

# Vscan View



Is Vscan the Next-Generation Stethoscope? Cross-Sectional Comparison of Rapidly Acquired Images with Standard Transthoracic Echocardiography

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Preparing for a Bright Future with Ultrasound

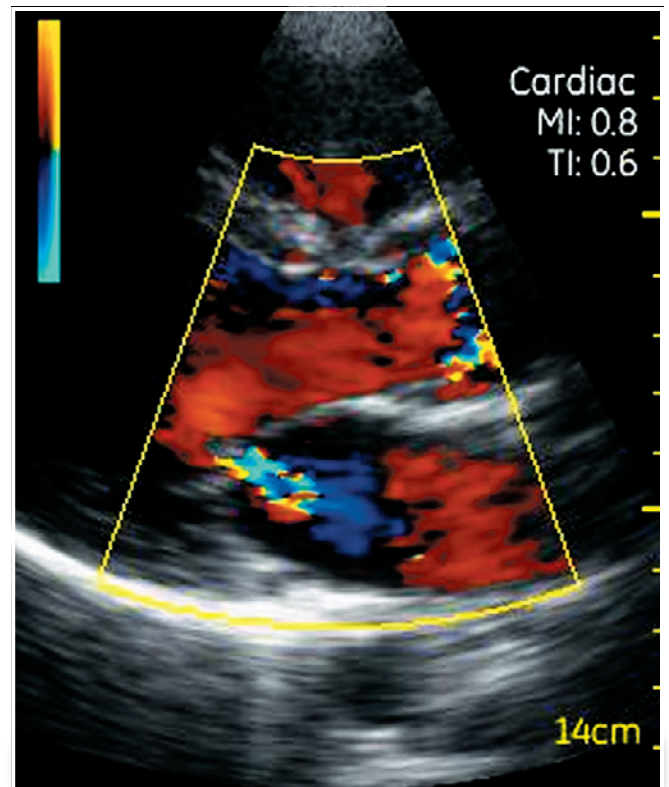
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# Welcome

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Colleagues:

Welcome to the first edition of the Vscan™ View. Vscan has now been in the market for four years and has more than 15,000 proud users globally. It is making a big impact in many clinical areas due to its low cost, ease of use, ultra high reliability and outstanding image quality. In this publication, we would like to share Vscan experiences from some of your peers.

We share a common view to provide the best patient care. GE's contribution is to arm you with tools like Vscan to support this mission. Ultrasound has the potential to be a ubiquitous imaging modality since it provides real-time, no-dose, functional views of the body. It provides important complimentary information during bedside evaluations, physical exams and medical education. In our view, this has the potential to improve clinical outcomes, improve access to better healthcare and reduce overall healthcare cost. Hence, the name View is particularly appropriate for this publication.

In this collection of articles, you will see highlights from experienced and new users of ultrasound. They discuss how Vscan can be used in different clinical settings. They talk about how Vscan training programs can be structured. They demonstrate the clinical and economic impact Vscan has made in their hospitals and clinics – including quick access to information about their patients. Hopefully, this gives you ideas that can be translated to your own practice.

As this is our first issue, we value your feedback. Together, we are at work for a healthier world.

Regards,  
Ajay Parkhe

A handwritten signature in black ink that reads "A. D. Parkhe". The signature is written in a cursive style and is underlined.

General Manager, Primary Care Ultrasound  
GE Healthcare

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# Ghana Uses Vscan to Help Reduce Maternal and Infant Mortality Rates



Clinicians in Ghana will soon be using Vscan in their effort to help reduce maternal and infant mortality rates in the African country.

The introduction of Vscan into Ghana Community-based Health Planning and Services compounds falls in line with GE's commitment to working with local governments, international organizations and Non-Governmental Organizations (NGOs) to address the Maternal and Infant Health (MIH) issue worldwide under the United Nation's Millennium Development Goals (MDGs) 4 and 5 (see story page 20).

Vscan, along with other healthymagination® devices from GE, provides access to healthcare in rural locations throughout

Africa. The clinical training provided by third parties along with the device training provided by GE Healthcare is helping to enhance the skills of Ghana clinicians delivering healthcare to mothers during pregnancy. Since Vscan launched in South Africa in 2010, it has given healthcare workers in remote areas imaging capabilities at the point of care.

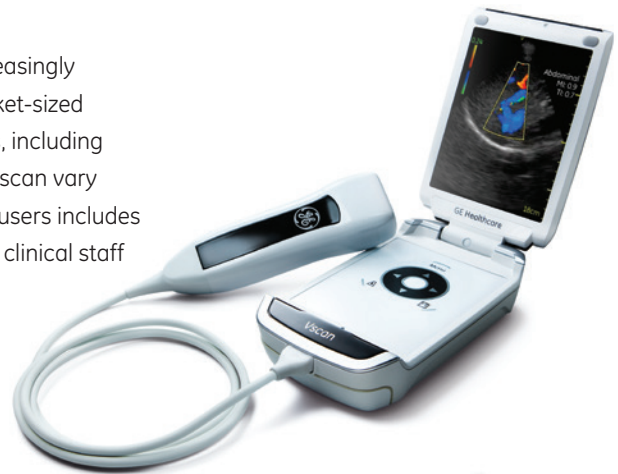
"We are proud to support many governments and private healthcare institutions across the continent with a focus on helping healthcare providers increase access to affordable and quality healthcare, improve skills capacity and ultimately support better patient outcomes," says Farid Fezoua, President & CEO of GE Healthcare in Africa. ■

# Vscan Hits 15,000 Milestone with More on the Way!

The global shipments of Vscan exceeded 15,000 units and adoption of the device continues to grow.

Since it was commercially introduced in 2010, Vscan has becoming increasingly popular among healthcare professionals throughout the world. The pocket-sized ultrasound device has been widely distributed across over 100 countries, including those located in developed and emerging markets. Clinical settings for Vscan vary from hospitals in large cities to clinics in rural areas. The broad range of users includes specialists, such as cardiologists, as well as primary care physicians and clinical staff operating under their guidance.

The team at GE couldn't be more excited see the Vscan community expand as this new category of device continues to help improve access to healthcare and quality of care throughout the world! ■



## Vscan Receives healthymagination Validation

Vscan has received GE's healthymagination validation according to Oxford Analytica, the independent strategic research firm that manages the validation process of healthymagination products.

According to Oxford Analytica's assessment, there is substantial evidence to back up Vscan's claim of improved quality as a healthymagination product. The rigorous validation process involved GE healthymagination Validation Council's assessment of Vscan. As part of its process the Council analyzed Vscan and reviewed peer-reviewed, published case studies and papers, including the study conducted by Cardim et. al<sup>1</sup> (See story Page 12). The Council then submitted the product and documentation to Oxford Analytica's network of experts.

After following its own rigorous process, the research firm delivered its findings.

"Healthymagination validation is a testament to the quality of Vscan," says Steffen Mueller, GE Healthcare Global Product Manager. "We're honored to receive the validation, which is another step in our commitment to help provide better healthcare for more people." ■

1. Cardim N, Golfin CF, Ferreria D, et al. Usefulness of a New Miniaturized Echocardiographic System in Outpatient Cardiology Consultations as an Extension of Physical Examination. *Journal of the American Society of Echocardiography* November 2010; 24(2): 117-24.

\*GE's "healthymagination" is about better health for more people. We've committed \$6 billion to continuously develop innovations that help clinicians and healthcare providers deliver high-quality healthcare at lower cost to more people around the world. For more information about our healthymagination commitment, visit [www.ge.com/healthymagination](http://www.ge.com/healthymagination).

