles was performed by consultant musculoskeletal (MSK) radiologist, blinded to the clinical score. These tests were repeated at 6 months. SFAQ scores >6 were considered high. DAS28CRP scores were stratified: high >5.1, moderate 5.1-3.2, low <3.2.

Results:
15 patients took part. On US scan, 5/15 (33%) had active synovitis (Images 1 & 2). Of these 3/5 had high SFAQ (p=0.064) and 4/5 had high DAS28CRP. Of 10 patients with no synovitis, 6/10 had high SFAQ and 3/10 had high DAS28CRP.

5 of 15 patients attended at 6 months. 2/5 had initial US synovitis and high SFAQ in the first assessment. At second assessment: none had active synovitis; SFAQ and DAS28CRP scores were all normal.
Conclusion:
We showed correlation between active synovitis on US and high SFAQ score. With increasing demand and pressure on the MSK US service, SFAQ could be used for stratification of active synovitis in foot and ankle, thus reducing the need for ultrasound scanning. Statistical significance is not achieved due to small numbers. Larger studies are needed.

Reference

5. Is it possible to predict the eventual outcome of a Graf Type IIa Hip by graphical extrapolation?, Deirdre Walden, Princess Anne Hospital, Southampton.

Introduction
For a Graf Type IIa hip that has not matured to a Graf Type I after two ultrasound scans, assuming a linear progression of maturation, is it possible to predict the eventual outcome by graphical extrapolation?

Objective
The purpose of the study was to investigate whether it is possible to reduce the number of follow up ultrasound scans for monitoring Developmental Dysplasia of the Hip (DDH).

Method
244 Infants with high risk factors for DDH referred for hip sonography in a six month period were included in this study. Sonographic examinations were performed using the Graf technique. Both hips were measured and the Graf classification determined.

Results
149 infants had Graf Type I hips at the first scan.

93 infants were referred for a follow up ultrasound scan of which 72 matured to a Graf Type I and 11 were referred for treatment.

10 were referred on for a third scan, of which 9 matured to a Graf Type I and one referred for treatment.

The results for the 10 infants that required three scans were used to test graphical extrapolation techniques.

Conclusion
The analysis showed that in general there is a linear maturation of the hip. This means that it is possible to predict the outcome from two scans using graphical extrapolation. In this study, 100% agreement between the extrapolated prediction and the clinical decision was demonstrated when the result from the first and third scan were used. However only 85% agreement was demonstrated when the first and second scans were used.

The study shows that it is possible to predict the eventual outcome for a Type IIa hip.

The study also shows that follow up scans can be reduced
6. **The role of ultrasound in the differential diagnosis of palpable abdominal wall lesions**, John Ferrier, Kate Kingston, Radiology, York Hospital, York

**Background**
Ultrasound is an important tool in assessing abdominal wall lesions. High frequency linear transducers allow detailed assessment of anatomy and high quality imaging of superficial pathology. The exact location of lesions with respect to the layers of the abdominal wall can be determined and dynamic Valsalva manoeuvre is particularly useful in the assessment of hernias.

**Case report**
We present a pictorial review encompassing the spectrum of palpable abdominal wall lesions encountered in our District General Hospital.

Abdominal wall masses can develop insidiously or acutely and as such present to primary care or a variety of secondary care specialties. Ultrasound is often the first line investigation and in many cases the only imaging modality undertaken. Rectus sheath haematoma often presents with pain, bruising and a rapidly-enlarging abdominal mass. While some patients have a predisposition such as bleeding disorders or anticoagulant medication, others occur spontaneously.

We will include the imaging findings of several abdominal wall haematomas seen in our department recently and outline the key anatomical landmarks. We present a pictorial review of the important alternative painful diagnoses including infection, abdominal wall hernias including postoperative appearances, endometriosis and fat necrosis. Other non-painful abdominal wall lesions such as lipomas, haemangiomas, pilomatrixomas and abdominal wall desmoids will also be depicted.

**Discussion**
Ultrasound is often the first line investigation for abdominal wall masses. Its role in characterising masses and determining whether further imaging is required is becoming increasingly useful. We present several cases of rectus sheath haematoma, outline the imaging and demonstrate the potential differential diagnoses as a pictorial review.

7. **Ultrasound detection of hamstrings tears (a less usual cause for hip pain)**, Min Hui Ho¹, Suraj Menon¹, Lisa Meacock²,¹Radiology Department, Darent Valley Hospital NHS Trust, ²Imaging Department, Kings College Hospital, NHS Foundation Trust

**Purpose/Aim of study:**
To demonstrate the value of ultrasound in detecting full thickness and partial thickness tears of the hamstrings attachment on the ischial tuberosities.

To demonstrate the value of ultrasound as an adjunct to guided intervention.

**Material and methods:**
191(n=191) patients were evaluated for hip pain complaints within a 6 months period in our two hospitals, using ultrasound, by 4 dedicated musculoskeletal radiologists. 112(k1= 112) were female patients and 79(k2=79) were male patients. The age range was between 49 and 91, with a preponderance of patients in their 6th and 7th decades.

The referring diagnosis was in most cases trochanteric bursitis, muscle tears, haematomas or joint effusion.

Several patients were referred with hip pain following hip joint replacements. Post-operative collections or muscle tears were suspected.
Results:
35 patients (r=35) unsuspected tears of the hamstrings.

2 (r1=2) patients were found to have full thickness tears of the hamstrings. Both patients presented following falls after hip replacement surgery.

33 (r2=33) patients presented with unsuspected deep surface partial tears of the hamstrings. Of these patients 7(b=7) had bilateral partial tears of the hamstrings.

Conclusion and study limitations:
Both full thickness and partial thickness tears can be demonstrated with high resolution ultrasound.

Ultrasound evaluation is particularly helpful in the postoperative setting (no artefact as compared to MRI), can be less time-consuming and can guide intervention.

Our study is limited by the small numbers included in the study cohort, and by the limitations of ultrasound in patients with high BMI, in whom studies are difficult to perform.

8. Acute medial Gastrocnemius tear with associated deep vein thrombosis: A case series and review of the literature, Christopher Lord¹, Thomas Gibson¹, Steve Baynes², Mark Wotherspoon³, Leonard King¹, ¹Radiology, University Hospitals, Southampton NHS Foundation Trust, ²Sports Medicine, Southampton Football Club, ³Sports Medicine Nuffield Health

Acute exercise related medial calf pain is a common clinical problem and often presents in middle-aged patients following sporting activity including tennis, badminton and netball etc. The symptoms frequently relate to an acute tear of the medial head of gastrocnemius, however the differential diagnosis includes other muscle injuries involving soleus or plantaris, rupture of a Bakers’ cyst and deep vein thrombosis. Ultrasound is often the diagnostic modality of first choice and can help distinguish between the main differential diagnoses. In the presence of an acute muscle tear, ultrasound can be used to assess the grade of injury and associated complications including haematoma formation. We present three cases of medial gastrocnemius tears in middle-aged athletes (mean age 52 years) diagnosed by ultrasound with simultaneous demonstration of an associated intramuscular deep vein thrombosis. None of these cases demonstrated proximal propagation into the popliteal vein. The clinical features, imaging findings and management are presented in this case series along with a review of the published literature. We suggest that the presence of a medial gastrocnemius tear should routinely prompt ultrasound assessment of the adjacent deep calf veins to exclude intercurrent DVT.
Paediatrics

9. The ultrasound features of necrotic bowel in children: A pictorial essay, Eu Leong Harvey Teo, Diagnostic Imaging and Intervention KK Women’s and Children’s Hospital, Singapore

Background
Bowel necrosis (BN) is death of part of the intestines due to its blood supply being cut off. Although patients are invariably septic and very ill, it is a difficult diagnosis to make clinically. Ultrasound is a relatively inexpensive, portable and readily available modality that is useful in the diagnosis of BN. This pictorial essay will illustrate the ultrasound features of BN and highlight some of the causes in children. Correlation with plain radiographs, CT and pathological specimens will be shown.

Imaging Findings
Necrotising enterocolitis, malrotation with small bowel volvulus and incarcerated inguinal hernias are common causes of BN in the neonatal period. Intussusception, complications of Meckel’s diverticulum, post-surgical adhesions, internal hernias and vasculitic causes are more common in older children.

The ultrasound features of BN include persistent dilated loops of thick-walled bowel, intramural gas appearing as echogenic specks, bubbles of gas within the portal vein, absent intra-mural colour Doppler signs and pneumoperitoneum. The diagnosis of BN can be made earlier on ultrasound than on abdominal radiographs.

Conclusion
This pictorial essay will familiarize the reader with a wide range of conditions that may cause BN in children. The reader will also learn to recognize the imaging features of BN on various imaging modalities with an emphasis on ultrasound. Knowledge of these findings will help the Radiologist diagnose the condition early possibly preventing severe complications later on.

10. The neonatal spine: Ultrasound technique and pathology, Mariesa Taylor-Allkins, Fariba Williams, Roy Wheeler, Tom Watson, Great Ormond Street Hospital for Children, London

Learning Objectives:
We present an educational poster of ultrasound scanning techniques and imaging examples of both normal and abnormal neonatal spinal pathology encountered at a quaternary paediatric referral centre.

Background:
Great Ormond Street NHS hospital, London (GOSH) is a quaternary paediatric referral centre which sees a wide variety of patients and pathologies. Ultrasound is frequently used at GOSH as a first line investigation of the spine and is particularly useful as a screening tool for most suspected neonatal spine abnormalities within the first few hours of life. It is an effective, non-invasive technique with high sensitivity and specificity. The pitfalls however, are that it is highly operator dependent and requires a sound knowledge, systematic approach and confidence in usage of the equipment.
Findings:
We analysed imaging of patients referred to our institution over the last 5 years (which included 300 patients) for an ultrasound of their spine in order to:

- Present our ultrasound scanning techniques and protocols used to enhance imaging and reduce inter-observer variability.
- Highlight the variety of clinical presentations requiring specialist spinal imaging that lead to a quaternary centre referral. These commonly include abnormalities seen in utero, myelomeningocele, skin discoloration of the lumbar region, sacral dimpling, bladder abnormalities and congenital abnormalities with spine association.
- Present a pictorial review of the variety of pathology encountered using ultrasound alongside any cross sectional imaging correlates, drawing reference from normal anatomy. These include myelomeningocele, cord tethering, sacrococcygeal teratoma and vertebral anomalies.

Summary:
Spinal pathology is a commonly encountered entity however often met with a degree of trepidation when ultrasound is used as an imaging modality. We have shown the techniques employed at a quaternary paediatric centre alongside both normal anatomy and examples of pathology with cross-sectional imaging correlates.

11. Vascular anomalies - The key role of ultrasound in making the diagnosis, Fariba Williams, Mariesa Taylor-Allkins, Roy Wheeler, Alex Barnacle, Great Ormond Street Hospital for Children, London

Learning objectives:
Vascular anomalies are richly varied in their clinical presentation and can be a diagnostic challenge for those without experience in this field. The classification of vascular anomalies is explained, with examples of the characteristic sonographic features of each subtype. The poster emphasises why it is also crucial to take a comprehensive clinical history and examine the patient to ensure the correct diagnosis. The poster includes examples of all the vascular anomaly subtypes encountered at a specialist paediatric vascular anomalies referral centre and aims to simplify this diagnostic field for the sonographer.

Background:
Vascular anomalies are common, with haemangiomas occurring in approximately 1 in 22 children. The clinical spectrum of vascular anomalies is diverse and imaging features vary according to the age of the child. Ultrasound is an efficient, non-invasive and highly effective imaging modality for characterisation of these anomalies but an understanding of the medical history and clinical findings is key to making a definitive diagnosis and advising on subsequent management.

Findings:
Over 500 soft tissue ultrasound scans have been reviewed in order to demonstrate:

- The variety of clinical presentations of vascular anomalies in childhood
- Recommended scanning techniques and ultrasound protocols for compartmentalising the main VA subtypes
- How to differentiate between a vascular malformation and a haemangioma or other benign vascular tumour
- The value of ultrasound in directing further investigation and management of vascular anomalies

Summary:
Vascular anomalies are richly varied in their clinical presentation and can be a diagnostic challenge for those without experience in this field. This poster gives an overview of the lesion subtypes and highlights aspects of the clinical history, examination and ultrasound study which are critical in making a correct and confident diagnosis.
12. Hepatocellular carcinoma on top of cystic fibrosis related liver disease: A deadly combination, Kelly Foley-Friel, Radiology Crumlin Children’s Hospital, Republic of Ireland

Background
Cystic fibrosis is defined as an autosomal recessive disorder caused by a defect in the cystic fibrosis transmembrane conductance regulator (CFTR) protein. It is a progressive disease process resulting in irreversible respiratory damage. Cystic fibrosis associated liver disease (CFLD) is progressive liver disease in these patients. It is presumed the CFTR protein on the surface of cholangiocytes is impaired resulting in inspissated bile. This ultimately leads to biliary obstruction resulting in fibrosis and cirrhosis of the liver.

Case report
A 16-year-old female patient with trisomy 21 and cystic fibrosis attended the ultrasound department. The patient had no surveillance scan performed since 2012, even though there were extensive hepatobiliary manifestations of the disease previously documented. Using a curvilinear 5-1 MHz transducer in conjunction with a linear 13-5 MHz, an abdominal scan was performed. Ultrasonography of the liver revealed a course heterogeneous echotexture associated with a nodular capsule and periportal fibrosis. Doppler studies illustrated portal hypertension in conjunction with recanalisation of the para umbilical vein. A suspicious hyperechoic lesion measuring 14.3x13 cm was detected within the right lobe. As a result of the sonographic findings, an MRI liver and CT Thorax were subsequently performed which revealed a 4x4cm lung lesion. A CT guided lung biopsy was carried out. Based on histology results, the patient was diagnosed with metastatic HCC and her condition was palliative.

Discussion
Ultrasound can be used as a baseline tool to diagnose and monitor progression of CFLD. A course heterogeneous nodular liver leads to difficulties in the detection of hepatocellular carcinoma. It is relatively cheap, quick and easy to perform but with the known limitation of operator dependency. Published guidelines recommend annual ultrasound surveillance for CF patients to detect hepatobiliary manifestations. However, a lack of interval ultrasound imaging led to a very poor prognosis for this patient.


Use of ultrasound in both children and MSK imaging is well established. Our District General Hospital (DGH) performs about 1600 paediatric US per year, the majority being renal, abdominal and screening hip examinations by paediatric radiologists and sonographers. Over the past few years the exponential use of ultrasound for assessing superficial lumps and bumps and musculoskeletal problems in children has meant a steep learning curve for our MSK radiologists, predominantly trained in adult imaging. We would like to share some strategies we have learned.

There are many challenges associated with scanning a child; some of the more important are practical involving actually getting to scan the child and keeping them still for the duration. Our pictorial discussion will review the tricks and stratagems we use to persuade the child into the room and onto the bed. We show some of the parental holds and distraction techniques we employ in an effort to keep the child still. Young children may not accurately localise or communicate the site of symptoms, requiring flexibility of approach. Although scan technique is similar in adults and children, the anatomy may be unfamiliar and changes markedly over a relatively short period of time as cartilaginous parts of joints progressively ossify. We provide examples of joints at different ages and stages of maturation. One of the main pitfalls can be differentiating cartilage from joint effusion or synovitis, we will use cases to illustrate some of the techniques we have found useful in avoiding misinterpretation. Some conditions and injuries encountered are specific to children, the history may be unclear and in infants the possibility of infection, non-accidental injury or developmental anomalies with deeper communication must be considered.

Ultrasound is excellent for children in MSK but has associated challenges and pitfalls. We will discuss how some of these may be overcome.
14. **Application of bowel ultrasound in comparison to MRI: A case study**, Mitesh Naik, Fariba Williams, Tom Watson, Great Ormond Street Hospital for Children NHS Foundation Trust, London

**Background**
Crohn's disease (CD) is an inflammatory disorder affecting any part of the gastrointestinal tract. The incidence and prevalence of CD is rising.

Imaging is pivotal in diagnosis and in monitoring disease activity. Although several imaging modalities are used, MR enterography is often preferred due to the high resolution of both bowel and relevant extra-intestinal sites. However, drawbacks include lack of availability, patient preparation, and examination length which may be challenging for infants. Ultrasound offers advantages of being non-invasive, generally well-tolerated and providing a dynamic assessment of the bowel.

**Case Report**
A 14-year-old boy of Hungarian origin with known CD, asymptomatic on maintenance treatment, was found on examination at a routine appointment to have an 8-10 cm mass palpable in the right iliac fossa.

An ultrasound scan was arranged which showed presence of a grossly abnormal mass of bowel loops with at least three interloop fistulae, and markedly abnormal vascularity of surrounding mesentery. The terminal and distal ileum were thick-walled, with dilatation of the mid-ileum suggesting a stricture. An MRI small bowel study corroborated these findings.

He was commenced on biologic treatment and underwent an ileocaecal resection.

Further cases will be demonstrated in our presentation.

**Discussion**
This case, alongside other examples in our presentation, highlights potential advantages of using ultrasound as an adjunct to MRI in the surveillance of CD. Sonographic assessment is reliable in detecting inflammatory changes within the colon and distal ileum - with our case clearly depicting interloop bowel fistulae - and may be particularly useful to confirm equivocal or unusual findings seen in other imaging modalities.

**References**

15. **Soft tissue masses in children: An important differential diagnosis**, Fariba Williams, Mitesh Naik, Derek Roebuck, Great Ormond Street Hospital for Children NHS Foundation Trust, London

**Background**
Synovial sarcomas (SS) are malignant tumours arising from mesenchymal cells, and account for 10% of all sarcomas. They most frequently occur in young adults, commonly within extremities near large joints. SS can invade locally and/or give rise to nodal or distant metastasis.

**Case Report**
A 9-year-old boy, previously fit and well, presented with a week's history of atraumatic painless swelling of the inferomedial right thigh. Their only relevant history was a strong family history of malignancy including leukaemia and breast cancer. On examination, a soft mass was palpable overlying the right lower femur, with a harder area centrally.

Initial ultrasound demonstrated a mixed echogenicity soft tissue mass measuring 11 x 6 x 5 cm, centred on the posterior compartment of the distal right thigh, displacing the hamstrings posteriorly. Hypoechoic foci were
found within, though these did not return Doppler signal to indicate intralesional vessels. Small disorganised arterialised vessels were present in other areas of the mass.

A subsequent MRI study demonstrated a lesion with a central solid component and surrounding cystic areas, some of which appeared to be blood-filled. At this point, an atypical vascular malformation was in the differential as well as a neoplastic process.

Ultrasound-guided needle biopsy confirmed a biphasic SS. PET-CT ruled out nodal and distant metastasis. Chemotherapy was instituted prior to considering surgery, which may include amputation for local control.

Discussion
Synovial sarcomas can be misdiagnosed as benign pathology due to their insidious onset and well-circumscribed appearance. On sonographic assessment, certain features can overlap with those found in vascular malformations or haematomas. It is important to consider SS as a differential diagnosis in children with soft tissue masses, and undertake biopsy where appropriate.

References

Head and Neck

16. Satisfying NICE (quickly) - A sonographer’s experience of a streamlined approach to becoming proficient in ultrasound guided biopsy in the neck, Michelle Davies, Chris Greenall, Rhodri Evans, Radiology, ABMU Health Board

In February 2016 NICE published ‘Cancer of the upper aerodigestive tract: Assessment and management in people aged 16 and over’. This recommended the use of ultrasound guided biopsy for the assessment of neck lumps. While the role of the neck lump clinic or alternative referral pathways are a source of much debate there is certainly increased demand for ultrasound guided neck biopsy.

Ultrasound guided biopsy has been traditionally undertaken by radiologists, but due to increasing demand, availability and portability of ultrasound, and a national shortage of radiologists, this has resulted in other healthcare practitioners increasingly undertaking these procedures.

Successful sonographer led neck lump clinics have been established throughout the United Kingdom based on training schemes adapted to the resources available locally. To date there is no nationally recognised training pathway for sonographers wishing to perform ultrasound guided neck biopsy.

