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Standards in surgical training in advanced pelvic malignancy across Europe and beyond – A Snapshot analysis

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ABSTRACT

Introduction: Multimodal treatment of patients with advanced pelvic malignancies (APM) is challenging and surgical expertise is usually concentrated in highly specialised centres. Given significant regional variation in APM surgery, surgical training represents a cornerstone in standardising and future-proofing of this complex therapy. The aim of this study was to describe the availability and current satisfaction levels with surgical training for APM.

Material and methods: An online questionnaire was developed and distributed through the Redcap© platform with 32 questions addressing participant and institution demographics, and training in APM surgeries. The survey was electronically disseminated in 2021 to surgical networks across Europe including all specialities treating APM via the European Society of Surgical Oncology (ESSO). All statistical analysis were performed using R.

Results: The survey received 280 responses from surgeons across 49 countries, representing general surgery (36%), surgical oncology (30%), gynaeoncology (15%), colorectal surgery (14%) and urology (5%). Fifty-three percent of participants report performing >25 APM procedures/year. Respondents were departmental chiefs (12%), consultants (34%), specialist surgeons (40%) and fellows (15%). 34% were happy/very happy with their training with 70% satisfaction about their exposure to surgical procedures. Respondents reported a lack of standardised training (72%), monitoring tools (41%) and mentorship (56%). 57% rated attended courses as useful for training, while 80% rated visiting expert centres as useful.

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Conclusion: This study has identified a learning need for improved structured training in APM, with low current satisfaction levels with exposure to APM training. Organisations such as ESSO provide an important platform for visiting expert centres, courses, and structured training.

1. Introduction

Pelvic malignancies are defined as neoplasms originating from the organs of the pelvis, with prostate, rectal, cervical and bladder malignancies the most common pelvic neoplasms according to Globocan data in 2020 [1]. This study utilises the term advanced pelvic malignancy to describe cancer affecting more than one organ or any recurrent pelvic cancer. The management of advanced pelvic malignancies (APM) is technically complex due to the proximity of these organs to each other in the narrow pelvis and a multidisciplinary approach is often required. Although pelvic exenteration is technically challenging, refinement of techniques, training and concentration of exenteration in high volume units has improved outcomes, with 30-day mortality rate now reported as <2% [2]. A key outcome measure in pelvic exenteration is R0 resection, with achieving clear margins critical to patient disease free survival [3]. Therefore, excellence is required in training both in technical and non-technical skills.

There are overlapping training challenges facing specialties that operate on advanced malignancy in the pelvis, including colorectal, gynaecological, urology and sarcoma surgical oncologists. These challenges include achieving sufficient case volume for training, understanding complex pelvic anatomy, changing treatment paradigms, the backlog created by Covid-19 and its resultant impact on training, and a relative lack of clearly defined training structures [4,5]. Training the next generation of surgeons to undertake surgery on advanced pelvic malignancy requires development of surgeons with both technical operative skills and a holistic skillset in patient assessment, pre- and post-operative management, communication with patients and colleagues and multidisciplinary working. In the UK and Ireland, the general surgical curriculum includes competencies in practice (CiPs) to assess the holistic skills required for a surgical practice including the ability to run an outpatient clinic or an Medical Decision-Making (MDM) [6]. For advanced malignancy, these skills are even more pertinent. Multimodal approaches such as the European School of Peritoneal Surface Oncology developed by ESSO are important ways to develop learning opportunities across specialties [6]. Fellowship training is an important model for developing skillsets in advanced malignancy at high volume units [7,8]. As there is minimal evidence about the quality of surgical training in APM, data on training models is extrapolated from other specialty training pathways, e.g. fellowship training in colorectal surgery or gynaeoncology. Supervision by an experienced trainer during minimally invasive colorectal surgery has been shown to be safe and effective in training [9].

The primary objective of this study was to examine the current structure of and participant satisfaction with training in APM across Europe and beyond. A secondary objective was to identify strategies to improve training in APM.

2. Material and Methods

2.1. Questionnaire development

A questionnaire was developed including a total of 32 questions addressing three main areas: details about each individual participant, the employing institute, and their training. The survey questions were evaluated by an independent team prior to finalization.

