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Orsi Consensus Meeting on European Robotic Training (OCERT): Results from the First Multispecialty Consensus Meeting on Training in Robot-assisted Surgery

Aude E. Vanlander[a], *Elio Mazzone*[b,c,d,e,*], *Justin W. Collins*[b,f], *Alexandre M. Mottrie*[b,c], *Xavier M. Rogiers*[a], *Henk G. van der Poel*[g], *Isabelle Van Herzeele*[h], *Richard M. Satava*[i], *Anthony G. Gallagher*[b,j]

[a] *Department of General and Hepatobiliary Surgery, Liver Transplantation Service, Ghent University Hospital, Ghent, Belgium;* [b] *Orsi Academy, Melle, Belgium;* [c] *Department of Urology, OLV, Aalst, Belgium;* [d] *Division of Oncology, Unit of Urology, Urological Research Institute, IRCCS Ospedale San Raffaele, Milan, Italy;* [e] *Vita-Salute San Raffaele University, Milan, Italy;* [f] *Department of Molecular Medicine and Surgery, Karolinska Institutet, Stockholm, Sweden;* [g] *Department of Urology, The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital, Amsterdam, The Netherlands;* [h] *Department of Thoracic and Vascular Surgery, Ghent University Hospital, Ghent, Belgium;* [i] *University of Washington Medical Center, Seattle, WA, USA;* [j] *Faculty of Life and Health Sciences, Ulster University, Belfast, Northern Ireland, UK*

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Abstract

To improve patient outcomes in robotic surgery, robotic training and education need to be modernised and augmented. The skills and performance levels of trainees need to be objectively assessed before they operate on real patients. The main goal of the first Orsi Consensus Meeting on European Robotic Training (OCERT) was to establish the opinions of experts from different scientific societies on standardised robotic training pathways and training methodology. After a 2-d consensus conference, 36 experts identified 23 key statements allotted to three themes: training standardisation pathways, validation metrics, and implementation prerequisites and certification. After two rounds of Delphi voting, consensus was obtained for 22 of 23 questions among these three categories. Participants agreed that societies should drive and support the implementation of benchmarked training using validated proficiency-based pathways. All courses should deliver an internationally agreed curriculum with performance standards, be accredited by universities/professional societies, and, trainees should receive a certificate approved by professional societies and/or universities after successful completion of the robotic training courses. This OCERT meeting established a basis for bringing surgical robotic training out of the operating room by seeking input and consensus across surgical specialties for an objective, validated, and standardised training programme with transparent, metric-based training outcomes.

Patient summary: The Orsi Consensus Meeting on European Robotic Training (OCERT) is an international, multidisciplinary, Delphi-panel study of scientific societies and experts focused on training in robotic surgery. The panel achieved consensus that standardised international training pathways should be the basis for a structured, validated, replicable, and certified approach to implementation of robotic technology.

* Corresponding author. Division of Oncology, Unit of Urology, Urological Research Institute, IRCCS Ospedale San Raffaele, Via Olgettina 60, Milan 20132, Italy. Tel. +39 02 26437286, Fax: +39 02 26437298.
E-mail address: eliomazzone@gmail.com (E. Mazzone).

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The robotic approach to minimally invasive surgery has grown in popularity since its introduction in the 1990s [1,2]. As robotic surgery continues to expand, the creation of standardised, quality assured, certified training pathways is imperative. In this context, both in Europe and the USA, structured training programmes for robotic surgery have been proposed [3,4]. However, none of these relied on objective metrics allowing for full implementation of proficiency-based progression (PBP) training. PBP is a scientific methodology that derives procedure performance metrics for what to do (eg, operative steps) and what not to do (performance errors and critical errors) from very experienced surgeons, which are then agreed by surgeon peers (at a Delphi meting) and demonstrate good reliability and construct validity (ie, they distinguish between the objectively assessed performance of experienced and less experienced surgeons). Thus, PBP training offers objective and validated performance metrics that can be used in performance feedback for trainees and in tracking trainee progression to ensure that predefined performance benchmarks are reached before trainees operate on real patients [5]. Moreover, in prospective, randomised, and blinded studies it has been repeatedly demonstrated that metric-based simulation training to proficiency (benchmarked against the performance of experienced and proficient surgeons) produces superior surgical skills in comparison to traditional training approaches [6–9]. Traditionally, case volume and exposure created expert surgeons, whereas nowadays metric-based deliberate practice determines improvement and may create experts.

