



Current practice and physicians' opinion about preoperative hair removal as a part of ERAS pathway implementation in gynecology and gynecology–oncology: a NOGGO-AGO survey of 148 gynecological departments in Germany

Helmut Plett^{1,4} · Enzo Ricciardi¹ · Mareike Bommert^{1,3} · Hendrik Veldink^{2,3} · Alexander Traut¹ · Klaus Pietzner⁴ · Mustafa Zelal Muallem⁴ · Jalid Sehouli⁴

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Abstract

Purpose To gather standardized information about current practices and doctors' opinions on preoperative hair removal (PHR) from the surgical site and to evaluate the extent of PHR as one of the elements of enhanced recovery after surgery (ERAS) pathways that is established in the clinical routine in gynecology and gynecology–oncology departments in Germany.

Methods We performed a nationwide survey among 638 primary, secondary and tertiary health care gynecological departments in Germany. Data were obtained by sending a multiple-choice questionnaire about preoperative management of hair removal. The authors also evaluated the awareness of doctors regarding PHR as well as the method and time frames of PHR. The results were compared to the existing standard of procedure (SOP) and guidelines.

Results 148 units (23.2%) took part in the survey; participants in the survey were mostly chief physicians in 47.3% of the cases. Half (50.7%) of all the responses came from certified gynecological cancer centers. A SOP regarding PHR was reported as present in 113 clinics (76.4%). 83.8% of all units are performing PHR for midline laparotomy, 52.7% in laparoscopic operations, and 45.3% in vaginal operations. 48% used a clipper, while 43.2% utilized a single-use razor. 56.1% shaved instantly before the operation, whereas 35.8% did it the day before and earlier. 40.3% of chief physicians believe that PHR causes more surgical site infections (SSI) compared to only 11.5% of junior doctors.

Conclusion PHR in gynecological departments in Germany is performed very heterogeneously and SOPs are often not based on guidelines and ERAS principles. Around one-third of the German gynecological clinics keep strictly to the guidelines. The awareness on PHR and SSI among junior doctors is very low.

Keywords Enhanced recovery after surgery (ERAS) · Gynecology · Gynecologic oncology · Wound infections · Surgical site infections · Preoperative hair removal · Shaving

Introduction

The enhanced recovery after surgery (ERAS) program refers to a number of pre-, peri- and postoperative interventions aiming to reduce surgical stress by maintaining normal

physiology [1–4]. Henrik Khelet et al. [5, 6] first established the ERAS pathways in colorectal surgery in the 1990s. In the same period, surgeons and clinicians questioned the globally established and widely performed shaving of surgical sites with the same idea as the ERAS concept to reduce surgical site infections (SSIs) and shorten hospital stay of patients.

SSI is one of the most severe causes of patients' morbidity and prolonged hospitalization. In the United States, it represents a financial burden with an estimated yearly cost of \$25 billion [7–9] and in Europe, the World Health Organization (WHO) reports costs between 1.5 and 19 billion euros [10]. SSI represent 13.5–29% of nosocomial infections [11, 12]. SSI were defined as “an infection related to an operative

NOGGO-AGO, Nord-Ostdeutsche Gesellschaft für Gynäkologische Onkologie-Arbeitsgemeinschaft Gynäkologische Onkologie (North-Eastern-German Society of Gynaecological Oncology- Society of Gynecological Oncology).

✉ Helmut Plett
pletth@googlemail.com

Extended author information available on the last page of the article

procedure that occurs at or near the surgical incision within 30 days” [10]. Pre-, intra- and postoperative risk factors for SSI were defined by The Centers for Disease Control [10] and different ‘SSI bundles’ were proposed to reduce the risk and the incidence of SSI such as hair removal before surgery. Traditionally, body hairs were removed from the surgical site as an attempt to lower the risk of SSI [13]. Several studies questioned the utility of this procedure [13–15] including the 2011 Cochrane review by Tanner et al. and indeed no significant differences in SSI rates could be observed [16]. Instead, shaving the surgical site using a razor was reported as a risk factor of SSI (relative risk, 2.09; 95% CI 1.15–3.80) [16]. Guidelines published by the Society for Healthcare Epidemiology of America/the Infectious Diseases Society of America (SHEA/IDSA) [17], the Royal College of Physicians of Ireland [18] as well as the Scottish NHS Guidelines [19] adopted these findings and recommend to avoid shaving in the preoperative setting. They also pointed out that if necessary, the use of clippers instead of razors should be preferred (see Table 1). The Swiss [20], German [21, 22] and UK [23] guidelines proposed additionally recommendations on the time frame of PHR: the time between hair removal and start of surgery should be as short as possible.

