OVARIAN CANCER PERI-OPERATIVE MANAGEMENT

POCKET GUIDELINES

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Based on

ESGO guidelines for the peri-operative management of advanced ovarian cancer patients undergoing debulking surgery

The European Society of Gynaecological Oncology (ESGO) has developed and established for the first time in 2016 and updated in 2020 quality indicators for advanced ovarian cancer surgery to audit and improve clinical practice in Europe and beyond. As a sequelae of the continuous effort to improve oncologic care in patients with ovarian cancer, ESGO has issued in 2018 a consensus guidance jointly with the European Society of Medical Oncology addressing in a multidisciplinary fashion twenty selected key questions in the management of ovarian cancer ranging from molecular pathology till palliation in primary and relapse disease.

In order to complement the above achievements and consolidate the promoted systemic advances and surgical expertise with the adequate peri-operative management, the ESGO developed as next step, clinically relevant and evidence-based guidelines focusing on key aspects of peri-operative care and complications management as part of ESGO’s mission to improve the quality of care for women with advanced ovarian cancer and reduce iatrogenic morbidity.

A five-step development process was followed:

1. Nomination of multidisciplinary international development group
2. Identification of scientific evidence
3. Formulation of guidelines
4. External evaluation of guidelines (international review)
5. Integration of international reviewers’ comments

The objectives of these ESGO guidelines are to improve the quality of care for women with ovarian cancer across Europe and worldwide. They are intended for use by all health professionals that are involved in the surgical care of ovarian cancer patients, across all allied disciplines.

These guidelines do not include any economic analysis of the strategies. Any clinician seeking to apply or consult these guidelines is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient’s care or treatment.

To ensure that the statements were evidence based, the current literature was reviewed and critically appraised. A systematic literature review of relevant studies published between January 2015 and June 2020 was carried out. The guidelines were adopted if they were supported by sufficient high level of scientific evidence and/or when a large consensus among experts was obtained. An adapted version of the ‘Infectious Diseases Society of America-United States Public Health Service Grading System’ was used to define the level of evidence and grade of recommendation for each of the recommendations:

**LEVELES OF EVIDENCE**

I  Evidence from at least one large randomised, controlled trial of good methodological quality (low potential for bias) or meta-analyses of well conducted, randomised trials without heterogeneity

II  Small randomised trials or large randomised trials with a suspicion of bias (lower methodological quality) or meta-analyses of such trials or of trials with demonstrated heterogeneity

III  Prospective cohort studies

IV  Retrospective cohort studies or case-control studies

V  Studies without a control group, case reports, and/or expert opinions

**GRADES OF RECOMMENDATIONS**

A  Strong evidence for efficacy with a substantial clinical benefit, strongly recommended

B  Strong or moderate evidence for efficacy but with a limited clinical benefit, generally recommended

C  Insufficient evidence for efficacy or benefit does not outweigh the risk or the disadvantages (adverse events, costs…), optional

D  Moderate evidence against efficacy or for adverse outcome, generally not recommended

E  Strong evidence against efficacy or for adverse outcome, never recommended
ESGO would like to thank the international development group for their constant availability, work, and for making possible the development of these guidelines for the peri-operative management of patients with ovarian cancer (see below). ESGO is also very grateful to the 117 international external reviewers for their participation (list available on the ESGO website).