## Is Vscan the Next-Generation Stethoscope? Cross-Sectional Comparison of Rapidly Acquired Images with Standard Transthoracic Echocardiography

By Max J. Liebo, MD; Rachel L. Israel, MD; Elizabeth O. Lillie, PhD; Michael R. Smith, MD; David S. Rubenson, MD; and Eric J. Topol, MD  
Scripps Medical Center, San Diego, California, United States



Although more testing is needed, early indications show the use of pocket mobile echocardiography (PME) by skilled ultrasonographers has the potential to provide accurate cardiovascular assessments in certain cases.

### Study exams 97 inpatients and outpatients

Several cardiologists conducted a study at the Scripps Clinic Torrey Pines and Scripps Green Hospital, La Jolla, California to assess if physician readers could accurately visualize some measurements from PME and TTE images. The 23-day study, which involved a convenience sample of 97 inpatients and outpatients, compared the accuracy of PME as a quick assessment for clinical and subclinical cardiovascular disease with standard TTE by using blinded assessments.

The study, approved by the institutional review board at Scripps Health, specifically calculated interobserver variability for PME image interpretation. Clinicians involved included experienced echocardiographers, as well as cardiology fellows with 2 months or less of training in echocardiographic interpretation. Patients for the study were selected according to a “next-available” model with even-numbered days dedicated primarily to inpatients and odd-numbered days dedicated primarily to outpatients, regardless of the indication for the imaging. Clinicians ordering echocardiography were not aware that patients referred for TTE would also have PME.

## Study acquisition

Ultrasonographers attempted to acquire standard echocardiography projections of parasternal (long axis and short axis); subcostal; and apical 2-, 3-, and 4-chamber views with PME (Vscan) before doing comprehensive TTE (Philips iE33 xMATRIX) with an echocardiograph system. Ultrasonographers were encouraged to complete the PME examination in 5 minutes or less to simulate the length of time a physician might use the PME device as part of the physical examination. The color flow function of the device was turned off to facilitate rapid acquisition of images in keeping with a first-pass examination.

## Study interpretation

Two cardiology fellows with two months or less of basic echocardiography training and two faculty cardiologists with advanced training in echocardiography individually interpreted PME images, which included measurements of the left

ventricular end-diastolic dimensions in the parasternal long-axis view with electronic calipers built into the software of the PME device. Color flow and mitral regurgitation were not assessed to facilitate rapid acquisition of images consistent with a first-pass screening examination.\*

## Discussion

Accuracy of interpretation of PME images by faculty and fellows is detailed in Table 1 as shown. Physicians with less experience disagreed with each other about what the PME images showed more than physicians with more experience. The findings are promising but suggest the device is not ready for general heart assessment use by clinicians untrained in obtaining and interpreting cardiac images. ■

Liebo, MD, M., Israel, MD, R., Lillie, PhD, E., Smith, MD, M., Rubenson, MD, D., & Topol, MD, E. (2011). Is Pocket Mobile Echocardiography the Next-Generation Stethoscope? A Cross-sectional Comparison of Rapidly Acquired Images With Standard Transthoracic Echocardiography. *Annals of Internal Medicine*, 155(1), 33-38.

**Table 1. Visualizability, Accuracy, and Variability of Readings of Images Obtained by Using Pocket Mobile Echocardiography**

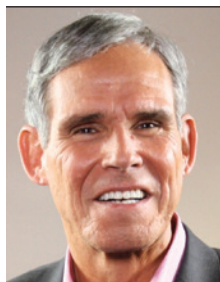
TTE Variable	Abnormal, %		Visualized, %		True-Positive Plus True-Negative Readings (Visualized/Total), %/%*			Variability ( $\lambda$ )		
	Overall	Attending	Attending	Fellows	Overall	Attending	Fellows	Overall (4 Raters)	Attending (2 Raters)	Fellows (2 Raters)
Ejection fraction	14 (low)	95	93	97	95/91	97/91	93/91	0.71	0.95	0.68
WMA <sup>†</sup>	13	83	85	81	89/74	90/77	87/71	0.72	0.90	0.47
LVEDD	15 (enlarged)	95	95	94	92/87	94/90	91/85	0.67	0.82	0.55
Pericardial effusion	0 (significant)	94	94	94	NA	NA	NA	NA	NA	NA
Aortic valve	6	82	86	80	96/79	97/83	95/76	0.76	0.84	0.75
Mitral valve	7	90	90	90	85/77	88/79	82/74	0.35	0.59	0.29
IVC size <sup>‡</sup>	12	75	73	77	78/58	81/59	74/57	0.42	0.84	0.39

IVC inferior vena cava; LVEDD left ventricular end-diastolic dimension; NA not available; TTE transthoracic echocardiography; WMA wall-motion abnormality.

\* TTE measurements were not visualized on every scan. The first estimate is the proportion of true-positive and true-negative readings among all scans in which the measurement was visualized (number varies by measurement). The second estimate is the proportion of true-positive and true-negative readings in all patients (n = 97).

<sup>†</sup> TTE comparison image missing for WMA assessment in 1 patient.

<sup>‡</sup> TTE comparison image missing for IVC size assessment in 2 patients.



### Eric J. Topol, MD

is a cardiologist at Scripps in La Jolla, California. He leads the flagship NIH supported Scripps Translational Science Institute and is Professor of Genomics at The Scripps Research Institute. He also serves as Chief Academic Officer of Scripps Health and is a co-founder of the West Wireless Health Institute. In 2012, he was voted the most influential physician executive in the United States by Modern Healthcare. He was elected to the Institute of Medicine of the National Academy of Sciences and is one of the top 10 most cited researchers in medicine.

# Vscan Helps Detect Pericardial Effusion, Enabling Prompt Initiation of Treatment

By Alfredo Tirado-Gonzalez, MD, Assistant Medical Director, Emergency Ultrasound Director, Emergency Medicine Residency Program, Orlando, Florida

A 22-year-old male arrived at the Emergency Department around midnight, complaining of chest pain and shortness of breath. It was his second visit to the ED in as many weeks; just 14 days earlier, he had come in with a respiratory infection, which was treated with antibiotics.

The patient's malaise and fatigue had continued, however. He presented the second time in severe distress. He had no nausea, vomiting or fever, but in addition to the chest pain and dyspnea, he had a rash on his extremities.

Because his symptoms were worsening, with increasing dyspnea, tachycardia and a rise in blood pressure to 172/102, we decided to perform a bedside ultrasound exam with Vscan.

The study showed moderate pericardial effusion. A surgeon was consulted, and the patient was transferred directly to the main hospital for possible pericardial window.

After his transfer, his condition rapidly deteriorated to cardiac tamponade.

However, an emergency pericardial window was successfully performed. The diagnosis ultimately included pericarditis with secondary diagnoses of lupus, pneumonia and sepsis. He was treated for these conditions and discharged to home care without further complications.

## High-quality ultrasound, literally at your fingertips

Emergency Department physicians don't always have immediate access to comprehensive ultrasound exams.

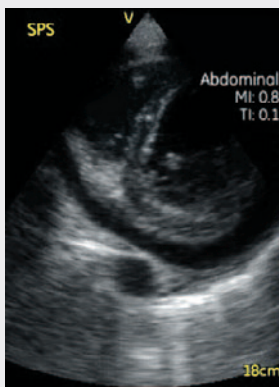
The solution? GE Healthcare's pocket-sized Vscan ultrasound device for a quick look. The Vscan is portable enough to slip into the pocket of a lab coat for on-the-spot evaluations. In fact, Emergency Medicine physicians are finding that its performance and excellent image quality can help speed diagnosis and initiation of the appropriate treatment, supporting the goals of improving outcomes and streamlining patient management. ■

## Discussion

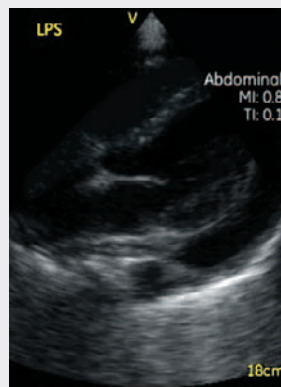
Vscan enabled the Emergency team to evaluate this patient quickly. After detection of a pericardial effusion we were able to transfer him to a tertiary facility where cardiothoracic surgery backup was immediately available.