Removal of body’s hair in gynecology is particularly an important issue, as it deals almost exclusively with female patients. Aspects for consideration are, e.g., pubic hair removal as part of the gynecologic surgical sites which is different from other surgical disciplines, a unique germ spectrum with a variety of endogenous bacteria in female patients [24] and the incidence of SSI in female patients which is different from male patients, whereas approximately two-thirds of gynecologic SSI are superficial incisional infections [25].

So, it seems to be obvious that SSI rates in gynecology can hardly be compared to data from general or other specific surgeries. The rate of SSI after hysterectomy is approximately 2%, according to literature [26], which is quite low, but still resulting in additional costs of about \$5000 per patient, reported in the US [27]. In gynecologic cancer surgery, the rates of SSI rise up from 3 to 36% [28–32]. Despite the great consensus in the guidelines, there are only very few prospective randomized clinical studies addressing the question of hair removal in gynecology in specific [33–36]. We conducted this survey to provide more specific data to support the best clinical practice and to raise the awareness of doctors and healthcare professionals.

Table 1 Recommendations on hair removal according to international guidelines

Guidelines	Recommendations on preoperative hair removal
Deutsche Gesellschaft für Krankenhaushygiene e.V. 2009 [22]	If hair removal is performed instantaneously before operation, the risk of SSI is lowest Instead of shaving (wet or dry) with a razor, hair removal by a clipper is preferable (provoking less skin irritation) Microscopic skin lesions caused by shaving may serve as a focus for bacterial scattering
AWMF (S1-Guideline) Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften [21]	Preoperative hair removal should not be performed Only if necessary for technical reasons use Clipping Chemical depilation (takes more time and can cause more skin irritation) Shaving (just instantly before operation)
FMH Guidelines Switzerland 2015 [20]	Hair removal is not necessary to prevent surgical site infections (SSI). If hair removal is required, use clippers ideally on the same day of surgery, or if needed the day before Shaving with a single-use razor or blade is not admissible. A chemical depilation is possible if compatibility was tested before
UK High impact Intervention bundle (2011) [23]	If hair removal is required, use clippers with a disposable head and timed as close as possible to the operating procedure
SHEA/IDSA (Society for Healthcare Epidemiology of America; Infectious Diseases Society of America) 2014 [17]	Hair should not be removed at the operative site unless the presence of hair will interfere with the operation. Do not use razors. If hair removal is necessary, remove hair outside the operating room using clippers or a depilatory agent
Health Protection Scotland bundle 2013 [19]	Avoid hair removal. If removal is necessary, use a single-patient use clipper
The Royal College of Physicians of Ireland 2012 [18]	Avoid hair removal. If hair must be removed, then use ‘single-patient use clippers’ and not razors

Methods

A multi-centric nationwide survey was performed from October 2016 to May 2017 among 638 primary, secondary and maximal health care gynecological departments in Germany. This project was endorsed by NOGGO (Nord-Ostdeutsche Gesellschaft für Gynäkologische Onkologie-Arbeitsgemeinschaft Gynäkologische Onkologie—North-Eastern-German Society of Gynecological Oncology) and was undertaken from JAGO (Young Academy of Gynecologic Oncology).

A multiple-choice questionnaire reflecting all kind of relevant details on the preoperative management of hair removal was developed by our group to gather information about perioperative management of shaving in gynecology and gynecological oncology. The questionnaire was divided into three parts: the first part included questions regarding the health institution as well as the position and experience of the responding doctor, the second part was about information on perioperative clinical management of PHR and the third part should reflect the doctors' awareness on shaving and their opinion about the impact of shaving on surgical site infections (questionnaire in German language see Table 6). The questionnaire was designed using "Survey Monkey" an online survey tool. Five physicians were first interviewed to confirm the comprehensibility and feasibility of this questionnaire. A link to the questionnaire was sent then via email to 638 gynecological departments in Germany as well as by conventional mail. We obtained contact information on the gynecological departments in Germany via the NOGGO contact database.

We like to provide further details to explain the specific remarks:

SOP—standard of procedure: we asked if it was existing. The content of the SOP was no issue in the questionnaire.

We defined "gynecological clinics according to guidelines" adopting as reference the "Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften" (AWMF) and "Deutsche Gesellschaft für Krankenhaushygiene e.V." guidelines with the following points: no PHR at all; use of a clipper or depilatory cream if PHR is performed; no use of razors; immediately before operation and not earlier.

The possibility to give more than one response concerning periods of PHR led to distinguishing between the two groups: "Only directly before surgery" and "before surgery and earlier". As there were multiple responses possible for the question "who is performing PHR?", we sorted responses into the following two groups: "medical staff only" and "with patient's involvement". Patient's involvement in PHR: we decided not to take this point into our definition on "gynecological clinics according to guidelines".

The categorical data were extracted from the applied online survey tool, presented as absolute counts with percentages and evaluated by means of Chi-square test or Fisher's exact test. The adjusted effect of factors, such as existence of a SOP and accordance to the guidelines was tested in a logistic regression model. All data have been analyzed using IBM® SPSS® Statistics 23 (SPSS Inc., an IBM Company, Chicago, Illinois, USA) and $p < 0.05$ was considered statistically significant.

