



Artificial Hype

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ARTIFICIAL HYPE, *L. DONOSO-BACH*

AI IS THE NEW REALITY: THE 4TH HEALTHCARE REVOLUTION IN MEDICINE, *I. A. WEISSMAN*

ARTIFICIAL INTELLIGENCE IN HEALTHCARE: WHAT IS VERSUS WHAT WILL BE, *R. PEARL*

WILL AI LEAD TO JOB CUTS OR WILL THE TECH IMPROVE WORKING LIVES? *L. FLORIDI ET AL.*

AI OPPORTUNITIES FOR HEALTHCARE MUST NOT BE WASTED, *L. FLORIDI*

AI-BASED PREDICTION IN CLINICAL SETTINGS: CAN WE TRUST IT? *W. LEODOLTER*

ARTIFICIAL INTELLIGENCE: A NEXT WAY FORWARD FOR HEALTHCARE, *R. CORBRIDGE*

AI IN MEDICAL IMAGING MAY MAKE THE BIGGEST IMPACT IN HEALTHCARE, *M. COLANGELO & D. KAMINSKIY*

FUTURE OF ULTRASOUND: WHERE ARE WE GOING? *P. SIDHU*

THE AI-POWERED RADIOLOGIST, *M. J. D. CANDAMIO*

CLINICAL ULTRASOUND IN THE AGE OF ARTIFICIAL INTELLIGENCE, *D. A. LICHTENSTEIN*

AI APPLICATIONS IN BREAST IMAGING, *J. TEUWEN ET AL.*

NYC GO RED FOR WOMEN
MOVEMENT: STEM GOES RED,
C. BEECHER

NURSING ON THE MOVE:
CROSS BORDER HIRING,
I. MEYENBURG-ALTWARG

REVITALISING THE AGED HEART
THROUGH SPERMIDINE-RICH DIET,
M. ABDELLATIF & S. SEDEJ

TRUST-ABUNDANT TEAM
PRINCIPLES, *E. E. SULLIVAN*

HOW FOLLOWING STEPS FOR
QUALITY IMPACT HEALTHCARE
CONSUMERISM, *P. FAGBENRO*

THE ROLE OF SOCIAL MEDIA IN
CARDIOLOGY, *V. VASSILIOU*

UNDERSTANDING BAD
COMMUNICATION, *M. KEEN*

THE "ONE STICK STANDARD" FOR
VASCULAR ACCESS, *N. NIKHANI*

ACHIEVING ZERO AVOIDABLE PATIENT
DEATHS BY 2020, *K. MCQUEEN*

VALUE-BASED HEALTHCARE AND
THE DOCTOR-PATIENT
RELATIONSHIP, *M. GAFANOVICH*

CRITICAL ANALYSIS OF MRI-BASED
CLASSIFICATION SYSTEMS FOR
SPORT MUSCLE INJURIES,
J. ISERN-KEBSCHULL ET AL.

INNOVATION IN PAEDIATRIC
REHABILITATION, *M. BEERI & E. BE'ERI*



Future of ultrasound: where are we going?

CEUS for children, ultrasound simulation and gamification models for training and education, EFSUMB initiatives.

Prof. Sidhu, EFSUMB president, talks to Healthmanagement.org about his ECR 2019 presentations: using ultrasound simulation models as tools for training and education, the greatest potential in combining ultrasound with contrast-enhanced ultrasound in examining children and new initiatives in the pipeline leading to EUROSON 2019.



Paul Sidhu

President
EFSUMB

Professor of Imaging Sciences
King's College London

Consultant Radiologist
Department of Radiology
King's College Hospital, UK

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At ECR 2019 you address the question “where are we going” on the use of ultrasound simulation models as tools in training and education. Which technical procedures do you see applied in a radiology curriculum?

There's a lot of simulation-based scanning at the moment, and it's really the abdominal and pelvic imaging that's becoming quite popular, including trans-intracavity ultrasound, trans-vaginal and trans-rectal procedures that can be applied to teach people using these simulation-based models. The country that's doing most of this work, at the moment, is Denmark and in his presentation during this session, Prof. Michael Bachmann Nielsen, who leads on this project, is presenting their findings. It's quite exciting because the studies have shown that simulators work just as well when applied to training as live models do and of course the benefit is that this is not patient-dependent and its uniform, so it's a very good aspect for education particularly early in the learning process.