He was therefore able to avoid the cardiac arrest which could have resulted from cardiac tamponade, and to be treated successfully without further complications.

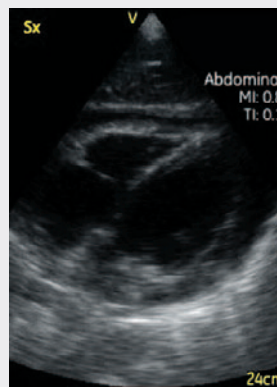
If this patient had been admitted to a facility without the ability to perform a pericardial window, he may have died. Fortunately, the Vscan study helped us quickly arrive at the diagnosis and transfer the patient to medical staff equipped to manage his deteriorating condition.



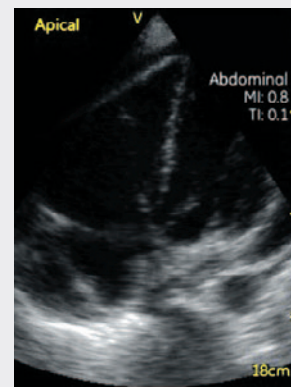
**Figure 1.** Short parasternal view of the heart, showing pericardial effusion, surrounding right and left ventricles.



**Figure 2.** Long parasternal view of the heart, showing pericardial effusion, surrounding cardiac silhouette.



**Figure 3.** Subxiphoid view of the heart, demonstrating pericardial effusion.



**Figure 4.** Apical four chamber view of the heart, with anterior and posterior pericardial effusion.



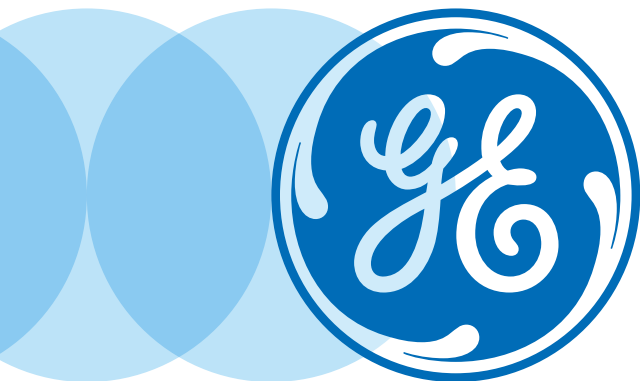
# Let's take a look.

## Vscan

Vscan™, a pocket-sized visualization tool with ultrasound technology, may redefine your physical exams. It enables a quick look inside your patients - immediately and non-invasively.

Visually confirm what you hear and feel to help detect abnormalities, help confidently plan the next course of action, and deepen the connection with your patients.

**Let's take a look – [vscan.gehealthcare.com](http://vscan.gehealthcare.com).**



# Bedside Echoscapy with Vscan: a Rapid Information-Gathering Tool in the Pocket of Clinicians

By Fabio Piscaglia, MD, PhD, Pr Luigi Bolondi, Dr Elisabetta Sagrini, Bologna, Italy



The use of ultrasound in internal medicine has been possible for more than three decades, however, not all internal medicine departments are ultrasound equipped and most still rely on the exams performed by radiologists. It is more and more accepted, however that point-of-care ultrasound, namely “ultrasonography performed and interpreted directly by the clinician at the bedside”<sup>1</sup> has an added value, since it can lead to quicker diagnoses and support immediate therapeutic decisions.

Furthermore, the growth of point-of-care ultrasonography has paralleled the process of developing more compact and portable devices that can be used at the bedside. Point-of-care ultrasonography is not aimed at replacing comprehensive ultrasonography, but at providing information to the physicians to rapidly diagnose and solve certain medical problems during rotations.

The solution to some of these problems may require basic focused ultrasound imaging. The answer to these problems may be a matter of “yes or no,” for instance: is there presence of pleural fluid? Pocket-sized portable ultrasound scanners may provide desired information, based on the operator’s expertise. The basic level ultrasound can be regarded as an extension of the physical examinations and, with the addition of visualization, the clinician can make a more informed decision. In order to better distinguish this very basic and focused approach from a conventional comprehensive ultrasound examination, the EFSUMB (European Federation of Societies for Ultrasound in Medicine and Biology) has defined a new name for this technique: EchoScapy.

For more information about common clinical scenarios and EFSUMB’s definition of EchoScapy go to [tiny.cc/VS142](http://tiny.cc/VS142).

1. C. Moore, J. Copel, N Engl J Med 2011;364:749-57

## CASE 1

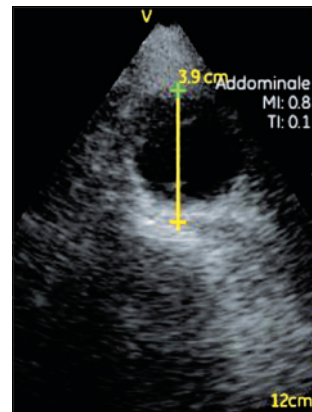
A patient with a history of Chronic Obstructive Pulmonary Disease (COPD) and smoking, visited as outpatient for worsening of cough and shortness of breath, with a suspicion of COPD exacerbation. On physical examination an area of pulmonary dullness with lack of murmur was noted. Completion of the physical examination with Vscan enabled confirmation of suspicions of unilateral left pleural effusion (Fig. 1). A chest X-ray reading confirmed left pleural effusion and did not disclose any additional finding. Repeated ultrasound examination with Vscan was performed to identify the best puncture site to perform a thoracentesis, both to obtain quick symptom relief and to obtain a fluid sample to be analyzed, on the suspicion of malignant pleural effusion.



**Figure 1:** U/S scan of left hemithorax, visualizing the spleen, the diaphragm and the pleural effusion.

## CASE 2

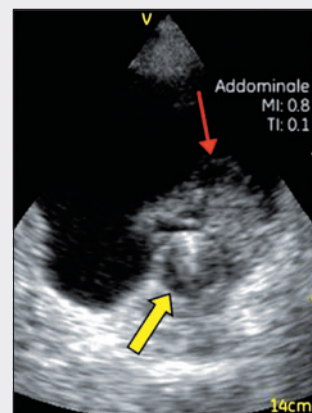
An overweight patient presented with hypertension, a family history of diabetes and cardiovascular diseases was referred to the clinic. During the physical examination a pulsating mass in epigastrium was barely felt on palpation. Bedside ultrasound examination with Vscan enabled immediate confirmation of the suspicion of abdominal aortic aneurysm (3.9 cm in maximum antero-posterior diameter, Fig. 2) and the patient entered a surveillance program.



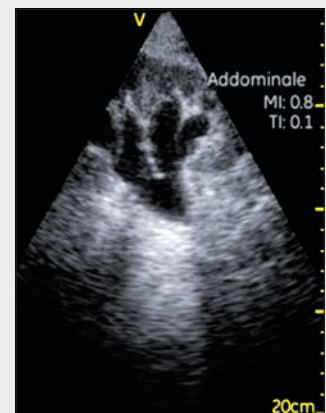
**Figure 2:** Antero - posterior scan of the aneurysm, with a diameter of 3.9 cm.