Results

Institutions' and responding doctors' characteristics

One hundred and forty-eight (23.2%) gynecological departments took part in the survey, 37.8% primary, 35.8% secondary and 26.4% tertiary (maximal) health care units, 50.7% were certified as gynecological oncological centers, but the majority of the certified hospitals were units of maximal health care (84.6%). 41.2% of responding doctors reported over 40 beds in their department and 15.5% under 20. The median of case numbers in a year was 1550 with a range between 200 and 6000. The majority of responding doctors (47.3%) were chief physicians, 34.5% were senior physicians and 18.2% residents. Work experience of the responding doctors ranged from 0 to 39 years with a median of 20 years (see Table 2).

PHR: what is the standard of care in German gynecological departments?

Most of the responding departments perform hair removal before laparotomy (83.8%). Less frequently, PHR is adopted before laparoscopy (52.7%) and about 45.3% of clinics perform any kind of hair removal for vaginal surgery (see Fig. 1). The applied technique was performed using a clipper in 48%. 43.2% use a single-use razor and 2% of responding clinics also use a depilatory cream for hair removal. 56.1% remove hair directly before surgery while 35.8% do it earlier, e.g., the day before. Hospital sanitary staff (medical doctors, OR nurses or ward nurses) perform PHR in 60.1% of departments, whereas 30.4% ask the patients to shave themselves. In only 4.7% of all replying clinics, PHR for surgical sites is not routinely performed (see Fig. 2).

Doctor's opinion about preoperative hair removal

55.4% of responding doctors do not think that shaving itself might cause more SSI, while about 30% believe the opposite. 48% of the responding doctors think that the method of PHR could be a risk factor for SSI. The highest conviction of any impact was found by the time point of shaving where we

Table 2 Institutions' and doctors' characteristics

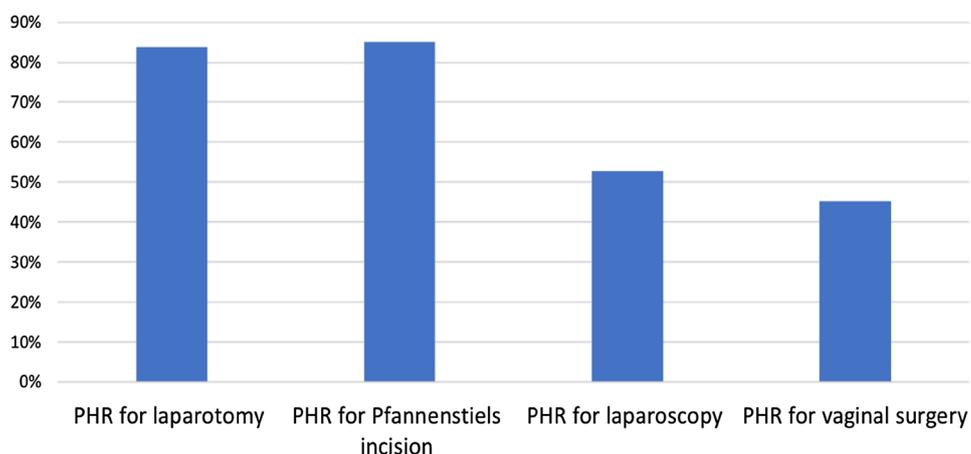
Variable	<i>n</i> (%)
Health institutions in total	148 (100)
Type of hospital	
Primary health care units	56 (37.8)
Certified gynecology–oncology center	13 (23.2% out of 56)
Secondary health care units	53 (35.8)
Certified gynecology–oncology center	29 (54.7% out of 53)
Maximal health care	39 (26.4)
Certified gynecology–oncology center	34 (84.6% out of 39)
Certified gynecology–oncology center	
Yes	75 (50.7)
No	73 (49.3)
Size of hospital (number of beds)	
≤ 20	23 (15.5)
21–29	35 (23.6)
30–39	29 (19.6)
> 40	61 (41.2)
Case numbers (per year)	<i>n</i> (%) (diff. parameter)
Mean (SD)	1865 (1063)
Median (range)	1550 (200–6000)
Missing responses	22 (14.9%)
Responding doctor's position	<i>n</i> (%)
Chief of service	70 (47.3)
Senior physician (Oberarzt)	38 (25.7)
Specialist/consultant (Facharzt)	13 (8.8)
Resident	27 (18.2)
Years of experience of responding doctors	Years
Mean (SD)	18.5 (10)
Median (range)	20 (0–39)
Hospital protocols (SOP on preoperative hair removal)	<i>n</i> (%)
Yes	113 (76.4)
No	29 (19.6)
Missing responses	6 (4.1)

asked for possibilities as directly before surgery, the night/day before and earlier, and actually 67.7% of responding doctors believe that the time point of PHR has any impact on SSI, whereas only 23% don't believe so (see Table 4).

