

The Euroson PoC-US School 4th Edition, 2023

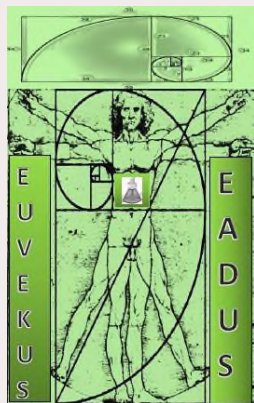
The Point of Care Ultrasonography in Family Medicine
and Ambulatory Healthcare at daily practice.

Vienna, Austria
08th-09th September,
2023

ABSTRACTS BOOK



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Euroson PoC-US School,

4th Edition

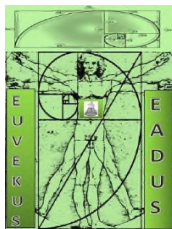
The Point of Care Ultrasonography in Family Medicine
and Ambulatory Healthcare at daily practice.

Vienna, Austria
Sept. 08-09th, 2023



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European Accreditation Council
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This book is available on the EUROSON POCUS SCHOOL website: <https://eurosonpocus.com/>

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POINT OF CARE ULTRASONOGRAPHY IN PRIMARY AND AMBULATORY HEALTHCARE
AS A DAILY PRACTICE
Euroson POCUS SCHOOL VIENNA 2023, 4th Edition
08-09 SEPTEMBER, 2023
VIENNA, AUSTRIA
Medizinische Universität / Universitätsklinik Wien
A-1090 Vienna, Sensengasse 2a



The Point of Care Ultrasonography in Primary and Ambulatory Healthcare at daily practice

The theme of the Conference reflects the collaboration to advance common approaches aimed to improve early diagnosis through ultrasonography techniques.

The meeting will provide participants with a unique opportunity for sharing knowledge, and skills through workshops. When we have advanced and relatively cheap ultrasound devices, and high-performance technology with artificial intelligence or some smart software using updated diagnostic algorithms, it's time to complete the classic clinical examination (history, inspection, palpation, percussion, and auscultation) **with the new concept of clinical-ultrasound examination** that currently allows us to visualize through ultrasound most organs and tissues of the human body (US-inspection), along with electronic ultrasound palpation through ultrasonographic elastography method (US-palpation), but also with the electronic auscultation through the Doppler Triplex technique (US-auscultation) to increase the diagnostic accuracy in primary and outpatient healthcare. In addition, this activity will provide a platform for networking with many of Europe's leading experts, focusing on reviewing and assessing best practices in ultrasonography.

The meeting program will include presentations, round-table sessions, video sessions, hands-on training, the launch of international research studies, and several informal social gatherings.

In addition to the importance of theoretical knowledge and different methods, sections, and standard plans used for different POCUS applications, we want our participants to acquire technical skills and learn useful manual skills in their current practice in the various Workshops at this Euroson School. We ask participants to actively involve one by one in the eight working points on different state-of-the-art ultrasound machines, where each of our speakers will try to teach participants with various practical techniques, tips, and tricks in the examination of organs at different topographic regions: abdominal, pelvis, thyroid, breast, cardiac and chest at a basic and medium level as we establish in our schedule. It will be a real POCUS marathon, at the end of which we want the participants to go home with solid theoretical and practical knowledge that will allow them to use the POCUS applications learned in this event. It is a unique event for the frontline physicians and primary healthcare through which we try to facilitate the transition and practical development of the Clinical-Ultrasound Examination which will increase the diagnostic accuracy in this field, following the statistical evidence we currently have. Together with you, we have taken important steps regarding the development of a European Curriculum of POCUS in primary healthcare, and WONCA Europe adopted at the last WONCA Conference 2023 held in Brussels a new position document recommending the use of POCUS in European primary healthcare, and we thank our colleague Prof. Shlomo Vinker from Israel who contributed and supported us in this regard. The position document of WONCA Europe regarding the POCUS in primary healthcare was unanimously adopted by all the national delegates at the WONCA Council, which practically represents another step forward in the promotion and development of clinical ultrasonography at this level. Also I obtained from both the Board of the American College of Family Medicine and WONCA Europe, the Montegut Global Scholar 2023 as a result of my activity to promote POCUS and clinical ultrasonography in primary and ambulatory healthcare.

As I stated at the end of the Montegut Prize awarding session, this represents:

"One small step for me, one giant leap for the European family medicine"

Together with Prof. Dr. Christian Jensen, the EFSUMB President we established the EFSUMB POCUS Task Force Group which is currently running a Delphi process in 50 European countries regarding the POCUS applications that will be introduced or implemented in the European Curriculum of POCUS in primary healthcare. We started promoting the recruitment process on several communication channels among our colleagues from EUVEKUS, WONCA Europe, EGPRN, EURACT, EURIPA, and among the family doctors involved in the European groups interested in POCUS in primary healthcare from most European countries. Let's hope that as many POCUS and clinical ultrasonography practitioners from frontline physicians will enter this Delphi study to have a significant number of participants.

We also signed a Memorandum of collaboration between EFSUMB and EUVEKUS regarding development of a POCUS Curriculum and new guidelines in primary healthcare.

With best wishes,

**Dr. Mihai Iacob, MD, Senior Medical Expert,
EUVEKUS President, Local Keynote Speaker**



CONFERENCE VENUE



I. Universitätszahnklinik Wien Sensengasse 2A, 1090 Vienna, Austria





EUEKUS ORGANIZATION

EUEKUS - Europäische Vereinigung für die Entwicklung von Klinischen Ultraschalluntersuchungen im Ambulanten Gesundheitswesen

EADUS/AEDUS - European Association for the Development of Clinical Ultrasonography in Ambulatory Health Care (Outpatient Health Care)

The governing body of EUEKUS is the Board of Directors made up of the following founding members:

I. **President** - **Dr. Mihai IACOB**, President of European Association for the Development of Clinical Ultrasonography in Ambulatory Health Care (Outpatient Health Care) ► EUEKUS / EADUS, Vienna, Austria; President of Timis Society of Family Medicine, Vice-president of Timis College of Physicians, Center for Preventive Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timisoara, Romania; Vice-president of Romanian National Society of Family Medicine, Coordinator of the Excellence Group of Ultrasound in Family Medicine at the Romanian National Society of Family Medicine, Bucuresti, Romania;

II. **Board Members** - **Andrea Eugenia IACOB**, **Elvis Giorgio STOICA**, **Andrei IACOB**

III. **Secretary** - **Mariane STOICA**

EUEKUS has the following honorary members:

I. **Dr. Ilse Hellemann**, Austria representative to the council of the European Society of General Practice/Family Medicine, Wonca-Europe' Executive Member of the Wonca Working Party on Education, Austria National representative to EURACT.

II. **Prof. Dr. Alina Popescu**, MD, PhD - Past President of SRUMB (Romanian Ultrasound Society), "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania.

III. **Prof. Dr. Dana Stoian**, MD, PhD, Hab, CCD, FECSM, senior endocrine consultant, Department of Endocrinology, "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania

IV. **Prof. Dr. Shlomo Vinker**, MD, MHA, WONCA Europe President, Executive Board member EGPRN Treasurer, Israel Association of Family Physicians, Chairman, Dep. of Family Medicine and Vice Dean, Sackler Faculty of Medicine, Tel Aviv University, Medical Director, Leumit Health Services, Israel.

V. **Dr. Peter Sigmund**, MD, Präsident der Steirischen Akademie für Allgemeinmedizin, General Practitioner, Geriatrics, ÖÄK diploma in geriatrics, ÖÄK diploma in diagnostics and Therapy according to Dr. F.X.Mayr, ÖÄK certificate emergency doctor, ÖÄK Diploma in Psychosocial Medicine (PSY I), Austria.

VI. **Dr. Carla Serra**, Board Member of the Ultrasound Course for SIUMB, Director of diagnostic and therapeutic ultrasound unit S. Orsola-Malpighi Hospital, Bologna, Italy

VII. **Prof. Dr. Ioan Sporea**, MD, PhD, FEBGH, Professor of Gastroenterology and Hepatology, University of Medicine and Pharmacy Timisoara, Romania, WFUMB Vice-president, Director, WFUMB Center of Education, Past President of the Romanian Society of Gastroenterology and Hepatology and of the Romanian Society of Ultrasonography.

VIII. **Dr. Gergely Agoston**, MD, Vice president of the WG of the Hungarian Association of Cardiovascular Imaging, the HIT Ambassador of Hungary, Member of the Web and Communication Committee of the EACVI, Nucleus member of the ESC Editors Network, Associate Editor of Cardiologia Hungarica, University of Szeged, Hungary.

IX. **Prof. Dr. Christian Jenssen**, MD, PhD, EFSUMB President 2021 - 2023, Professor for Internal Medicine/ Gastroenterology Brandenburg Institute for Clinical Ultrasound (BICUS) at Medical University Brandenburg, Neuruppin, Krankenhaus Märkisch-Oderland, Head of Department of Internal Medicine Deputy Medical Director Krankenhaus Märkisch Oderland GmbH Strausberg & Wriezen Germany.

X. **Prof. Dr. Paul S. Sidhu**, BSc MBBS MRCP FRCR DTM&H FCIRSE FAIUM (Hon.) Past President of EFSUMB Professor of Imaging Sciences Acting Corporate Medical Director (Operations) Department of Radiology King's College Hospital London, United Kingdom

XI. **Dr. med. Dominique Amy**, Vice-president of the European Society of Breast Echography, IBUS board member (international breast ultrasound school), CFFE director. (centre francophone formation en Echographie, President of : Ecole d' echographie sans frontiere, France.

XII. **Dr. Mateusz Kosiak**, MD, Co-founder EDUSON, University of Gdansk, Poland.



CONFERENCE AGENDA

Day 1 / Friday, 8 SEPTEMBER 2023

► 07:45-08:00 - Registration of participants

Amphitheater: Hörsaal.

► 08:00-08:15 • Welcome speech - The 4th Edition - Euroson POCUS School Vienna 2023.

Chairman: Dr. Mihai IACOB, EUVEKUS President

► 08:15-08:45 • The WONCA Europe Position Paper on the use of Point-of-Care ultrasound in Family Medicine.

Keynote Speaker: Prof. Dr. Shlomo VINKER, WONCA Europe President

► 08:45-09:15 • The PoC- US applications in Family Medicine. E FAST Exam - Extended Focused Abdominal Sonography in Trauma. The contribution of POCUS in emergencies at the family doctor's practice.

Speaker: Dr. Mihai IACOB, EUVEKUS President.

► 09:15-09:45 • What if I will find something unexpected during POCUS examination?

Speaker: Dr. Mateusz KOSIAK, MD.

► 09:45-10:00

Equipment on stage. Coffee break.

► 10:00-10:20 • POCUS of the upper abdominal floor. (POCUS applications in the liver, gallbladder, pancreas, and spleen). **Speaker: Prof. Dr. Radu BADEA, „Iuliu Hatieganu” University of Medicine and Pharmacy Cluj Napoca;**

► 10:20-10:50 • Syndrome-focused ultrasonography.

Speaker: Prof. Dr. Dieter NUERNBERG, Dean of the Brandenburg Medical University Theodor Fontane, Brandenburg Institute for Clinical Ultrasound (BICUS), NGO consultant of WHO (Representing WFUMB.)

► 10:50-11:10 • The role of ultrasound in abdominal emergencies. GP perspective

Speaker: Prof. Dr. Ioan SPOREA, MD, Ph.D., Professor of Gastroenterology at University of Medicine and Pharmacy of Timisoara

► 11:10-11:30 • The contribution and limitations of breast ultrasound in medical practice. Introduction to the ductal and conventional clinical ultrasound.

Speaker: Dr. Dominique AMY, MD, EFSUMB Breast US/Elastography Expert.

► 11:30-12:00 • Pelvic anatomy and pathology - what should be easily recognized in a PoCUS examination?

Keynote Speaker: Prof Dr. Med. Christian JENSSEN, EFSUMB PAST PRESIDENT.

► 12:00-12:15

Equipment on stage. Coffee break

► 12:15 -12:45 • Focused cardiac ultrasound in general practice: diagnosis and management of the cardiac disease. **Speaker: Dr.Gergely AGOSTON MD, Vicepresident of the WG of the Hungarian Association of Cardiovascular Imaging.**

► 12:45-13:15 • Lung ultrasound in diagnosis and follow-up of community acquired pneumonia.

Speaker: Dr. Mateusz KOSIAK.

► 13:15-13:45 • A Clinical Test Report: The Accuracy and Acceptance of a Handheld POCUS Device in an Emergency Room Setting. **Zicherman Y., Binenbaum M., Evron I., Lyons M., Chadi B., Polliack G.**

Speaker: Yehuda ZICHERMAN D.Sc. , Product Marketing, TRISO Technologies Ltd. Bet-Shemesh, Israel.

► 13:45-14:00 • Keynote speech on the topic: The scientific summary of the day.

Keynote Speaker: Prof. Dr. Shlomo VINKER, WONCA Europe President

► 14:00-14:30 - Lunch Break Symposium / Video Presentation • Cervical ultrasonography. The Thyroid Clinical Multimodal Ultrasound. **Prof. Dr. Vito CANTISANI, MD, Ph.D., EFSUMB PRESIDENT ELECT**





CONFERENCE AGENDA

II.Seminarraum B1 and B2

Workshop / Hands-on Session

Practical elements of POCUS applications to the abdominal, pelvis, chest, thyroid, and heart will be conducted together with our experts. Live transmission of ultrasonographic examinations (Live streaming broadcast).

► 14.30 -14.55

•WS.1.1 / Hands-on Session: **Prof. Dr. Dieter NUERNBERG** - *Syndrome-focused ultrasonography.*

► 14.55-15.20

•WS.1.2 / Hands-on Session: **Prof. Dr. Ioan SPOREA** - *Abdominal clinical ultrasonography.*

► 15.20-15.35

•WS.1.3 / Hands-on Session: **Dr. Mihai IACOB** - *Thyroid clinical ultrasound - basic notion, eFAST - Basic*

► 15.35 -16.00

•WS.1.4 /Hands-on Session: **Dr. Dominique AMY, MD** - *Breast Ultrasound.*

► 16.00- 16.25

•WS.1.5 /Hands-on Session: **Prof. Dr. Radu BADEA** - *POCUS of the upper abdominal floor.*

► 16.25 -16.50

•WS.1.6 /Hands-on Session: **Prof. Dr. Christoph Frank DIETRICH** - *Practical aspects of POCUS.*

► 16.50 -17.15

•WS. 1.7/ Hands-on Session: **Dr.Gergely AGOSTON** - *Basic Cardiac Ultrasound for non-cardiologists.*

► 17.15 -17.40

•WS. 1.8 Hands-on Session: **Dr. Mateusz KOSIAK, MD** - *Thoracic ultrasonography*

► 17.40-18.00

•W.S. 1.09/ Final questions, answers, and discussions session.

Day 2 / Saturday, 09 SEPTEMBER 2023

► 07:45-08:15 - Registration of participants

I.Amphitheater: Hörsaal.

► 08:15-08:20 •Euroson POCUS School, 4th Edition Briefing. The previous day's newsletter.

Chairman: Dr. MIHAI IACOB, EUVEKUS President

► 08:20-08:50 • History of point of care ultrasound. Prof. **Dr. Christoph Frank DIETRICH**, Head of the department for General Internal Medicine DAIM at Hirslanden in Bern, Switzerland, WFUMB Treasurer.

► 08:50-09:20 • Lower quadrants abdominal pain - the value of PoCUS.

Keynote Speaker: Christian JENSEN, EFSUMB PAST PRESIDENT.

► 09:20-09:50 • Challenges of Hand Held US devices in POCUS Speaker: **Prof. Dr. Christoph Frank Dietrich**, Head of the department for General Internal Medicine DAIM at Hirslanden in Bern, Switzerland, , WFUMB Treasurer.

► 09:50-10:10

Equipment on stage. Coffee break

► 10:10-10:40 • Sonography on seated patients with dyspnoea, thoracic or lumbar pain with use of Handheld Point of Care Ultrasound (HH-POCUS).

Speaker: **Dr. Peter SIGMUND**, MD, Präsident der Steirischen Akademie für Allgemeinmedizin

► 10:40-11:10 • Ultrasonography of the digestive tract and retroperitoneal space.