The poster details how an ‘in house’ sonographer training programme was established for head and neck ultrasound guided FNA in Morriston Hospital, Swansea. Unlike other training schemes in the UK our program was streamlined, requiring completion of fewer biopsies, focusing instead on multiple work based assessments performed at regular intervals throughout the training.

The assessments, performed by different radiologists, were based on the ‘mini-DOPS’ tools used by the Royal College of Radiologists and are an essential part of the Radiology Trainee’s curriculum. These Direct Observation of Procedural Skills are used as a summative measurement of progress in a particular technique, taking into account not only practical skills, but also communication and cross infection.

The poster describes the program, its advantages and pitfalls, and highlights the multiple assessments that had to be successfully completed prior to moving onto the next.
The assessment tools encourage reflective practice. The trainee was also required to keep a separate log book of biopsies performed with periodical reflection on positive and negative experiences. The trainee attended the Head and Neck Oncology MDT and also regularly audited their biopsy success against local and national standards.

Through regular assessment, reflection and audit of the trainee’s progress this training pathway offers a reproducible, transparent, efficient and ultimately safe training pathway with the goal of becoming proficient in a much sought after procedure.

17. Orbital Ultrasound - the good, the bad and the ugly, Lydia Guthrie¹, T Betts², R Rhys¹, C Greenall¹, ¹Radiology Royal Glamorgan Hospital, ²Opthalmology University Hospital of Wales

Orbital ultrasound is a procedure generally performed by ophthalmologists in the outpatient clinic. It is routinely used in the assessment of common pathologies such as retinal detachment, the ‘swollen optic disc’ and choroidal melanomas.

Clinic based imaging however is ultimately limited by both user proficiency and the quality of outpatient ultrasound equipment. A national survey of all ophthalmology services found only one Health Board (14%) offer formal ocular ultrasound. Benefits of the service include greater investigator expertise in the use of ultrasonography, greater clinician exposure to the modality and access to superior technologies allowing for more accurate assessments, for example, choroidal melanoma tumour depth.

This poster highlights how within our Radiology Department, B mode ultrasound is commonly performed as an adjunct to that performed by our Ophthalmology colleagues.

The poster will describe the normal ultrasound anatomy of the eye. Additionally it will demonstrate the ultrasound features of the most commonly presenting pathologies, including melanoma, retinal detachment and optic nerve head drusen.

18. Scrofula – The King’s Evil. Sonographic features of tuberculous cervical lymphadenitis, Gerald Orpen¹², Mary Walsh¹², Marie Stanton², Therese Herlihy², Victoria Chan¹, ¹Mater Misericordiae University Hospital, ²University College Dublin

Background:
Tuberculosis (TB) is on the rise in non-endemic countries. Factors linked with its resurgence include human migration, multi-drug resistance and acquired immunodeficiency syndrome (AIDS). Extrapulmonary TB can manifest as tuberculous cervical lymphadenitis (TCL), historically known as scrofula. This poster describes the application of ultrasound (US) in a case of TCL. A 23-year old Nepalese woman presented to an Irish hospital with night sweats, neck pain, right-sided supraclavicular swelling and a non-productive cough.

Ultrasound Findings:
Over a period of 9 months, ultrasound was used to aid the diagnosis of TCL, assist therapeutic intervention and monitor the effectiveness of anti-microbial treatment. Early sonographic findings demonstrated normal nodal appearances – echogenic fatty hilum with associated vascular elements. Raised clinical suspicion warranted intervention by means of a core needle biopsy. During the procedure, a hypoechoic mass with an inhomogenous echotexture was visualised, likely representing a TB abscess. TCL was confirmed after the detection of heavy acid-fast bacilli during laboratory testing. Ultrasound-guided fine needle aspiration was used to acquire a sample of purulent material for drug sensitivity testing. Follow-up ultrasound imaging demonstrated more pronounced features of cervical adenopathy – hypoechoic rounded nodes, displaced vasculature and posterior acoustic enhancement. A large purulent abscess was also detected. The abscess spontaneously discharged on two occasions. Final ultrasound evaluation demonstrated residual fluid without adenopathy, indicating resolution of TCL.
Conclusion:
In addition to its role in assisting the diagnosis of scrofula, ultrasound has a part to play in the ongoing monitoring of response to treatment in complex cases of tuberculous cervical lymphadenitis.

Keywords:
Scrofula, extrapulmonary TB, ultrasound, tuberculous cervical lymphadenitis

19. A practical approach to the common diagnostic dilemmas encountered in ultrasound examination for thyroiditis, Sally Daniels, Sofia Otero, Imaging, UCLH, London.

Thyroiditis is inflammation of the thyroid gland (1) and it is a common presentation in a busy head and neck ultrasound clinic. While there are some typical ultrasound appearances that point to a particular type of thyroiditis, there is a level of overlap and contradiction that can generate confusion. In order to use the ultrasound findings to guide diagnosis it is important to consider imaging appearances alongside the clinical context.

This poster will aim to provide a collective overview of the different types of thyroiditis, incorporating clinical features, signs and symptoms and typical ultrasound appearances, with a view to providing a practical and unambiguous approach to formulating an ultrasound report and diagnostic conclusion that positively assists the referring clinician.

There is room for a small introductory section that discusses the categories of thyroiditis including some of the physiological mechanisms of how these processes manifest themselves.

There will be a pictorial section illustrating the various ultrasound appearances that when correlated with hormone and antibody profiles and patient signs and symptoms can direct the ultrasound practitioner towards the categorisation/identification of the type of thyroiditis presenting in the patient.

A flow chart will be developed that assists the ultrasound practitioner in arriving at their diagnostic conclusion. Optimal report terminology can then be discussed that provides the referring clinician with a useful adage to the array of results used for patient consultation.

20. Clinical role extension for sonographers: A case report, Angela Dowle, Peter Cantin, Ultrasound, Derriford Hospital, Plymouth

Clinical role extension is an essential facet of sonographer practice. Extending clinical roles have the potential to enhance patient pathways by widening access for patients to more specialised ultrasound examinations. For the ultrasound practitioner, properly delegated role extension can help to retain role satisfaction while maintaining a safe, supportive environment.

This poster describes a training package for sonographers in head and neck ultrasound, including the performance of invasive tests where needed. We describe the documentation, training, assessment, governance and on-going CPD which are necessary to ensure that extended practice is safe and well-accepted by clinicians within and without the imaging department.

It is hoped that our experience may be used as a framework for other sonographers in developing their own extended clinical practice roles.

21. Reducing non-diagnostic Thyroid FNA rates using 2 pass technique, Russell Young, Cirencester Radiology Department, Gloucestershire Hospitals NHS Foundation Trust, Gloucester.

Thyroid Fine Needle Aspiration (FNA) is a low risk technique with non-diagnostic cytology reported in up to 40% of patients in the literature, although the number of needle passes is not usually specified. A study from Brazil in 2012 has suggested that a two-pass needle technique is optimal.
An audit of a total of 112 Thyroid FNAs was performed by the author between July 2010 and May 2017; 64 used a one-pass technique, and 48 used a two-pass technique. The percentage of non-diagnostic FNAs (Thy1) was 31% with the one-pass technique, reducing to 15% with a two-pass technique. Non-diagnostic FNAs likely to be cysts (Thy1c) were found in 45% using the one-pass technique, reducing to 31% with the two-pass technique.

In summary, the two-pass needle technique shows a clear reduction in the rate of non-diagnostic FNAs, therefore the author will continue to use this technique.

Some ultrasound pictures will be presented.

22. Correlation between the British Thyroid Association ultrasound grading of thyroid nodules and histopathology specimens with assessment of inter-rater agreement: A one-year institutional experience from UCLH, Olivia Francies, Susan Jawad, Simon Morley, Sally Daniels, Sofia Otero, Radiology, University College London Hospitals

The British Thyroid Association (BTA) guidelines 2014 introduced an ultrasound (US) classification for thyroid nodules (U1-U5) with U1 being normal thyroid, U2 benign, U3 indeterminate, U4 suspicious for malignancy, and U5 likely malignant. We retrospectively reviewed thyroidectomy specimens from a twelve-month period between 2015 and 2016. 121 specimens were eligible for inclusion. The U grade given in the original US report was correlated with the histopathology result. In addition, four observers (three Consultant radiologists and one Sonographer, all with an interest in head and neck imaging) retrospectively allocated a U grade based on the saved US pictures, blinded to the patient information, original reports and any cytology or histopathology results.

The rate of malignancy for each U category (as given in the original report) was calculated: U2 = 3%; U3 = 40%; U4 = 79%; U5 = 100%.

In addition, we calculated the specificity and sensitivity for diagnosis of malignant thyroid nodules on US for the original report and four further raters. The sensitivity was high (92-98%), however the specificity was only moderate (43-49%).

The inter-rater agreement was calculated for the original reports and four further raters, with a Fleiss Kappa score of 0.51, indicating moderate inter-rater agreement.

We conclude that the BTA guidelines U classification has a high sensitivity for detecting malignant thyroid nodules but only a moderate specificity and moderate inter-rater agreement. This is likely to be due to the inherent difficulty in the assessment of thyroid nodules on US, but may also be due to the complexity of the scoring system. The next step would be to ascertain whether the BTA guidelines provide any advantage over a simplified three-tier scoring system e.g. benign, indeterminate, likely malignant. We intend to repeat the study comparing both the BTA 2014 U grading with a simplified three-tier score.

**Purpose:**
Current quality assurance (QA) procedures incorporate subjective tests of system sensitivity, i.e., the ability of the system to detect and display weak echoes. While it is apparent that automated methods could reduce the time intensiveness of QA, it is not clear to what extent automation influences the variance and also which sensitivity method is most reproducible.

**Method:**
Two routine system sensitivity tests were evaluated namely the in-air reverberation distance (AR)(IPEM 102 guidelines) and the depth of penetration (DOP)(AAPM TG1 guidelines) for linear array probes from three ultrasound scanners (SuperSonic Imagine Aixplorer/SL15-4(S1), Medison Accuvix XQ/L5-12IM(S2) and Zonare Z.one/L10-5(S3)). Following guidelines, four observers manually performed (×3) the tests and saved images for automated analysis. A computer program was developed to automatically estimate the AR and DOP using observer images. Results were compared statistically (T-test) and by coefficient of variation (COV).

**Results:**
Mean inter-user manual and automated AR and DOP distances were either not statistically different (p>0.05) (S2/S3) or within the tolerance of one reverberation line (AR,-1mm) or 1cm (DOP) presented in guidelines (S1). The mean COV difference between manual and automatic methods was also not significant. The mean COV was lower for both manual and automated estimates of AR (5.3% and 4.0%, respectively) compared to DOP (8.5% and 8.7%). For a single observer and imaging preset, mean (intra-user) COV was <5% for both manual and automated estimates of AR and DOP. AR was more sensitive than DOP to -3dB reduction in transmit power (mean change in AR was -8.6±6.2% greater).

**Conclusions:**
Results support the use of automated and objective estimates of sensitivity. Automatic methods would speed-up QA. Automatically reproduced image acquisition settings such as a QA preset could also be employed, due to removal of subjectivity in image interpretation. AR estimates appear to be more sensitive to changes in scanner sensitivity than DOP.

24. Everything you wanted to know about knobs but were too afraid to ask, Matthew Murphy, Thomas Davies, Karis McFeely, Darren Chan, Peter Cantin, Radiology Derriford Hospital, Plymouth

The array of tools available for image optimisation in ultrasound can seem bewildering, and once the initial hurdle of understanding and demonstrating anatomy has been overcome, producing the best quality image becomes the next challenge for any trainee in the field. Whilst image optimisation can help to produce better images, its use requires a good understanding of the underlying physics in order to maximise its potential and avoid introducing artefact. Here, some of the common image optimisation techniques will be reviewed together with the physics that underlie them.

25. In vivo validation of 3D transperineal ultrasound estimates of prostate motion during radiotherapy, Alexander Grimwood1, Helen McNair2, Tuathan O’Shea2, Jeffrey C Bamber1, Alison Tree2, Emma Harris1, 1Radiotherapy and Imaging, Institute of Cancer Research, 2Radiotherapy and Imaging, Royal Marsden Hospital, London

**Background**
Ultrasound is increasingly used for image guidance in radiotherapy (RT). Good soft-tissue contrast, excellent spatial resolution and non-ionising nature make it an attractive modality for estimating prostate motion during treatment.
The Elekta Clarity® ultrasound system is designed for RT guidance applications. Here we present an in-vivo validation of the system for monitoring 3D prostate motion during RT fractions.

**Methods**
Imaging data from 17 patients across 80 fractions were analysed as follows.

Sequences of 3D ultrasound images were acquired during radiotherapy delivery. Simultaneously acquired X-ray portal image sequences were contrast enhanced and reviewed by three observers to manually identify the positions of three intra-prostatic fiducial markers. The Clarity® system’s prostate position monitoring data were compared to marker positions in the portal images.

Three observers rated the ultrasound image sequences into four image quality levels. A sequence from each level was selected. Prostate motion was estimated using an in-house automated echo-tracking algorithm, and by manually tracking anatomical features within the prostate. These estimates were compared to Clarity®.

**Results**
Clarity measurements of prostate position exhibited a 1 mm mean geometric error and 95% uncertainty of 3 mm relative to portal images. Alternative motion estimation methods produced estimates similar to Clarity, independent of image quality.

**Conclusions**
Clarity accurately estimates prostate motion regardless of image quality, demonstrating its potential usefulness in motion compensation strategies during radiotherapy delivery.

**References**

**26. Measurement of the output of transvaginal probes and correlation with temperature variation in a phantom test**, Piero Miloro, Ultrasound and Underwater acoustics, National Physical Laboratory

**Background**
The Thermal Index (TI) is commonly used as an indicator for the assessment of the thermal hazard. TI definition and the methods for its evaluation are reported in the IEC standard 62359. However, use of TI has been criticized for being too simplistic, not taking into account, for example, the spatial and temporal distribution of heat deposition and transducer self-heating. This latter aspect can be the dominant source of thermal hazard during endocavitary scans.

**Method**
32 different transvaginal probes from 5 manufacturers were tested in 17 hospitals. The surface temperature with the probe operating in air was measured using an infrared camera and the acoustic output power was measured using a Pyrometer. The results were correlated with temperature variations measured in a phantom, reported in a previous work.

**Results**
When B-mode was activated for gynaecology and obstetrics pre-sets, the average temperature rise at equilibrium for the probe in air was 5.5 °C (st. dev. 2.5 °C, max 12.5 °C). An average output power of 16.1 mW (st. dev. 7.1 mW, max 41 mW) was measured using the Pyrometer. When compared with the temperature after a sufficiently long exposure in the phantom experiments, the coefficients of determination R2 for linear regression...
were 0.70, 0.48 and 0.28 (at the surface and at 7 and 14 mm depth within the phantom respectively) for the infrared measurements, and 0.30, 0.30 and 0.36 using the acoustic power (see image below). R2 was always below 0.1 using the Thermal Index.

Conclusions
Both the probe temperature in air and the acoustic output power measurements were better predictors than the TI for the final temperature after a sufficiently long exposure, based on phantom measurements. Goodness of fit decreases with depth using infrared data and increases when output power is used.

27. In-vivo measurement of temperature variation during transvaginal scans, Piero Miloro¹, Suzanne Beattie-Jones², Lee Wing Fai³, Christoph Lees⁴, ¹Ultrasound and Underwater acoustics National Physical Laboratory, ²Queen Charlotte’s and Chelsea Hospital, ³Imperial College Healthcare NHS Trust, ⁴Imperial College London

Background
Transvaginal examinations, particularly of the first trimester fetus, are safety-critical due to the close proximity of sensitive tissues to the transducer that can produce heat during use. However, knowledge of how heat is generated and transferred to tissues remains limited, and the monitoring of thermal hazards mostly relies on a derived parameter, the Thermal Index (TI).

Method
We carried out a registered Service Evaluation on 24 patients and measured the temperature rise during transvaginal scans, using fine wire thermocouples (75 µm spatial resolution), secured to the surface of the transducer. Two scanners were used (GE Voluson E8 with a RIC 6D transducer and Samsung WS80 with a V5-9 probe). With the thermocouple in place, no imaging artefacts were detected. Where possible, examinations were recorded to DVD. Generated images were anonymised and analysed using custom-developed software, which was able to extract the values of the TI, and the active imaging mode and status. This information was correlated with the recorded temperature.

Results
The average duration of the scans was 7 minutes 15 seconds (minimum 3, maximum 18 minutes). The majority of the scans last around 4 minutes. The average peak temperature was 36.3°C, minimum 34.1°C, maximum 38°C, with most of the scans showing a value around 37.5°C, with no significant difference shown between the machines. When the video was available, it was possible to correlate the temperature curves to the active mode and TI (see image below for an example).

Conclusions
The measured temperature at the probe surface never approached values reported as hazardous in the international standards. For an average body temperature of 36.5°C, the most frequent temperature rise was around 1°C. Results of duration and maximum temperature are in line with previous studies. Doppler modes were often correlated with a faster increases in temperature and higher temperatures being achieved.

Professional Issues

28. Right test, right place, right time; Implementing the BMUS Best Practice Guidelines, Pamela Parker, Ultrasound, Hull and East Yorkshire Hospitals NHS Trust, Hull.

Background
All ultrasound service providers want to give the best care to their patients. Quality assessment and peer review can ensure that the patients receive a high quality examination performed by competent sonographers working in a service underpinned by education and development. However, all services are under pressure. With a year on year increase in demand for ultrasound imaging in the region of 7.2% since 2013 making best uses of
all resources, be it staffing, appointment capacity or hardware is paramount in the delivery of a cost effective, efficient and effective ultrasound service.

Locally, a significant peak in demand of 24% in 2015/16 was realised. At this point action was required as additional resources in terms of staffing and room capacity could not be sourced. It was recognised that implementing the BMUS Best Practice Guidelines to justify referrals may aid in demand management.

Methodology
Following discussion and agreement with the local Clinical Commissioning Group the BMUS guidelines were implemented in February 2017. Since then, any referrals deemed inappropriate are returned to the referrer with advice and guidance of either alternative imaging or more appropriate actions required.

Results
Between February and June 2017 11917 GP referrals were received. Of these
- 946 cancelled as inappropriate
- 94 changed modality or had subsequent US imaging following further information
- This has resulted in a real decrease in imaging activity of 7.5%

Outcomes
This poster will outline the process followed to ensure that educating referrers is at the heart of the demand management. The ultimate goal of this process is to ensure patients receive right test in the right place at the right time.

29. Mystery shoppers – A quality review process in radiology, Pamela Parker¹, Simon Freeman²,¹Ultrasound, Hull and East Yorkshire Hospitals NHS Trust, ²Radiology, Plymouth Hospitals NHS Trust

The national Friends and Family Test (FFT), launched in 2013, is an Important feedback tool that supports the fundamental principle that people who use NHS services should have the opportunity to provide feedback on their experience. However, the FFT quality assessment tools within radiology often centre around the clinical aspect of the patient pathway rather than evaluating patient experiences of the whole journey from referral to examination.

The use of mystery shoppers in the retail sector is widely embraced to assess quality of the customer experience. The same process can be mirrored within radiology to review the quality of the service provided.

The idea of using mystery shoppers in radiology was first devised by the radiology accreditation team at Derriford Hospital, Plymouth as a means of quality testing the patient pathway. The process was then introduced within ultrasound of the Hull and East Yorkshire Hospitals NHS Trust. The radiology process from receiving the appointment letter through to being greeted into the examination room by the radiographer or radiologist is reviewed using this process.

This poster presents the results of the patient feedback from both hospital sites. The key learning outcomes generated by the feedback are presented.

The mystery shopper feedback has proven to be a useful quality assessment process in both centres and the authors recommend its widespread use. Top tips and pitfalls to avoid are presented to aid implementation within other imaging departments.
POSTER EXHIBITION

30. Is sonography a real profession?, Rachel Barker, Anushka Sumra, Radiography, Birmingham City University, Birmingham

The title ‘Sonographer’ is not currently protected due to the denial of recognition by the HCPC of Sonography as a profession. Those individuals that pursue a career in ultrasound without statutory registration, can and are being accepted into the NHS workforce identifying themselves as a ‘Sonographer’.