What are the advantages and challenges of implementing the different types of ultrasound simulators?

The first challenge will be to overcome reactionary attitudes to the application of simulators to teach; patient-based learning has been the bedrock of education for a long time. Traditionalists will not want to use it on models when not using an actual patient. That first success for the introduction of a simulator will be to demonstrate that using these models effectively teaches the very basic aspects of ultrasound to a competent level. The second hurdle will be to

acquire these simulators. They will involve an initial forward investment, and people have to put capital costs out there to get the simulators in place, and then use them. Bearing in mind of course once you've got the model you can upgrade all the software etc. over time and you've got a simulator model for a long period. Those are, in my opinion, the two main hurdles.

What do you believe is the potential to using virtual reality and gamification for training and education?

This is a really exciting area. Again, Prof. Bachmann Nielsen is leading on this out of Denmark, and they are investigating the potential of using all of these procedures and techniques to help in the training of ultrasound. It's in the early stages, but the technology and the software is there from all the other aspects that physicians use it for and it's going to inevitably be applied to training for ultrasound. It's coming.

Are other countries also using simulation tools successfully?

Yes. In the UK, the company that manufactures some of these simulation tools is from Wales, and they are using them in some of the training schemes in the UK as well, on a smaller scale. They are also applying these tools in the United States of America. I'm not familiar where else they're using it in Europe but hopefully during the session people from other countries will be sharing their experience.

Do you believe that these new technology techniques will be included in the daily work of

the radiologist? Could they improve your work?

Some of this technology is already there in our daily practice in imaging. An example being fusion imaging, which enables you to use new 'gaming' technology. Fusion imaging has been around for a few years, and we are able to use the technique while performing an ultrasound to precisely match findings from CT or MR imaging. When you're trying to detect a lesion, in effect, you are using the gaming technology to find the lesion by setting coordinate points to pinpoint the area precisely for your ultrasound examination, confidently knowing you are looking at the same thing. It is already done in practice, and this will continue to improve with the continued innovation in software and new technologies.

You are presenting the Luigi Oliva Honorary lecture at ECR 2019. You are a pioneer in contrast-enhanced ultrasound and also for the application in children. What do you see as the greatest potential in combining ultrasound with contrast-enhanced ultrasound in examining children?

There are a couple of areas where the combination is most important, particularly when considering the example of children who present with blunt abdominal trauma. It is critically important to look at the right area, getting the right diagnosis and avoiding repeated CT examinations.

In a child with trauma, it is best to have the mother or father in the room which is not possible during an MRI or CT exam, but it can happen very easily with ultrasound. The child can be running around the room, jumping back on the examination couch and proceeding with the ultrasound examination, without disruption to the scanning protocol. Furthermore, the child's parent(s) in the room makes all the difference, and is not problematic for the imaging procedure.

I see this as a very exciting area, but also expansion in other areas in children, is developing particularly following the approval by the FDA for investigating the liver for determining the characteristics of focal lesions in children. This method again eliminates the need for MR and CT examinations that are currently needed to characterise these lesions. Ultrasound can be of better use in these cases as it is child friendly, does not require sedation or anaesthesia and the child has the comfort of a parent during the whole examination.

Combining ultrasound with contrast-enhanced ultrasound can be used in a number of other places

when you think outside the box. Consider it a problem-solving tool, for example, when looking at the chest cavity, the lungs may be assessed for areas of consolidation or for the overlying empyema; adequate information to assess the need for a catheter drainage can be scrutinised easily. This essentially helps the clinician to target the right areas safely and adequately to ultimately help the child.

Is contrast-enhanced ultrasound for assessing children ready for clinical practice?

Part of my presentation is focused on proving contrast-enhanced ultrasound is indeed ready for clinical practice. I will be presenting cases and circumstances where contrast-enhanced ultrasound is all that is really needed for the accurate diagnosis for the child. Therefore, I am confident it is ready for clinical use.