The participants were asked about demographic information including gender, age, years of practice since the end of surgical training, their speciality, their country of training and current practice, full time employment, as well as surgical experience. Questions focusing on the characterisation of the surgical institute contained the type of institute, annual caseload of advanced pelvic surgeries, existence of standardised training, multidisciplinary team meetings, auditing programs as well as common practice of surgical interdisciplinarity. The training of the individuals was targeted using questions about existence and number of mentors, time of dedicated training, monitoring items, visiting of expert centres, and specific courses, as well as the satisfaction of each item, and the exposure to surgery. Finally, the participants were asked to identify potential areas for improvement.

Most of the questions were designed as a single or multiple option to choose from. A total of five questions allowed the participants to answer in free text. Satisfaction about training and specific items were questioned using Likert scales of five possibilities: 1) not happy at all, 2) less happy, 3) indifferent, 4) happy, 5) very happy [11]. The full questionnaire is illustrated in Appendix_Fig. 1.

2.2. Survey distribution and data collection

The survey was distributed through various channels and social media platforms from March to May 2021. The survey was additionally shared to EYSAC National representatives (Appendix_Table 1), and ESSO partner societies (Appendix_Table2).

The Redcap© platform was used to collect and obtain a descriptive and comparative analysis of the data.

2.2.1. Statistical analysis

Descriptive statistics (frequency, percentage, mean and standard deviation) were calculated and charted in data tables.

Centered bar charts showing the percentage of responses for each question for each of the respective Likert question sections were created with items listed in order of most agreement to least agreement.

Responses to open ended/free text questions were analysed using word clouds±using descriptive qualitative content analysis in which recurring themes were identified. Thematic analysis was performed as previously described by others [10]. The Description of analytic steps undertaken in thematic analysis are illustrated in (Appendix_Table 3).

All statistical analysis were performed using R statistical software [11].

Fisher's Exact Test was used to test the significance of differences in the distribution of categorical variables. Two-sided $p < 0.050$ was considered to indicate statistical significance. Missing data from participants were excluded from analysis.

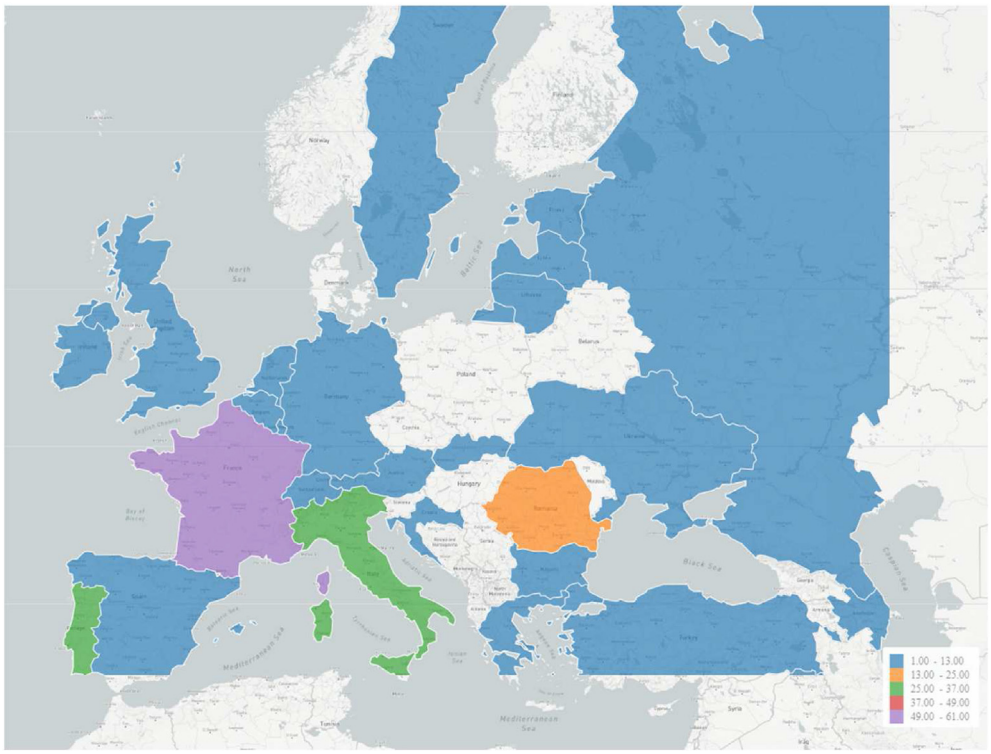

Fig. 1. Participant's distribution in Europe.