<table>
<thead>
<tr>
<th>NAME</th>
<th>SPECIALTY</th>
<th>AFFILIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christina Fotopoulou</td>
<td>Gynecologic oncologist (chair)</td>
<td>Imperial College London Faculty of Medicine, London (United Kingdom)</td>
</tr>
<tr>
<td>François Planchamp</td>
<td>Methodologist</td>
<td>Institut Bergonié, Bordeaux (France)</td>
</tr>
<tr>
<td>Tugce Aytulu</td>
<td>Oncology specialist dietian</td>
<td>American Hospital, Istanbul (Turkey)</td>
</tr>
<tr>
<td>Jeremy Campbell</td>
<td>Anaesthetist</td>
<td>Imperial College London Faculty of Medicine, London (United Kingdom)</td>
</tr>
<tr>
<td>Luis Chiva</td>
<td>Gynecologic oncologist</td>
<td>University Clinic of Navarra, Madrid (Spain)</td>
</tr>
<tr>
<td>Alessandro Cina</td>
<td>Interventional radiologist</td>
<td>Fondazione Policlinico Universitario Agostino Gemelli, Rome (Italy)</td>
</tr>
<tr>
<td>Onder Ergonul</td>
<td>Microbiologist</td>
<td>American Hospital, Istanbul (Turkey)</td>
</tr>
<tr>
<td>Anna Fagotti</td>
<td>Gynecologic oncologist</td>
<td>Fondazione Policlinico Universitario Agostino Gemelli, Rome (Italy)</td>
</tr>
<tr>
<td>Dimitrios Haidopoulos</td>
<td>Gynecologic oncologist</td>
<td>Alexandra Hospital, University of Athens, Athens (Greece)</td>
</tr>
<tr>
<td>Annette Hasenburg</td>
<td>Gynecologic oncologist</td>
<td>Medical Center Johannes Gutenberg University, Mainz (Germany)</td>
</tr>
<tr>
<td>Cathy Hughes</td>
<td>Consultant nurse</td>
<td>Imperial College London Faculty of Medicine, London (United Kingdom)</td>
</tr>
<tr>
<td>Pawel Knapp</td>
<td>Gynecologic oncologist</td>
<td>Medical University of Bialystok, Bialystok (Poland)</td>
</tr>
<tr>
<td>Philippe Morice</td>
<td>Gynecologic oncologist</td>
<td>Institut Gustave Roussy, Villejuif (France)</td>
</tr>
<tr>
<td>Stephanie Schneider</td>
<td>Gynecologic oncologist</td>
<td>Evangelical Hospital Essen-Mitte, Essen (Germany)</td>
</tr>
<tr>
<td>Jalid Sehouli</td>
<td>Gynecologic oncologist</td>
<td>Charite-Universitätsmedizin Berlin, Berlin (Germany)</td>
</tr>
<tr>
<td>Emmanouil Stamatakas</td>
<td>Anaesthetist</td>
<td>Alexandra General Hospital, Athens (Greece)</td>
</tr>
<tr>
<td>Stephanie Suria</td>
<td>Anaesthetist</td>
<td>Institut Gustave Roussy, Villejuif (France)</td>
</tr>
<tr>
<td>Cagatay Taskiran</td>
<td>Gynecologic oncologist</td>
<td>Koc University School of Medicine, Koc (Turkey)</td>
</tr>
<tr>
<td>Ralf Ulrich Trappe</td>
<td>Haematologist</td>
<td>Evangelisches Diakonie Krankenhaus Bremen GmbH, Bremen (Germany)</td>
</tr>
</tbody>
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General recommendations

All patients should be adequately informed preoperatively about the risks and benefits of radical ovarian cancer surgery, about the most common complications and their management and also future steps of their journey.

Early and continuous patient education, information and coaching within a multidisciplinary approach is advised to holistically support and empower patients.

A risk stratification of ovarian cancer patients who are planned to undergo debulking surgery should be preoperatively undertaken to tailor management and proactively act against expected risks.

Timing of surgery in relation to targeted and antihormonal agents

**Bevacizumab**
A treatment-free interval of at least 28 days between bevacizumab administration and surgery is recommended.

Patients who experience impaired wound healing under antiangiogenic therapy should discontinue this until the wound has completely healed.

**Poly(ADP-ribose) polymerase (PARP) inhibitors**
No specific time interval is defined between elective surgery and oral PARP therapy discontinuation. A general evaluation of the known side effects and their resolution before surgery is recommended.

**Antihormonal therapy**
In case of ovarian cancer progression on antihormonal therapy, this should be stopped at decision to operate to reduce risk of thromboembolic morbidity.

Pre-operative bowel preparation

Mechanical bowel preparation alone is not routinely recommended.

If mechanical bowel preparation is performed, this should be done in combination with oral antibiotics to decrease postoperative complications.

Skin antisepsis and hair removal

Pre-operative patients bathing or showering with antiseptic solutions such as chlorhexidine gluconate has no benefit in reducing surgical site infections and is therefore not recommended over shower or bath with common soap.

Pre-operative hair shaving is not recommended.

Surgical site antisepsis should be performed using 4% chlorhexidine gluconate with alcohol.

Surgical safety checklists, patient positioning and retractors use

**Safety checklists**
Safety checklists are mandatory in ovarian cancer surgery.

**Patient positioning - General recommendations**
Safe positioning requires planning and good communication between members of the operating room team and should be checked periodically.

All members of the team should have adequate training in patient positioning.