Traditionally Sonographers have come from a radiographic background therefore, bringing HCPC registration with them. The backgrounds of students on entry to postgraduate ultrasound education has been evolving in recent years, now including professionals that carry NMC or GMC registration. However, there are also now individuals that use ultrasound as a tool within their profession and those that present with a scientific or other first degree who would therefore find it impossible to gain registration with the HCPC or other regulatory body. Further groups of individuals who are unable to register also includes ‘qualified and competent sonographers who trained overseas’ (Society and College of Radiographers (2014)). With this emerging diverse workforce it leads to the question, do we need registration to work as a Sonographer within the NHS?

As practicing clinical radiographer-sonographers and as senior lecturers at an educational institution within one of the largest regions in the country, we have observed the varying backgrounds that students hold on application. This led to a retrospective investigation into the entry backgrounds and exit destinations of students applying for post-graduate medical ultrasound programmes at Birmingham City University over a recent time period, in order to establish the significance of professional recognition and the importance of the requirement of regulation to practice as a Sonographer.

Initial themes will be discussed and presented with the collating of data and drawing of conclusions currently being established.


Background
Any changes in slice thickness incurred by lens repair or replacement may be clinically relevant. A simple method for measuring ultrasound beam slice thickness with depth has been devised. The technique aims to allow quantification of acoustic lens wear via changes in measured slice thickness at different stages of a transducer’s working life. Proof of principle of the technique has been established, with the theory and method described in an accompanying submission.

Method/Results obtained
This poster displays and discusses example images from tests on a range of scanners and transducers. The transducers have been selected such that a cross section of transducer ages and differing levels of acoustic lens wear are represented. Visual representation of the measured slice thickness is displayed to show the simplicity of interpreting the data acquired by the technique.

Conclusions
The newly devised method can give quantitative information about the ultrasound beam slice thickness of a clinical transducer. By comparing repeat measurements over time quantitative assessment of acoustic lens wear can be performed.
32. **Lump not rump: The value of a sonographer run lump ultrasound service**, Rina Hirani, Radiology, London North West Hospital Trust

**Introduction:**
Superficial soft tissue masses are common 3:1000 of the general adult population with the vast majority of superficial lumps being benign (99%).

The value of ultrasound referral is for reassurance and the identification of potentially serious lesions requiring further assessment. The aim of the study is to show the value of an ultrasound triage by sonographers to identify cases needing further assessment.

**Methods:**
Retrospective audit of prospectively acquired data from GP-referred lump ultrasound performed over an 8 month period by three trained and experienced sonographers was carried out. Sonographers initially had all scans reviewed by consultants, reducing to selective review after 4 weeks. Standards set locally were: >90% of reports made through a structured template identifying cases needing further assessment; images in 2 planes, with measurements and colour flow in >90%; consultant opinion in >90% of lumps >5cm, with deep infiltration, irregular margins, or suspicious intra-nodular flow.

**Results:**
Of the total of 113 cases, 30 patients had no lump at the time of examination. Of the 83 lumps examined, 81/83 (98%) had structured reports through templates; 78/83 (94%) had satisfactory images; 3/83 lumps were regarded as atypical and all of these were double reported by consultants. No malignancies were identified. A timely, sustainable service was provided enabling reassignment of 2-3 consultant lists per week.

**Conclusion:**
All standards have been met for the sonographer led lumps and bumps service. As expected, the pick-up rate of serious pathology is very low. We recommend that a sonographer run lump ultrasound service is feasible, efficient and uniform, and will allow consultant sessions to be released for complex cases.

33. **EVAR stent graft: Ultrasound characteristics**, Myra Calumpong, Joao Carreira, Steven Rogers, Vascular Studies Unit, University of South Manchester NHS Trust, Manchester

**Aims**
Management of Abdominal Aortic Aneurysms via Endovascular Aneurysm Repair (EVAR) has become common practice. EVAR choice is partly governed by specific stent graft features that lend themselves to best treatment for that aneurysm. Multiple stent graft types exist within post EVAR ultrasound (US) surveillance. This poster identifies the various stent models that are frequently being used by vascular surgeons today and highlights common pitfalls that US practitioners must be aware of to avoid misdiagnosis.

**Methods**
Device images have been obtained with permission from EVAR manufacturers including Vascutek, Trivascular Endologix, Medtronic, Lombard and Cook Medical. Selection of US images were obtained with the purpose of demonstrating common pitfalls and highlight the potential risks of misdiagnosis as a result of common EVAR device characteristics.
Results
Different stent graft device characteristics can be visualised on 2D US. Endobags in Nellix devices can be mistaken for thrombus/dissection. Altura with a unique bilateral “D” shape stent design lacks a single neck which can be perceived as a dissection. Ovation stent graft consists of sealing rings and therefore type Ia endoleak misdiagnosis from pooled blood at the two polymer rings can occur. Anaconda devices have a saddle shape configuration designed for aneurysm with highly angulated necks and are commonly misdiagnosed as a kinked/fractured stent graft. Conventional devices include Cook which uses anchoring barbs and Endurant with endoanchors. Both are visualised as echogenic walled structures poses low risk of misdiagnosis despite little evidence on endoanchors until the ANCHOR trial is complete.

Conclusion
The multitude of stent grafts adopted in EVAR surgery has increased the occurrence of new stent types within EVAR surveillance. Communication between the surgical team and surveillance team is ever more important. A good understanding of the device characteristics by US practitioners is essential to prevent misdiagnosis.

34. Sonographic findings of a recannalised femoral pseudoaneurysm: What happened next?, Ellen Cronin, Maria O Brien, Therese Herlihy, University College, Dublin

Background
A femoral pseudoaneurysm is one of the most common complications following cardiac catheterisation. In this case a 90 year old lady presented to the ultrasound department for a 4 week follow up of a left superficial femoral artery (SFA) pseudoaneurysm. This developed as a complication of a coronary angiogram and was treated initially with ultrasound guided thrombin injection which appeared to result in complete thrombosis of the pseudoaneurysm.

Ultrasound Findings
The ultrasound examination incorporated a B-mode, colour Doppler and spectral Doppler assessment of the left SFA. An echolucent sac adjacent to the SFA was identified on B-mode. Colour Doppler identified a tract connecting the pseudoaneurysm chamber to the SFA. The “yin-yang” sign was also visualised within the chamber, indicating bidirectional flow. Spectral Doppler demonstrated a “to-and-fro” waveform in the communicating neck between the SFA and the pseudoaneurysm chamber, indicating blood entering and exiting during systole and diastole respectively.

Discussion
Ultrasound findings indicated a recannalised pseudoaneurysm due to a persistent defect in the proximal SFA. Surgical correction was deemed necessary for the patient. In anticipation of this, a computed tomography lower limb angiogram was performed. This demonstrated a haematoma anterior to the proximal SFA with no visible arterial flow, indicating that the pseudoaneurysm had spontaneously thrombosed. Therefore, no further intervention was required. This case study demonstrates an unusual outcome in the management of a femoral pseudoaneurysm. Although ultrasound guided thrombin injection was successful initially, the pseudoaneurysm recanalised. Additionally, the recanalised pseudoaneurysm spontaneously thrombosed.

Conclusion
Ultrasound plays an essential role in the diagnosis and monitoring of a pseudoaneurysm. Diagnostic confidence is achieved when the triad of classical ultrasound findings are identified, including an echolucent sac adjacent to a vessel on B-mode, the “yin-yang” sign on colour Doppler and the “to-and-fro” waveform on spectral Doppler.

Key words:
Recannalisation, Femoral Pseudoaneurysm, Doppler Ultrasound
35. **What is the impact of changing body position on liver stiffness estimates obtained using point shearwave elastography in fasted healthy volunteers?**, Suman Bassi1, Anne-Marie Culpan2, Kirstie Godson2, 1Philips Clinical Applications Specialist, 2University of Leeds

**Aim:**
To investigate the effect of changing posture on liver stiffness elastography measurements (LSEM) obtained using Point Shear-wave Elastography (PSWE) in healthy volunteers.

**Materials and Methods**
Sixteen self-selecting healthy volunteers with BMI < 30 kgm⁻² were fasted for at least 3 hours before being examined by a single operator using an Affiniti 70 Philips® system with C5-1 curvi-linear transducer. Ten LSEM (kPa) were performed with participants in standard supine (control), left lateral decubitus (LLD) (experimental 1) and semi-erect (SE) (experimental 2) positions. The right lobe of liver was accessed intercostally on neutral breath hold. Data analysis of the mean LSEM using both Bland Altman assessment for agreement and paired sample T-tests to compare control values with each of the two experimental positions was performed.

**Results**
Median age: 37 years (range 22-61); median BMI 22.2kgm⁻² (range 17-28). LSEM mean (SD) and median (range) in kPa: Supine: 4.66 (0.85), 4.66 (3.22-6.95); LLD: 4.80 (1.06), 4.65 (3.40-6.95); semi-erect: 5.26 (1.42), 5.23 (2.87-7.68).

Experiment 1 resulted in mean difference 0.14, p=0.593 (95% CI -0.41 - 0.69); Experiment 2 showed mean difference 0.59, p=0.027 (95% CI 0.07- 1.11). Bland Altman analysis indicates 95% limits of agreement for experiment 1 (2.22 to -1.98) and experiment 2 (2.5 to -1.3).

**Conclusion**
Both experimental postures showed increased variability in LSEM relative to supine control. No statistically significant difference for supine v LLD suggests these postures are interchangeable in clinical practice; statistically significant difference for SE posture suggests this could lead to higher liver stiffness grading, up to 1kPa. Although small mean differences, the wide LoA (approx. 2kPa) for both experimental postures could have clinical impact particularly in mild/moderate fibrosis categories due to narrower cut-off ranges. Results suggest measurements should be performed in supine posture where possible, or same posture maintained for patients undergoing serial surveillance scans.

Please note I have done this MSc study whilst employed by Philips as an Applications Specialist, but this study has not been sponsored by Philips.

36. **Exposition of a renal cell carcinoma (RCC) with an associated pelvis mass on ultrasound**, Jake Wheater, Michelle Hood, Radiology, Sheffield Teaching Hospitals NHS Trust

Renal cell carcinoma (RCC) is the most common type of adult kidney cancer, accounting for 90% of cases (Curti et al., 2014). Common metastases include ovarian and pelvic tumours; however an incidental finding of a solitary tumour is the most likely presentation. Prognosis largely depends on the stage of the cancer upon discovery, with survival rates decreasing significantly if the cancer has metastasised (NHS, 2016), highlighting the importance of early diagnosis; which ultrasound (US) is an acknowledged part. This case study will focus on US in a patient with RCC and an associated pelvic mass. US arguably has the largest role to play in the diagnosis of this RCC. Its initial diagnostic value is huge, owing to it being the first imaging modality for most abdominal complaints. Furthermore, US is not solely limited to diagnosis through B-mode visualisation. In addition, recent developments such as CEUS, elastography and fusion imaging in conjunction with guided percutaneous biopsies make it difficult to perceive a more complete modality for RCC assessment. This work makes recommendations for future practice, deeming it necessary to improve the assessment of iliac venous velocities in lower limb
doppler studies. It may also be beneficial to extend a negative Doppler scan further to assess the pelvis, as adnexal scanning was proved integral. However, US as a staging modality is not advocated, due to lack of sensitivity, specifically in IVC assessment in this case. Furthermore, huge diagnostic and management benefits would likely be granted to this patient if CEUS and fusion imaging were commonly used, alongside a ‘one stop’ scan and biopsy clinic for kidney lesions. This work has highlighted throughout how US use is fundamental to earlier and accurate diagnosis, treatment and management

37. The role of Sonography in the detection of Transitional Cell Carcinoma, Adele Hardcastle, Stephen Wolstenholme, Simon Burbidge, Radiology, Leeds Teaching Hospitals NHS Trust

Background
The aim of this case report is to evaluate the role of Diagnostic Medical Sonography (DMS) in the management of a patient who presents with haematuria. The case report will be useful for continuing professional development for Radiologists, Sonographers, and referring Clinicians. The clinical presentation, Sonographic and CT (Computed Tomography) findings and Cystoscopy correlation are to be discussed.

Case report
A 77 year old male patient was referred from his General Practitioner on the two week wait pathway with visible haematuria to the one-stop clinic (renal ultrasound scan (USS) and Cystoscopy).

Discussion
The USS showed three well defined lesions in a thick-walled bladder. The largest lesion measured 3 cm, with the further two lesions each measuring 1.4 cm. All lesions demonstrated a vascular supply. An enlarged prostate was noted. No renal hydronephrosis. The US report concluded findings consistent with multiple Transitional Cell Carcinoma’s (TCC).

The patient went on to have a Cystoscopy. A CT staging scan of the abdomen and pelvis was carried out 2 days after the USS.

The CT staging scan of the abdomen/pelvis and Cystoscopy confirmed the US diagnosis. CT confirmed no metastatic disease.

This case highlights the sonographic findings of TCC in patients presenting with haematuria. The one-stop clinic and rapid access to CT are valuable tools in the management of patients presenting with haematuria.

38. Goblet cell carcinoma of the appendix: Case review, Leigh Cassels-Gibson, Ultrasound, Leicester Royal Infirmary, University Hospitals of Leicester

50 year old male presented for urinary tract ultrasound. Symptoms included dysuria, frequency and lower abdominal pain, persisting for several months. No known infective cause. Ultrasound requested to rule out bladder stones. No previous relevant imaging.

Ultrasound: Indentation on the external bladder wall from the right iliac fossa, is an avascular, hypoechoic mass (9cm x 3cm x 4cm), which contains several hyperechoic, shadowing foci.

CT: Focal thick walled, enhancing collection related to superior aspect of the urinary bladder. A contiguous, enhancing soft tissue mass tethers and involves urinary bladder, terminal ileum, distal ileum and appendix in a stellate configuration. No fistula identified. Appearances of primary appendiceal pathology. In view of the enhancing soft tissue mass, surgical excision was advised.

Histology: A diffusely infiltrative Goblet Cell Carcinoma (GCC) of the Appendix.

Goblet cells are glandular cells which excrete mucins to protect associated mucous membranes. GCC occurs when there is excessive proliferation of both goblet and neuroendocrine cells.
Goblet cell carcinoma accounts for 5% of neoplasms of the appendix, with an annual incidence of 0.12 per million. GCCs are rare and share characteristics with adenocarcinoma and carcinoid tumours. They almost exclusively involve the appendix.

Symptoms often present in 5th & 6th decade with no gender preference. Clinical presentations are varied; most commonly acute appendicitis, pain and mass. Other symptoms include bowel obstruction, intussusception and gastro-intestinal bleeding.

Imaging findings include ill-defined nodular thickening of the appendix (most commonly at the tip) with a diffuse pattern of infiltration. The majority of GCCs are >2cm and demonstrate longitudinal growth patterns. In 3% of patients with GCC, findings are incidental.

Treatment requires en-bloc, possibly followed by chemotherapy, systemic or hyperthermic intraperitoneal chemotherapy (HIPEC) for recurrent peritoneal disease.

39. **Ultrasound in diagnosing acute calculous cholecystitis**, Suzzanna Leeming, Radiology, Sheffield Teaching Hospital and University of Leeds

**Background**

Acute cholecystitis affects about 1 in 10 adults in the United Kingdom (National Health Service (NHS) choices, 2016). This case study identifies a patient with suspected gallstone disease and the role of ultrasound in the diagnosis and outcome.

**Case Report**

A 44 year old female presented to the Accident and Emergency (A&E) department with an acutely tender upper abdomen. A previous ultrasound examination reported a solitary, mobile gallstone.

The ultrasound examination revealed a solitary, immobile gallstone in the neck of the gallbladder, smaller mobile gallstones in the fundus and biliary debris. The gallbladder wall appeared thickened and oedematous with hyperaemic vascularity. The patient also displayed a positive Murphy’s sign. Using the clinical signs and ultrasound a diagnosis of acute calculous cholecystitis was made. The patient had a laparoscopic cholecystectomy and made a full recovery.

**Discussion**

Early diagnosis is imperative to relieve pain and plan for surgical management for patients with acute calculous cholecystitis. The accuracy of ultrasound in diagnosing acute calculous cholecystitis has been described as imperfect; its sensitivity is widely varied between studies. However ultrasound has a high sensitivity and specificity in detecting cholelithiasis which is one of the main findings in acute cholecystitis and in this case. Other imaging characteristics in this case such as wall thickening, pericholecystic fluid and specifically a positive Murphy’s sign, improve ultrasound’s ability alone to diagnose acute calculous cholecystitis.

This patient underwent a laparoscopic cholecystectomy within 5 days as recommended by NICE (2015). There is much discussion into the advantages and disadvantages of both laparoscopic surgery and open surgery and much depends on the severity of the inflammation. This case was successfully treated using laparoscopic methods which is less invasive.

In this case ultrasound alone was able to efficiently conclude and diagnose acute calculous cholecystitis.
40. **An unusual presentation of Urachal Tumour**, Ruth Reeve, Laura Durdle, Portsmouth Hospitals NHS Trust

**Background**
There are only around 350 cases of Urachal cancer described in the medical literature to date, accounting for 0.2% of all bladder cancers. Urachal cancer is a rare type of cancer arising from the urachus or its remnants. It is often difficult to diagnose and requires a multidisciplinary approach. Patients who present with early confined disease have a good prognosis. Whereas those with advanced disease have less promising outcomes.

**Case Report**
We report a 40 year old woman with no previous history, complaining of unprovoked right shoulder pain. Following an initial x-ray which demonstrated diffuse permeative disease, further imaging tests including ultrasound ultimately made the rare diagnosis of metastatic urachal malignancy, which was confirmed by biopsy.

**Discussion**
Advanced Ultrasound Practitioners should be aware of the role of ultrasound in the management of indeterminate pelvic masses. As ultrasound is often a first line imaging tool it is important to be aware of the appearances and be able to differentiate pelvic masses to exclude the rare diagnosis of urachal malignancy.

41. **Appendix Mucocoele: A case review**, Vanita Suthar-Grady, Queen Alexandra Hospital, Portsmouth.

**Background**
Appendix mucocoeles are a rare finding presenting in 0.2-0.3% of surgical appendectomy specimens. There are 4 main types; Mucosal hyperplasia, Mucinous neoplasm of the appendix, appendiceal carcinoid and an adjacent caecal tumour. The result is obstruction of the appendiceal lumen and accumulation of mucous. The discovery of a mucocoele is usually incidental as patients are asymptomatic and prognosis is usually positive if no mucous cells are noted within the peritoneum.

**Case Report**
This report reviews a 70 year old patient with a palpable mass within the right adnexa and no previous significant clinical history. She was known to have fibroids and the initial assessment with ultrasound was requested through her gynaecologist. The ultrasound demonstrated a 10 cm tubular heterogeneous structure seen separate to the right ovary and extending from the caecum. While the patient was in the department she was reviewed by a Specialist GI Sonographer. Appearances were concluded to be in keeping with an appendiceal mucocoele and review with CT and Colorectal opinion was recommended.

**Discussion**
Advanced Ultrasound Practitioners need to be able to appreciate findings of indeterminate pelvic mass as timely management can have improved prognosis for the patient in rare cases. As this is the common modality of choice for initial assessment, Advanced Ultrasound Practitioners need to be able to assess findings even if they are outside their scope of their practice.
42. **Is a full bladder still necessary for pelvic ultrasound?**, Susan Unwin-Golding, Radiology, Plymouth Hospital NHS Trust, Plymouth

Despite some evidence that it is not necessary, female patients are often asked to arrive with a full bladder for initial trans-abdominal ultrasound views, prior to a trans-vaginal ultrasound. The rationale is to provide a good ultrasound ‘window’ to assess the uterus and ovaries. However, in our centre, the vast majority of patients go on immediately to have a transvaginal ultrasound anyway, during which better views are usually obtained. Therefore, we postulated that asking patients to arrive with a full bladder was unnecessary, and led to delays whilst the patient left the ultrasound room to void.

We reviewed all the images acquired for 20 consecutive patients, to determine whether adequate views were obtained trans-abdominally, and then trans-vaginally.

