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GYNECOLOGIC ONCOLOGY

Gynecology-obstetric resident surgery training: a national evaluation

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Abstract

Objectives The main objective of this study was to evaluate surgery training and evaluation of French gynecology-obstetrics residents. The second objective was to evaluate using simulation during residency.

Study design This national descriptive study, utilized a questionnaire to survey all interns in French gynecology and obstetrics. At the end of a study, 129 responses of residents were analyzed.

Results The participation rate was 12%. The majority of residents were women (84%) and the highest response rate was from the Ile-de-France region (36%). The lowest rate was from the Southern region. The majority of residents were in the eighth semester (20%). Residents reported surgical and obstetric orientations in 53% ($n=68$) and 44% ($n=57$) of cases, respectively. Registration for cancer oncology was reported by 22% ($n=28$) of respondents. Evaluation of oncologic surgery training was mostly considered "good" by the surgical group and "passable" by the obstetrics group. Access to simulators was usually restricted and most often utilized the pelvitrainer. Sessions were typically not mandatory and numbered between zero and five per semester. Three types of simulators were accessible in the Ile-de-France, North-West, West and Rhône-Alpes. The North-East did not have access to animal models, and the South-West did not have access to corpses. Surgical classes were more common in the Rhône-Alpes, North-East, Ile-de-France and North-West regions. To improve their training in oncological surgery, 64% ($n=18$) of residents planned to do an inter-university exchange and 54% had completed additional specialized training. Measures that were most expected to improve training were increased training in surgery (96% of respondents, $n=27$) and more intensive coaching (96%, $n=27$).

Conclusions Companionship is a pillar of residents training, but its effectiveness is variable. One solution could be to implement better use of simulation methods.

Keywords Assessment · Surgical training · Internal · Gynecology-obstetrics

Introduction

Transmission of knowledge is a fundamental element of the medical profession, and the current learning model for surgery is based on companionship and integration of residents within medical teams. Although this mode of learning has proven very effective, it relies on a high number of surgical procedures and the gradual development of responsibility to enable students to work autonomously.

Surgical training for obstetrics and gynecology residents involves both theoretical and the practical aspects. Theoretical training is mainly achieved through the Diploma of Specialized Studies and training within the services; including bibliography sessions, courses and meetings. Practical training is carried out in gynecological surgical departments; cancer centers and visceral, urological or vascular surgery departments during the ten semesters of internship, and is conducted mainly by companionship. The resident can choose his or her course, orient the training according to their preferences and rank of classification and can choose to complete the training by following an inter-university degree and participating in specialized training oriented to gynecological surgery.

Our investigation aimed to generate a national inventory of gynecology-obstetric residents surgery training, especially the use of simulation.

The study was conducted across all regions of France.

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Materials and methods

The present national descriptive study employed a questionnaire, which was sent to all French gynecology-obstetrics residents through the Association of Gynecologists Obstetricians Training (AGOF). The survey was conducted from January to June, 2018 (Appendix).

The residents were questioned about their gender, region, current semester, enrollment in classes or projects in the Diploma of Complementary Specialized Studies (DESC) of cancerology, placement in an internship in a French comprehensive cancer center and inter-university degree, as well as on the follow-up of complementary specialized training. Residents were asked about the quality of their surgical training and evaluation, the different types of teaching that they received and the resources that were available for their surgical learning.

Residents' training was analyzed according to their orientation, enrollment in DESC, region (Antille-Guyane, Ile-de-France, North-East, North-West, West, Rhône-Alpes and South-West) and semester (first or second year of internship).

Data were organized and analyzed using an Excel database (Microsoft, Redmond, WA, USA). Univariate analysis was performed on orientation (surgical or obstetrical), enrollment in DESC (yes or no), and semester (1–5 or 6–10). The Chi-squared test was used to compare categorical variables, or Fisher's exact test or the Wallis–Kruskal test when Chi-squared validity conditions were not required. The Student's *t* test was used to compare a continuous variable with a categorical variable, or the Wilcoxon test was used when the variable did not follow a normal distribution. Results were considered significant when $p < 0.05$.

Statistical analyses were carried out using R software version 2.15.3 (https://lib.stat.cmu.edu/R/CRAN/).

Results

Of 1114 questionnaires that were sent, we received 129 responses (participation rate = 12%). Most residents were women (84%, $n = 108$). The Ile-de-France region had the highest response rate [36% of residents ($n = 47$)]. The lowest rate was in the South region, where no residents responded to the questionnaire. Participation rates were 17% ($n = 22$), 15% ($n = 19$), 11% ($n = 14$), 9% ($n = 12$), 6% ($n = 8$) and 2% ($n = 3$) in the North-East, Rhône-Alpes, North-West, West, South-West and Antilles-Guyane regions, respectively, and the region was not indicated in 3% of cases ($n = 4$). The majority of residents were in the eighth semester (20%, $n = 26$), 19% ($n = 25$) were in the tenth semester, 14% ($n = 18$) in the sixth semester, 13% ($n = 17$) in the seventh semester, 9% ($n = 12$) in the fourth semester, 8% ($n = 11$) in the ninth semester, 8% ($n = 11$) in the fifth semester, 3% ($n = 4$) in the third semester, 2% ($n = 3$) in the second semester and no first-semester residents responded. The semester was not reported in 1% of cases ($n = 2$). The majority of residents had a surgical orientation (53%, $n = 68$), and 44% ($n = 57$) were obstetrically oriented. The orientation was not reported in 3% of cases ($n = 4$). Residents enrolled in cancer oncology accounted for 22% of the respondents ($n = 28$), and 16% ($n = 21$) planned to enroll (Table 1).