In 2002, the first randomised controlled trial demonstrated that laparoscopic technical skills acquired on a virtual reality simulator successfully transferred to technical and procedural skills in the operating room [10]. This outcome has been replicated hundreds of times [11], establishing that surgical skills can be successfully trained outside the operating room. To improve patient outcomes in robotic surgery, robotic training and education need to be modernised and augmented. The skills and performance levels of trainees need to be objectively assessed before they operate on real patients. The main goal of this first Orsi Consensus Meeting on European Robotic Training (OCERT) was to establish the opinions of experts from different scientific societies on standardised robotic training pathways and a PBP training methodology.

A 2-d consensus conference was held at the Orsi Academy (Melle, Belgium). Overall, 36 participants took part in this consensus meeting, representing eight scientific societies, four industries, and educationalists (Supplementary Table 1). Industry representatives did not participate in the Delphi voting. The outcomes represent the general view on robotic training from a multidisciplinary audience consisting of academics and representatives of key surgical societies.

At the end of the conference, after hearing the points of view from all societies, 26 participants identified 23 key statements allotted to three themes: (1) training standardisation pathways, (2) validation metrics and implementation prerequisites, and (3) certification. Subsequently, the participants were invited to respond to an online questionnaire concordant with the Delphi methodology [12]. After receiving the responses and feedback from the first Delphi round, the statements that did not reach the agreed consensus ($\geq$80%) were rephrased and a second electronic Delphi round was completed. The latter represents the final version of our questionnaire.

The response rates in the first and second Delphi rounds were 100% and 81% (21/26), respectively. After two rounds, consensus was obtained for 22 of 23 (96%) questions divided into the three categories (Table 1). The only question for which no consensus was reached was about the role of scientific societies in funding training (Q14b, 75% agreement). Detailed summaries of the results from rounds 1 and 2 of the Delphi voting are reported in Supplementary Tables 2 and 3.

Overall, this international, multidisciplinary, Delphi-panel study of experts achieved high levels of consensus on standardisation pathways, implementation prerequisites and validation metrics, and certification. Participants agreed that societies should drive and support the implementation of benchmarked training using validated PBP pathways including instructions on basic skills. Trainees should pass benchmarked e-learning modules before hands-on training. All courses should (1) deliver an internationally agreed curriculum with performance standards and (2) be accredited by universities/professional societies, and (c) trainees should receive a certificate approved by professional societies and/or universities after successful completion of the robotic training courses. Unlike previous consensus statements [13,14], our study used a defined Delphi methodology to achieve consensus on robotic training. In addition, unlike the approach of Ahmed et al [13], in which the discussion was exclusively focused on the definition of a standardised training pathway, our consensus meeting focused on three main themes: training standardisation pathways; validation metrics and implementation prerequisites; and certification. Another crucial novelty of our consensus meeting was its explicit multidisciplinary nature, with experts from different scientific societies (Supplementary Table 1) involved.

The panel relied on templates available from the literature to set up a replicable model for training [15,16]. For standardised training pathways, the panel agreed that it is essential that every robotic course should be preceded by pre-course learning and that only attendees who have reached the benchmark level should be permitted to attend the hands-on courses. Every robotic training programme should start with a basic non–specialty-related technology course. Since different robotic platforms will be available soon, this basic technology training should be system-specific and replicable across all specialties and societies. The panel agreed that the societies should peer review the instructions for use developed by manufacturers and contribute to establishing the benchmarks for basic technology training courses using a PBP approach. After the basic hands-on course, training should be tailored to different subspecialties. Ideally, a 1-wk specialty boot-camp should precede stepwise, structured, proficiency-based,

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Table 1 – Results of the Delphi process completed over two rounds during the OCERT meeting using Google forms.