3. Results

3.1. Demographics

The questionnaire was answered by a total of 303 participants. After cleaning the datasheet from blank or doubled questionnaires, a total of 285 forms were eligible for analysis of participants practicing in 49 different countries. The distribution of different countries is illustrated in Fig. 1, indicating the Top 5 countries: France (n = 61), Portugal (n = 35), Italy (n = 28), Romania (n = 14), and India (n = 12).

The participants' demographics are illustrated in Table 1. Of the 280 respondents, 68% were male, 36% were General Surgeons, 62% had more than 5 years' experience since the end of their training, 22% report performing >100 APM procedures per year and 81% were aged <50 years.

The participants were mainly employed in a university or teaching hospital (63.5%), with the median annual case volume of 26–50 patients operated due to APM. The majority (73.6%) reported always discussing patients in a multidisciplinary team meeting, while 34.6% have a standardised auditing process. The centre and training characteristics are illustrated in Table 2. Only 10.7% of participants report having a standardised training program in APM at their institute, 34% report having specific mentorship during their APM training, and 36% used monitoring items of accomplishment during their training.

Regarding the extra-institutional training, 23.9% of participants participated in national or international courses and 45.6% visited expert centres. The majority of participants stayed between one and two months (36%). Details about these items are illustrated in Table 3. The number of specialities in which APM surgeons of various disciplines trained in differed between a mean of 1.9 ± 1.6 for surgical oncologists and 1.3 ± 1.1 for general surgeons (Table 4).

Several questions aimed to detect the satisfaction with training and training structure at the participant's institute. Only 34% of all participants were happy/very happy with training at their institute, while 56% were in general happy/very happy with their training overall, also including rotations to other institutes or fellowships (Fig. 2). A total of 70% were happy/very happy with their exposure to surgical procedures during their training in APM. Additional courses and visitation of expert centres were seen useful to their training in 57%, and 80%, respectively (Fig. 3).

4. Qualitative analysis

Participants were asked to provide feedback about the possibility of improvement of their training. The Top 3 expressions applying the thematical analysis were 'hands on practice' (72%), 'curriculum' (36%), and 'mentorship' (16.2%) (Table 5).

5. Discussion

This study explored the status quo of surgical training in advanced pelvic malignancy in an international group of surgeons of different specialities and identified areas for improvement.

5.1. Cross specialty learning

Management of patients with APM often includes a multimodal therapeutic approach of different specialities including the three main areas colorectal, urology, and gynaecology, as well as sarcoma and neurosurgery among others. Interestingly, surgeons from the disciplines surgical oncology and gynaecology were most frequently trained in a second area of expertise whereas general surgery rarely rotated to other areas. This can certainly be explained in two ways. 1) General surgery is often the first speciality in European models in the field of visceral surgery and is therefore often associated with a younger age of those surveyed. 2)

Table 1
Demographics of participants.