Table 1 Characteristics of the population

	Number of residents ($n = 129$)
Sex	
Man	19 (15)
Woman	108 (84)
Semester	
1	0
2	3 (2)
3	4 (3)
4	12 (9)
5	11 (8)
6	18 (14)
7	17 (13)
8	26 (20)
9	11 (8)
10	25 (19)
Not specified	2 (1)
Inter-region	
Ile-de-France	47 (36)
North-west	14 (11)
North-east	22 (17)
West	12 (9)
South	0
South-west	8 (6)
Rhone-Alpes	19 (15)
Antilles-Guyane	3 (2)
Not specified	4 (3)
Orientation	
Obstetric	57 (44)
Surgical	68 (53)
Not specified	4 (3)
DESC of cancerology	
In progress	28 (22)
Registration project	21 (16)

Data are presented as the average number (percentage), average (minimum–maximum)

DESC diploma of complementary specialized studies

Analysis of residents profiles according to their orientation revealed more female residents regardless of orientation [81% ($n=55$) in the surgical group, 89% ($n=51$) in the obstetrics group], but that male residents were more likely to have a surgical than obstetrics orientation (19% versus 11%, $p<0.05$). There were no significant differences between the residents orientations in terms of their current semester and inter-region ($p=0.38$ and $p=0.32$, respectively) (Table 2).

The obstetric group rated their training in gynecological surgery as "good" and more often than the surgical group [50% ($n=34$) and 51% ($n=35$) respectively], and "passable more often in the obstetric compared with surgical group [44% ($n=25$) and 47% ($n=27$), respectively; $p<0.05$]. Access to a simulator was more common in the surgical group [62% ($n=42$) versus 53% ($n=30$) for the obstetric group, $p<0.05$]; though this was reported as not freely available for the majority of both groups [60% ($n=41$) and 58% ($n=33$) of the surgical and obstetric groups, respectively; $p=0.05$]. The pelvitrainer was the most commonly used simulator [73% ($n=50$) and 63% ($n=36$) in the surgical and obstetric groups, respectively], followed by animal models [28% ($n=19$) and 14% ($n=8$) for the surgical and obstetric groups, respectively]. Cadaver simulation was the least represented simulator type [available to 13% ($n=9$) and 3% ($n=2$) of the surgical and obstetric group, respectively; $p=0.24$]. Pelvitrainer sessions were frequently reported to be not required [by 72% ($n=49$) and 79% ($n=45$) of the surgical and obstetric groups, respectively ($p=0.24$)]. The number of simulator sessions was typically between zero and five sessions per semester [76% ($n=52$) and 79% ($n=45$) in the surgical and obstetric groups, respectively; $p=0.33$]. Evaluations of theoretical knowledge were carried out in 35% ($n=24$) of the surgical group, and in 30% ($n=17$) of the obstetric group ($p=0.22$). Practical knowledge was evaluated for 9% ($n=6$) of the surgical group and 3% ($n=2$) of the obstetric group ($p=0.83$). All three types of simulators were accessible in the Ile-de-France, North-West, West and Rhône-Alpes inter-regions; but the North-East region did not have access to the animal model and the South-West region did not have access to cadaver simulators ($p=0.55$). Simulator sessions were mostly not mandatory in all regions ($p=0.14$), and the number of sessions was typically between zero and five sessions ($p=0.47$) (Table 3).

Surgically orientated residents reported more surgical courses than the obstetric group [73% ($n=50$) versus 67% ($n=38$), $p<0.05$). No significant differences were found between the groups concerning anatomy and surgery courses during the internship, theoretical or practical surgery courses or surgical training via video. A significant difference was found in the existence of surgical courses, more frequently reported in the Rhône-Alpes, North-East, Ile-de-France and North-West regions than in the West, South-West and Antilles-Guyane regions [100% ($n=14$), 89% ($n=8$), 82% ($n=18$), 67% ($n=6$), 38% ($n=3$), 25% ($n=1$) and 0%, respectively; $p<0.05$]. Residents of all regions reported the absence of anatomy classes, except for the South-West region where anatomy classes were provided for 50% of residents ($n=2$) (Table 4).

Of all respondents, 22% ($n=28$) were registered for DESC oncology. Most of these (86%, $n=24$) had completed a semester in a comprehensive cancer center. This internship was mandatory if they had access in 25% of the cases ($n=7$), optional if the resident wanted it in 46% of the cases ($n=13$) and was completed in the context of an inter-university exchange in 14% ($n=4$) of cases. It was found that 11% ($n=3$) of DESC-registered residents had not undertaken a semester in a regional cancer center for the reasons of there being no comprehensive cancer center in the region (4%, $n=1$) or having no access (4%, $n=1$). The third resident did not provide the reason. The majority

Table 2 Characteristics of residents according to the orientation

	Residents		*p*
	Surgical orientation ($n=68$)	Obstetrical orientation ($n=57$)	
Sex			
Man	13 (19)	6 (11)	< 0.05
Woman	55 (81)	51 (89)	
Semester			
1	0	0	0.38
2	1 (1)	1 (2)	
3	0	1 (2)	
4	5 (7)	7 (12)	
5	8 (11)	2 (3)	
6	12 (18)	6 (11)	
7	9 (13)	8 (17)	
8	14 (20)	12 (21)	
9	5 (7)	6 (11)	
10	14 (20)	11 (19)	
Inter-region			
Ile-de-France	22 (32)	24 (42)	0.32
North-west	9 (13)	5 (9)	
North-east	9 (13)	13 (23)	
West	8 (11)	4 (7)	
South	0	0	
South-west	4 (6)	4 (7)	
Rhone-Alpes	14 (20)	4 (7)	
Antilles-Guyane	1 (1)	2 (3)	
DESC of cancerology			
In progress	28 (41)	0	< 0.05
Registration project	19 (28)	2 (3)	

