European Society of Gynaecological Oncology quality indicators for the surgical treatment of endometrial carcinoma

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ABSTRACT

Background Quality of surgical care as a crucial component of a comprehensive multi-disciplinary management improves outcomes in patients with endometrial carcinoma, notably helping to avoid suboptimal surgical treatment. Quality indicators (QIs) enable healthcare professionals to measure their clinical management with regard to ideal standards of care.

Objective In order to complete its set of QIs for the surgical management of gynecological cancers, the European Society of Gynaecological Oncology (ESGO) initiated the development of QIs for the surgical treatment of endometrial carcinoma.

Methods QIs were based on scientific evidence and/or expert consensus. The development process included a systematic literature search for the identification of potential QIs and documentation of the scientific evidence, two consensus meetings of a group of international experts, an internal validation process, and external review by a large international panel of clinicians and patient representatives. QIs were defined using a structured format comprising metrics specifications, and targets. A scoring system was then developed to ensure applicability and feasibility of a future ESGO accreditation process based on these QIs for endometrial carcinoma surgery and support any institutional or governmental quality assurance programs.

Results Twenty-nine structural, process and outcome indicators were defined. QIs 1–5 are general indicators related to center case load, training, experience of the surgeon, structured multi-disciplinarity of the team and active participation in clinical research. QIs 6 and 7 are related to the adequate pre-operative investigations. QIs 8-22 are related to peri-operative standards of care. QI 23 is related to molecular markers for endometrial carcinoma diagnosis and as determinants for treatment decisions. QI 24 addresses the compliance of management of patients after primary surgical treatment with the standards of care. QIs 25–29 highlight the need for a systematic assessment of surgical morbidity and oncologic outcome as well as standardized and comprehensive documentation of surgical and pathological elements. Each QI was associated with a score. An assessment form including a scoring system was built as basis for ESGO accreditation of centers for endometrial cancer surgery.

INTRODUCTION

Optimizing and ensuring the quality of surgical care is essential to improve the management and outcome of patients with endometrial carcinoma. The quality of surgical care as a component of comprehensive multi-disciplinary management has been shown to improve outcomes in patients with endometrial carcinoma, notably helping to avoid suboptimal surgical treatment.[1] Adoption of guidelines is an effective tool for disease control and should be considered as a process measure of quality of gynecological cancer care.[2] QIs enable healthcare professionals to compare their clinical management with the ideal standards according to the guidelines in order to detect aspects of suboptimal care.[3] In order to complete its set of QIs for the surgical management of gynecological cancers, the European Society of Gynaecological Oncology (ESGO) initiated a project aiming to develop a list of QIs for surgical treatment of endometrial carcinoma.

The idea behind the project is to improve the standard of surgical care by providing a set of quality criteria that can be used on many levels: self-assessment, institutional quality assurance programs, governmental quality assessment, and eventually, to build a network of certified centers for endometrial carcinoma surgery. Certified centers can make the award known to doctors, patients, patient advocacy groups, and lay persons. The intention is incentive, not punitive. The targets defined by the international development group should not be used to penalize or litigate doctors or institutions. These QIs will be updated and modified based on new evidence.

METHODS

QIs for the surgical treatment of endometrial carcinoma were developed using a three-step evaluation process (Figure 1). This development process involved two meetings of an international development group, chaired by Professor Nicole Concin (Medical University of Innsbruck, Innsbruck, Austria/Evangelische

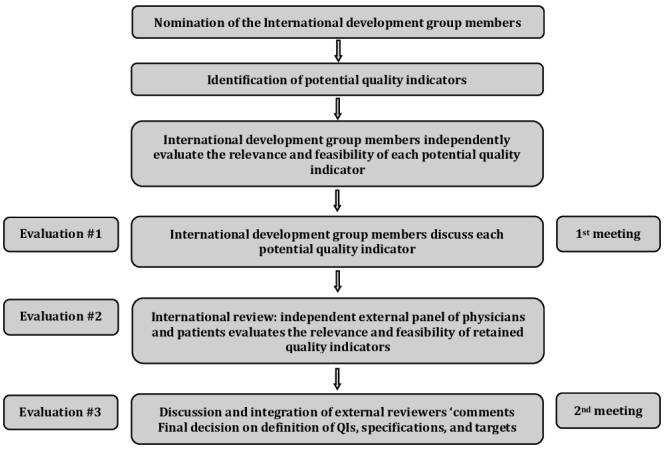

Figure 1 Development process.

Kliniken Essen-Mitte, Essen, Germany) and Professor Jan Persson (Skåne University Hospital, Lund University, Faculty of Medicine, Clinical Sciences, Lund, Sweden).

Nomination of an International Development Group

The ESGO Council nominated 17 gynecologic oncologists from its membership body, with well-recognized expertize, clinical and research activity, and leadership in the field as surrogate markers for their continuous effort in improving patients care.

Identification of Potential QIs

All potential QIs for endometrial carcinoma surgery were defined from the guidelines jointly developed by ESGO, the European SocieTy for Radiotherapy and Oncology (ESTRO), and the European Society of Pathology (ESP), and published indicators identified using a systematic literature search in Medline without any restriction of the search period (indexing terms: QI, quality assurance, endometrial carcinoma, endometrial cancer, uterine neoplasms, surgery, methodology, consensus statements, evidence-based medicine).[4–11] Another systematic literature search was then conducted in Medline to identify available scientific evidence which supports the potential QIs (Online supplemental appendix 1). The reference list of each identified article was reviewed for other potentially relevant papers. The development group members were allowed to provide any additional references they deemed relevant (if any).

Evaluation of Potential QIs

Potential QIs were formatted as a questionnaire and sent to the international development group. Experts were asked to evaluate each indicator according to relevance and feasibility in clinical practice. They were also free to propose any additional possible QIs they deemed relevant. Acceptance, rejection, or the need for further consideration of each indicator was discussed during the first meeting (February 3–4, 2021). QIs were retained if a large consensus among experts was reached.

External Evaluation of the Retained QIs: International Review

The ESGO Council established a large panel of practicing clinicians who provide care to patients with endometrial carcinoma. These international reviewers are independent of the international development group and are from different European and non-European countries to ensure global perspective. Patients with endometrial carcinoma were also included. The retained indicators were formatted as a questionnaire and sent to the reviewers for quantitative evaluation of each indicator according to relevance, feasibility in clinical practice, and quality of care improvement (physicians only). Open comments were encouraged (qualitative evaluation). Patients were asked to qualitatively evaluate each QI (according to their experience, preferences, feelings, etc). Evaluations of the indicators were returned by 140 independent physicians and by three patients with endometrial carcinoma (the list of international reviewers is available in Online supplemental appendix 2). Responses were pooled and sent to experts who convened during the second meeting (May 26–27, 2021). The comments were reviewed and discussed by the international development group members. Definitions of QIs, specifications, and targets were validated during the second meeting. Although the strengths of the process include an international development group, an international expert consensus to support the QIs, an international external review process (physicians and patients), a structured format to present the QIs, and management of potential conflicts of interests, the QIs result from a consensus of experts, with inherent bias in this type of method. They may have to be modified in the future based on publication of new data.

RESULTS

The key characteristics of an ideal indicator are clear definition, clinical relevance, measurability, and feasibility in clinical practice. Each retained QI is categorized as a structural indicator, process indicator, or outcome indicator and has a description which specifies what the indicator is measuring.[12] The measurability specifications are then detailed. The latter highlight the way in which the indicator will be measured in practice to allow audits. The time frame for assessment of criteria is the last calendar year (unless otherwise indicated). Further to measurement of the indicator, a target is indicated. This specifies the level which each unit/center should be aiming to achieve. When appropriate, two targets were defined: an optimal target, expressing the best possible option for patients and a minimal target, expressing the minimal requirement when practical feasibility factors are taken into account. Targets are based on available scientific evidence, personal experience of the international development group members, on expert consensus, and on feedbacks from external reviewers. QIs 1–5 are general indicators related to center case load, training, experience of the surgeon, structured multi-disciplinarity of the team, and active participation in clinical research (Table 1). QIs 6 and 7 are related to the adequate pre-operative investigations (Table 2). QIs 8–22 are related to the compliance of the perioperative management with the standards of care (Table 3). QI 23 is related to molecular markers for endometrial carcinoma diagnosis and as determinants for treatment decisions (Table 4). QI 24 addresses the compliance of management of patients after primary surgical treatment with the standards of care (Table 5). QIs 25–29 highlight the need for a systematic assessment of surgical morbidity and oncologic outcomes as well as standardized and comprehensive documentation of surgical and pathological elements (Table 6).

Table 1 General indicators

QI 1 - Number of newly diagnosed cases of endometrial carcinoma treated per center per year	
Type	Structural indicator
Description	Number of newly diagnosed cases of endometrial carcinoma treated (surgically or not surgically) per center per year.
Specifications	*Numerator*: number of newly diagnosed endometrial carcinoma cases treated per center per year. *Denominator*: not applicable.
Targets	Optimal target: ≥90 Minimum required target: ≥50
QI 2 - Number of endometrial carcinoma primary surgeries (including early and advanced stages) performed per center per year	
Type	Structural indicator
Description	Primary surgeries, including lymph node assessment, hysterectomy, and cytoreductive surgeries for early and advanced-stage endometrial carcinoma
Specifications	*Numerator*: number of patients undergoing a primary surgery as defined above performed per center per year *Denominator*: not applicable
Targets	Optimal target: ≥80 Minimum required target: ≥50
QI 3 - Surgery performed by a gynecologic oncologist or a trained surgeon specifically dedicated to gynecological cancer management	
Type	Process indicator
Description	Surgery is performed or supervised by a certified gynecologic oncologist, or in countries where certification is not established, by a trained surgeon dedicated to the management of gynecological cancer (accounting for more than 80% of his or her practice) or having completed an ESGO-certified fellowship
Specifications	*Numerator*: number of patients with endometrial carcinoma operated by a surgical specialist as defined above or supervised by this category *Denominator*: number of patients with endometrial carcinoma undergoing surgery
Target	≥95%
QI 4 - Treatment and/or follow-up plan discussed at a multi-disciplinary team meeting	
Type	Process indicator
Description	The decision for any therapeutic intervention and/or follow-up plan has been made by a multi-disciplinary team including at least a certified gynecologic oncologist (or in countries where certification is not organized, a trained surgeon dedicated to the management of gynecological cancer (accounting for more than 80% of his or her practice) or having completed an ESGO-certified fellowship), a radiologist, a radiation oncologist, a physician certified to deliver chemotherapy (a gynecologic oncologist and/or a physician with special interest to gynecologic oncology (medical or clinical oncologist)), and a pathologist
Specifications	*Primary treatment:* ► *Numerator*: number of patients with endometrial carcinoma in whom the decision for any primary treatment has been made by a multi-disciplinary team ► *Denominator*: all patients presenting with newly diagnosed endometrial carcinoma *Relapse treatment:* ► *Numerator*: number of patients with endometrial carcinoma in whom the decision for any relapse treatment has been made by a multi-disciplinary team ► *Denominator*: all patients presenting with relapsed endometrial carcinoma
Targets	Primary treatment: 90% Relapse treatment: 99%
QI 5 - Center participating in ongoing prospective studies in gynecological oncology	
Type	Structural indicator
Description	The center actively accrues patients in ongoing prospective studies (including notably studies on imaging, translational research, quality of life, and/or tissue procurement) in gynecological oncology. The studies should be approved by an ethical committee
Specifications	*Numerator*: not applicable *Denominator*: not applicable

Continued

Table 1 Continued

Targets	Optimal target: participation in ongoing prospective studies in endometrial carcinoma Minimum required target: participation in ongoing prospective studies in gynecological oncology

General Indicators

Although the number of cases treated per center per surgeon per year is not a sufficient guarantee of surgical quality, it is major prerequisite. The volume effect on outcomes of cancer operation is related to a surgeon's skill and experience defined notably by surgical volumes, as well as hospital infrastructure and the supporting team dedicated to surgical care. Available data support a positive relationship between number of cases operated on and outcomes (eg, survival, increased technical expertize, adherence to evidence-based treatment recommendations, and appropriate management of complications) for different types of cancer, indicating a benefit for centralization of care pathways.[13–112] Volume appears to have more effects on outcomes for high-risk procedures that are associated with substantial morbidity. In a large National Cancer Database in the United States including 441 863 patients with uterine cancer patients, survival was significantly increased with increasing hospital volume for women with all stages of endometrioid, clear cell, serous, or carcinosarcoma endometrial cancer (25, 50, or 100 cases per year).[88]

Wright et al explored the association between changes over time (from 2000 to 2014) in volume and peri-operative outcomes for 44 558 women undergoing hysterectomy for endometrial cancer at 218 hospitals and showed that increased hospital volume was associated with lower rates of surgical and medical complications, mortality, transfusion, and prolonged length of stay.[109] Diaz-Montes et al aimed to characterize the short-term outcomes for uterine cancer according to hospital case volume (6181 women undergoing primary surgery by 894 surgeons at 49 hospitals).[34] Although there was a trend toward a lower in-hospital death rate for women managed at high-volume hospitals compared with low-volume hospitals, this trend did not reach statistical significance. Dividing volume hospitals depending on the average annual number of surgeries for endometrial carcinoma (using relatively low case number cut-off points: low <15/year, medium 15–24/year, and high ≥25/year), Becker et al observed no relation between surgical volumes and relative survival of patients with endometrial cancer.[18]

In Europe, the organization of gynecologic oncology training differs among countries, but there is a trend towards centralization and subspecialization. ESGO has developed a subspecialty training program in gynecologic oncology. Increasing evidence shows that the subspecialty backgrounds of treating physicians affect treatment outcomes of patients with malignant disease.[113–120] Chan et al explored this hypothesis specifically for patients with endometrial carcinoma.[121] Treatment by gynecologic oncologists was n independent prognostic factor for improved disease-specific survival after adjusting for age, stage, and grade of disease. According to the ESGO/ESTRO/ESP guidelines, treatment should be undertaken in a specialized center by a dedicated team of specialists in the diagnosis and management of gynecological cancers, especially in high-risk and/or advanced-stage disease.[4–6]

Multi-disciplinary care is recognized as best practice in treatment planning and care for patients internationally. In several cancer types, there is evidence that decisions made by a multi-disciplinary team are more likely to be in accord with evidence-based guidelines than those made by individual clinicians, and the role of a multi-disciplinary approach in the quality of care is recognized.[119 122–129] According to the ESGO/ESTRO/ESP guidelines, planning of staging and treatment should be made on a multi-disciplinary basis

Table 2 Adequate pre-operative investigations

QI 6 - Proportion of patients with a pre-operative work-up according to the ESGO/ESTRO/ESP guidelines	
Type	Outcome indicator
Description	The pre-operative mandatory work-up, based on the ESGO/ESTRO/ESP guidelines, includes: family history; general assessment and inventory of co-morbidities; geriatric assessment, if appropriate; clinical examination, including pelvic examination; expert vaginal or transrectal ultrasound or pelvic MRI. Depending on clinical and pathologic risk, additional imaging modalities (thoracic, abdominal, and pelvic CT scan, MRI, positron emission tomography scan, or ultrasound) should be considered to assess ovarian nodal, peritoneal, and other sites of metastatic disease
Specifications	*Numerator*: number of patients who have undergone pre-operative work-up according to the ESGO/ESTRO/ESP guidelines (as defined above) *Denominator*: all patients who have undergone surgery
Target	90%
QI 7 - Proportion of presumed FIGO stage I–II upstaged to IVB disease	
Type	Outcome indicator
Description	Presence of peritoneal carcinomatosis and distant metastases in patients who have been considered early-stage disease (stage I–II) pre-operatively
Specifications	*Numerator*: number of patients with post-operative stage IVB including peritoneal carcinomatosis *Denominator*: all patients with presumed stage I–II disease undergoing surgery
Target	<5%