## CASE 3

A patient with known bladder carcinoma and reduced urinary output had a vesical catheter placed. The next day, he complained of increasing lower abdominal and lumbar pain and there was a further reduction in urinary output. Ultrasound examination with Vscan enabled visualization that the Foley catheter was in place, but an over-distended bladder with echogenic mass (likely to be blood clots) in the lumen close the malignant mass (Fig. 3). Extension of the examination to the kidneys showed bilateral hydronephrosis (Fig. 4) most likely originating from the Foley catheter obstructed by clots. Prompt urological treatment was then provided. ■



**Figure 3:** Foley catheter, indicated by the yellow large arrow, and clot superimposed (red thin arrow) over the malignant mass originating from bladder wall, encasing the Foley catheter balloon.



**Figure 4:** Bilateral hydronephrosis as a result of the Foley catheter obstruction.

# The Use of Vscan Demonstrates Clinical Additive Value as Part of Physical Examinations in Initial Cardiology Consultations

By Nuno Cardim, MD, PhD, Covadonga Fernandez Golfín, MD, Daniel Ferreira, MD, Adalia Aubele, MD, Julia Toste, Miguel Angel Cobos, MD, Vanda Carmelo, MD, Igor Nunes, MD, Antonio Gouveia Oliveira, MD, PhD, and Jose Zamorano, MD, PhD, Madrid, Spain and Lisbon, Portugal

The use of a miniaturized echocardiographic system (MS) for initial outpatient cardiology consultations at the bedside as an extension of physical examinations shows promise in its ability to save time, lower costs and improve the quality of care.



## Two hospitals participate in study

To assess the usefulness of MS in outpatient cardiology consultations, six physicians at a university hospital in Madrid, Spain and a hospital in Lisbon, Portugal, conducted a one-month study in 2010 of MS using GE Healthcare's pocket-sized Vscan. It included 189 consecutive patients. The study involved 99 males and 90 females with ages between 37 and 69 years. The purpose of the study was to assess the usefulness of MS to perform echocardiographic studies at the bedside in initial cardiac consultations in outpatients in addition to conventional cardiac auscultation.

Each patient was submitted to a conventional physical examination. After physical examination, 17 patients were released from the outpatient clinic. On those patients who remained, cardiologists performed scans using the MS. None followed a preset exam protocol. The mean scanning time with the new equipment was 180 +/- 86 seconds. All MS examinations were considered to have adequate quality for analysis.

## Additive clinical value over physical examinations

Findings on the MS examinations were considered abnormal in 89 patients (47.1%). When used after physical examination, the use of the MS led to diagnoses in 141 patients (74.6%). After physical examination followed by the use of the MS, 37 patients (19.6%) were released from the outpatient clinic because of no need for additional diagnostic testing. This is in addition to the 17 patients released after physical examination alone.

## Fewer referrals to echocardiography lab

Following physical examination, 95 patients (50.3%) were referred to the echocardiography lab while no echocardiography was performed on 94 patients (49.7%). In contrast, only 64 patients (33.9%) were sent to the lab after the use of the MS. After the use of the MS in the other 125 patients (66.1%), cardiologists decided not to refer them for routine

echocardiography. The reasons for lab referral after MS were exclusively related to the need for spectral Doppler, which is not available with the MS for various in-depth studies. No patient was sent to the lab because of inadequate image quality with the MS.

Moreover, in 67 patients (35.4%), there was agreement between physical examination and the use of MS to not refer to the lab. There was agreement between the two methods to refer 37 patients (19.6%) to the lab.

For 27 patients (14.3%), the use of the MS modified the clinical decision of whether to send them to the lab based exclusively on unexpected echocardiographic findings requiring spectral Doppler assessment. Additionally, with the use of the MS, the physicians changed their decision and they did not refer 57 patients.

### Professor Jose L. Zamorano, MD

A Professor of Medicine at the University Alcala de Henares, Madrid, and the Chief of Cardiology at the University Hospital Ramón y Cajal in Madrid, Spain. Professor Zamorano obtained his medical degree from the University Complutense in 1987 and his doctor in Medicine in 1991. He received his board certification in Cardiology in 1993 before

## Right patients to the right tests

The use of MS in outpatient cardiology consultations as an extension of physical examination showed additive clinical value over the physical examination – demonstrating the ability to help clinicians refer the right patients to the right tests. Its use also allowed many patients to be released from the outpatient clinic without the need for further testing after the initial consultation. Further, the use of the MS showed a negligible increase in the duration of consultations. ■

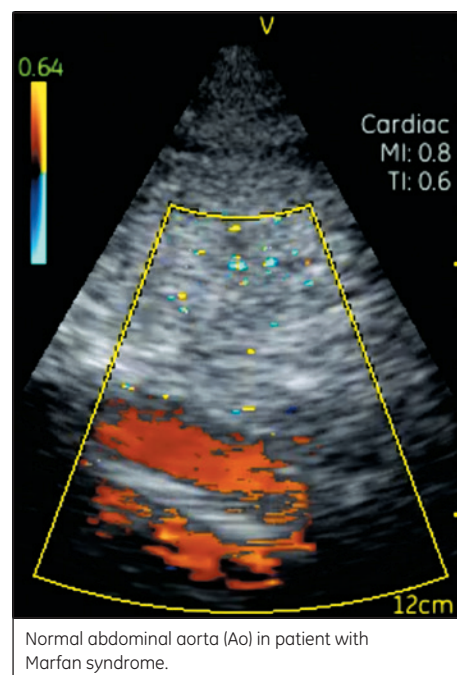
joining as an Associate Professor the faculty at the University Complutense. Dr. Zamorano has a broad range of research interests including heart failure, ischaemic heart disease, cardiovascular risk factors and cardiovascular imaging modalities. Within these fields, he has published over 300 articles and twenty books including the European Textbook of Cardiovascular Imaging. His impact factor is > 1000 and Hirsch Index of 40 with more than 10,000 citations.

## Cardiac Evaluation with Vscan Leads to Quick and Confident Diagnosis

David Liang, MD, Associate Professor of Medicine, in California, recently used Vscan when examining a number of patients, and says he's excited about high quality point-of-care (POC) ultrasound and what it means for the future of medicine. In one patient, Vscan helped him quickly and confidently diagnose a patient with Marfan syndrome.

"The patient, who came to the clinic, was being seen for routine annual follow-up," Dr. Liang explains. "The echocardiogram performed prior to the visit showed a stable aortic root and valve after prior valve sparing root replacement. Since abdominal aortic aneurysms are seen rarely in Marfan syndrome, the abdominal aorta was screened quickly with the point of care ultrasound."

Says Liang: "The immediate availability of POC ultrasound opens many opportunities for improving the quality and timeliness of patient care, resulting in convenience and reassurance for both patients and physicians." ■



## Vscan Adds Clinical Value, Strengthens the Physician-Patient Connection



When two primary care physicians used Vscan to triage patients at their offices, they found it added immediate clinical value and helped them make a deeper connection with patients.

“It was very easy to use,” says Robert Blee, MD, MDVIP, Washington, D.C. “The controls were simple and intuitive. The machine is small and easy to use with one hand. The images of the heart and aorta were easy to obtain not requiring more than five minutes to do. Additionally, the bladder was easy to image looking for post void residual.”

Patients also appreciated what the high-tech device offers, Dr. Blee adds.

“Patients were both impressed with me having such a piece of state-of-the-art equipment, as well as seeing the images of their heart beating at the bedside during the examination,” he says. “It’s probably the biggest step forward in bedside physical examination equipment since the stethoscope.”

Steven C. Burns, MD, MDVIP, Tempe, Arizona, says Vscan had a significant clinical impact on his practice early on.