Speaker: **Prof. Dr. Dieter NUERNBERG**, Dean of the Brandenburg Medical University Theodor Fontane, Brandenburg Institute for Clinical Ultrasound (BICUS), NGO consultant of WHO (Representing WFUMB).

► 11:10-11:40 • The contribution and limits of elastography in Breast Ultrasound.

Speaker: **Dr. Dominique AMY**, MD, EFSUMB Breast US/Elastography Expert, President de Ecole d'Echographie Sans Frontières

► 11:40-12:10 • Intima Media Thickness as a predictive factor of subclinical atherosclerosis in the family doctor's practice. Speaker: **Dr.Gergely AGOSTON** MD, Vice president of the WG of the Hungarian Association of Cardiovascular Imaging,

► 12:10-12.30 Equipment on stage. Coffee break.

► 12.30-13.00 •The contribution and limits of the use of Artificial Intelligence in Thyroid Screening in primary healthcare. The role of using Strain Elastography in family doctors/GPs practice.

Chairman: Dr. Mihai IACOB, EUVEKUS President.

► 13.00-13.20 • Liver Ultrasound based Elastography in 2023

Speaker: **Prof. Dr. Ioan SPOREA**, MD, PhD.

CONFERENCE AGENDA

► 13.20 - 13.40 • *Applications of POCUS in urology (kidneys, urinary tracts, prostate, testicles).*

Speaker: Prof. Dr. Radu BADEA, MD, Ph.D., Medical Imaging Department, „Iuliu Hatieganu” University of Medicine and Pharmacy Cluj Napoca;

► 13.40-14.00 • The scientific summary of the day.

Keynote Speaker: Prof. Shlomo VINKER MD, MHA, WONCA Europe President, Executive Board member EGPRN.

► 14.00-14.30 - Lunch Break Symposium / Video Presentation • US-elastography: general principles and clinical indications **Prof. Dr. Vito CANTISANI, MD, Ph.D., EFSUMB PRESIDENT ELECT**

II. Seminarraum B1 and B2

14:30-15:30

ROUND TABLE: University and postgraduate training and POCUS training curriculum for family doctors/GPs from the perspective of professional organizations: WONCA EUROPE, EFSUMB, WFUMB, EUVEKUS.

Guest speakers: Prof. Dr. SHLOMO VINKER, WONCA Europe President / Prof. Dr. Med. CHRISTIAN JENSSEN, EFSUMB PAST-PRESIDENT, /Dr. MIHAI IACOB, MD, EUVEKUS President / Prof. Dr. DIETER NUERNBERG, Dean of the Brandenburg Medical University Theodor Fontane, Brandenburg Institute for Clinical Ultrasound (BICUS), NGO consultant of WHO (Representing WFUMB) / Prof. Dr. VITO CANTISANI, MD, PhD EFSUMB ELECT PRESIDENT, SIUMB Past President / Prof. Dr. CHRISTOPH FRANK DIETRICH, Head of the department for General Internal Medicine DAIM at Hirslanden in Bern, Switzerland, *EFUMB Past President 2013 - 2015, member of the ExBoard, WFUMB Treasurer*/Prof. IOAN SPOREA, WFUMB VICE-PRESIDENT / Dr. PETER SIGMUND, MD, Präsident der Steirischen Akademie für Allgemeinmedizin / DR. DOMINIQUE AMY, MD, EFSUMB Breast US, Elastography Expert, President de Ecole d'Echographie Sans Frontières <<https://www.ultrasound.fr/accueil>>/ Prof. Dr. RADU BADEA, MD, Ph.D., Director of the Ultrasound Training Center („Center of Research and Education in Ultrasonography” - CECUS) of „Iuliu Hatieganu” University of Medicine and Pharmacy, Cluj Napoca, affiliated with Thomas Jefferson University, Philadelphia, USA (since 1997)/ Dr. MATEUSZ KOSIAK, Co-founder of EDUSON School Poland, / Dr. GERGELY AGOSTON, Vicepresident of the Working Group of Hungarian Assoc. of Cardiovascular Imaging.

II. Seminarraum B1 and B2

15:30 -17:45 Workshop / Hands-on Session : All experts US practical demonstration:

Practical elements of POCUS applications of the abdominal, pelvis, breast, thyroid, thoracic and heart will be conducted together with our experts. Live transmission of ultrasonographic examinations (Live streaming broadcast) to one post. Easy questions and answers of POCUS in primary healthcare practice. Tips and tricks about POCUS through the dialogue between two experts.

15:30 -17:45 Workshop / Hands-on Session : All experts US practical demonstration:

Easy questions and answers in the POCUS applications in primary healthcare practice.

Tips and tricks in POCUS applications through the dialogue between two experts:

► 15.30-16.00

•WS.2.1/Hands-on Session: **Prof. Dr. Christoph Frank DIETRICH / Prof. Dr. Dieter NUERNBERG** – Abdominal clinical ultrasonography and Syndrome-focused ultrasonography.

► 16.00-16.20

•WS.2.2/Hands-on Session: **Prof. Dr. Ioan SPOREA / Prof. Dr. Radu BADEA** - Practical aspects of clinical US. (abdominal/pelvis US)

► 16.20 -16.40

•WS.2.3 /Hands-on Session: **Dr. Mihai IACOB / Dr. Gergely AGOSTON** - FOCUS Real-Time Demonstration / Basic Cardiac Ultrasound for non-cardiologists

► 16.40- 17.00

•WS.2.4 /Hands-on Session: **Dr. Peter SIGMUND / Dr. Mateusz KOSIAK** - Hand Held US devices in POCUS ► 17.00 -17.30

•WS.2.5/ Hands-on Session: **Dr. Dominique AMY/ Dr. Mihai IACOB** - Breast / Thyroid POCUS applications

► 17:30-18:00

•Final evaluation of the participants - Awards - Certificates of Participation EFSUMB endorsed to all participants and EACCME credits.

► 19:00 - 22:00 - Gala Dinner

Wienerwald Restaurant - Wienerwald Restaurants GmbH, Goldschmiedgasse 6, 1010 Wien

Across from St. Stephen's Cathedral - Vienna Center



AWARD Certifications of Participations with

16 CME Credits by EACCME and

EFUMB endorsement to all conference attendees



Euroson PoC-US School 2023

POCUS: THE MODERN TOOL OF THE FUTURE CLINICAL ULTRASOUND EXAMINATION THAT COULD APPLY IN PRIMARY HEALTHCARE AT THE EUROPEAN LEVEL AND A PROSPECTIVE POCUS STUDY IN PATIENTS WITH ACUTE ABDOMINAL PELVIC PAIN IN FAMILY MEDICINE PRACTICE.

Mihai Iacob1, Andrei Iacob2

1. Research Department in Family Medicine, EUVEKUS/EADUS - European Association for the Development of Clinical Ultrasonography in Ambulatory Health Care (Outpatient Health Care), Vienna, Austria, 2. Research Department of Timis Society of Family Medicine, 3. Timis Medical Chamber 4. The Romanian National Society of Family Medicine (SNMF), 300150 TIMISOARA, Romania. E-mail:

dr_iacob@yahoo.com <mailto:dr_iacob@yahoo.com>

2. University of Medicine „Vasile Goldis” from Arad, EUVEKUS Board Member.



Keywords: POCUS applications, POCUS curriculum, POCUS screening, POCUS survey, core POCUS curriculum, clinical ultrasonography

Justification:

The point-of-care ultrasonography (POCUS) performed by the clinician at the site of patient care, both in the medical office and at home, is an important tool to guide case management for early diagnosis and to increase diagnostic accuracy. It turned out that in addition to increasing the quality of the examination and the positive results in terms of patient management.

Objective.

Participants will receive practical information and tips on new POCUS applications in family practice. The participants of this POCUS workshop will be educated according to the latest guidelines in the field of clinical ultrasonography. The main purpose of this study was to establish some POCUS applications for family doctors based on their expectations in current medical practice. Indications of POCUS are the detection of stones/tumors, pathologic-fluid/gas accumulation, enlarged organs, aneurysms/vessels-obstruction, and pleural recesses-effusions. In connection with the clinical picture, the diagnosis could be very accurate and enough to start the treatment. In this workshop, we will do a POCUS hands-on session giving presentations of the standard plans and views for the topographical regions. We need training and quality standards to ensure that this will be done in a way with positive benefits for our patients. It will need to be useful in the implementation of ultrasound standards and practice guidelines at the primary care level. The workshop will include an interactive presentation and practice examples with ultrasound movies, role-plays, and a short hands-on session; the participants will debate lectures and practical demonstrations regarding selected applications of POCUS.

Background:

Point-of-care-ultrasonography performed by the clinician, is an important tool to guide and improve case management for early diagnosis and treatment. It represents an extension of the clinical examination of the physician, to achieve an accurate positive or differential diagnosis.

Research questions:

What is the diagnostic accuracy and which POCUS applications can be used in primary healthcare?

Method:

This study aimed to establish some POCUS applications for family doctors. All these presented a typical ultrasound pattern and simple diagnostic criteria. We brainstormed and conducted an online survey on what POCUS applications can be used in primary care. We designed a questionnaire and distributed it to family physicians from the WONCA-Networks. We performed a POCUS screening on 3400 patients with acute abdominal pain who were examined first time by the family physician and afterward by the specialist. Each patient followed an ultrasound protocol and was archived in an e-database. We made a descriptive statistic and analyzed the POCUS-screening data, and the inter-rater-agreement using Cohen's-kappa coefficient.

Results:

We had 450 family physicians and family medicine residents as respondents to this POCUS survey from all European countries. We made a comparative analysis of their answers and found out which POCUS applications are of great interest to European family doctors. We present the results of the survey launched by EUVEKUS regarding the education and future POCUS curriculum in primary healthcare. The opinions of over 86% of the respondents were in favor of using POCUS. The results of our second prospective study on the patients with abdominal-pelvic pain were: an accuracy: 94.54%, sensitivity: 96.43%, and specificity: 91.16% ($p < 0.001$). The agreement between US results performed by a trained GP versus an emergency specialist in the abdominal emergency diagnosis was: 91% ($k = 0.86; 95\%CI: 0.79-0.91$).

Conclusions:

Ultrasonography should be a diagnosis tool, besides the stethoscope, in the GP's office. Early and accurate diagnosis can help to save many patients in primary care, based on notions of good clinical practice (GCP).

Points for discussion:

How can we increase the accuracy of diagnosis in primary healthcare?
Could ultrasound along with clinical examination help in decision-making and case management of pathology in primary healthcare?
What kind of PoC-US applications may be required in family medicine practice?

THE RESULTS OF A PROSPECTIVE STUDY OF MULTIMODAL BREAST POC-US SUPPORTED BY ARTIFICIAL INTELLIGENCE IN SYMPTOMATIC PATIENTS WITH INCREASED RISK OF MALIGNANCY IN THE HISTORY WHO PRESENTED FOR CONSULTATION IN THE FAMILY DOCTOR'S OFFICE.

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Background:

This study evaluates the utility of POCUS for the assessment of patients with breast complaints who present to the family doctor's office and the impact of POCUS on medical decision-making and patient-management. Mammography is the first-line imaging method used in breast cancer screening and the diagnosis of breast lesions, still considered the "gold-standard" method.

Facts About Dense Breasts

- **40%** of women have **dense breast tissue**.
- **70% of breast cancers occur in dense breasts**
- Women with dense breasts have a **4 to 6 times higher risk of developing breast cancer**.

Clinical evidence is growing currently about the effectiveness of ultrasound for finding small, node-negative, invasive cancers missed frequently by mammography.

Research question: What can be the impact of Breast POCUS as a complementary method to mammography for the diagnosis of symptomatic breast diseases in primary healthcare.

Material & Methods:

We report a prospective Breast-multimodal-US-screening performed on 1456 females with oncological risk-factors+, with symptomatic breast complaints. Ultrasound, as a complementary-method to mammography, was useful in differentiating cystic lesions from solid ones and in evaluating tumors masked by dense glandular tissue on the mammographic image. We used the BIRADS as Final Risk Assessment Categories and Strain-Elastography, with both elastographic scores by UENO and semiquantitative-Strain-Ratio (SR), for standardization and to establish if fine-needle-aspiration-cytology (FNAC) should be performed. We designed an Ultrasound-Scoring-System (USS) for risk-stratifications and a smart software (AI - based). Finally, we compared ultrasound scores designed by us, with the histological results and correlated with mammography and Breast MRI results as "Gold-Standard" methods.

Results:

Were found 22% normal breasts, 60% patients with different breast diffuse diseases and 440 (15%) females with focal breast lesions. *Prevalence* of breast-pathology was: 38.99% (95%CI: 37.54% to 40.45%) with *sensitivity*: 91.49%, *specificity*: 86.52%, and a *high accuracy* 90.51%, PPV:94.66%, NPV:97.73%, statistically significant, $p < 0.01$. The ROC-analysis confirmed a higher-level of diagnostic accuracy of multimodal US, $p < 0.001$, $AUC = 0,89$, 95% CI: 0,87 to 0,95.

Our cut-off value of SR ≥ 3

Conclusion:

Performing POCUS breast multimodal screening had the best accuracy in the analysis of the vascular network and absence of elasticity for differentiating "benign-versus-malignant" the breast-lesions and for diagnosis of breast pathology.

Points for discussion:

- How can we improve early diagnosis and risk stratification of breast pathology in the family doctor's office?
- Can ultrasound along with clinical examination help in decision-making and case management of breast pathology in symptomatic women?
- Is there any imaging method that is predictive for the breast focal lesions appearance in high-risk patients?

A PROSPECTIVE EXPERIMENTAL STUDY OF EARLY DIAGNOSIS OF MONONUCLEOSIS VIRAL INFECTION THROUGH MULTIMODAL ULTRASOUND SPLEEN SCREENING FOR THE SPLENOMEGALY DETECTION IN PRIMARY HEALTHCARE.

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Focus of the abstract: Research

Besides hepatitis viruses more frequently involved in lymphopoiesis organs damage, appear to be infections with Epstein-Barr-virus and cytomegalovirus, members of the herpes virus family, with high prevalence in adolescents from 50 to 80%. The symptoms could vary from nothing to fever, superficial and deep lymphadenopathy, moderate hepatitis, and pharyngitis. The herpes-virus family could persists latent with reactivation with subsequent complications.

Research questions:

How could we early diagnose mononucleosis?

Method:

A prospective-study conducted over three years, included a total of 632 symptomatic patients under the age of 40. All patients performed multimodal-US screening of both abdominal and lymph-nodes in superficial or deep chains. Biological investigations were monitored: inflammatory syndrome, hepatocytolysis, cholestasis syndromes, blood-picture and CMV, EBV specific antibodies(ImmunoglobulinM/G), or for other viruses, and we did the clinical-imaging serological correlations. All data obtained were entered into a Smart-US-Software. Blood-picture, Liver laboratory-tests were monitored besides CMV/EBV/herpes viruses specific-antibodies and we did the clinical-imaging-serological correlations.

Results:

The incidence of cases studied was: 41% Epstein Barr virus infection and 20% CMV infection(sensitivity 91%, specificity 87%), $p < 0.001$. Each patient performed an ultrasound protocol. Some quantitative/qualitative ultrasound features were obtained with morphological and structural changing mild /severe hepatomegaly and /or splenomegaly.

We found increased velocity in the portal and spleen vein over 30cm/sec (Doppler-US). In 60% of cases with mononucleosis, we detected some ultrasound pattern.

Doppler ultrasound of lymphadenopathy allowed us to identify two main types of node vascularity patterns.

We obtained a statistically significant correlation $p < 0.0001$ (Chi-square-test; Fisher's exact test) between the ultrasound-markers (morphometry /spleen-volume/ Doppler-Index / Elastographic Strain Ratio) and the specific virus antibodies.

Conclusions:

Multimodal ultrasound in mononucleosis infections with CMV and EBV could establish early detection of lymphadenopathy with hepatomegaly and splenomegaly.

We found in this study some ultrasound-markers and patterns with clinical-imaging and serological statistically significant correlations for infectious mononucleosis for the early diagnosis.

Points for discussion:

► Is the infection with cytomegalovirus and Epstein-Barr virus harmless to healthy teenagers?

► Could we consider yet the Herpes viruses, like retroviruses, with potentially malignant subsequent evolution, knowing that there are chronic cases of infectious mononucleosis?

► Is infectious mononucleosis common in children and young adults in family physicians' daily practice?