SOP

76.4% of departments are following their own SOP regarding PHR. The existence of a SOP in clinics was independent from hospitals' characteristics like primary, secondary and maximal health care units ($p=0.219$) or certified/not certified gynecology–oncology centers ($p=0.835$). Also, the number of beds ($p=0.178$) or case numbers per year ($p=0.904$) did not have any influence on the existence of a SOP. Besides, the existence of a SOP was not a factor of performing PHR or not ($p=0.202$ – 1.000), as well as it was not according to other variables like the method of PHR ($p=0.471$) or the period of PHR ($p=0.840$). Only the doctor's position and their work experience was found as a factor for the existence of a SOP. Residents and senior doctors reported 72% of all questionnaires with no existing SOP on PHR in their clinic ($p=0.018$). This was as well reflected by years of experience ($>/\leq 12$ years: $p=0.036$) (see Table 3). Generally, the doctor's opinion on a possible influence of PHR on SSI was without any correlation to the existing or missing SOP. However, in contrast to a general opinion on PHR, doctors' opinion on time frames of PHR was influenced significantly by a deposited SOP or vice versa ($p=0.042$). A tendency in this direction was observed also by the method of shaving ($p=0.072$) (see Table 4).

Fig. 1 Share of German gynecological clinics performing PHR



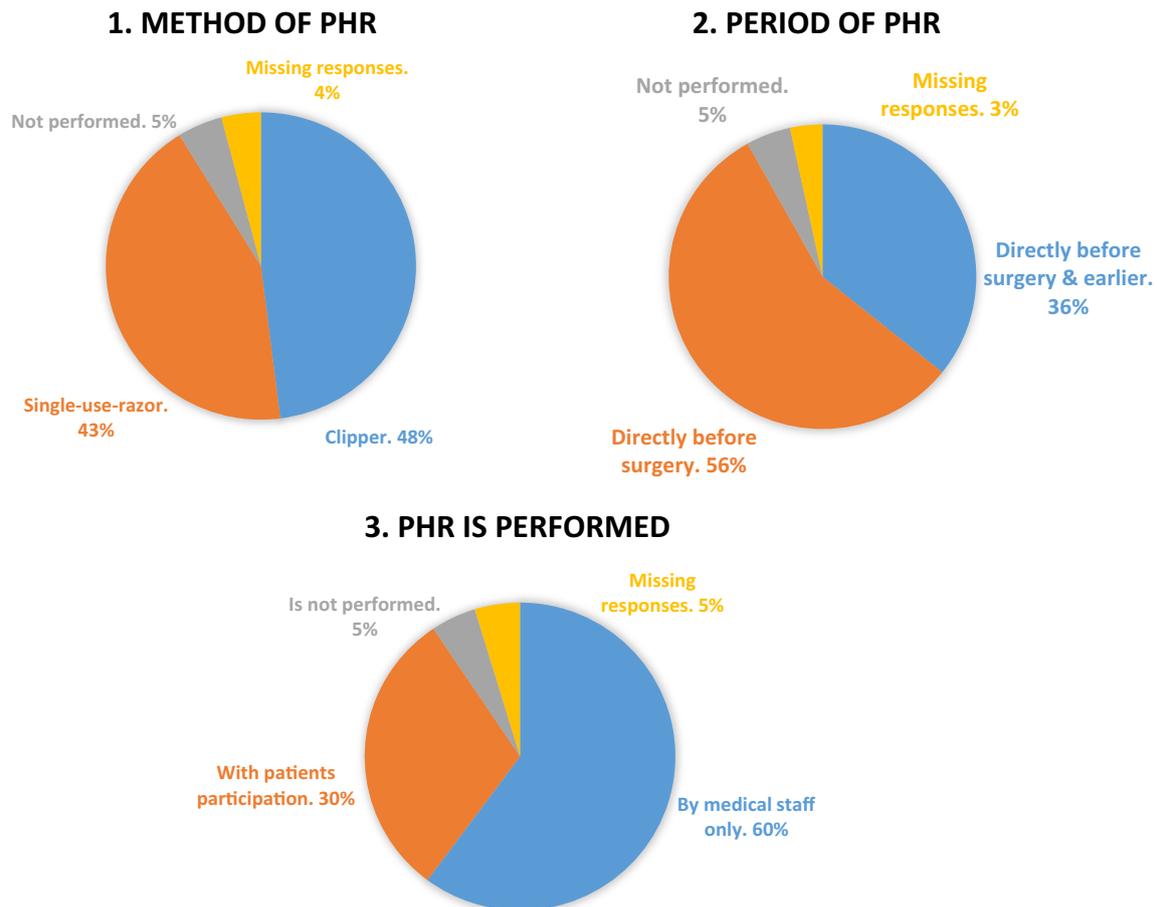


Fig. 2 Distribution of methods and periods of PHR and “who is shaving”. 1 Method of PHR. 2 Period of PHR. 3 PHR is performed

Guidelines from the Institute of Hygiene (Deutsche Gesellschaft für Krankenhaushygiene e.V.) and AWMF (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften e.V.)