	Total	Colorectal Surgeon	General Surgeon	Gynaecology	Surgical Oncology[a]	Urology
	N = 280	N = 39	N = 101	N = 41	N = 84	N = 15
Age						
<30	12 (4.29%)	0 (0.00%)	7 (6.93%)	2 (4.88%)	1 (1.19%)	2 (13.3%)
30–35	71 (25.4%)	8 (20.5%)	28 (27.7%)	13 (31.7%)	17 (20.2%)	5 (33.3%)
36–40	76 (27.1%)	13 (33.3%)	25 (24.8%)	7 (17.1%)	27 (32.1%)	4 (26.7%)
41–50	69 (24.6%)	13 (33.3%)	20 (19.8%)	10 (24.4%)	22 (26.2%)	4 (26.7%)
51–65	46 (16.4%)	5 (12.8%)	19 (18.8%)	9 (22.0%)	13 (15.5%)	0 (0.00%)
> 65	6 (2.14%)	0 (0.00%)	2 (1.98%)	0 (0.00%)	4 (4.76%)	0 (0.00%)
Gender						
Female	89 (31.8%)	15 (38.5%)	32 (31.7%)	21 (51.2%)	19 (22.6%)	2 (13.3%)
Male	191 (68.2%)	24 (61.5%)	69 (68.3%)	20 (48.8%)	65 (77.4%)	13 (86.7%)
Current position						
Fellow	41 (14.6%)	5 (12.8%)	17 (16.8%)	10 (24.4%)	4 (4.76%)	5 (33.3%)
Specialist surgeon	111 (39.6%)	13 (33.3%)	44 (43.6%)	20 (48.8%)	32 (38.1%)	2 (13.3%)
Consultant	95 (33.9%)	16 (41.0%)	30 (29.7%)	6 (14.6%)	37 (44.0%)	6 (40.0%)
Chief of department	33 (11.8%)	5 (12.8%)	10 (9.90%)	5 (12.2%)	11 (13.1%)	2 (13.3%)
Years of practice after specialisation						
< 5	107 (38.2%)	16 (41.0%)	37 (36.6%)	19 (46.3%)	25 (29.8%)	10 (66.7%)
6–10	68 (24.3%)	9 (23.1%)	25 (24.8%)	8 (19.5%)	24 (28.6%)	2 (13.3%)
11–20	61 (21.8%)	9 (23.1%)	21 (20.8%)	9 (22.0%)	19 (22.6%)	3 (20.0%)
> 20	44 (15.7%)	5 (12.8%)	18 (17.8%)	5 (12.2%)	16 (19.0%)	0 (0.00%)
Performed # of procedures as 1st operator						
0	32 (11.4%)	2 (5.13%)	19 (18.8%)	8 (19.5%)	1 (1.19%)	2 (13.3%)
1–25	98 (35.0%)	16 (41.0%)	53 (52.5%)	7 (17.1%)	16 (19.0%)	6 (40.0%)
26–50	42 (15.0%)	7 (17.9%)	12 (11.9%)	5 (12.2%)	16 (19.0%)	2 (13.3%)
51–100	45 (16.1%)	6 (15.4%)	7 (6.93%)	8 (19.5%)	23 (27.4%)	1 (6.67%)
> 100	63 (22.5%)	8 (20.5%)	10 (9.90%)	13 (31.7%)	28 (33.3%)	4 (26.7%)
Region of practice						
Europe	219 (78.5%)	38 (97.4%)	83 (83.0%)	33 (80.5%)	55 (65.5%)	10 (66.7%)
Non-European	60 (21.5%)	1 (2.56%)	17 (17.0%)	8 (19.5%)	29 (34.5%)	5 (33.3%)

[a] Peritoneal Surface Malignancy or Sarcoma.

In many countries, gynaecologists or urologists have rotations in general surgery or started their training in this discipline, 3) general surgery as an umbrella term may be interpreted to include other specialties such as vascular surgery depending on regional training structures. In principle, cross-specialty learning in a complementary surgical discipline is advantageous. Cross-Specialty training and knowledge especially in the field of surgical oncology represents a cornerstone of the European curriculum of the European Society of Surgical Oncology and is likely to become more important in the future [12,13].

5.2. Variation in cancer care and training

Cancer care is regulated in many countries by the government and national health system and the specific set up significantly differs amongst different European countries. Centralisation generally has the following main goals: improvement of quality of care, optimization of resource use, and eventually cost saving [14]. Centralisation in cancer care has proven advantages in improved patient outcomes through better knowledge about exact indications, surgical quality, postoperative care, and the “rescue phenomen” [15,16]. The rescue phenomenon or failure to rescue is a model, which tries to explain the observation, that hospitals with high rates of complications do not necessarily have high mortality in contrast to high-mortality hospitals, which may not be as proficient at recognizing and managing serious complications once they occur. The two main contributing factors towards a better patient outcome, measured by mortality and complication rate are high surgeon volume and specialisation [17]. In our study, a considerable number of participants (n = 129; 46%) visited an expert centre during their training in APM, with a high rate of satisfaction (80% very happy/happy), which reflects the learning potential of expert centres. Leading societies such as the Society of Surgical Oncology (SSO) and the European Society of Surgical Oncology (ESSO) are working on formal integration of training opportunities in surgical oncology into advanced training, with the development of a global curriculum in surgical oncology [12,13].