THE RISK STRATIFICATIONS OF THYROID PATHOLOGY. THE USE OF ARTIFICIAL INTELLIGENCE IN THYROID ULTRASOUND SCREENING IN PRIMARY HEALTHCARE.

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Keywords: Thyroscreen project, thyroid malignancy, artificial intelligence, smart thyroid ultrasound software, ultrasound screening, diffuse or focal thyroid pathology.

Background:

This project has three stages.

The first step was the development of a smart computerized diagnostic algorithm used to stratify the risk in thyroid pathology, Ultrasound based. It set the optimum time to achieve a thyroid biopsy (FNAB). We have used the latest international classifications (two international scores: EU-TIRADS, ACR-TIRADS, besides a scoring made by us, correlated with the pathological results.

The second stage included a Targeted Thyroid Screening in a population with high risk, statistically significant.

Finally, we launched a cross border interdisciplinary-multicenter- US-Screening.

Research questions:

How can we early diagnose thyroid malignancies in the high risk population in primary healthcare by using new medical technology and artificial intelligence?

Method:

We report a targeted thyroid screening performed on 4386 apparently healthy adults with oncological risk factors⁺, aged over 20 years, followed for five years.

We used the TIRADS classification by Russ modified and Strain Elastography, with both the elastographic scores by Rago and semiquantitative Strain Ratio(SR), for standardization and to establish if fine needle aspiration biopsy(FNAB) should be performed.

The positive patients with focal thyroid lesions found at this screening by family doctors were validated by endocrinologists through ultrasonography, FNAC, and histopathological or cytological examination.

We designed an Ultrasound Scoring System (USS) for predicting malignancy and diagnostic algorithm software.

All patients were stored and counted into a Smart Thyroid Ultrasound Software. Finally, we compared ultrasound scores designed by us, with the histological results as "Gold Standard" method.

Results:

In this study, they were found: 861 patients with thyroid diffuse disease and 696 with different focal lesions. Prevalence of thyroid pathology was: 38.99%, 95%CI: 37.54% to 40.45% with screening sensitivity: 96.49%-specificity: 96.52% and a high accuracy of 96.51%, PPV: 94.66%, NPV: 97.73%, statistically significant, $p < 0.01$. The ROC analysis of our US methods confirmed a higher level of diagnostic accuracy of Strain-Elastography, $p < 0.001$, AUC=0.995, 95%CI: 0.97 to 1 correlated finally with the pathological result. Our cut-off-value of SR was: 2.5.

Conclusions:

Performing Doppler Triplex Ultrasound Screening together with Strain-Elastography, had the best accuracy for the analysis of the vascular network and the tumor stiffness, for differentiating "benign versus malignant" of the thyroid tumors and for diagnosis of the diffuse thyroid diseases by family physicians with uses of the artificial intelligence as a support tool for the risk stratification.

Points for discussion:

- How can we improve the early diagnosis of thyroid malignancies in the context of increasing their prevalence in industrialized countries?
- Is it possible to perform thyroid ultrasound in a multidisciplinary screening team by family doctors specially trained in this regard?
- How can artificial intelligence help us with ultrasonography technology as a diagnostic method in the practice of family doctors?

LOWER QUADRANTS ABDOMINAL PAIN - THE VALUE OF POCUS (ABSTRACT)

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Acute abdominal pain accounts for 6-10% of all Emergency Department visits with a rather broad differential diagnosis and non-specific abdominal complaints representing 21 - 44% of cases [(1-4)]. Right lower quadrant (RLQ) abdominal pain is reported by nearly 50% of patients presenting to the emergency department with abdominal pain, and appendicitis is the most common pathology responsible for RLQ abdominal pain in Western countries. Other less frequent causes of RLQ pain include right colonic diverticulitis, ureteral stone, colitis of various etiology, and intestinal obstruction [(5, 6)]. The leading cause of left lower quadrant (LLQ) abdominal pain is diverticulitis of the sigmoid and descending colon. Less frequent causes are colitis, ureteral colic, and epiploic appendicitis [(7, 8)]. Gynecological pathology (adnexal torsion, pelvic inflammatory disease, ovarian cystic rupture, ectopic pregnancy), bowel obstruction, and hematoma of the abdominal wall have to be considered in both, RLQ and LLQ abdominal pain [(6)]. An atypical location of abdominal pain is observed in a substantial portion of patients with appendicitis and diverticulitis [(5)]. Based on substantial evidence, a recent EFSUMB position paper recommends ultrasound (US) as the 1st line imaging modality in patients suspected to have appendicitis or diverticulitis [(9)]. The normal appendix is characterized by a diameter < 6 mm, a layered wall, its origin near the cecal pole, a “blind end” and a lack of peristalsis. However, the anatomical position is highly variable, and the uninflamed appendix is a highly mobile small organ [(10, 11)]. Visualization is difficult in the case of retrocausal position, in obese patients, and pregnant women [(12-15)]. Despite the detection of the normal appendix may fail in 20% - 55% of adults and 20% - 30% of pediatric patients, a negative US examination by an experienced US practitioner has a very high negative predictive value in cases without high clinical suspicion, no leucocytosis and a lack of secondary

US features (free fluid, phlegmon, hyperechoic perirectal fat sign) [(14, 16-18)]. Conversely, an increased uncompressible appendiceal diameter of ≥ 8 mm, accentuated or impaired layering of the appendix wall, local pain induced by the US probe, and the presence of secondary US features are highly predictive for the diagnosis of acute appendicitis [(9)]. Recent meta-analyses convincingly demonstrate a 91% sensitivity and 97% specificity of Point of Care US (PoCUS) for the diagnosis of appendicitis, and no disadvantage of Emergency Physician-performed PoCUS compared to Radiologist-performed US [(19, 20)]. Up to now, no studies are available on the quality of GP and Family physicians performed PoCUS for the diagnosis of acute appendicitis. For diagnosis of acute left-colonic diverticulitis, the accuracy of the US is only slightly inferior to computed tomography (CT), and diagnosis is possible in the US with a sensitivity of 90% - 92% and a specificity of 90% 97% according to meta-analyses [(20-22)]. The essential diagnostic criteria with the US are the demonstration of wall thickening > 5 mm in a short colonic segment, the demonstration of a hypoechoic diverticulum, the hyperechoic mesenteric fat sign, pericolic exudations, and local pain induced by the US probe. Therefore, an approach of performing CT only in selected cases with inconclusive clinical and US features is meanwhile evidence-based [(9, 21)]. For PoCUS diagnosis of both, acute appendicitis and left-sided colonic diverticulitis, an optimal examination technique with graded compression, inclusion of the clinical findings, adequate training, and the courage to diagnose the most important preconditions. GPs, Family Physicians, and ambulatory working pediatricians have a major responsibility and chance especially for ruling out appendicitis in children, detecting uncomplicated and ambulatory diverticulitis in adults, and avoiding unnecessary radiation exposure in patients with LLQ and RLQ abdominal pain.

LOWER QUADRANTS ABDOMINAL PAIN - THE VALUE OF POCUS

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PELVIC ANATOMY AND PATHOLOGY - WHAT SHOULD BE EASILY RECOGNIZED IN A POCUS EXAMINATION?

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In both sexes, the urinary bladder can be easily detected on ultrasound (US), its contents and filling status assessed, and the residual urine volume determined. Symmetrical wall thickening (> 3 mm) and pseudodiverticula are indications of a chronic urinary bladder emptying disorder. In males, prostate hyperplasia may be easily detected. The prostate volume should not exceed 25 ccm [(1)]. The position and function of a transurethral or suprapubic indwelling catheter can be easily checked and corrected if necessary. Ultrasound is the optimal guidance for percutaneous suprapubic catheter insertion [(2)].

Easily visible pathological contents are blood clots, calculi, gas, debris, and pus.

Free fluid in the small pelvis may be detected in both sexes. A small amount of free fluid in the pouch of Douglas is a physiological finding in healthy young women. However, free fluid may be a red flag criterion for a variety of serious diseases. Ascites should always be evaluated for echogenic internal reflexes and assessed in the clinical context. Underlying pathologies are not limited to the lesser pelvis. A US-guided diagnostic paracentesis using a 20 Gauge needle should be performed in all cases with standardized biochemical analysis of peritoneal and pelvic fluid should always be performed if ascites is clinically indeterminate or potentially related to trauma, infection, or malignant disease.

The uterus presents as a pear-shaped organ 5-9 cm in longitudinal extent and 2-4 cm in thickness with the homogeneously echo-poor structure of the myometrium, the cycle-dependent midline reflex band of the endometrium of varying echogenicity, and the normally empty uterine cavity. The hypoechoic ovaries should not exceed 35 mm in diameter. Mature follicles can be visualized as cysts measuring up to 25 mm, In older ages, the normal uterus cannot always be detected by a transabdominal approach [(3, 4)].

In the female pelvis, the most important pathological conditions in the clinical setting of acute pelvic pain are ruptured ectopic pregnancy, adnexal torsion, and complicated pelvic inflammatory disease. Emergency bedside US (including transvaginal US) is the cornerstone of the diagnosis of acute life-threatening causes of acute pelvic pain [(5, 6), Table 1]. A standardized PoCUS approach may include at least four images: a transabdominal view of Morrison's pouch; a longitudinal view of the uterus to look for the midline stripe indicating an empty uterus; and a transvaginal or transabdominal view of both ovaries. In cases of abnormalities, additional images should include a view of the uterine cavity content (*i.e.* gestational sac, fluid, gas, other abnormality) and a view including any abnormal extra-uterine finding (e.g., extra-uterine gestational sac, ovarian cyst). Positive Ultrasound features are free fluid in the Morrison pouch, free pelvic fluid reaching the Uterine corpus, abnormal adnexal mass, and ovarian cyst > 50 mm. In a prospective cohort of female patients presenting at two Emergency Departments with acute pelvic pain, the combination of this pelvic PoCUS protocol and History-taking (history of ectopic pregnancy? Shoulder pain? intolerable pain? Pain during movement? Pain on abdominal palpation? Vomiting during pain?) reached the highest predictive value among all combinations of two among five non-invasive diagnostic tools for identifying potentially life-threatening gynecological emergencies [(6)].

Table 1 Three main gynecological causes of acute pelvic pain and their B-Mode and Doppler features [(7)]

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PELVIC ANATOMY AND PATHOLOGY - WHAT SHOULD BE EASILY RECOGNIZED IN A POCUS EXAMINATION?

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Causes of acute pelvic pain

B-Mode findings

Doppler findings

Pelvic inflammatory disease

- Endometrial thickening or fluid as a result of endometritis
- Internal echoes or fluid levels in a complicated purulent fluid in the pelvis
- Dilated fluid-filled fallopian tubes with internal echoes (Pyosalpinx)
- Multiloculated, septated mass with poorly defined irregular boundaries, internal echoes, (tubo-ovarian abscess)

Ectopic pregnancy

- Enlargement of the uterus or a decidual response in the endometrium in the absence of a gestational sac
- A gestational sac in the adnexa containing a fetal pole with heart tones and a yolk sac.
- Cystic formation (containing echogenic fluid) in the uterine cavity (pseudo gestational sac).
- Exceptionally thick *endometrial cavity echoes* due to a decidual reaction without a pseudo sac.
- A rim of vessels surrounding (and supplying an ectopic pregnancy)
- A low-resistance pattern at the center of a nonspecific extra ovarian mass

Adnexal torsion

A big hemorrhagic cyst in an edematous ovary, an enlarged ovary with follicles scattered peripherally:

- Heterogeneous ovarian echotexture
- Whirlpool sign indicating the twisted pedicle appearing as a hypoechoic band
- The cut-section of a twisted pedicle may resemble a snail shell or massive echogenic or hypoechoic masses
- No flow on Colour Doppler
- Whirlpool sign indicating the vessels looping around the center axis

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THE WONCA EUROPE POSITION PAPER ON THE USE OF POINT OF CARE ULTRASOUND IN FAMILY MEDICINE

Prof Shlomo Vinker, MD, MHA, WONCA Europe President, Executive Board member EGPRN Treasurer, Israel Association of Family Physicians, Chairman, Dep. of Family Medicine and Vice Dean, Sackler Faculty of Medicine, Tel Aviv University, Medical Director, Leumit Health Services, Israel.



4th EUROSON PoC-US SCHOOL 2023 Conference, Vienna, 08-09 September 2023

During my last lecture in the previous year, I mentioned our ongoing efforts in drafting a statement from WONCA Europe emphasizing the importance of Point-of-Care Ultrasound (POCUS) in family medicine and primary care.

I am proud to announce that our hard work has yielded fruitful results.

The statement has now been officially adopted by the WONCA Europe Council in Brussels during the meeting held in June 2023. This achievement marks a significant milestone in our commitment to promoting the integration of POCUS as an essential tool in the field of family medicine and primary care.

The main topics in the statement are as follows:

► **POCUS (Point-of-Care Ultrasound) in Primary Care:** POCUS will play an increasingly important role in specific indications within primary care, assisting general practitioners in meeting the health needs of their patient populations.

► **WONCA Europe's Recommendation:** WONCA Europe recommends that all general practitioners should receive training in POCUS that is tailored to their healthcare context. This training should be provided during residency and continuing medical education programs.

► **Evidence Supporting POCUS:** Existing evidence supports the use of POCUS in diagnosis and management. It does however have potential risks of underdiagnosis, misdiagnosis, and overdiagnosis.

There is a need for further research in this field to enhance its effectiveness.

► **Financing and Reimbursement:** Qualified general practitioners who use POCUS in clinics, house calls, and community healthcare should be appropriately financed and reimbursed.

► **Supporting Best Practice and Long-term Effects:**

The statement expresses support for ongoing efforts to gather evidence for best practices in POCUS use and to explore the long-term effects of POCUS on diagnosis in primary care.

1. HISTORY OF POINT OF CARE ULTRASOUND (POCUS)

Prof. Dr. CHRISTOPH FRANK DIETRICH

Clinical ultrasound defined as „continuation of clinical examination by technical means“ was first mentioned by Gerhard Rettenmaier (1929 - 2015). In contrast to computed tomography and magnetic resonance imaging, clinical ultrasound is characterized by a direct interaction between the patient and his examiner at the point of care. “Examiner and patient look into each other’s eye, the talk to each other: the clinical US is a „dialogical examination“ with a bi-directional, dynamic transfer of information” (Maio G. Medicine and the holistic understanding of the human being: Ultrasound examination as dialogue. Ultraschall Med 2014;35:98-107). During the 1970s, ultrasound technology was improved with the development of better transducers and improvements in image quality. These developments created opportunities for use in more clinical settings, including many specialties. In the presentation, the history of POCUS and current views are discussed [Dietrich CF, Goudie A, et al. Point of Care Ultrasound: A WFUMB Position Paper.

Ultrasound Med Biol 2017;43:49-58].

2. CHALLENGES OF HAND-HELD ULTRASOUND DEVICES (HHUSD) IN POCUS

Prof. Dr. CHRISTOPH FRANK DIETRICH, MBA, Head of the Department for General Internal Medicine (DAIM) at Hirslanden Bern, Switzerland, EFSUMB Past President 2013 - 2015, WFUMB Treasurer (Switzerland)



The use of handheld ultrasound devices from a technical and data protection point of view, device properties, functionality, documentation, indications, the delegation of performance, and applications by doctors, students, and non-medical staff is presented and discussed

[Dietrich CF, Bulla P, Dudwiesus H, et al. Perspectives and Challenges of Hand-held Ultrasound. Zeitschrift für Gastroenterologie 2022,

DOI: 10.105 /a-1901-9394].

1.THE CONTRIBUTION AND LIMITATION OF BREAST ULTRASOUND IN MEDICAL PRACTICE, INTRODUCTION TO DUCTAL AND CONVENTIONAL CLINIC ULTRASOUND

Dr. med. Dominique AMY

Vice-president of the European Society of Breast Echography,
IBUS board member (international breast ultrasound school),
CFFE director. (centre francophone formation en Echographie,
President of : Ecole d' echographie sans frontiere



There are three techniques used for the exploration of the breast:

- Mammography and its new developments: digitization, low dose, tomo synthesis, and angio-mammography
- NMR (Nuclear Magnetic Resonance) with an injection of a contrasting product
- Conventional ultrasound combined with Doppler, angio-echography, elastography, and 3D

and lastly ductal ultrasound which also uses ultra-fast Doppler, SWE (Shear Wave Elastography) elastography, or RTE elastography (Real Time Elastography)
Ultrasound (conventional or ductal) is the perfect complement to mammography and NMR which are considered the gold standard of breast exploration, although they have their limitations (false positives and false negatives) Ductal ultrasound is the only form of ultrasound able to:

- analyze real mammary anatomy (lobes, lobules, ducts, lymph nodes)
- understand the physiological variations related to age, hormonal status, different treatments, and so on...
- discover the first modifications brought about by a budding pathology, to pinpoint its precise location (ductal or lobular), its development, and its evolution: single focal, multifocal, or multicentric, with an excellent correlation between the anatomopathological and histological pictures.

