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Letter to the Editor

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Current Specialist Awareness on Ultrasound Use for Central Venous Catheterization

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Obtaining central venous access is a fundamental clinical skill for managing patients in a wide variety of clinical situations. The role of routine portable Ultrasound (US) in the placement of Central Venous Catheters (CVCs) has been debated and some important evidence-based guidelines supporting the liberal use of ultrasound for this specific procedure have been published.[1-3] The use of ultrasound to help on central venous catheterization has shown to improve success rates with reduced complications, however the ultrasound has not been adopted worldwide for this specific end. Also, specialists' response to new publications on this subject is unknown. It is our feeling that, although many manuscripts have already proven that the US is safe and effective, its use is not routinely observed in a daily practice.

With this observation made, a question to validate this affirmative has blossomed and these authors decided to post it on a scientific social network, so we could be able to investigate current opinion and awareness from worldwide physicians from different specialties on ultrasound use for central venous catheterization. Throughout a specific scientific social network (researchgate.net) composed by 9 million members up-to-date from different professional areas including medicine, the question: "Is ultrasound an essential tool for placing central venous lines?" was raised. One of the website tools is a section where members perform questions and get answers on specific subject from different worldwide scientists. After 500 days online, answers were no longer accepted and the question placed offline for analysis. The following variables were analyzed: number of answers, number of countries answering the question, number of institutions involved on the query, quality of responders (based on published articles/citations and impact factors), specialties and opinions.

Two-hundred and twenty-four answers were registered. Three answers were excluded: two from registered nurses and one from a veterinarian. In total, 221 physician's answers were analyzed. Thirty-six countries and 114 different institutions participated answering the proposed question as represented in Table 1. All responders were analyzed regarding their academic activity. A mean of 21.5 articles published (average of 28.39 impact factor) were related to responders (SD±37.4) with 85.5(SD±427.62) average of citations.

Regarding all specialties 61.66% were anesthesiologists, 10% ER physicians, 7.5% surgeons, 5.83% critical care specialists, 5% pediatricians, 3% GI specialists and the remaining neonatologists, cardiologists, hematologists, radiologists, orthopedics and general practitioners summed 4.98% all together.

In regards to the specific question "Is ultrasound an essential tool for placing central venous lines?" an average of 54% of responders answered yes (46% otherwise). Among the top five specialties that more participated on this research, ER physicians and pediatricians are those that most likely believe that the ultrasound is an essential tool for placing CVCs (50%), followed by surgeons (44.4%), critical care specialists (42.85%) and anesthesiologists (41.89%).

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Country	Institution
Argentina	Hospital Durand
Australia	University of Sydney
	University of New South Wales
	St John of God Healthcare
	Royal Flying Doctor Services
Brazil	University of Campinas
Canada	University of Ottawa
	SickKids - Toronto
China	Jinhua Municipal Central Hospital
	Chinese University of Hong Kong
Croacia	University Clinical Hospital Center
	Klinički bolnički centar Rijeka
	Varazdin General Hospital
	University Hospital Centre Zagreb
Czech Republic	Charles University of Prague
Denmark	Aarhus University Hospital
Egypt	Zagazig University
France	Hôpital Universitaire Necker
	Centre Hospitalier de Saint-Quentin
	Clinique Du Parc Saint Lazar
	Clinique Saint Augustin
	Institut de Radiologie de Neuchâtel
	Clinique Hospitalier de Fontainebleau
Germany	Elisabeth-Krankenhaus
	University of Cologne
	Herz- und Diabeteszentrum Nordrhein-Westfalen
Greece	General Hospital Preveza
	General University Hospital of Larissa
	Hygeia Hospital
Hungary	Kaposi Mór Oktató Kórház
India	All India Institute of Medical Sciences Rishkesh
	Madras Institute of Orthopaedics and Traumatology
	Sanjay Gandhi Post Graduate Institute of Medical Sciences
	Institute of Medical Sciences
	Postgraduate Institute of Medical Education and Research
	Sanjay Gandhi Post Graduate Institute of Medical Sciences
	Global Hospital
	Columbia Asia Hospital - Mysore
	Reliance Industries Limited
	B. J. Medical College
	Kingsway Healthcare
	AIIMS Bhopal All India Institute of Medical Sciences
	Institute of Liver and Biliary Sciences
	Pondicherry Institute of Medical Sciences
	Lady Hardinge Medical College