Analyzing the specific characteristics, we identified 37.8% of departments acting in accordance to the German guidelines, whereas 62.2% did not conform at one or more points. Disagreement was mostly observed in terms of the technique and the time frame of PHR. 74.4% still utilized a single-use razor instead of the recommended clipper or depilatory cream ($p \leq 0.001$; cc (correlation coefficient) = 0.595). A very poor agreement with the guidelines was also observed in the time frame of PHR ($p \leq 0.001$; $cc = 0.523$). So, 56.1% applied the recommendation to shave strictly before surgery, whereas 35.8% removed hair the night or day before surgery or even earlier, without resulting in any difference. A significantly lower disagreement with German guidelines was observed in departments where PHR was not performed routinely by the medical staff but by the patients themselves ($p \leq 0.001$;

$cc = 0.313$). Only 4.7% of all replying gynecological units do not remove hair for surgical sites routinely and subsequently the accordance with national guidelines in these clinics was much higher ($p = 0.008$ – 0.071) (see Table 5).

Guidelines, SOP and doctors' opinion on PHR

76.4% of gynecological wards act on behalf of a SOP, but only around one-third of all wards are acting congruently to German guidelines. Interestingly, the awareness of doctors regarding PHR and prevalence of SSI is much higher in chief physicians than in residents ($p = 0.023$, $cc = 0.224$). Only 11.5% of residents believe that there is an impact on SSI, while 28% of senior doctors and even 40.3% of chief physicians believe so. No significant differences were observed when asking in detail about the method of PHR; responses did not differ significantly between senior (52.2% believe yes) and junior (46.2%) doctors ($p = 0.835$). 83.6% of chief physicians and 65.4% of residents believe that there might be a correlation between a higher prevalence of SSI and a wrong time of shaving ($p = 0.836$) (see Fig. 3). Comparing

Table 3 Institutions'/physicians' shaving characteristics and SOP

Variable	SOP		<i>P</i> <i>X</i> ² (fisher)	Correlation coefficient
	No	Yes		
<i>n</i>	29	113		
Type of hospital			0.219	0.145
Primary healthcare units	8 (27.6)	46 (40.7)		
Secondary healthcare units	10 (34.5)	41 (36.3)		
Maximal health care units	11 (37.9)	26 (23)		
Certified gynecology–oncology center			0.835	0.017
Yes	15 (51.7)	56 (49.6)		
No	14 (48.3)	57 (50.4)		
Number of beds in units			0.602	0.114
≤20	6 (20.7)	16 (14.2)		
21–29	8 (27.6)	26 (23)		
30–39	6 (20.7)	21 (18.6)		
>40	9 (31)	50 (44.2)		
Case number of units			0.103	0.042
Median (range)	1300 (400–6000)	1800 (200–5260)		
Physician's position			0.018	0.195
Chief of service	8 (27.6)	59 (52.2)		
Resident/consultant/senior physician	21 (72.4)	54 (47.8)		
Years of experience			0.045	
Median (range)	15 (2–37)	21 (0–39)		
<12	13 (44.8)	28 (25)	0.036	0.174
≥12	16 (55.2)	84 (75)		
PHR for Laparoscopy	13 (44.8)	65 (58)	0.202	0.107
PHR for Laparotomy	25 (86.2)	99 (89.2)	0.653	0.038
PHR for Vaginal surgery	12 (48)	54 (50)	0.857	0.016
Method of PHR			0.471	0.106
No PHR	2 (6.9)	5 (4.4)		
Clipper	12 (41.4)	59 (53.2)		
Razor	15 (51.7)	48 (44)		
Periods of PHR			0.840	0.051
No PHR	2 (6.9)	5 (4.4)		
Before surgery and earlier	11 (37.9)	41 (36.3)		
Only directly before surgery	16 (55.2)	67 (59.3)		
Who is performing PHR			0.777	0.062
No PHR	2 (6.9)	5 (4.5)		
Patients involvement	8 (27.6)	37 (33.3)		
Medical staff only	19 (65.5)	69 (62.2)		

Bold values denote statistical significance at the $p < 0.05$ level

the answers from certified and not certified gynecological–oncological centers, we could not identify significant differences between the groups ($p = 0.868$).