Data are presented as the average number (percentage), average (minimum–maximum)

DESC diploma of complementary specialized studies

Table 3 Characteristics of access to surgical simulators and modalities of evaluation of interns according to orientation and inter-region

	Residents			Residents with surgical orientation							
	Surgical orientation ($n=68$)	Obstetrical orientation ($n=57$)	p	Antille-Guyane ($n=1$)	Ile-de-France ($n=22$)	North-West ($n=9$)	North-East ($n=9$)	West ($n=8$)	Rhone-Alpes ($n=14$)	South-West ($n=4$)	p
Formation											
Gynecologic surgery											
Excellent	1 (1)	0	**< 0.05**	0	1 (5)	0	0	0	0	0	0.29
Very good	4 (6)	1 (2)		0	2 (9)	0	0	0	0	2 (50)	
Good	34 (50)	13 (23)		1 (100)	9 (41)	7 (78)	3 (33)	5 (62)	8 (57)	0	
Fair	24 (35)	25 (44)		0	8 (36)	2 (22)	5 (56)	3 (38)	5 (36)	2 (50)	
Bad	5 (7)	16 (28)		0	2 (9)	0	1 (11)	0	1 (7)	0	
Surgery of gynecological cancers											
Excellent	1 (1)	0	**< 0.05**	0	1 (5)	0	0	0	0	0	0.45
Very good	9 (13)	1 (2)		0	3 (14)	2 (22)	0	0	3 (21)	1 (25)	
Good	35 (51)	19 (33)		1 (100)	13 (59)	6 (67)	4 (44)	5 (62)	4 (28)	2 (50)	
Fair	19 (28)	27 (47)		0	3 (14)	1 (11)	3 (33)	3 (38)	7 (50)	1 (25)	
Bad	4 (6)	10 (17)		0	2 (9)	0	2 (22)	0	0	0	
Surgical simulators											
Access to a simulator											
Yes	42 (62)	30 (53)	**< 0.05**	0	13 (59)	9 (100)	5 (56)	6 (75)	6 (43)	2 (50)	0.15
No	26 (38)	27 (47)		1 (100)	9 (41)	0	4 (44)	2 (25)	8 (57)	2 (50)	
Type of simulator											
Pelvitrainer	50 (73)	36 (63)	0.24	NA	15 (68)	9 (100)	7 (78)	8 (100)	8 (57)	2 (50)	0.55
Animal model	19 (28)	8 (14)		NA	7 (32)	0	2 (22)	4 (50)	5 (36)	1 (25)	
Corpses	9 (13)	2 (3)		NA	2 (9)	1 (11)	1 (11)	2 (25)	3 (21)	0	
Free access to simulator											
Yes	17 (25)	14 (24)	0.05	NA	2 (9)	5 (56)	5 (56)	4 (50)	0	1 (25)	0.06
No	41 (60)	33 (58)		NA	15 (68)	4 (44)	3 (33)	4 (50)	13 (93)	1 (25)	
Mandatory simulator sessions											
Yes	9 (13)	6 (10)	0.24	NA	3 (14)	2 (22)	0	0	2 (14)	1 (25)	0.14
No	49 (72)	45 (79)		NA	15 (68)	7 (78)	8 (89)	8 (100)	8 (57)	1 (25)	
Number of simulator sessions per semester											
0–5	52 (76)	45 (79)	0.33	NA	17 (77)	6 (67)	6 (67)	7 (88)	12 (86)	3 (75)	0.47
5–10	8 (12)	2 (3)		NA	2 (9)	3 (33)	1 (11)	1 (12)	1 (7)	0	
10–15	0	0		NA	0	0	0	0	0	0	
15–20	0	1 (2)		NA	0	0	0	0	0	0	
More than 20	0	0		NA	0	0	0	0	0	0	

Table 3 (continued)

	Residents			Residents with surgical orientation							
	Surgical orientation ($n=68$)	Obstetrical orientation ($n=57$)	p	Antille-Guyane ($n=1$)	Ile-de-France ($n=22$)	North-West ($n=9$)	North-East ($n=9$)	West ($n=8$)	Rhone-Alpes ($n=14$)	South-West ($n=4$)	p
Do you benefit from an evaluation of your theoretical knowledge?											
Yes	24 (35)	17 (30)	0.22	0	11 (50)	3 (33)	0	2 (25)	8 (57)	0	0.06
No	44 (65)	40 (70)		1 (100)	11 (50)	6 (67)	9 (100)	6 (75)	6 (43)	4 (100)	
Do you benefit from an evaluation of your practical knowledge?											
Yes	6 (9)	2 (3)	0.83	0	2 (9)	1 (11)	0	2 (25)	1 (7)	0	0.77
No	62 (91)	55 (96)		1 (100)	20 (91)	8 (89)	9 (100)	6 (75)	13 (93)	4 (100)	

Data are presented as number (percentage)

of DESC-registered residents (64%, $n=18$) planned to do an inter-university exchange to improve their training in oncological surgery. Complementary specialized training was completed by 64% ($n=18$) of DESC-registered residents; by inter-university degree in 25% of cases ($n=7$) and in training centers in 39% of cases ($n=11$). The measures that residents expected to improve their training were reported as being: more training in surgery (96%, $n=27$), more intensive coaching (96%, $n=27$), supervision by a senior throughout the internship (64%, $n=18$), more access to simulators and operating theater (61%, $n=17$), the option of seniorization during the internship (54%, $n=15$), more than access to theoretical training (50%, $n=14$) and the opportunity of an intensive internship in a dedicated surgery department (43%, $n=12$). However, inter-region comparative analysis found no significant difference between respondents' preferences among these measures ($p=0.56$) (Table 5).