5.3. European collaboration in surgical training

In recent years, ESSO launched two successful international training programs, including a detailed curriculum, mentorship program, and logbooks. In 2014, the European School of Peritoneal Surface Oncology (ESPSO) as a joint venture of the ESSO and the Peritoneal Surface Oncology Group (PSOGI) and a few years later the European School of Soft Tissue Sarcoma Surgery (ESSTSS) as a joint venture between ESSO and the Connective Tissue Oncology Society (CTOS) were established. Both schools are training and accrediting specialists who complete a specific track which ensures a high level of expertise in their graduates. Certainly, European collaboration is a practicable and important approach especially in the treatment of patients with less common diseases such as APM.

5.4. Standardisation in training

Important parameters associated with the quality of surgical training include hospital or surgical case volume, surgical technique, definition of resectability, surgical margins and methods of assessing adverse events using the Common Terminology Criteria for Adverse Event (CTCAE) according to an assessment of the most common quality parameters described in protocols [18]. A urology survey reported a similar range of low satisfaction of surgical trainees with training and low confidence [19]. Common themes leading to dissatisfaction included lack of mentoring (56%), standardisation (72%), and monitoring tools (41%). Formal mentoring of surgeons is an important parameter in developing a training

Table 2
Centre and training characteristics.

	Total	Colorectal Surgeon	General Surgeon	Gynaecology	Surgical Oncology[a]	Urology
	N = 280	N = 39	N = 101	N = 41	N = 84	N = 15
Current centre						
Type of institution						
University/Teaching hospital	178 (63.6%)	29 (74.4%)	54 (53.5%)	24 (58.5%)	59 (70.2%)	12 (80.0%)
Community hospital	48 (17.1%)	5 (12.8%)	29 (28.7%)	6 (14.6%)	7 (8.33%)	1 (6.67%)
Research hospital	21 (7.50%)	2 (5.13%)	7 (6.93%)	2 (4.88%)	9 (10.7%)	1 (6.67%)
Other	14 (5.00%)	2 (5.13%)	3 (2.97%)	6 (14.6%)	3 (3.57%)	0 (0.00%)
'Missing'	19 (6.79%)	1 (2.56%)	8 (7.92%)	3 (7.32%)	6 (7.14%)	1 (6.67%)
Patients' inclusion in MDT[b]						
Always	206 (73.6%)	35 (89.7%)	64 (63.4%)	29 (70.7%)	68 (81.0%)	10 (66.7%)
Sometimes	45 (16.1%)	3 (7.69%)	23 (22.8%)	7 (17.1%)	8 (9.52%)	4 (26.7%)
Never	10 (3.57%)	0 (0.00%)	6 (5.94%)	2 (4.88%)	2 (2.38%)	0 (0.00%)
'Missing'	19 (6.79%)	1 (2.56%)	8 (7.92%)	3 (7.32%)	6 (7.14%)	1 (6.67%)
Presence of standardised auditing program						
Yes	97 (34.6%)	17 (43.6%)	34 (33.7%)	19 (46.3%)	19 (22.6%)	8 (53.3%)
No	164 (58.6%)	21 (53.8%)	59 (58.4%)	19 (46.3%)	59 (70.2%)	6 (40.0%)
'Missing'	19 (6.79%)	1 (2.56%)	8 (7.92%)	3 (7.32%)	6 (7.14%)	1 (6.67%)
Training/Mentoring						
Current role						
Trainee	44 (15.7%)	6 (15.4%)	20 (19.8%)	5 (12.2%)	7 (8.33%)	6 (40.0%)
Trainer	95 (33.9%)	15 (38.5%)	21 (20.8%)	16 (39.0%)	40 (47.6%)	3 (20.0%)
Neither	77 (27.5%)	8 (20.5%)	36 (35.6%)	10 (24.4%)	20 (23.8%)	3 (20.0%)
'Missing'	64 (22.9%)	10 (25.6%)	24 (23.8%)	10 (24.4%)	17 (20.2%)	3 (20.0%)
Quantity of mentors						
1	64 (22.9%)	5 (12.8%)	25 (24.8%)	5 (12.2%)	27 (32.1%)	2 (13.3%)