We also wished to determine, via a patient satisfaction survey, whether patients had any discomfort from the pressure of the ultrasound probe on the abdomen, if they had a full bladder; or whether they were in discomfort in the waiting area, with a feeling of needing to void.

The total time taken to complete the clinical encounter was also recorded, to determine if asking patients to arrive with a full bladder and then sending them out of the ultrasound room to void resulted in significantly longer appointment times.

The study was therefore undertaken at two centres, one which asked patients to arrive with a full bladder via a letter sent out with the appointment time, and one which did not. The results were compared.

43. **Solid Adnexal Masses – All you need to know**, Philip Jarvis¹, Diane De Friend², ¹Peninsula Radiology Academy, ²Imaging, Plymouth Hospital NHS Trust, Plymouth

Pelvic ultrasound is the most common technique used to assess adnexal masses and it is important for all practitioners to understand the sonographic features used to characterise adnexal masses. Benign adnexal masses are predominantly cystic although some e.g. dermoids and cystadenomas may have a solid component. Malignant epithelial neoplasms are usually largely cystic with a variable amount of solid tissue. Predominantly solid adnexal masses may be benign (e.g. fibroma) but include rare malignancies such as sex cord stromal tumours, malignant germ cell tumours and metastases. Solid extra-ovarian masses may also mimic ovarian pathology in the adnexa. Understanding the key identifying features of solid adnexal masses and potential pitfalls is therefore extremely valuable in everyday pelvic ultrasound. We present a pictorial review of predominantly solid adnexal masses and how their sonographic appearances are used to aid diagnosis.

44. **Ovarian dysgerminoma case report - Lessons learnt**, Elizabeth Bullivant, Obstetrics and Gynaecology Ultrasound, Sheffield Teaching Hospitals NHS Foundation Trust

A 28 year old presented at the Early Pregnancy Assessment Unit (EPAU) believed to be pregnant with suboptimal Beta-Human Chorionic Gonadotropin (bHCG) levels. On ultrasound scan there was no evidence of an intrauterine pregnancy. However a bulky right ovary was reported containing a ‘39mm cystic area with several septa and the appearance of some solid elements with no associated vascularity’. The ultrasound appearances were interpreted by clinicians as suspicious for ectopic pregnancy. The patient’s bHCG levels were then monitored.

Over a period of three months the patient’s bHCG levels fluctuated and a second ultrasound scan was performed by a Specialist Nurse Practitioner where a bulky right ovary was reported, but nil else. The case was then referred to the Trust’s gynaecology diagnostic multidisciplinary team (MDT) meeting where images from both ultrasound scans were reviewed by a Consultant Radiologist and Specialist Sonographer. The outcome
from the meeting was that a further ultrasound scan would be performed by the Specialist Sonographer as appearances of the right ovary from both ultrasound scans did not appear normal. At this ultrasound scan appearances of the right ovary were highly suspicious for a lesion. Pathology confirmed ovarian dysgerminoma.

Discussion
Many lessons were learnt from this case and recommendations included standardisation of ultrasound reports on EPAU, interpretation of ultrasound reports and who should review reports, together with the remit of Specialist Nurse Practitioner focused scanning. Positive outcomes from the case highlighted the value of a gynaecology diagnostic MDT meeting and the role of the Specialist Sonographer working closely with a Consultant Radiologist and Gynaecologists.

45. Exposition of an endometrial polyp on ultrasound, Jake Wheater, Michelle Hood, Radiology Sheffield Teaching hospitals NHS Trust

An Endometrial Polyp (EP) is a mass situated within the lining of the endometrium, affecting premenopausal and postmenopausal women, specifically those treated with tamoxifen (Bates, 1997; Wethington et al., 2011). It is estimated that around 25% of women have an EP (Sherman et al., 2002), which are a predominately benign overgrowth of endometrial cells, however a malignant risk exists (1 - 3%) (Laughlin-Tommaso, 2015; Machtinger et al., 2005). Commonly, endometrial polyps may be difficult to differentiate between endometrial hyperplasia, prolapsed submucosal fibroids and endometrial carcinoma (Kelly, Dobbs and McCluggage, 2007). Malignancy risk, alongside symptoms such as menorrhagia and infertility, categorise EP’s as a pathology that requires an early diagnosis to aid best treatment. Ultrasound (US) is the first-choice modality for assessment of suspected EP’s and pelvic abnormalities (NICE, 2016), with large studies proving it highly sensitive (Lee et al., 2003). This work focuses on US in a patient with an EP and how US imaging, plus recent US developments can help to aid diagnosis and improve management. Overall, US is arguably the most complete imaging modality for endometrial assessment and with current technological developments, supported by future research and proactive changes to the current tentative treatment pathway, US can become undeniably valuable. Additionally, this work draws a basic conclusion on the treatment and management of this patient whilst also analysing the use of other appropriate imaging adjuncts.

References
46. **Ultrasound in diagnosing a dermoid cyst - A case study**, Suzanna Leeming, Radiology, Sheffield Teaching Hospitals

**Background**
Dermoid cysts are the most common benign ovarian germ cell tumour and make up 10-20% of ovarian neoplasms (Rathore et al. 2017). This case report illustrates the use of gynaecological ultrasound in the diagnosis of a dermoid cyst in a young, premenopausal female with abdominal pain.

**Case Report**
A nulliparous, premenopausal, 21 year old female attended the ultrasound department for a pelvic scan as requested by her General Practitioner (GP). The request read: “Lower abdominal pain, very tender. History of ovarian cysts in home country of Albania”. The patient was a victim of human trafficking and was unable to communicate her symptoms and history. There were no prior biochemical tests.

The transabdominal scan revealed there was a complex, unilocular mass of mixed echogenicity measuring 22mm in the right ovary. The transvaginal examination verified the right ovarian mass consisted of solid components, hyperechoic stranded echoes and demonstrated acoustic shadowing. The right ovarian mass was reported as a dermoid cyst and a gynaecological referral was recommended. The dermoid cyst was not causing any acute symptoms at the time and the patient is currently undergoing expectant management.

**Discussion**
Ultrasound has a high sensitivity in diagnosing dermoid cysts. Despite this dermoid cysts can have a varied appearance which makes the diagnosis challenging. The images demonstrated multiple, thin echogenic striations within which may represent hair and posterior acoustic shadowing likely caused by calcified components within the mass. These appearances have previously been described as typical ultrasound characteristics of a dermoid cyst. Using the IOTA simple rules also deterred suspicions of malignancy. Whilst laparoscopic surgery is the preferred management, conservative management for smaller dermoid cysts is accepted. In this case ultrasound alone was able to efficiently conclude and diagnose a dermoid cyst.

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47. **Cervical length measurement - A pictorial review**, Gillian Coleman, Ultrasound Department, Nottingham University Hospitals NHS Trust and University of Derby

**Obstetrics**

Preterm birth is one of the largest causes of neonatal morbidity. The cervical length measurement can be used during pregnancy to act as a predictor for the likelihood of preterm labour and can act as a tool for surveillance of the cervix to enable clinicians to guide any intervention or treatment in a timely fashion.

The measurement of cervical length is an advanced technique which is inherently difficult for trainee and newly qualified sonographers to become competent and confident in performing. Cervical length scanning is frequently performed by feto-maternal medicine specialists and obstetricians at Nottingham University Hospitals NHS Trust with specific preterm birth clinics now being undertaken. Consequently, the number of cervical length scans performed by the obstetric ultrasound department is not as large which impacts on staff confidence in performing the technique.

The aim of this pictorial review is to outline the cervical anatomy which is visualised when performing a cervical length ultrasound examination. The optimum technique will be discussed alongside common pitfalls of the cervical length examination and how to overcome these. It is aimed that this review will act as a useful guide in the technique of performing the cervical length scan to aid the confidence of obstetric sonographers.
48. **Review of third trimester abdominal circumference (AC) measurements**, Ellen Dyer, Trish Chudleigh, Rosie Ultrasound Cambridge University Hospitals

**Aim:**
To pilot a method of peer-review for obstetric ultrasound.

**Background:**
Sonographers are aware of the need for peer-review as advocated by both Royal College of Radiologists and BMUS. Vigorous review processes are in place for nuchal translucency scans. Similar peer-review processes are not routine within other areas of obstetric ultrasound. To pilot obstetric peer-review we have chosen third trimester growth scans, and specifically AC measurements due to the implementation of the “Saving Babies Lives” care bundle. This relies on serial third trimester growth scans to monitor pregnancies at risk of fetal growth restriction. AC measurements are the best predictor of fetal wellbeing. There is evidence to suggest that the two-diameter method of measurement is more reproducible than an ellipse.

**Method:**
22 growth scans (5% March 2017) were randomly selected. The BMI, amniotic fluid index and gestational age was recorded. 9 sonographers blindly re-measured 5 AC images using the ellipse and two-diameter methods. The sonographers were given a PowerPoint presentation of 22 measured AC images to assess independently against image criteria based on the Fetal Anomaly Screening Program.

The results were then presented and discussed with the sonographers.

**Results:**
Preliminary results showed comparable inter-operator variability between ellipse and two-diameter measurements (Table 1).

- Minimum Difference ellipse = 16.9mm
- Minimum Difference 2-diameter = 12.7mm
- Maximum Difference ellipse = 33.7mm
- Maximum Difference 2-diameter = 35.7mm

The average retrospect ellipse measurements for each case varied from the original measurement obtained during live scanning by between -9.9mm and +1mm, this indicates a possible tendency to over-measure the AC during scans.

**Conclusions:**
Individual sonographers are now more aware of their own practice and the potential for bias. The next stage will be to evaluate the interpretation of AC measurements by reviewing reports. We will re-audit in 3 months’ time and plan to use the same model to review other aspects of obstetric ultrasound.

49. **Potential of new 3D ultrasound-based metric to assess the fetal skull: A pilot study**, Jacqueline Matthew¹, Caroline Knight¹, Chandni Gupta¹, Alberto Gomez², Matthew Sinclair², Yuanwei Li², Daniel Rueckert², Juan J Cerrolaza², ¹Department of Perinatal Imaging and Health, King’s College London, ²Biomedical Image Analysis Group, Imperial College London

**Purpose:**
To evaluate the potential of a novel 3D cranial index (3DCI), derived automatically from 3D ultrasound (US) volumes and to compare 3DCI to the usual method for skull shape assessment (cephalic index, CI = BPD/OFD).

**Method:**
This retrospective study (NRES ref.num. 14/LO/1806) includes 55 cases (mean gestational age 24.7 weeks, range 20-36) collected during a dedicated US research clinic. All participants had previously had a mid-trimester anomaly scan. Standard 2D scanning planes and 3DUS head volumes were acquired using a Philips Epiq7G scanner with a X6-1 xMatrix transducer. The skull was automatically segmented using a fully-convolutional...
network architecture, and a statistical model of the normal head shape was generated using principal component analysis and leave-one-out cross-validation. The 3DCI was computed as the distance to the mean shape of the skull normalized to the patient’s gestational age. Additionally, a patient-specific 3D distance map was automatically generated showing in detail the spatial distribution of the distance to the expected shape (see figure attached). The CI was obtained from manually annotated 2D scans. The 5th percentile threshold was used to identify potentially abnormal cases in both metrics. The ground truth for fetal assessment of skull shape was established by a sonographer and a fetal medicine specialist, identifying two cases with dolichocephaly.

Results:
The accuracy, specificity and sensitivity for the abnormal shape identification were 90%, 50%, and 92%, for CI, and 98%, 100% and 98% for 3DCI. The new automatic 3DCI significantly outperformed the CI (p-value < 0.005 using McNemar’s statistical test).

Conclusions:
The new automatic and objective US-based 3D biometric has the potential to provide objective and accurate assessment of the fetal head, reducing sonographer subjectivity and showing higher diagnostic power than traditional metrics. Finally, the patient-specific morphological map of the fetal skull could allow more objective and quantitative follow up of the patient’s evolution.

50. Twin reversed arterial perfusion (TRAP) sequence, Denise McGrath¹², S Briody¹ N Ravikumar¹, M Moran², ¹Fetal Assessment Unit, Regional Hospital Mullingar, Mullingar, Westmeath, Ireland ²Radiography and Diagnostic Imaging, School of Medicine, University College Dublin, Ireland

Background:
Twin reversed arterial perfusion (TRAP) sequence, is where one monochorionic twin (acardiac) has an absent, rudimentary or non-functioning heart with a normal second (pump) twin. It is hypothesised that the acardiac twin has no direct vascular connection to the placenta, obtaining all of its blood supply through an arterio-arterial communication from the unaffected twin.

Case Report:
A case of twin reversed arterial perfusion (TRAP) sequence was diagnosed at 12 weeks’ gestation using transvaginal color Doppler ultrasound, which demonstrated the presence of retrograde perfusion in the umbilical artery of the abnormal twin. Ultrasound imaging showed a mono-chorionic–diamniotic twin pregnancy with an inappropriately grown second twin, the morphological evaluation of which revealed an abnormal cephalic pole with acrania, diffuse subcutaneous edema and the presence of cardiac activity in an abnormal heart with a single chamber.

We report a case of TRAP sequence diagnosed at 13 weeks gestation. Ultrasound diagnosed a monochorionic–monoamniotic twin pregnancy, the second twin inappropriately grown with acardiac amorphus. Colour Doppler displayed reversed arterial blood flow towards the acardiac twin via the umbilical artery. The pump twin delivered at term.

Discussion:
The pump twin has a high mortality rate due to cardiac failure. Early and accurate diagnosis facilitated appropriate referral for assessment and monitoring resulting in a good outcome for the pump twin.
Early Pregnancy

51. **Diagnosing caesarean scar pregnancy with transvaginal ultrasound**, Alex Rourke, Radiology Nottingham University Hospitals

**Background**
Caesarean scar pregnancy (CSP) is the implantation of a pregnancy in a hysterotomy scar. The prevalence is low and the diagnosis is challenging, with 13% of reported cases misdiagnosed (Timor-Tritsch et al, 2016). Misdiagnosis is significant as untreated CSPs can result in serious complications.

In 2016 the RCOG published criteria for diagnosing CSP using transvaginal ultrasound. However, these criteria were derived from descriptive studies. A literature review will therefore be conducted to identify the evidence base for diagnosing CSP and evaluate the RCOG’s guidelines.

**Method**
A literature review was conducted with a carefully considered search strategy. Key words from the title were enhanced and used as search terms in high quality healthcare databases. The results were assessed against inclusion and exclusion criteria, leaving three articles for critical appraisal.

**Results**
1. Timor-Tritsch et al's (2012) study described seven imaging features for diagnosing CSP with TVUS. These support the RCOG’s diagnostic criteria. However, a small number of cases (n=26) were used. Also, the study’s conclusions came from practical experience rather than tested evidence.
2. Buresch et al (2014) described six ultrasound markers that also support the RCOG’s criteria. However, again these recommendations are based on the experience of the authors and not a trial.
3. Timor-Tritsch et al (2016) found an accurate method for diagnosing CSP by assessing the location of the gestation sac relative to the midpoint of the uterus. This was not described by the RCOG.

**Conclusions**
The literature review showed that the RCOG’s diagnostic criteria are supported by current research evidence and can be used in local practice.

However, research based on large scale studies of accuracy was not found. This means that while the results of the literature review agree with the RCOG, validated evidence to support the diagnosis of CSP with TVUS is still lacking.

52. **Image quality management in early pregnancy: The case for improved guidance**, Vincent Pelling, Joely Smith, Michael Mills, Lisa Harris, Medical Physics, Brighton and Sussex University Hospitals NHS Trust

Early pregnancy scans for patients with severe and genuine anxiety over pregnancy loss require sensitive care and quick accurate diagnosis. The quality of early pregnancy ultrasound (EPUS) scanning has recently been under review and as a result a small sample of 4 EPUS machines were subject to advanced quality testing. The results were suboptimal supporting the hypothesis that a lack of coordinated professional and management guidelines has been affecting the quality of early pregnancy scanning.

Machines are not managed by the imaging department therefore quality management controls such as governance and procurement are easily overlooked.

Scanning is not covered under ISAS accreditation, or RCR guidelines, and lies outside the remit of FASP.

Users have diverse training, from experienced sonographers, to midwives and rotational specialist trainee grade doctors.
There are no clear published recommendations for quality assurance testing in early pregnancy. Medical physics testing has shown variable performance across early pregnancy machines, using standard and novel methods. A semi-automated MATLAB script to assess the contrast-to-noise ratio (CNR) in phantom anechoic targets was developed. Preliminary results of Kruskal Wallis testing showed significance (P<0.000) between the CNR of clinically ‘failing’ and adequately performing machines.

It is recommended that quality assurance testing is undertaken on all early pregnancy machines and national guidelines produced to improve and standardise service provision.

53. **Ultrasound scoring for assessment of soft tissue masses**, Richard Simon Davies, Dr Tishi Ninan, Dr Suresh Dalavaye, Dr Luqman Wali, Dr Fahad Zaman, Department of Radiology Morriston Hospital

Ultrasound scans are frequently used in the initial assessment of suspected soft tissue masses, with underlying concern that the mass may be malignant. This study aimed to develop an ultrasound based scoring system to identify the benign lesions so as to expedite assessment and subsequent treatment.

The British Sarcoma Group guidelines give a number of criteria for assessing whether a lesion should be considered suspicious and these were adapted with ultrasound findings to give a scoring system, each being scored as 0 if negative or 1 for positive, and a total score assigned.

Our audit of more than 200 patients showed that majority of patients (~90%) referred for assessments of soft tissue lesions have a score of 0 or 1. Less than 7% of patients scored 3 or more.

The advantage of using this scoring system is that it makes early assessment of lesions relatively straightforward for non-specialised radiologists and sonographers. This means there is easier and quicker triage of patients helping to easily identify lesions that do not need further imaging and specialist input. It also helps to make the services of specialised radiologists quickly available to patients who need specialist assessment and treatment.

54. **Impact of an intensive ultrasound training block on trainee competence**, Sarah Hamilton¹, Katharine Orr¹, Peter Cantin², ¹Imaging Peninsula Radiology Academy, ²Imaging Plymouth Hospitals NHS Trust

Ultrasound training involves a steep learning curve and within the current clinical climate there is ever increasing pressure on departments to optimise the efficiency of their ultrasound service. It is increasingly important therefore that we deliver ultrasound training that is effective for trainees, and helps them achieve competence as early in their training as possible, whilst minimising impact on service provision.

In our institution ST1 ultrasound training is multifaceted, involving simulator training, small group tutorials and small group clinical cases in addition to clinical supervised scanning, which all run alongside other modality learning. Two years ago we introduced a dedicated intensive month long ultrasound block, which all trainees rotated through during the first year of training.

Trainees are assessed utilising a standardised assessment template after 10 months of training when most, but not all trainees have rotated through the block. To assess the impact of introducing a dedicated ultrasound block, we intend to compare the assessment scores from those who have completed their ultrasound block with those who have not.

We will use the data from these assessments to demonstrate the impact of an intensive ultrasound block on trainee competence.
55. The role of ultrasound in the assessment of chest pathology - A pictorial review, Catherine Payton, Ultrasound, Maidstone and Tunbridge Wells NHS Trust

The poster aims to visually display examples of thoracic pathology and conditions which can be evaluated with ultrasound either in department or at the bedside. This is a useful tool for the ultrasound practitioner to include in their report to improve the diagnosis and therefore the treatment pathway of the patient.

56. When the penny drops - threshold concepts in postgraduate sonographer training and development, Heather Venables, Diagnostic Imaging, University of Derby

Background and purpose
Meyer and Land (2003) present the idea that in most disciplines ... “there are ‘conceptual gateways’ or ‘portals’ that lead to a previously inaccessible, and initially perhaps ‘troublesome’, way of thinking about something”. These are the ‘penny drop’ moments that lead to transformative and irreversible learning, the dawning realisation of the interconnection of theories and practice experiences that enable students to make sense of profession-specific expectations. Threshold concepts can transform the way students think and challenge their self-identity. Both are key as they move towards autonomy as advanced practitioners. However, these insights may lead to challenge and re-evaluation of their emerging professional role.