Discussion

PHR of surgical sites is widely performed in German gynecological clinics even though no benefit was observed by clipping or chemical depilation compared with no depilation in preventing SSI in previous studies. With this present survey, we could demonstrate a great variability in the current practice as well as a great variability in the level

Table 4 Responding doctors' opinion and SOP

Variable	SOP		<i>P</i> <i>X</i> ² (fisher)	Correlation coefficient
	No	Yes		
<i>n</i>	29	113		
Opinion on PHR—SSI			0.236	0.141
No influence on SSIs	16 (55.2)	65 (57.5)		
Influence on SSIs	7 (24.1)	37 (32.7)		
No difference	6 (20.7)	11 (9.7)		
Opinion on method of PHR—SSI			0.072	0.189
No influence on SSIs	15 (51.7)	39 (34.5)		
Influence on SSIs	9 (31)	62 (54.9)		
No difference	5 (17.2)	12 (10.6)		
Opinion on period of PHR—SSI			0.042	0.207
No influence on SSIs	12 (41.4)	22 (19.5)		
Influence on SSIs	15 (51.7)	84 (74.3)		
No difference	2 (6.9)	7 (6.2)		

Bold values denote statistical significance at the $p < 0.05$ level

of awareness among German gynecologists and obstetricians. Only 4.7% of all replying gynecological clinics do not remove hair for surgical sites routinely. Baida et al. reported a similar rate of 4.7%, in a survey involving 800 members of the Spanish Association of Surgeons (AEC), presenting data that are comparable to ours [37]. An interesting approach on reducing SSI rates before cesarean section was conducted by Ng et al. 2013. Via various educational strategies over 3 years, the authors could reduce prehospital hair removal by patients. Subsequently, a 51% reduction of SSI rates was seen [38]. Viney et al. performed a small-scale study in six gynecological wards of teaching hospitals in England in 1992. Interestingly, 90% of PHR was performed using razors. Compared to this publication, we could demonstrate in our survey that the most common techniques of PHR changed over the last 25 years. Only 43.2% of German gynecological wards use a razor, while 48% use a clipper. 30.4% of the clinic staff ask the patients to shave their surgical sites themselves compared to 90% reported in 1992 by Viney et al. [33] which is three times less frequent. Viney et al. additionally demonstrated that doctors shave less extensively and with a higher focus on the surgical site than nurses, e.g., for laparotomy only pubic hair—not extended to the vulva or anus which may cause unnecessary cuts or abrasions to the skin [33], supposing that patients would also shave their surgical sites with a totally different focus probably with much less awareness on damages and risk factors. PHR for any kind of vaginal surgery is performed in 54.7% of German clinics, while 45.3% do not perform PHR. A similar number has been reported by Kamei et al. where 36.3% of the participating Japanese clinics did not remove hair for tension-free vaginal mesh surgery in gynecological and urological wards [39]. Concerning the time frame of

PHR, Kamei et al. reported that 20% of institutes removed hair immediately before surgery and 34.5% until the morning of the operating day which was thought not a significant risk factor for SSI ($p=0.07$) [39]. Lui et al. compared 1984 SSI rates in 2 different gynecological wards with shaved and unshaved patients in the Kandang Kerbau Hospital in Singapore and found SSI rates of 2.2% in the shaved cohort opposite to 1.2% in the unshaved cohort [34]. These findings were though not statistically significant, but they emphasize the need for a more prospective study activity within the gynecological wards on this topic.

We should underline again that 76% of clinics have based PHR on a standard of procedure, a rather high index. Still, 24% reported a missing SOP which is thought essential to assure a quality control process. Proportionally, the number of existing SOPs (39.8%) was not higher within the group that did not match with the German guidelines ($p=0.514$), but interestingly the majority of replying doctors in this group (77%) did not believe that PHR causes more SSI ($p=0.041$, $cc=0.207$) (see Table 5). This is therefore very likely to be the crucial point. The same tendency was observed for the period of PHR, surprisingly we received the highest number of positive responses (> 70%). Obviously, the awareness in this detail of PHR is very high in doctors working in Germany, while other international guidelines even do not mention this point.

Supposed that patients who shave themselves before surgery without any professional healthcare assistance would hardly adopt the national recommendations. Subsequently the number of clinics according to guidelines would probably be much lower. The study by Ng et al. already mentioned above proposed that SSI rates could be reduced significantly by adopting educational strategies to reduce prehospital

Table 5 Characteristics of PHR/Doctor’s opinion and German guidelines (AWMF and Deutsche Gesellschaft für Krankenhaushygiene e. V.)