Country	Institution
Iran	Tehran University of Medical Sciences
	Shahid Beheshti University of Medical Sciences
Japan	Japan Community Health Care Organization
Jordan	King Hussein Medical Center
Morocco	Université Ibn Tofail
Nigeria	University of Ibadan
Netherlands	Academisch Medisch Centrum Universiteit van Amsterdam
	University of Groningen
	Radboud University Nijmegen
Pakistan	Hamdard University
Peru	Hospital Regional Docente de Trujillo
Poland	Children's Memorial Health Institute
Portugal	Coimbra University Hospital Center
Qatar	Hamad Medical Corporation
Romania	Universitatea de Medicina si Farmacie Grigore T. P.
	Institutul Clinic Fundeni
Saudi Arabia	Prince Sultan Military Medical City
	King Faisal Specialist Hospital and Research Center
Singapure	National University Health System
Spain	Hospital Universitário La Paz
	Onkologikoa
	Hospital Universitario Miguel Servet
	Hospital Universitari i Politècnic la Fe
	University of Valencia
Sweeden	Linköping University
Turkey	Gulhane Military Medical Academy
	Haseki Training and Research Hospital
	Necmettin Erbakan Üniversitesi
	Anadolu Medical Center
United Arab Emirates	Cleveland Clinic Abu Dhabi
	Tawan Hospital
	NMC Healthcare LLC
	Specialized Medical Care Hospital
United States of America	Washington University in St. Louis
	University of Miami Miller School of Medicine
	Medical College of Wisconsin
	Tampa General Hospital
	University of California
	University of Texas Health Science Center
	Vail Valley Medical Center
	Greater Baltimores Medical Center
	Mayo Foundation for Medical Education and Research
	University of Nebraska Medical Center
	Hartford Hospital
	University of South Carolina
	Loyola University Medical Center
	University of Pittsburgh
	Wayne State University

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Italy	CTO Torino (Italy) Trauma Center Hospital of Imola Azienda Ospedaliera Santa Maria della Misericordia Azienda Ospedaliero-Universitaria Pisana Azienda USL Valle d'Aosta Ospedale San Pietro Fatebenefratelli Azienda Ospedaliera Papa Giovanni XXIII Azienda Ospedaliero Universitaria Careggi AORN Ospedali dei Colli University Hospital of Parma	United Kingdom	University of Manchester Southern Health and Social Care Trust NHS Lanarkshire National Health Service Central Manchester University Hospitals NHS Foundation Zayed Military Hospital Imperial College Healthcare NHS Walsall Healthcare NHS Trust Belfast Health and Social Care Trust University of Dundee
Israel	Hillel Yaffe Medical Center		

Table1: Countries and institutions involved on debating the subject.

Ten responder opinions were relevant to mention, as follows:

1) Ultrasound is the gold standard for the placement of CVCs - 56.34%;
2) US device for CVC placement should be preferred if US is available - 53.17%;
3) Physicians should be trained in both anatomic landmark technique (AL) and US technique (US) - 46.82%;
4) Residents must be taught into both techniques AL and US -44.44%;
5) US use should be mandatory - 42.85%;
6) US technique is difficult to use on subclavian vein - 11.9%;
7) Physicians should be free to use whatever technique he/she thinks is better for their patients - 11.11%;
8) Physicians should learn first anatomic landmark technique before start handling the US for this matter - 10.31%;
9) The US learning curve is long - 4.76%;
10) Physicians used to anatomic landmark technique have trouble to learn the US technique - 1.58%;

This brief opinion report brings to light whether specialists are aware of the use of ultrasound on placing CVCs. Many studies were published reinforcing the use of ultrasound for this purpose proving to be safe and effective. Even though there are a number of recent papers stressing the use of ultrasound as an essential tool in placing CVCs, this device is not available at all institutions and it is not currently the standard of care worldwide.