“After using the device for three weeks, I found a patient with a life-threatening condition that required surgery. With the additional information I was able to obtain with the Vscan, I was able to conduct a more complete physical exam and make a diagnosis that significantly changed this patient’s care, probably saving his life,” Burns says.

As with Dr. Blee, Dr. Burns says using Vscan strengthened the physician-patient connection.

“My patients are delighted to be able to see their heart valves, aorta, liver and kidneys on the Vscan screen, and it has added no more than five minutes to their physical examinations. I have seen gallstones and heart valve abnormalities, and have been able to visualize one patient’s pacemaker lead. With these types of examples alone, the device and training were clearly worth the price,” he concludes.

### About MDVIP

MDVIP is a personalized healthcare program that empowers people to reach their health and wellness goals through in-depth knowledge, expertise and one-on-one coaching with some of the finest primary care doctors in America. Through a membership fee, members can receive the highest levels of personalized care. For more visit information on MDVIP and how it works visit <http://www.mdvip.com/> ■



#### Dr. Robert H. Blee, MD

An internist in Washington, District of Columbia and is affiliated with Sibley Memorial Hospital. He received his medical degree from Georgetown University School of Medicine and has been in practice for 38 years.

## Preparing for a Bright Future with Ultrasound



While Dr. Richard Hoppmann of the University of South Carolina (USC) School of Medicine can't predict the future, he has no doubt that ultrasound and the use of pocket-sized devices like Vscan will become a core clinical skill that promising physicians must learn in medical school. Its acceptance as a valuable tool for teaching and practicing medicine is why.

"You can compare it to learning to use a stethoscope," says Dr. Hoppmann when reflecting on the growing importance of ultrasound and pocket-sized ultrasound devices. "You would never wait until students are in residency before teaching them how to use a stethoscope. The same is true with ultrasound. It just makes so much sense for students to have that foundation early on. I don't know when, but it's going to be a standard practice in teaching and medical practice."

Hoppmann says using ultrasound to prepare medical students for a career in medicine has moved far beyond the idea stage.

"It helps students understand and learn anatomy, physiology, pathology – all areas of medicine," he says. "It's a great diagnostic and teaching tool."

Dr. Hoppmann championed ultrasound education at the USC School of Medicine, a practice now in its eighth year. The university uses ultrasound as part of its curriculum throughout all four years of medical school. Under Dr. Hoppmann's

leadership, the school also hosted the first World Congress of Ultrasound in Medical Education (WCUME) in 2011 and held the second one in September of 2013.

At the USC School of Medicine, course directors incorporate the use of ultrasound into lectures and lab work. Students are trained to use ultrasound to learn and work with physicians to help diagnose and treat patients. Training covers the use of laptop and pocket-sized devices and image interpretation. Students practice ultrasound on "standardized patients," which is the name for people trained to act as real patients. The patients themselves follow a standardized process that allows educators to accurately and fairly assess students in a number of areas, including their interaction with patients.

Eventually, students at the school use ultrasound to help physicians diagnose patients with a wide variety of diseases. At USC, all third-year students who study internal medicine, family medicine and pediatrics are given a Vscan device for use throughout the remainder of their clerkships. Third-year students must also take an ultrasound Objective Structured Clinical Exam (OSCE) to assess their knowledge and skills in ultrasound, including the use of a pocket-sized device.

The mobility and convenience of a small, yet powerful device like Vscan is uniquely advantageous in the field of education, Hoppmann says.

“It has the potential to fundamentally change how we teach medicine for the benefit of the learner, as well as the patients. That will always be the theme.”

*Richard A. Hoppmann, MD*

“It’s a phenomenal teaching tool at the bedside, and in the lab as well,” he says. “Let’s say someone comes in with shortness of breath. Could it be a lung problem, or could it be a heart problem? You can talk about it, but then with the Vscan, you can actually look. As a teacher you can go into much greater depth. For students, it brings concepts alive for them and they can make those connections.”

According to Dr. Hoppmann, interest in the use of pocket-sized ultrasound devices for teaching continues to grow.

“The interest in ultrasound is ballooning, not only across the nation but the globe,” he says, adding that a pocket-sized device is an excellent tool for physicians and practitioners in emerging markets. “You can use it to reach populations that don’t have access to imaging equipment. We’re going to find tremendous use for it in developing countries.”

For Dr. Hoppmann, the heightened focus on the use of ultrasound in medical education is ultimately about the ability to deliver a higher level of care.

“Educators have to continue to coordinate what we do from an education standpoint with practitioners and the organizations that credential them to make sure we maximize the power of this tool. It has the potential to fundamentally change how we teach medicine for the benefit of the learner, as well as the patients. That will always be the theme,” he concludes. ■

The use of pocket-sized ultrasound devices will be among the many workshops and topics at this year’s WCUME event in Oregon in October. Whether it’s a pocket-sized device or laptop, education is also the focus of the Society of Ultrasound in Medical Education (SUSME). Each year, SUSME brings medical educators and practitioners together to help direct what he describes as a revolutionary change in medicine.



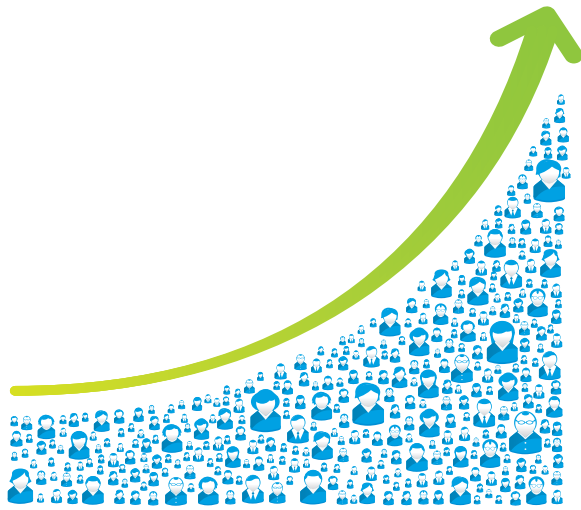
THIRD ANNUAL  
**WORLD CONGRESS**  
 ULTRASOUND IN MEDICAL EDUCATION

### **Richard A. Hoppmann, MD**

is currently Professor of Medicine, the Dorothea Krebs Endowed Chair of Ultrasound Education, and Dean Emeritus of the University of South Carolina School of Medicine. Dr. Hoppmann is board certified in Internal Medicine and Rheumatology. He is Director of the Ultrasound Institute at the University of South Carolina and is principle investigator on multiple ultrasound grants totaling over \$1 million. He has introduced an integrated ultrasound curriculum (iUSC) over four years of medical student education and has helped develop an ultrasound training program for primary care physicians in rural South Carolina. He is also founder and the former president of the Society of Ultrasound in Medical Education.



## The Picture is Clear: Pocket-Sized Ultrasound Devices Offer Economic Value in Optimizing Resources



While there's mounting evidence that Pocket-sized Ultrasound Devices (PSUDs) provide clinical value to cardiologists in cardiology clinics, it's becoming clear they also offer the potential for significant savings at the department level when used by highly experienced echocardiographers as an adjunct to standard physical examination.

Often, cardiologists turn to Standard Echocardiography (SE) whenever a physical examination is inconclusive or for further evaluation of a known disease's severity<sup>1</sup>. And while SE helps enable more accurate diagnosis than physical examination alone, it requires highly skilled personnel, and may not be performed until days after the initial cardiology evaluation; thus resulting in potential further delays in diagnosis and increased economic costs due to the need for additional patient-doctor encounters to discuss results and possible revisions to treatment.

