An easy, fast, and accurate way for implementing the standards of care for the management of patients with endometrial carcinoma into daily clinical practice: the ESGO mobile app

Thomas Gaillard,[1] Richard Schwameis ,[2,3] Enora Laas-Faron,[4] Tali Eisenberg-Nissim,[5] Xavier Matias-Guiu,[6] Carien L Creutzberg,[7] Jonathan Ledermann ,[8] François Planchamp ,[9] Nicole Concin [3,10]

Abstract The European Society of Gynaecological Oncology (ESGO), the European Society for Radiotherapy and Oncology (ESTRO), and the European Society of Pathology (ESP) jointly published comprehensive evidence-based guidelines on all relevant issues of diagnosis and treatment in endometrial carcinoma in a multidisciplinary setting. In order to improve their implementation, a free downloadable easy-to-use mobile app was developed. Two interactive decision tools were created for (1) helping users to identify the recommended surgical steps, especially in terms of nodal staging approach based on the pre-operatively assumed risk group (tool #1), and (2) to facilitate prognostic risk group allocation and adjuvant treatment decision-making after primary surgery integrating both clinicopathological and molecular markers (if known) (tool #2). Algorithms and readable guidelines were also incorporated into the mobile app on all relevant issues of diagnosis and treatment. The scientific content presented in the app will be updated and modified in the future based on new evidence and user feedback. This article presents the decision tools and two practical examples of using these calculators to illustrate that the ESGO mobile app (available without the necessity of an internet connection) can provide fast and accurate responses to complex clinical questions that require the evaluation of numerous parameters.

For numbered affiliations see end of article.

Correspondence to
Nicole Concin, Department of Gynecology and Gynecologic Oncology, Evangelische Kliniken Essen-Mitte, Essen, 45136, Germany; nicole.concin@i-med.ac.at

Accepted 22 May 2023
Published Online First 17 July 2023

To cite: Gaillard T, Schwameis R, Laas-Faron E, *et al. Int J Gynecol Cancer* 2023;**33**:1181–1184.

CONTEXT

The development of guidelines is one of the core activities of the European Society of Gynaecological Oncology (ESGO), as part of ESGO's mission to improve the quality of care for women with gynecological cancers across Europe. A European consensus conference on endometrial carcinoma including representation from ESGO, the European Society of Medical Oncology (ESMO), and the European Society for Radiotherapy and Oncology (ESTRO) was held in 2014 to produce multidisciplinary, evidence-based guidelines on selected questions.[1–3] Given the large body of literature on the management of endometrial carcinoma published since 2014, ESGO, ESTRO, and the European Society of Pathology (ESP) jointly updated these evidence-based guidelines covering also new topics in order to provide comprehensive guidelines on all relevant issues of diagnosis and treatment in endometrial carcinoma in a multidisciplinary setting.[4–6]

According to the recent ESGO-ESTRO-ESP guidelines, molecular classification is encouraged in all endometrial carcinomas. A new definition of prognostic risk groups has been established integrating both clinicopathological parameters and molecular markers. Endometrial carcinoma is classified into five prognostic risk groups respecting the histological subtype, disease stage according to the International Federation of Gynecology and Obstetrics (FIGO), grading (low grade vs high grade), status of lymphovascular space invasion (LVSI) (negative/focal vs substantial), and molecular profile. Endometrial carcinoma risk group classification should be based on traditional clinicopathological features only if molecular classification is not available. The definition of prognostic risk groups is presented in online supplemental appendix 1 for both situations, namely when molecular classification is known or unknown.

Besides prognostic information, the ESGO-ESTRO-ESP guidelines provide adjuvant treatment recommendations depending on molecular profile for specific, well-defined clincial situations and based on the current level of evidence. This allows more personalized decision-making for adjuvant treatment.

Conversely, the increasing number of criteria (clincopathological and molecular) and the high number of possible combinations of these criteria complicate correct risk group allocation and adjuvant treatment decision-making, and might be difficult to memorize even for highly specialized clinicians. This could potentially lead to misclassification and erroneous decisions for adjuvant treatments and could also hamper the implementation of the comprehensive evidence-based ESGO-ESTRO-ESP guidelines in the

daily clinical routine. Similarly, surgical strategy can also be difficult to establish, especially with respect to lymph node staging in early-stage endometrial carcinoma, the management of positive lymph nodes, and the potential indication of omentectomy.