The question on how physicians from different specialties worldwide are aware about using the ultrasound for this specific purpose have aroused, creating an interesting field of investigation on current opinion of specialists on this specific matter. One important need for these authors was to determine whether or not the responders group are involved in academic activities. The meaning of this is that if the majority of responders are really involved in academic activities, doing research and publishing, then we were probably dealing with a very special high-level group of specialists. This is the reason why we also searched on responders' publications, impact factor of publications and citations. To the end of this very first section of the study we realized that we were dealing with a strong group of specialists involved with many publications of good power. An average of 21.5 manuscripts were related to each responder with an impact factor average of 28.39 confirming that our group of responders are all involved in academics and indeed are experts on the subject. Fifty-four percent of specialists believe that the ultrasound is an essential tool for placing central venous lines. Fifty percent of emergency physicians and pediatricians were skeptical in affirm that the ultrasound is essential for the procedure in question. Not too far from this number were surgeons, intensivists and anesthesiologists, dividing the population of specialists on the opinion that ultrasound is or is not an essential tool for obtaining central lines. The point that these two authors were not able to clarify is why specialists are divided on the use of ultrasound for this purpose, even though literature enforces safety and efficacy with fewer complications with the use of this modern point-of-care device?

Following this rationale, only 56% of responders expressed that the use of ultrasound for determining a CVC is the standard-of-care. In the same way, only 53.7% affirm that ultrasound should be preferred when available. In a time of evidence-based medicine shouldn't we expect a higher number of physicians defending the use of ultrasound?[3-5] Maybe, because of ultrasound for determining CVC and ultrasound point-of-care is something relatively new in medicine, adoption for this new technique including its learning curve and training would be a hassle for experienced physicians to shift from one technique to another. The answer is no. Based on this research only 1.58% expressed in the discussion that learning another technique would be an issue. 10.31% of physicians expressed that should learn first anatomic landmark technique before start handling the US for this matter. In the other hand, around 90% of this selective group of responders do not agree that a physician should use whatever technique he or she thinks is the best for their patients,

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suggesting that a protocol must be followed. In order to that, some training must happen in any stage of medical career but only 44.44% of these opinion leaders defended in the discussion that residents must be taught into both techniques. Many questions and debates are arising on literature regarding training for central venous line access and learning both techniques during residency looks reasonable, in contrast to specialists' position on this research where 66% of responders did not expressed any argument for residents training in both techniques. Our opinion is that both residents and physicians must be prepared for the use of ultrasound or not depending on the situation or where he is working. In a critical scenario the quick use of the ultrasound may be difficult due to patient's severity and anatomic landmark should be stimulated. By the other hand, ultrasound should be the first option when available, in agreement with responders (58%) that stated that ultrasonography should not be mandatory. A physician should have adequate proficiency in the landmark technique as in the ultrasound technique but the evidence favors for the ultrasound technique. The fact that a certain percentage of people agreed with the same opinion does not mean that the others disagree with them; therefore, this dataset could estimate the real opinion from responders but was not precise about it.

With this brief opinion report it is clear to us that in a time of evidence-based medicine there are still some controversies that need to be addressed regarding the use of ultrasound for placing CVCs, including a uniform opinion on training, protocols and finally broad use of a proven benefic device. The pros and cons on using or not the ultrasound for the subject herein discussed maybe never end; however, there are so strong evidences that support its use in order to avoid not only mechanical complications but infectious complications and thrombosis that the use of US seems in fact the best option.

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