Table 3 Compliance of the peri-operative management with the standards of care

QI 8 - Proportion of cases of early-stage endometrial carcinoma with non ruptured uterus after hysterectomy	
Type	Outcome indicator
Description	Uterus should be removed intact. Intra-operative rupturing/fragmentation/morcellation of the uterus (including in a bag) must be avoided
Specifications	*Numerator*: number of patients with early-stage endometrial carcinoma after hysterectomy with intact/non-ruptured/non-fragmented/non-morcellated uterus *Denominator*: all patients with early-stage (I-II) endometrial carcinoma who underwent hysterectomy.
Target	99%
QI 9 - Proportion of patients with early-stage endometrial carcinoma who have undergone successful minimally invasive surgery	
Type	Outcome indicator
Description	Minimally invasive surgery (laparoscopic or robotic) is considered successful if performed without any intra-peritoneal tumor spillage, tumor rupture, or morcellation (including in a bag). If vaginal extraction risks uterine rupture, other measures should be taken (eg, mini-laparotomy, use of endobag). If a mini-laparotomy for such purpose is performed within a minimally invasive procedure, the surgery is still considered a successful minimally invasive surgery
Specifications	*Numerator*: number of patients with presumed early-stage endometrial carcinoma who have undergone successful minimally invasive surgery (as defined above) *Denominator*: all patients who have undergone surgery for presumed early-stage (I–II) endometrial carcinoma
Targets	Optimal target: ≥80% Minimum required target: 60%
QI 10 - Proportion of patients with BMI >35 kg/m² who have undergone successful minimally invasive surgery	
Type	Outcome indicator
Description	Minimally invasive surgery (laparoscopic or robotic surgery) is considered successful if performed without any intra-peritoneal tumor spillage, tumor rupture, or morcellation (including in a bag). If vaginal extraction risks uterine rupture, other measures should be taken (eg, mini-laparotomy, use of endobag). If a mini-laparotomy for such purpose is performed within a minimally invasive procedure, the surgery is still considered a successful minimal invasive surgery
Specifications	*Numerator*: number of patients with BMI >35 kg/m² with presumed early-stage endometrial carcinoma who have undergone successful minimally invasive surgery (as defined above) *Denominator*: all patients with BMI >35 kg/m² who have undergone surgery for presumed early-stage (I–II) endometrial carcinoma
Target	>60%
QI 11 - Proportion of conversions from minimally invasive surgery to open surgery	
Type	Outcome indicator
Description	Minimally invasive surgery includes laparoscopic and robotic surgery. Conversions to laparotomy occur due to intra-operative findings or complications. Mini-laparotomy to extract the uterus is not considered as conversion to laparotomy
Specifications	*Numerator*: number of patients with endometrial carcinoma who have undergone minimally invasive surgery in whom a conversion to open surgery has been required *Denominator*: all patients with endometrial carcinoma who have undergone minimally invasive surgery
Target	<10%
QI 12 - Proportion of patients with intra-operative injuries	
Type	Outcome indicator
Description	Intra-operative injuries include positioning complications and urinary, bowel, vascular, and neural injuries
Specifications	*Numerator*: number of patients with endometrial carcinoma who have undergone a surgery in whom intra-operative injuries as described above have been reported *Denominator*: all patients with endometrial carcinoma who have undergone a surgery
Target	<2%
QI 13 - Proportion of infracolic omentectomy in patients with endometrial carcinoma and presumed early-stage serous, undifferentiated carcinoma or carcinosarcoma	
Type	Outcome indicator
Description	According to the ESGO/ESTRO/ESP guidelines, staging infracolic omentectomy should be performed in apparent uterus-confined serous, undifferentiated carcinoma, or carcinosarcoma

Continued

Table 3 Continued

Specifications	*Numerator*: number of patients with endometrial carcinoma and presumed early-stage serous, undifferentiated carcinoma, or carcinosarcoma who underwent infracolic omentectomy *Denominator*: all patients with endometrial carcinoma and presumed early-stage (I–II) serous, undifferentiated carcinoma, or carcinosarcoma who underwent surgery
Target	≥90%
QI 14 - Proportion of lymph node staging performed in patients with presumed early-stage high-intermediate or high-risk endometrial carcinoma	
Type	Outcome indicator
Description	According to the ESGO/ESTRO/ESP guidelines, surgical lymph node staging should be performed in patients with early-stage endometrial carcinoma deemed pre-operatively as high-intermediate or high risk Sentinel lymph node biopsy is an acceptable alternative to systematic lymphadenectomy for lymph node staging in stage I–II. Sentinel lymph node procedure and lymph node dissection are taken into account for lymph node staging
Specifications	*Numerator*: number of patients with presumed early-stage high-intermediate or high-risk endometrial carcinoma who underwent lymph node staging *Denominator*: all patients with presumed early-stage (I–II) high-intermediate or high-risk endometrial carcinoma who underwent surgery
Target	>85%
QI 15 - Proportion of sentinel lymph node procedures in patients undergoing lymph node staging	
Type	Outcome indicator
Description	Lymph node staging in early-stage (I–II) endometrial carcinoma is defined as sentinel lymph node procedure and/or systematic pelvic lymphadenectomy
Specifications	*Numerator*: number of patients with early-stage endometrial carcinoma for whom sentinel lymph node procedure was attempted or performed *Denominator*: all patients with early-stage (I–II) endometrial carcinoma who have undergone a lymph node staging
Target	90%
QI 16 - Number of sentinel lymph node procedures for endometrial carcinoma performed or supervised per surgeon per year	
Type	Outcome indicator
Description	Sentinel lymph node procedures require high surgeon skills to improve the identification rate and to minimize the false-negative rate. Sentinel lymph node procedures should be performed by a certified gynecologic oncologist or a trained surgeon specifically dedicated to gynecological cancer management (see QI 3). Surgeons must ensure that their colleagues in radiology, nuclear medicine, and/or pathology are actively involved in the successful implementation of this multi-disciplinary procedure
Specifications	*Numerator*: number of sentinel lymph node procedures performed or supervised in patients with endometrial carcinoma per surgeon per year *Denominator*: not applicable
Target	≥20
QI 17 - Proportion of indocyanine green cervical injection	
Type	Outcome indicator
Description	According to the ESGO/ESTRO/ESP guidelines, indocyanine green cervical injection is the preferred detection technique
Specifications	*Numerator*: number of patients with presumed early-stage endometrial carcinoma in whom indocyanine green cervical injection was performed *Denominator*: all patients with presumed early-stage (stage I–II) endometrial carcinoma who underwent sentinel lymph node procedure
Target	≥95%
QI 18 - Proportion of high-intermediate/high-risk patients with side-specific systematic pelvic lymphadenectomy in cases of failed sentinel lymph node detection	
Type	Outcome indicator
Description	According to the ESGO/ESTRO/ESP guidelines, side-specific systematic lymphadenectomy should be performed in high-intermediate/high-risk patients if sentinel lymph node is not detected on either pelvic side. Low-risk and intermediate-risk patients are not taken into account as systematic lymphadenectomy is not recommended in these patients

Continued

Table 3 Continued

Specifications	*Numerator*: number of high-intermediate/high-risk patients who underwent side-specific or bilateral systematic pelvic lymphadenectomy *Denominator*: all high-intermediate/high-risk patients with unilaterally or bilaterally failed sentinel lymph node detection
Target	>90%
QI 19 - Proportion of patients who underwent ultrastaging of sentinel lymph nodes	
Type	Outcome indicator
Description	Intensive pathologic assessment of sentinel lymph node (sentinel lymph node ultrastaging) supports the detection of small metastases which could be missed by standard evaluation. According to the ESGO/ESTRO/ESP guidelines, pathologic ultrastaging of sentinel lymph nodes is recommended, although there is no universal ultrastaging protocol
Specifications	*Numerator*: number of patients who underwent ultrastaging of sentinel lymph nodes *Denominator*: all patients who underwent a sentinel lymph node procedure
Target	≥99%
QI 20 - Proportion of bilateral mapping rate of sentinel lymph node procedures	
Type	Outcome indicator
Description	The ESGO/ESTRO/ESP guidelines suggest cervical injections of indocyanine green as the preferred technique to detect sentinel lymph nodes. Tracer re-injection is an option if sentinel lymph node is not visualized upfront. The aim is bilateral detection of sentinel lymph nodes
Specifications	*Numerator*: number of patients with presumed early-stage endometrial carcinoma who underwent successful bilateral sentinel lymph node detection *Denominator*: all patients with presumed early-stage (stage I–II) endometrial carcinoma who underwent sentinel lymph node procedure
Target	≥75%
QI 21 - Proportion of complete macroscopic resection for curative intent in patients with primary advanced endometrial carcinoma (stage III–IV)	
Type	Outcome indicator
Description	In advanced endometrial carcinoma (stage III–IV), surgical tumor debulking, including removal of enlarged lymph nodes, should be considered when complete macroscopic resection (no residual disease) is feasible with an acceptable morbidity and quality of life profile. Debulking surgery should be preceded by a full pre-operative staging and discussion by a multi-disciplinary team. This includes patients with neoadjuvant chemotherapy
Specifications	*Numerator*: number of patients with advanced endometrial carcinoma who have undergone a cytoreductive surgery and in whom complete macroscopic resection was achieved *Denominator*: all patients with primary advanced endometrial carcinoma (stage III–IV) who have undergone a cytoreductive surgery
Target	≥75%
QI 22- Proportion of patients who underwent salvage surgery for loco-regional recurrent disease (isolated pelvic or nodal recurrent disease) in whom complete macroscopic resection is achieved	
Type	Outcome indicator
Description	Indications of salvage surgery for loco-regional recurrent disease are defined according to the ESGO/ESTRO/ESP guidelines, as follows: Treatment of patients with recurrent endometrial carcinoma involves a multi-disciplinary approach with surgery, radiotherapy, and/or systemic therapy depending on the fitness and wishes of the patient, the tumor dissemination patterns, and prior treatment In radiotherapy naïve patients, a decision about surgery needs to take account of patient morbidity and wishes, available non-surgical treatments, and resources. The interval between primary treatment and recurrences should also be taken into consideration. Patients with recurrent disease (including peritoneal and lymph node relapse) should be considered for surgery only if it is anticipated that complete removal of macroscopic disease can be achieved with acceptable morbidity In radiotherapy pre-treated patients (external beam radiotherapy ±brachytherapy) with loco-regional recurrence, radical surgery, including exenteration, should be considered when the intention is complete resection with clear margins
Specifications	*Numerator*: number of patients in whom complete macroscopic resection and clear margins (if applicable) are achieved *Denominator*: all patients who underwent salvage surgery for recurrent disease (isolated pelvic or nodal recurrent disease)
Target	≥85%

Table 4 QI related to molecular markers for endometrial carcinoma diagnosis and as determinants for treatment decisions

QI 23 - Proportion of patients undergoing complete molecular classification of their tumor according to the ESGO/ESTRO/ESP guidelines	
Type	Process indicator
Description	According to the ESGO/ESTRO/ESP guidelines, molecular classification (*POLE* mutation, mismatch repair deficiency, non-specific molecular profile, p53 abnormality) is encouraged in all endometrial carcinoma, especially high-grade tumors. *POLE* mutation analysis may be omitted in low-risk and intermediate-risk endometrial carcinoma with low-grade histology. All diagnostic tests to identify these four molecular subgroups should be performed in conjunction due to the occurrence of 'double classifiers' (referred to as complete molecular classification). Molecular classification can be performed in the treating center or in a referred to institution
Specifications	*Numerator*: number of patients with endometrial carcinoma undergoing complete molecular classification of their tumor *Denominator*: all patients treated for an endometrial carcinoma
Targets	Optimal target: ≥90% Minimum required target: ≥50%

(generally at a tumor board meeting, composed according to local guidelines) and based on the comprehensive and precise knowledge of prognostic and predictive factors for outcome, morbidity, and quality of life.[4–6]

Treatment requires centralization and involvement of a broad multi-disciplinary team including at least a certified gynecologic oncologist (or in countries where certification is not organized, a trained surgeon dedicated to the management of gynecological

Table 5 Compliance of management of patients after primary surgical treatment with the Standards of care

QI 24 - Compliance with the ESGO/ESTRO/ESP adjuvant treatment guidelines	
Type	Outcome indicator
Description	The ESGO/ESTRO/ESP guidelines recommend specific adjuvant treatments based on prognostic risk groups stratification of patients, as follows: ► *Low risk*: no adjuvant treatment is recommended. When molecular classification is known, omission of adjuvant treatment should be considered for patients with endometrial carcinoma stage I–II, low risk based on pathogenic *POLE* mutation. For the rare patients with endometrial carcinoma stage III–IVA and pathogenic *POLE* mutation, there are no outcome data with the omission of the adjuvant treatment. Prospective registration is recommended ► *Intermediate risk*: adjuvant brachytherapy can be recommended to decrease vaginal recurrence. Omission of adjuvant brachytherapy can be considered, especially for patients aged <60 years. When molecular classification is known, *POLE* mutation and p53 abnormal with myometrial invasion have specific recommendations ► *High-intermediate risk (pN0 after lymph node staging)*: adjuvant brachytherapy can be recommended to decrease vaginal recurrence. External beam radiation therapy can be considered for substantial lymphovascular space involvement and for stage II. Adjuvant chemotherapy can be considered, especially for high-grade and/or substantial lymphovascular space involvement. Omission of any adjuvant treatment is an option. When molecular classification is known, *POLE* mutation and p53 abnormal have specific recommendations ► *High-intermediate risk cN0/pNx (lymph node staging not performed)*: adjuvant external beam radiation therapy is recommended, especially for substantial lymphovascular space involvement and/or for stage II. Additional adjuvant chemotherapy can be considered, especially for high-grade and/or substantial lymphovascular space involvement. Adjuvant brachytherapy alone can be considered for high-grade lymphovascular space involvement negative and for stage II grade 1 endometrioid carcinomas. When molecular classification is known, *POLE* mutation and p53 abnormal have specific recommendations ► *High risk*: external beam radiation therapy with concurrent and adjuvant chemotherapy or, alternatively, sequential chemotherapy and radiotherapy is recommended. Chemotherapy alone is an alternative option. Carcinosarcomas should be treated as high-risk carcinomas (not as sarcomas). When the molecular classification is known, p53 abnormal carcinomas without myometrial invasion and *POLE* mutation have specific recommendations
Specifications	*Numerator*: number of patients with early-stage endometrial carcinoma receiving adjuvant treatment according to the ESGO/ESTRO/ESP guidelines *Denominator*: all patients with endometrial carcinoma who underwent surgery
Target	≥90%

Table 6 Recording pertinent information

QI 25 - Minimum required elements in surgical reports	
Type	Process indicator
Description	According to the ESGO/ESTRO/ESP guidelines, the surgical report requires inclusion of at least the following elements: ► Abdominal findings status at start and at end of surgery ► Description of tumor spread (if any) ► Lymph node evaluation ► Complications ► Total blood loss ► Tracer used for the sentinel lymph node procedure ► Number of sentinel lymph nodes removed (if any) ► Location of sentinel lymph nodes (if any) ► Residual post-operative disease; location of residual disease (if any) ► Kind of procedure (sentinel lymph node procedure, debulking, etc) ► Adhesiolysis (yes vs no) ► Aim of surgery (palliative vs curative) ► Stage of the disease ► Rupture of uterus
Specifications	Numerator: number of patients who have a complete surgical report that contains all required elements as defined above Denominator: all patients with endometrial carcinoma who underwent surgery
Target	≥99%
QI 26 - Minimum required elements in pathology reports	
Type	Process indicator
Description	According to the ESGO/ESTRO/ESP guidelines, the minimum required elements in pathology reports include at least the following elements: ► Description of the specimen(s) submitted for histologic evaluation ► Attached anatomic structures ► Accompanying specimens ► Tumor type (WHO Classification of Tumors (fifth edition)) ► Tumor grade (FIGO and WHO Classification of Tumors (fifth edition)) ► Absence or presence and depth of myometrial invasion ► Lymphovascular space involvement should be unequivocal and reported as focal and extensive/substantial (five vessels or more) ► Presence of cervical stromal invasion should be described ► Presence or absence of vaginal involvement ► Presence or absence of uterine serosal involvement ► Presence or absence of parametrial involvement ► Presence or absence of adnexal involvement ► Presence or absence of omental involvement ► Presence or absence of peritoneal involvement ► Lymph node status, including sentinel lymph node status, reports the total number of nodes found and the number of positive lymph nodes, and the presence of extranodal extension (list for all separates sites). Micrometastasis (>0.2 mm and up to 2 mm) are reported as pN1(mi). Isolated tumor cells no greater than 0.2 mm in regional nodes should be reported as pN0 (i+) ► Presence or absence of pathologically proven distant metastases ► Required ancillary techniques ► Tumor site ► Tumor size ► Percentages of different components of mixed carcinoma and in carcinosarcoma ► Presence or absence of myometrial invasion. Depth of myometrial invasion (none or less than half, or half or more) Measurement should be performed from the adjacent endometrial–myometrial interface ► Microcystic, elongated, fragmented pattern of invasion ► Peritoneal cytology (if available).
Specifications	Numerator: number of patients in whom all minimum required elements as defined above are included in the pathology report Denominator: all patients with endometrial carcinoma who underwent surgery
Target	≥99%
QI 27 - Structured morbidity and mortality conference per year for quality assurance of surgical care	
Type	Outcome indicator
Description	Structured morbidity and mortality conferences are crucial for quality assurance of surgical care. Complications, reoperations, readmissions, secondary transfers to intermediate or intensive care units, and deaths should be discussed

Continued

Table 6 Continued

Specifications	Numerator: number of structured morbidity and mortality conferences per year
	Denominator: not applicable
Targets	Optimal target: 4
	Minimum required target: 2
QI 28 - Proportion of reoperations within 30 days for complications after primary minimally invasive surgery	
Type	Outcome indicator
Description	Reoperation due to complications related to surgery
Specifications	Numerator: number of reoperations for complications after primary minimally invasive surgery
	Denominator: all patients with endometrial carcinoma who underwent primary minimally invasive surgery.
Target	≤2%
QI 29 - Structured prospective reporting of recurrences/deaths	
Type	Outcome indicator
Description	This applies for the first 5 years after diagnosis. Thereafter, patients will be offered to a survivorship program
Specifications	Numerator: number of audits for recurrences/deaths for all treated patients with endometrial carcinoma per year
	Denominator: not applicable.
Target	≥once a year

cancer (accounting for more than 80% of his or her practice or having completed an ESGO-accredited fellowship)), a radiologist, a radiation oncologist, a physician certified to deliver chemotherapy (a gynecologic oncologist and/or a physician with special interest to gynecologic oncology (medical or clinical oncologist)), and a pathologist. A structured program for multi-disciplinary diagnostic work-up, treatment, and follow-up must be present in centers responsible for the treatment. Institutions participating in clinical research can contribute to improvement of quality of care.[130–159] Patients treated in study hospitals have a higher chance of receiving standard treatment according to guidelines than patients treated in hospitals not participating in cooperative clinical studies. Study hospitals might participate more often in quality assurance programs.