I want to highlight that the main reason for using ultrasound for children is that it is the best imaging modality for the child. It is patient-friendly, even in cases when CT or MR exams are required. If you can avoid radiation, or avoid sedation, administering a general anaesthetic, or iodinated gadolinium contrast agents in the child, you are helping in your role as a physician. The ultrasound contrast is safe for and should be used as often as possible to achieve a diagnosis.

What is the legal aspect to clinical applications of CEUS in children?

I will talk about the legal aspect of CEUS, and it is very important to know that nearly 70% of the medication used in children is off-licence, but as a physician, you know how the medicines work, and can take responsibility for this and can proceed to use them in an unlicensed manner. It is only recently become licensed in the United States, and it is used mainly to determine focal liver lesions and in vesico-ureteric reflux studies.

In Europe, there is no licensed intravenous application in children, but it is nevertheless used widely as it presents great benefit. It is safe for the child and helps reach an accurate diagnosis. I will be talking more in depth during the session discussing why it is safe and perfectly acceptable to be applied as a tool of diagnosis for children.

Do you see any potential developments in the next 3-5 years that could be applied to better assessing children?

I know that researchers in the U.S. at the Children's

Hospital of Philadelphia (chop.edu) are currently looking at the use of contrast-enhanced ultrasound in assessing the neonatal brain, and considering it a tool for determining extent of ischaemia which is very important for prognosis. Neurosurgeons are also looking at perfusion of the brain in children when they are performing tumour resection allowing the assessment of tumour boundaries for adequate resection; often intra-operative MRI is the alternative, which is cumbersome and costly, not widely available. However, we are still at the early stages.

In May, EFSUMB and FESUMB will welcome the imaging and ultrasound community to Granada for EUROSON 2019. What are the highlights physicians can look forward to?

We are very excited about Granada! Granada is a fantastic city in Spain with a very rich cultural history, and I would recommend anyone who is interested in the history of that area of the world to come and visit Granada. The conference centre is excellent with good facilities, and we have up to six parallel sessions each day at the conference, over three days.

There will be discussions on all aspects concerning ultrasound, from gynaecology right through to the newest advances in contrast-enhanced ultrasound (CEUS). Breakthroughs from new scientific evidence will be presented in the scientific sessions. In addition, we will have a Young Investigators section where the cream of the young investigator participants of the European societies will battle it out for the chance to win the large prize we are offering to the best investigator. This is a very popular section of the meeting.

We will also be launching all the new guidelines that have been recently published by EFSUMB. The most important of these will be the guidelines on non-liver elastography which will be very shortly available online. This will be one of the highlights of the meeting, as it will identify where ultrasound is most useful in all aspects of elastography outside the liver.

What are the new initiatives you are working on with EFSUMB?

We are launching a number of new initiatives. In particular, we are working on many new guidelines including specific ones for point-of-care-ultrasound (POCUS), musculoskeletal guidelines and continuing with the renowned gastrointestinal guidelines. Assessment of the gastrointestinal tract will be the fifth and sixth set of new guidelines.

This compliments the most recently published statement on the use of handheld ultrasound devices.

Looking to the future, we are working on restructuring the society itself, hopefully opening up to more membership, not just in Europe, but across the world and making it a very attractive organisation in ultrasound education throughout the world. In addition, we are looking at the EUROSON Congress trying to upgrade it and update it to make it more attractive worldwide to physicians and people interested in ultrasound.

Exciting times! With even more improvement planned for the future, we are very excited about the potential to opening up the society internationally and restructuring the meeting in the future. ■

KEY POINTS



- ✓ Simulators work just as well when applied to training as using live models with guaranteed uniformity, which is a very good aspect for early education.
- ✓ Ultrasound can be better than CT or MRI in selected paediatric cases being non-invasive, pain-free, real time and the child does not have to experience the examination without a parent beside them; ultrasound is child friendly.
- ✓ Ultrasound is ultimately the best imaging modality for the child, with high resolution when applied to the correct situation, avoids radiation and sedation or a general anaesthetic, circumventing iodinated or gadolinium contrast agents assisting the physician to do best for the child.
- ✓ EFSUMB is currently restructuring the society, opening up and making it a very attractive organisation in ultrasound education throughout the world and updating the EUROSON Congress to welcome an international audience.



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