Web-based applications are routinely used in clinical practice. The Memorial Sloan Kettering Cancer cancer website provides some prediction tools, for example, the probability of non-sentinel lymph node involvement, or the overall survival probability following surgery in endometrial carcinoma.[7] Nomograms and other medical calculators, and web-based applications are currently broadly used by clinicians for various other tumor types. For instance, in breast cancer, the PREDICT breast cancer, the CancerMath, or the Residual Cancer Burden Calculator tools are used to predict patient survival with or without adjuvant treatment and to help clinicians choose the optimum treatment.[8–13] The prognostic risk group allocation, the adjuvant treatment decision-making process, and surgical strategy in endometrial carcinoma are excellent candidates for mobile app tools because of their complexity.

ESGO MOBILE APP

In order to facilitate the implementation of evidence-based ESGO-ESTRO-ESP recommendations for the management of patients with endometrial carcinoma into daily clinical practice, a free downloadable, easy-to-use, mobile app, available without the necessity of an internet connection, was designed for professionals in the field. This app provides the recently published ESGO-ESTRO-ESP guidelines in the format of interactive algorithms and allows access to the complete guideline information anytime and anywhere. The user-friendly navigation throughout the mobile app allows users easy and quick access to the required information. The user can also submit comments/suggestions on the content. The mobile app is available for iPhone, iPad, and Android devices via the following links:

- App store: https://apps.apple.com/us/app/esgo-guides/id1321659269
- Google Play: https://play.google.com/store/apps/details?id=com.esgomobileguides.org.

Algorithms and readable guidelines were created for all relevant issues of diagnosis and treatment (Figure 1).

Two interactive decision tools were also created. The first one provides case-based recommendations on surgical approach and procedures in early stage disease based on the pre-operatively assumed risk group (Figure 2). The user specifies the FIGO stage (IA, IB, II), the histological type (endometrioid, serous, clear cell, undifferentiated carcinoma, carcinosarcoma), and the tumor grade for endometroid carcinomas (low (G1, G2) vs high (G3)). Once the variables are filled in, the calculator automatically and instantly provides the user with the corresponding surgical approach and procedures, for example, for the uterus, adnexa, pelvic and para-aortic lymph nodes, and the omentum.

The second interactive decision tool facilitates prognostic risk group allocation and adjuvant treatment decision-making after primary surgery integrating molecular markers (if known) (Figure 3). The user specifies the molecular subgroup (pathogenic polymerase ε mutated (*POLE*mut), mismatch repair deficiency (MMRd), p53abnormal), the FIGO stage (IA (with or without myometrial invasion), IB, II, III, IVA, or IVB), the histological subtype (endometrioid, serous, clear cell, undifferentiated carcinoma, carcinosarcoma), the tumor grade (low (G1, G2) vs high (G3)), the lymphovascular space invasion (LVSI) status (negative or focal vs substantial), and the presence or absence of residual disease. In case of allocation of the specific patient to the high-intermediate risk group, the user needs to also provide information on the lymph node status. Then, the calculator automatically and instantly provides the user with the risk group of the patient (low, intermediate, high-intermediate, or high risk) and the respective adjuvant treatment ESGO-ESTRO-ESP recommendations.

Importantly, this interative tool does not necessarily demand knowledge of the molecular profile. It can be used in both situations,

Figure 1 Algorithms for the management of patients with endometrial carcinoma (main menu).

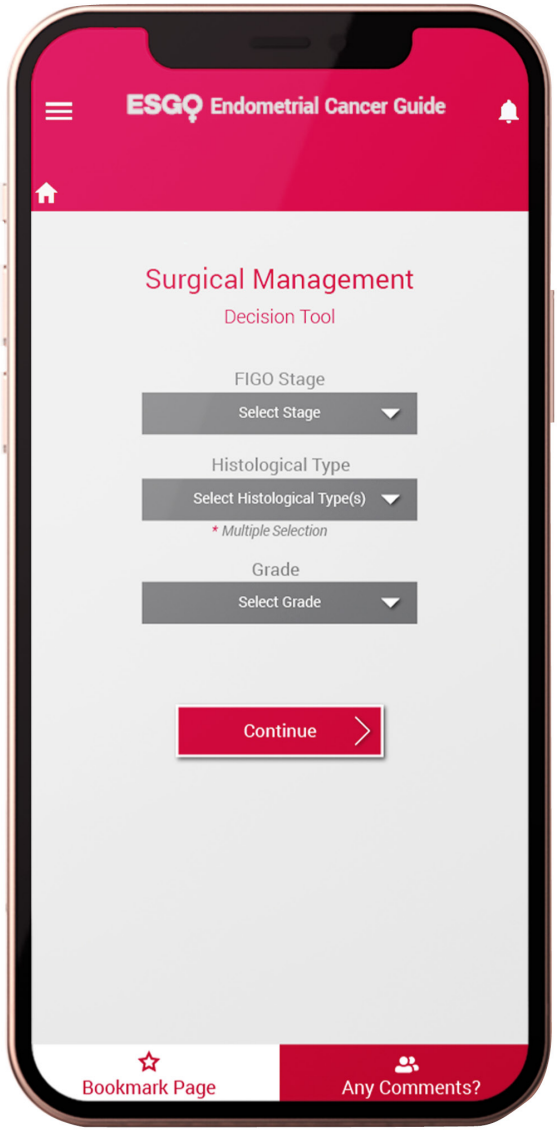

Figure 2 Interactive surgical management decision tool.