Adequate Pre-operative Investigations

Recording of histopathological tumor type and grade is required in endometrial biopsies. According to the ESGO/ESTRO/ESP guidelines, the mandatory pre-operative work-up includes: family history; general assessment and inventory of co-morbidities; geriatric assessment, if appropriate; clinical examination, including pelvic examination; expert vaginal or transrectal ultrasound or pelvic MRI.[4–6] Depending on clinical and pathologic risk, additional imaging modalities (thoracic, abdominal and pelvic CT scan, MRI, positron emission tomography scan, or ultrasound) should be considered to assess ovarian nodal, peritoneal, and other sites of metastatic disease.

Multiple studies have reported high specificity of MRI techniques in the assessment of deep myometrial invasion, cervical stromal involvement, and lymph node metastasis.[160–207] Similarly, high diagnostic performance of transvaginal ultrasound for the assessment of deep myometrial and cervical stromal invasions has also been described.[164 169 181 208–213] In centers routinely performing a sentinel lymph node procedure in all patients with endometrial carcinoma, the need for pre-operative risk grouping based on myometrial invasion estimates is less pronounced.

Compliance of the Peri-operative Management with the Standards of Care

Many studies including two randomized prospective studies and pooled analyses support the use of minimally invasive surgery for patients with early-stage endometrial carcinoma, including those with high-risk carcinomas.[214–281] Patients with high body mass index benefit from a minimally invasive approach most.[282] According to the ESGO/ESTRO/ESP guidelines, minimally invasive surgery is the preferred surgical approach, including patients with high-risk endometrial carcinoma, in stage I and II disease.[4–6] Any intra-peritoneal tumor spillage, including tumor rupture or morcellation (including in a bag), should be avoided. If vaginal extraction risks uterine rupture, other measures should be taken (eg, minilaparotomy, use of endobag). Tumors with metastases outside the uterus and cervix (excluding lymph node metastases) are relative contraindications for minimally invasive surgery. Staging infracolic omentectomy should be performed in clinical stage I serous endometrial carcinoma, carcinosarcoma, and undifferentiated carcinoma, due to the high risk of microscopic omental metastases.[283] The low rate of omental metastases in apparent clinical stage I endometrioid and clear cell carcinoma does not justify the procedure.[284–298]

A large amount of evidence supports the importance of sentinel lymph node biopsy in the surgical staging of patients with early-stage endometrial carcinoma and in the decision process on adjuvant therapies.[299–361] Applying a sentinel lymph node algorithm in high-risk/high-grade endometrial carcinomas in the hands of experienced surgeons appears accurate to detect pelvic lymph node metastases.[301 302 357 362] The use of indocyanine green increases sentinel lymph node detection rates per hemipelvis as compared with methylene blue dye in women with endometrial carcinoma

undergoing minimally invasive surgery.[363 364] High bilateral pelvic sentinel lymph node detection can be achieved when the tracer is injected into the cervix.[300 365] Ultrastaging and pathologic review of negative pelvic lymph nodes of patients with presumed isolated para-aortic metastasis can identify occult pelvic dissemination.[334 352] According to the ESGO/ESTRO/ESP guidelines, sentinel lymph node biopsy can be considered for staging purposes in patients with low-risk/intermediate-risk disease.[4–6] Surgical lymph node staging should be performed in patients with high-intermediate-risk/high-risk disease. Sentinel lymph node biopsy is an acceptable alternative to systematic lymphadenectomy for lymph node staging in stage I–II. If sentinel lymph node biopsy is performed:

- Indocyanine green with cervical injection is the preferred detection technique.
- Tracer re-injection is an option if sentinel lymph node is not visualized upfront.
- Side-specific systematic lymphadenectomy should be performed in high-intermediate-risk/high-risk patients if sentinel lymph node is not detected on either pelvic side.
- Pathologic ultrastaging of sentinel lymph nodes is recommended.

A meta-analysis published in the beginning of the 2010s has quantified the association of complete cytoreduction with a statistically significant improvement in survival in patients with advanced/metastatic endometrial cancer.[366] More recently, several retrospective studies have confirmed the prognostic importance of complete cytoreductive surgery.[367–370] According to the ESGO/ESTRO/ESP guidelines, surgical tumor debulking including enlarged lymph nodes should be considered in stage III and IV endometrial carcinoma (including carcinosarcoma) when complete macroscopic resection is feasible with an acceptable morbidity and quality of life profile.[4–6]

Treatment of patients with recurrent endometrial carcinoma involves a multi-disciplinary approach with surgery, radiotherapy, and/or systemic therapy depending on the fitness and wishes of the patient, the tumor dissemination patterns, and prior treatment. In radiotherapy naïve patients, a decision about surgery needs to take account of patient morbidity and wishes, available non-surgical treatments, and resources. The interval between primary treatment and recurrences should also be taken into consideration. According to the ESGO/ESTRO/ESP guidelines, radiotherapy naïve patients with recurrent disease (including peritoneal and lymph node relapse) should be considered for surgery only if it is anticipated that complete removal of macroscopic disease can be achieved with acceptable morbidity.[4–6] In radiotherapy pre-treated patients (external beam radiotherapy ± brachytherapy) with loco-regional recurrence, radical surgery, including exenteration, should be considered when the intention is complete resection with clear margins. Patients with oligometastatic disease should be considered for radical local therapy, including surgery, radiation therapy, and local ablating techniques.

Molecular Classification and Adjuvant Treatment

Four molecular subgroups of endometrial carcinoma and their determination by surrogate maker analyses have undergone extensive studies in recent years (*POLE* mutated, mismatch repair-deficient, p53 abnormal and endometrial carcinoma lacking any of these alterations, referred to as non-specific molecular profile). A diagnostic algorithm using immunohistochemical markers and one molecular test has been applied. The prognostic impact of the molecular classification has repeatedly been shown by independent groups and is of particular relevance in high-grade and high-risk tumours.[371–376] All diagnostic tests should be performed in conjunction due to the occurrence of 'double classifiers'.[377] Other biomarkers such as L1 cell adhesion molecule expression or mutations in CTNNB1 may be potentially useful for low-grade endometrioid carcinomas with non-specific molecular profile, but further investigations are required.[378–381] According to the ESGO/ESTRO/ESP guidelines, adjuvant treatment recommendations for endometrial carcinoma strongly depend on the prognostic risk group, as follows[4–6]:

- *Low risk*: no adjuvant treatment is recommended. When molecular classification is known, omission of adjuvant treatment should be considered for patients with endometrial carcinoma stage I–II, low risk based on pathogenic *POLE* mutation. For the rare cases of patients with endometrial carcinoma stage III–IVA and pathogenic *POLE* mutation, there are no outcome data with the omission of the adjuvant treatment. Prospective registration is recommended.
- *Intermediate risk*: adjuvant brachytherapy can be recommended to decrease vaginal recurrence. Omission of adjuvant brachytherapy can be considered, especially for patients aged <60 years. When molecular classification is known, *POLE* mutation and p53 abnormal with myometrial invasion have specific recommendations.
- *High-intermediate risk (pN0 after lymph node staging)*: adjuvant brachytherapy can be recommended to decrease vaginal recurrence. External beam radiation therapy can be considered for substantial lymphovascular space involvement and for stage II. Adjuvant chemotherapy can be considered, especially for high-grade and/or substantial lymphovascular space involvement. Omission of any adjuvant treatment is an option. When molecular classification is known, *POLE* mutation and p53 abnormal have specific recommendations.
- *High-intermediate risk cN0/pNx (lymph node staging not performed)*: adjuvant external beam radiation therapy is recommended, especially for substantial lymphovascular space involvement and/or for stage II. Additional adjuvant chemotherapy can be considered, especially for high-grade and/or substantial lymphovascular space involvement. Adjuvant brachytherapy alone can be considered for high-grade lymphovascular space involvement negative and for stage II grade 1 endometrioid carcinomas. When molecular classification is known, *POLE* mutation and p53 abnormal have specific recommendations.
- *High risk*: external beam radiation therapy with concurrent and adjuvant chemotherapy, or alternatively, sequential chemotherapy and radiotherapy is recommended. Chemotherapy alone is an alternative option. Carcinosarcomas should be treated as high-risk carcinomas (not as sarcomas). When the molecular classification is known, p53 abnormal carcinomas without myometrial invasion and *POLE* mutation have specific recommendations.

The definition of prognostic risk groups is presented in Online supplemental appendix 3 for both situations when molecular classification is known or unknown.

Recording Pertinent Information to Improve Quality of Care

Proper documentation is crucial for the quality of surgical care. Several studies highlighted the association of the use of standardized operative reports and the acquisition of more complete and interpretable operative data compared with the use of non-standardized operative reports.[382–385] Synoptic reporting methods were developed as a result of the lack of essential informations in the narrative operative reports in other surgical disciplines.[386–402] The synoptic operative report generally improves completeness and consistency in surgical documentation compared with the traditional narrative operative report, suggesting its incorporation into surgical practice. ESGO has approved a template for ovarian cancer operative reports.[403] In the absence of an international validated standardized surgical report for endometrial carcinoma, the international development group considers that the surgical report must be structured and should include at least the following minimum requirements: status of abdominal findings at the start and end of surgery, description of tumor spread (if any), lymph node evaluation, complications, total blood loss, tracer used for the sentinel lymph node procedure, number of sentinel lymph nodes removed (if any), location of sentinel lymph nodes (if any), residual post-operative disease, location of residual disease (if any), kind of procedure (sentinel lymph node procedure, debulking, etc), adhesiolysis (yes vs no), aim of surgery (palliative vs curative), stage of the disease, and rupture of uterus.

The pathology report is a major component of patient management and its accuracy depends on several factors. Pre-analytical steps must be carried out in an optimal way to allow for adequate pathological evaluation. The inclusions of informative clinical and surgical data on the pathology request form, and accurate sampling and processing of the specimens, are the basis for a correct histological diagnosis and the provision of information on tumor staging. The pathology report should comprehensively include all the features that enable a patient with endometrial carcinoma to be placed into a risk group, which ensures the appropriate management. It should include all the parameters affecting tumor staging and patient management.

Structured morbidity and mortality conferences are required for quality assurance of surgical care. Complications, reoperations, readmissions, secondary transfers to intermediate or intensive care units, and deaths should be discussed. The use of a validated surgical complications scoring system is encouraged. Several surgical complications reporting systems have been proposed in the 1990s.[404–410] The therapy needed to manage a specific complication remains the cornerstone for ranking a complication. The most commonly used scoring system for post-operative complications is the Clavien-Dindo classification. It consists of five severity grades and focuses on the interventions needed, with a major emphasis on the risk and invasiveness of the therapy used, to correct a complication.[404 405] A 5-year evaluation demonstrated its validation, reproducibility, and applicability worldwide, irrespective of the cultural background and in many fields of surgery.[411] Several indexes based on the Clavien-Dindo classification and modifications of this classification have been proposed and used in large multi-centric studies.[412–422] Proactive reporting of the recurrences/deaths in institutions/centers is also needed.

Box 1 Center criteria for ESGO accreditation for endometrial carcinoma surgery: (A) Standard Accreditation and (B) Center of Excellence

(A) Entry criteria for standard ESGO accreditation for endometrial carcinoma surgery

- Sum of the individual scores ≥115 (>80% of the score)
- All the following criteria must apply (minimum required targets should be met): 1, 2

(B) Requirements for ESGO accreditation for endometrial carcinoma surgery as a Center of Excellence

- Sum of the individual scores ≥115 (>80% of the score)
- All the following criteria must apply (optimal targets should be met (if any)): 1, 2, 3, 5, 10, 15, 17, 20, 21, 22, 29
- Publication of three articles on endometrial carcinoma authored by a gynecological surgical oncology member of the team over the last 3 years, including at least one article as first or last author

SCORING SYSTEM/ESGO ACCREDITATION

The ESGO accreditation of centers for endometrial carcinoma surgery is an award to institutions that offer patients the specific skills, experience, organization, and dedication that are required to achieve optimal levels of surgical care. The ESGO accreditation is based on the completion of these QIs and a scoring system that has been developedand internally, validated by the international development group. To do so, each QI was associated with a score, and an assessment form was built (Online supplemental appendix 4). The form can also be used to support the self-assessment, quality assurance programs, or the external assessment of an institution.

The sum of the individual scores being 143, it was decided that an institution that meets at least 80% of the score (score ≥115) provides satisfactory surgical management of patients with endometrial carcinoma. Centers interested to become accredited are also required to meet the minimum required targets of QIs 1 and 2. Centers receiving the ESGO accreditation will be entitled to use the subtitle 'ESGO accredited center in endometrial carcinoma surgery', to use the ESGO logo in its endometrial carcinoma related communication, and be listed on the ESGO website as accredited center for patients' and physicians' reference.

ESGO has also developed criteria that distinguish centers with accreditation for endometrial carcinoma surgery into two categories, either 'Standard Accreditation' or 'Center of Excellence'. These criteria are outlined in Box 1. Centers accredited as a Center of Excellence may then build a network for education, training, and research. The system will have to be refined in the future with the feedback provided by the scoring of candidate centers, and by prospective research on the multivariate correlation between survival outcome, characteristics of the patient, and indicators.

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REFERENCES

1 du Bois A, Strutas D, Buhrmann C, *et al*. Impact of treatment guidelines and implementation of a quality assurance program on quality of care in endometrial cancer. *Onkologie* 2009;32:493–8.
2 Ferron G, Martinez A, Gladieff L, *et al*. Adherence to guidelines in gynecologic cancer surgery. *Int J Gynecol Cancer* 2014;24:1675–8.
3 Chenoz L, Phelippeau J, Barranger E, *et al*. Evaluation and selection of quality indicators for the management of endometrial cancer. *Int J Gynecol Cancer* 2017;27:979–86.
4 Concin N, Matias-Guiu X, Vergote I, *et al*. ESGO/ESTRO/ESP guidelines for the management of patients with endometrial carcinoma. *Int J Gynecol Cancer* 2021;31:12–39.
5 Concin N, Matias-Guiu X, Vergote I, *et al*. ESGO/ESTRO/ESP guidelines for the management of patients with endometrial carcinoma. *Radiother Oncol* 2021;154:327–53.
6 Concin N, Creutzberg CL, Vergote I, *et al*. ESGO/ESTRO/ESP guidelines for the management of patients with endometrial carcinoma. *Virchows Arch* 2021;478:153–90.
7 Bonte A-S, Luyckx A, Wyckmans L, *et al*. Quality indicators for the management of endometrial, cervical and ovarian cancer. *Eur J Surg Oncol* 2019;45:528–37.
8 Healthcare Improvement Scotland. NHS Scottland. Endometrial cancer clinical quality performance indicators, 2018. Available: http://www.healthcareimprovementscotland.org/our_work/cancer_care_improvement/cancer_qpis/quality_performance_indicators.aspx
9 Luyckx A, Wyckmans L, Bonte A-S, *et al*. Acceptability of quality indicators for the management of endometrial, cervical and ovarian cancer: results of an online survey. *BMC Womens Health* 2020;20:151.
10 Society of Gynecologic Oncology - Endometrial Indicators. Available: https://www.sgo.org/resources/quality-indicators/ [Accessed 14 Oct 2020].
11 Werbrouck J, Bouche G, de Jonge E, *et al*. Evaluation of the quality of the management of cancer of the corpus uteri--selection of relevant quality indicators and implementation in Belgium. *Gynecol Oncol* 2013;131:512–9.
12 Mainz J. Defining and classifying clinical indicators for quality improvement. *Int J Qual Health Care* 2003;15:523–30.
13 Anderson O, Ni Z, Møller H, *et al*. Hospital volume and survival in oesophagectomy and gastrectomy for cancer. *Eur J Cancer* 2011;47:2408–14.
14 Avdic D, Lundborg P, Vikström J. Estimating returns to hospital volume: evidence from advanced cancer surgery. *J Health Econ* 2019;63:81–99.
15 Aviki EM, Chen L, Dessources K, *et al*. Impact of hospital volume on surgical management and outcomes for early-stage cervical cancer. *Gynecol Oncol* 2020;157:508–13.
16 Bach PB, Cramer LD, Schrag D, *et al*. The influence of hospital volume on survival after resection for lung cancer. *N Engl J Med* 2001;345:181–8.