Ultrasound is within reach of all the practitioners concerned with point-of-care ultrasonography in primary and ambulatory healthcare.

2.THE CONTRIBUTION AND LIMITATIONS OF ELASTOGRAPHY IN BREAST ULTRASOUND

Dr. med. Dominique AMY

Elastography is one of the latest developments in the ultrasound technique used in many applications of point-of-care ultrasonography.

Very developed in breast ultrasound, it consists of two different techniques SWE (Shear Wave Elastography) and RTE (Real Time Elastography) used by all the manufacturers of ultrasound machines, with linear or 3D (tridimensional) probes.

Seven different topics are going to be dealt with as regards elastography:

- identification of the lesion, the diagnostic distinction between benign and malignant
- characterization of some lymph nodes
- significant help to echo-guided punctures with the precise location of the suspect zones
- analysis of diffuse micro-calcifications revealed by mammography.
- Attempt to give a prognosis with an evaluation of the aggressivity of the lesion
- Oncologic management along with the various treatments
- Attempt to classify the early epithelial modifications in the case of 'no mass' cancers

The limitations of elastography are of course related to the quality of the material used, to the possibility (or not) to distinguish a case of epithelial proliferation (atypical, borderline) from an 'in situ cancer, or on the contrary, to analyze big lesions with large zones of modifications or necrosis, or lastly to control post-operation complications. The combination of elastography and ultra-fast-speed Doppler makes it possible to improve early diagnosis significantly.

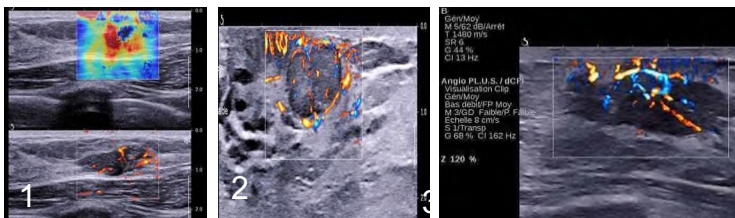


Fig 1 & 2 malignant lesion: elastography & Doppler.

Fig 3 Doppler of a benign fibro-adenoma.

ULTRASONOGRAPHY OF THE DIGESTIVE TRACT AND RETROPERITONEAL SPACE

Prof. Dr. Dieter NUERNBERG, BSc MBBS MRCP FRCR

DTM&H FCIRSE FAIUM

(Hon.) First Dean of the Brandenburg Medical University (Germany)

Director of Brandenburg Institute for Clinical Ultrasound (BICUS)

Representant of WFUMB in different function



Ultrasonography has become widely accepted for the diagnosis of gastrointestinal diseases. It is not only estimating the lumen but more important the wall and the surroundings of the stomach and bowels. Furthermore, functional processes (peristalsis, blood flow) can be visualized and provide important information for passage and perfusion. Modern high-resolution (compressive) sonography represents an ideal complementary method besides endoscopy for the gastroenterologist.

It is used in emergency diagnosis in case of obstruction, ileus, or perforation. Here sonography is the method of first choice for achieving a high sensitivity. This applies esp. to the ileus, which can be diagnosed significantly earlier by sonography than with a conservative X-ray. Meanwhile, sonography can contribute considerably to clarifying genesis (e.g. chronic or acute inflammatory stenosis).

Perforation of the GIT is occurring very rarely (1-2%). Most frequently it is caused by ulcers of the stomach and the duodenum. X-ray, sonography, and endoscopy are most important in the diagnosis of this complication. X-ray is reliable in detecting air but needs a greater emission of gas. Given optimal conditions during the examination ultrasound can detect small amounts of air (1-2 ml). The diagnosis of a covered perforation is very complicated as it is lacking the typical criteria of free air in an X-ray. Here sonography is more effective. A covered perforation can only be visualized by enhancement of air. Criteria of a covered perforation are:

- Echogenous enhancement of a strictly limited cavity of perforation.
- Reverberations of air within the cavity.
- Detection of the leakage (orifice of perforation)
- Detection of air motion.
- Change of sonographic image after second look sonography.

Seldom is a retroperitoneal perforation e.g. after endoscopy or diverticulitis. Typical signs will be shown.

In acute GI diseases, appendicitis and diverticulitis ultrasound is the first choice in examination too. Sensitivity in both is high and it's possible to see the complications. CT is the 2nd choice if complications are estimated but not exactly shown. As a result of more use of the US, the rate of appendectomy of false positive cases went down.

Ultrasound is not only the first method in the diagnosis and differentiation of Inflammatory Bowel Disease (IBD), it's helpful in the staging of disease activity (Crohn's Disease/CD) and it's equal to other imaging methods in detecting complications (fistula, abscess and stenosis). In interventional therapy of abscesses, US-guided procedures are used successfully. In conclusion, the possibilities of the US in IBD play an important role because it's a non-invasive and non-radiation method.

Sonography is important for differential diagnosis and follow-up. Due to the complexity of the topic, the presentation concentrates on giving an idea of the present stage of sonography in chronic inflammatory bowel disease, some less frequent intestinal infections, or ischaemic bowel diseases.

Recommendations and clinical guidelines for the use of GIUS in IBD, under the auspices of EFSUMB were published in the last years. These guidelines present the consensus on the current data on the sonographic features of IBD and summarize the possibilities of GIUS overall.

Some parts of GIT are located retroperitoneal. That means that we there also can see collections of gas or abscesses. - The most important structures in retroperitoneal space are the big vessels aorta and vena cava inferior. In the second part of the lecture important diseases of AO and VCI were demonstrated like aortic aneurysm and cava vein thrombosis.

SYNDROME- (SYMPTOM-) FOCUSED ULTRASONOGRAPHY

Prof. Dr. Dieter NUERNBERG, BSc MBBS MRCP FRCR
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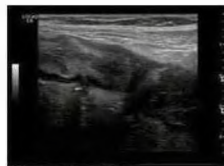
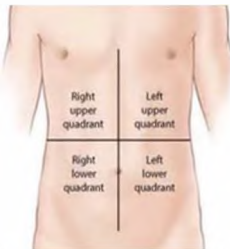


In point-of-care US, we often find a special situation. Doctor's time is limited, e.g. in-home visits or time is of the essence for the patient, e.g. in an emergency. Also, the conditions are not those of a US special laboratory. Rooms, assistance, or equipment are often limited in the possibilities. Therefore, POCUS concentrates on important further information. If leading symptoms are present, POCUS focuses on clarifying the most important questions, to exclude important diseases or determine the next steps in diagnostics or therapy. In this respect, POCUS plays a particularly important role in leading symptoms.

Examples of leading symptoms and common causes:

- vomiting/nausea: ileus, bowel obstruction, pancreatitis
- jaundice: cirrhosis, biliary obstruction
- pain (quadrant orientation): choledocholithiasis, nephrolithiasis, appendicitis, diverticulitis
- fever: abscess, lymph nodes, cholecystitis
- shortness of breath: pleural effusion, interstitial edema, pneumothorax trauma: free fluid in the abdomen, hematoma of the spleen, pneumothorax, hemothorax
- anemia: lymph nodes, splenomegaly, tumor
- and more like:
- ok**-big belly: ascites, ileus, obesity
- ok**-thick leg: thrombosis, tumor, hematoma
- ok**-thick neck: thrombosis, thyroid tumor
- ok** and others ...

Important questions esp. for GPs are, whether to send the patient to the hospital or not, whether to do other diagnostic procedures or not, to change drug therapy or not. The lecture shows what and where you have to focus on leading symptoms to find the next step for diagnostics and therapy.



Diverticulitis



Crohn abscess and fistula



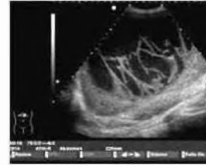
Malignant lymphoma



Acute pancreatic necrotic fluid collection



Infected Hydronephrosis



Hematoma of spleen



Acute cholecystitis



Biliary obstruction



Liver cirrhosis with ascites



Small bowel ileus

THE ROLE OF ULTRASOUND IN ABDOMINAL EMERGENCIES. A GP'S PERSPECTIVE

Prof. Ioan Sporea, MD, PhD, FEBGH

Professor of Gastroenterology and Hepatology

University of Medicine and Pharmacy Timișoara, Romania

WFUMB Vice-president

Director, WFUMB Center of Education

Past President of the Romanian Society of Gastroenterology and Hepatology and of the Romanian Society of Ultrasonography



In daily activities in all specialties, abdominal emergencies are frequent. GPs deal with such emergencies in their consultation room almost daily, and their tools for diagnosis are few. In these conditions, abdominal ultrasound is of real value for trained GPs when faced with patients with abdominal pain.

Currently, ultrasound is recognized as a "point of care" method, which can be immediately used in the consultation room, after the anamnesis and clinical examination. In many cases, a diagnosis can be established following an abdominal ultrasound examination and the therapeutical solutions can be applied.

From the point of view of the usefulness of ultrasound in patients with abdominal pain, there are three categories of applications:

1. Pathologies where ultrasound is the method of choice for emergency diagnosis:

- Gallbladder stones and their complications (vesicular hydrops, acute cholecystitis)
- Kidney stones and hydronephrosis
- Ascitic syndrome
- Aortic aneurysm
- Chronic pancreatitis and its complications (pseudocysts)
- Urinary bladder stones and urine retention.

Pathologies where ultrasound is useful for emergency diagnosis:- Delayed gastric emptying

- Bowel occlusion
- Acute appendicitis
- Ileal Crohn's disease
- Acute diverticulitis
- Acute pancreatitis
- Gynecological diseases (ovarian cysts/tumors, ectopic pregnancy)
- Palpable abdominal masses

1. Other diagnoses where abdominal ultrasound is useful:

- Abdominal trauma for:
 - hemoperitoneum
 - liver hematoma
 - spleen hematoma
- Splenomegaly and spleen pathologies
- Complications of liver cirrhosis
- Enlarged abdominal lymph nodes.

► Thus, in daily practice, is important for the GPs to be trained in abdominal ultrasound.

► This will reduce the time to diagnose for patients with abdominal pain so that therapeutical solutions can be applied as soon as possible.

LIVER ULTRASOUND BASED ELASTOGRAPHY IN 2023

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For many years severity assessment in chronic liver diseases was performed using liver biopsy. In the last 10-15 years this invasive procedure was replaced in many cases by non-invasive methods (biological tests and /or elastographic methods).

Liver elastography developed a lot in the last few years and is used more and more in daily practice. It can be performed with ultrasound-based methods or by MRI.

Ultrasound-based elastographic methods have the advantage that is inexpensive and that they can be used by clinicians (not only by radiologists such as in MR-Elastography). They can be divided into Strain Elastography (used mainly for the breast, thyroid, and prostate) and Shear Wave Elastography (SWE). The SWE methods are subdivided into transient elastography (TE), point SWE and 2D-SWE. SWE methods are used for the evaluation of liver stiffness as a marker of fibrosis in many pathological conditions such as chronic viral hepatitis, NAFLD, alcoholic liver diseases, cholestatic liver diseases, and others.

TE was the first elastographic method used for liver fibrosis assessment. Published papers regarding pSWE and 2D-SWE show similar results and accuracy for all these 3 methods. This is why any of these methods can be used for liver fibrosis assessment in clinical practice. The advantage of pSWE and 2D-SWE is that they are included in standard ultrasound machines which can be used for other types of evaluation (such as standard ultrasound, Doppler assessment, or CEUS).

More recently, not only liver stiffness assessment is performed in chronic liver disease, but also spleen stiffness. Spleen stiffness alone or spleen + liver stiffness are used for the evaluation of portal hypertension in patients with cACLD (compensated advanced chronic liver disease).

Furthermore, in the last 10 years, the quantitative evaluation of fatty infiltration of the liver with ultrasound systems became available. The Controlled Attenuation Parameter (CAP), implemented in the FibroScan device is used in clinical practice with good results for many years. Other types of QUS (quantitative ultrasound assessment) of fatty infiltration became available in the last years, implemented in ultrasound machines from different vendors (Canon, GE, Fujifilm, Siemens, and others).

More recently, some ultrasound systems can assess the viscoelastic properties of the liver, trying to evaluate inflammation severity.

Considering all the above, ultrasound can be considered more and more as a multiparametric tool (Multiparametric Ultrasound - MPUS), very useful for the complex evaluation of patients with chronic liver diseases.

POCUS OF THE UPPER ABDOMINAL FLOOR. LIVER. PANCREAS. SPLEEN

Prof. Radu Badea,
Dept. Ultrasonography,
Institute of
Gastroenterology &
Hepatology "Octavian
Fodor" & the University of
Medicine and Pharmacy
"Iuliu Hatieganu"
Cluj Napoca, Romania



Exploration of the upper abdominal region using Point-of-Care Ultrasound (POCUS) benefits from the contribution of a convex transducer (3 - 6 MHz). The examination is multimodal, but the greyscale mode is the most important. This method should be practiced as the fifth step of the clinical examination, providing a non-invasive projection inside the patient's body. The applications of the ultrasound method are focused on both emergencies (acute pain, jaundice syndrome, septic condition, eating disorders, significant weight loss, etc.) and chronic conditions (periodic health status evaluation, early detection of hepatic nodules in patients with cirrhosis, evaluation of the biliary tract centered on lithiasis disease, evaluation of splenomegaly syndrome). The upper abdominal region can be assessed with high quality and confidence within 5 minutes. The level of reproducibility depends on the examiner's experience. The main conditions detectable through POCUS are a. diffuse hepatopathies; b. hepatic nodules; c. gallbladder and bile duct lithiasis; d. pancreatic cystic or solid tumors; e. splenomegaly; f. splenic tumors; g. splenic hematomas and lacerations. The cumulative use of vascular and elastographic modes allows the extraction of multiple, advanced, reproducible, and complex information. Regular patient evaluations help specify the evolutionary trends of diseases.

APPLICATIONS OF POCUS IN UROLOGY (KIDNEYS, URINARY TRACTS, PROSTATE, TESTICLES).

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POCUS exploration of the urinary tract is a non-invasive method for routine evaluation of urinary syndromes (infections, hematuria, septic conditions, neoplastic syndromes, dysuria, and frequent urination). The aspect of the kidneys is typically assessed using coronal sections. In greyscale mode, this method allows the identification and characterization of the renal parenchyma, as well as the detection of possible urinary tract obstructions. Renal nodules have characteristic appearances, and the differentiation between cysts and solid tumors is highly effective. The examiner's experience is decisive for the performance of the examination. Exploring the ureter is challenging. The prostate is easily evaluated -for orientation through a transversal (suprapubic) approach, and with high precision in the endorectal approach. The main indications of the method are a. detection of prostatic adenoma; b. detection and staging of prostatic carcinoma; c. assessment of postoperative treatment effectiveness and detection of recurrences; d. guidance for interventional procedures. Elastographic exploration of the prostate provides significant additional details. Vascular investigation can also be useful. The scrotum and testicles are easily visualized through POCUS. The examination allows a. detection of scrotal collections, characterization of their content, and volumetric evaluation; b. dimensional evaluation (individual and comparative) of the testicles in traumatic states and infertility; c. detection of testicular tumors; d. evaluation of orchitis and septic conditions; e. urgent evaluation of the testicle (spermatic cord torsion).