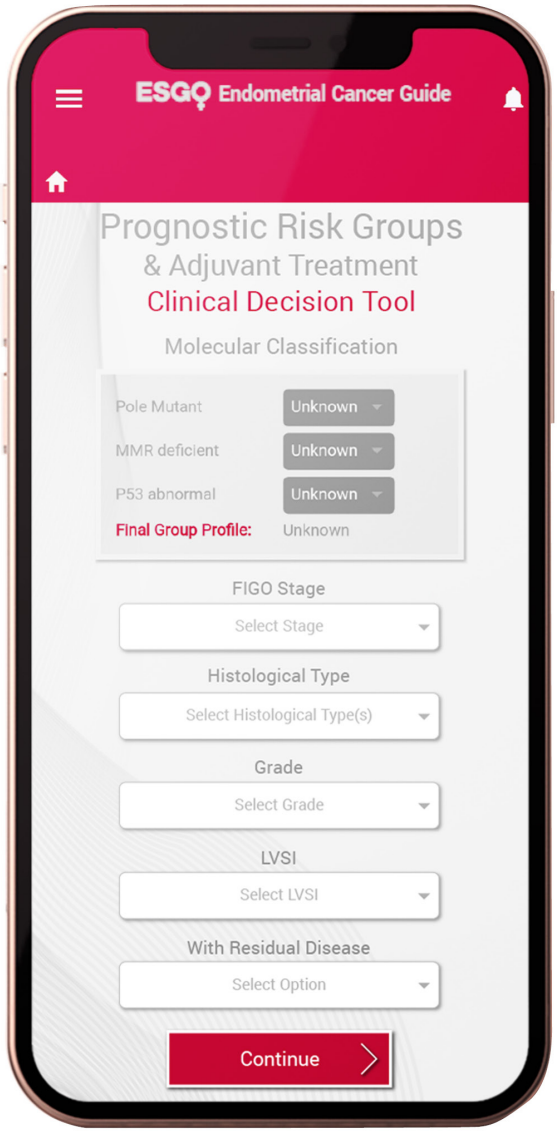

Figure 3 Interactive adjuvant treatment clinical decision tool.

namely when clinicopathological parameters only are known (no molecular profile available) or when both clinicopathological and molecular markers are known.

Taken together, the ESGO mobile app can provide fast and accurate responses to complex clinical questions that require evaluating numerous parameters in daily clinical practice. It can be used for training purposes by residents and fellows in gynecologic oncology as it allows simulation of a large variety of clinical situations. The entire scientific content presented in the ESGO mobile app is extracted from the ESGO-ESTRO-ESP guidelines for the management of patients with endometrial carcinoma. The app will be updated and modified in the future based on new evidence and user feedback.

ESGO MOBILE APP IN DAILY PRACTICE: ILLUSTRATION OF CLINICAL CASES

Avoiding overtreatment/therapeutic de-escalation by knowledge of molecular profile

Case 1

A patient with an endometroid endometrial carcinoma, FIGO stage II, high-grade tumor, presence of substantial LVSI, unknown molecular classification, surgically lymph node staged with pN0 status, and no residual disease after primary surgery is allocated to the high-intermediate risk group. In this specific patient, adjuvant brachytherapy can be recommended to decrease vaginal recurrence. External beam radiation therapy can be considered because of the presence of substantial LVSI and for stage II. Adjuvant chemotherapy can be considered especially

as the patient has a high-grade tumor and because of the presence of substantial LVSI. However, also the omission of any adjuvant treatment is an option in this patient.

Avoiding undertreatment/treatment escalation

Importantly, the knowledge of molecular profile will change the risk group allocation of this patient and consequently the recommendations for adjuvant treatment. As an example, if the same patient has a pathogenic *POLE* mutation, her risk group would shift from the high-intermediate risk group to the low risk group with consideration of descalation of treatment and of not applying any adjuvant treatment. If the same patient is found to have a tumor with a p53 abnormality, her risk group will shift to high-risk with recommendations to escalate treatment.

Case 2

A patient with an endometrioid endometrial carcinoma, FIGO stage IB (with myometrial invasion), low grade, no LVSI, unknown molecular biology, and a surgically staged pN0 status by sentinel lymph node biopsy is allocated to the intermediate-risk group, with recommendation for vaginal brachytherapy or no adjuvant treatment. However, a molecular classification indicating a p53 abnormality with the same clinicopathological features shifts the patient to the high-risk group. In this high-risk group of patients, external beam radiotherapy with concurrent and adjuvant chemotherapy/sequential chemotherapy and radiotherapy is recommended or alternatively chemotherapy alone.