Variable PHR	Accordance to German guidelines			
	No	Yes	<i>P</i> <i>X</i> ² (fisher)	Correlation coefficient
<i>n</i>	92	56		
PHR for laparoscopy	53 (60.9)	25 (45.5)	0.071	0.150
PHR for laparotomy	80 (94.1)	44 (80)	0.010	0.212
PHR for vaginal surgery	47 (59.5)	20 (36.4)	0.008	0.222
Method of PHR			< 0.001	0.595
Clipper	22 (25.6)	48 (87.2)		
Single-use-razor	64 (74.4)	0		
No PHR	0	7 (12.5)		
Not reported (excluded for <i>X</i> ²)	6	1		
Period of PHR			< 0.001	0.523
Directly before surgery and earlier	52 (59.8)	0		
Directly before surgery	35 (40.2)	49 (87.5)		
No shaving	0	7 (12.5)		
Not reported (excluded for <i>X</i> ²)	5	0		
Who is performing PHR			< 0.001	0.313
Patients` involvement	51 (60)	11 (19.6)		
Medical staff only	34 (40)	38 (69.7)		
No shaving	0	7 (12.5)		
Not reported (excluded for <i>X</i> ²)	7	0		
Opinion on PHR—SSI			0.041	0.207
Yes	20 (23)	24 (42.9)		
No	55 (63.2)	27 (48.2)		
No difference	12 (13.8)	5 (8.9)		
Opinion on method of PHR—SSI			0.481	0.101
No	35 (40.2)	20 (35.7)		
Yes	40 (46)	31 (55.4)		
No difference	12 (13.8)	5 (8.9)		
Opinion on period of PHR—SSI			0.206	0.153
No	24 (27.6)	10 (17.9)		
Yes	56 (64.4)	44 (78.6)		
No difference	7 (8)	2 (3.6)		

Fig. 3 Doctors’ opinion: Yes I believe that PHR/method of PHR/time frame of PHR is causing more SSIs

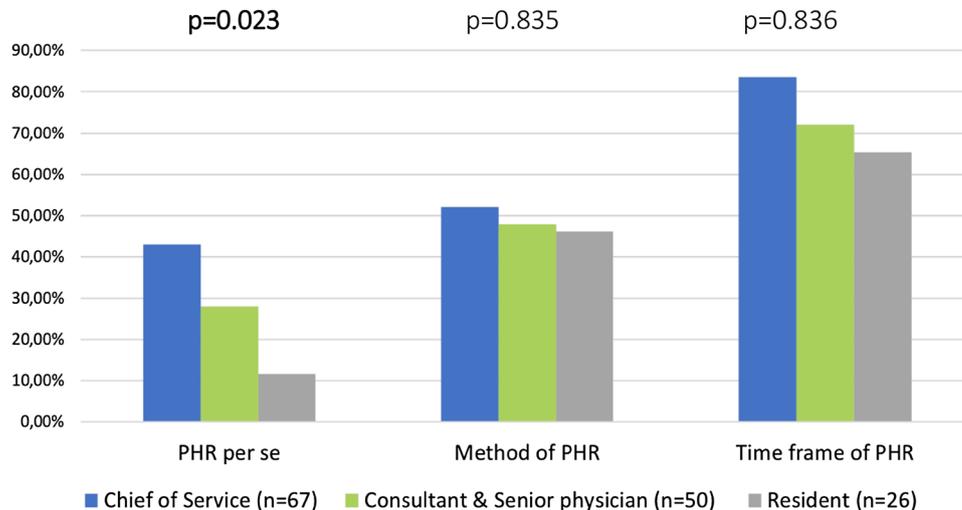


Table 6 Questionnaire in Germany language as it was sent to 638 gynecological departments in GermanyFragebogen:

Allgemeine Informationen zu Ihrer Klinik

- | | | | | |
|---|---|-----------------------|-------------------|---------------|
| 1 | Es handelt sich um ein Haus der
Grund-/Regelversorgung | Schwerpunktversorgung | Maximalversorgung | |
| 2 | Bettenzahl in der Gynäkologie
<20 | 20-30 | 30-40 | >40 |
| 3 | Zertifiziertes Gynäkologisches Krebszentrum
ja | nein | | |
| 4 | Fallzahl der operativen Eingriffe
_____ | | | |
| 5 | Wer bearbeitet die Vorliegende Umfrage
Chefarzt | Oberarzt | Facharzt | Assistenzarzt |
-

Die präoperative Haarentfernung

- | | | | |
|---|---|------------------------------|------------------|
| 1 | Gibt es in Ihrer Klinik ein standardisiertes Vorgehen (SOP – standart operating procedure) bezüglich der präoperativen Rasur?
Ja | Nein | |
| 2 | Wird in Ihrer Klinik bei Laparoskopien eine präoperative Rasur vorgenommen?
Ja | Nein | |
| | Wird in Ihrer Klinik bei Laparotomien eine präoperative Rasur vorgenommen?
Ja | Nein | |
| | Wird bei vaginalen Eingriffen (Kurettagen/vag. Hysterektomien/Kolporrhaphien/ecc.) eine Rasur vorgenommen?
Ja | Nein | |
| 3 | Wie wird die Rasur durchgeführt? (Keine - Mehrfachantworten sind möglich)
Elektrischer Rasierer (Clipping) | Einmalrasierer (Shaving) | Enthaarungscreme |
| 4 | Zu welchem Zeitpunkt wird die Rasur in der Regel vorgenommen?
5 (Keine - Mehrfachantworten sind möglich)
direkt vor der OP | am Tag vorher | noch früher |
| 6 | Wer führt die Rasur durch (Keine - Mehrfachantworten sind möglich)?
Stationsschwester/-pfleger | Operationsschwester/-pfleger | Patient selbst |
-