Intervention
An informal workshop was used to explore the idea of threshold concepts and skills with ultrasound mentors and consider the key ‘penny drop’ moments in sonographer training. We consider the threshold concepts that underpin key skills (such as scan orientation and effective communication) and the stages of learning when we would expect these to be grasped. We explore the challenges in identifying students who are in a ‘stuck place’ and innovative interventions that can help students progress.

Results
We found:
- Mentors focused overwhelmingly on threshold skills rather than underlying concepts
- Limited consensus on the expected timing of when key concepts should normally be grasped by students
- More guidance is needed from the University on creative learning opportunities

Conclusions
Further work is required to identify threshold concepts that are implicit (but not clearly articulated) within the curriculum and discussion of ‘troublesome’ concepts needs to be encouraged. We consider novel ways of enabling students to explore threshold concepts within their own practice. Mentor training needs to include guidance to help them identify students who are in a ‘stuck place’.

57. Where’s the baby?, Heather Venables, Diagnostic Imaging, University of Derby

Background and purpose
In ultrasound training, image orientation and the ability to link 2D image interpretation with 3D anatomy is key. Ultrasound looks easy when performed by an expert. However, the hand-eye coordination and spatial awareness required to complete a scan often come as ‘a bit of a shock’ to novice sonographers. This is particularly true in obstetrics where we image a moving target. This can result in a rapid drop in confidence and significant anxiety.

There is evidence that students cope with this uncertainty by mimicking expert behaviours. This may include transducer position, patient position and ‘image grabbing’. This frequently results in feedback from mentors that the student “….just doesn’t get it”.

Review of work by Meyer and Land (2003) identifies the importance of threshold concepts in education. Where students fail to grasp key concepts, they may find themselves in a ‘stuck place’ where they are aware that they are failing to progress but, are unable to articulate why.
Intervention
We use simulation activities to ‘unpick’ student understanding of image acquisition. This helps them move from image grabbing to a logical and systematic approach building on good 3D spatial awareness rather than mimicking of observed behaviours.

We have developed a simple card game that is enables students to identify misconceptions around image scan planes and orientation that may result in an inability to interpret fetal position and situs.

Results
Students and mentors report rapid improvement in scan technique and confidence once essential threshold concepts are grasped. This is frequently described by students and their trainers as a ‘penny drop’ moment.

Conclusions
This simple, low-cost intervention may help facilitate early identification of students who are struggling with image orientation and fetal lie. A better understanding of threshold concepts enables us to develop targeted learning and assessment activities.

58. Peer assisted learning for point of care ultrasound in nursing education, Hong Chuen Toh, Nor Azhar, Sa’at, Sok Keng Tan, Michael Ebuna, Sanjay Patel, Acute and Emergency Care Centre Khoo Teck Puat Hospital, Singapore

Introduction
Point of care ultrasound (POCUS) is increasingly utilised by the nursing community. Considerable challenges still exist with regards to training nurses in this skill, as this is typically provided by physician faculty or senior nurses. These include limited faculty time, power distance and scheduling conflicts. Peer assisted learning (PAL) has the potential to overcome these barriers. Nevertheless, despite the extensive body of literature on PAL in nursing education, there remains a paucity of data examining the role of PAL for training nurses in POCUS, and in particular the effectiveness of near peer (NP) versus same level peer (SLP) learning.

Method
We designed a prospective quasi-experimental research to evaluate the competency of ultrasound novice nurses who learn ultrasound guided peripheral intravenous cannulation (UG-PIVC) from near peers (NP) versus same level peers (SLP). Competencies are defined as the time to complete the UG-PIVC task on a standardised mannequin. A visual aid was created to scaffold peer learning and teaching.

Two senior nurses were trained by a recognised POCUS expert physician to perform UG-PIVC on the mannequin. They were designed as NP and trained a group of 8 nurses. After training, these 8 nurses were designated as SLP and subsequently trained another group of 12 nurses. The competencies of these two group of nurses were recorded and compared using the t-test.

Results
Nurses who were taught by the NP and SLP completed the UG-PIVC task with a mean of 104.75 seconds (SD 39.59) and 94.25 seconds (SD 34.88) respectively, p = 0.540.

Conclusion
There is no statistical significance in the time to task completion for both groups. The result suggests that ultrasound novice nurses could learn UG-PIVC skills from same level peers as effectively, if not more, compared to learning from near peers. PAL has the potential to alleviate faculty teaching pressure in nursing POCUS education.
59. **Diaphragmatic ultrasound: Technique and cases**, Sarah Hamilton¹, Sowkhyra Ramachandraiah¹, Richard Riordan², Catherine Gutteridge², ¹Imaging Peninsula Radiology Academy, ²Imaging Plymouth Hospitals NHS Trust

Diaphragmatic dysfunction is commonly underdiagnosed as a consequence of the non-specific nature of presentation. Symptoms include dyspnoea, asymmetric breathing, paradoxical movement of the epigastrium, recurrent pneumonia or unilateral collapse, and in mechanically ventilated patients slow respiratory weaning.

Diaphragmatic paralysis can be caused by direct involvement of the diaphragm (through trauma, surgery or adjacent pathology), or through neuromuscular disorders such as direct phrenic nerve damage, motor neurone disease, central nervous system abnormalities and muscular dystrophies. Prompt diagnosis is important because some causes are amenable to treatment and provision can be made for longer term ventilatory support.

There are multiple well-described techniques for evaluation of the diaphragm, including many different modalities and indirect function tests such as pulmonary function tests, trans diaphragmatic pressure measurements, phrenic nerve conductions studies and electromyography. Although each of these has their strengths and weaknesses, ultrasound combines many of the strengths, offering assessment of both structure and function in a non-invasive, real time manner at a location of choice (bedside or ultrasound room).

We present a guide to the technique of ultrasound assessment of the diaphragm and a series of clinical cases illustrating its utility.

Although not a new technique, diaphragmatic ultrasound currently lies outwith the skill set of many experienced sonographers and radiologists, commonly falling to critical care or respiratory physicians. At a time when clinicians are looking for added value we suggest that diaphragmatic ultrasound is a useful skill to retain within the imaging department.

60. **Transvaginal ultrasound: The musculoskeletal risks for practitioners**, Lianne Dadson, Ultrasound Maidstone and Tunbridge Wells NHS Trust

**Background:**
The aim of this study was to identify factors that affect the strain on practitioners when performing transvaginal ultrasound examinations. The positioning for transvaginal examinations were examined to demonstrate factors, which can impact the strain on the practitioners, and provide ergonomic recommendations.

**Method:**
The research was completed in two sections. An electronic questionnaire was designed to provide background information on the technique, prevalence and symptoms of Work Related Musculoskeletal Disorders (WRMSD) amongst practitioners performing transvaginal ultrasound. The second part, was an observational study involving 7 volunteer sonographers who each performed 5 transvaginal examinations with each scan in a different patient and sonographer position. Each scan was assessed using the Rapid Upper Limb Assessment form, which evaluated the muscular strain and positioning of the sonographer.

**Results:**
The study demonstrated that performing transvaginal examinations with the patient’s legs in stirrups with the sonographer seated scored a RULA score of 6.6 indicating this placed the sonographer at the highest risk of muscular strain and work. Performing transvaginal examinations using a wedge with the sonographer standing scored the lowest RULA score of 3 indicating this position resulted in the lowest risk for muscular strain.

A total of 742 responses were analysed for the electronic questionnaire, which demonstrated that 96.2% of respondents were suffering from pain and 87.8% stating transvaginal examinations resulted in awkward postures. The results of the questionnaire demonstrated multiple factors that contribute to work related musculoskeletal disorders.
Conclusion:
The transvaginal ultrasound examination has been demonstrated to be associated with WRMSD and there remains a high prevalence of pain amongst practitioners who perform transvaginal ultrasound. Performing transvaginal examinations whilst standing improved the sonographers posture. These results are in concordance with previous literature; these results indicate a significant association between posture and examination positng and the prevalence and severity of musculoskeletal symptoms.

61. Penile Sonography: Benefits of clinical input with difficult cases, Karen Lau, Stephen Wolstenhulme, Roger Lapham, Oliver Hulson, Leeds Teaching Hospital

Background
Penile sonography is an accessible and invaluable diagnostic tool in characterising lesions, identifying fractures and assessing functional vascularity. It is technically straightforward but the interpretation of penile lesions can be difficult. This pictorial review aims to demonstrate educational points from two cases regarding a superficial and a deep penile lesion and the crucial benefit of involving the referring clinical team in aiding the diagnosis.

Case Discussion

Case one: A young man who presented with a smooth and mobile lump on the mid-shaft of the penis for the last six weeks. Clinical diagnosis: superficial cyst. Sonography demonstrated an hypoechoic ellipsoid lesion on the dorsum of the penis; possibly arising from the glans. Foreskin retraction was not performed; may differentiate the lesion from the skin or the glans. Follow up is ongoing.

Case two: A young man who presented with penile discharge and a history of phimosis with a clinical suspicion for penile abscess. Sonography requested to help differentiate whether the abscess was superficial or deep; to determine the patient’s medical or surgical management respectively. The patient had two scans over two days. First scan reported as a left corporal abscess involving the glans. The clinical team felt the abscess was deeper and a second scan was done with a urologist on site to demonstrate where the abscess was felt clinically. Repeat sonography confirmed a penile abscess in the deep tissue of the corpora cavernosa without foreskin and superficial tissue involvement.

Conclusion
These two cases demonstrate the diagnostic dilemma of performing and interpreting penile sonography. The first demonstrates a scenario whereby technique (i.e. retraction of foreskin) may have altered lesion characterisation. The second highlights the importance of clinical input from the referring team. The lessons from these cases may prove to be useful in improving the quality of penile sonography.
62. **The role of ultrasound in the diagnosis and management of jumpers' knee; A critical review**, Matthew Hicks¹
Gill Dolbear², ¹Elizabeth Hospital, Kings Lynn, ²Canterbury Christ Church University

Jumpers’ Knee is a term used to describe tendonitis or tendinopathy of the patellar tendon, as it is most prevalent following participation in sports such as jumping, basketball, football and volleyball (Rudavsky & Cook, 2014).

The phrase tendonitis has been in decline following the study by Maffulli et al (1998) that suggested inflammatory responses had little involvement in tendinopathic changes. In 2009 Cook and Purdam introduced the concept of tendinopathy as a dynamic process, with areas of a single tendon in different stages at any given time. More recently, a large systematic literature review by Dean et al (2017, p.5) considered the evidence of inflammation in tendinopathy to be “increasingly overwhelming in recent years”. Could the theory that surrounds the aetiology and pathogenesis of tendinopathy therefore be about to change once more?

Ultrasound aids clinical diagnosis by correlating B-mode and Doppler findings to patient symptoms. However, despite some claims, there seems little evidence that ultrasound findings can reliably predict the onset of Jumpers’ Knee at this moment in time.

The optimum imaging modality for accurately diagnosing or predicting tendinopathy may be Shear Wave Elastography (SWE), as De Zordo et al (2009) found a correlation between tendon stiffness and normal B-mode appearances, whilst Ooi et al (2015) found a correlation between SWE strain mapping and tendon thickness. More recently, Dirrichs et al (2016) performed a prospective study on 112 patients, in which the correlation between symptomatic tendons and low SWE values was found to be highly significant (P< 0.001); however, it remains to be seen if its use can be more reliable in predicting the onset of tendinopathy when compared to B-mode and Doppler ultrasound.
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Stand 19

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Stand 28 & 38

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Stand 30

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Stand 31

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A major feature of our educational work recently has been the recent review of e-LfH learning units for obstetric and non-obstetric ultrasound – come and see these excellent resources on our stand. The College of Radiographers has also been working with Health Education England and other stakeholders to try and resolve the current shortage of sonographers.

We welcome visitors to our stand where representatives will be on hand to discuss a wide range of topics, including regulation, workforce shortages and development, work-related injuries, continuing professional development, etc. So, please visit us – members and non-members are all very welcome.

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Stand 36

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Stand 37

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General Imaging

What to do with incidental renal lesion, Dr Christopher Harvey, Hammersmith Hospital

Ultrasound (US) is often the initial imaging modality used in the evaluation of renal diseases and detects many incidental lesions. Traditionally these would be further characterised using CT and MR. Despite improvements in B-mode and Doppler imaging, US still has limitations in the assessment of focal renal masses and complex cysts as well as the microcirculation. Imaging with contrast-enhanced US (CEUS) with microbubbles has overcome many of these problems with an increasing number of renal applications and guidelines underpinning their importance. This talk describes microbubble contrast agents and their role in renal imaging. Microbubbles are extremely safe and well-tolerated pure intravascular agents that can be used in renal failure and obstruction where CT and MR contrast agents may have deleterious effects. Their intravascular distribution allows quantitative perfusion analysis of the microcirculation, diagnosis of vascular problems, and qualitative assessment of tumor vascularity and enhancement patterns. Low acoustic power real-time imaging can be performed without exposure to ionizing radiation and at lower cost than CT or MR. CEUS can accurately distinguish pseudotumors from true tumors. CEUS has been shown to be more accurate than unenhanced US, rivals CT in aiding diagnosis of malignancy in complex cystic renal lesions, and can be used to stage Bosniak type cysts. CEUS is useful in the characterization of indeterminate renal masses and focal inflammatory lesions in native and transplant kidneys.

Contrast enhanced ultrasound in the assessment of renal lesions, Asha Omar, Georgiana Zamfir, Radiology Plymouth Hospitals NHS Trust

Contrast enhanced ultrasound (CEUS) is being increasingly used as a problem solving tool in the assessment of atypical or difficult to characterise renal lesions. It is relatively quick and easy to perform and can avoid the need for ionising radiation. It is able to accurately detect if there is intra-lesional blood flow which may indicate underlying malignancy. There are limitations to CEUS, particular in the assessment of small lesions, typically less than 1cm in size where enhancement can be difficult to confidently assess.

We have reviewed the use of CEUS at a tertiary referral centre in the South-West of England. Over a two-year period between June 2015 and June 2017, a total of 454 CEUS examinations were performed. Of these, 141 examinations were for the assessment of a renal lesion. Referrals for CEUS included lesions identified via conventional ultrasound and computed tomography (CT) that required further assessment. We have found that CEUS is able to accurately confirm the presence of benign lesions such as hyperdense cysts and anatomical variants including a column of Bertin. In these cases, patients have avoided further ionising radiation exposure and unnecessary worry through this investigation. If a lesion is deemed suspicious for malignancy following CEUS, it is inevitable the patient will require further investigation with CT, thus ionising radiation is not entirely avoided. We present our local experience of CEUS and an educational review of the beneficial role CEUS has in clinical practice.

Early post-operative ultrasound for renal transplant: What not to miss, Karis McFeely1, Thomas Davies1, Matthew Murphy1, Catherine Gutteridge2, 1Radiology Peninsula Radiology Academy, 2Radiology Derriford Hospital Ultrasound (US) is the preferred imaging modality for evaluation of renal transplants in the immediate post-operative period and-long term follow up. This is namely due to its accessibility, inexpensive and non-invasive qualities. Furthermore, patients can remain monitored on the hospital ward with the scanning performed portably if necessary.
Upwards of 3300 renal transplants were performed in the U.K in the last financial year 1009 living, 1404 Donation after brain death (DBD) and 934 donation after circulatory death (DCD) with an estimated 5000 or more patients on the waiting list (1,2).

At Derriford Hospital, as the tertiary referral centre for the South West, a total of 57 renal transplants were performed within the same time period: 17 living, 18 Donation after brain death (DBD) and 22 donation after circulatory death (DCD). 21 patients (39%) underwent renal ultrasound prior to hospital discharge.

If there are concerns in the early post-operative period, ultrasound may be used to evaluate and diagnose complications. The principal aim is to identify those complications which may benefit from urgent surgical intervention. These include renal vein thrombosis, renal artery thrombosis, arterial kink, and large perinephric collections.

This paper demonstrates typical post-surgical sonoanatomy and identifies common early complications of renal transplant that can be depicted sonographically and are essential not to miss.

References:
Donald MacVicar Brown Keynote Lecture

Future reverberations from past reflections: A glimpse at the full capabilities of ultrasound, Jeffrey Bamber, Joint Department of Physics and Division of Radiotherapy and Imaging, Institute of Cancer Research and Royal Marsden NHS Foundation Trust

Compared with other mainstream medical imaging technologies, ultrasound is low cost, transportable, high throughput, safe and comfortable for the patient. It offers excellent 3D soft tissue visibility, good blood flow and other functional information, and high frame rate. Since its commercialisation in the 60s, it has made enormous contributions to medicine but the potential for further impact is truly exciting. This lecture draws on the author’s work and experience in cancer research to look at recent technical progress in medical ultrasound, and considers some of the physical possibilities as well as technically achievable goals for the next decade.

An area that continues to show promise is mechanical property imaging, known as elastography. Different types of mechanical wave travel in tissue at different speeds, and each provides importantly different information about tissue composition and function. Pressure waves (ultrasound) are used to watch the progress of a shear wave and make images of its speed, or to image the tissue strain created by a hand-induced or a physiologically generated stress. It is proving important for diagnosis and assisting treatment of an astonishingly wide range of diseases. In an emerging form of elastography (of which there are many) the methods are combined; the tissue is held under gentle pressure while elastography is used to watch it change over time as fluid between the cells is squeezed out. This allows assessment of the microscopic pores (gaps) in tissue through which fluid can squeeze. Applications include assessment of cancer and conditions such as lymphoedema.

Elastography is just one method that takes advantage of new capabilities for transducer arrays, electronics, computers, and software for image reconstruction and data processing. These capabilities enable, for example, plane wave imaging at thousands of frames per second, observation of electromechanical wave propagation in the heart, multi-wave assistance of drug delivery, exquisite super-resolution of deep microscopic blood vessels, and optoacoustic imaging which reveals optical pigments such as haemoglobin or melanin, or dyes or nanoparticles introduced intravenously, because they emit sound waves when illuminated by a short (<10 ns) laser pulse. Furthermore, using reconstruction methods that incorporate the physics of ultrasound wave propagation, high resolution quantitative images may be reconstructed of ultrasound speed, attenuation and scattering. These images hold potential for cancer screening, diagnosis and monitoring, and even quantifying the risk of developing cancer.

MSK Fundamental

Plantar fibromatosis: Getting to the foot of the problem, James Moran¹, P. O’Brien¹, Therese Herlihy², M Stanton³, ¹Radiology Department, Saint James’s Hospital, Ireland, ²Radiography and Diagnostic Imaging, School of Medicine, University College Dublin, Ireland

Background
Plantar Fibromatosis, also known as Ledderhose disease, is a rare, benign, hyperproliferative condition, in which slow growing nodules develop within the plantar fascia. Patients typically present with a palpable lump and associated foot pain. This paper describes the case of a 36 year old female who presented to the emergency department with a sudden onset of sharp right foot pain when weight bearing and a palpable lump on the planter aspect of her foot. An ultrasound examination was performed to image the lump.

Ultrasound Findings
The ultrasound examination revealed a firm, well defined, heterogenous and hypoechoic nodule, measuring 10.7mm x 3.1mm. The nodule demonstrated no internal vascularity and had direct involvement with the plantar fascia.

Discussion
This ultrasound examination resulted in a definitive diagnosis of plantar fibromatosis, no further imaging was required. The ultrasound features identified were used to distinguish this lesion from differential pathologies, such as a ganglion cyst or fibrosarcoma. Plantar fibromatosis can cause persistent foot pain, therefore prompt diagnosis is essential to allow treatment to commence.
Conclusion
Ultrasound is cheap, efficient and readily available, it is recognised as the gold standard for first line imaging in the investigation of palpable plantar lumps. It offers high resolution imaging, often making a definitive diagnosis of plantar fibromatosis, as in this case. When suspicious image features are seen, further imaging and biopsy is recommended, to rule out a lesion of neoplastic nature.