FOCUSED CARDIAC ULTRASOUND IN GENERAL PRACTICE: DIAGNOSIS AND MANAGEMENT OF CARDIAC DISEASE

Dr. GERGELY Agoston

MD, Vice president of the WG of the Hungarian Association of Cardiovascular Imaging, the HIT Ambassador of Hungary, Member of the Web and Communication Committee of the EACVI, Nucleus member of the ESC Editors Network, Associate Editor of *Cardiologia Hungarica*



Echocardiography or cardiac ultrasound is one of the most widely applied imaging techniques. Echocardiography tends to generate a large amount of structural and functional data. For this reason, it is a versatile and incredibly useful diagnostic tool. Nowadays, miniaturization and technical development allow portable, high-quality, low-cost imaging at the bedside. A large variety of users have emerged in different clinical settings. Appropriate theoretical and practical skill is needed to apply standard transthoracic echocardiography confidently. In most countries, the use of echocardiography belongs to a specialty (cardiologist, pediatrician, anaesthesiologist) or to obtain a properly regulated license examination. We know it takes a long practice with a tutor to learn echocardiography, but how can we introduce echocardiography in family practice? We need to determine the details and the protocol of the examination. The Ultrasound-Assisted Physical examination and the Focused Cardiac Ultrasound (FOCUS) is the best-fitting protocol for the daily routine of family physicians. Adequate interpretation in certain clinical situations is essential to reduce the likelihood of potential diagnostic and treatment errors. Therefore, organizing regularly standardized theoretical and practical training for family doctors is necessary. FOCUS examination aims to detect a limited number of cardiac conditions. It may provide relevant clinical information regarding pericardial effusion, left and right ventricular size and function, gross valvular abnormalities, and intravascular volume status. The presentation gives an illustrated overview of FOCUS's theoretical and practical details, highlighting the importance of education, training, and levels of competence.

INTIMA MEDIA THICKNESS A PREDICTIVE FACTOR OF SUBCLINICAL ATHEROSCLEROSIS IN THE FAMILY PRACTICE

Dr. GERGELY Agoston

MD, Vice president of the WG of the Hungarian Association of Cardiovascular Imaging, the HIT Ambassador of Hungary, Member of the Web and Communication Committee of the EACVI, Nucleus member of the ESC Editors Network, Associate Editor of *Cardiologia Hungarica*



Carotid intima-media thickness (IMT), the thickness of the intimal and medial layer of the carotid artery wall, can be easily measured using ultrasound and is considered a marker for the early stage of atherosclerosis. Atherosclerosis most often develops gradually and slowly with different susceptibility to cardiovascular complications. The first structural change detected in atherosclerosis is an increase in IMT. IMT is an important atherosclerotic risk marker. However, this increase is not synonymous with subclinical atherosclerosis but is related. The uniform thickening progresses in straight arterial segments as the patient ages, and all known vascular risk factors accelerate this process. Therefore IMT is an important atherosclerotic risk marker but cannot be accepted as a risk factor and should not be subjected to treatment. The recent European guidelines on cardiovascular disease prevention in clinical practice do not recommend the systematic use of IMT to improve risk assessment due to the lack of methodological standardization and the absence of added value of IMT in predicting future CVD events, even in the intermediate-risk group. However, recent research supports the usefulness of IMT progression as a surrogate marker for cardiovascular disease risk. In general practice, with adequate ultrasound equipment, the measurement of IMT is an easy, feasible, and promising tool to assess the progression of IMT thickness and to recognize it as a risk factor for the development of future cardiovascular disease.

1. SONOGRAPHY IN EMERGENCY AMBULANCE SERVICE

Dr. Peter SIGMUND, MD,
Präsident der Steirischen
Akademie für
Allgemeinmedizin



There are several situations in the emergency ambulance service where sonography is very useful.

Four scenarios where ultrasound - already at a prehospital stage - can make a significant difference:

- **Dyspnea**
- **Resuscitation**
- **Trauma**
- **Shock**

The evident indications deliver potential consequences for therapy and transport. The presentation will demonstrate the processing of crucial emergency scenarios with sonography.

2. SONOGRAPHY ON SITTING PATIENTS WITH DYSPNOEA, THORACIC OR LUMBAR PAIN

*with use of Handheld Point of Care
Ultrasound (HH-POCUS)*

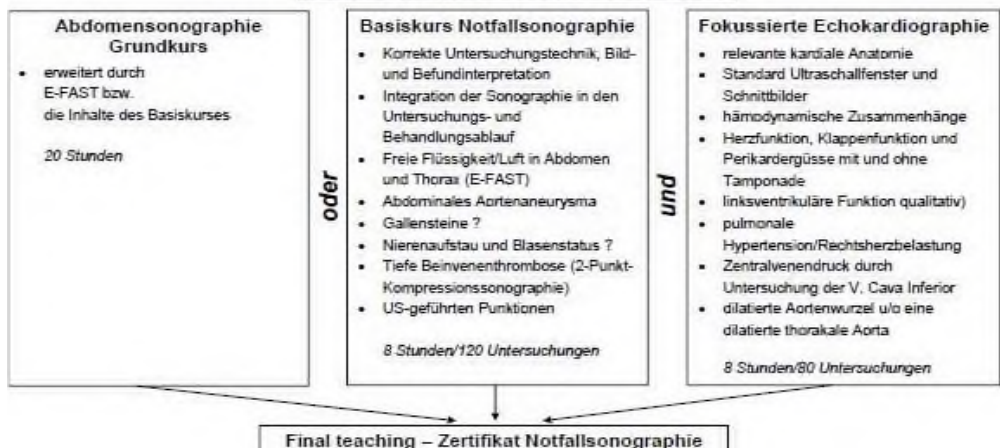
Dr. Peter SIGMUND, MD,
Präsident der Steirischen Akademie für
Allgemeinmedizin

Family practices are mostly frequented by patients who are able to walk. For that reason, consultations as well as physical inspections, including percussion and auscultation of heart and lungs, will usually be conducted on patients in a sitting position. The same position is also suitable for the further examination of the chest by lung ultrasound, which can provide crucial sonographic details, especially for patients with dyspnea, coughing or chest pain. Kidneys and lumbar region are as well sonographically accessible in the same process.

The physical and sonographic examination of patients in a sitting position allows a time-saving workflow. In offices with multiple examination rooms, handheld ultrasound devices can allow instant diagnostics at each workspace.

Handheld devices cannot replace conventional sonography, but can provide imaging in an astonishing quality and are quite adequate within the scope of POCUS.

Notfallsonographie-Basisausbildung



1. TOPIC: LUNG ULTRASOUND IN DIAGNOSIS AND FOLLOW-UP OF COMMUNITY-ACQUIRED PNEUMONIA.

Dr. Mateusz KOSIAK, MD,
Co-founder EDUSON
University of Gdansk, Poland.

Community-acquired pneumonia (CAP) is a diagnostic challenge in the everyday practice of physicians of different specialties. It is mainly due to the dynamic course of CAP and its inhomogeneous manifestation in different age groups. The increasing popularity of PoCUS opens new diagnostic possibilities in patients with suspected pneumonia. To fully benefit from

PoCUS in patients with suspected CAP, it is important not only to know the sonographic image of pneumonia but also the differences between interstitial and bacterial pneumonia in children, adults, and seniors. In the lecture, current opinions about the clinical implication of PoCUS in patients with CAP will be presented. Also, the possibility of sonographic follow-up in CAP and its decision-making impact will be presented. From a practical point of view, in patients with symptoms of CAP, it is important to focus on the following issues:

- In what situations, after PoCUS, the Patients should be referred for further imaging diagnostics (X-ray or computed tomography)?
 - What are the main limitations of PoCUS in the diagnostics of CAP?
 - Does sonographic image (PoCUS) can help in deciding on antibiotic therapy?
 - What should be considered in sonographic (PoCUS) differential diagnosis in patients with suspected CAP?
- The current state of knowledge based on literature will be supported by examples of sonographic images of CAP from PoCUS examinations.

2. WHAT IF I WILL FIND SOMETHING UNEXPECTED IN THE POCUS EXAMINATION

Dr. Mateusz KOSIAK,
MD, Co-founder EDUSON



Each physician who performs PoCUS, even to answer simple dichotomous questions, needs to be aware that during the examination unexpected findings and unexpected images can be revealed. The physician who performs PoCUS should not only know the indications and limitations

of the examination but also should be familiar with the most common possible findings, in the scanned area, not related to the currently diagnosed problem. The unexpected finding can be

found in the interested area (for example in the gallbladder) or around the area (for example liver). The unexpected findings may be divided into four main groups: anatomical variants, artifacts, benign lesions, and malignant lesions. From a practical point of view, it is important to know when further diagnostics are needed and when it is not needed and may cause unnecessary stress for patients and unnecessary involvement of other medical staff and cost.

The lecture will present a list of anatomical variants including (column of Bertin, junctional parenchymal defect, urachus remnant, Riedel's lobe), benign lesions, and common malignancies.

Also, tips and tricks that will help to deal with those unexpected situations will be presented.

The main purpose of the lecture is to help to avoid mistakes of unnecessary referral for further diagnostics. Because of the increasing possibility of teleconsultation, hints on how to save images and loops and prepare them for sending for consultation will be presented. In the end, the potential utility of artificial intelligence as a supporting tool in PoCUS will be analyzed.

US-ELASTOGRAPHY: GENERAL PRINCIPLES AND CLINICAL INDICATIONS

Prof. Vito Cantisani, MD, PhD.

Assoc. Prof. of Radiology, Vice-Dean of Medicine and Dentistry, Univ. Sapienza, Rome, Chairman of Ultrasound Unit Policlinico Umberto I, Univ. Sapienza, Rome, SIUMB Past President,

EFSUMB Elect President, Editor of *Ultraschall* EJU, UiO, Qualified as Full Prof in Radiology at ASN, <<https://web.uniroma1.it/droap/>>



The mechanical properties sensed by palpation and elastography are associated with the elastic restoring forces in the tissue that act against a type of deformation (shape change) known as shear.

Elastography uses ultrasonic imaging to observe tissue shear deformation in a real-time two-dimensional image sequence, after applying a force that is either dynamic (e. g. by thumping or vibrating) or varying so slowly that it is considered “quasi-static” (e. g. by probe palpation). The deformation may be represented in an elasticity image (elastogram), or as a local measurement, in one of three ways:

1. tissue displacement may be detected and displayed directly, as in the method is known as acoustic radiation force impulse (ARFI) imaging;
2. tissue strain may be calculated and displayed, producing what is termed strain elastography (SE);
3. in the dynamic case only, the data may be used to record the propagation of shear waves, which are used to calculate either
 - a) regional values of their speed (without making images) using methods referred to herein as transient elastography (TE) and point shear-wave elastography (pSWE), or
 - b) images of their speed using methods referred to herein as shear-wave elastography (SWE) which includes 2 D SWE and 3 D SWE. These shear-wave speed methods could all be grouped under the term SWE.

In ultrasonic imaging, a varying pressure at the tissue surface causes a change in density, and both perturbations travel together as a longitudinal wave. Its speed (about 1540 ms⁻¹), is determined almost entirely by the tissue’s density and the bulk modulus of elasticity.

The shear deformation of the return echo of the US beam is therefore determined by the biomechanical properties of the analyzed tissue, displaying information about their composition.

Elastosonography currently has been applied in the evaluation of focal lesions of multiple parenchymal organs such as thyroid and breast, but also in the evaluation of diffuse pathology of the hepatic parenchyma or the soft musculotendinous components.

Recently EFSUMB and WFUMB produced Evidence-Based Guidelines which provide recommendations and limitations of USE clinical use.

CERVICAL ULTRASONOGRAPHY. THE THYROID CLINICAL MULTIMODAL ULTRASOUND.

Prof. Vito Cantisani, MD, PhD.

Assoc. Prof. of Radiology, Vice-Dean of Medicine and Dentistry, Univ. Sapienza, Rome, Chairman of Ultrasound Unit Policlinico Umberto I, Univ. Sapienza, Rome, SIUMB Past President, EFSUMB Elect President,, Editor of Ultraschall EJU, UiO, Qualified as Full Prof in Radiology at ASN, <https://web.uniroma1.it/droap/>



Thyroid nodules are a common finding in the general population: depending on the population examined and the technique used, nodules are found in 20-70% of people¹.

The increasing availability and use of ultrasound have also led to an increase in the diagnosis of thyroid nodules⁹. While the vast majority of nodules are benign and of no relevance to the patient, a small proportion of nodules are malignant and require further diagnosis and treatment.

Nevertheless, the use of thyroid ultrasound in clinical practice and reality. The task and challenge is therefore not primarily to detect thyroid nodules but to correctly characterize them sonographically and to identify the few malignant nodules from the large number of benign nodules and to direct them to adequate further diagnostics and, if necessary, therapy. Individual sonographic criteria for malignancy such as irregular margins, microcalcifications, hypoechogenicity, and taller-than-wide shape are not sufficiently sensitive and specific when used as single criteria. In recent years, systems combining individual criteria, so-called TIRAD systems (thyroid imaging and reporting system), have therefore become established for risk

stratification of thyroid nodules.

However, TIRADS has some limitations.

TIRAD systems have mainly been evaluated to detect papillary thyroid cancer²⁹. In addition, TIRAD systems are not applicable in the presence of an autonomous adenoma³⁰ - this should be ruled out beforehand, e.g. by scintigraphy. TIRAD systems also do not appear to be sufficiently accurate in the detection of medullary thyroid carcinomas³¹. TIRADS, therefore, does not replace calcitonin measurement. In addition to the sonographic criteria for malignancy, other risk factors such as age, sex, comorbidities, and location of the nodules within the thyroid gland should always be taken into account.

Therefore, most authors suggested to us multiparametric ultrasound using US-elastography, Artificial Intelligence (AI), and in some cases CEUS. Indeed, an up-to-date overview of standards and new developments in the sonography of thyroid nodules will be provided. In addition to the individual sonographic criteria, the so-called TIRAD systems for risk stratification and other techniques such as US-elastography and contrast-enhanced ultrasound (CEUS) will be presented.

WILL AN AI-BASED HANDHELD ULTRASOUND DEVICE BECOME A MARKET STANDARD IN PRIMARY CARE?

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The global handheld ultrasound market is surging, with an overall revenue growth expectation of hundreds of millions of dollars during the next decade. North America dominates the market, while **Asia-Pacific is the fastest-growing global segment**. The rapid adoption of advanced technologies has promoted the growth of the market in Japan, as well.

Market analysis focusing on the end-user shows that the hospital segment is the most highly invested in the handheld ultrasound market. On the other hand, it is estimated that the percentage of primary care physicians using ultrasound is in the single digits percentages in most countries. So, one of the main questions to be answered, is how to best promote, the implementation of an AI-based handheld ultrasound to a European family practitioner

The driving factors of the point-of-care ultrasound device, are the increasing emphasis on immediate and on-the-spot clinical diagnosis of a patient, reduction in the risk of a failed diagnosis, and the performance of visual-based diagnostic procedures, rather than sending the patient to a radiology clinic if possible. Emergency physicians specifically, have adopted these mobile devices for fast and efficient clinical triage and assessment.

Two of the major barriers to the wider implementation of a handheld ultrasound device are the long-time obligatory learning and training curve and the subsequent lack of ultrasound skills. However, as the handheld ultrasound market will expand during the coming years, it is expected to be strongly driven by new user groups. Thus, the above barriers will be greater than ever before. The initial investment in handheld ultrasound devices is a burden, yet comparatively less "painful" for small-scale clinics to invest in. Meanwhile, the reimbursement for the diagnostic procedure is merely being given the appropriate attention and hasn't been resolved in most countries.

The above barriers can be partially addressed by artificial intelligence (AI) solutions that guide users with the positioning and moving of the ultrasound probe. In addition to AI for image capture support, AI solutions for image analysis will enable the evolution of ultrasound to a more efficient practical tool for users. Robust validation of the AI solutions, especially for the non-expert user, is the main reason for the lack of adoption of AI-based ultrasound in China.

From the manufacturer's perspective, the main challenge and obstacle to overcome is the question of how these AI applications are going to be paid for. Due to the low cost of handheld ultrasound devices, with the global average selling price, now down to around \$4,000, vendors need large sales volumes to make a profit. This is a challenge as handheld ultrasound has not yet achieved mainstream adoption. As such, most dedicated handheld ultrasound vendors are not yet profitable. Adding an AI vendor's compensation to this challenge does not ease the penetration rate of AI applications.

We developed an AI-based application that assists the family practitioner in performing a short cardiology examination. The application helps reach optimal views and when these views are reached, it calculates and presents cardiac parameters such as ESV, EDV, EF, RV/LV, IVC collapse rate, and pericardial effusion. In this presentation, we will propose a possible feasible answer to the above challenges and will ask for your input regarding the optimal strategy for the implementation of AI-based handheld devices.

POCUS IN FAMILY MEDICINE/GPs CURRICULUM (BASIC AND ADVANCED LEVEL).