Among residents with surgical orientation, 21% ($n=14$) were in the first part of their internship (semesters 1–5) and 79% ($n=54$) were in the second part (semesters 6–10). An internship in a comprehensive cancer center was carried out by 71% of first part residents ($n=10$) and by 67% of second part residents ($n=36$) ($p=0.05$). The internship was not mandatory for the second part group and was mandatory for 4% ($n=2$) of residents in the first part group ($n=2$). The internship was completed if available by 43% ($n=6$) of first part residents and 18% ($n=10$) of second part residents, while 14% ($n=2$) of first part and 39% ($n=21$) of second part residents completed the internship if they wished to. An inter-university exchange internship was required to gain access to a comprehensive cancer center for 14% ($n=2$) of first-year and 6% ($n=3$) of second-year residents, and was more frequently undertaken by first part residents [71% ($n=10$) versus 44% ($n=24$), $p=0.07$]. Specialized training was more frequent among second part residents, but without significant difference to that of first part residents [67% ($n=36$) versus 50% ($n=7$), $p=0.16$]. Among first-part residents, this training was completed via a DESC inscription for 21% ($n=3$), an inter-university degree for 21% ($n=3$) and a training center for 21% ($n=3$). Of second-part residents, 48% ($n=26$) completed DESC training, 17% ($n=9$) completed an inter-university degree, and 33% ($n=18$) undertook a training center course. No significant differences were found between the first and second part groups in terms of measures which they believed would improve their training ($p=0.48$). All first part residents ($n=14$) desired more intensive surgical training at the start of the internship, while 91% ($n=49$) of second-part residents wanted this. More sustained companionship was expected to improve training by 93% ($n=13$) and 96% ($n=52$) of first- and second-part residents, respectively. More access to the simulators was desired by 76% ($n=11$) and 65% ($n=35$) of first- and second-part residents, respectively, more access to the operating

Table 4 Characteristics of in-house training by orientation and inter-region

	Residents			Residents with surgical orientation							
	Surgical orientation ($n=68$)	Obstetrical orientation ($n=57$)	p	Antille-Guyane ($n=1$)	Ile-de-France ($n=22$)	North-West ($n=9$)	North-East ($n=9$)	West ($n=8$)	Rhone-Alpes ($n=14$)	South-West ($n=4$)	p
Anatomy courses											
Yes	17 (25)	19 (33)	0.29	0	8 (36)	1 (11)	1 (11)	1 (12)	4 (28)	2 (50)	0.53
No	51 (75)	38 (67)		1 (100)	14 (64)	8 (89)	8 (89)	7 (88)	10 (71)	2 (50)	
Surgery courses											
Yes	50 (73)	38 (67)	< 0.05	0	18 (82)	8 (89)	6 (67)	3 (38)	14 (100)	1 (25)	< 0.05
No	18 (26)	19 (33)		1 (100)	4 (18)	1 (11)	3 (33)	5 (62)	0	3 (75)	
Provided during											
DES courses	46 (68)	38 (67)	0.30	NA	16 (91)	6 (67)	6 (67)	3 (38)	13 (93)	2 (50)	0.18
Bibliography	4 (6)	4 (7)		NA	1 (5)	1 (11)	0	0	1 (7)	1 (25)	
IUD	25 (37)	7 (12)		NA	8 (36)	6 (67)	1 (11)	1 (12)	9 (64)	0	
Mandatory surgical IUD											
Yes	3 (4)	1 (2)	0.30	0	1 (5)	0	0	3 (38)	1 (7)	0	0.45
No	63 (93)	56 (98)		1 (100)	21 (95)	9 (100)	9 (100)	5 (62)	12 (86)	4 (100)	
Mandatory theoretical courses of surgery											
Yes	44 (65)	38 (67)	0.20	1 (100)	17 (77)	6 (67)	4 (44)	2 (25)	12 (86)	2 (50)	0.05
No	24 (35)	18 (31)		0	5 (23)	3 (33)	5 (56)	6 (75)	2 (14)	2 (50)	
Mandatory practical courses of surgery											
Yes	6 (9)	11 (19)	0.33	0	4 (18)	1 (11)	0	0	1 (7)	0	0.48
No	62 (91)	46 (81)		1 (100)	18 (82)	8 (89)	9 (100)	8 (100)	13 (93)	4 (100)	
Surgical training by videos											
Yes	22 (32%)	10 (17)	0.92	0	5 (23)	5 (56)	3 (33)	3 (38)	6 (43)	0	0.46
No	46 (68)	47 (82)		1 (100)	17 (77)	4 (44)	6 (67)	5 (62)	12 (86)	4 (100)	
Mandatory											
Yes	3 (4)	4 (7)	0.33	NA	1 (5)	0	0	0	2 (14)	NA	0.48
No	39 (57)	31 (54)		NA	13 (59)	7 (78)	4 (44)	5 (62)	8 (57)	NA	
Information training for patients											
Yes	6 (9)	5 (9)	0.65	0	2 (9)	1 (11)	2 (22)	1 (12)	0	0	0.77
No	62 (91)	52 (91)		1 (100)	20 (91)	8 (89)	7 (78)	7 (88)	14 (100)	4 (100)	
Training in the writing of an operational report											
Yes	8 (12)	4 (7)	0.68	0	3 (14)	3 (33)	1 (11)	0	1 (7)	0	0.52
No	61 (90)	53 (91)		1 (100)	19 (86)	6 (67)	8 (89)	8 (100)	13 (93)	4 (100)	
Is this training necessary?											
Yes	66 (97)	38 (67)	< 0.05	1 (100)	22 (100)	9 (100)	8 (89)	8 (100)	13 (93)	4 (100)	0.75
No	2 (3)	19 (33)		0	0	0	1 (11)	0	1 (7)	0	