2	55 (19.6%)	9 (23.1%)	18 (17.8%)	6 (14.6%)	18 (21.4%)	4 (26.7%)
> 2	95 (33.9%)	14 (35.9%)	34 (33.7%)	19 (46.3%)	22 (26.2%)	6 (40.0%)
'Missing'	66 (23.6%)	11 (28.2%)	24 (23.8%)	11 (26.8%)	17 (20.2%)	3 (20.0%)
dedicated time as trainee in APM[c]						
< 6 months	30 (10.7%)	2 (5.13%)	13 (12.9%)	3 (7.32%)	10 (11.9%)	2 (13.3%)
7–12 months	24 (8.57%)	4 (10.3%)	7 (6.93%)	3 (7.32%)	9 (10.7%)	1 (6.67%)
12–24 months	32 (11.4%)	5 (12.8%)	5 (4.95%)	9 (22.0%)	12 (14.3%)	1 (6.67%)
>24 months	53 (18.9%)	6 (15.4%)	10 (9.90%)	12 (29.3%)	19 (22.6%)	6 (40.0%)
Not applicable	77 (27.5%)	12 (30.8%)	42 (41.6%)	4 (9.76%)	17 (20.2%)	2 (13.3%)
'Missing'	64 (22.9%)	10 (25.6%)	24 (23.8%)	10 (24.4%)	17 (20.2%)	3 (20.0%)
Course participation in APM[c]						
Yes	67 (23.9%)	7 (17.9%)	16 (15.8%)	18 (43.9%)	24 (28.6%)	2 (13.3%)
No	148 (52.9%)	22 (56.4%)	61 (60.4%)	12 (29.3%)	43 (51.2%)	10 (66.7%)
'Missing'	65 (23.2%)	10 (25.6%)	24 (23.8%)	11 (26.8%)	17 (20.2%)	3 (20.0%)
Visitation of expert centres during training?						
Yes	129 (46.1%)	20 (51.3%)	28 (27.7%)	26 (63.4%)	48 (57.1%)	7 (46.7%)
No	87 (31.1%)	9 (23.1%)	49 (48.5%)	5 (12.2%)	19 (22.6%)	5 (33.3%)
'Missing'	64 (22.9%)	10 (25.6%)	24 (23.8%)	10 (24.4%)	17 (20.2%)	3 (20.0%)

[a] Peritoneal Surface Malignancy or Sarcoma.
[b] Multidisciplinary team meeting.
[c] Advanced pelvic malignancies.

programme in surgical oncology. Mentoring refers not only to technical skills, but also to the wider non-technical aspects of surgical practice. The Association of Surgeons in Training (ASiT) created consensus recommendations for mentoring programmes in 2014 [20]. There are many advantages to active development of a mentorship structure for surgical oncology. One of the key components of the European School of Peritoneal Surface Oncology is the pairing of candidates with a mentor who is an expert in their field to provide guidance and support, nurturing surgeons' potential. Mentoring should be formally incorporated into curricula instead of relying on the good will of individual surgeons to ensure sustainability and growth [12,13]. Other formal components of training programmes, such as a logbook or electronic logbook are helpful to monitor progression as well as the number of surgical procedures but can be subject to inconsistency in logging habits and perceived lack of accuracy [21].

5.5. Limitations

Online surveys have by nature several limitations. 1) The possibility of generalisation from sample to population. 2) The participants were – due to the nature of this online survey, and topic – biased in the following characteristics: literacy, online access, potential membership in societies of surgical oncology, and interest in the subject. Therefore, there may be bias in participant selection [22]. 3) The timing bias. A total of 105 of 280 participants (37%) were currently working >11 years after the end of their specialisation and might have faced a different training environment and mentoring set up as may be in place today. Therefore, they might have been unhappy with their training in APM but are providing a better training environment for current trainees at this moment.