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I. Definitions and abbreviation POCUS in Primary Healthcare

Abbreviation:

POCUS - Point-of-care Ultrasonography
POCUS - Point-of-care Compression Ultrasound
CUS - Clinical ultrasound
CUS - Clinical ultrasonography

Definitions:

1. What does POCUS mean in family medicine?

PoC-US represents a complementary ultrasound investigation done by the clinician at the person's home or in the family doctor's office, wherever the patient is situated, addressed to symptomatic patients with acute or chronic conditions, with the early diagnostic purpose or/and to guide and lead the treatment management. PoC-US practically represents an extension of the clinical examination in the family doctor's practice and is based on and directly correlated with the location of the symptoms.

It is the right hand of medical specialties, playing a prominent role in an emergency, acute or chronic pathology, especially in the family doctor's practice. POCUS could be a central pillar in the first contact with the symptomatic patient. [3].

Point-of-care ultrasound can be defined as the use of an image-producing ultrasound device for diagnostic and procedural guidance by the clinician himself at the point of care, in real-time allowing for direct correlation with signs and symptoms. Point of care ultrasonography (POCUS) is advanced diagnostic ultrasonography that is performed and interpreted by the attending physician as a bedside test [1].

It is integrated into the clinical work and may increase the accuracy of diagnoses or aid procedures as well as reduce time spent on diagnoses and decrease overall costs [2].

General practitioners are trained to manage both chronic conditions as well as acute emergencies, often within the same session, seeing women and men, young and old. The Point of Care Ultrasonography - performed by the clinician at the site of patient care is an important tool to guide case management for the early diagnosis with a targeted purpose. It represents an extension and complements the clinical examination of physicians to achieve an accurate positive and differential diagnosis.

In conclusion, because of a significant number of advantages, ultrasonography should be a diagnostic tool besides the stethoscope in the general practitioner's office. In our opinion, the two instruments should be considered complementary.[5]

POCUS is defined as „ultrasonography brought to the patient and performed by the provider in real time”[1].

It is designed to answer a specific clinical question or to perform a specific procedural aim and is not a replacement for a formal ultrasound examination or screening.[1, 2].

POCUS is useful to rule in, or rule out, medical emergencies, diagnose conditions of low to moderate complexity, and to monitoring acute and chronic illnesses independent of hospital infrastructures[2-7].

Point-of-care ultrasound (PoCUS) is a cost-effective diagnostic technology that, with training, is accessible, portable, and a convenient diagnostic modality to complement physical assessments. PoCUS is beneficial in that it can reduce the number of imaging tests required, while also mitigating barriers to healthcare for rural and remote communities.

POCUS refers to the use of ultrasound at a patient's bedside for diagnostic or therapeutic purposes. The clinician uses **point-of-care ultrasound (POCUS)** to guide the evaluation and diagnosis in conjunction with a traditional medical examination. PoCUS is a focused ultrasound examination performed immediately in the context of the physical examination.

The central question is what should and must a doctor specializing in general medicine be able to do to carry out basic medicine with ultrasound: Essentially, it is about being able to decide with greater accuracy in acute situations with the support of emergency sonography in particular ("triage tool" emergency sonography) whether a patient can continue to be treated at home or whether further acute diagnostics and treatment within the hospital are necessary. This saves other diagnostic examinations and leads to an earlier start of adequate therapy. Many clinicians have agreed that POC ultrasound, due to its scoped capabilities, works well as a complement to physical assessment.⁵ The difference between traditional ultrasonography and POC ultrasound? The latter lets the doctor perform "acquisitions and interpretations of images at the point of care."^[6] They can use this curated data immediately to reach a quick and reliable diagnosis that will guide the next steps in the patient's treatment journey. There are, therefore, many settings where the GP could potentially benefit from her use of PoCUS. Both the interest and the actual extent of use among GPs are increasing and PoCUS training is also increasingly implemented in residency programs [10]. However, the amount of research on PoCUS performed by GPs is still rather limited compared to other specialties in which it has become more established, such as the specialty of emergency medicine [11, 12]. It is integrated into the clinical work and may increase the accuracy of diagnoses or aid procedures, as well as reduce time spent on diagnoses and decrease overall costs [2].

PoCUS always is clinical ultrasound(CUS), but clinical ultrasound includes both POCUS directly correlated with patient symptoms and comprehensive specialist ultrasound. (Christian Jenssen).

POCUS deals with narrowly defined clinical questions within a body region or an individual organ without claiming to comprehensively assess a region or an organ system. Point-of-care ultrasound can be defined as the use of an image-producing ultrasound device for diagnostic and procedural guidance, by the clinician himself, at the point of care, in real-time allowing for direct correlation with signs and symptoms.

Point-of-Care ultrasound (POCUS) is based on target ultrasound that is performed wherever a patient is being treated, and by a non-radiologist directly involved in the patient's care.

Point-of-care ultrasound (PoCUS) is a cost-effective diagnostic technology that, with training, is accessible, portable, and a convenient diagnostic modality to complement physical assessments. [21]. A point-of-care ultrasound exam involves using ultrasound to answer specific clinical questions or guide a procedure at the "point of care," whether in a hospital or a remote setting. It provides a quick, non-invasive way to speed the diagnosis and treat the patient more effectively. Point-of-care Ultrasound (PoCUS) is defined as a 'diagnostic or procedural guidance ultrasound that is performed by a clinician during a patient encounter to help guide the evaluation and management of the patient. There is also a difference between POCUS and the term "bedside ultrasound", as "bedside ultrasound" is an older term that describes the sonographic assessment of patients, usually in a medical facility, at the patient's bedside. POCUS is a broader term that includes the many scenarios (emergency room, ambulance, helicopter, etc.) in which portable ultrasound can be used. [20,22,26,30].

2.What does clinical ultrasound mean?

Clinical ultrasound (CUS) is defined as a focused ultrasound examination performed and interpreted by the treating clinician, at the point of care, to interrogate a specific clinical question or to guide a procedure. Clinical ultrasonography is a diagnostic modality that provides clinically significant data not obtainable by inspection, palpation, auscultation, or other components of the physical examination, and should be considered complementary to the physical examination. It is a separate entity that adds anatomic, functional, and physiologic information to the care of the patient. (17)

Clinical ultrasound, for this paper, will be considered synonymous with other terms such as “bedside,” “focused,” and “point-of-care-ultrasound (POCUS). Emergency Ultrasound (EUS) is an example of a sub-category of CUS.

CUS is intended to be goal-directed and focused to answer brief and important clinical questions in an organ system or query a clinical symptom or sign involving multiple organ systems. It may be performed as a single examination, repeated due to clinical need or a change in condition, or used to monitor physiologic or pathologic changes and assess the response to treatment.

Because CUS is performed, interpreted, and integrated into patient management by the evaluating clinician contemporaneously with the patient’s evaluation, it enjoys some unique properties. Real-time visualization of critical and pathological anatomy increases the safety of many procedures which have historically been performed without imaging guidance. This includes removal of retained foreign bodies, needle placement, incision and drainage, regional anesthesia, fracture reduction, and joint dislocation reduction.

The difference between POCUS and consultative ultrasonography is that the doctor performs all acquisitions and interpretations of images at the point of care and uses information immediately to address specific hypotheses and guide therapy in progress.

1. POCUS vs. Bedside Ultrasound

POCUS is similar to “bedside ultrasound,” but there are some key differences. A bedside ultrasound is a traditional term that uses a sonographic assessment of the patient when they cannot move from their bed to another location for scanning.

POCUS encompasses a bedside ultrasound but is usually performed by a physician and provides much more flexibility. While traditional US certainly still has its place, POCUS allows the physician to review and interpret images and make critical decisions at the point of care.

2. POCUS vs. Comprehensive Ultrasound Examinations

Unlike a more comprehensive ultrasound examination, POCUS focuses on answering a very specific question. It examines only a particular area of the body or organ. They are also generally performed by the same clinician who has asked the specific question.

3. POCUS Uses in the Emergency Setting

POCUS can be used in virtually any care setting. However, because of its ease of use and speed of diagnosis, it has proven invaluable in Emergency Medicine. This technology can also combine with other assessment tools to assist with a quick diagnosis. Below are a few examples of how POCUS can assist in emergencies.

Practical examples of POCUS ultrasound-assisted assessment used in the emergency setting include:

eFAST: extended focused assessment with sonography for trauma

FOCUS: focused cardiac ultrasound

RCA: rapid cardiac assessment

BLUE: bedside lung ultrasound in emergency

RADiUS: rapid assessment of dyspnea with ultrasound

RUSH: rapid ultrasound in shock

FEEL: focused echocardiography in emergency life support for cardiac arrest⁷

ACES: abdominal and cardiac evaluation with sonography in shock⁸

FEPO - fast evaluation of parenchymal organs

II.POCUS curriculum (basic and advanced). Selection criteria.

The criteria for the selection of the modalities have been the following:

- 1.Adherence to the principle of point-of-care ultrasound which we define as: a limited and specific ultrasound examination performed at the bedside by the provider caring for the patient. It usually answers a specific question that helps guide treatment. Typically, the answer is dichotomic e.g., the gallstone is either present or absent.**
 - 2.The condition should be commonly encountered (prevalence) in general practice for the GP to gain and maintain competency over time.**
 - 3.Sensitivity and specificity should to the widest possible extent guide the choice of content to reduce the risk of false positive and false negative results thereby avoiding overdiagnosis and causing harm to the patient. We are aware that for several modalities these criteria cannot be fulfilled. In these instances, best practices must be applied.**
 - 4.Diagnostic/therapeutic consequences: relevant up to high. (Viktor Ruttermann)**
 - 5.The modality should be easy to learn.**
 - 6.The GPs should be able to perform the scan in less than 5-10 minutes.**
 - 7.The modality should be acceptable to the patient.**
 - 8.The modality must make a difference in the management of the patient.**
 - 9.To the widest possible extent contribute to the efficient use of resources in the overall healthcare system e.g., reduce the number of referrals to other healthcare providers.**
- The central question is what should and must a doctor specializing in general medicine be able to do to carry out clinical exams completed with POCUS in diagnostic or procedural scope.

III.Methodology for establishing the POCUS curriculum for Family physicians / GPs

Curricula should include details of the following:

A. POCUS Applications to be included:

- ▶ Demonstration of how to generate and optimize an image (from literature)
- ▶ CORE selection of applications (surveys, literature)
- ▶ Enhanced selection of applications (surveys, other national curricula)
- ▶ Demonstration of good practice in Family Medicine/GPs practice (research, literature)
- ▶ Diagnostic applications(AAA, multiple areas to be evaluated) / or Procedural applications (vascular access)

Each application should include:

- What it is, and its potential benefits.***
- Equipment requirements***
- Knowledge of anatomy/pathology***
- Techniques/skills requirement***

B. Methodology of training for each application:

- ▶ ***Introductions to applications (introductory course, online learning, guidelines)***
- ▶ ***Time to gain experience for each application (Hands-on session, workshops, simulations, fellowship programs, the required number of ultrasound examinations)***
- ▶ ***Achieving competency, credentialing for each application (the methodology of training doctors, the required preparation time for each application, final exam for obtaining the competence)***
- ▶ ***Keeping up skills and knowledge. (continuous quality improvement)***

C. Methods of teaching POCUS courses in Family Medicine/GPs:

The general opinion is for a modular format of Basic (elementary level) and advanced level courses by POCUS for the family doctor.

The curriculum will be structured in three main chapters:

1. Basic training: Ultrasound physics and basic functions of ultrasound scanner, basic notions of ultrasound semiology. (2 days - 16 h)

Basic training - concepts of ultrasound physics and basic ultrasound functions, the choice of the ultrasound probe, the settings of the ultrasound machines, the choice of ultrasound technique and application, basic concepts of ultrasound semiology and ultrasound semiology (standard sections and plans, normal sonoanatomy and pathological) (two-day courses, 16 hours).

2. Basic Level (2 days -16h) - Pocus Applications based on topographic regions centered on the patient's symptoms:

Elementary-level POCUS applications, based on topographic regions centered on the patient's signs and symptoms in different topographical regions with standard plans and sections. (two-day courses, 16 hours).

3. Advanced level. (2 days -16 h / topographical region)- POCUS Applications with a higher degree of complexity based on different topographical regions centered on the patient's symptoms:

Symptom-centered topographical regions patients (two-day courses, 16 hours for each topographical region) with a higher degree of complexity. Multimodular - multiple modules, each based on a topographical region of interest.

A minimum of 300 documented sonographic examinations of all topographical regions at the basic level will be required to obtain accreditation in the practice of POCUS in family medicine.

We propose the issuance of a certificate of ultrasonographic skills by WFUMB/EFSUMB/EUVEKUS/WONCA or another specialized professional organization - "POCUS applications in general medicine/family medicine", following an appropriate theoretical and practical technical discussion (final teaching), about the content teaching of modules and documented cases.

Teaching with a WFUMB/EFSUMB/EUVEKUS/WONCA or other professional organization course leader and two medical trainers of family with competence in general ultrasound.

Proof of continuous training is MINIMUM two days (16 hours), within three years for different POCUS applications depending on their degree of difficulty

Modules teach ultrasound technique, physical basics, emergency, abdomen/pelvis (including basic gynecology and urology), cardiac, thoracic, vascular, thyroid, interventional, small-parts ultrasound, pediatrics, and advanced knowledge focused on the topic. The courses are held in cooperation with the responsible working groups. Preclinical sonography in family medicine modules I and II serve to deepen sonographic competence.

The different POCUS applications in the advanced module can be selected from the group of training content, according to the individual clinical needs of each family doctor, and useful in his workplace.

Courses conducted abroad and documented cases will be credited if they are equivalent and recognized by EACCME.

D. Minimal course requirements:

- **Minimum requirements for the organization of the POCUS course in primary medicine:**
- **It is led by lecturers WFUMB/EFSUMB/EUVEKUS/WONCA or another national or international professional organization, with a theoretical part and mandatory hands-on sessions and practical workshops in which the participants will perform all types of taught applications.**
- **Five to maximum ten course participants share one device and are supervised by a tutor.**
- **Course instructors and at least half of tutors must be WFUMB/EFSUMB/WONCA/EUVEKUS/or other professional organization approved trainers.**
- **Quality control – evaluation of the courses.**
- **The courses are published on the website of WFUMB/EFSUMB/EUVEKUS/WONCA or other national or international professional organizations.**

E. Specific objectives of the POCUS curriculum

At the end of these training modules of POCUS the family physician/GP will be able to:

- knows how to choose the appropriate ultrasonographic technique (transducer, section, equipment setting, technique);
- knows how to make a quick emergency diagnosis, using the ultrasonographic result;
- participated in the formulation of an ultrasound bulletin, supervised by the training manager;
- integrate the obtained ultrasonographic information and other imaging investigations in the clinical context of the patient;
- identify the need to request an imaging investigation (knowledge of indications and contraindications and the opportunity to perform them);

At the end of the two basic modules, the family doctors/GPs must be able to formulate a clinical question that can be answered through a POCUS application (with simple yes or no answers) and know the standard sections and plans used in all the basic POCUS application types from the Curriculum.

F. Barriers of POCUS in Family Medicine /GPs.

- Insufficient training module
- Lack of training doctors specialized in POCUS education in primary healthcare
- Insufficient practice time
- Insufficient knowledge of ultrasound
- Unavailability of ultrasound machine
- Insufficient cases to practice on
- Insufficient supervised practice time.
- Insufficient educational infrastructure.

IV.Classification of topographic regions of POCUS applications in family medicine (basic and advance levels):

- 1.PoCUS applications in abdominal pathology
- 2.PoCUS applications of the pelvic pathology
- 3.PoCUS applications in thoracic pathology (Chest and Lung Ultrasound)
- 4.PoCUS - applications for non-cardiologists - The Rapid Cardiac Assessment for heart diseases. FOCUS
- 5.PoCUS applications in the vascular diseases
- 6.PoCUS applications in the symptomatic breast.
- 7.PoCUS applications in thyroid pathology.
- 8.PoCUS applications to soft tissue and musculoskeletal disorders
- 9.PoCUS applications in gynecology and obstetrics
- 10.PoCUS applications in urology.
- 11.PoCUS applications in pediatrics
- 12.The Extended Focused Assessment using Sonography in Trauma (eFAST)
- 13.Procedural or intervention guidance

V. Basic training curriculum : Ultrasound physics and basic functions of ultrasound scanner, basic notions of ultrasound semiology (Basic level):

- Ultrasound physics
- Transducer types
- B mode, M mode
- Doppler, Elastography
- Knobology (gain, depth, freeze image, measure, focus, frequency)
- Common artifacts
- Scanning conventions
- Probe movements
- Ultrasonographic elementary semiology (normal, pathological)
- Obtaining an optimal ultrasound image: recognition criteria, methods of achievement, standard ultrasonographic sections and plans.
- Anatomy and sono-anatomy
- Formulation of a clinical question with imaging response based on topographical signs and symptoms.
- General indications, limitations, artifacts and possible errors.
- The risk of overdiagnosis or underdiagnosis in ultrasound practice. Tips and tricks.