17 Baumrucker CC, Spring SR, Cohen BL, *et al*. The effect of hospital volume on outcomes of patients with occult breast cancer. *Ann Surg Oncol* 2021;28:2128–35.
18 Becker JH, Ezendam NPM, Boll D, *et al*. Effects of surgical volumes on the survival of endometrial carcinoma. *Gynecol Oncol* 2015;139:306–11.
19 Bilimoria KY, Talamonti MS, Sener SF, *et al*. Effect of hospital volume on margin status after pancreaticoduodenectomy for cancer. *J Am Coll Surg* 2008;207:510–9.
20 Birkmeyer JD, Sun Y, Wong SL, *et al*. Hospital volume and late survival after cancer surgery. *Ann Surg* 2007;245:777–83.
21 Bos ACRK, van Erning FN, Elferink MAG, *et al*. No difference in overall survival between hospital volumes for patients with colorectal cancer in the Netherlands. *Dis Colon Rectum* 2016;59:943–52.
22 Bristow RE, Chang J, Ziogas A, *et al*. High-volume ovarian cancer care: survival impact and disparities in access for advanced-stage disease. *Gynecol Oncol* 2014;132:403–10.
23 Bristow RE, Palis BE, Chi DS, *et al*. The National Cancer Database report on advanced-stage epithelial ovarian cancer: impact of hospital surgical case volume on overall survival and surgical treatment paradigm. *Gynecol Oncol* 2010;118:262–7.
24 Bruins HM, Veskimäe E, Hernández V, *et al*. The importance of hospital and surgeon volume as major determinants of morbidity and mortality after radical cystectomy for bladder cancer: a systematic review and recommendations by the European Association of Urology muscle-invasive and metastatic bladder cancer guideline panel. *Eur Urol Oncol* 2020;3:131–44.
25 Busweiler LAD, Dikken JL, Henneman D, *et al*. The influence of a composite hospital volume on outcomes for gastric cancer surgery: a Dutch population-based study. *J Surg Oncol* 2017;115:738–45.
26 Chang C-M, Huang K-Y, Hsu T-W, *et al*. Multivariate analyses to assess the effects of surgeon and hospital volume on cancer survival rates: a nationwide population-based study in Taiwan. *PLoS One* 2012;7:e40590.
27 Chen C-S, Liu T-C, Lin H-C, *et al*. Does high surgeon and hospital surgical volume raise the five-year survival rate for breast cancer? A population-based study. *Breast Cancer Res Treat* 2008;110:349–56.
28 Cheung MC, Koniaris LG, Perez EA, *et al*. Impact of hospital volume on surgical outcome for head and neck cancer. *Ann Surg Oncol* 2009;16:1001–9.
29 Chioreso C, Del Vecchio N, Schweizer ML, *et al*. Association between hospital and surgeon volume and rectal cancer surgery outcomes in patients with rectal cancer treated since 2000: systematic literature review and meta-analysis. *Dis Colon Rectum* 2018;61:1320–32.
30 Coupland VH, Konfortion J, Jack RH, *et al*. Resection rate, hospital procedure volume and survival in pancreatic cancer patients in England: population-based study, 2005-2009. *Eur J Surg Oncol* 2016;42:190–6.
31 Damhuis RAM, Meurs CJC, Dijkhuis CM, *et al*. Hospital volume and post-operative mortality after resection for gastric cancer. *Eur J Surg Oncol* 2002;28:401–5.
32 David EA, Cooke DT, Chen Y, *et al*. Surgery in high-volume hospitals not commission on cancer accreditation leads to increased cancer-specific survival for early-stage lung cancer. *Am J Surg* 2015;210:643–7.
33 Derogar M, Sadr-Azodi O, Johar A, *et al*. Hospital and surgeon volume in relation to survival after esophageal cancer surgery in a population-based study. *J Clin Oncol* 2013;31:551–7.
34 Díaz-Montes TP, Zahurak ML, Giuntoli RL, *et al*. Uterine cancer in Maryland: impact of surgeon case volume and other prognostic factors on short-term mortality. *Gynecol Oncol* 2006;103:1043–7.
35 Dikken JL, Dassen AE, Lemmens VEP, *et al*. Effect of hospital volume on postoperative mortality and survival after oesophageal and gastric cancer surgery in the Netherlands between 1989 and 2009. *Eur J Cancer* 2012;48:1004–13.
36 Elferink MAG, Krijnen P, Wouters MWJM, *et al*. Variation in treatment and outcome of patients with rectal cancer by region, hospital type and volume in the Netherlands. *Eur J Surg Oncol* 2010;36 Suppl 1:S74–82.
37 Ellison LM, Trock BJ, Poe NR, *et al*. The effect of hospital volume on cancer control after radical prostatectomy. *J Urol* 2005;173:2094–8.
38 Engel J, Kerr J, Eckel R, *et al*. Influence of hospital volume on local recurrence and survival in a population sample of rectal cancer patients. *Eur J Surg Oncol* 2005;31:512–20.
39 Enzinger PC, Benedetti JK, Meyerhardt JA, *et al*. Impact of hospital volume on recurrence and survival after surgery for gastric cancer. *Ann Surg* 2007;245:426–34.
40 Fong Y, Gonen M, Rubin D, *et al*. Long-term survival is superior after resection for cancer in high-volume centers. *Ann Surg* 2005;242:540–7. discussion 544-547.
41 Freixinet JL, Julià-Serdà G, Rodríguez PM, *et al*. Hospital volume: operative morbidity, mortality and survival in thoracotomy for lung cancer. A Spanish multicenter study of 2994 cases. *Eur J Cardiothorac Surg* 2006;29:20–5.
42 Gooiker GA, van Gijn W, Post PN, *et al*. A systematic review and meta-analysis of the volume-outcome relationship in the surgical treatment of breast cancer. Are breast cancer patients better of with a high volume provider? *Eur J Surg Oncol* 2010;36 Suppl 1:S27–35.
43 Gottlieb-Vedi E, Mattsson F, Lagergren P, *et al*. Annual hospital volume of surgery for gastrointestinal cancer in relation to prognosis. *Eur J Surg Oncol* 2019;45:1839–46.
44 Goyal G, Kommalapati A, Bartley AC, *et al*. Association between hospital volume and mortality of patients with metastatic non-small cell lung cancer. *Lung Cancer* 2018;122:214–9.
45 Greenup RA, Obeng-Gyasi S, Thomas S, *et al*. The effect of hospital volume on breast cancer mortality. *Ann Surg* 2018;267:375–81.
46 Gruen RL, Pitt V, Green S, *et al*. The effect of provider case volume on cancer mortality: systematic review and meta-analysis. *CA Cancer J Clin* 2009;59:192–211.
47 Guller U, Safford S, Pietrobon R, *et al*. High hospital volume is associated with better outcomes for breast cancer surgery: analysis of 233,247 patients. *World J Surg* 2005;29:994–9. discussion 999-1000.
48 Hagemans JAW, Alberda WJ, Verstegen M, *et al*. Hospital volume and outcome in rectal cancer patients; results of a population-based study in the Netherlands. *Eur J Surg Oncol* 2019;45:613–9.
49 Harling H, Bülow S, Møller LN, *et al*. Hospital volume and outcome of rectal cancer surgery in Denmark 1994-99. *Colorectal Dis* 2005;7:90–5.
50 Hillner BE, Smith TJ, Desch CE. Hospital and physician volume or specialization and outcomes in cancer treatment: importance in quality of cancer care. *J Clin Oncol* 2000;18:2327–40.
51 Hodgson DC, Zhang W, Zaslavsky AM, *et al*. Relation of hospital volume to colostomy rates and survival for patients with rectal cancer. *J Natl Cancer Inst* 2003;95:708–16.
52 Hsu P-K, Chen H-S, Wu S-C, *et al*. Impact of hospital volume on long-term survival after resection for oesophageal cancer: a population-based study in Taiwan. *Eur J Cardiothorac Surg* 2014;46:e127–35. discussion e135.
53 Hsu RCJ, Barclay M, Loughran MA, *et al*. Impact of hospital nephrectomy volume on intermediate- to long-term survival in renal cell carcinoma. *BJU Int* 2020;125:56–63.
54 Huguet M, Perrier L, Bally O, *et al*. Being treated in higher volume hospitals leads to longer progression-free survival for epithelial ovarian carcinoma patients in the Rhone-Alpes region of France. *BMC Health Serv Res* 2018;18:3.
55 Huo YR, Phan K, Morris DL, *et al*. Systematic review and a meta-analysis of hospital and surgeon volume/outcome relationships in colorectal cancer surgery. *J Gastrointest Oncol* 2017;8:534–46.
56 Ioka A, Tsukuma H, Ajiki W, *et al*. Influence of hospital procedure volume on ovarian cancer survival in Japan, a country with low incidence of ovarian cancer. *Cancer Sci* 2004;95:233–7.
57 Jonker FHW, Hagemans JAW, Verhoef C, *et al*. The impact of hospital volume on perioperative outcomes of rectal cancer. *Eur J Surg Oncol* 2017;43:1894–900.
58 Jonker FHW, Hagemans JAW, Burger JWA, *et al*. The influence of hospital volume on long-term oncological outcome after rectal cancer surgery. *Int J Colorectal Dis* 2017;32:1741–7.
59 Killeen SD, O'Sullivan MJ, Coffey JC, *et al*. Provider volume and outcomes for oncological procedures. *Br J Surg* 2005;92:389–402.
60 Kim EY, Song KY, Lee J. Does hospital volume really affect the surgical and oncological outcomes of gastric cancer in Korea? *J Gastric Cancer* 2017;17:246–54.
61 Kozower BD, Stukenborg GJ. Hospital esophageal cancer resection volume does not predict patient mortality risk. *Ann Thorac Surg* 2012;93:1690–8. discussion 1696-1698.
62 Kressner M, Bohe M, Cedermark B, *et al*. The impact of hospital volume on surgical outcome in patients with rectal cancer. *Dis Colon Rectum* 2009;52:1542–9.
63 Kumpulainen S, Sankila R, Leminen A, *et al*. The effect of hospital operative volume, residual tumor and first-line chemotherapy on survival of ovarian cancer - a prospective nation-wide study in Finland. *Gynecol Oncol* 2009;115:199–203.
64 Kuo RN, Chung K-P, Lai M-S. Re-examining the significance of surgical volume to breast cancer survival and recurrence versus process quality of care in Taiwan. *Health Serv Res* 2013;48:26–46.

65 Lee B, Kim K, Park Y, *et al*. Impact of hospital care volume on clinical outcomes of laparoscopic radical hysterectomy for cervical cancer: a systematic review and meta-analysis. *Medicine* 2018;97:e13445.
66 Leonard D, Penninckx F, Kartheuser A, *et al*. Effect of hospital volume on quality of care and outcome after rectal cancer surgery. *Br J Surg* 2014;101:1475–82.
67 Lin C-C, Lin H-C. Effects of surgeon and hospital volume on 5-year survival rates following oral cancer resections: the experience of an Asian country. *Surgery* 2008;143:343–51.
68 Lombardi CP, Raffaelli M, Boniardi M, *et al*. Adrenocortical carcinoma: effect of hospital volume on patient outcome. *Langenbecks Arch Surg* 2012;397:201–7.
69 Lüchtenborg M, Riaz SP, Coupland VH, *et al*. High procedure volume is strongly associated with improved survival after lung cancer surgery. *J Clin Oncol* 2013;31:3141–6.
70 Matsuo K, Nishio S, Matsuzaki S, *et al*. Hospital volume-outcome relationship in vulvar cancer treatment: a Japanese Gynecologic Oncology Group study. *J Gynecol Oncol* 2021;32:e24.
71 Moterani VC, Tiezzi DG, de Andrade JM, *et al*. Analysis of the relationship between hospital characteristics and survival in ovarian cancer: a historical cohort. *J Surg Oncol* 2020;122:1802–7.
72 Mroczkowski P, Kube R, Ptok H, *et al*. Low-volume centre vs high-volume: the role of a quality assurance programme in colon cancer surgery. *Colorectal Dis* 2011;13:e276–83.
73 Mukai Y, Kurokawa Y, Takiguchi S, *et al*. Are treatment outcomes in gastric cancer associated with either hospital volume or surgeon volume? *Ann Gastroenterol Surg* 2017;1:186–92.
74 Nomura E, Tsukuma H, Ajiki W, *et al*. Population-based study of the relationship between hospital surgical volume and 10-year survival of breast cancer patients in Osaka, Japan. *Cancer Sci* 2006;97:618–22.
75 Nomura E, Tsukuma H, Ajiki W, *et al*. Population-based study of relationship between hospital surgical volume and 5-year survival of stomach cancer patients in Osaka, Japan. *Cancer Sci* 2003;94:998–1002.
76 Okawa S, Tabuchi T, Morishima T, *et al*. Hospital volume and postoperative 5-year survival for five different cancer sites: a population-based study in Japan. *Cancer Sci* 2020;111:985–93.
77 Osada H, Yamakoshi E. Hospital volume and surgical outcomes of lung cancer in Japan. *Gen Thorac Cardiovasc Surg* 2007;55:360–5.
78 Osler M, Iversen LH, Borglykke A, *et al*. Hospital variation in 30-day mortality after colorectal cancer surgery in Denmark: the contribution of hospital volume and patient characteristics. *Ann Surg* 2011;253:733–8.
79 Peltoniemi P, Peltola M, Hakulinen T, *et al*. The effect of hospital volume on the outcome of breast cancer surgery. *Ann Surg Oncol* 2011;18:1684–90.
80 Ptok H, Marusch F, Kuhn R, *et al*. Influence of hospital volume on the frequency of abdominoperineal resection and long-term oncological outcomes in low rectal cancer. *Eur J Surg Oncol* 2007;33:854–61.
81 Rouvelas I, Lindblad M, Zeng W, *et al*. Impact of hospital volume on long-term survival after esophageal cancer surgery. *Arch Surg* 2007;142:113–7. discussion 118.
82 Salz T, Sandler RS. The effect of hospital and surgeon volume on outcomes for rectal cancer surgery. *Clin Gastroenterol Hepatol* 2008;6:1185–93.
83 Santos F, Zakaria AS, Kassouf W, *et al*. High hospital and surgeon volume and its impact on overall survival after radical cystectomy among patients with bladder cancer in Quebec. *World J Urol* 2015;33:1323–30.
84 Schrag D, Cramer LD, Bach PB, *et al*. Influence of hospital procedure volume on outcomes following surgery for colon cancer. *JAMA* 2000;284:3028–35.
85 Schrag D, Earle C, Xu F, *et al*. Associations between hospital and surgeon procedure volumes and patient outcomes after ovarian cancer resection. *J Natl Cancer Inst* 2006;98:163–71.
86 Schrag D, Panageas KS, Riedel E, *et al*. Hospital and surgeon procedure volume as predictors of outcome following rectal cancer resection. *Ann Surg* 2002;236:583–92.
87 Schrag D, Panageas KS, Riedel E, *et al*. Surgeon volume compared to hospital volume as a predictor of outcome following primary colon cancer resection. *J Surg Oncol* 2003;83:68–78. discussion 78-69.
88 Seagle B-LL, Strohl AE, Dandapani M, *et al*. Survival disparities by hospital volume among American women with gynecologic cancers. *JCO Clin Cancer Inform* 2017;1:1–15.
89 Sharma A, Schwartz SM, Méndez E. Hospital volume is associated with survival but not multimodality therapy in Medicare patients with advanced head and neck cancer. *Cancer* 2013;119:1845–52.
90 Siesling S, Tjan-Heijnen VCG, de Roos M, *et al*. Impact of hospital volume on breast cancer outcome: a population-based study in the Netherlands. *Breast Cancer Res Treat* 2014;147:177–84.
91 Simunovic M, To T, Baxter N, *et al*. Hospital procedure volume and teaching status do not influence treatment and outcome measures of rectal cancer surgery in a large general population. *J Gastrointest Surg* 2000;4:324–30.
92 Tella SH, Kommalapati A, Ganti AK, *et al*. Association between hospital volume, therapy types, and overall survival in stage III and IV cutaneous malignant melanoma. *J Natl Compr Canc Netw* 2019;17:1334–42.
93 Thai AA, Stuart E, Te Marvelde L, *et al*. Hospital lung surgery volume and patient outcomes. *Lung Cancer* 2019;129:22–7.
94 Thompson AM, Rapson T, Gilbert FJ, *et al*. Hospital volume does not influence long-term survival of patients undergoing surgery for oesophageal or gastric cancer. *Br J Surg* 2007;94:578–84.
95 Turner MC, Jawitz O, Adam MA, *et al*. Comparison of survival of stage I-III colon cancer by travel distance and hospital volume. *Tech Coloproctol* 2020;24:703–10.
96 Uhlig J, Sellers CM, Khan SA, *et al*. Hepatocellular carcinoma: impact of academic setting and hospital volume on patient survival. *Surg Oncol* 2019;31:111–8.
97 von Meyenfeldt EM, Gooiker GA, van Gijn W, *et al*. The relationship between volume or surgeon specialty and outcome in the surgical treatment of lung cancer: a systematic review and meta-analysis. *J Thorac Oncol* 2012;7:1170–8.
98 Vrijens F, Stordeur S, Beirens K, *et al*. Effect of hospital volume on processes of care and 5-year survival after breast cancer: a population-based study on 25000 women. *Breast* 2012;21:261–6.
99 Wenner J, Zilling T, Bladström A, *et al*. The influence of surgical volume on hospital mortality and 5-year survival for carcinoma of the oesophagus and gastric cardia. *Anticancer Res* 2005;25:419–24.
100 Woldu SL, Matulay JT, Clinton TN, *et al*. Impact of hospital case volume on testicular cancer outcomes and practice patterns. *Urol Oncol* 2018;36:14.e7–14.e15.
101 Wouters MW, Wijnhoven BP, Karim-Kos HE, *et al*. High-volume versus low-volume for esophageal resections for cancer: the essential role of case-mix adjustments based on clinical data. *Ann Surg Oncol* 2008;15:80–7.
102 Wright JD, Chen L, Hou JY, *et al*. Association of hospital volume and quality of care with survival for ovarian cancer. *Obstet Gynecol* 2017;130:545–53.
103 Wright JD, Hershman DL, Burke WM, *et al*. Influence of surgical volume on outcome for laparoscopic hysterectomy for endometrial cancer. *Ann Surg Oncol* 2012;19:948–58.
104 Wright JD, Herzog TJ, Siddiq Z, *et al*. Failure to rescue as a source of variation in hospital mortality for ovarian cancer. *J Clin Oncol* 2012;30:3976–82.
105 Wright JD, Huang Y, Ananth CV, *et al*. Influence of treatment center and hospital volume on survival for locally advanced cervical cancer. *Gynecol Oncol* 2015;139:506–12.
106 Wright JD, Huang Y, Melamed A, *et al*. Potential consequences of minimum-volume standards for hospitals treating women with ovarian cancer. *Obstet Gynecol* 2019;133:1109–19.
107 Wright JD, Lewin SN, Deutsch I, *et al*. Effect of surgical volume on morbidity and mortality of abdominal hysterectomy for endometrial cancer. *Obstet Gynecol* 2011;117:1051–9.
108 Wright JD, Lewin SN, Deutsch I, *et al*. The influence of surgical volume on morbidity and mortality of radical hysterectomy for cervical cancer. *Am J Obstet Gynecol* 2011;205:e221–7.
109 Wright JD, Ruiz MP, Chen L, *et al*. Changes in surgical volume and outcomes over time for women undergoing hysterectomy for endometrial cancer. *Obstet Gynecol* 2018;132:59–69.
110 Xia L, Strother MC, Taylor BL, *et al*. Hospital volume and short-term outcomes after cytoreductive nephrectomy. *J Surg Oncol* 2018;117:1589–96.
111 Yasunaga H, Nishii O, Hirai Y, *et al*. Impact of surgeon and hospital volumes on short-term postoperative complications after radical hysterectomy for cervical cancer. *J Obstet Gynaecol Res* 2009;35:699–705.
112 Yun YH, Kim YA, Min YH, *et al*. The influence of hospital volume and surgical treatment delay on long-term survival after cancer surgery. *Ann Oncol* 2012;23:2731–7.
113 Chan JK, Kapp DS, Shin JY, *et al*. Influence of the gynecologic oncologist on the survival of ovarian cancer patients. *Obstet Gynecol* 2007;109:1342–50.
114 Read TE, Myerson RJ, Fleshman JW, *et al*. Surgeon specialty is associated with outcome in rectal cancer treatment. *Dis Colon Rectum* 2002;45:904–14.