Table 4 (continued)

	Residents			Residents with surgical orientation							
	Surgical orientation ($n=68$)	Obstetrical orientation ($n=57$)	p	Antille-Guyane ($n=1$)	Ile-de-France ($n=22$)	North-West ($n=9$)	North-East ($n=9$)	West ($n=8$)	Rhone-Alpes ($n=14$)	South-West ($n=4$)	p
Postoperative follow-up training											
Yes	10 (15)	6 (10)	0.71	0	5 (23)	2 (22)	1 (11)	1 (12)	1 (7)	0	0.85
No	58 (85)	51 (89)		1 (100)	17 (77)	7 (78)	8 (89)	7 (88)	13 (93)	4 (100)	
Is this training necessary?											
Yes	66 (97)	36 (63)	0.09	1 (100)	22 (100)	9 (100)	8 (89)	8 (100)	13 (93)	4 (100)	0.75
No	2 (3)	9 (16)		0	0	0	1 (11)	0	1 (7)	0	

Data are presented as number (percentage)

DSS diploma of specialized studies, *IUD* inter-university degrees

room in 64% ($n=9$) and 63% ($n=34$), the completion of an intensive internship in a specialized service in 64% ($n=9$) and 54% ($n=29$) of first- and second-part residents. Senior management and seniorization were expected to improve training by 71% ($n=10$) and 54% ($n=29$), and 64% ($n=9$) and 43% ($n=23$) of first- and second-part residents, respectively (Table 6).

Discussion

In January 2012, a report of the High Authority for Health (HAS) evaluated ten proposals for improving the quality and safety of care in France which involved development and implementation of surgical simulation in all health professional education programs at all stages of curricula [1]. Simulation learning represents an essential complement to current gynecology-obstetrics training, and is deemed to be valuable by residents [2].

In France, simulation is already available in a few expert centers such as the International Center for Endoscopic Surgery (CICE) in Clermont-Ferrand. This non-compulsory training program at CICE provides theoretical sessions, pelvitrainer sessions and training sessions on live porcine models to improve the surgical skills of residents [3]. It has been reported that assessment of laparoscopic skills was desired by 75% of residents participating in this training course [4]. The present study revealed that not all residents have access to the same types of simulators, and that simulator sessions are often not mandatory. We found that surgical courses were most frequently undertaken during the DES courses regardless of region, but only the West and Rhône-Alpes regions provided complementary theoretical and surgical courses. Mandatory surgical courses were absent or very infrequent (with a maximum of 18% in the Ile-de-France region). The use of video training was not commonplace, practiced only in the Ile-de-France, North-East and Rhône-Alpes regions. In view of these results and the fact that residents mostly did not have free access to the simulators, the number of sessions rarely amounted to more than five per semester, and they were not mandatory. It is therefore easy to understand that most residents use complementary training centers that offer these pedagogical options to improve their skills, at their own expense—typically around 500 euros. In Europe, simulation is a well-established pedagogical tool, but inequalities in resident's access to this resource remain significant, especially in France [2], which was confirmed by the present study. Definition of training objectives using simulation models throughout the internship could be included in the gynecologist-obstetrics resident's notebook, which is often underemployed. Making its use mandatory and regular throughout the internship could improve the quality of training that is offered.

Table 5 Characteristics of diploma of complementary specialized studies residents by inter-region