VI. POCUS Applications based on topographic regions centered on the patient's symptoms: Basic and Advanced Level

1. POCUS applications in abdominal pathology

► POCUS in upper abdominal pathology (liver, gallbladder, pancreas, spleen); (Basic level)

✓ POCUS applications to the liver:

Right upper quadrant (RUQ): assessment of the pathogenicity of liver formations (liver abscess, biliary cysts, hydatid cyst), focal liver lesion (FLL), liver tumor (benign – adenoma, hemangioma, focal nodular hyperplasia FNH, and malignant – hepatocarcinoma [HCC], hepatoblastoma, cholangiocarcinoma), diffuse liver lesions, liver abnormal in size (hepatomegaly), outline, echo pattern and/or presence of solid lesions, intrahepatic bile duct dilatation, liver cirrhosis, biliary cirrhosis, metastatic liver, increased hepatic echogenicity (NAFLD)/steatosis, hepatitis, NASH, congestive hepatomegaly, traumatic liver changes, visceral ruptures - liver, diagnosis of ascites, portal hypertension, portal venous thrombosis, dilation of extrahepatic bile ducts, choledochal lithiasis, obstructive jaundice.

✓ POCUS applications to the gallbladder:

Acute cholecystitis (congested gallbladder >10x4 cm ± gallstones), chronic cholecystitis of the gallbladder, gallbladder polyps, common bile duct disease, gallbladder tumors, gallbladder carcinoma, porcelain gallbladder, strawberry atrophic gallbladder.

✓ Pancreas POCUS applications:

Enlargement of the head of the pancreas and enlargement of the pancreatic duct (Wirsung), evaluation of acute or chronic pancreatitis, pancreatic cyst, and pseudocyst, and evaluation of pancreatic tumors.

✓ Spleen POCUS applications:

Left upper quadrant (LUQ): focal lesions of the spleen, traumatic changes of the spleen, tumors, and cysts of the spleen, ruptured spleen / Splenomegaly from different pathologies: hepatopathies, hematological or oncological diseases, systemic and infectious diseases, focal splenic lesion (FSL), splenic hematoma, splenic abscess.

► POCUS in the pathology of the middle abdominal floor (digestive tract, retroperitoneal space); (Basic level)

✓ Stomach POCUS applications:

Gastric stasis, gastroesophageal reflux disease (GERD), gastric perforation, gastric ulcer, gastritis, hiatal hernia, gastric tumor, perforated esophagus, duodenal ulcer, infantile hypertrophic pyloric stenosis (pyloric muscle thickness ≥5mm, gastric pyloric canal length ≥16mm), gastric hyperperistalsis or gastric emptying disorder (dilated, fluid-filled stomach, without dilated, fluid-filled small intestinal loops, gastroparesis).

✓ Bowel POCUS applications:

Evaluation of appendicitis, diverticulitis, hernia and ileus, ileocolitis, mesenteric lymphadenitis, free fluid in the bowel – hydro-aerial imaging, disease of the rectum or colon, and complicated diverticulitis, colitis, ultrasound evaluation of Crohn's disease and pneumoperitoneum, anal fissures, hemorrhoidal disease, rectal abscesses, ulcerative rectocolitis, assessment of the rectum diameter.

✓ POCUS applications to the adrenal glands:

Hyperplasia, hemorrhage, focal lesions, and tumors of the adrenal glands.

✓ POCUS applications in the retroperitoneal space: Evaluation of abdominal lymph nodes and tumors.

✓ Kidney POCUS applications:

Hydronephrosis, renal lithiasis, pyelonephritis (perirenal fluid), urinoma (perirenal fluid), renal tumor, visceral ruptures - kidney, evaluation of benign and malignant renal tumors, ureteral obstruction (dilated ureter), ureteral stones (with echogenic reflexes, with posterior shadowing and twinkling.)

2. POCUS applications in pelvic pathology:

► POCUS applications in lower abdominal pathology (bladder, prostate, uterus, ovaries); (Basic level)

✓ Bladder POCUS Applications:

Residual urine (post micturition bladder volume >300 cm³), urinary retention, chronic obstructive micturition disorder (bladder wall thickening or diverticula), bladder calculi (echogenic reflexes with shadowing (and twinkling), bladder neoplasia, segmental bladder wall thickening, bladder polyps or diverticula, bladder infection, Foley's balloon in the bladder, hemorrhagic cystitis, ureterocele.

✓ **Ovarian POCUS applications:**

Adnexal mass, evaluation of ovarian pathology, ovarian cysts, ovarian torsion, ovarian tumor/adnexal mass, ruptured ovarian cyst, polycystic ovaries, teratoma.

✓ **Prostate POCUS applications:**

Evaluation of prostate urinary disorders, hypertrophy of the prostate, prostatitis, prostatic hyperplasia (prostate volume >20 cm³), acute urinary retention, prostate tumors, or adenocarcinoma.

✓ **POCUS applications in trauma:**

FAST and EFAST evaluation in abdominal trauma and poly trauma.

✓ POCUS applications in the acute pelvis: Assessment of free fluid in the pelvis.

3. POCUS applications in thoracic pathology (chest and lung ultrasound)

✓ Pleural and pericardial effusion (pleurisy, empyema, hemothorax, pericarditis, hemopericardium, cardiac tamponade, pleural mesothelioma) (Basic level).

✓ Exacerbation of HF (Heart Failure) (Advanced level).

✓ Pneumothorax (Basic level).

✓ Interstitial syndrome (Advanced level).

✓ Rib fractures (Basic level).

✓ Pneumonia, bronchopneumonia, atelectasis (Advanced level).

✓ Pulmonary embolism (Advanced level).

✓ Pleuropulmonary lesions in COVID-19 (Advanced level).

✓ Diagnosing or monitoring interstitial pneumonia (adults and children); (Advanced level).

4. POCUS - applications for non-cardiologists: The Rapid Cardiac Assessment for heart diseases /FOCUS:

► **Focused echocardiography (Advanced level)**

✓ Left ventricular ejection fraction.

✓ Left ventricular hypertrophy.

✓ The dimensions of the cardiac chambers.

✓ Increased sizes of heart chambers LV, RV, and LA.

✓ Pericardial effusion (Basic level).

✓ Obvious cardiac pathology.

✓ Inferior vena cava pathology (Basic level).

✓ Identification of valvulopathies and intracardiac thrombi.

✓ Pulmonary embolism (enlargement of the right ventricle, "D" sign and abnormal movement in the interventricular septum, restricted left ventricular filling).

✓ Contractility disorders – hypokinesia or paradoxical movement of the septum.

✓ Arrhythmia.

✓ Assessment findings for atrial and ventricular septal defects.

✓ Decreased left ventricular contractility.

✓ Assessment of left and right ventricular size and function (diastolic and systolic enlargement and dysfunction).

✓ Heart attack, cardiac arrest, shock.

✓ Hypovolemia.

✓ Identification of intracardiac thrombi.

✓ Obstruction or obstruction of left ventricular flow.

✓ Regional wall motion disorder/myocardial ischemia.

✓ Diastolic dysfunction (E/A<1 or E/A>2 ratio).

✓ Reduced ejection fraction (Eye-balling contractility and left ventricle function).

✓ Reduced shortening fraction.

✓ Regurgitation/valvular stenosis.

5. POCUS applications in vascular diseases

- ▶ AAA (abdominal aortic aneurysm) (Basic level).
- ▶ Evaluation of aortic aneurysm or intra-abdominal venous thrombosis. (Basic level)
- ▶ Carotid intima-media thickness (IMT) – arteriosclerosis (Basic level).
- ▶ Evaluation of internal intr-abdominal hemorrhage (Basic level).
- ▶ Ultrasound assessment of pelvic vessels (Advanced level).
- ▶ Deep vein thrombosis/three-point and four-point compression ultrasound (Basic level).
- ▶ Carotid stenosis (Basic level).
- ▶ Pseudoaneurysms (Advanced level).
- ▶ Acceleration of flow (not the degree of stenosis), aneurysm, occlusion, thrombosis of abdominal and peripheral vessels (Advanced level).

6. POCUS applications in the symptomatic breast

- ▶ Sore breast / Painful breast (Basic level).
- ▶ Redbreast (Basic level).
- ▶ Asymmetric breast, retractable nipple, "orange peel" (Advanced level).
- ▶ Palpable breast tumor examination (Basic level).
- ▶ Breast with galactorrhea (Advanced level).
- ▶ Induration and palpable breast mass or ▶ Breast Lump (Basic level).

7. POCUS applications in thyroid pathology

- ▶ Evaluation of diffuse thyroid pathology: goiter, Grave's disease, Hashimoto's thyroiditis, De Quervain's subacute thyroiditis, Acute suppurative thyroiditis, Thyroid malformations, Thyroiditis: Acute thyroiditis (AT), Subacute thyroiditis (SAT), Chronic autoimmune thyroiditis (CAT). (Basic level)
- ▶ Evaluation of focal thyroid pathology – benign nodules: colloid cysts, spongiform cysts, colloid nodules, follicular adenomas, Hashimoto's thyroiditis nodules, hyperplastic nodules, thyroid nodules in subacute thyroiditis, nodular goiter ((Basic level)).
- ▶ Evaluation of focal thyroid pathology – malignant tumors: hyperplastic nodules, anaplastic thyroid cancer, papillary carcinomas, follicular carcinomas, medullary carcinomas, Hurthle cell carcinoma, thyroid lymphoma – rare, thyroid metastases – rare. (Basic level).
- ▶ Examination of the hypertrophic cervical region/ the goiter exam. (Basic level).
- ▶ Painful anterior cervical region (Basic level).

8. PoCUS applications to soft tissue and musculoskeletal disorders:

▶MSK POCUS Applications: (Advance level)

▶Shoulder (Advance level):

- ✓Gleno-humoral joint effusion
- ✓Rotator cuff tendinopathy
- ✓Rotator cuff lesions (partial/total)
- ✓Subdeltoid bursitis
- ✓Biceps teno-synovitis
- ✓Acromio-clavicular joint effusion/synovitis

▶Elbow (Advance level):

- ✓Joint effusion
- ✓Epicondylitis (lateral/medial)

▶Knee (Advance level):

- ✓Knee joint effusion (basic)
- ✓Bakers' cyst (advanced)
- ✓Patellar tendinopathy (advanced)
- ✓Quadriceps tendinopathy (advanced)

▶Ankle/foot (Advance level):

- ✓Ankle joint effusion
- ✓Achilles tendinopathy
- ✓Fascia plantaris tendinopathy

▶Hands (Advance level):

- ✓Tendinitis, teno-synovitis, bursitis, synovitis
- ✓Carpal tunnel syndrome

▶ Bones fracture (Basic level)

▶ Gout, osteoarthritis (Advance level)

► **Small parts POCUS applications:**

- ✓ muscle fiber tear, hematoma, tendinitis, tendon ganglion, tendon tear, subcutaneous foreign bodies, abscesses, lymph nodes, groin, tumors. (Basic level)
- ✓ neurosono, nerve blocks (Advance level)

► **Skin POCUS applications:**

- ✓ Absces vs. phlegmone (Basic level)
- ✓ Hematoma, Absces (hypoechoic mass +/- fluctuation on probe compression +/- flow inside with CDI) (Advance level)
- ✓ Foreign body (Basic level)
- ✓ Lumps and bumps (Basic level)
- ✓ Epidermal inclusion cyst (Basic level)
- ✓ Simple lipoma (Basic level)
- ✓ Prominent xiphoid process (Basic level)
- ✓ Flat and cavernous cutaneous hemangiomas (Advance level)

9. POCUS applications in gynecology and obstetrics

- Viable intrauterine pregnancy (Basic level).
- Establishing the gestational age in the first trimester (establishing the size of the gestational sac, establishing the length of the embryo by the craniocaudal length - LCC or CRL, the appearance of the fetal heartbeat [BCF], when the embryo reaches about 5 mm); 6 weeks and 3-4 days (Basic level).
- Intrauterine pregnancy/early pregnancy (Basic level).
- Placement/position of the intrauterine device (Advance level).
- Determination of gestational age in the second and/or third trimester of pregnancy (Advanced level).
- Early (advanced) pregnancy and ruptured ectopic pregnancy (Advanced level).
- Fetal position (Advanced level).
- First-trimester ultrasound, weeks 11- 14 of pregnancy, with nuchal translucency screening that measures the transparent (translucent) space at the level of the tissue behind the child's neck. The combined test or the first-trimester screening test (the bitest) (advanced level).
- Fetal heartbeat (Basic level).
- Fetal position (Advanced level).
- IUD position (Advanced level).
- Number of embryos (Basic level).
- The viability of the intrauterine fetus, the positioning of the placenta, the detection of fetal movements, the presence of amniotic fluid. (Basic level).
- Pathology regarding the uterus, appendages, and ovaries (level of the base; see pelvic applications).

10. POCUS applications in urology

- **POCUS applications regarding the kidneys.** Pyelocalyceal congestion/stasis, perfusion defect, detection of hydronephrosis, ureterohydronephrosis, evaluation of renal colic, presence of urolithiasis, pre vesical renal lithiasis (but, of example, not ureteral lithiasis), presence of urolithiasis, acute or chronic pyelonephritis, pyonephrosis, renal infarction (Basic level).
- **POCUS applications regarding the urinary bladder:** Bladder disorders (shape, volume, ureterocele, tumors, diverticula, polyps, bladder stones) (Basic level).
- **Testicular POCUS applications:** Acute scrotum - evaluation of acute testicular pain (torsion, pain, inflammation, and tumors), orchitis, testicular torsion, testicular infarction and hydrocele (Advanced level).
- **POCUS applications for the prostate.** Prostate enlargement and diffuse and focal prostate pathology (see pelvic applications) (Basic level).

12. Extended Focused Assessment Using Sonography in Trauma (eFAST):

Identification of free fluid and air in the peritoneal and pleural cavity.

- ▶ Peritoneal and pericardial free fluid (Basic level).
- ▶ Pneumothorax (Basic level).
- ▶ Pneumoperitoneum (Basic level).
- ▶ Pericardial effusion/cardiac tamponade (Basic level).

13. Ultrasound-guided interventions and procedures

- ▶ Fine needle punctures, cysts, adenomas, lipomas, metaplasia of breast and thyroid (Advanced level).
- ▶ Intra- articular injections and aspiration of large joints, bursae, and tendon sheaths (Advanced level).
- ▶ Blood samples, Venous puncture (Basic level).
- ▶ Administration of fluids and drugs in peripheral veins (Basic level).
- ▶ Performing thoracentesis guided by ultrasound (Advanced level).
- ▶ Performing paracentesis guided by ultrasonography (Advanced level).

VII. EUVEKUS experience in the preparation of the POCUS curriculum and continuing medical education in family medicine at the European level:

The acronym EUVEKUS means: Europäische Vereinigung für die Entwicklung von Klinischen Ultraschalluntersuchungen im Ambulanten Gesundheitswesen or European Association for the Development of Clinical Ultrasonography in Ambulatory Health Care (Outpatient Health Care) - EADUS.

Created in 2011, the European Ultrasound Working Group in Family Medicine EUVEKUS (EADUS) contains a large number of family doctors practicing ultrasonography with competency and certified in general ultrasound and other ambulatory specialists practicing clinical ultrasound, who are working in urban and rural areas, from Europe. The EUVEKUS headquarters held in Vienna (Austria), 1200 - Wolsfsgasse street no. 2-4, with Dr. Mihai Jacob as President and Founding Member.

Purpose of the Association:

Founding members of EUVEKUS wishes to associate with the main purpose of promoting and developing the use of clinical ultrasound among family doctors and other specialist doctors in ambulatory care, as a complement to the clinical examination, to increase the quality of the medical act, increase diagnostic accuracy, achieving primary and secondary prevention of the population served and improving public health by decongesting emergency services in hospitals.