Intravascular lines, the endotracheal tube, urinary catheter, epidural catheter, and any other devices/equipment should be secured before any movement, and their position and function reassessed after repositioning.

**Arm positioning**
The arms may be positioned either by the side of the patient, or abducted and placed on an arm board. Abduction of more than 90 degrees should be avoided.

**Surgical retraction**
When using self-retaining retractors, the shortest blades possible should be used for adequate retraction without nerve or muscle compression. Rolled laparotomy sponges may be placed between the retractor and abdominal wall to reduce nerve compression especially in thin patients.

**Electrothermal devices**
Electrosurgical instruments should be checked to ensure that they are safe to use.
### Anaesthesia, intra- and post-operative volume and replacement

**Blood transfusion and oncologic outcome**

Iron supplementation for correction of anemia should be considered (IV or oral depending on timing, availability, and patient's profile).

There is no well-defined threshold for blood transfusion in advanced ovarian cancer surgery. Since many patients need chemotherapy, more liberal transfusion thresholds may be used.

Tranexamic acid should be considered peri-operatively to reduce blood loss.

**Peri-operative fluid replacement**

The use of intravenous albumin should not be considered as a substitute for nutritional support.

Hypoalbuminemia should not be used as a single marker for patient selection for surgery but as guidance for pre-operative optimization of patients.

Balanced crystalloids should be used for routine fluid replacement.

**Prevention of hypothermia**

Continuous temperature monitoring is recommended. Methods to actively warm patients should be applied.

### Major intra- and post-operative bleeding

A multidisciplinary major haemorrhage protocol should be in place in any centre performing ovarian cancer surgery. The protocol should be reviewed periodically.

**Surgical options**

A variety of different local hemostatic agents should be considered and used appropriately according to their mechanism of action and the related potential adverse effects.

Abdominal and pelvic packing is an effective option in uncontrollable intra-operative bleeding in ovarian cancer debulking surgery.

A successful abdominal packing should not be removed or replaced before the completion of the first post-operative day. Intervals to remove or replace the pack longer than 3 days increase the risk of infectious complications.

**Medical options**

Normothermia and the prevention of acidosis are critical to control bleeding effectively. A pH of 7.35-7.45 and a core body temperature of >34°C should be maintained.

Replacement of combined blood and plasma products as well as pharmacologic agents to support coagulation pathways such as tranexamic acid are recommended in the management of intra-abdominal blood loss in well-defined algorithms.

**Interventional radiology options**

Interventional radiology techniques such as percutaneous transcatheter embolization should be considered as a treatment option in an active arterial bleeding (or a suspected vascular lesion-like pseudoaneurysm) in a stable post-operative patient to avoid a relaparotomy.

### Prevention and management of upper abdominal complications

In patients with large-volume ascites and extensive peritoneal and/or lymph node resections a placement of an intra-abdominal drainage could be considered.

**Liver resection**

A gynaecological oncology surgeon must be familiar with the anatomy of the liver and the biliary tree and also the various indications and anatomical borders of liver resection techniques (i.e. metastasectomy, segmentectomy and partial hepatectomy).

**Biliary leak**

First-line treatment for biliary leaks includes conservative management and endoscopic/interventional radiology techniques, depending on the clinical picture of the patient and the extent of the leak.

If sepsis and biliary peritonitis predominate, a percutaneous, ultrasound assisted or surgical drainage should be considered as additional treatment.

**Spleen, pancreas**

There is no value of routine use of prophylactic somatostatin for patients undergoing splenectomy +/- distal pancreatectomy. Somatostatin analogues, especially its longer lasting derivates may be used for selected patients with high-output fistulas.

Pancreatic pseudo abscesses due to pancreatic leak should be managed with percutaneous drains or with an internal endoscopically inserted drain to avoid reoperation.
Diaphragm, pleural effusion

A prophylactic chest tube placement after diaphragmatic surgery is not routinely indicated.

Prophylactic chest tube placement could be considered for those patients with high-volume pre-operative pleural effusion, frailty and hypoalbuminemia and large/full-thickness diaphragmatic resection.

Small to moderate post-operative pleural effusions, which are not progressive and not associated with respiratory symptoms should be managed conservatively.

Thoracentesis alone without pleural drain placement is not recommended for the treatment of parapneumonic effusion or empyema.

Lesser sac-Porta hepatis-celiac region

If post-operative gastric perforation occurs, reoperation is the mainstay of treatment.