Ultrasound evaluation of rectus abdominis and lumbar multifidus muscles in individuals with postural changes, Rute Santos, Ruben Barreiro, Medical Imaging and Radiotherapy Department, IPC, Coimbra Health School

Introduction:
Postural changes are well present in society. These pathologies, when not congenital, come from the practice of bad posture habits and lack of physical exercise. The cases of hyperlordosis, kyphosis and scoliosis are often diagnosed in adulthood when they are in a more advanced state. When detected early, they can be applied or treated surgically. The postural muscles are muscles responsible for stabilization and the various actions of the spine. MRI is the best method of muscle evaluation, however ultrasound is a method less expensive and also has a great ability to assess muscle characteristics.

The aim of this study is to characterize the muscular echography of two postural muscles in healthy individuals and in individuals with postural alterations (namely hyperlordosis).

Materials:
30 young adults were submitted to an ultrasound evaluation of the rectus abdominis and multifidus lumbar muscles in rest and contraction and an angle measurement of the lumbar spine through a photometry equipment. They were divided in to groups: one of control and other with non-congenital posture. With a sample composed by 11 participants with postural deviations, and 19 without. 360 images were analysed with Image J software to obtain muscle thickness and echo intensity values from the two muscles in two conditions and the angle of the lumbar spine was calculated also for all participants.

Results:
There were significant differences between the rest and contraction on muscle thickness and echo-intensity of both muscles. There were not significant differences between the two groups of participants and there was no correlation between the angle and the ultrasound measurements.

Conclusion:
The postural deviations don’t influence the ultrasound characteristics of the studied muscles. However more studies must be performed to analyse the relation between the lumbar and abdominal muscles and postural changes.

Professional Issues
Optimising your existing radiology service, Lesley Wright, Lesley Wright Improvement

There has never been greater pressure on Radiology and Ultrasound services.

Radiology and Sonography staff are coping with a combination of workforce shortages and conflicting lead-time targets for different priorities of patients including: 1-hour Stroke, 2-week wait for Cancer, 31/62 Cancer Pathway, new 28-day NICE Cancer Diagnosis, 6-week Diagnostics for 18-week pathway,4-hour Emergency care, and the need to keep in-patient stays as short as possible.

We make significant investment in continuous professional development to ensure staff have the most up to date training to diagnose a variety of conditions for our patients, but do we put enough investment into developing staff to diagnose the long waiting times in Radiology?

Radiology staff are understandably ‘firefighting’ to reschedule previously ‘scheduled’ patients and current ‘emergency or urgent’ patients. Consequently, many patients experience long lead-times (waiting times). Faced with an overwhelming backlog and long waiting times, it is easy to understand why radiology staff believe there is ‘lack of capacity’ in their system¹ ².

Therefore, it is important that we diagnose the reason for the backlog and long waiting times. If we are to get support for developing services, demonstrating that we have addressed service optimisation is key and will help develop your business case.
This presentation will identify how to optimise your current service and understand the cause of the constraints.

**Ultrasound referrals: Good, bad, does it matter?**, Kim Gregson¹, Pamela Parker¹, Kirstie Godson², ¹Ultrasound Hull and East Yorkshire Hospitals NHS Trust, ²Diagnostic Imaging University of Leeds

Diagnostic imaging is one of the fastest expanding services with a rise in demand of 40% within the last decade. Sources report that up to 40% of radiological examinations are unnecessary and radiology services are generally overused by GPs.

In a service which is already under strain, departments are often not keeping up with demand. In 2015 BMUS released referral guidelines in attempt to support better use of ultrasound services.

**Aim:**
To determine whether GP referrals for abdominal ultrasound scans are appropriate according to BMUS guidelines.

**Objectives**
- To demonstrate whether the BMUS guidelines had any implications for volume and detection of clinical findings.
- To assess agreement between sonographers using the BMUS guidelines.

**Methodology**
300 referrals were reviewed using retrospective cohort analysis.

Date collected included referral details and quality assessment scores. Each referral was individually evaluated by three observers with variable experience (range 2 – 22 years).

**Results**
- 27.9% of referrals were deemed inappropriate
- Of these:
  - 19 % rejected as inappropriate for imaging
  - 44 % redirected to a more appropriate modality
  - 37% rejected with no clinical question.
- Inter observer percentage agreement ranged from 57.9 % to 69.9 %
- 45.3% of examinations produced a clinical finding.

**Conclusion**
Most referrals in this study were appropriate. Almost half of inappropriate referrals were because another imaging investigation would be optimum. Approximately one third of referrals did not directly ask a clinical question; better-quality decision making is needed.

Moderate agreement between observers is demonstrated supporting the notion that the BMUS guidelines can be used when vetting referrals.

Little association between referral quality and diagnostic outcome is seen in this study. The guidelines will reduce demand but it cannot guaranteed that this will not be at the expense of missing serious clinical findings. Proper channels of communication between ultrasound departments and GPs is essential.

**Physics**

**A simple method for measuring ultrasound beam slice thickness with depth to assess changes in lens properties**, Steven Jackson, Stephen Russell, Christie Medical Physics and Engineering, Christie NHS Foundation Trust,

**Background**
Any difference in slice thickness with depth between two ultrasound probes may not be visible in standard in-plane phantom testing but may have an impact upon what is clinically visible. The aim of this study was to demonstrate a simple, reproducible method for assessing slice thickness with depth using a standard phantom. The intention was not to provide a definitive slice profile but a reference to assess time based changes in slice thickness profile due to wear.
Method
A linear array probe was drawn across a Gammex 403 GS phantom orientated such that wires of known depths are either present or absent in the field of view depending on the slice thickness of the beam at that depth. The probe was manipulated using a bespoke jig with a screw thread mechanism that allowed 0.5mm positional resolution. Images acquired every 0.5mm were exported for offline analysis. A MATLAB script was written to plot the received signal intensity from each wire against relative probe position and fit a curve to each plot. The FWHM of each fitted curve was assumed to be a robust estimate of the slice thickness at each wire depth.

Results obtained
Slice thickness profiles were calculated from an average of three measurements on several machines in separate sessions. The results obtained demonstrated good reproducibility of the method at all available wire depths, both between individual measurements in a single session and between repeat sessions performed with the same equipment on different days. Obtaining, exporting and analysing the images required around twenty minutes.

Conclusion drawn
The study demonstrated proof of principle that ultrasound beam slice thickness profile with depth can be reproducibly measured using the described method. The test duration and simplicity is suitable to be incorporated into acceptance testing of ultrasound probes as it involves a standard phantom and simply engineered jig.

Elastography in carotid disease, Kumar Ramnarine, University Hospitals of Leicester NHS Trust

It has been well established that ageing and diseases such as stroke, hypertension, diabetes mellitus and cardiovascular disease can affect carotid artery elasticity. Various ultrasound techniques including dynamic B-mode, Tissue Doppler and elastography imaging have been used to assess biomechanical characteristics. Strain based elastography techniques have predominately been applied to assess carotid plaques and studies have compared against histological and B-mode characterisation. This talk will provide an overview of different elastography techniques and focus on the application of a state of the art Supersonic Shear Wave Elastography (SSWE) technique for identification of the unstable carotid plaque. Although many studies have demonstrated the clinical benefit of SSWE for a variety of applications, particularly the liver, breast and thyroid, there are only a few recent studies on vascular applications. Carotid plaque imaging is a challenging clinical application considering the small heterogeneous tissue size, the dynamic environment due to pulsatile blood flow, thin vessel walls, non-linear tissue elasticity and shear wave propagation model assumptions which may not be valid. Despite these challenges, we hypothesised that SSWE imaging of carotid plaque can help identify the unstable plaque. Our clinical and experimental studies in Leicester have demonstrated the feasibility of SSWE for assessing Young’s Modulus of carotid plaque. We highlight the clinical potential of SSWE imaging and suggest that SSWE may be superior to B-mode greyscale median (GSM) for identification of carotid plaque vulnerability. There are exciting developments in ultrasound technology which are relatively easy to implement in the vascular clinic and provide new information to address important clinical questions.


Background:
The reliability and validity of an instrument determines the confidence that can be placed in the measurements produced. Validity is an assessment of whether an instrument measures what it aims to measure; reliability is the ability of the instrument to consistently reproduce a measurement. Intra-class correlation coefficients (ICC) assess the consistency between quantitative measurements, in terms of reliability, reproducibility and validity. Echocardiography is routinely used to assess and monitor LV size and function, but may be less accurate than other methods.

Aim:
To critically assess intra- and inter-observer variability in the analysis of clinical research echocardiograms, to demonstrate the validity of the measurements used.

Methods:
Echocardiogram data used in a clinical research study were reanalysed to check intra-observer variability,
with an interval of one week between analyses. Data were also analysed by a second experienced and accredited cardiac physiologist who was also blinded to the patient, date and intervention.

Results:
ICC for intra-observer variability was 0.957 (95% confidence interval 0.824 – 0.989). ICC for inter-observer variability was 0.989 (95% confidence interval 0.971 – 0.996). These results indicate a good level of consistency for both intra- and inter-observer measurements.
ABSTRACTS

Day 2 Thursday 7th December

Obstetrics

Assessing the accuracy of ultrasound estimation of gestational age during routine antenatal care in In-Vitro Fertilization (IVF) pregnancies, Aaron Brereton, Helen Liversedge, Bridget Knight, Roy Powell, Royal Devon and Exeter NHS Foundation Trust

Objective:
To assess the accuracy of the current standard Crown Rump Length (CRL) reference range used locally to estimate gestational age in early routine antenatal care.

Methods:
Routinely collected retrospective data from 178 IVF pregnancies seen for antenatal care at the Royal Devon and Exeter NHS Foundation Trust over the period 1/1/2006 to 1/1/2016 was identified. We compared ultrasound calculated CRL Gestational Age (GA) taken at the routine First Trimester Screening Clinic (FTSC) with the “true” GA calculated from the known IVF fertilization date.

Results
The results demonstrate a systematic overestimation of GA by ultrasound using the Robinson and Fleming ultrasound reference chart (as recommended by British Medical Ultrasound Society and UK national screening committee/Fetal anomaly screening programme) when compared to IVF GA. The mean overestimation was 3.0 days (95% CI: 2.7 to 3.4), p < 0.0001. A range of alternative ultrasound reference charts also generated a systematic overestimation, ranging from 1.6 to 2.9 days, p<0.001, p<0.0001 for each.

Conclusions
The current CRL reference chart used in routine clinical practice would appear to systematically overestimate GA by an average of 3 days when assessed in IVF pregnancies. This finding was repeated in alternative available reference charts. While these differences may appear slight, the systematic error we identified may have potential implications on the accuracy of GA estimation in routine antenatal care particularly when related to those pregnancies at risk of pre-term delivery or growth retardation. Further research is needed to confirm our findings in larger, non IVF cohorts and may lead to the need for a new CRL reference chart to be developed.

Identifying factors which influence the antenatal detection of congenital heart defects, Angie Hobbs, Rita Phillips, Antenatal Clinic, North Bristol Trust, Medical Ultrasound, University of the West of England

Background and aim:
Early identification of Congenital Heart Disease (CHD) provides significant benefits for babies and their families. This study aimed to evaluate the Trust’s detection rates of congenital heart disease (CHD); to explore factors that may affects these rates and finally to explore the sonographers attitudes towards scanning the fetal heart. This triangulation method provided a more holistic picture of the current service and identified future training needs of the department.

Methods:
All pregnancies affected with CHD between 1st Jan 2009 and 31st December 2014 were identified and data obtained on those diagnosed in the antenatal period and those diagnosed only in the postnatal period. The detection rates for all types of heart defect were recorded with the main focus being on the four specific conditions that make up the FASP serious cardiac anomaly group; HLHS, AVSD, TGA, TOF. Sonographers’ attitudes towards assessing the fetal heart were explored by means of a survey. Ethics approval was obtained.

Results:
There were a total of 355 cases of CHD reported after exclusions. The overall antenatal detection rate increased significantly over the study period from 45% to 63%. Detection rates were considerably higher rising from 70% to 93% for the four FASP cardiac auditable conditions. There was a response rate of 79% from the on-line survey, themes identified were issues of individual litigation, difficulties in scanning women with raised Body Mass Index (BMI), sonographer’s confidence and training.
Conclusion:
There is a clear improvement in the antenatal detection which exceeds the minimum 50% target required by FASP. Factors such as the time of day for the scan, the variation in the machine used, and high maternal BMI did not adversely affect the antenatal detection rates. The study has also highlighted the importance of continual professional development, feedback, ongoing training and audit. The role of cardiac champions was also well recognised by the sonographers.

Head and Neck

Case study: Ultrasound detection of a left supraglottic tumour, Jean Bainbridge, Hull and East Yorkshire NHS Trust

Background:
A 68 year male was referred by his GP for an ultrasound examination of his neck with the presenting symptoms of tender left mid anterior triangle lymph node palpable.

Additional information; the patient is a smoker, has been experiencing left ear pain and is long term hypothyroid.

Case report:
Patient had a high frequency ultrasound examination of the neck performed using the standard 7 sweep technique. Ultrasound revealed an ill-defined mass arising from within the larynx. This mass was hypoechoic and measured 19 x 15 x 19 mm and appeared to be closely related to the left false vocal cord. Appearances were highly suspicious of malignancy.

There was no abnormal lymphadenopathy demonstrated within the neck.

No masses or suspicious features were seen in the area of concern.

The patient was informed that there was an area within his larynx that would need further investigations and that an urgent referral to ENT would be advised to the GP.

The patient had a staging CT of the neck and chest performed. The conclusion of the CT report read:

‘The imaging appearances remain highly suspicious for a left-sided supraglottic tumour with no lymphadenopathy or distant metastatic disease identified. If malignancy is proven suggested radiological staging would be T3 N0 M0.’

The patient underwent a microlaryngoscopy, biopsy revealed carcinoma in situ of the left false cord.

This cancer has been staged as T4aN0M0. Patient is to have radical chemoradiotherapy to both sides of the neck, he has a RIG in-situ.

Discussion:
Ultrasound is not routinely used to assess the larynx; however this case shows that using the standard 7 sweeps of the neck for ultrasound examination of the neck can reveal incidental cancers of the larynx.

MSK Advanced

A framework for requesting, performing and reporting shoulder diagnostic ultrasound scans, incorporating a novel approach to quantifying tendinopathic findings, Mike Smith¹, Alison Hall², ¹School of Healthcare Sciences, Cardiff University ²Research Institute for Primary Care and Health Sciences, Keele University

Ultrasound scanning of the shoulder can provide valuable diagnostic information to guide the management of the patient with shoulder pain. However, this is partially dependent upon (i) well-reasoned integration of the scan findings into the patient care pathway and (ii) images being generated, evaluated and interpreted in a systematic manner, including more subjective elements such as tendinopathic findings. This abstract outlines a framework designed to address these challenges.
Framework part 1:
The referral form is designed to enable the referring clinician to support the sonographer with undertaking a clinically meaningful scan. It (i) provides a brief precis of the indications for (and not for) requesting a shoulder ultrasound scan and (ii) prompts for relevant clinical information pertinent to the suspected pathology.

Framework part 2a and 2b:
Part 2a is based upon the ESSR shoulder guidelines (Beggs et al. 2010) and was adapted from the shoulder ultrasound training and assessment paper by Smith et al. (2015). It provides the sonographer with a recommended checklist to guide performance of the scan, including key pathological characteristics and their definitions. As such it supports the sonographer with arriving at a well-reasoned differential sonographic diagnosis. It also proposes a novel algorithm for characterising tendinopathic change comprising tendon thickness, echogenicity and echotexture with the contralateral shoulder used as a pseudo-comparator. This form aligns with the subsequent scan recording proforma (part 2b), whereby mirroring of the terminology and structure help to ensure consistency.

Framework part 3:
The scan reporting proforma mirrors part 2b, but also enables the sonographer to place the findings in context of the clinical information provided in Framework part 1, along with providing feedback regarding future scan requests.

It is hoped that this framework will facilitate referring clinicians and sonographers to support each other in providing optimal patient care alongside finite imaging resources.

Adult meningocele – an uncommon ultrasound finding, Denise Choong1, Colette Sheehan2, Marie Stanton1, Therese Herlihy1, 1University College Dublin, 2Radiology, Connolly Hospital Blanchardstown

Background
Meningoceles are herniations of meninges, through an embryological defect in the neural arches of the vertebrae. Classified as spina bifida cystica, meningoceles are a rare type of closed neural tube defect, which is covered by skin. This case study demonstrates the possible ultrasound findings of an adult meningocele.

Ultrasound findings
A 39 year old male presented at the emergency department with a palpable, tender mass on his left lateral chest wall. He stated that this was a new swelling and complained of unexplained weight loss over the last 6 months. He has a history of spina bifida. Ultrasonography revealed a complex cystic mass with internal septation and soft tissue components. Colour Doppler interrogation demonstrated minimal vascularity within the soft tissue components and pulsation artefacts within cystic portions of the mass. Additionally a solid finger-like projection was identified at the inferior aspect of the mass. Due to posterior shadowing from the spine, the deep extension of the mass could not be fully evaluated.

Discussion
A previous renal computed tomography scan reported an incidental finding of a meningocele 5 years prior. Most meningoceles are detected and surgically treated in the antenatal or perinatal stages. Adult meningoceles are much rarer and patients often present with pain or neurological symptoms. Ultrasound is useful for assessing cyst contents which may include fibrous bands, aberrant nerve roots or glial nodules. Sonographers should be aware of normal pulsations of cerebrospinal fluid which can differentiate meningoceles from other complex cystic lesions.

While ultrasound can be useful here, it is difficult to assess the entire extent of the mass. In addition to plain spine radiographs, magnetic resonance imaging is often recommended for its superior anatomical visualization and would contribute to a more definitive diagnosis. Surgical treatment for adults is considered when there are severe symptoms of paraparesis or bladder dysfunction.

Soft tissue sarcoma masquerading as a haematoma, Mark Charnock, Sheffield Teaching Hospitals

Background:
Patients presenting with a soft tissue lump are commonly encountered in clinical practice. The vast majority of these are benign with one study reporting 95% of patients from primary care referred for imaging of a potential sarcoma had either benign or non-cancerous lesions (Lakkaraju et al 2009). Sarcomas account for around 1% of all primary adult soft tissue masses (Grimer and Briggs, 2010). Although relatively rare, there
were 3298 new diagnoses of soft tissue sarcomas and 531 new diagnoses of bone sarcomas in the UK in 2010 with the overall incidence of sarcomas increasing from 35 per million to 45 per million in the period from 1996 and 2010 (National Cancer Intelligence Network, 2010).

Case report:
This case study reports on a soft tissue sarcoma that was initially reported as a haematoma. The patient presented to their GP with a 3 month history of a soft tissue thigh lump following trauma that was not painful or increasing in size. An initial Ultrasound scan reported the superficial soft tissue mass as a probable haematoma and recommended a rescan is 6 weeks. This showed no interim changes. The patient presented back to their GP 8 months later with the same lump increasing in size and painful. A further Ultrasound reported an irregular, hypervascular soft tissue mass and an MRI scan discovered a soft tissue mass with peritumoral oedema suspicious of a malignancy. The patient was referred to the local Sarcoma MDT with an Ultrasound guided biopsy confirming the diagnosis of a myxofibrosarcoma. The patient had this subsequently excised.

Discussion:
Despite the Ultrasound findings correlating with the clinical details, this case demonstrates that the diagnosis of a haematoma can be difficult and other differential diagnoses such as soft tissue sarcomas should also be considered.

A simple lipoma - Not so simple after all!! A case of Myxoid Liposarcoma, Michele Cunningham, Radiography and Diagnostic Imaging, School of Medicine, University College Dublin, Ireland

Background
A 24 year old male was referred to the imaging department due to the presence of a soft tissue mass growing on the inner left thigh. The patient had become increasingly aware of the lump due to pain.

Ultrasound Findings
Focal localised scanning was undertaken of the soft tissue mass and its surrounding area. The ultrasound examination demonstrated a well-defined, smooth, heterogeneous lesion with linear septations 8cm x 6.8cm x 3.9cm located between the deep subcutaneous tissue and the muscle. Internal vasculature was detected but no gross hyperaemia.

Discussion
The findings were suspicious of malignant degeneration in a pre-existing lipomatous lesion so the patient was immediately referred for further investigations. MRI imaging of both thighs was performed and again the suspicious lesion was identified. Surgical biopsy was performed which identified the lesion as a high-grade Myxoid Liposarcoma. Pre-operative radiotherapy was performed on the lesion which was subsequently surgically removed.