Table 6 (continued)

7	Glauben Sie, dass postoperative Wundinfektionen oder Wundheilungsstörungen durch eine Rasur vermehrt auftreten?	ja ()	nein ()	> das ist gleich ()
8	Glauben Sie, dass die Methode (Clipping, Shaving ecc.) der Rasur einen Einfluss auf die postoperative Wundinfektionsrate oder Wundheilungsstörungen hat?	ja ()	nein ()	> das ist egal ()
9	Glauben Sie, dass der Zeitpunkt der Rasur einen Einfluss auf die postoperative Wundinfektionsrate oder Wundheilungsstörungen hat?	ja ()	nein ()	> das ist egal ()

hair removal by patients [38] and this we should take under consideration by trying to inform and educate patients. In our study, the majority of clinics that were not congruent with German guidelines reported that PHR is performed by patients (60%), while it was only 19.6% in departments that match with the guidelines ($p=0.001$; $cc=0.313$).

With this survey, we could demonstrate that a deposited SOP is not automatically associated with a higher adherence to the guidelines, which led us to conclude that a lot of contents of SOPs must be currently not congruent to German guidelines. We would like to encourage clinics and professional healthcare staff to reevaluate the contents of SOPs and to raise the awareness as well in patients in this topic in the sense to educate patients to be more differentiated, informed and to concern carefully and responsibly regarding their surgical sites before any minor or major operation.

Except these points mentioned before, we could not identify any other significant variable correlating with a better adherence to national guidelines within institutions' or responding doctors' characteristics. For example, a higher agreement with the German guidelines was not automatically associated with a maximal health care unit ($p=0.586$) or a greater work experience of the responding doctor ($p=0.735$) (see Table 5). The most important factor for a higher adherence to the German guidelines seems therefore to be a high awareness and interest of hospitals' professional healthcare staff for this issue.

An important limitation of this survey is the missing data on SSI rates in clinics that have taken part in the survey. Thus, the only two evaluation tools we could adopt was first, the concordance with existing SOPs (though we had no precise information about contents of the reported SOPs) and second the German guidelines (Table 6).

The purpose of this study was to raise the awareness of preoperative hair removal management among nurses and doctors and to let them reevaluate their own standard of

procedures regarding PHR. The use of razors, periods and probably patient's involvement in PHR should be further investigated to raise the evidence level of PHR and decrease the incidence of SSI after surgical procedures.

Author contributions HP and JS conceived the presented idea, developed the theory and performed the computations. AT verified the analytical methods. MB and HV encouraged HP to investigate "Survey-Monkey" as an online tool and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript. HP carried out the project. HP wrote the manuscript with support from ER, MB and HV. JS supervised the project. KP helped supervise the project. AT developed the theoretical formalism, performed the analytic calculations and performed the numerical simulations. All authors provided critical feedback and helped shape the research, analysis and manuscript. HP, MB and HV designed the model and the computational framework and analyzed the data. AT performed the calculations.

Compliance with ethical standards

Conflict of interest No financial or personal conflict of interest by any of the authors to declare.

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Affiliations

Helmut Plett^{1,4}  · Enzo Ricciardi¹ · Mareike Bommert^{1,3} · Hendrik Veldink^{2,3} · Alexander Traut¹ · Klaus Pietzner⁴ · Mustafa Zelal Muallem⁴ · Jalid Sehoul⁴

Enzo Ricciardi
E.Ricciardi@kliniken-essen-mitte.de

Mareike Bommert
info@mareike-bommert.com

Hendrik Veldink
hveldink@yahoo.com

Alexander Traut
a.traut@kliniken-essen-mitte.de

Klaus Pietzner
klaus.pietzner@charite.de

Mustafa Zelal Muallem
mustafa-zelal.muallem@charite.de

¹ Department of Gynecology and Gynecologic Oncology, Kliniken Essen-Mitte, Evangelische HuysSENS-Stiftung, Essen, Germany

² Department of Gynecology and Obstetrics, Mathias-Spital Rheine, Frankenburgstr. 31, 48431 Rheine, Germany

³ Young Academy of Gynecologic Oncology (JAGO) of the NOGGO, Berlin, Germany

⁴ Department of Gynecology with Center for Oncological Surgery, Charité – Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health, Berlin, Virchow Campus Clinic, Charité Medical University, Berlin, Germany