Post-surgical gastroparesis should be addressed with correction of electrolytes, appropriate diet and pharmacological support including metoclopramide, domperidone, and erythromycin.

Paracardiac lymph node resection

Complications like chylothorax after cardiophrenic lymph node resection are rare and multidisciplinary management is required.

In case of pericardial opening, no pericardial closure is recommended to avoid tamponade and infection.

Prevention and management of infective and urological complications

Post-operative sepsis, collection, drainage

Computed tomography scan is indicated as the best imaging modality in patients with septic symptoms and/or clinical symptoms evoking a collection or abscess after debulking surgery.

Post-operative collections or intra-abdominal abscess should be managed with image-guided percutaneous drainage as the preferred option to avoid relaparotomy.

Urological complications: hydronephrosis, ureteric fistulas, nephrostomies

Use of prophylactic ureteric stents could be considered in patients at high-risk for ureteric injury such as previous urological operations and/or pre-existent hydronephrosis.

Immediate primary repair is recommended for any iatrogenic ureteric injury recognized during surgery.

In the event of complete ureteral transection, immediate reconstruction after mobilization of the ureteric ends and spatulation should be performed. End-to-end anastomosis is usually preferred. Ureteric stent placement is mandatory.

Type of ureteric repair (end-to-end anastomosis versus reimplantation) depends on the distance from the insertion into the urinary bladder.

For iatrogenic ureteral injuries/fistulas diagnosed postoperatively, ureteric stent insertion or urinary diversion via nephrostomy tube is recommended:

- Internal stenting (with or without dilatation) can be performed either retrogradely or antegrade through a percutaneous nephrostomy
- Surgical repair is necessary in cases of failure of conservative management

In case of vesicovaginal fistulas we recommend adequate post-operative bladder drainage and delay of catheter removal until no contrast extravasation on cystogram is observed 7-21 days after leak/fistula diagnosis.

Management of bowel-related morbidity, prophylactic stoma formation and stoma reversal

Prevention and management of anastomotic leak

Routinely applied protective stoma formation is not recommended to reduce risk of anastomotic leak in ovarian cancer patients with colorectal resection.

Post-operative fasting does not prevent anastomotic leak and should not be recommended.

Treatment of patients with gastrointestinal anastomotic leak should be assessed for conservative treatment with radiological and endoscopic interventional techniques if stable and appropriate. Those patients with extensive peritonitis through bowel content should be managed with reoperation, lavage, and repair and/or diversion.

Endoscopic therapies, including self-expanding metal or covered stents, clips, glue, suturing, (alone or in combination), vacuum-assisted closure systems could be considered as part of the management of gastrointestinal leak.

Patients without symptoms but with incidentally detected small leaks/fistulas may be managed expectantly with close surveillance.
Stoma reversal and care

Early versus delayed stoma reversal show comparable outcomes and timing should be chosen depending on patients’, surgery- and treatment-related factors.

Support by a dedicated stoma care team is recommended.

Antibiotic/microbiologic management and post-splenectomy management

Optimal timing for administration of surgical antibiotic prophylaxis

Administration of surgical antibiotic prophylaxis is recommended in the 2-hour time window before surgical incision, while considering the half-life of the antibiotic.

Repeat intra-operative dosing of the antibiotic prophylaxis should be performed depending on the half-life time of the antibiotic and the duration of the surgery.

Post-operative routine surgical antibiotic prophylaxis

A routine prolonged surgical antibiotic prophylaxis after completion of the operation for the purpose of preventing surgical site infections is not recommended.

In case of post-operative complications, antibiotic treatment should be considered depending on patients’ clinical picture, biochemistry results, microbiological cultures, and previous treatments.

Post-splenectomy management

All ovarian cancer patients post-splenectomy should receive vaccinations against S. pneumoniae (pneumococcus), H. Influenzae type b, and N.meningitidis (meningococcus) approximately 2 weeks after surgery.

Annual vaccination against seasonal influenza virus is strongly recommended in post-splenectomy patients.

Patient education regarding higher susceptibility to certain infections is strongly recommended in post-splenectomy patients, along with an emergency antibiotic supply in case of acute infection.

Post-operative pain management

A multi-modal approach to postoperative analgesia including systemic and regional techniques should be used for ovarian cancer surgery.

There is evidence that epidurals provide benefits in addition to analgesia and these should be considered.