### Studies suggest positive economic impact

In recent years, the use of PSUDs, such as Vscan, have proven to be reliable tools for physicians to rapidly assess the presence of cardiac and non-cardiac abnormalities<sup>1</sup>. A study conducted by Cardim et. al<sup>2</sup> showed the use of PSUD directly impacted patient treatment costs by reducing the number of diagnostic tests needed (see story on page 18). Additionally, further cost savings were realized with an early discharged group because these

patients no longer required further consult or treatment. The use of PSUD also has the potential to deliver indirect cost savings and lower downstream costs.

It also saves physicians time because follow-up visits may no longer need to be scheduled or conducted for patients who no longer need to be seen<sup>2</sup>. Additionally, the study conducted by Cardim and his colleagues concluded that the downstream time savings recognized through the clinical benefits and efficiencies of using the PSUD offset the initial time it took to use it during the physical exam workup.

Evidence also supports that implementing bedside echocardiograms into cardiology units improves workflow<sup>3,4</sup>. Performing echocardiograms in the admissions department of an inpatient clinic improved sonographer productivity by 34%<sup>3</sup> and echocardiography lab productivity by 41%<sup>1</sup>.

These improvements in productivity coupled with reductions in porter and staff time, hospital costs, and scanning and reporting times, decreased the average cost of each echocardiography exam by approximately 29%<sup>4</sup>. Similar findings from another study confirm that the use of hand-carried ultrasound reduced both the number of echocardiography exams and follow-up visits, which led to overall cost savings of € 2,142 per 100 patients referred for SE in Italy<sup>1</sup>.

The use of PSUDs may also help improve the patient experience. In particular, the efficiencies of Vscan use reported above led to reductions in waiting times and follow-up visits among patients who do not require further evaluation<sup>2,4</sup>. These savings imply potential additional indirect cost savings for patients by reducing travel time and time missed from work due to unwarranted doctor appointments. The bottom line points to overall cost savings. ■

1. Trambaiolo P, Papetti F, Posteraro A, et al. A Hand-carried Cardiac Ultrasound Device in the Outpatient Cardiology Clinic Reduces the Need for Standard Echocardiography. *Heart* 2007; 93(4): 470-475.
2. Cardim N, Golfin CF, Ferreria D, et al. Usefulness of a New Miniaturized Echocardiographic System in Outpatient Cardiology Consultations as an Extension of Physical Examination. *Journal of the American Society of Echocardiography* November 2010; 24(2): 117-24.
3. Badano LP, Nucifora G, Stacule S, et al. Improved Workflow, Sonographer Productivity, and Cost-effectiveness of Echocardiographic Service for Inpatients by Using Miniaturized Systems. *European Journal of Echocardiography* February 2009; 10(4): 537-42.
4. Gianstefani S, Catibog N, Whittaker AR, et al. Pocket-size Imaging Device: Effectiveness for Ward-based Transthoracic Studies. *European Heart Journal Cardiovascular Imaging* May 2013.

# Pocket-Sized Imaging Device (PSID) Effectiveness for Ward-based Transthoracic Studies<sup>1</sup> (TTE); a Clinical and Economic Study

By Silvia Gianstefani<sup>1</sup>, Norman Catibog<sup>1</sup>, Almira R. Whittaker<sup>1</sup>, Antonios G. Ioannidis<sup>1</sup>, Francesco Vecchio<sup>1</sup>, Peter T. Wathen<sup>1</sup>, Abdel Douiri<sup>2</sup>, Joseph Reiken<sup>1</sup>, and Mark J. Monaghan<sup>1</sup>

1. King's College Hospital, London, UK

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The use of a Pocket-sized Imaging Device (PSID) can provide a valuable alternative to transthoracic echocardiogram (TTE) in the presence of focused clinical questions, and in the process, deliver a clear economic advantage in the delivery of ward-based transthoracic echo service.

During a three-month period at King's College Hospital, London, United Kingdom physicians assessed the clinical and economic usefulness of a PSID in the setting of bedside echo requests. Physicians established two objectives for the study:

- Clinical: Assess the usefulness of a PSID in evaluating focused clinical questions including: left ventricular function, presence of regional wall motion abnormalities, evidence of pericardial effusion, or exclusion of significant valve pathology.
- Economic: Calculate cost effectiveness of PSID use in limited cardiac assessments conducted by experienced sonographers.

The study involved 92 inpatients during a three-month enrollment period where bedside ultrasound was ordered and performed. In the study involving experienced sonographers and echocardiography fellows, the Vscan was compared to Philips CX50 and GE Healthcare Vivid™ i ultrasound systems. It involved experienced sonographers and echocardiography fellows, and Kappa statistics were used to estimate the level of agreement and reproducibility.

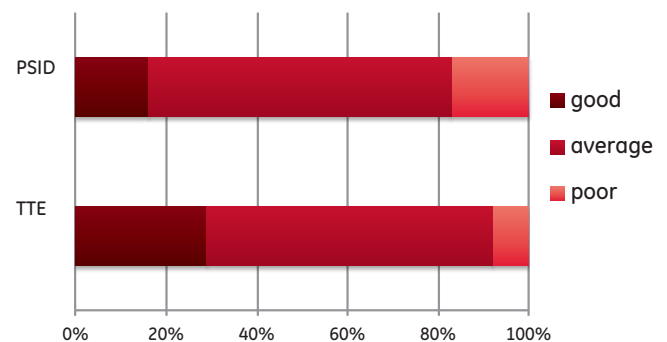
## Clinical: PSID and TTE image quality for focused clinical questions

Assessment of the chambers, valves and the presence of effusion were compared between devices.

PSID: Qualitative assessments performed on the device

TTE: Quantitative measurements performed offline

### Image quality



The results indicate PSID as a valuable alternative to standard approaches for focused clinical questions in ward-based echocardiography when performed and interpreted by experienced clinicians.

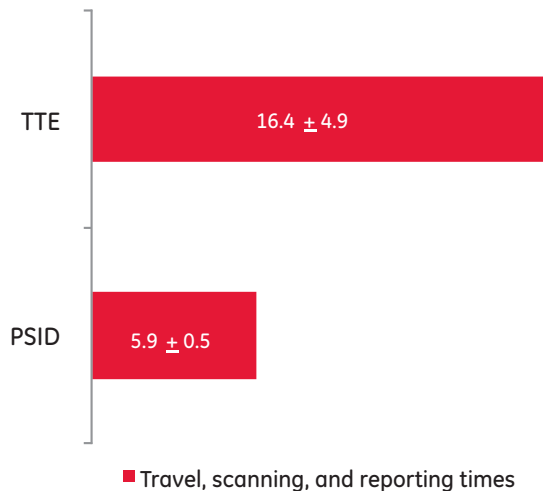
- In 90% (83 of 92) of patients the PSID provided the desired clinical information
- PSID is useful to exclude major valve pathology, but TTE including Doppler is required to assess severity of lesions

## Digital Dive

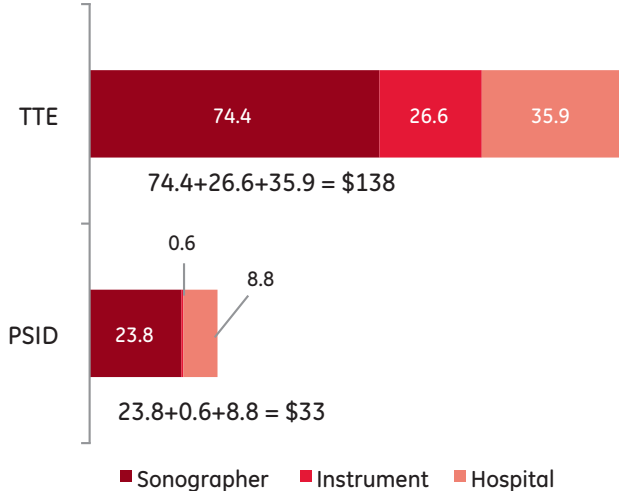
Go to an abstract of the article:  
[tiny.cc/Vs144](https://tiny.cc/Vs144)

## Economic: Scan time and costs reduced using PSID for focused echocardiographs

Mean Scanning Time\* (min)



Mean Cost Per Scan\*\* (US \$)



The use of PSID in limited patients referred for bedside TTE resulted in:

- 66% reduction in mean scanning and reporting times\*
- 76% reduction in mean cost per scan\*\* ■

Journal/article Eur Heart J Cardiovasc Imaging Vol. 14 (12), 2013: 1132-1139 first published online May 24, 2013. Silvia Gianstefani et al. Pocket-size imaging device: effectiveness forward-based transthoracic studies. By permission of Oxford University Press.