	DESC ($n=28$)	Residents registered in DESC							
		Antille-Guyane ($n=1$)	Ile-de-France ($n=7$)	North-East ($n=5$)	North-West ($n=5$)	West ($n=3$)	Rhone-Alpes ($n=5$)	South-West ($n=2$)	p
Semester in a French comprehensive cancer center									
Yes	24 (86)	0	6 (86)	5 (100)	5 (100)	3 (100)	4 (80)	2 (100)	0.12
Mandatory	0	NA	0	0	0	0	0	0	0.18
If possible	7 (25)	NA	3 (43)	1 (20)	3 (60)	0	0	0	
If wished	13 (46)	NA	3 (43)	4 (80)	1 (20)	3 (100)	1 (20)	2 (100)	
Inter-CHU	4 (14)	NA	0	0	1 (20)	0	3 (60)	0	
No	3 (11)	1 (100)	0	0	0	0	1 (20)	0	
No French comprehensive cancer center in the region	1 (4)	0	NA	NA	NA	NA	1 (20)	NA	0.91
No access possible	1 (4)	1 (100)	NA	NA	NA	NA	0	NA	
Not wanted	0	0	NA	NA	NA	NA	0	NA	
Inter-CHU done or planned to improve the practice of surgery									
Yes	18 (64)	1 (100)	1 (14)	4 (80)	3 (60)	2 (67)	5 (100)	2 (100)	0.06
No	10 (36)	0	6 (86)	1 (20)	2 (40)	1 (33)	0	0	
Specialized training									
Yes	15 (54)	0	3 (43)	4 (80)	1 (20)	1 (33)	4 (80)	2 (100)	0.83
IUD	7 (25)	0	1 (14)	1 (20)	1 (20)	1 (33)	2 (40)	1 (50)	
Formation center	11 (39)	0	3 (43)	3 (60)	1 (20)	0	3 (60)	1 (50)	
No	10 (36)	0	0	0	0	0	0	0	
Measures expected to improve training									
More training in surgery	27 (96)	1 (100)	6 (86)	5 (100)	5 (100)	3 (100)	5 (100)	2 (100)	0.56
More intensive companionship	27 (96)	1 (100)	6 (86)	5 (100)	5 (100)	3 (100)	5 (100)	2 (100)	
More access to theoretical training	14 (50)	0	3 (43)	3 (60)	2 (40)	2 (67)	2 (40)	2 (100)	
More access to simulator	17 (61)	0	5 (71)	3 (60)	3 (60)	1 (33)	4 (80)	1 (50)	
More access to the block	17 (61)	1 (100)	4 (57)	2 (40)	2 (40)	2 (67)	4 (80)	2 (100)	
Intensive course in a specialized service	12 (43)	0	2 (28)	1 (20)	2 (40)	1 (33)	4 (80)	2 (100)	
Coaching by a senior	18 (64)	0	3 (43)	4 (80)	4 (80)	2 (67)	4 (80)	2 (100)	
Seniorization during the internship	15 (54)	0	3 (43)	3 (60)	1 (20)	2 (67)	4 (80)	1 (50)	

Data are presented as number (percentage)

CHU university hospital center, *IUD* inter-university degrees, *DESC* diploma of complementary specialized studies

Table 6 Characteristics of interns with surgery orientation according to the semester

	Residents with surgical orientation		*p*
	Semester 1–5 ($n=14$)	Semester 6–10 ($n=54$)	
Semester in a French comprehensive cancer center			
Yes	10 (71)	36 (67)	0.05
Mandatory	0	2 (4)	
If possible	6 (43)	10 (18)	
If wished	2 (14)	21 (39)	
Inter-CHU	2 (14)	3 (6)	
No	3 (21)	18 (33)	0.42
No French comprehensive cancer center in the region	2 (14)	4 (7)	
No access possible	0	3 (6)	
Not wanted	1 (7)	9 (17)	
Inter-CHU done or planned to improve the practice of surgery			
Yes	10 (71)	24 (44)	0.07
No	4 (28)	30 (56)	
Specialized training			
Yes	7 (50)	36 (67)	0.16
DESC	3 (21)	26 (48)	
IUD	3 (21)	9 (17)	
Formation center	3 (21)	18 (33)	
No	0	0	
Measures expected to improve training			
More training in surgery	14 (100)	49 (91)	0.48
More intensive companionship	13 (93)	52 (96)	
More access to theoretical training	9 (64)	28 (52)	
More access to simulator	11 (76)	35 (65)	
More access to the block	9 (64)	34 (63)	
Intensive course in a specialized service	9 (64)	29 (54)	
Coaching by a senior	10 (71)	29 (54)	
Seniorization during the internship	9 (64)	23 (43)	

Data are presented as number (percentage)

CHU university hospital center, *IUD* inter-university degrees, *DESC* diploma of complementary specialized studies

In 2012, Philippe et al. reported that, of 306 residents, 50% were not satisfied with the training they received in laparoscopy at CICE Clermont Ferrand. Intensive and short-term training were found to result in rapid progression and significant improvements in the body language skills of the residents [4]. The most formative simulator type was the animal model for 86% of residents, and 60% of residents felt that companionship was essential for their learning [4]. Although Philippe et al. reported results concerning laparoscopy training, their findings support those of the present study.

The rapid development of new minimally invasive surgical techniques necessitates constant revision of training programs. Increase in the numerus clauses and the requirement for compensatory rest means that more residents are trained in less time. Moreover, the evolution of our society has resulted in reduced learning about the individual patient. The use of simulators and access to training centers provide solutions to these difficulties to some extent.

A study by Rathat et al. was the first to evaluate the surgical training of gynecology-obstetrics residents at a national level. The participation rate was 46%, and 83% of respondents wanted an objective evaluation of surgical learning to be included in the internship. If the participants criticize the conditions of learning, this suggests that they do not have the distance to understand what would allow them to professionalize, while the seniors are able to judge this objectively. The authors suggest that the transition from residency to senior status ultimately confirms the quality of training, thus allowing the resident to assume the functions of the new role. This success does, to some degree, negate the criticisms that the model receives. A training course can be considered as an internship that is provided by experienced service practitioners who are willing to pass on some of their knowledge [5]. In 2008, the practical evaluation of gynecology-obstetrics residents was almost non-existent, and the present study indicates that it is not significantly more frequent at the present time. In particular, the assessment of practical knowledge is insufficient in many cases. When this is performed, it is at the discretion of the senior manager or a colleague, and is therefore subjective and rarely explained to the resident [5]. Increasing the accessibility of simulators, setting practical training objectives at the beginning of each semester and including mid-semester systematic evaluations could improve the assessment of residents throughout their internships.