115 Farjah F, Flum DR, Varghese TK, *et al*. Surgeon specialty and long-term survival after pulmonary resection for lung cancer. *Ann Thorac Surg* 2009;87:995–1006. discussion 1005-1006.
116 Wu M-F, Li J, Lu H-W, *et al*. Impact of the care provided by gynecologic oncologists on outcomes of cervical cancer patients treated with radical hysterectomy. *Onco Targets Ther* 2016;9:1361–70.
117 Yagi A, Ueda Y, Nakagawa S, *et al*. Relation between the number of board-certified gynecologic oncologists per hospital and survival of cervical cancer. *J Obstet Gynaecol Res* 2019;45:1160–6.
118 Rim SH, Hirsch S, Thomas CC, *et al*. Gynecologic oncologists involvement on ovarian cancer standard of care receipt and survival. *World J Obstet Gynecol* 2016;5:187–96.
119 Vernooij F, Heintz P, Witteveen E, *et al*. The outcomes of ovarian cancer treatment are better when provided by gynecologic oncologists and in specialized hospitals: a systematic review. *Gynecol Oncol* 2007;105:801–12.
120 Carney ME, Lancaster JM, Ford C, *et al*. A population-based study of patterns of care for ovarian cancer: who is seen by a gynecologic oncologist and who is not? *Gynecol Oncol* 2002;84:36–42.
121 Chan JK, Sherman AE, Kapp DS, *et al*. Influence of gynecologic oncologists on the survival of patients with endometrial cancer. *J Clin Oncol* 2011;29:832–8.
122 Ray-Coquard I, Thiesse P, Ranchère-Vince D, *et al*. Conformity to clinical practice guidelines, multidisciplinary management and outcome of treatment for soft tissue sarcomas. *Ann Oncol* 2004;15:307–15.
123 Chang JH, Vines E, Bertsch H, *et al*. The impact of a multidisciplinary breast cancer center on recommendations for patient management: the University of Pennsylvania experience. *Cancer* 2001;91:1231–7.
124 Burton E, Chase D, Yamamoto M, *et al*. Surgical management of recurrent ovarian cancer: the advantage of collaborative surgical management and a multidisciplinary approach. *Gynecol Oncol* 2011;120:29–32.
125 Castel P, Tassy L, Lurkin A, *et al*. Multidisciplinarity and medical decision, impact for patients with cancer: sociological assessment of two tumour committees' organization. *Bull Cancer* 2012;99:E34–42.
126 Evans AC, Zorbas HM, Keaney MA, *et al*. Medicolegal implications of a multidisciplinary approach to cancer care: consensus recommendations from a national workshop. *Med J Aust* 2008;188:401–4.
127 Crawford R, Greenberg D. Improvements in survival of gynaecological cancer in the Anglia region of England: are these an effect of centralisation of care and use of multidisciplinary management? *BJOG* 2012;119:160–5.
128 Shylasree TS, Howells REJ, Lim K, *et al*. Survival in ovarian cancer in Wales: prior to introduction of all Wales guidelines. *Int J Gynecol Cancer* 2006;16:1770–6.
129 Vernooij F, Heintz APM, Coebergh J-W, *et al*. Specialized and high-volume care leads to better outcomes of ovarian cancer treatment in the Netherlands. *Gynecol Oncol* 2009;112:455–61.
130 Du Bois A, Rochon J, Lamparter C, *et al*. Pattern of care and impact of participation in clinical studies on the outcome in ovarian cancer. *Int J Gynecol Cancer* 2005;15:183–91.
131 Rochon J, du Bois A. Clinical research in epithelial ovarian cancer and patients' outcome. *Ann Oncol* 2011;22 Suppl 7:vii16–19.
132 Robinson WR, Ritter J, Rogers AS, *et al*. Clinical trial participation is associated with improved outcome in women with ovarian cancer. *Int J Gynecol Cancer* 2009;19:124–8.
133 Davis S, Wright PW, Schulman SF, *et al*. Participants in prospective, randomized clinical trials for resected non-small cell lung cancer have improved survival compared with nonparticipants in such trials. *Cancer* 1985;56:1710–8.
134 Bertelsen K, Andersen JE. Long-term survival and prognostic factors in advanced epithelial ovarian cancer with special emphasis upon the effects of protocol inclusion. *Int J Gynecol Cancer* 1994;4:180–7.
135 Dowling AJ, Czaykowski PM, Krahn MD, *et al*. Prostate specific antigen response to mitoxantrone and prednisone in patients with refractory prostate cancer: prognostic factors and generalizability of a multicenter trial to clinical practice. *J Urol* 2000;163:1481–5.
136 Mayers C, Panzarella T, Tannock IF. Analysis of the prognostic effects of inclusion in a clinical trial and of myelosuppression on survival after adjuvant chemotherapy for breast carcinoma. *Cancer* 2001;91:2246–57.
137 Peppercorn JM, Weeks JC, Cook EF, *et al*. Comparison of outcomes in cancer patients treated within and outside clinical trials: conceptual framework and structured review. *Lancet* 2004;363:263–70.
138 Karjalainen S, Palva I. Do treatment protocols improve end results? A study of survival of patients with multiple myeloma in Finland. *BMJ* 1989;299:1069–72.
139 Winger MJ, Macdonald DR, Schold SC, *et al*. Selection bias in clinical trials of anaplastic glioma. *Ann Neurol* 1989;26:531–4.
140 Schmoor C, Olschewski M, Schumacher M. Randomized and non-randomized patients in clinical trials: experiences with comprehensive cohort studies. *Stat Med* 1996;15:263–71.
141 Ward LC, Fielding JW, Dunn JA, *et al*. The selection of cases for randomised trials: a registry survey of concurrent trial and non-trial patients. The British Stomach Cancer Group. *Br J Cancer* 1992;66:943–50.
142 Boros L, Chuang C, Butler FO, *et al*. Leukemia in Rochester (NY). A 17-year experience with an analysis of the role of cooperative group (ECOG) participation. *Cancer* 1985;56:2161–9.
143 Marubini E, Mariani L, Salvadori B, *et al*. Results of a breast-cancer-surgery trial compared with observational data from routine practice. *Lancet* 1996;347:1000–3.
144 Roy P, Vaughan Hudson G, Vaughan Hudson B, *et al*. Long-term survival in Hodgkin's disease patients. A comparison of relative survival in patients in trials and those recorded in population-based cancer registries. *Eur J Cancer* 2000;36:384–9.
145 Feuer EJ, Frey CM, Brawley OW, *et al*. After a treatment breakthrough: a comparison of trial and population-based data for advanced testicular cancer. *J Clin Oncol* 1994;12:368–77.
146 Cottin V, Arpin D, Lasset C, *et al*. Small-cell lung cancer: patients included in clinical trials are not representative of the patient population as a whole. *Ann Oncol* 1999;10:809–15.
147 Dahlberg M, Glimelius B, Påhlman L. Improved survival and reduction in local failure rates after preoperative radiotherapy: evidence for the generalizability of the results of Swedish Rectal Cancer Trial. *Ann Surg* 1999;229:493–7.
148 Schea RA, Perkins P, Allen PK, *et al*. Limited-stage small-cell lung cancer: patient survival after combined chemotherapy and radiation therapy with and without treatment protocols. *Radiology* 1995;197:859–62.
149 Greil R, Holzner B, Kemmler G, *et al*. Retrospective assessment of quality of life and treatment outcome in patients with Hodgkin's disease from 1969 to 1994. *Eur J Cancer* 1999;35:698–706.
150 Burgers JA, Arance A, Ashcroft L, *et al*. Identical chemotherapy schedules given on and off trial protocol in small cell lung cancer: response and survival results. *Br J Cancer* 2002;87:562–6.
151 Stiller CA, Benjamin S, Cartwright RA, *et al*. Patterns of care and survival for adolescents and young adults with acute leukaemia--a population-based study. *Br J Cancer* 1999;79:658–65.
152 Link MP, Goorin AM, Miser AW, *et al*. The effect of adjuvant chemotherapy on relapse-free survival in patients with osteosarcoma of the extremity. *N Engl J Med* 1986;314:1600–6.
153 Lennox EL, Stiller CA, Jones PH, *et al*. Nephroblastoma: treatment during 1970-3 and the effect on survival of inclusion in the first MRC trial. *Br Med J* 1979;2:567–9.
154 Meadows AT, Kramer S, Hopson R, *et al*. Survival in childhood acute lymphocytic leukemia: effect of protocol and place of treatment. *Cancer Invest* 1983;1:49–55.
155 Stiller CA, Draper GJ. Treatment centre size, entry to trials, and survival in acute lymphoblastic leukaemia. *Arch Dis Child* 1989;64:657–61.
156 Stiller CA, Eatock EM. Survival from acute non-lymphocytic leukaemia, 1971-88: a population based study. *Arch Dis Child* 1994;70:219–23.
157 Wagner HP, Dingeldein-Bettler I, Berchthold W, *et al*. Childhood NHL in Switzerland: incidence and survival of 120 study and 42 non-study patients. *Med Pediatr Oncol* 1995;24:281–6.
158 Stiller CA, Eatock EM. Patterns of care and survival for children with acute lymphoblastic leukaemia diagnosed between 1980 and 1994. *Arch Dis Child* 1999;81:202–8.
159 Harter P, du Bois A, Schade-Brittinger C, *et al*. Non-enrolment of ovarian cancer patients in clinical trials: reasons and background. *Ann Oncol* 2005;16:1801–5.
160 Luomaranta A, Leminen A, Loukovaara M. Magnetic resonance imaging in the assessment of high-risk features of endometrial carcinoma: a meta-analysis. *Int J Gynecol Cancer* 2015;25:837–42.
161 Andreano A, Rechichi G, Rebora P, *et al*. MR diffusion imaging for preoperative staging of myometrial invasion in patients with endometrial cancer: a systematic review and meta-analysis. *Eur Radiol* 2014;24:1327–38.
162 Das SK, Niu XK, Wang JL, *et al*. Usefulness of DWI in preoperative assessment of deep myometrial invasion in patients with

endometrial carcinoma: a systematic review and meta-analysis. *Cancer Imaging* 2014;14:32.
163 Deng L, Wang Q-ping, Chen X, *et al*. The combination of diffusion- and T2-weighted imaging in predicting deep myometrial invasion of endometrial cancer: a systematic review and meta-analysis. *J Comput Assist Tomogr* 2015;39:661–73.
164 Alcázar JL, Gastón B, Navarro B, *et al*. Transvaginal ultrasound versus magnetic resonance imaging for preoperative assessment of myometrial infiltration in patients with endometrial cancer: a systematic review and meta-analysis. *J Gynecol Oncol* 2017;28:e86.
165 Tanaka T, Terai Y, Fujiwara S, *et al*. Preoperative diffusion-weighted magnetic resonance imaging and intraoperative frozen sections for predicting the tumor grade in endometrioid endometrial cancer. *Oncotarget* 2018;9:36575–84.
166 Sánchez MF, Causa Andrieu PI, Latapie C, *et al*. Diagnostic yield of magnetic resonance imaging and intraoperative frozen section in the determination of deep myometrial invasion in endometrial cancer. *Radiologia* 2019;61:315–23.
167 Fasmer KE, Bjørnerud A, Ytre-Hauge S, *et al*. Preoperative quantitative dynamic contrast-enhanced MRI and diffusion-weighted imaging predict aggressive disease in endometrial cancer. *Acta Radiol* 2018;59:1010–7.
168 Taufiq M, Masroor I, Hussain Z. Diagnostic accuracy of diffusion weighted magnetic resonance imaging in the detection of myometrial invasion in endometrial carcinoma. *J Coll Physicians Surg Pak* 2016;26:13–17.
169 Christensen JW, Dueholm M, Hansen ES, *et al*. Assessment of myometrial invasion in endometrial cancer using three-dimensional ultrasound and magnetic resonance imaging. *Acta Obstet Gynecol Scand* 2016;95:55–64.
170 Arnaiz J, Muñoz A-B, Verna V, *et al*. Magnetic resonance imaging for the pre-surgical assessment of endometrial cancer: results in a routine clinical setting, outside dedicated trials; a cross-sectional study. *Anticancer Res* 2016;36:1891–4.
171 Shrivastava S, Barmon D, Kataki AC, *et al*. Magnetic resonance imaging in pre-operative staging of endometrial cancer. *Indian J Cancer* 2016;53:181–5.
172 Body N, Lavoué V, De Kerdaniel O, *et al*. Are preoperative histology and MRI useful for classification of endometrial cancer risk? *BMC Cancer* 2016;16:498.
173 Rodríguez-Trujillo A, Martínez-Serrano MJ, Martínez-Román S, *et al*. Preoperative assessment of myometrial invasion in endometrial cancer by 3D ultrasound and diffusion-weighted magnetic resonance imaging: a comparative study. *Int J Gynecol Cancer* 2016;26:1105–10.
174 Horváth K, Pete I, Vereczkey I, *et al*. Evaluation of the accuracy of preoperative MRI in measuring myometrial infiltration in endometrial carcinoma. *Pathol Oncol Res* 2014;20:327–33.
175 Nougaret S, Reinhold C, Alsharif SS, *et al*. Endometrial cancer: combined MR volumetry and diffusion-weighted imaging for assessment of myometrial and lymphovascular invasion and tumor grade. *Radiology* 2015;276:797–808.
176 Ippolito D, Cadonici A, Bonaffini PA, *et al*. Semiquantitative perfusion combined with diffusion-weighted MR imaging in pre-operative evaluation of endometrial carcinoma: results in a group of 57 patients. *Magn Reson Imaging* 2014;32:464–72.
177 Tanaka T, Terai Y, Ono YJ, *et al*. Preoperative MRI and intraoperative frozen section diagnosis of myometrial invasion in patients with endometrial cancer. *Int J Gynecol Cancer* 2015;25:879–83.
178 Bonatti M, Stuefer J, Oberhofer N, *et al*. MRI for local staging of endometrial carcinoma: is endovenous contrast medium administration still needed? *Eur J Radiol* 2015;84:208–14.
179 Karataşlı V, Çakır İlker, Şahin H, *et al*. Can preoperative magnetic resonance imaging replace intraoperative frozen sectioning in the evaluation of myometrial invasion for early-stage endometrial carcinoma? *Ginekol Pol* 2019;90:128–33.
180 Fujii S, Kido A, Baba T, *et al*. Subendometrial enhancement and peritumoral enhancement for assessing endometrial cancer on dynamic contrast enhanced MR imaging. *Eur J Radiol* 2015;84:581–9.
181 Yang T, Tian S, Li Y, *et al*. Magnetic resonance imaging (MRI) and three-dimensional transvaginal ultrasonography scanning for preoperative assessment of high risk in women with endometrial cancer. *Med Sci Monit* 2019;25:2024–31.
182 Ahmed M, Al-Khafaji JF, Class CA, *et al*. Can MRI help assess aggressiveness of endometrial cancer? *Clin Radiol* 2018;73:833 e811–33.
183 Sahin H, Sarioglu FC, Bagci M, *et al*. Preoperative magnetic resonance volumetry in predicting myometrial invasion, lymphovascular space invasion, and tumor grade: is it valuable in International Federation of Gynecology and Obstetrics stage I endometrial cancer? *Int J Gynecol Cancer* 2018;28:666–74.
184 Yan B, Zhao T, Liang X, *et al*. Can the apparent diffusion coefficient differentiate the grade of endometrioid adenocarcinoma and the histological subtype of endometrial cancer? *Acta Radiol* 2018;59:363–70.
185 Zhang L, Liu A, Zhang T, *et al*. Use of diffusion tensor imaging in assessing superficial myometrial invasion by endometrial carcinoma: a preliminary study. *Acta Radiol* 2015;56:1273–80.
186 Bonatti M, Pedrinolla B, Cybulski AJ, *et al*. Prediction of histological grade of endometrial cancer by means of MRI. *Eur J Radiol* 2018;103:44–50.
187 Tsikouras P, Koukouli Z, Bothou A, *et al*. Preoperative assessment in endometrial cancer. is triage for lymphadenectomy possible? *J Buon* 2017;22:34–43.
188 Zamani N, Modares Gilani M, Zamani F, *et al*. Utility of pelvic MRI and tumor markers HE4 and CA125 to predict depth of myometrial invasion and cervical involvement in endometrial cancer. *J Family Reprod Health* 2015;9:177–83.
189 Bourgioti C, Chatoupis K, Tzavara C, *et al*. Predictive ability of maximal tumor diameter on MRI for high-risk endometrial cancer. *Abdom Radiol* 2016;41:2484–95.
190 Ytre-Hauge S, Dybvik JA, Lundervold A, *et al*. Preoperative tumor texture analysis on MRI predicts high-risk disease and reduced survival in endometrial cancer. *J Magn Reson Imaging* 2018;48:1637–47.
191 Thieme SF, Collettini F, Sehouli J, *et al*. Preoperative evaluation of myometrial invasion in endometrial carcinoma: prospective intra-individual comparison of magnetic resonance volumetry, diffusion-weighted and dynamic contrast-enhanced magnetic resonance imaging. *Anticancer Res* 2018;38:4813–7.
192 Deng L, Wang Q-P, Yan R, *et al*. Combined subjective and quantitative analysis of magnetic resonance images could improve the diagnostic performance of deep myometrial invasion in endometrial cancer. *Clin Imaging* 2017;43:69–73.
193 Gallego JC, Porta A, Pardo MC, *et al*. Evaluation of myometrial invasion in endometrial cancer: comparison of diffusion-weighted magnetic resonance and intraoperative frozen sections. *Abdom Imaging* 2014;39:1021–6.
194 Brocker KA, Radtke JP, Hallscheidt P, *et al*. Comparison of the determination of the local tumor extent of primary endometrial cancer using clinical examination and 3 Tesla magnetic resonance imaging compared to histopathology. *Arch Gynecol Obstet* 2019;299:1391–8.
195 Goel G, Rajanbabu A, Sandhya CJ, *et al*. A prospective observational study evaluating the accuracy of MRI in predicting the extent of disease in endometrial cancer. *Indian J Surg Oncol* 2019;10:220–4.
196 Cignini P, Vitale SG, Laganà AS, *et al*. Preoperative work-up for definition of lymph node risk involvement in early stage endometrial cancer: 5-year follow-up. *Updates Surg* 2017;69:75–82.
197 Soneji ND, Bharwani N, Ferri A, *et al*. Pre-operative MRI staging of endometrial cancer in a multicentre cancer network: can we match single centre study results? *Eur Radiol* 2018;28:4725–34.
198 Green RW, Valentin L, Alcazar JL, *et al*. Endometrial cancer off-line staging using two-dimensional transvaginal ultrasound and three-dimensional volume contrast imaging: Intermethod agreement, interrater reliability and diagnostic accuracy. *Gynecol Oncol* 2018;150:438–45.
199 Takeuchi M, Matsuzaki K, Harada M. Evaluating myometrial invasion in endometrial cancer: comparison of reduced field-of-view diffusion-weighted imaging and dynamic contrast-enhanced MR imaging. *Magn Reson Med Sci* 2018;17:28–34.
200 Ota T, Hori M, Onishi H, *et al*. Preoperative staging of endometrial cancer using reduced field-of-view diffusion-weighted imaging: a preliminary study. *Eur Radiol* 2017;27:5225–35.
201 Koplay M, Dogan NU, Erdogan H, *et al*. Diagnostic efficacy of diffusion-weighted MRI for pre-operative assessment of myometrial and cervical invasion and pelvic lymph node metastasis in endometrial carcinoma. *J Med Imaging Radiat Oncol* 2014;58:538–46. quiz 648.
202 Woo S, Kim SY, Cho JY, *et al*. Assessment of deep myometrial invasion of endometrial cancer on MRI: added value of second-opinion interpretations by radiologists subspecialized in gynaecologic oncology. *Eur Radiol* 2017;27:1877–82.
203 Alves I, Cunha TM. Clinical importance of second-opinion interpretations by radiologists specializing in gynecologic oncology at a tertiary cancer center: magnetic resonance imaging for endometrial cancer staging. *Radiol Bras* 2018;51:26–31.