Question	Level of agreement
Section 1: Standardisation pathways	
1. Technology training courses can be generic for different basic specialty courses	100%
2a. Societies should peer review the IFU (ie, device training) produced by manufacturers to aid the development of technology training courses	85%
2b. Societies should peer review the IFU produced by manufacturers and contribute to setting the benchmarks for a PBP approach to device training courses	95%
3. Courses should be tailored to trainee experience (residents/fellows, experienced robot-naïve, experienced non–robot-naïve)	100%
4. Trainees should not perform independent surgery on patients until after obtaining a video-based PBP certificate	92%
5. Specialty societies should design a specialty-specific training course, using a consistent template across all societies	96%
6. Specialty societies should design procedure-specific training course, using a consistent template across all societies	100%
7. Validated PBP-based metrics are the proper tools for assessing skills at the end of procedural training pathways	100%
8. Similar PBP assessments are mandatory for each different robotic system	92%
Section 2: Implementation prerequisites	
9. Societies should take a leading role in being responsible for certification of training and verification should be affiliated with the society	92%
10. Societies should recommend that certification is possible only for validated outcome-based training (eg, IFU, tasks, full procedures) with benchmarks (eg, PBP training programmes)	96%
11. Training and certification should meet the same internationally defined standard all over Europe	96%
12. The educational content should be defined and follow an international standard that is based on outcome-based metrics that are benchmarked on the performance of experienced clinical users	100%
13. A specialised simulation training centre that provides procedure-based skills training courses should be approved by an accrediting body/organisation and show that it meets internationally agreed standards	100%
14a. Industry should contribute to the set-up and running costs for outcome-based training run by accredited training centres	95%
14b. Professional societies should contribute to the set-up and running costs for outcome-based training run by accredited training centres (paid from membership fees)	75%
14c. Individual surgeons and trainees should contribute to costs for outcome-based training run by accredited training centres	85%
14d. Government/national health services/hospitals should contribute to the set-up and running costs for outcome-based training run by accredited training centres	95%
Section 3: Certification	
15. Should basic robotic skills training be included in every surgical curriculum (accreditation by university + professional society)?	80%
16. Should objective criteria for becoming a certified mentor (recertification) be defined?	100%
17. Is a cultural change required to optimally prepare trainees before attending a basic robotic skills training course?	96%
18a. Should pre-course e-learning evaluation be completed to a sufficient standard (benchmarked) before attending a basic robotic skills training course?	100%
18b. Should further pre-course e-learning evaluation, related to procedural training, be completed to a sufficient standard (benchmarked) before attending an advanced procedure-focused robotic skills training course?	100%

PBP = proficiency-based progression; IFU = instructions for use.

modular training at an accredited host centre. Structured robotic programmes or advanced procedure-specific training programmes can be proposed. It is crucial to define standardised criteria for progression, such as a PBP benchmarked assessment. A trainee can be assessed using validated metrics to evaluate their procedure proficiency at the end of a training module [5,15].

Training has to cover the "four As": awareness, agreement, accessibility, and affordability. The first challenge is to raise awareness on the benefits and importance of PBP training and achieving quality-assured training with well-defined benchmarks. Evidence that high-quality training improves clinical outcomes with unambiguous cause-effect demonstration is crucial [16,17], as conceptualised by PBP metrics. There was general agreement within the panel that societies should own the training. They should be responsible for supervising training quality and driving a process that leads robotic surgery from an emerging technology to an accepted and integral part of everyday practice. In terms of accessibility, training should be equally accessible across different countries. Affordability represents one of the major hurdles. There was agreement that funding should come from industry, trainees, and governments/national health systems; however, consensus was lacking on the role of scientific societies in funding training. Hence, scientific societies may voluntarily contribute to the costs of developing, endorsing, or reviewing surgical training courses.

For certification, it is fundamental to define a mentor and the criteria to certify a mentor. Mentors should be evaluated using objective assessment criteria, as proposed by Collins

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et al [12]. The panel agreed on the necessity to define a PBP-based European robotic training license certified locally by universities and provided in every surgical curriculum. Conversely, procedure-specific training should be certified by societies.

In conclusion, this OCERT meeting established a basis for bringing surgical robotic training out of the operating room by seeking input and consensus across surgical specialties for an objective, validated, and standardised training programme with transparent, metric-based training outcomes. The need to improve robotic surgery–related patient outcomes in a period of rapid expansion makes the OCERT initiative imperative.

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Study concept and design: Mottrie, Gallagher, Mazzone, Vanlander.
Acquisition of data: Mazzone, Vanlander, Collins.
Analysis and interpretation of data: van der Poel, Van Herzeele, Mottrie, Gallagher.
Drafting of the manuscript: Vanlander, Mazzone, Mottrie, Gallagher.
Critical revision of the manuscript for important intellectual content: Van Herzeele, van der Poel, Satava, Rogiers.
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Appendix A. Supplementary data

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