The mobile app easily and effectively demonstrates the clinical implications of knowledge of clinicopatholgical parameters only or of both clinicopathological and molecular parameters in a specific patient by simply entering "molecular classification unknown" or by providing the molecular information.

RESPONSIBILITIES

Any user of this mobile app is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient's care or treatment. The ESGO mobile app makes no warranties of any kind regarding its content, use, or application and the authors disclaim any responsibility for its application or use in any way.

Author affiliations
[1]Department of Surgical Oncology, Institut Curie, Paris, France
[2]Division of General Gynecology and Gynecologic Oncology, Department of Obstetrics and Gynecology, Gynecologic Cancer Unit, Comprehensive Cancer Center, Medical University of Vienna, Vienna, Austria
[3]Department of Gynecology and Gynecologic Oncology, Evangelische Kliniken Essen-Mitte, Essen, Germany
[4]Senological, Gynecological, and Reconstructive Surgery, Institut Curie, Paris, France
[5]Smart Analytics, Tel-Aviv, Israel
[6]Department of Pathology, Hospital Universitari Arnau de Vilanova, Lleida, Spain
[7]Department of Radiation Oncology, Leiden University Medical Center, Leiden, The Netherlands
[8]Department of Oncology and Cancer Trials, UCL Cancer Institute, University College London, London, UK
[9]Institut Bergonie, Bordeaux, France
[10]Department of Gynecology and Obstetrics, Medical University of Innsbruck, Innsbruck, Austria

Contributors All authors are responsible for the decision to submit for publication and have actively given personal input, reviewed the manuscript, and have given final approval before submission.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests The research activity of XMG is supported by Asociación Española Contra el Cáncer (AECC). TG, RS, ELF, TEN, CLC, JL, FP, and NC have reported no conflicts of interest.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; internally peer reviewed.

Author note The project was initiated by the European Society of Gynaecological Oncology ESGO (a non-profit scientific society).

ORCID iDs
Richard Schwameis http://orcid.org/0000-0001-9780-6657
Jonathan Ledermann http://orcid.org/0000-0003-3799-3539
François Planchamp http://orcid.org/0000-0002-8709-0410
Nicole Concin http://orcid.org/0000-0002-9795-2643

REFERENCES

1 Colombo N, Creutzberg C, Amant F, *et al*. ESMO-ESGO-ESTRO consensus conference on endometrial cancer: diagnosis, treatment and follow-up. *Int J Gynecol Cancer* 2016;26:2–30.
2 Colombo N, Creutzberg C, Amant F, *et al*. ESMO-ESGO-ESTRO consensus conference on endometrial cancer: diagnosis, treatment and follow-up. *Radiother Oncol* 2015;117:559–81.
3 Colombo N, Creutzberg C, Amant F, *et al*. ESMO-ESGO-ESTRO consensus conference on endometrial cancer: diagnosis, treatment and follow-up. *Annals of Oncology* 2016;27:16–41.
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 Memorial Sloan Kettering Cancer Center. Endometrial carcinoma nomogram: overall survival probability following surgery. Available: https://www.mskcc.org/nomograms/endometrial [Accessed 13 Dec 2021].
8 Wishart GC, Azzato EM, Greenberg DC, *et al*. PREDICT: a new UK prognostic model that predicts survival following surgery for invasive breast cancer. *Breast Cancer Res* 2010;12:R1.
9 Wishart GC, Bajdik CD, Dicks E, *et al*. PREDICT Plus: development and validation of a prognostic model for early breast cancer that includes HER2. *Br J Cancer* 2012;107:800–7.
10 Down SK, Lucas O, Benson JR, *et al*. Effect of PREDICT on chemotherapy/trastuzumab recommendations in HER2-positive patients with early-stage breast cancer. *Oncol Lett* 2014;8:2757–61.
11 Candido Dos Reis FJ, Wishart GC, Dicks EM, *et al*. An updated PREDICT breast cancer prognostication and treatment benefit prediction model with independent validation. *Breast Cancer Res* 2017;19:58.
12 Michaelson JS, Chen LL, Bush D, *et al*. Improved web-based calculators for predicting breast carcinoma outcomes. *Breast Cancer Res Treat* 2011;128:827–35.
13 The University of Texas MD Anderson Cancer Center. Residual Cancer Burden Calculator. Available: http://www3.mdanderson.org/app/medcalc/index.cfm?pagename=jsconvert3 [Accessed 13 Dec 2021].