The objectives of EUVEKUS are to inform patients and the general public about the health benefits of primary disease prevention and the early diagnosis of serious pathologies, such as cancer, through the development and use of clinical ultrasound screening, and to organize the specific training of family doctors and staff with medical or technical training, related to ultrasound, to practice ultrasonography at high-quality standards, alongside the development of research in the field of general ultrasound, by creating study support and multicenter national and international networks of research. We promote medical education/training to improve the practice of clinical ultrasound and the development of modern techniques among family doctors and other outpatient specialists (focus groups, workshops, conferences, symposia, courses on ultrasound, telemedicine, ultrasound guides, medical publications, ultrasound books) to drive this investigation based on internationally validated diagnostic guidelines. We want to promote and use clinical ultrasonography, such as point-of-care ultrasonography, in primary medicine and specialist outpatient clinics, by a significant number of family doctors or specialist doctors, to improve the quality of medical care and diagnostic accuracy to the greatest possible number of patients treated on an outpatient basis, thus contributing to lower costs in the health system and avoiding overcrowding in emergency hospitals. We support the management of the activities of the Primary Care Group and results from ultrasonographic research for promotion or collaborations with other multidisciplinary specialties within national and international medical societies, together with the dissemination of general ultrasound information among family doctors and other health professionals, so we are developing a more effective way of communicating and learning, for easier assimilation of ultrasound techniques and advanced medical technology.

EUVEKUS hosts basal and advance courses in POCUS for students, family medicine residents, family physicians/GPs and other ambulatory specialists with available certification and an EACCME accredited annual Euroson POCUS Conference in Vienna and EFSUMB endorsed.

In the year 2022, a **MEMORANDUM OF UNDERSTANDING (MOU)** was signed between the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) and "Europäische Vereinigung für die Entwicklung von Klinischen Ultraschalluntersuchungen im Ambulanten Gesundheitswesen" (EUVEKUS). This memorandum of understanding aims to establish the framework for collaboration between the parties in terms of common goals and common interests. The parties intend to collaborate on projects, specialized education programs, and events, including but not limited to the following activities:

Areas for collaboration between EFSUMB and EUVEKUS:

- The parties aim to collaborate on projects, specialist education programmes and events, encompassing, but not limited to the following activities:
- To develop an EFSUMB core curriculum for education and training of PoCUS in primary health care
- To define quality standards for performing, documenting, and reporting results of PoCUS in primary health care using hand-held US systems
- To set up a EFSUMB faculty for education and training of PoCUS in primary health care.
- To encourage and support scientific work in the field of PoCUS in primary health care
- To make proposals for EUROSON sessions, EFSUMB webinars and other educational activities on PoCUS in primary health care.
- Pursue other opportunities to progress mutual goals through joint education initiatives or the promotion of beneficial learning opportunities including cross-linking to educational content on the parties' websites.
- Partner on training at meetings.
- EUVEKUS launched a series of educational projects, contributed to the publication of several books and atlases in the field of general ultrasonography, organized a series of workshops and presentations within WONCA Europe Conferences and its networks: EGPRN, EURACT, EURIPA, and launched more many ongoing research projects.

Plans for the future

In addition to the already established activities, EUVEKUS has several plans for its future development:

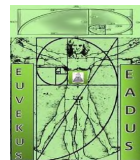
- Better cooperation with other EFSUMB and WONCA Europe networks in joint projects.
- Development of a European POCUS Curriculum and POCUS guidelines in primary healthcare.
- Continuing medical education and the organization of POCUS accredited Courses and Workshops for family doctors at the European level together with EFSUMB and other professional organizations.
- Issuance of a European POCUS accreditation certificate in family medicine at basic / advanced level.
- Working on partnerships in EU projects
- Improving liaison with institutional members
- Database of ongoing projects and research interests for EUVEKUS/EFSUMB members



Fig1. Prof Shlomo Vinker (WONCA Europe President), Dr. Mihai Iacob (EUVEKUS President) and Prof Christian Jenssen (EFSUMB President) at the third edition of Euroson POCUS School Vienna 2022.

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The European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) &

- **Europäische Vereinigung für die Entwicklung von Klinischen Ultraschalluntersuchungen im Ambulanten Gesundheitswesen. ► EUVEKUS**
► **European Association for the Development of Clinical Ultrasonography in Ambulatory Health Care (Outpatient Health Care). ► EADUS**

EFSUMB's objective is to promote the science, research and development of ultrasound and to publish these results. Guidelines and standards are proposed, advice concerning criteria for optimum equipment and techniques and clinical applications. EFSUMB hosts biennial congresses and promotes ultrasound meetings and courses of its National Society members and co-operates with the World Congress for Ultrasound in Medicine and Biology (WFUMB) and other international organisations whose purposes are consistent with those of EFSUMB.

EUVEKUS's objectives are to inform patients and the general public about the health benefits, of primary prevention of illness, and early diagnosis of serious pathologies such as cancer, through the development and use of Clinical Ultrasound Screening and to organize the specific training of family physicians and staff with a medical or technical formation, linked to ultrasounds to practice ultrasonography at the high-quality standards and development of research on General Ultrasound, by creating the support of national and international multicenter studies and research networks. We promote medical education/training to improve General Ultrasonography and the development of modern techniques among family physicians and other ambulatory specialists (focus groups, workshops, conferences, symposia, courses on ultrasound topics, Telemedicine, ultrasound guidelines, medical publications, ultrasound books) to conduct this investigation based on internationally validated diagnostic guidelines. We want to promote and use Clinical Ultrasonography such as the Point of Care Ultrasonography in primary and outpatient medicine, by a more significant number of family physicians or specialist physicians for the enhancement of medical quality and diagnostic accuracy at a greater number of patients treated ambulatory, thereby contributing to lowering costs in the health care system and to avoid the overcrowding of emergency hospitals. We support the management of the Primary Care Group's activities and results from ultrasonographic research for promotion or collaborations with other specialties multidisciplinary) within national and international medical societies and dissemination of general ultrasound information among family physicians and other specialists from out care health, and develop a more effective way of communication and learning for easier assimilation of ultrasound techniques and advanced medical technology.

EUVEKUS hosts basal courses in general ultrasound for students, family doctors, and other ambulatory specialists without available ultrasound certification and an annual conference in Vienna. **This MOU aims to set forth the framework for collaboration between the Parties regarding shared objectives and shared interests.**

Areas for collaboration

The parties aim to collaborate on projects, specialist education programmes and events, encompassing, but not limited to the following activities:

- 1) To develop an EFSUMB core curriculum for education and training of PoCUS in primary health care
- 2) To define quality standards for performing, documenting, and reporting results of PoCUS in primary health care using hand-held US systems
- 3) To set up a EFSUMB faculty for education and training of PoCUS in primary health care
- 4) To encourage and support scientific work in the field of PoCUS in primary health care
- 5) To make proposals for EUROSON sessions, EFSUMB webinars and other educational activities on PoCUS in primary health care
- 6) Pursue other opportunities to progress mutual goals through joint education initiatives or the promotion of beneficial learning opportunities including cross-linking to educational content on the parties' websites.
- 7) Partner on training at meetings.

Conditions of the agreement

Collaboration and co-ordination can be achieved through several channels and venues. EFSUMB and EUVEKUS hereby agree the following:

Rights and confidentiality

Any agreed projects, events and programmes shall not be exclusive i.e. neither party is restricted from opportunities for arrangements with other organisations towards the independent organisations' goals or the shared goals of this agreement.

The parties agree to non-competitive and transparent sharing of information between them as required, but observe the rights of the other to the confidentiality of their own information and documentation as requested. Additionally, non-disclosure of the content of this and other agreements made between the parties shall be observed, to be shared only as mutually agreed.

Branding

The collaborating organisations will be mutually acknowledged as partners on each other's websites. Both parties agree to seek approval from the other for all promotional items bearing their name and/or logo before making them public.

Duration

This MOU will become effective immediately after its approval by the Board of Delegates of EFSUMB and being adopted in EUVEKUS. The MoU remains valid indefinitely unless its termination is desired by either of the parties and can only be concluded by written notification, duly signed by the presiding officer of the notifying party, giving at least sixty days' notice. A review of the MoU will be undertaken every 5 years after signature.

Financial terms

Each party is responsible entirely for the finances of their respective projects, meetings and programmes. The financial terms of any specific projects resulting from the MoU should be developed separately. However, until projects are self-funded, any planning costs incurred by working group members shall be fully funded by the respective party which they represent.

Modification of the MoU

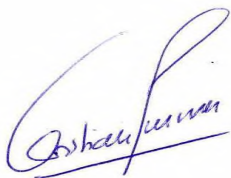
Any modifications to this MoU must be agreed by both parties and in writing.

Duration of the agreement

This MOU will become effective immediately after its approval by the Officers of both EFSUMB and EUVEKUS.

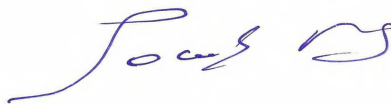
EFUMBEUVEKUS

PO Box 727181200 Wolfsaugasse nr.2-4, Top 5
London SW19 9HD UK Vienna, Austria



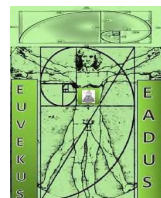
Prof Dr Christian Jenssen
EFSUMB President Signature

26/11/2022
Date



Dr. Mihai Iacob, MD
EUVEKUS President signature

25.11.2022



WONCA Europe Position Paper on the use of Point-of-Care ultrasound (POCUS) in primary care (V4.3)

Author: Dr Sonia Tsukagoshi and Dr Aaron Poppleton, on behalf of WONCA Europe Executive Board

Comments: Professor Shlomo Vinker (Israel), Dr Francois Heritier (Switzerland), Dr Paul Frappé (France), Dr Dr Fabian Dupont (Germany), Dr Peter Sigmund (Austria), Dr Mihai Iacob (Romania), Prof Josep Vilaseca (Spain), Prof Mehmet Ungan (Turkey), Dr Camilla Aakjær Andersen (Denmark), Europrev, EGPRN, POCUS iGP,

Statement

Point of care ultrasound (POCUS) has been introduced across a number of medical specialities, with emerging research showing promising results. We anticipate that POCUS will have an increasingly important place for specific indications within primary care over the coming years, supporting general practitioners to meet the health needs of their patient populations. We recommend that all general practitioners receive training in POCUS that is tailored to the needs of their healthcare context. This training should be delivered during general practitioners' residency and continuing medical education programmes. Where evidence supports the use of POCUS in diagnosis, qualified general practitioners should be appropriately financed for its use in clinics, house calls and community healthcare. We support ongoing efforts to gather evidence for best practice use of POCUS, and to explore the long-term effects of POCUS use on diagnosis within primary care.

Background

POCUS is defined as 'ultrasonography brought to the patient and performed by the provider in real time'. [1] It is designed to answer a specific clinical question or to perform a specific procedural aim and is not a replacement for a formal ultrasound examination or screening. [1, 2] POCUS has been shown to be useful to rule in or rule out medical emergencies, diagnose conditions of low to moderate complexity, and to monitoring acute and chronic illnesses independent of hospital infrastructures. [2-7] Effective use of POCUS has been demonstrated in numerous clinical specialities for a wide range of indications, including those relating to internal organs, such as the heart, lungs, and kidneys, musculoskeletal and vascular conditions, and pregnancy. [3, 4, 8-12] Exposure to and popularity of POCUS during undergraduate medical training has increased over the past decade. [13, 14]

Use of POCUS has been increasing in primary care, [5, 14] with a strong interest among residents in family medicine to incorporate POCUS training into the family medicine curriculum. [15] Indications for POCUS vary between countries, shaped by the requirements of local health systems, the scope of primary care and training of general practitioners. Benefits of POCUS within primary care include its portability, ease of operation, high acceptability amongst patients and high user satisfaction amongst both patients and doctors. [16-18] POCUS can increase doctor confidence and studies suggest it can increase accuracy in diagnosis. [19] POCUS therefore has the potential to improve patient outcomes through a rapid initiation of effective treatment and a reduction in referrals to secondary care for investigations, specialist clinics and hospitalisation. [7, 8] POCUS has the potential to reduce health inequalities and empower general practitioners who work in rural, remote, under-resourced or underserved settings. [20, 21]

However, the use of POCUS in primary care is not without limitations. As with other physical examinations (e.g. pulmonary auscultation, thyroid palpation), accuracy of POCUS is user-dependent.[1, 12, 22] Compared with auscultation/clinical examination alone, focused use of POCUS has the potential to ensure higher levels of diagnostic accuracy and reduce risk of harm.[22]

Without adequate training and continuous utilisation, POCUS can lead to false reassurance, underdiagnosis, misdiagnosis, overdiagnosis and overtreatment.[2, 23] Training should be stepwise and ongoing, including adequate coverage of anatomy and physiology, procedural techniques and communication skills including standardised reporting of clinical findings, and the impact of findings on medical decision making in primary care.[4, 24, 25, 26] Maintaining competency will be an important aspect of ongoing use of POCUS within a generalist speciality.[27] More research is required to identify best practice in training, methods of assessment and quality improvement, including avoidance of overdiagnosis, within the context of primary care. Medicolegal considerations vary across countries and frequently change. This will require providers and institutions to understand local regulatory requirements and legal frameworks to mitigate the potential risks of POCUS. Even, the stethoscope, a tool routinely used by physicians for over 200 years has its limitations and failings.[28]

Reviews of POCUS-associated litigation within secondary care have not identified cases relating to the use of POCUS, but rather to the lack of POCUS use when the technology was available. [29-31] Assessing medicolegal risk is a preventative process to avoid harm, whether to the patient, provider, or institution. Efforts must be made to gather evidence for guidelines on appropriate (and inappropriate) use of POCUS within primary care, in addition to the long-term impact on patient prognosis. We anticipate that specific regulatory frameworks for POCUS in General Practice are likely to evolve with an increased emphasis on quality and safety. We support the development of licensure and availability of General Practitioners to undertake POCUS in countries where this is not currently available.

Conclusion

POCUS is an accessible and promising medical tool capable of increasing diagnostic value and accuracy within primary care. It has the potential to reduce healthcare costs, patient travel, waiting times, and need for referral to secondary care services. It does however have potential risks of underdiagnosis, misdiagnosis, overdiagnosis and overtreatment. We recommend that all general practitioners receive tailored curriculum-based training in POCUS during residency and continuing medical education programmes, with adequate financial provision to undertake POCUS within primary care. We suggest that open dialogue and partnership with providers, administrators, and regulatory agencies experienced in POCUS will enable development of strategies to improve availability, provider performance, patient outcomes and minimisation of risk.



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FEEDBACK QUESTIONNAIRE



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EACCME® participant's evaluation form

1) Quality of the event

How useful for your professional activity did you find this event?

Extremely useful	Useful	Fairly useful	Not useful

If this activity was not useful, please explain why:

What was your overall impression of this event?

	Excellent	Good	Fairly good	Poor	Very poor
Programme					
Organisation					

What was the best aspect of this event?

What was the worst aspect of this event?

2) Relevance of the event

Did the event fulfil your educational goals and expected learning outcomes?

Very much	Somewhat	Not much	Not at all	Undecided

Was the presented information well balanced and consistently supported by a valid scientific evidence base?

Very much	Somewhat	Not much	Not at all	Undecided

How useful to you personally was each session?

	Extremely useful	Useful	Fairly useful	Not useful	Undecided/ DNA
1 st session's title					
2 nd					

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3) Suitability of formats used during the event

Was there adequate time available for discussions, questions & answers and learner engagement?

Yes, always/almost always	Yes, sometimes	Only rarely	Never	Undecided

Can you indicate any innovative elements during the activity?

.....

4) Ways the event affects clinical practice

Will the information you learnt be implemented in your practice?

Very much	Somewhat	Not much	Not at all	Undecided

Can you provide ONE example how this event will influence your future practice?

.....

5) Commercial bias

Did all the faculty members provide their potential conflict of interest declaration with the sponsor(s) as a second slide of their presentation?

Yes, all	Yes, for the majority	Yes, but only a small part	No	Undecided/ don't know

Can you provide an example of biased presentation in this activity?

.....

Do you agree that the information was overall free of commercial and other bias?

Strongly agree	Rather agree	Rather disagree	Strongly disagree	Undecided/ don't know