Together, these studies indicate that evaluation during internships is insufficient. It has been noted that, in 2007, the situation had not changed since 2000 [5]. Tranchart et al. [6] reported that for ophthalmological, digestive and orthopedic surgery, the implementation of systematic evaluation was necessary in more than 90% of the cases, and the ideal evaluation modality was the performance of an intervention on a patient. Obstacles to implement this were resident's anxiety, medico-legal reasons and lack of objective criteria. The ideal frequency of these sessions was found to be half-yearly.

Teaching is currently based on new educational tools, such as surgical practice on animal or cadaveric models, as well as the use of pelvitrainer and simulators. While such teaching resources exist, they are often difficult to access. Although more than half of the residents included in our analysis reported having access to a simulator (62% in the surgical group and 53% in the obstetrical group), not all residents had access to the same types of resources. Overall,

residents had more access to the pelvitrainer than to animal or cadaveric models. The benefits of dissection, sessions on the pelvitrainer and interventions involving animal models have already been demonstrated.

In our study, more intensive companionship was among the most desired measures of residents, combined with more training in surgery. Companionship forms the basis of the practical training of surgeons, which begins during residency and continues during post-resident appointments. While highly beneficial, this training remains at the discretion of the senior physician and is becoming less applicable to the current situation. The increase in operating time associated with this training, combined with the need for profitability of operating theaters and increase in the number of residents (768 residents in 2008 compared with 1106 in 2018) create obstacles to the continuity of operation learning [6]. Furthermore, the compliance with compensatory rest and absences for inter-university degree mean that the effectiveness of companionship training has decreased in recent years [7]. Smaller numbers of residents would mean that training could be more regular and, therefore, more effective as the senior could establish a better knowledge of his interns. Current conditions often mean that seniors lack understanding of the benchmarks to help the progression of residents. The questions that are asked regarding patient observations are no longer personalized, whereas before they were adapted to the resident's knowledge, which was known to the senior [8]. However, companionship remains a beneficial mode of training as it enables residents to follow a senior and care for a patient from admission to discharge. The creation of senior–resident pairs is more comfortable for the senior, more satisfactory for the resident and increases the overall efficiency of training.

Companionship requires trust, compatibility of the resident's and senior's personalities and a productive relationship. Although a pillar of in-house training, companionship is not fair and its effectiveness varies according to the type of intervention. One solution could be to encourage better use of simulators, with obligatory sessions from the beginning of the internship. It is the responsibility of the University Hospital Centers to provide residents with educational resources so that they receive theoretical and practical training of uniform quality, and the use of simulators could result in better training and more rapid progression.

Considering work hour restrictions, expectations of patients and increased number of residents, Appleton et al. created a laparoscopic curriculum for gynecology residents to improve learning time outside of the operating room. Residents completed electronic modules on their own, quarterly simulation labs, and were evaluated using objective structured assessments of technical skills. In their study, the implementation of the program was feasible wit reasonable cost and limited resident and faculty time [9]. Simulation, which is currently widespread, could be used more optimally.

Many residents begin their surgical activity with insufficient knowledge of anatomy [5], and inclusion of anatomy could develop surgical capabilities. Surgical anatomy and anatomical reports could be taught in compulsory theoretical courses at the beginning of the internship, as well as by the senior in the operating room. However, the challenges of managing operating room time and the lack of work for residents can limit this type of learning. Video formation represents an economical alternative which warrants development within training programs. At the present time this method is not well known and is used infrequently. Videos can be made available on the internet to be viewed by residents during their personal work time, and viewing in the presence of a senior can improve the resident's understanding of possible difficulties arising from an intervention or enable debriefing following an intervention performed by a resident.

An educational program developed by the University Hospital Center (CHU) in Nice included theoretical and practical sessions on simulators and analyzed the learning curves of residents [10]. Residents reported satisfaction with the 2-day program, which was followed by evaluation on simulators, and felt that it led to progression in the precision of surgical gestures. The development of a new simulation model by a French CHU based on the use of corpses associated with a pulsatile circulation device and ventilation will teach complex surgical procedures with a very high degree of realism. A study by Danion et al. showed that this simulation model allowed a new mode of learning, with residents rating the general realism and satisfaction with the training higher than 80% [11]. Simulation therefore appears to be a useful pedagogical support, necessary for the training of future surgeons.

A prospective study conducted in 2011 in the Gynecology and Cancer Surgery department of the Georges Pompidou European Hospital evaluated the practical surgical training of gynecology-obstetrics residents, and their ability to self-assess. Before starting the procedure, an examiner asked the resident if he/she felt able to perform the procedure alone, with help or unable to perform the surgical procedure. At the end of the intervention, the same question was asked and the examiner also judged the ability of the resident to perform the intervention with or without help. Residents self-assessed correctly 53% of the time (17/32), 40.7% (13/32) overestimated and 6.3% (2/32) underestimated. The study revealed that residents at the end of their course were only able to perform a quarter of the surgeries required to be mastered, and 50% still required assistance from a senior. This issue was most often related to lack of knowledge of surgical gestures. The occurrence of a surgical complication was also found to be destabilizing and disabling to the residents [12].

Recently, Acosta et al. evaluated practical skills learning curriculum and assess its effect over time on surgical residents. Implementation of a practical skills program during surgery residency improved confidence perception, patient management, administrative tasks and knowledge [13].

Our results confirm the importance of objective evaluation of the surgical practice of residents. Increased use of the resident's notebook and simulators including the pelvitrainer or surgery on corpses could constitute means of evaluation. The standardization of pedagogy and evaluation should be considered using these simulators, and according to specific criteria to enable the progress of residents to be followed and regular objectives to be set [10].