Prolonged use of opioids is not recommended.

Peri-operative thromboprophylaxis (pharmacological and mechanical) and management of post-operative thromboembolic events

Prophylactic anticoagulation in routine patients without thrombophilia or previous thrombosis

Patients undergoing cytoreductive surgery for ovarian cancer, without additional risk factors such as thrombophilia or prior thromboembolic events, should receive prolonged postoperative thromboprophylaxis with low-molecular weight heparin (LMWH) at prophylactic doses for 28 days.

Peri-operative mechanical thromboprophylaxis should be considered in addition to pharmacological thromboprophylaxis.

Post-operative thromboprophylaxis with 2.5 mg apixaban twice daily for up to 28 days after ovarian debulking procedures, could be considered as an equally effective alternative to the traditional thromboprophylaxis with prophylactic doses of LMWH in low risk ovarian cancer patients.

Management in high-risk patients with previous venous thromboembolism (VTE) already on anticoagulation (vitamin K antagonists (VKA), LMWH, direct oral anticoagulants (DOACs))

In patients with recent VTE in the last 3 months, there is a high risk of VTE recurrence, requiring bridging of VKAs with heparin/LMWH at therapeutic doses.

In patients with recent VTE in the last 3-12 months, there is a moderate risk of VTE recurrence, allowing bridging of VKAs with heparin/LMWH at lower than therapeutic doses, for example in half therapeutic dose.

Therapeutic doses of LMWH should not be resumed sooner than 48 hours after surgery.

Management in high-risk patients with previous VTE not anymore on anticoagulation and in high risk patients with a thrombophilia but without previous VTE

Patients undergoing cytoreductive surgery for ovarian cancer with a previous VTE who are no longer on anticoagulation and patients with non-severe thrombophilia without previous VTE should receive pre-operative (evening before surgery) and prolonged post-operative thromboprophylaxis for 28 days with LMWH at prophylactic doses similar to routine patients without thrombophilia or previous thrombosis.

Patients with severe thrombophilia and previous VTE are already on long-term anticoagulation and should be managed with bridging as per instructions above.
Bridging in patients on anticoagulation and/or antiplatelet drugs due to cardiovascular co-morbidities: atrial fibrillation, biologic or mechanic valve replacement in mitral and aortic position, cardiac stents and stroke

In patients at high risk for cardiovascular events due to for example previous ischemic heart disease, stents, or cerebrovascular disease who are receiving antiplatelet monotherapy with aspirin and require ovarian cancer surgery, aspirin should be continued peri- and intra-operatively.

In patients at low risk for cardiovascular events who are receiving antiplatelet monotherapy with aspirin, aspirin should be stopped 7 to 10 days before ovarian cancer surgery.

Surgery under dual antiplatelet therapy is not recommended.

Management of postoperative VTE events

Initial anticoagulation for cancer-associated VTE should be treated with unfractioned heparin (UFH) or LMWH at full therapeutic doses, or rivaroxaban (15 mg twice daily for 3 weeks) or apixaban (10 mg twice daily for 7 days). LMWH is preferred over UFH for the initial 5 to 10 days of anticoagulation in patients who do not have severe renal impairment (glomerular filtration rate <30 ml/min).

Edoxaban (60 mg once daily starting at day 5), or rivaroxaban (15 mg twice daily for 3 weeks followed by 20 mg once daily) or apixaban (10 mg twice daily for 7 days followed by 5 mg twice daily) can be used as a safe alternative to 75%-100% therapeutic dose of LMWH for prolonged anticoagulation of patients with cancer-associated VTE.

Spinal/epidural anesthesia and anticoagulation

At least 12 hours should elapse after the last prophylactic dose of LMWH before performing a spinal or epidural, or removing an epidural catheter.

Therapeutic doses of LMWH should be discontinued at least 24 hours before performing a spinal or epidural, or removing an epidural catheter.

Low dose aspirin (≤ 100 mg) is not a contraindication for spinal/epidural anesthesia.

Indications and contraindications for insertion of an inferior vena cava filter

Routine prophylactic pre-operative inferior vena cava filter placement is not recommended in patients at high risk for thrombosis such as history of thromboembolism or thrombophilia outside of specific indications.

Retrievable inferior vena cava filters should be employed as first option over permanent ones, due to equivalent long-term efficacy and additional option of retrieval.

Wound considerations/complications

Implementation of an established surgical site infection reduction bundle is recommended to reduce surgical site infection rates.