204 Masroor I, Rashid S, Afzal S, *et al*. Diagnostic accuracy of pelvic MRI for determination of the cervical involvement in endometrial cancer. *J Coll Physicians Surg Pak* 2018;28:262–5.
205 Teng F, Zhang Y-F, Wang Y-M, *et al*. Contrast-enhanced MRI in preoperative assessment of myometrial and cervical invasion, and lymph node metastasis: diagnostic value and error analysis in endometrial carcinoma. *Acta Obstet Gynecol Scand* 2015;94:266–73.
206 Bhosale P, Ma J, Iyer R, *et al*. Feasibility of a reduced field-of-view diffusion-weighted (rFOV) sequence in assessment of myometrial invasion in patients with clinical FIGO stage I endometrial cancer. *J Magn Reson Imaging* 2016;43:316–24.
207 Lin G, Huang Y-T, Chao A, *et al*. Endometrial cancer with cervical stromal invasion: diagnostic accuracy of diffusion-weighted and dynamic contrast enhanced MR imaging at 3T. *Eur Radiol* 2017;27:1867–76.
208 Alcazar JL, Pineda L, Martinez-Astorquiza Corral T, *et al*. Transvaginal/transrectal ultrasound for assessing myometrial invasion in endometrial cancer: a comparison of six different approaches. *J Gynecol Oncol* 2015;26:201–7.
209 Eriksson LSE, Lindqvist PG, Flöter Rådestad A, *et al*. Transvaginal ultrasound assessment of myometrial and cervical stromal invasion in women with endometrial cancer: interobserver reproducibility among ultrasound experts and gynecologists. *Ultrasound Obstet Gynecol* 2015;45:476–82.
210 Vieillefosse S, Huchon C, Chamming's F, *et al*. Assessment of different pre and intra-operative strategies to predict the actual ESMO risk group and to establish the appropriate indication of lymphadenectomy in endometrial cancer. *J Gynecol Obstet Hum Reprod* 2018;47:517–23.
211 Jantarasaengaram S, Praditphol N, Tansathit T, *et al*. Three-dimensional ultrasound with volume contrast imaging for preoperative assessment of myometrial invasion and cervical involvement in women with endometrial cancer. *Ultrasound Obstet Gynecol* 2014;43:569–74.
212 Pineda L, Alcázar JL, Caparrós M, *et al*. Agreement between preoperative transvaginal ultrasound and intraoperative macroscopic examination for assessing myometrial infiltration in low-risk endometrioid carcinoma. *Ultrasound Obstet Gynecol* 2016;47:369–73.
213 Frühauf F, Zikan M, Semeradova I, *et al*. The diagnostic accuracy of ultrasound in assessment of myometrial invasion in endometrial cancer: subjective assessment versus objective techniques. *Biomed Res Int* 2017;2017:1–10.
214 Janda M, Gebski V, Davies LC, *et al*. Effect of total laparoscopic hysterectomy vs total abdominal hysterectomy on disease-free survival among women with stage I endometrial cancer: a randomized clinical trial. *JAMA* 2017;317:1224–33.
215 Walker JL, Piedmonte MR, Spirtos NM, *et al*. Recurrence and survival after random assignment to laparoscopy versus laparotomy for comprehensive surgical staging of uterine cancer: Gynecologic Oncology Group LAP2 study. *J Clin Oncol* 2012;30:695–700.
216 Togami S, Kawamura T, Fukuda M, *et al*. Learning curve and surgical outcomes for laparoscopic surgery, including pelvic lymphadenectomy, for early stage endometrial cancer. *Jpn J Clin Oncol* 2019;49:521–4.
217 Deura I, Shimada M, Azuma Y, *et al*. Comparison of laparoscopic surgery and conventional laparotomy for surgical staging of patients with presumed low-risk endometrial cancer: the current state of Japan. *Taiwan J Obstet Gynecol* 2019;58:99–104.
218 Ghazali WAHW, Jamil SA, Sharin IA. Laparoscopic versus laparotomy: staging surgery for endometrial cancer - Malaysia's early experience. *Gynecol Minim Invasive Ther* 2019;8:25–9.
219 Vardar MA, Gulec UK, Guzel AB, *et al*. Laparoscopic surgery for low, intermediate and high-risk endometrial cancer. *J Gynecol Oncol* 2019;30:e24.
220 Pookunju AP, Ayyappan S. Technique of laparoscopic hysterectomy and pelvic lymphadenectomy for endometrial cancer. *Indian J Surg Oncol* 2018;9:290–3.
221 Wollinga T, Ezendam NPM, Eggink FA, *et al*. Implementation of laparoscopic hysterectomy for endometrial cancer over the past decade. *Gynecol Surg* 2018;15:7.
222 Van den Bosch A, Mertens H. Implementation of laparoscopic surgery for endometrial cancer: work in progress. *Facts Views Vis Obgyn* 2016;8:23–30.
223 Chu L-H, Chang W-C, Sheu B-C. Comparison of the laparoscopic versus conventional open method for surgical staging of endometrial carcinoma. *Taiwan J Obstet Gynecol* 2016;55:188–92.
224 Favero G, Anton C, Le X, *et al*. Oncologic safety of laparoscopy in the surgical treatment of type II endometrial cancer. *Int J Gynecol Cancer* 2016;26:1673–8.
225 Bennich G, Rudnicki M, Lassen PD. Laparoscopic surgery for early endometrial cancer. *Acta Obstet Gynecol Scand* 2016;95:894–900.
226 Lee C-L, Kusunoki S, Huang K-G, *et al*. Long-term survival outcomes of laparoscopic staging surgery in treating endometrial cancer: 20 years of follow-up. *Taiwan J Obstet Gynecol* 2016;55:545–51.
227 Berretta R, Gizzo S, Noventa M, *et al*. Quality of life in patients affected by endometrial cancer: comparison among laparotomy, laparoscopy and vaginal approach. *Pathol Oncol Res* 2015;21:811–6.
228 Yin X, Shi M, Xu J, *et al*. Perioperative and long-term outcomes of laparoscopy and laparotomy for endometrial carcinoma. *Int J Clin Exp Med* 2015;8:19093–9.
229 Kroft J, Li Q, Saskin R, *et al*. Trends over time in the use of laparoscopic hysterectomy for the treatment of endometrial cancer. *Gynecol Oncol* 2015;138:536–41.
230 Pawłowicz PS, Ajdacka U. The role of laparoscopy in the surgical treatment of endometrial cancer. *Wideochir Inne Tech Maloinwazyjne* 2015;10:44–8.
231 Gao H, Zhang Z. Laparoscopy versus laparotomy in the treatment of high-risk endometrial cancer: a propensity score matching analysis. *Medicine* 2015;94:e1245.
232 Şenol T, Polat M, Şanverdi İlhan, *et al*. Laparoscopic staging of endometrial cancer: does it have any impact on survival? *Turk J Obstet Gynecol* 2015;12:139–43.
233 Palomba S, Ghezzi F, Falbo A, *et al*. Conversion in endometrial cancer patients scheduled for laparoscopic staging: a large multicenter analysis: conversions and endometrial cancer. *Surg Endosc* 2014;28:3200–9.
234 Lee C-L, Huang K-G, Wu P-J, *et al*. Long-term survival outcome of laparoscopic staging surgery for endometrial cancer in Taiwanese experience. *Taiwan J Obstet Gynecol* 2014;53:57–61.
235 Terai Y, Tanaka T, Sasaki H, *et al*. Total laparoscopic modified radical hysterectomy with lymphadenectomy for endometrial cancer compared with laparotomy. *J Obstet Gynaecol Res* 2014;40:570–5.
236 Koskas M, Jozwiak M, Fournier M, *et al*. Long-term oncological safety of minimally invasive surgery in high-risk endometrial cancer. *Eur J Cancer* 2016;65:185–91.
237 Uccella S, Bonzini M, Palomba S, *et al*. Laparoscopic vs. open treatment of endometrial cancer in the elderly and very elderly: an age-stratified multicenter study on 1606 women. *Gynecol Oncol* 2016;141:211–7.
238 Bogani G, Cromi A, Uccella S, *et al*. Perioperative and long-term outcomes of laparoscopic, open abdominal, and vaginal surgery for endometrial cancer in patients aged 80 years or older. *Int J Gynecol Cancer* 2014;24:894–900.
239 Baek M-H, Lee S-W, Park J-Y, *et al*. Feasibility and safety of laparoscopic surgery for obese Korean women with endometrial cancer: long-term results at a single institution. *J Korean Med Sci* 2014;29:1536–43.
240 Bogani G, Cromi A, Uccella S, *et al*. Laparoscopic staging in women older than 75 years with early-stage endometrial cancer: comparison with open surgical operation. *Menopause* 2014;21:945–51.
241 Freeman AH, Barrie A, Lyon L, *et al*. Venous thromboembolism following minimally invasive surgery among women with endometrial cancer. *Gynecol Oncol* 2016;142:267–72.
242 Raventós-Tato RM, de la Torre-Fernández de Vega J, Sánchez-Iglesias JL, *et al*. Surgical approaches in women with endometrial cancer with a body mass index greater than 35 kg/m^2. *J Obstet Gynaecol Res* 2019;45:195–202.
243 Bishop EA, Java JJ, Moore KN, *et al*. Surgical outcomes among elderly women with endometrial cancer treated by laparoscopic hysterectomy: a NRG/Gynecologic Oncology Group study. *Am J Obstet Gynecol* 2018;218:109.e1–109.e11.
244 Casarin J, Multinu F, Ubl DS, *et al*. Adoption of minimally invasive surgery and decrease in surgical morbidity for endometrial cancer treatment in the United States. *Obstet Gynecol* 2018;131:304–11.
245 Ee WW, Nellore V, McMullen W, *et al*. Laparoscopic hysterectomy for endometrial cancer: impact of age on clinical outcomes. *J Obstet Gynaecol* 2018;38:734.
246 Singh S, Swarer K, Resnick K. Longer operative time is associated with increased post-operative complications in patients undergoing minimally-invasive surgery for endometrial cancer. *Gynecol Oncol* 2017;147:554–7.
247 Bregar AJ, Melamed A, Diver E, *et al*. Minimally invasive staging surgery in women with early-stage endometrial cancer: analysis of the National Cancer Data Base. *Ann Surg Oncol* 2017;24:1677–87.