Fazel et al. reported that nearly two-thirds of gynecology-obstetrics residents had no compulsory theoretical courses or fewer than once a month, and only 20% had courses within their department [12]. Only about 50% residents received training on patient information, fewer still received training in the drafting of an operative report. These results are in agreement with our study, which indicated theoretical training to be minimal despite its necessity for the clear majority of residents. In 2015, a study evaluated gynecology resident's curriculum in North America. Only 59% were satisfied with their formation. For the majority, there were no theoretical examinations or skill assessments before residents performed surgery on patients. In their study, they propose three recommendations to ensure that residents receive adequate training during residency: uniform use of simulator, standardized curriculum, and standardized assessments [14].

The main limit of our study is the low rate of participation. The questionnaire was sent by mail by the AGOF, two times. This low rate does not reflect the motivation of residents to invest in this type of evaluation, but is more likely to be related to the method used to publicize the study.

Conclusion

Currently, evaluation of gynecology-obstetrics residents is not systematic or clearly defined. Simulation techniques are accessible to residents but their use does not appear to be optimal, even though this could compensate for the lack of practical training and enable assessment of resident's skills and definition of the minimum number of procedures required before residents can operate on patients. Surgical training will be modified by the recent reform of postgraduate studies, which requires first-year residents to transfer to the hospital, thus creating earlier immersion in the field of surgery.

Systematic and regular assessment of the technical skills of residents is highly important, and could involve several evaluation systems combining surgical simulators, animal models and patient evaluations. The main objective must be to guarantee equal access to such systems for all residents in France.

Compliance with ethical standards

Conflict of interest The authors declare that they have no confict of interest.

Appendix: Questionnaire

Question 1: You are:

- Male
- Female

Question 2: What is your current semester?
Question 3: What is your inter-region?

- Ile-de-France
- North-West
- North-East
- West
- South
- South-West
- Rhône-Alpes
- Antilles-Guyane

Question 4: What is your orientation?

- Obstetric
- Surgical

Question 5: Are you registered for oncology DESC?

- Yes
- No

Question 6: If not, do you plan to register in the future?

- Yes
- No

Question 7: Overall, how would you rate your training in oncological surgery?

- Excellent
- Very good
- Good
- Fair
- Bad

Question 8: Regarding surgery of gynecological cancers, how would you rate your training ?

- Excellent
- Very good
- Good
- Fair
- Bad

Question 9: Do you have access to simulators as part of your training in oncology surgery?

- Yes
- No

Question 10: If so, are simulation sessions mandatory?

- Yes
- No

Question 11: How many sessions do you attend per semester?

- Between 0 and 5
- Between 5 and 10
- Between 10 and 15
- Between 15 and 20
- More than 20

Question 12: What kind of simulators do you have access?

- Pelvitrainer
- Animal models
- Cadavers

Question 13: If you have access to a simulator, do you have free access (not restricted by specific slots)?

- Yes
- No

Question 14: Do you have courses in surgical anatomy during your residency?

- Yes
- No

Question 15: Do you have surgery courses during your residency?

- Yes
- No

Question 16: If so, during which course?

- DES courses
- Bibliography
- IUD courses

Question 17: Do you have mandatory surgery diplomas for the validation of your DES?

- Yes
- No

Question 18: During your residency, do you have mandatory theoretical courses in oncological surgery?

- Yes
- No

Question 19: During your residency, do you have mandatory practical courses in oncological surgery?

- Yes
- No

Question 20: Do you have training using video surgery during your residency?

- Yes
- No

Question 21: If so, is this training mandatory?

- Yes
- No

Question 22: Do you do a semester in a regional cancer center during your residency?

- Yes
- No

Question 23: Is a semester in a regional cancer center (RCC) during your residency:

- Mandatory
- Mandatory if you have access
- Optional
- Doing an inter CHU?

Question 24: If you are not doing a semester in an RCC during your residency, what is the reason?

- There is no RCC in your region

– You did not have access
– You did not wish to have access

Question 25: During your residency, do you benefit from training on the information given to patients of oncological surgery?

– Yes
– No

Question 26: During your residency, do you benefit from training in the writing of an operative report?

– Yes
– No

Question 27: Do you think that having training on patient information and the writing of an operative report is important?

– Yes
– No

Question 28: Do you receive training for postoperative follow-up for patients who have experienced an oncological pathology?

– Yes
– No

Question 29: Do you think that training for postoperative follow-up is important?

– Yes
– No

Question 30: During your residency, is your theoretical knowledge in oncological surgery evaluated?

– Yes
– No

Question 31: During your residency, is your practical knowledge of oncological surgery evaluated?

– Yes
– No

Question 32: Are you considering or have you already completed an Inter CHU or a semester abroad to improve your practice?

– Yes
– No

Question 33: Would you find it helpful to have more training in oncology surgery during your residency?

– Yes
– No

Question 34: Do you follow or have you been trained specifically for oncology surgery?

– DESC
– Inter-university degree
– Specialised training center (CICE)

Question 35: Do you think that companionship in the operating room should be more intensively performed for training in oncological surgery?

– Yes
– No

Question 36: Which measures do you think would be useful to improve your training in oncological surgery?

– More access to theoretical training
– More access to surgery simulators
– More access to the operating room
– Undertaking an intensive semester in a specialized service
– Supervision by a senior who follows you in your curriculum to train you and guide you in your choices
– Seniorization during your residency (work as the main surgeon without the help of a senior)

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