5.6. Future perspectives

The Covid-19 pandemic hampered the quality of surgical training since March 2020, with restrictions on travel and the ability to visit expert centres and attend face to face courses. There was also a dramatic impact on patient care with reduced operating in many areas, followed by a backlog of advanced malignancy [23]. As a result, numerous online platforms and webinars emerged over the past year. Future hybrid training models may build on the

Table 3
Details about participants' training and training abroad.

Items						
Standard APM training at institute	**Yes**	**work in progress**	**No**			
n = 261	30	44	187			
	11%	17%	72%			
Mentoring in APM	**Yes**	**No**				
n = 216	95	121				
	44%	56%				
Monitoring items[a]	**Defined curriculum**	**Operative logbook**	**Definition of learning outcomes**	**reg. quality assessments**	**None**	**Other**
n = 216	35	64	45	46	114	1
	13%	23%	16%	16%	41%	0.3%
Course visited[a]	**Yes – national**	**Yes - INT EUR**	**Yes - INT Asia**	**Yes - INT N. America**	**Yes - NT AUS/NZ**	**Yes - INT Other**
n = 215	39	33	2	3	1	2
	13.9%	11.8%	0.7%	1.1%	0.4%	0.7%
Training abroad						
Visit expert centres	**Yes**	**No**				
n = 216	129	87				
	59.9%	40.1%				
Location[a]	**National**	**INT - EUR**	**INT - Asia**	**INT - North America**	**INT - AUS/NZ**	**INT - other**
n = 148	85	65	5	19	9	4
	57.4%	43.9%	3.4%	12.8%	6.1%	2.7%
Time	**1 - 2 mo**	**3 - 6 mo**	**7 - 12 mo**	**13 - 24 mo**	**>24 mo**	
n = 143	51	43	21	20	8	
	35.7%	30.1%	14.7%	14.0%	5.6%	

[a] Respondents could select more than one option.

Table 4
Number of specialities in which APM surgeons of various disciplines trained in.

Specialty		# Specialities trained in for APM	
	N	Mean	SD
Colorectal Surgeon	39	1.41	1.19
General Surgeon	101	1.32	1.12
Gynaecology	41	1.63	1.70
Surgical Oncology (Peritoneal Surface Malignancy or Sarcoma)	84	1.92	1.62
Urology	15	1.53	1.60

Descriptive statistics including N or respondents from each surgical discipline as well as mean and standard deviation (SD) are tabulated.

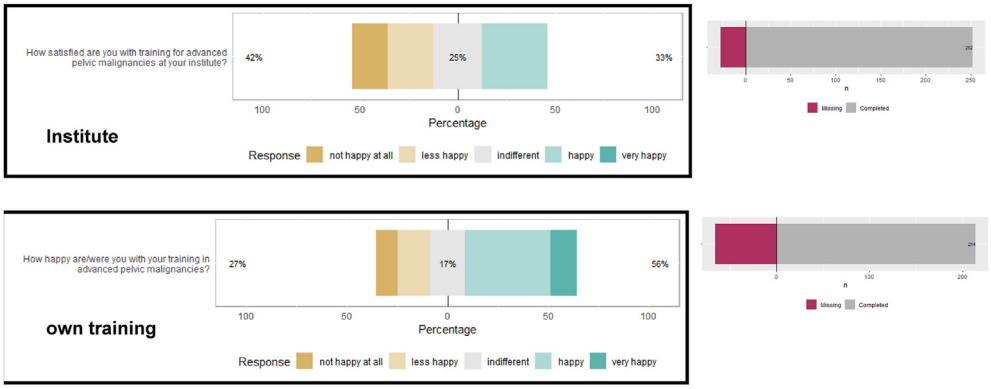

Fig. 2. Satisfaction of participants with their institute's and their own training.

online expertise developed over the past year and utilise the best of pre-pandemic face to face and pandemic online learning. The advantage of increased digital communication is improved global connectivity with mentoring opportunities on a global scale e.g. bringing experts and learners together virtually to exchange information in case discussions and to enable a modern model for mentoring.