248 Monterossi G, Ghezzi F, Vizza E, *et al*. Minimally invasive approach in type II endometrial cancer: is it wise and safe? *J Minim Invasive Gynecol* 2017;24:438–45.
249 Barber EL, Gehrig PA, Clarke-Pearson DL. Venous thromboembolism in minimally invasive compared with open hysterectomy for endometrial cancer. *Obstet Gynecol* 2016;128:121–6.
250 Pulman KJ, Dason ES, Philp L, *et al*. Comparison of three surgical approaches for staging lymphadenectomy in high-risk endometrial cancer. *Int J Gynaecol Obstet* 2017;136:315–9.
251 Marcos-Sanmartín J, López Fernández JA, Sánchez-Payá J, *et al*. Does the type of surgical approach and the use of uterine manipulators influence the disease-free survival and recurrence rates in early-stage endometrial cancer? *Int J Gynecol Cancer* 2016;26:1722–6.
252 Tanaka T, Terai Y, Hayashi S, *et al*. Comparison between laparoscopy and laparotomy in systematic para-aortic lymphadenectomy for patients with endometrial cancer: a retrospective multicenter study. *J Gynecol Surg* 2017;33:105–10.
253 Galaal K, Donkers H, Bryant A, *et al*. Laparoscopy versus laparotomy for the management of early stage endometrial cancer. *Cochrane Database Syst Rev* 2018;10:CD006655.
254 Asher R, Obermair A, Janda M, *et al*. Disease-free and survival outcomes for total laparoscopic hysterectomy compared with total abdominal hysterectomy in early-stage endometrial carcinoma: a meta-analysis. *Int J Gynecol Cancer* 2018;28:529–38.
255 Mahajan V. Prospective nonrandomized comparative study of laparoscopic versus open surgical staging for endometrial cancer in India. *Indian J Surg Oncol* 2018;9:133–40.
256 Jørgensen SL, Mogensen O, Wu C, *et al*. Nationwide introduction of minimally invasive robotic surgery for early-stage endometrial cancer and its association with severe complications. *JAMA Surg* 2019;154:530–8.
257 Kyrgiou M, Swart A-M, Qian W, *et al*. A comparison of outcomes following laparoscopic and open hysterectomy with or without lymphadenectomy for presumed early-stage endometrial cancer: results from the Medical Research Council ASTEC trial. *Int J Gynecol Cancer* 2015;25:1424–36.
258 Park DA, Lee DH, Kim SW, *et al*. Comparative safety and effectiveness of robot-assisted laparoscopic hysterectomy versus conventional laparoscopy and laparotomy for endometrial cancer: a systematic review and meta-analysis. *Eur J Surg Oncol* 2016;42:1303–14.
259 Ran L, Jin J, Xu Y, *et al*. Comparison of robotic surgery with laparoscopy and laparotomy for treatment of endometrial cancer: a meta-analysis. *PLoS One* 2014;9:e108361.
260 Nevis IF, Vali B, Higgins C, *et al*. Robot-assisted hysterectomy for endometrial and cervical cancers: a systematic review. *J Robot Surg* 2017;11:1–16.
261 Lundin ES, Wodlin NB, Nilsson L, *et al*. A prospective randomized assessment of quality of life between open and robotic hysterectomy in early endometrial cancer. *Int J Gynecol Cancer* 2019. doi:10.1136/ijgc-2019-000285. [Epub ahead of print: 28 Mar 2019].
262 Herling SF, Møller AM, Palle C, *et al*. Robotic-assisted laparoscopic hysterectomy for women with endometrial cancer. *Dan Med J* 2017;64:A5343.
263 Uccella S, Bonzini M, Palomba S, *et al*. Impact of obesity on surgical treatment for endometrial cancer: a multicenter study comparing laparoscopy vs open surgery, with propensity-matched analysis. *J Minim Invasive Gynecol* 2016;23:53–61.
264 Corrado G, Mereu L, Bogliolo S, *et al*. Robotic single site staging in endometrial cancer: a multi-institution study. *Eur J Surg Oncol* 2016;42:1506–11.
265 Backes FJ, ElNaggar AC, Farrell MR, *et al*. Perioperative outcomes for laparotomy compared to robotic surgical staging of endometrial cancer in the elderly: a retrospective cohort. *Int J Gynecol Cancer* 2016;26:1717–21.
266 Guy MS, Sheeder J, Behbakht K, *et al*. Comparative outcomes in older and younger women undergoing laparotomy or robotic surgical staging for endometrial cancer. *Am J Obstet Gynecol* 2016;214:350.e1–350.e10.
267 Herling SF, Havemann MC, Palle C, *et al*. Robotic-assisted laparoscopic hysterectomy seems safe in women with early-stage endometrial cancer. *Dan Med J* 2015;62:A5109.
268 Beck TL, Schiff MA, Goff BA, *et al*. Robotic, laparoscopic, or open hysterectomy: surgical outcomes by approach in endometrial cancer. *J Minim Invasive Gynecol* 2018;25:986–93.
269 Doo DW, Guntupalli SR, Corr BR, *et al*. Comparative surgical outcomes for endometrial cancer patients 65 years old or older staged with robotics or laparotomy. *Ann Surg Oncol* 2015;22:3687–94.
270 Park HK, Helenowski IB, Berry E, *et al*. A comparison of survival and recurrence outcomes in patients with endometrial cancer undergoing robotic versus open surgery. *J Minim Invasive Gynecol* 2015;22:961–7.
271 Feuer GA, Lakhi N, Woo A, *et al*. Robotic surgery for staging of serous papillary and clear cell carcinoma of the endometrium. *Int J Med Robot* 2014;10:306–13.
272 Pant A, Schink J, Lurain J. Robotic surgery compared with laparotomy for high-grade endometrial cancer. *J Robot Surg* 2014;8:163–7.
273 Safdieh J, Lee Y-C, Wong A, *et al*. A comparison of outcomes between open hysterectomy and robotic-assisted hysterectomy for endometrial cancer using the National Cancer Database. *Int J Gynecol Cancer* 2017;27:1508–16.
274 Wright JD, Burke WM, Tergas AI, *et al*. Comparative effectiveness of minimally invasive hysterectomy for endometrial cancer. *J Clin Oncol* 2016;34:1087–96.
275 Barraez D, Godoy H, McElrath T, *et al*. Low incidence of port-site metastasis after robotic assisted surgery for endometrial cancer staging: descriptive analysis. *J Robot Surg* 2015;9:91–5.
276 Yoon A, Yoo H-N, Lee Y-Y, *et al*. Robotic single-port hysterectomy, adnexectomy, and lymphadenectomy in endometrial cancer. *J Minim Invasive Gynecol* 2015;22:322.
277 Geppert B, Persson J. Robotic infrarenal paraaortic and pelvic nodal staging for endometrial cancer: feasibility and lymphatic complications. *Acta Obstet Gynecol Scand* 2015;94:1074–81.
278 Damiani GR, Turoli D, Cormio G, *et al*. Robotic approach using simple and radical hysterectomy for endometrial cancer with long-term follow-up evaluation. *Int J Med Robot* 2016;12:109–13.
279 Bige Özgür, Demir A, Saatli B, *et al*. Laparoscopy versus laparotomy for the management of endometrial carcinoma in morbidly obese patients: a prospective study. *J Turk Ger Gynecol Assoc* 2015;16:164–9.
280 Salehi S, Åvall-Lundqvist E, Legerstam B, *et al*. Robot-assisted laparoscopy versus laparotomy for infrarenal paraaortic lymphadenectomy in women with high-risk endometrial cancer: a randomised controlled trial. *Eur J Cancer* 2017;79:81–9.
281 Salehi S, Brandberg Y, Åvall-Lundqvist E, *et al*. Long-term quality of life after comprehensive surgical staging of high-risk endometrial cancer - results from the RASHEC trial. *Acta Oncol* 2018;57:1671–6.
282 Cusimano MC, Simpson AN, Dossa F, *et al*. Laparoscopic and robotic hysterectomy in endometrial cancer patients with obesity: a systematic review and meta-analysis of conversions and complications. *Am J Obstet Gynecol* 2019;221:410–28.
283 Kaban A, Topuz S, Erdem B, *et al*. Is Omentectomy necessary for non-endometrioid endometrial cancer. *Gynecol Obstet Invest* 2018;83:482–6.
284 Joo WD, Schwartz PE, Rutherford TJ, *et al*. Microscopic omental metastasis in clinical stage I endometrial cancer: a meta-analysis. *Ann Surg Oncol* 2015;22:3695–700.
285 Larson DM, Connor GP, Broste SK, *et al*. Prognostic significance of gross myometrial invasion with endometrial cancer. *Obstet Gynecol* 1996;88:394–8.
286 Ren Y-lan, Wang H-ying, Shan B-er, *et al*. [Clinical implications of positive peritoneal cytology in endometrial cancer]. *Zhonghua Fu Chan Ke Za Zhi* 2011;46:595–9.
287 Freij MA, Burbos N, Mukhopadhyay D, *et al*. The role of omental biopsy in endometrial cancer staging. *Gynecol Surg* 2009;6:251–3.
288 Fujiwara H, Saga Y, Takahashi K, *et al*. Omental metastases in clinical stage I endometrioid adenocarcinoma. *Int J Gynecol Cancer* 2008;18:165–7.
289 Metindir J, Dilek GB. The role of omentectomy during the surgical staging in patients with clinical stage I endometrioid adenocarcinoma. *J Cancer Res Clin Oncol* 2008;134:1067–70.
290 Usubütün A, Ozseker HS, Himmetoglu C, *et al*. Omentectomy for gynecologic cancer: how much sampling is adequate for microscopic examination? *Arch Pathol Lab Med* 2007;131:1578–81.
291 Dilek S, Dilek U, Dede M, *et al*. The role of omentectomy and appendectomy during the surgical staging of clinical stage I endometrial cancer. *Int J Gynecol Cancer* 2006;16:795–8.
292 Gehrig PA, Van Le L, Fowler WC. The role of omentectomy during the surgical staging of uterine serous carcinoma. *Int J Gynecol Cancer* 2003;13:212–5.
293 Nieto JJ, Gornall R, Toms E, *et al*. Influence of omental biopsy on adjuvant treatment field in clinical stage I endometrial carcinoma. *BJOG* 2002;109:576–8.

294 Saygili U, Kavaz S, Altunyurt S, *et al*. Omentectomy, peritoneal biopsy and appendectomy in patients with clinical stage I endometrial carcinoma. *Int J Gynecol Cancer* 2001;11:471–4.
295 Zhang W, Bai P, Wu L. [The clinical value of surgical-pathological staging for endometrial carcinoma]. *Zhonghua Fu Chan Ke Za Zhi* 2001;36:479–82.
296 Marino BD, Burke TW, Tornos C, *et al*. Staging laparotomy for endometrial carcinoma: assessment of peritoneal spread. *Gynecol Oncol* 1995;56:34–8.
297 Chen SS, Spiegel G. Stage I endometrial carcinoma. Role of omental biopsy and omentectomy. *J Reprod Med* 1991;36:627–9.
298 Ozdal B, Unlu BS, Yalcin HR, *et al*. Role of omentectomy and appendectomy in surgical staging of endometrioid endometrial cancer. *Eur J Gynaecol Oncol* 2013;34:322–4.
299 Bogani G, Murgia F, Ditto A, *et al*. Sentinel node mapping vs. lymphadenectomy in endometrial cancer: a systematic review and meta-analysis. *Gynecol Oncol* 2019;153:676–83.
300 Leitao MM. Sentinel lymph node mapping in patients with endometrial carcinoma: less can be more. *Curr Obstet Gynecol Rep* 2016;5:279–85.
301 Rossi EC, Kowalski LD, Scalici J, *et al*. A comparison of sentinel lymph node biopsy to lymphadenectomy for endometrial cancer staging (FIRES trial): a multicentre, prospective, cohort study. *Lancet Oncol* 2017;18:384–92.
302 Persson J, Salehi S, Bollino M, *et al*. Pelvic sSentinel lymph node detection in high-risk endometrial cancer (SHREC-trial)-the final step towards a paradigm shift in surgical staging. *Eur J Cancer* 2019;116:77–85.
303 Daraï E, Dubernard G, Bats A-S, *et al*. Sentinel node biopsy for the management of early stage endometrial cancer: long-term results of the SENTI-ENDO study. *Gynecol Oncol* 2015;136:54–9.
304 Renz M, Marjon N, Devereaux K, *et al*. Immediate intraoperative sentinel lymph node analysis by frozen section is predictive of lymph node metastasis in endometrial cancer. *J Robot Surg* 2020;14:35–40.
305 How JA, O'Farrell P, Amajoud Z, *et al*. Sentinel lymph node mapping in endometrial cancer: a systematic review and meta-analysis. *Minerva Ginecol* 2018;70:194–214.
306 Lin H, Ding Z, Kota VG, *et al*. Sentinel lymph node mapping in endometrial cancer: a systematic review and meta-analysis. *Oncotarget* 2017;8:46601–10.
307 Staley A, Sullivan SA, Rossi EC. Sentinel lymph node technique in endometrial cancer. *Obstet Gynecol Surv* 2017;72:289–95.
308 Tschernichovsky R, Diver EJ, Schorge JO, *et al*. The role of lymphadenectomy versus sentinel lymph node biopsy in early-stage endometrial cancer: a review of the literature. *Am J Clin Oncol* 2016;39:516–21.
309 Bodurtha Smith AJ, Fader AN, Tanner EJ. Sentinel lymph node assessment in endometrial cancer: a systematic review and meta-analysis. *Am J Obstet Gynecol* 2017;216:459–76.
310 Wang L, Liu F. Meta-analysis of laparoscopy sentinel lymph node mapping in endometrial cancer. *Arch Gynecol Obstet* 2018;298:505–10.
311 Baiocchi G, Mantoan H, Kumagai LY, *et al*. The impact of sentinel node-mapping in staging high-risk endometrial cancer. *Ann Surg Oncol* 2017;24:3981–7.
312 Tanner E, Puechl A, Levinson K, *et al*. Use of a novel sentinel lymph node mapping algorithm reduces the need for pelvic lymphadenectomy in low-grade endometrial cancer. *Gynecol Oncol* 2017;147:535–40.
313 Martinelli F, Ditto A, Signorelli M, *et al*. Sentinel node mapping in endometrial cancer following hysteroscopic injection of tracers: a single center evaluation over 200 cases. *Gynecol Oncol* 2017;146:525–30.
314 Buda A, Di Martino G, Restaino S, *et al*. The impact on survival of two different staging strategies in apparent early stage endometrial cancer comparing sentinel lymph nodes mapping algorithm and selective lymphadenectomy: an Italian retrospective analysis of two reference centers. *Gynecol Oncol* 2017;147:528–34.
315 Yamagami W, Susumu N, Kataoka F, *et al*. A comparison of dye versus fluorescence methods for sentinel lymph node mapping in endometrial cancer. *Int J Gynecol Cancer* 2017;27:1517–24.
316 Touhami O, Grégoire J, Renaud M-C, *et al*. Performance of sentinel lymph node (SLN) mapping in high-risk endometrial cancer. *Gynecol Oncol* 2017;147:549–53.
317 Papadia A, Buda A, Gasparri ML, *et al*. The impact of different doses of indocyanine green on the sentinel lymph-node mapping in early stage endometrial cancer. *J Cancer Res Clin Oncol* 2018;144:2187–91.
318 Eoh KJ, Lee YJ, Kim H-S, *et al*. Two-step sentinel lymph node mapping strategy in endometrial cancer staging using fluorescent imaging: a novel sentinel lymph node tracer injection procedure. *Surg Oncol* 2018;27:514–9.
319 Ducie JA, Eriksson AGZ, Ali N, *et al*. Comparison of a sentinel lymph node mapping algorithm and comprehensive lymphadenectomy in the detection of stage IIIC endometrial carcinoma at higher risk for nodal disease. *Gynecol Oncol* 2017;147:541–8.
320 Tanner EJ, Ojalvo L, Stone RL, *et al*. The utility of sentinel lymph node mapping in high-grade endometrial cancer. *Int J Gynecol Cancer* 2017;27:1416–21.
321 How J, Gauthier C, Abitbol J, *et al*. Impact of sentinel lymph node mapping on recurrence patterns in endometrial cancer. *Gynecol Oncol* 2017;144:503–9.
322 Papadia A, Zapardiel I, Bussi B, *et al*. Sentinel lymph node mapping in patients with stage I endometrial carcinoma: a focus on bilateral mapping identification by comparing radiotracer $Tc99^{m}$ with blue dye versus indocyanine green fluorescent dye. *J Cancer Res Clin Oncol* 2017;143:475–80.
323 Tanaka T, Terai Y, Fujiwara S, *et al*. The detection of sentinel lymph nodes in laparoscopic surgery can eliminate systemic lymphadenectomy for patients with early stage endometrial cancer. *Int J Clin Oncol* 2018;23:305–13.
324 Buda A, Gasparri ML, Puppo A, *et al*. Lymph node evaluation in high-risk early stage endometrial cancer: a multi-institutional retrospective analysis comparing the sentinel lymph node (SLN) algorithm and SLN with selective lymphadenectomy. *Gynecol Oncol* 2018;150:261–6.
325 Buda A, Bussi B, Di Martino G, *et al*. Sentinel lymph node mapping with near-infrared fluorescent imaging using indocyanine green: a new tool for laparoscopic platform in patients with endometrial and cervical cancer. *J Minim Invasive Gynecol* 2016;23:265–9.
326 Buda A, Di Martino G, Vecchione F, *et al*. Optimizing strategies for sentinel lymph node mapping in early-stage cervical and endometrial cancer: comparison of real-time fluorescence with indocyanine green and methylene blue. *Int J Gynecol Cancer* 2015;25:1513–8.
327 Signorelli M, Crivellaro C, Buda A, *et al*. Staging of high-risk endometrial cancer with PET/CT and sentinel lymph node mapping. *Clin Nucl Med* 2015;40:780–5.
328 Rajanbabu A, Venkatesan R, Chandramouli S, *et al*. Sentinel node detection in endometrial cancer using indocyanine green and fluorescence imaging-a case report. *Ecancermedicalscience* 2015;9:549.
329 Surynt E, Reinholz-Jaskolska M, Bidzinski M. Laparoscopic sentinel lymph node mapping after cervical injection of indocyanine green for endometrial cancer - preliminary report. *Wideochir Inne Tech Maloinwazyjne* 2015;10:406–12.
330 Chen C-H, Chen H-H, Liu W-M. Detection of sentinel lymph node mapping using indocyanine green in the management of endometrial cancer: a pilot study. *J Minim Invasive Gynecol* 2015;22:S239.
331 Plante M, Touhami O, Trinh X-B, *et al*. Sentinel node mapping with indocyanine green and endoscopic near-infrared fluorescence imaging in endometrial cancer. A pilot study and review of the literature. *Gynecol Oncol* 2015;137:443–7.
332 Sinno AK, Fader AN, Roche KL, *et al*. A comparison of colorimetric versus fluorometric sentinel lymph node mapping during robotic surgery for endometrial cancer. *Gynecol Oncol* 2014;134:281–6.
333 Blakely M, Liu Y, Rahaman J, *et al*. Sentinel lymph node ultra-staging as a supplement for endometrial cancer intraoperative frozen section deficiencies. *Int J Gynecol Pathol* 2019;38:52–8.
334 Multinu F, Casarin J, Cappuccio S, *et al*. Ultrastaging of negative pelvic lymph nodes to decrease the true prevalence of isolated paraaortic dissemination in endometrial cancer. *Gynecol Oncol* 2019;154:60–4.
335 Gorostidi M, Villalain C, Ruiz R, *et al*. Maximizing sentinel lymph node detection: aortic sentinel lymph node detection in endometrial cancer. *J Minim Invasive Gynecol* 2019;26:23–4.
336 Taşkin S, Altin D, Şükür YE, *et al*. Extrapelvic sentinel lymph nodes in endometrial cancer patients with unmapped pelvic side: a brief report. *Int J Gynecol Cancer* 2018;28:700–3.
337 Fernandez-Prada S, Delgado-Sanchez E, De Santiago J, *et al*. Laparoscopic sentinel node biopsy using real-time 3-dimensional single-photon emission computed tomographic guidance in endometrial cancer. *J Minim Invasive Gynecol* 2015;22:1075–8.
338 Ruiz R, Gorostidi M, Jaunarena I, *et al*. Sentinel node biopsy in endometrial cancer with dual cervical and fundal indocyanine green injection. *Int J Gynecol Cancer* 2018;28:139–44.
339 Euscher E, Sui D, Soliman P, *et al*. Ultrastaging of sentinel lymph nodes in endometrial carcinoma according to use of 2 different methods. *Int J Gynecol Pathol* 2018;37:242–51.