Conclusion
Sonography is usually the diagnostic imaging method of choice in the initial assessment of soft tissue lesions whose origin and nature are not fully understood. The primary goal for the imaging referral was to confirm the presence of a mass and to assess its extent in preparation for possible intervention and treatment. Ultrasound can contribute to effective management of such cases when combined with MRI, laboratory and histological assessment.

Vascular

Future of carotid disease assessment, Steven K Rogers, IVS Ltd, Manchester University NHS FT, Academic Surgery Unit, University of Manchester

The velocity criteria endorsed by the Vascular Surgical Society and the Society for Vascular Technology for the assessment of carotid disease are now ten years old. Our knowledge of carotid artery disease has progressed significantly since 2007 yet, the criteria has remained unchanged. Are we now at the point of needing new criteria?
Current European Society of Vascular Surgery (ESVS) guidelines recommend carotid endarterectomy (CEA) for a symptomatic severe carotid stenosis (> 70%; NASCET criteria). However, in asymptomatic patients, the severity of carotid stenosis is a poor predictor of stroke, with a <2% risk of ipsilateral stroke per year. Despite these differences, we assess symptomatic and asymptomatic carotid disease using the same stenosis velocity criteria which potentially may be doing some patients a disservice. A proportion of symptomatic patients may have unnecessary surgery as their actual risk of further ischemic event could be lower than the risk associated with a high-grade stenosis. Conversely, an asymptomatic patient may have significant risk of an ischemic event as they firmly fall within that 2% of patients. Therefore, there is a need for personalised risk assessment.

In recent publications, groups have focused on assessing the vulnerability of the carotid plaque. Techniques documented include, plaque volume, grey scale median, juxta-luminal black area, neovascularisation and elastography. This talk will present the current state of research and perhaps outline the future for carotid disease assessment.

**Doppler velocity accuracy**, Nick Dudley, United Lincolnshire Hospitals NHS Trust

**Background:**
The implementation of Doppler QA is patchy. This may be due to the availability of expertise and the expensive test equipment required. However, the accuracy and linearity of Doppler velocity estimation is critical to patient management. The aim of this work was to explore the options for assuring Doppler velocity accuracy.

**Methods:**
The Medical Devices Directive requires manufacturers to provide accurate and stable measurements, taking account of the intended purpose, and to state the limits of accuracy. Suppliers were therefore asked for measurement accuracy specifications and methods of assurance. Measurements were made in the field using a flow phantom and a string phantom.

**Results:**
No suppliers were able to supply the requested information on first demand; at the time of writing we are still awaiting responses from some suppliers; one supplier has refused to supply information. Current responses include velocity accuracy specifications ranging from ±5% to ±15% and assurance methods using a variety of phantoms. Some suppliers claimed accuracies well within specification (2-3%) during their own testing. Testing is performed at relatively low velocities compared to those encountered in clinical practice and no testing of linearity was reported. Tests with both phantoms showed good agreement with set mean velocities.

**Discussion:**
It is concerning that suppliers are largely unable to provide assurance of Doppler velocity accuracy on demand, one implication being that customers are not asking for this information at the procurement stage. Manufacturers’ assurance methods are not standardised, so that Doppler velocity accuracy may vary between them, having potentially serious implications for patients. String and flow phantoms differ in the characteristics of the resulting Doppler spectra and care is required in using them to assess accuracy.

**Ultrasound shear-wave elastography (SWE) of the carotid arteries in patients with Spontaneous Coronary Artery Dissection (SCAD) vs. healthy volunteers**, Fahad Farhan Almutairi, University of Leicester

**Background and purpose**
Spontaneous coronary artery dissection (SCAD) is a rare but potentially life-threatening condition, mainly affecting women, sometimes around the time of pregnancy. The aim of this study was to evaluate the Young’s Modulus (YM) of the common carotid artery (CCA) wall using shear wave elastography (SWE) in SCAD patients and healthy volunteers to assess whether SWE could be used as a novel biomarker for SCAD.

**Methods**
Following Medical Ethics approval and informed consent, 127 women (89 SCAD and 38 healthy volunteers) underwent SWE scanning of the CCA using a Supersonic Imagine Aixplorer ultrasound scanner and L15-4 probe. Cine-loop data were analysed by a blinded observer, who measured mean YM in 5 consecutive frames within 2mm ROIs; 2 positioned on the anterior wall and 2 on the posterior wall. Mean YM estimates were compared between SCAD patients and volunteers, and between measurements from the anterior and posterior vessel walls. Intra-frame variability was assessed by calculating the co-efficient of variation (CV).
ABSTRACTS

Results
There was no significant difference in YM between SCAD patients (YM = 54kPA, 95% CI 49 - 59 kPA) and healthy volunteers (YM = 56kPa, 95% CI 51 - 61; p= 0.60). The YM for the anterior wall was 6.5 kPa (9.9%) higher than the posterior wall. The inter-frame CV for the anterior wall estimates (CV=23%) was lower than for the posterior wall (CV=30%).

Conclusions
The YM of the CCA in SCAD patients is similar to those in healthy volunteers suggesting that changes in arterial compliance are not a major factor in the pathogenesis of SCAD. The difference in YM between the anterior and posterior wall is attributed to an artefact of the SWE technique that has not previously been reported and requires further investigation. Variability of YM estimates was satisfactory, confirming the clinical feasibility of SWE for assessment of vessel elasticity.

Iliac endothelial fibrosis, Fabrizio D’Abate, St George’s Vascular Institute, Vascular Laboratory

Endofibrosis (EF) of the iliac arteries is a flow-limiting condition typically seen in highly trained endurance athletes with cyclists being the most affected category. The data to inform everyday clinical management are weak and therefore we have formed an international group of experts (INSITE) to explore areas of consensus and disagreement concerning the diagnosis and management of patients with suspected EF. The results of a first consensus highlighted that an exercise test (measuring pre- and post-exercise ankle-brachial pressure index-ABPI) was the most appropriate way to confirm or exclude EF. Ultrasound may be a useful tool for the diagnosis of EF, however established diagnostic criteria are lacking. We performed a prospective study to define the role of ultrasound in the diagnosis of EF. Thirty-seven athletes (74 limbs) were referred to our department with suspected EF. All patients had a pre- and post exercise colour Doppler ultrasound (CDU) of the iliac arteries and ABPI. Doppler waveform, peak systolic velocity (PSV) and end-diastolic velocity (EDV) were assessed pre- and post-exercise. EF was diagnosed with CDU in 24 athletes (29 limbs). Arterial wall and course abnormalities were detected at rest in 20 (67%) symptomatic limbs of athletes with EF and 4 (22%) symptomatic limbs of athletes without EF. Post-exercise abnormal waveforms of the stenotic/damped type were seen in the iliac arteries in all 29 limbs of athletes diagnosed with EF. These waveform changes were accompanied by high PSV (>350 cm/s) and EDV (>150 cm/s), with (n = 10; 34%) or without (n = 19; 66%) evidence of reduced arterial lumen calibre. Some 17 athletes with EF underwent surgery with endarterectomy and patch angioplasty. Intraoperative findings confirmed the ultrasound findings. Colour Doppler ultrasound can be used to detect EF. Larger studies are needed to confirm suggested diagnostic criteria.

Budd-Chiari Syndrome: A rare but important cause of raised liver function tests, Marita O'Neill1, Gillian McCrea2, Therese Herlihy1, 1Diagnostic Imaging, School of Medicine University College Dublin, 2Radiology, Cork University Hospital

Background
A twenty five year old female patient presented to the emergency department. The patient had known primary sclerosing cholangitis on a background of ulcerative colitis. On this presentation there was an acute elevation in her liver enzymes. The patient was also vomiting and experiencing tender right upper quadrant (RUQ) pain. The patient was referred for ultrasound to assess for an acute cause of hepatitis.

Case Report
The lumen of the right and middle hepatic veins were echogenic and demonstrated no flow indicating thrombosis of these vessels. The left hepatic vein demonstrated some flow but eccentric thrombus was noted. Non-occlusive thrombus was also noted in the portal vein. There was no evidence of portal hypertension or collateral formation. The echotexture of the liver was heterogenous and there was ascites present.

Discussion
A diagnosis of Budd-Chiari syndrome was given based on these ultrasound findings. This was confirmed by CT. This was an acute form of Budd-Chiari and for this reason there was no evidence of collateral vessels, which are very defining of Budd-Chiari. However the patient was symptomatic and had ascites and a heterogenous liver, which are not specific to Budd-Chiari but closely relate to an acute onset. Given the patients history of ulcerative colitis, a thrombogenic diathesis, particularly in acute flare up is the most likely underlying cause of the patient’s Budd-Chiari.
The patient commenced anticoagulation therapy and a full resolution of hepatic vein patency was noted on MRI one week post-commencement.

Ultrasound was able to definitively diagnose Budd-Chiari in this patient in a timely manner. Given the importance of timely intervention for a good prognosis, it is imperative that hepatic vein patency is interrogated in all patients presenting with raised LFTs when no other causative factor is identified.

**Young Investigator**

**3D spatial compounding improves ultrasound image quality in gynaecological image-guided radiotherapy,** Sarah Mason, Joint Department of Physics and Imaging Institute of Cancer Research

**Purpose:**
The poor image quality of current online imaging methods makes it challenging to localise the uterus during radiotherapy. A novel method using commercially available transducer-tracking technology to create spatially-compounded 3D ultrasound (US) images was developed. Image quality was evaluated as a function of the number of US images used to create a compounded image in a phantom and in-vivo.

**Methods:**
3D-US images were acquired from different positions in an US quality assurance phantom (7 images), and transabdominally of the uterus from four volunteers (6 images/imaging session/volunteer; 21 total sessions), and from four cervical cancer patients (4 images/fraction/patient; 15 total fractions). Images were transferred onto a common frame of reference. Compounded images (imCs) were created by averaging 2,3,4,5,6 or 7 individual images. Phantom: Differences in (1) contrast-to-noise-ratio (CNR) in four gray-scale targets and (2) spatial resolution were determined between the non-compounded image and each imC using ANOVA. In vivo: Three observers independently ranked randomized sets of images (non-compounded and imCs) for image quality of the uterus (1 representing poorest image quality). A Wilcoxon-signed-rank test was used to measure differences in mean rank (MR) of 3 observers between the compounded and non-compounded images.

**Results:**
Phantom: The CNR of imCs was significantly greater by a range of 35% to 104%, depending on the number of individual images in the ImC and gray-scale target assessed [Fig 1]. Spatial resolution was unchanged compared with non-compounded images.

In vivo:
The non-compounded image had significantly poorer MR than all imCs, with mean [range] MR of 1.3 [1-2.67] and 1.6 [1-2.33], respectively. MR increased significantly with increasing number of 3D-US images used up to 3 images and 5 images for patient and volunteers, respectively [Figs 2, 3].

**Conclusion:**
3D spatial compounding improves US image quality compared with non-compounded images in both the phantom and in vivo.

**Optic nerve sheath evaluation by ultrasound,** Rute Santos, Helena Ferraz, Medical Imaging and Radiotherapy department, IPC - Coimbra Health School

**Introduction:**
The human eye is one of the most complex organs in our body. The eyeball is located in the anterior region of the orbit. The lens divide the globe into 2 segments: anterior and posterior. The sheath of the optic nerve passes from the posterior globe to the brain. The fact that the eye is a liquid-filled, superficial structure allows an optimal appreciation of the ocular structures on ultrasound. There has been an increase in the use of this modality in the evaluation of the diameter of the optic nerve sheath (ONSD).

**Purpose:**
To analyse the reproducibility of measurements of the diameter of the sheath of the optic nerve, characterize the nerve sonographically, verifying that without the existence of associated symptomatology, whether this measurement is affected or not, throughout the variation of the body mass index, by the values of blood pressure or blood glucose.
Materials and methods:
370 ONSD images were collected from 84 individuals, divided into 2 groups. The ICC was obtained to evaluate the reproducibility of the measurements. The correlation of variables and samples was also evaluated with the Pearson test and the T-student test for independent samples.

Results:
The left ONSD ICC showed satisfactory reproducibility (0.73). BMI and age showed a positive correlation with AP (p<0.05). No significant differences were found between the group with pathology (myopia, astigmatism or hypermetropia) and without pathology.

Conclusions:
Ultrasoundography can be used to assess the ONSD, because the left ONSD ICC shows satisfactory reproducibility and can help in new ocular diseases evaluation.

Brain tissue pulsation measurements for diagnosis of acute stroke: A pilot study, Caroline Banahan, Mintu Nath, Sara Venturini, Jyoti Nath, Kirk W. Beach, M. Oura, P. Turner, Kumar V. Ramnarine, Mark Moehring, Asanka Dewaraja, Amit K. Mistri, Thompson G. Robinson, Emma M.L. Chung, Dept. of Cardiovascular Sciences, University of Leicester, UK, National Institute for Health Research Leicester Biomedical Research Centre, University of Leicester, UK, Dept. of Medical Physics, University Hospitals of Leicester NHS Trust, UK, University of Washington, Seattle, WA, USA, Nihon Kohden, Japan, Broadview Laboratories, Seattle WA, USA

Background:
Normal brain tissue pulsates with the cardiac cycle, but whether ultrasound measurement of tissue pulsations could provide a non-invasive biomarker for intracranial pathology has yet to be explored. Here we compare Doppler ultrasound brain tissue pulsation measurements from healthy volunteers and stroke patients to assess whether changes in intracranial pulsatility are observed in acute stroke.

Methods:
Brain tissue motion was measured using Doppler ultrasound through the forehead and temporal bone window for 30 depths within the brain ranging from 2-8 cm. Healthy volunteer pulsation measurements were then used to develop a generalized additive model describing the expected healthy range of pulsations for each depth and probe position (temporal vs. forehead) as a function of age, sex, and heart rate (HR), while accounting for correlations between measurements within subjects. Test data from stroke patients were then compared with the model-derived expected healthy pulsations to identify subjects experiencing abnormal pulsations.

Results:
Brain tissue motion was measured in 24 healthy volunteers and 14 acute stroke patients (12 ischemic and 2 hemorrhagic). Pulsations in healthy subjects were well described by the model; including correlations in pulsation between adjacent depths, an overall increase in pulsation with depth, differences due to probe position, and variations in pulsation magnitude with age and HR. The model was tested using 25 pulsation measurements from the stroke and non-stroke hemispheres of patients. Pulsations in stroke patients significantly deviated from the model, with a higher proportion of depths exhibiting pulsations outside of the normal expected range. On this basis, the fitted model correctly classified stroke subjects with 85% sensitivity and 85% specificity based on a single 8 second pulsation recording.

Conclusion:
With further refinement of this technique, portable ultrasound measurement of brain tissue pulsations may prove useful for hyper-acute assessment of stroke.

Magnetic Resonance Imaging (MRI)/Ultrasonography (US) fusion-guided transrectal biopsy is equally effective with MRI/US fusion-guided transperineal biopsy in detecting anteriorly located prostate cancer, Grigoris Kyriazis, Matthew Simms, Sachie Siriwardena, Pam Parker, Radiology Hull and East Yorkshire Hospitals, Andy Hunter, Oliver Byass, Hull and East Yorkshire Hospitals

Objective:
Transperineal template biopsy has been shown to be effective in detecting anteriorly located prostatic cancer, and is often performed under a general anaesthetic. In this study we have evaluated the effectiveness of MRI/US fusion-guided transrectal biopsy in detecting anteriorly located prostatic cancer. This may be a more cost-effective approach compared with the transperineal approach and can be performed under local anaesthesia.
Methods:
A total of 148 patients underwent multiparametric MRI and biopsy for suspected prostate cancer in a single centre over a 13 month period (2015-2016) were analysed retrospectively. Computer records were reviewed to determine: location of suspected tumour, type of biopsy (standard TRUS and fusion-guided transrectal biopsy under local anaesthesia or transperineal biopsies under general anaesthesia) and histology results from biopsy and prostatectomy.

Results:
Of the 148 patients, 17 (12%) had a suspected anterior lesion in MRI (AL) and 131 (88%) patients had a MRI without a suspected anterior lesion (NAL). In the AL group, 81% of the patients had a PIRAD 4 or 5 lesion and 53% of them a benign DRE. In the NAL group 34% of patients had a PIRAD 4 or 5 lesion and 62% a benign DRE. In the AL, 12 (71%) patients had fusion biopsies and in 11 (92%) of them prostate cancer was detected, with 8 (67%) positive targeted cores. In the NAL group, 40 (31%) patients had fusion biopsies, and in 30 (75%) of patients prostate cancer was detected, with 24 (60%) positive targeted cores. 17 (41%) patients in total had a radical prostatectomy and anteriorly located prostatic cancer was detected in 11(65%).

Conclusions:
The results showed that fusion-guided transrectal biopsy is equally effective in detecting anteriorly located prostatic cancer compared with fusion-guided transperineal biopsy. The obvious advantage is that transrectal fusion biopsies can be performed under local anaesthesia.

Combined focused ultrasound and radiotherapy for the treatment of hypoxic tumours, using photoacoustic imaging as a planning tool, Márcia Costa, Dr. Anant Shah, Dr. Ian Rivens, Dr. Tuathan O’Shea, Dr. Carol Box, Dr. Jeffrey Bamber, Dr. Gail ter Haar

Introduction:
Tumours with significant regions of hypoxia respond poorly to radiotherapy (RT). There is therefore a clinical need for treatment strategies that address this. We here propose the combination of High Intensity Focused Ultrasound (HIFU) ablation of hypoxic regions and radiotherapy.

Methods:
We have investigated this approach in human head and neck cancer xenograft tumours grown subcutaneously in the flanks of immunocompromised mice. A preliminary study assessed their radiation response to X-rays (SARRP, X-Strahl), over a 60 day follow up period. Tumour control was seen in 46% of subjects exposed to a single 10 Gy fraction, in 73% for 20 Gy and 92% for 30 Gy. 10 Gy was therefore chosen for combined treatments in order to maximise the scope for improvement in outcome. Tumour regions that were likely to be hypoxic were identified non-invasively, using photoacoustic imaging (MSOT inVision256TF, iThera Medical) to provide a map of the blood oxygen saturation. The ultrasound-guided HIFU treatments (VIFU-2000, Alpinion) comprised 6 x 10s exposures at a focal peak intensity of 1200±240W.cm-2, delivered in a spiral pattern (diameter 3 mm, exposure spacing 1 mm).

Results:
HIFU exposure of a single hypoxic region, in the absence of RT resulted in a tumour growth delay of up to 13 days. HIFU immediately before or after 10 Gy RT resulted in tumour control rates over 60 days of 76% and 86%, respectively, similar to 20 Gy- and 30 Gy-alone treatments. This was a highly significant (p-value<0.05) improvement in treatment outcome.

Conclusions:
This novel study has allowed investigation of the potential of HIFU ablation of regions of tumours believed to be hypoxic, to permit a reduction in radiation dose (to 10 Gy) whilst achieving the same efficacy as higher RT doses (20-30 Gy). This approach holds potential for decreasing cytotoxic side effects of radiation treatments in normal tissues.

Use of small bowel ultrasound to identify small bowel crohn’s disease compared with magnetic resonance enterography, Jonathan Delf, Syed Umair Mahmood, Ratan Verma, Steve Jepson, Vikas Shah, Joe Mullineux, Peter Rodgers, James Stephenson

Use of small bowel ultrasound to identify small bowel crohn’s disease compared with magnetic resonance enterography, Jonathan Delf, Syed Umair Mahmood, Ratan Verma, Steve Jepson, Vikas Shah, Joe Mullineux, Peter Rodgers, James Stephenson, Gastrointestinal Imaging Group University Hospitals of Leicester
ABSTRACTS

Background
Imaging is central to the diagnosis and monitoring of patients with Crohn’s disease (CD). The advent of faecal calprotectin measurement in primary care has led to increasing numbers of patients being referred for imaging assessment of possible CD. It is generally accepted that colonoscopy with terminal ileal biopsies and MR enterography (MRE) are the gold standard investigations for diagnosis and mapping of CD. However, from a cost and service provision perspective this is an expensive, labour intensive approach with significant impact on MRI provision. Our local practice of focused small bowel ultrasound (SBUS) predates the introduction of MRE. We assess our use of SBUS in lieu of baseline MRE and evaluate SBUS findings against MRE.