In extensive sheet/subcutaneous mobilisation with creation of large dead space and in largely obese patients, a closed suction drainage and subcutaneous closure may be recommended.

Meticulous hemostasis at abdominal closure especially in the subcutis is strongly recommended to prevent postoperative wound haematomas and seromas.

A continuous closing technique of a midline fascial incision using a slowly absorbable suture material is the best way for closing the abdomen in the elective setting. The small bites suture technique seems to be more effective than the traditional large-bites suture technique for the prevention of incisional hernia in the midline incisions.

Negative pressure wound treatment is an option for patients in wound management of peri-operative infections and/or wound breakdown.

Surgical necrotizing fasciitis

Immediate surgical exploration in case of suspected necrotizing fasciitis is recommended for confirmation of diagnosis, wound debridement and to obtain cultures for optimal antimicrobial treatment.

Initial broad empiric antibiotic therapy that covers both gram-negative and Gram-positive organisms (eg., vancomycin or linezolid plus piperacillin-tazobactam or carbapenem, or ceftriaxone and metronidazole) is recommended as the etiology maybe polymicrobial (mixed aerobic-anaerobic microbes).

Second-look surgery should be considered within 24 hours after the initial debridement. On average, three to four debridements may be needed.
Nutritional management

Patients should be screened and assessed for nutritional status with validated nutritional screening tools for malnutrition.

Pre-operative nutritional supplementation should be considered.

Carbohydrate pre-loading prior to surgery is recommended.

Early oral feeding adapted to patients’ habits and tolerances is recommended within the first 24 hours after ovarian cancer surgery.

High protein diet/immunonutrition and oral nutritional supplements may be considered in early feeding.

Parenteral nutrition is recommended in malnourished patients in whom enteral nutrition is not feasible or not tolerated, and in patients with post-operative complications, impairing gastrointestinal function rendering them unable to receive and absorb adequate amounts of oral/enteral feeding for at least 7 days.

If oral food intake has been decreased severely for a prolonged period of time, nutritional support should be initiated slowly to prevent refeeding syndrome.

Patients with bowel stoma should receive specialist dietary advice tailored to the type of stoma and length of residual small bowel, to avoid stoma-related complications such as high/loose output, constipation, blockage, flatulence and odour.

Prehabilitation, enhanced recovery, post-operative ileus prevention

Prehabilitation and enhanced recovery programs should be applied as a new and relevant global concept in ovarian cancer surgery.

Trimodal concepts consisting of physical exercise, nutritional assessment and intervention and psychological support and patients education are key elements to this program.

The implementation of Enhanced Recovery After Surgery protocols in gynecological oncology is recommended, whereby adherence monitoring is of fundamental importance.

A multimodal approach, comprising of early feeding, goal directed/balanced fluid therapy, physical activity, opioid-sparing pain therapy and early mobilisation is recommended for the prevention of post-operative ileus.

Post-operative physiotherapy and mobilisation

Physiotherapy should be offered as part of routine perioperative care for women with ovarian cancer.

Early mobilisation after surgery is recommended.

Frailty scores/management of the fragile patient

Preoperative frailty assessment is recommended to improve tolerability and outcome of any medical and surgical interventions.

Psycho-oncological and social support

Every woman with ovarian cancer should be screened for distress in a holistic approach as early as possible and should be offered professional psycho- oncological support.

Screening should be repeated in regular intervals during the course of treatment, follow-up and survivorship programs. For every woman the individual need for psycho-oncological support should be evaluated.

Besides evaluation by the treating clinician, women should be screened with validated and standardized screening tools such as the National Comprehensive Cancer Network® distress thermometer or the Hospital Anxiety and Depression Scale.

Scores that require intervention should be identified in whatever tool is used and women offered psycho-oncological counselling to evaluate distress and psychological/psychiatric comorbidity:

- Women with low level of distress should be offered patient-orientated information and psychosocial consultation including creative therapies.
- Women with high level of distress should be offered psycho- oncological interventions (therapy, escort), in addition.

Women should be counseled for sequelae of diagnosis and treatment on sexual function and for options of support.

Survivorship care should support survivors beyond their cancer treatment and regular follow-up care, throughout a lifetime.

Every cancer patient should receive an individualized survivorship care plan with information about diagnosis, therapy, possible long-term side effects, recommended check-ups and health promotion as well as psychosocial and psycho-oncological support.