\* Scanning time was calculated as time from beginning to end of exam. Vscan scan times were based on focused assessment while TTE utilized imaging modes including M-mode, pulsed and continuous wave Doppler modes.

\*\* Overall costs for both modalities were calculated in a UK health system using the combination of staff, equipment and hospital costs, in addition to travel and mean scanning and reporting times.

## Important study information

- This was a single-center study with a small focused population.
- PSID scan times were based on focused assessment while TTE (full echo) scan times were based on multiple imaging modes for complete assessment.
- Cost effectiveness analysis was based on cost minimization analysis.
- Cost calculations were determined as follows:
  - Sonographer cost calculations based on scan times described in mean cost table (above)
  - Hospital costs computed as a percentage of the procedure costs (35%)
  - Staff cost calculated by using a mid-point B7 salary and multiplying by total scan time
  - Instrument cost calculations assumed a 5-year equipment life span and assumed 4,000 scans per year



## Vscan and Maternal & Infant Health Around the Globe

With affordable and accessible technologies like the Vscan pocket-sized visualization tool – and the continued commitment of stakeholders everywhere – the world may be closer to closing the gap on maternal and infant health (MIH) and Millennium Development Goals.

Since 2000, 192 United Nations member states and 23 international organizations have committed to achieving 8 Millennium Development Goals (MDGs)<sup>1</sup>. Among them is MDG 4, which calls for reducing the under-five child mortality rate by two-thirds from 1990 levels by 2015. Another is MDG 5. It aims to reduce the maternal mortality rate by three-fourths during the same time period.<sup>2</sup>

Although progress has been made, more needs to be done. Toward that end, GE is committed to helping address MIH. Part of the commitment involves the availability of technologies like Vscan. The innovative tool, as well as others, was designed to meet the needs of local markets working to address MIH.

Specifically, it is designed as a cost-effective technology to meet the needs of developed and developing countries.

As part of its commitment to MIH, GE will continue to partner with local governments, international organizations and NGOs to help address a host of other issues and challenges associated with MDGs 4 and 5. This includes training healthcare workers how to use Vscan and other MIH technologies. GE also encourages governments and international organizations to meet MIH spending commitments, look for ways to partner with the private sector, and develop post-2015 plans for MIH.

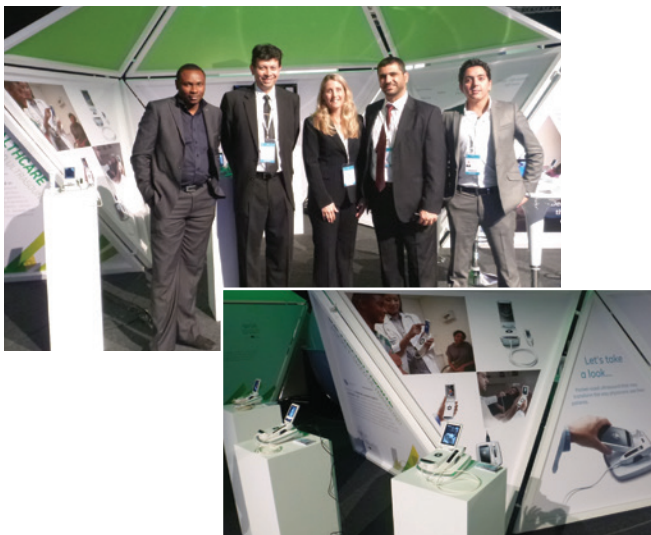
With continued commitment from all stakeholders, strong partnerships and medical device innovations like Vscan, there is hope that high maternal and infant mortality rates will decline in every corner of the world. ■

1. OECD. The OECD and the Millennium Development Goals. <http://www.oecd.org/dac/theoecdandthemillenniumdevelopmentgoals.htm>

2. UN. Millennium Development Goals and Beyond 2015. <http://www.un.org/millenniumgoals/>

# Making an Impression at WISH 2013

World leaders from across the globe were impressed with their first look at Vscan, one of very few innovations that debuted at the inaugural World Innovation Summit for Health (WISH) in Doha, Qatar.



The WISH summit was held for the first time in December 2013. It provided a forum for healthcare decision-makers, as well as senior government officials, academics, and business leaders, to discuss practical and lasting approaches to solving global healthcare challenges. Event organizers also invited a select group of companies to showcase innovations with the potential to help meet health challenges in all corners of the globe. Vscan was among only 15 innovations selected for review.

After seeing a Vscan demonstration, attendees were enthralled with the portability of the device, its capacity to generate high quality images, and the versatility it delivers in a myriad of clinical applications. What stood out for most at the event is the ability of Vscan to help enhance the skills a broader base of healthcare workers of the future, marking another positive step in addressing healthcare challenges worldwide. ■

## Want to Learn More About Vscan? Your Destination is the Vscan Web Portal

GE Healthcare

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**A QUICK LOOK AT VSCAN**  
What is Vscan?

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Packet-sized ultrasound that may transform the way physicians see their patients. A quick look that may strengthen your clinical confidence, aid in speedy diagnosis, and deepen the patient connection.

**What is Vscan?**

Vscan® is a handheld, pocket-sized visualization tool powered by ultrasound technology that enables you to visually inspect the inside of your patient's body during a physical exam.

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Vscan is a prescription medical device and available for sale only to licensed physicians. Privacy Policy Terms and Conditions Accessibility Sitemap Contact Us Feedback SmartMed Registration  
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Whether you own it and have questions, or want to add it to your practice, virtually everything you want to learn about Vscan – and more – is only a click away at the Vscan web portal [tiny.cc/Vs142](http://tiny.cc/Vs142).