340 Schlappe BA, Weaver AL, Ducie JA, *et al*. Multicenter study comparing oncologic outcomes between two nodal assessment methods in patients with deeply invasive endometrioid endometrial carcinoma: a sentinel lymph node algorithm versus a comprehensive pelvic and paraaortic lymphadenectomy. *Gynecol Oncol* 2018;151:235–42.
341 Buda A, Restaino S, Di Martino G, *et al*. The impact of the type of nodal assessment on prognosis in patients with high-intermediate and high-risk ESMO/ESGO/ESTRO group endometrial cancer. A multicenter Italian study. *Eur J Surg Oncol* 2018;44:1562–7.
342 Mendivil AA, Abaid LN, Brown JV, *et al*. The safety and feasibility of minimally invasive sentinel lymph node staging using indocyanine green in the management of endometrial cancer. *Eur J Obstet Gynecol Reprod Biol* 2018;224:29–32.
343 Restaino S, Ronsini C, Finelli A, *et al*. Role of blue dye for sentinel lymph node detection in early endometrial cancer. *Gynecol Surg* 2017;14:23.
344 Sinno AK, Peijnenburg E, Fader AN, *et al*. Reducing overtreatment: a comparison of lymph node assessment strategies for endometrial cancer. *Gynecol Oncol* 2016;143:281–6.
345 Naoura I, Canlorbe G, Bendifallah S, *et al*. Relevance of sentinel lymph node procedure for patients with high-risk endometrial cancer. *Gynecol Oncol* 2015;136:60–4.
346 Papadia A, Gasparri ML, Radan AP, *et al*. Retrospective validation of the laparoscopic ICG SLN mapping in patients with grade 3 endometrial cancer. *J Cancer Res Clin Oncol* 2018;144:1385–93.
347 Papadia A, Gasparri ML, Siegenthaler F, *et al*. FIGO stage IIIC endometrial cancer identification among patients with complex atypical hyperplasia, grade 1 and 2 endometrioid endometrial cancer: laparoscopic indocyanine green sentinel lymph node mapping versus frozen section of the uterus, why get around the problem? *J Cancer Res Clin Oncol* 2017;143:491–7.
348 Ghezzi F, Casarin J, Uccella S. Mini-laparoscopic sentinel node detection in endometrial cancer: further reducing invasiveness for patients with early-stage disease. *Ann Surg Oncol* 2015;22 Suppl 3:S342.
349 Montero Macias R, Balaya V, Bonsang-Kitzis H, *et al*. Precaval positive sentinel lymph node with bilateral negative pelvic sentinel lymph node in low-risk endometrial cancer patient. *J Gynecol Obstet Hum Reprod* 2019;48.
350 Brugger S, Hamann M, Mosner M, *et al*. Endometrial cancer-how many patients could benefit from sentinel lymph node dissection? *World J Surg Oncol* 2018;16:95.
351 Kataoka F, Susumu N, Yamagami W, *et al*. The importance of para-aortic lymph nodes in sentinel lymph node mapping for endometrial cancer by using hysteroscopic radio-isotope tracer injection combined with subserosal dye injection: prospective study. *Gynecol Oncol* 2016;140:400–4.
352 Backes FJ, Cohen D, Salani R, *et al*. Prospective clinical trial of robotic sentinel lymph node assessment with isosulfane blue (ISB) and indocyanine green (ICG) in endometrial cancer and the impact of ultrastaging (NCT01818739). *Gynecol Oncol* 2019;153:496–9.
353 Togami S, Kawamura T, Fukuda M, *et al*. Prospective study of sentinel lymph node mapping for endometrial cancer. *Int J Gynaecol Obstet* 2018;143:313–8.
354 Rajanbabu A, Agarwal R. A prospective evaluation of the sentinel node mapping algorithm in endometrial cancer and correlation of its performance against endometrial cancer risk subtypes. *Eur J Obstet Gynecol Reprod Biol* 2018;224:77–80.
355 Farzaneh F, Moridi A, Azizmohammadi Z, *et al*. Value of sentinel lymph node (SLN) mapping and biopsy using combined intracervical radiotracers and blue dye injections for endometrial cancer. *Asian Pac J Cancer Prev* 2017;18:431–5.
356 Holloway RW, Ahmad S, Kendrick JE, *et al*. A prospective cohort study comparing colorimetric and fluorescent imaging for sentinel lymph node mapping in endometrial cancer. *Ann Surg Oncol* 2017;24:1972–9.
357 Soliman PT, Westin SN, Dioun S, *et al*. A prospective validation study of sentinel lymph node mapping for high-risk endometrial cancer. *Gynecol Oncol* 2017;146:234–9.
358 Frati A, Ballester M, Dubernard G, *et al*. Contribution of lymphoscintigraphy for sentinel lymph node biopsy in women with early stage endometrial cancer: results of the SENTI-ENDO study. *Ann Surg Oncol* 2015;22:1980–6.
359 Hagen B, Valla M, Aune G, *et al*. Indocyanine green fluorescence imaging of lymph nodes during robotic-assisted laparoscopic operation for endometrial cancer. A prospective validation study using a sentinel lymph node surgical algorithm. *Gynecol Oncol* 2016;143:479–83.
360 Geppert B, Lönnerfors C, Bollino M, *et al*. Sentinel lymph node biopsy in endometrial cancer-feasibility, safety and lymphatic complications. *Gynecol Oncol* 2018;148:491–8.
361 Zuo J, Wu LY, Cheng M, *et al*. Comparison study of laparoscopic sentinel lymph node mapping in endometrial carcinoma using carbon nanoparticles and lymphatic pathway verification. *J Minim Invasive Gynecol* 2019;26:1125–32.
362 Cusimano MC, Vicus D, Pulman K, *et al*. Assessment of sentinel lymph node biopsy vs lymphadenectomy for intermediate- and high-grade endometrial cancer staging. *JAMA Surg* 2021;156:157–64.
363 Rozenholc A, Samouelian V, Warkus T, *et al*. Green versus blue: randomized controlled trial comparing indocyanine green with methylene blue for sentinel lymph node detection in endometrial cancer. *Gynecol Oncol* 2019;153:500–4.
364 Frumovitz M, Plante M, Lee PS, *et al*. Near-Infrared fluorescence for detection of sentinel lymph nodes in women with cervical and uterine cancers (FILM): a randomised, phase 3, multicentre, non-inferiority trial. *Lancet Oncol* 2018;19:1394–403.
365 Kang S, Yoo HJ, Hwang JH, *et al*. Sentinel lymph node biopsy in endometrial cancer: meta-analysis of 26 studies. *Gynecol Oncol* 2011;123:522–7.
366 Barlin JN, Puri I, Bristow RE. Cytoreductive surgery for advanced or recurrent endometrial cancer: a meta-analysis. *Gynecol Oncol* 2010;118:14–18.
367 Rajkumar S, Nath R, Lane G, *et al*. Advanced stage (IIIC/IV) endometrial cancer: role of cytoreduction and determinants of survival. *Eur J Obstet Gynecol Reprod Biol* 2019;234:26–31.
368 Lee LJ, Demaria R, Berkowitz R, *et al*. Clinical predictors of long-term survival for stage IVb uterine papillary serous carcinoma confined to the abdomen. *Gynecol Oncol* 2014;132:65–9.
369 Solmaz U, Mat E, Dereli ML, *et al*. Stage-III and -IV endometrial cancer: a single oncology centre review of 104 cases. *J Obstet Gynaecol* 2016;36:81–6.
370 Shih KK, Yun E, Gardner GJ, *et al*. Surgical cytoreduction in stage IV endometrioid endometrial carcinoma. *Gynecol Oncol* 2011;122:608–11.
371 Cancer Genome Atlas Research Network, Kandoth C, Schultz N, *et al*. Integrated genomic characterization of endometrial carcinoma. *Nature* 2013;497:67–73.
372 Piulats JM, Guerra E, Gil-Martín M, *et al*. Molecular approaches for classifying endometrial carcinoma. *Gynecol Oncol* 2017;145:200–7.
373 Talhouk A, McConechy MK, Leung S, *et al*. A clinically applicable molecular-based classification for endometrial cancers. *Br J Cancer* 2015;113:299–310.
374 Talhouk A, McConechy MK, Leung S, *et al*. Confirmation of promise: a simple, genomics-based clinical classifier for endometrial cancer. *Cancer* 2017;123:802–13.
375 Stelloo E, Nout RA, Osse EM, *et al*. Improved risk assessment by integrating molecular and clinicopathological factors in early-stage endometrial cancer-combined analysis of the PORTEC cohorts. *Clin Cancer Res* 2016;22:4215–24.
376 León-Castillo A, de Boer SM, Powell ME, *et al*. Molecular classification of the PORTEC-3 trial for high-risk endometrial cancer: impact on prognosis and benefit from adjuvant therapy. *J Clin Oncol* 2020;38:3388–97.
377 León-Castillo A, Gilvazquez E, Nout R, *et al*. Clinicopathological and molecular characterisation of 'multiple-classifier' endometrial carcinomas. *J Pathol* 2020;250:312–22.
378 Kommoss FK, Karnezis AN, Kommoss F, *et al*. L1CAM further stratifies endometrial carcinoma patients with no specific molecular risk profile. *Br J Cancer* 2018;119:480–6.
379 van der Putten LJ, Visser NC, van de Vijver K, *et al*. L1CAM expression in endometrial carcinomas: an ENITEC collaboration study. *Br J Cancer* 2016;115:716–24.
380 Van Gool IC, Stelloo E, Nout RA, *et al*. Prognostic significance of L1CAM expression and its association with mutant p53 expression in high-risk endometrial cancer. *Mod Pathol* 2016;29:174–81.
381 Bosse T, Nout RA, Stelloo E, *et al*. L1 cell adhesion molecule is a strong predictor for distant recurrence and overall survival in early stage endometrial cancer: pooled PORTEC trial results. *Eur J Cancer* 2014;50:2602–10.
382 Harvey A, Zhang H, Nixon J, *et al*. Comparison of data extraction from standardized versus traditional narrative operative reports for database-related research and quality control. *Surgery* 2007;141:708–14.
383 Parikh JA, Yermilov I, Jain S, *et al*. How much do standardized forms improve the documentation of quality of care? *J Surg Res* 2007;143:158–63.

384 Gillman LM, Vergis A, Park J, *et al*. Structured operative reporting: a randomized trial using dictation templates to improve operative reporting. *Am J Surg* 2010;199:846–50.
385 Pope RJ, Abdelbadee AY, Armstrong AJ, *et al*. Standardization of laparoscopic operative reporting: improving gynaecological surgeon communication. *J Obstet Gynaecol Can* 2018;40:304–9.
386 Bidwell SS, Merrell SB, Poles G, *et al*. Implementation of a synoptic operative report for rectal cancer: a mixed-methods study. *Dis Colon Rectum* 2020;63:190–9.
387 Schneider L, Shargall Y, Schieman C, *et al*. Design of a consensus-derived synoptic operative report for lung cancer surgery. *Ann Thorac Surg* 2014;97:1163–8.
388 Bonney W, Christie S, Paterson G, *et al*. Design and implementation of synoptic operative report template using interoperable standards. *Stud Health Technol Inform* 2013;183:195–200.
389 Paterson GI, Christie S, Bonney W, *et al*. Synoptic operative reports for spinal cord injury patients as a tool for data quality. *Health Informatics J* 2016;22:984–91.
390 Vergis A, Stogryn SE, Mullan MJ, *et al*. Electronic synoptic reporting: assessing the completeness of synoptic and narrative reports for Roux-en-Y gastric bypass. *Surg Obes Relat Dis* 2017;13:1863–8.
391 Park J, Pillarisetty VG, Brennan MF, *et al*. Electronic synoptic operative reporting: assessing the reliability and completeness of synoptic reports for pancreatic resection. *J Am Coll Surg* 2010;211:308–15.
392 Gardner GJ*et al*. Prototype of a synoptic electronic operative note for gynecologic oncology surgical procedures. *Gynecol Oncol* 2009;112:S64–5.
393 Chambers AJ, Pasieka JL, Temple WJ. Improvement in the accuracy of reporting key prognostic and anatomic findings during thyroidectomy by using a novel web-based synoptic operative reporting system. *Surgery* 2009;146:1090–8.
394 Edhemovic I, Temple WJ, de Gara CJ, *et al*. The computer synoptic operative report--a leap forward in the science of surgery. *Ann Surg Oncol* 2004;11:941–7.
395 Eng JL, Baliski CR, McGahan C, *et al*. Uptake and impact of synoptic reporting in a community care setting. *Am J Surg* 2018;215:857–61.
396 Gur I, Gur D, Recabaren JA. The computerized synoptic operative report: a novel tool in surgical residency education. *Arch Surg* 2012;147:71–4.
397 Hoffer DN, Finelli A, Chow R, *et al*. Structured electronic operative reporting: comparison with dictation in kidney cancer surgery. *Int J Med Inform* 2012;81:182–91.
398 Maniar RL, Hochman DJ, Wirtzfeld DA, *et al*. Documentation of quality of care data for colon cancer surgery: comparison of synoptic and dictated operative reports. *Ann Surg Oncol* 2014;21:3592–7.
399 Maniar RL, Sytnik P, Wirtzfeld DA, *et al*. Synoptic operative reports enhance documentation of best practices for rectal cancer. *J Surg Oncol* 2015;112:555–60.
400 Stogryn SE, Hardy K, Mullan MJ, *et al*. Synoptic operative reporting: assessing the completeness, accuracy, reliability, and efficiency of synoptic reporting for Roux-en-Y gastric bypass. *Surg Endosc* 2018;32:1729–39.
401 Eryigit Özgür, van de Graaf FW, Lange JF. A systematic review on the synoptic operative report versus the narrative operative report in surgery. *World J Surg* 2019;43:2175–85.
402 Stogryn S, Hardy KM, Abou-Setta AM, *et al*. Advancement in the quality of operative documentation: a systematic review and meta-analysis of synoptic versus narrative operative reporting. *Am J Surg* 2019;218:624–30.
403 ESGO Guidelines. Recommendations and assurance quality committee. ovarian cancer operative report, 2016. Available: https://www.esgo.org/wp-content/uploads/2016/10/ESGO-Operative-Report.pdf
404 Clavien PA, Sanabria JR, Strasberg SM. Proposed classification of complications of surgery with examples of utility in cholecystectomy. *Surgery* 1992;111:518–26.
405 Dindo D, Demartines N, Clavien P-A. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004;240:205–13.
406 Pomposelli JJ, Gupta SK, Zacharoulis DC, *et al*. Surgical complication outcome (SCOUT) score: a new method to evaluate quality of care in vascular surgery. *J Vasc Surg* 1997;25:1007–15. discussion 1014-1005.
407 Veen MR, Lardenoye JW, Kastelein GW, *et al*. Recording and classification of complications in a surgical practice. *Eur J Surg* 1999;165:421–4. discussion 425.
408 Pillai SB, van Rij AM, Williams S, *et al*. Complexity- and risk-adjusted model for measuring surgical outcome. *Br J Surg* 1999;86:1567–72.
409 Rosenthal R, Hoffmann H, Clavien P-A, *et al*. Definition and classification of intraoperative complications (CLASSIC): Delphi study and pilot evaluation. *World J Surg* 2015;39:1663–71.
410 Kaafarani HMA, Velmahos GC. Classification of intraoperative complications. *World J Surg* 2015;39:3032.
411 Clavien PA, Barkun J, de Oliveira ML, *et al*. The Clavien-Dindo classification of surgical complications: five-year experience. *Ann Surg* 2009;250:187–96.
412 Strasberg SM, Linehan DC, Hawkins WG. The accordion severity grading system of surgical complications. *Ann Surg* 2009;250:177–86.
413 Slankamenac K, Graf R, Barkun J, *et al*. The comprehensive complication index: a novel continuous scale to measure surgical morbidity. *Ann Surg* 2013;258:1–7.
414 Pecorelli N, Hershorn O, Baldini G, *et al*. Impact of adherence to care pathway interventions on recovery following bowel resection within an established enhanced recovery program. *Surg Endosc* 2017;31:1760–71.
415 Rössler F, Sapisochin G, Song G, *et al*. Defining benchmarks for major liver surgery: a multicenter analysis of 5202 living liver donors. *Ann Surg* 2016;264:492–500.
416 Danielsen AK, Park J, Jansen JE, *et al*. Early closure of a temporary ileostomy in patients with rectal cancer: a multicenter randomized controlled trial. *Ann Surg* 2017;265:284–90.
417 Nederlof N, Slaman AE, van Hagen P, *et al*. Using the comprehensive complication index to assess the impact of neoadjuvant chemoradiotherapy on complication severity after esophagectomy for cancer. *Ann Surg Oncol* 2016;23:3964–71.
418 Marsman EM, de Rooij T, van Eijck CH, *et al*. Pancreatoduodenectomy with colon resection for cancer: a nationwide retrospective analysis. *Surgery* 2016;160:145–52.
419 Orri M, Boleslawski E, Regimbeau JM, *et al*. Influence of depression on recovery after major noncardiac surgery: a prospective cohort study. *Ann Surg* 2015;262:882–9. discussion 889-890.
420 Vibert E, Boleslawski E, Cosse C, *et al*. Arterial lactate concentration at the end of an elective hepatectomy is an early predictor of the postoperative course and a potential surrogate of intraoperative events. *Ann Surg* 2015;262:787–93. discussion 792-783.
421 Soubrane O, de Rougemont O, Kim K-H, *et al*. Laparoscopic living donor left lateral sectionectomy: a new standard practice for donor hepatectomy. *Ann Surg* 2015;262:757–61. discussion 761-753.
422 Linecker M, Limani P, Botea F, *et al*. "A randomized, double-blind study of the effects of omega-3 fatty acids (Omegaven) on outcome after major liver resection". *BMC Gastroenterol* 2015;15:102.