CRediT authorship contribution statement

Andreas Brandl: Conceptualization, Methodology, Validation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Dara Lundon:** Conceptualization, Methodology, Validation, Software, Formal analysis, Data curation, Writing – review & editing, Visualization, Project administration. **Laura Lorenzon:** Conceptualization, Methodology,

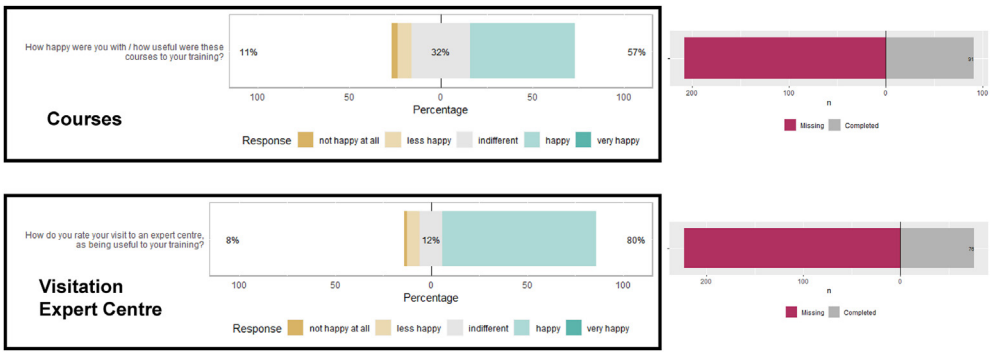

Fig. 3. Participant's satisfaction with specific components in their training.

Table 5
Presentation of the themes and sub themes to the question; "What would improve your training?"

Curriculum	Hands on practice	Mentorship
- Participating in courses - Prescription of knowledge required - Board certification	- new techniques - more exposure/practice - need for models/simulation trainers - Train in other specialties	- Professional guidance - Senior advocates for the specialty

Validation, Writing – review & editing, Supervision, Project administration. **Yvonne Schrage:** Conceptualization, Methodology, Validation, Writing – review & editing. **Carmela Caballero:** Conceptualization, Methodology, Validation, Writing – review & editing. **Carl Jacob Holmberg:** Conceptualization, Methodology, Validation, Writing – review & editing. **Nada Santrac:** Conceptualization, Methodology, Validation, Writing – review & editing. **Mariela Vasileva-Slaveva:** Conceptualization, Methodology, Formal analysis, Data curation, Validation, Writing – review & editing. **Giacomo Montagna:** Conceptualization, Methodology, Validation, Writing – review & editing. **Olivia Sgarbura:** Conceptualization, Methodology, Validation, Writing – review & editing. **Raza Sayyed:** Conceptualization, Methodology, Validation, Writing – review & editing. **Almog Ben-Yaacov:** Conceptualization, Methodology, Validation, Formal analysis, Data curation, Writing – review & editing, Visualization. **Johnn Henry Herrera Kok:** Conceptualization, Methodology, Validation, Formal analysis, Data curation, Writing – review & editing, Visualization. **Ina Suppan:** Conceptualization, Methodology, Validation. **Helen Mohan:** Conceptualization, Methodology, Validation, Writing – review & editing. **Wim Ceelen:** Conceptualization, Methodology, Validation, Writing – review & editing, Visualization, Supervision, Project administration. **Tibor Kovacs:** Conceptualization, Methodology, Validation, Supervision, Project administration. **Domenico D'Ugo:** Conceptualization, Methodology, Validation, Supervision, Project administration. **Sergio Sandrucci:** Conceptualization, Methodology, Validation, Supervision, Project administration.

Declaration of competing interest

Andreas Brandl, Dara Lundon, Laura Lorenzon, Yvonne Schrage, Carmela Caballero, Carl Jacob Holmberg, Nada Santrac, Mariela Vasileva-Slaveva, Giacomo Montagna, Olivia Sgarbura, Raza Sayyed, Almog Ben-Yaacov, Johnn Henry Herrera Kok, Ina Suppan, Helen Mohan, Wim Ceelen, Tibor Kovacs, Domenico D'Ugo, Sergio Sandrucci declared that they have no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ejso.2022.01.002.

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