Methods
We retrospectively reviewed all adult patients who had a SBUS followed by a MRE within 4 months from 2012-2016 in a single institution for concordance of imaging findings using the MRE as gold-standard.

Results
195 patients were identified, average age 31 years, with 126 females. Sensitivity of SBUS to identify macroscopic small bowel inflammation was 98.5%, specificity of 95%, PPV of 95% and a NPV 98.5%. Review of all false negative discordant cases revealed that the discrepancy was due to isolated jejunal disease in all cases. On review of false positive cases all had macroscopic ileitis on retrospective SBUS review which had resolved/was not present on subsequent MRE.

Conclusion
SBUS is a useful, sensitive and specific investigation in assessment of small bowel inflammation and Crohn’s disease in the correct operator hands. If there is clinical concern of isolated jejunal disease after a normal SBUS, our local practice is to investigate further with small bowel barium studies and capsule endoscopy once strictures have been excluded.

The effect of 4-hour SkinSuit induced partial axial reloading upon stature elongation and anterior intervertebral disc height as assessed by ultrasound after 8-hour hyper-buoyancy flotation, Philip Carvil\(^1\), Susan Halson Brown\(^2\), Thais Russomano\(^3\), David A Green\(^3\), \(^1\)Centre for Human and Aerospace Physiological Sciences, King’s College London, \(^2\)Women’s Health King’s College London, \(^3\)King’s College London

Astronauts experience significant stature elongation in space which may contribute to a four-fold increased risk of intervertebral disc (IVD) herniation. Lumbar herniation risk is attributed to prolonged IVD swelling, though risk factors for cervical herniation remain unidentified. An ultrasound protocol assessing IVD height was trialled in space, but no data was reported. The European Space Agency’s Mk VI SkinSuit, which imparts (~20% bodyweight) axial loading shoulder-foot, has been shown to mitigate elongation experienced from overnight unloading. Its ability to reload the IVDs, however, requires further assessment. Therefore, this study investigated the effect of 8-hour hyper-buoyancy flotation (HBF) followed by 4-hour Mk VI SkinSuit reloading upon IVD height using the NASA in-orbit ultrasound protocol.

Eight healthy males (27±5y; 1.78±0.07m; 70.6±10.4kg) lay for 8 hours overnight on the HBF in normal clothes, followed by a further 4 hours having donned the SkinSuit. Cervical (C4/C5-C7/T1) and Lumbar (L2/L3-L5/S1) anterior disc spaces (mm) were measured using ultrasound (6-13MHz linear and 2-5MHz convex transducers, respectively) on the HBF at the start/end of the 8-hour unloading and 4-hour reloading periods, in addition to stature.

Significant stature elongation (177.17.5 vs. 179.27.7cm) was induced following 8-hour HBF. SkinSuit reloading immediately reduced stature elongation by 1cm (178.27.8cm), which was maintained throughout the 4h reloading. Eight hour HBF unloading induced significant increments in C4/C5 (1.01.0mm) C6/C7 (0.80.7mm) C7/T1 (0.40.5mm) and L5/S1 (2.12.0mm) IVD height. Reloading initially reduced L5/S1 (0.50.7mm) IVD height whereas L2/L3 (11.1mm) and L4/L5 (0.41.2mm) increased further.

Eight hour HBF unloading induced significant stature elongation and for the first time, using the NASA in-orbit ultrasound protocol, parallel anterior IVD height increments were identified. Reloading, produced an immediate reduction in stature but variable lumbar anterior IVD height changes. Therefore, further evaluation of the inter-relationship between Gz loading, stature, and IVD heights across the vertebral column is warranted.
Professional Issues

Direct entry undergraduate education for sonographers: A case study, Rachel Barker, Anushka Sumra, Helen Brown, David Cole, Radiography, Birmingham City University

It is a challenging time within the national ultrasound workforce. Staffing shortages are directly impacting on patient waiting lists and the ability to facilitate education of the next generation of sonographers. The aging of the existing workforce means that exit rates are predicted to be higher than entry rates, resulting in a range of solutions having been consulted and developed.

Much discussion has therefore been held on additional routes through ultrasound education. Current models involve the need for shortage professions such as diagnostic radiography and midwifery to be further reduced through these professionals pursuing training as advanced practitioner sonographers, emphasising the need for action now rather than when it is too late in order to protect service delivery standards.

This case study presents an innovative new model leading development of the future of ultrasound education: the direct entry BSc (Hons) Medical Ultrasound plus PgCert Medical Ultrasound (preceptorship) programme being delivered at Birmingham City University. The experiences gained through the discussion, the development, delivery and continuous evaluations of the programme will be shared. An overview of the recruitment and selection of students and their backgrounds will be provided. With the second intake now recruited, the team are in a strong position to present the highs and lows of the journey so far, particularly emphasising areas that have been further examined and re-considered, as well as those requiring further ongoing professional discussion.

Presenting the University, the student and clinical perspectives, this presentation offers unique insights into the considerations that need to be allowed for when contemplating the design of education for sonographers in this manner.
Day 3 Friday 8th December

Gynaecology

Mimics of Ovarian Masses, Dr. Victoria Birkett, Dr. Katherine Kingston, Dr. Tobi Aderotimi, York NHS Teaching Hospital

Background:
Pelvic masses from non-gynaecological origin can mimic ovarian or uterine pathology. We present 3 patients with gynaecological related symptoms and pelvic masses on ultrasound that were proven subsequently to be derived from the gastrointestinal tract.

Case Studies:
All patients were referred from primary care with gynaecological symptoms and had initial imaging with TA and TV Ultrasound.

Case 1: A 75 year woman with post-menopausal bleeding. Ultrasound demonstrated an incidental complex cyst with linear internal echoes thought to be an ovarian cyst. MRI and CT demonstrated a tubular cyst connecting to the appendix diagnostic of a mucocele appendix, confirmed at operation. Ultrasound findings of the classic onion ring sign of mucocele appendix are described.

Case 2: A 54 year woman with pelvic heaviness. Ultrasound revealed a 12cm cystic/solid right adnexal mass with vascularity, suspicious of malignant ovarian tumour. MRI demonstrated similar findings and central MDT advised removal. At operation, the ovaries appeared normal and the tumour was arising from the small bowel. Histology confirmed a malignant small bowel GIST.

Case 3: A 52 year woman with bloating and mildly raised CA 125. A 3.5 cm solid but avascular left adnexal mass on ultrasound was thought to be pedunculated fibroid or ovarian fibroma but suggested a bowel origin as an alternative. CT demonstrated a large sigmoid polyp that accounted for the ultrasound findings and colposcopy was advised.

Conclusion:
Non gynaecological causes should be considered in the differential of pelvic masses particularly when the findings are unusual. Other imaging modalities can be helpful in discriminating their origin, though not always, due to the close proximity of pelvic organs and bowel.

An unusual ovarian lesion: Benign vs malignant, Michele Keenan, B Dunne, Mary Moran, Therese Herlihy, 1University College Dublin, 2Midlands Regional Hospital, Portlaoise, Laois. Ireland

Background
A 57 nulliparous lady with a 6 month history of bloating, being treated for water retention by her GP was referred for pelvic ultrasound to assess uterus and ovaries pathology. The GP indicated this lady was virgo-intacta so transvaginal scanning was not an option.

Ultrasound Findings
Ultrasound revealed diffuse abdominal and pelvic ascites present making the examination technically challenging. A 8.6cm x 5x5cm mildly heterogenous, predominantly solid, mass like lesion was seen posterior to the uterus towards the right adnexal region, suspicious for ovarian malignancy. The lesion displayed internal vascularity but no gross hyperaemia was seen. The uterus appeared normal measuring 5.2cm x 2cm with an endometrial stripe thickness of 5mm. The left ovary was not identified. Kidneys were normal in size shape and echotexture. A CT scan was advised for further assessment.

Discussion
According to IOTA guidelines this ovarian lesion displayed at least three malignant features which warranted further imaging. CT and MRI scans of the lesion were also concerning for malignancy. Ascitic fluid cytology was negative but CA 125 was significantly raised at 1145u/ml (normal range 0-35u/ml). All other bloods were unremarkable.

Patient underwent total abdominal hysterectomy with bilateral salpingo-oophorectomy, omenectomy, appendicectomy and lymphadenectomy.
Pathology results revealed a proliferative oxyphillic struma ovarii of the right ovary. Struma ovarii is a rare ovarian neoplasm consisting almost exclusively of mature thyroid tissue (> 50%) derived from germ cell in a mature teratoma, however in this case there was no evidence of stromal carcinoid or typical stroma derived thyroid carcinoma. As a result no further treatment was required.

**Conclusion**
This case reinforces the importance of ultrasound as an initial screening tool for gynaecological investigations. Even though the patient was not suitable for TV imaging, ultrasound still provided a large amount of valuable information that aided rapid diagnosis and treatment.

**Early Pregnancy**

**Case of a live unilateral dichorionic twin ectopic pregnancy – A rare entity**, Denise McGrath1,2, Sheila Briody1,2, Therese Herlihy2, Mary Moran1,1University College Dublin, 2Regional Hospital Mullingar, Ireland

**Background:**
The incident of ectopic pregnancy is increasing, possibly related to a rise in assisted reproduction and better diagnosis using high-resolution transvaginal ultrasound.

**Case Report:**
A 36-year-old woman, with a history of a left laparoscopic salpingo-oophorectomy (previous ectopic pregnancy) presented with painless vaginal bleeding at 9 weeks post LMP and a positive pregnancy test and BhCG of 92,000 IU/l. Transvaginal ultrasound showed two separate right sided adnexal masses. Each mass had had a gestational sac, each with its own yolk sac and embryo. Cardiac activity was identified in both embryonic poles and further demonstrated on M-mode and colour Doppler, confirming a live twin ectopic pregnancy.

**Discussion:**
Ultrasound findings of two suspected adnexal masses, no interuterine pregnancy, along with an increased BhCG level, especially with associated risk factors, can help the early diagnosis of an ectopic pregnancy and reduce the related mortality and morbidity

**Professional Issues**

**Peer Review - Underpinning Safe Practice,** Deborah Beare, Diagnostic Imaging, St Mary’s Hospital, Newport, Isle of Wight

**Background**
The BMUS Peer Review audit tool was introduced into our practice in November 2015. Regular Peer review proved difficult due to increasing workload and long term sickness but the team unanimously agreed that it was beneficial to practice in terms of quality review and to standardise good practice. In 2016 long term sickness resulted in little or no peer review being undertaken for several months.

**Case Report**
In February 2017 a case was reviewed following input from the requesting Consultant and an error was found in the report.

Further cases for the sonographer were reviewed and multiple errors discovered in report content.

An incident form was completed, a SIRI declared and a Clinical Advisory Group convened to investigate the extent of the incident, the degree of harm and any associated Duty of Candour for patients.

A review of the previous year’s work identified a mean error rate of 25%.

The errors in the most recent 9 month cohort were reviewed by referrer for a decision to rescans. A small number of patients were re scanned and updated reports issued.

**Outcome**
Insufficient peer review contributed to these errors not being identified through this process.
ABSTRACTS

The importance of adequate time for Peer Review, CPD and continual learning for the sonographer role must not be underestimated. This conflicts with examination capacity but needs to be recognised as an essential aspect of safe ultrasound practice.

Actions
• Time for peer review & CPD embedded into practice
• Support for sonographer and manager involved sourced from local colleagues, the HR team and BMUS.
• Structured re-training period planned
• Competency assessment planned prior to resuming independent practice.

A clinical audit to establish if Salisbury District Hospital is complying with its chaperone policy for testicular ultrasound, Farrah Elsaghir, Clinical Radiology Salisbury District Hospital

Background
Testicular ultrasound is an intimate examination and all patients should be offered a chaperone.

Objectives
To establish if testicular ultrasound scans at Salisbury District Hospital meet the hospital's chaperone policy. To determine this, criteria and standards must be set. The performance needs to be assessed against the set criteria and standards and identification must be made as to what standards have been met.

Setting and subjects
All patients who attended the ultrasound department for a testicular ultrasound between 1st January-31st December 2016 who met the specific inclusion and exclusion criteria were audited.

Methods
Data were collected retrospectively from Salisbury District Hospital in the form of a clinical audit.

Results
The study population included 699 patients who met the inclusion and exclusion criteria. The department failed to meet the 100% in offering every patient a chaperone and achieved 37% compliance. In all the reports of the patients who received a chaperone, the name and position was correctly identified in 100%. However it was not identified in any of the reports that had a female chaperone that only a female was available. In the 3% of patients who declined a chaperone, this was documented accurately in 100% of the reports.

Conclusion
The Ultrasound Department is failing to offer all testicular ultrasound patients a chaperone. Documentation within the reports regarding name and identity of chaperone is always correct but information regarding whether the opposite sex of chaperone was available is not present. Recommendations include holding a meeting to discuss results and briefing staff about the chaperone and its requirements. It would be recommended that practice is altered to have specific set testes lists on set days per week so that it can be appropriately staffed with two members of the team. A chaperone proforma for reports would be suggested and discussed.

The role of preceptorship in the development of a newly qualified sonographer, Úna Haren, Tameside and Glossop Integrated Care Hospital NHS Foundation Trust

Purpose:
The aim of this study is to understand the educational role of preceptorship in the development of a newly qualified sonographer.

Method:
All gynaecology examinations performed and reported by a newly qualified sonographer over their initial six-month preceptorship period, were marked before verification by a single Consultant Practitioner. The report marking options that could be selected were ‘agree’, ‘disagree with wording’, ‘disagree with meaning (no impact on patient)’ and ‘disagree with meaning (impact on patient)’.
Results:
166 gynaecology examinations were performed over a six-month period. The Consultant Practitioner selected ‘agree’ on a total of 107 reports, ‘disagree with wording’ on 11, ‘disagree with meaning (no impact on patient)’ on 17 and ‘disagree with meaning (impact on patient)’ on 31.

A record was kept of the different pathologies encountered, the number of patients that had to be recalled for further examination before verification of the report and the number of patients that had follow-up scans/further alternative imaging as a result of the scan findings and report produced by the preceptee. Any discrepancies in the report were highlighted by the Consultant Practitioner and discussed with the preceptee.

Through this record of examinations and through use of current literature, the preceptee could, on a month by month basis, identify key learning points and areas for development, examples of which include improvements made to wording of reports. Furthermore, over the preceptorship period, the preceptee felt more confident identifying and reporting pathology and as a result, fewer report corrections needed to be made.

Conclusion:
This study demonstrates the educational value of preceptorship. By recording and analysing these results and through use of current literature, key learning points could be identified and a greater understanding gained of the educational benefit of the preceptorship process to the preceptee.

General Imaging
Ultrasound management of the splenic lesion, Dr Simon Freeman, Derriford Hospital, Plymouth Hospitals NHS Trust

The spleen has been called “the forgotten organ” because splenic pathology is relatively uncommon and frequently clinically silent. Splenic abnormalities will however be encountered by all ultrasound practitioners who scan the abdomen, particularly if the spleen is evaluated carefully rather than just a cursory measurement of splenic size, these abnormalities will often be clinically important.

The aim of this lecture is to suggest an approach to the sonographic evaluation of non-traumatic splenic pathology. We will discuss the differential diagnosis for cystic, echogenic and echo-poor solid lesions. The immense value of contrast enhanced ultrasound (CEUS) in detection and characterisation will be reviewed, particularly its role in the triage of patients to observation, further imaging or biopsy. The latest recommendations on the use of CEUS from EFSUMB guidelines will be presented. Potential pitfalls in diagnosis due to ectopic splenic tissue that might lead to over-investigation and treatment will be shown. The role of complementary imaging (particularly PET CT) and biopsy will also be considered.

At the end of this lecture I hope that participants will have a framework to help them evaluate non-traumatic splenic pathology. Even when it is not possible to make definitive diagnosis based on ultrasound appearances, a report can be issued that is clinically valuable and gives a useful opinion on the likely significance of the abnormality encountered and, where necessary, advice on further management.

Paediatrics
A retrospective analysis of safety and cost implications of paediatric Contrast Enhanced Ultrasound at a single centre, Gibran Timothy Yusuf, Radiology King’s College Hospital

Objective
Because of concern over medical ionising radiation exposure of children, contrast-enhanced ultrasound (CEUS) has generated interest as an inexpensive, ionising radiation-free alternative to CT and MRI. CEUS has received approval for paediatric hepatic use but remains off-label for a range of other applications. The purposes of this study were to retrospectively analyse adverse incidents encountered in paediatric CEUS and to assess the financial benefits of reducing the number of CT and MRI examinations performed.
Materials and Methods
All paediatric (patients 18 years and younger) CEUS examinations performed between January 2008 and December 2015 were reviewed. All immediate reactions deemed due to contrast examinations were documented in radiology reports. Electronic patient records were examined for adverse reactions within 24 hours not due to an underlying pathologic condition. With tariffs from the U.K. National Institute of Clinical Excellence analysis, CEUS utilization cost ($94) was compared with the CT ($168) and MRI ($274) costs of the conventional imaging pathway.

Results
The records of 305 paediatric patients (187 boys, 118 girls; age range, 1 month–18 years) undergoing CEUS were reviewed. Most of the studies were for characterising liver lesions (147/305 [48.2%]) and trauma (113/305 [37.1%]); the others were for renal, vascular, and intracavitary assessment (45/305 [14.8%]). No immediate adverse reactions occurred. Delayed adverse reactions occurred in two patients (2/305 [0.7%]). These reactions were transient hypertension and transient tachycardia. Neither was symptomatic, and both were deemed not due to the underlying disorder. The potential cost savings of CEUS were $74 per examination over CT and $180 over MRI.

Conclusion
Paediatric CEUS is a safe and potentially cost-effective imaging modality. Its use allows reduction in the ionising radiation associated with CT and in the gadolinium contrast administration, sedation, and anaesthesia sometimes required for MRI.

The application of contrast enhanced ultrasound (CEUS) in tertiary paediatrics, Mariesa Taylor-Allkins, Martijn Verhagen, Paul Humphries, Tom Watson, Great Ormond Street Hospital

Background:
Although childhood malignancy is uncommon, it remains the most frequent cause of death in under 14’s (Smith & Phillips, 2014). For example, hepatic lesions account for only 6% of intrabdominal masses, however 2 in 3 will be malignant (Alqatie et al, 2015) with a timely diagnosis essential. CEUS is a recognised imaging modality for characterising indeterminate lesions, together with other recommended applications such as trauma. Despite its documented success, use of CEUS remains off licence in paediatrics (Piscaglia et al., 2012), meaning many centres will not routinely adopt this practice as a first-line investigations. At Great Ormond Street, the service is evolving and auditing will enable service providers to analyse current data for future development.

Aim:
Assess the application, technique and findings of CEUS in tertiary paediatrics in comparison to the EFSUMB recommendations and guidelines. This audit is necessary to evaluate the current service to enable progression and development.

Data Collected:
Analyse patient demographics, clinical indications, technique (probe selection, contrast given), organ assessed/region of interest, adverse reactions, diagnosis and patient management as a consequence of findings.

Results:
37 examinations were performed over 3 years with patient age ranging from 4 months to 16 years. Indications were varied with 10 patients having a history of malignancy. The examinations were categorised into organs; 25 hepatic, 6 renal, 4 splenic, 1 bowel and 1 polytrauma. All examinations were performed alongside other imaging modalities. A diagnosis was established in 29 patients with the remaining 8 requiring additional examinations (Individual diagnoses will be provided).

Conclusion:
All CEUS performed was justified contributing to diagnosis and management. Applications are in line with recommended EFSUMB guidelines. Examinations performed were based on solid clinical history and there was good documentation of lesion characteristics. Improvement is necessary in discussing/documenting off label usage and better awareness/being prepared for adverse reactions.
BMUS would like to express its grateful thanks to the following companies for their support of Ultrasound 2017

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