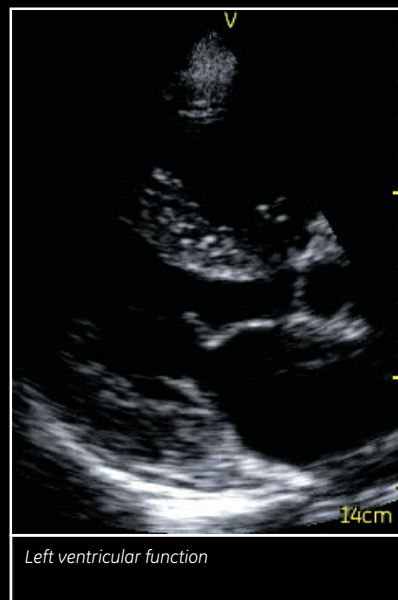
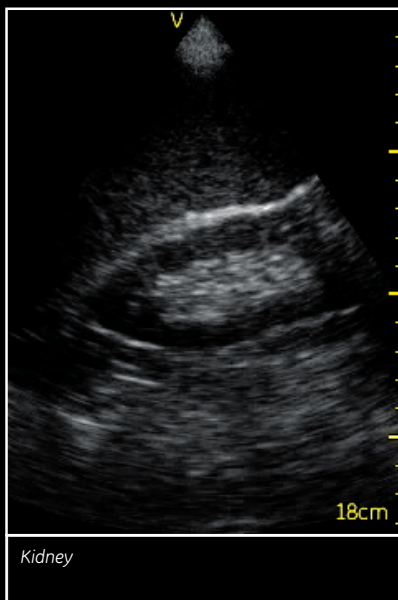
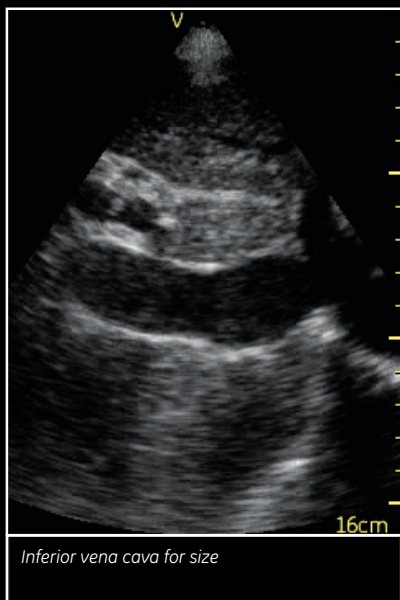
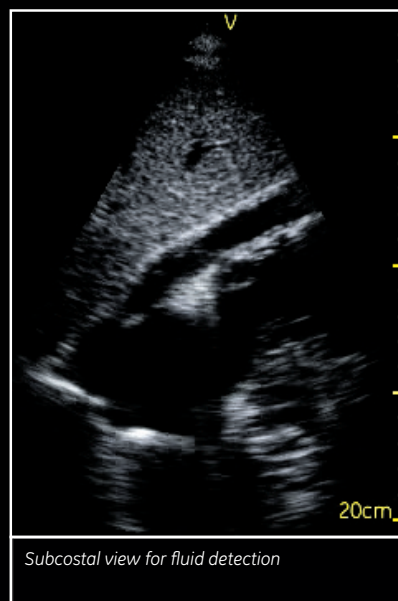
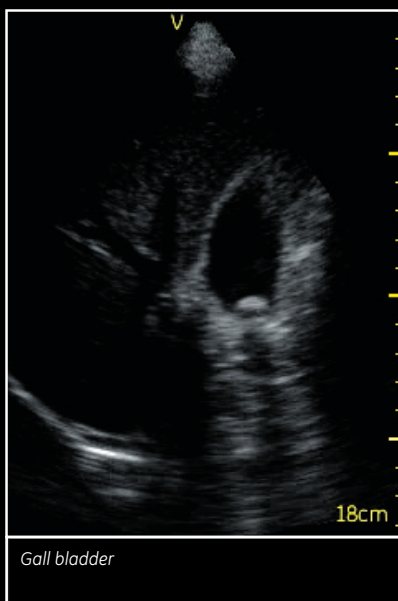
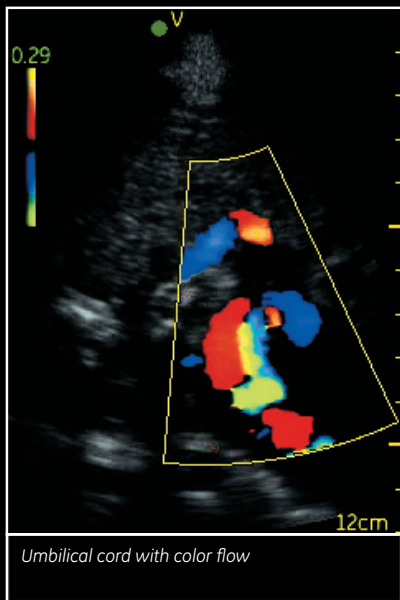
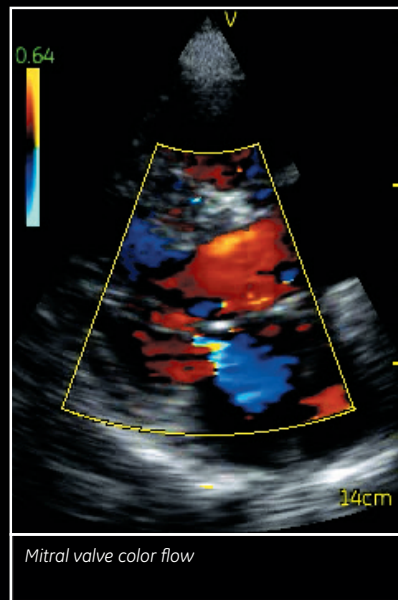
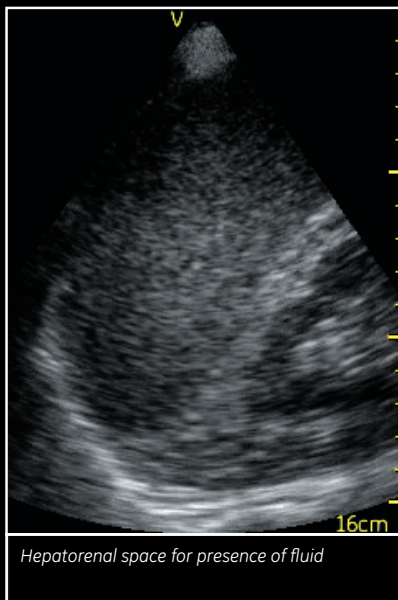
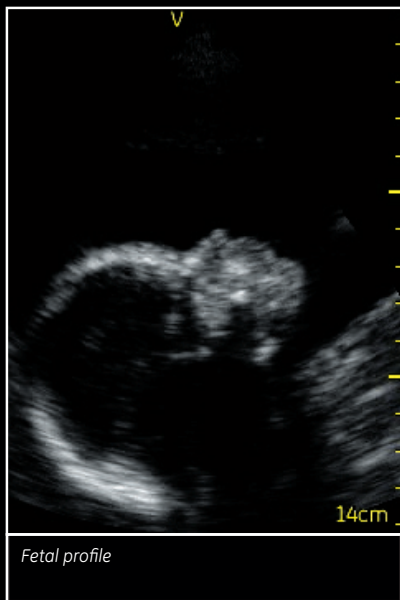
Designed with busy clinicians in mind, the Vscan online portal serves as a both a quick reference source and user-friendly, yet robust informational platform that lets clinicians discover how Vscan helps strengthen clinical confidence, aid in speedy diagnoses, and deepen the patient connection. Care areas explored include primary care, cardiology, critical and emergency care, and women's health. The portal also offers the opportunity to get in touch with the Vscan team to answer additional questions you may have.

Visitors to the content-rich portal will appreciate the ability to quickly locate and choose the information desired, whether it's a brief overview of Vscan, in-depth product video demos and tutorials, or detailed case reports that describe how physicians have used Vscan to cost-effectively help improve the quality

of care. An interactive tutorial allows visitors to research the device at their own pace and examine how it applies to their areas of interest.

For those interested in clinical applications, a dedicated section provides clinical information on the pocket-sized visualization tool and consolidates a host of resources in one spot, including a video gallery of clinical uses, brief physician testimonials and an introductory webinar. Also listed are dates for upcoming third party in-person and online ultrasound courses, as well as references for additional resources. Gain even deeper access to Vscan-specific clinical components, including product use scenarios, an interactive ultrasound anatomy section, troubleshooting tips, and libraries of Vscan clinical images.

Visit the portal today to answer your questions, learn about Vscan, or to get in touch with a GE Healthcare representative. While you're there, let us know what you think. ■



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imagination at work

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