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ORIGINAL RESEARCH

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Inquiry and Endometrial-Online computer program: 27 years of clinical registry for endometrial cancer at the University Medical Centre Maribor

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Abstract

Objective: Clinical registries are designed to collect quality data generated during diagnosis and cancer treatment, post-treatment monitoring, and survival and to enhance patient treatment. Evaluation of registry data allows an improvement of patient care and a comparison between healthcare providers. Our goal is to present a computer-based endometrial cancer registry that could serve as a model for those planning to develop a similar registries. **Methods**: Comprehensive forms for monitoring patients with endometrial cancer (EC) were introduced at the Department of Gynaecological and Breast Oncology, Maribor General Hospital in 1994. Following the clinical development in treatment approaches to EC. This form has been revised several times. The amendments were based on our experience and new approaches to treatment. The form of Endometrial-Online computer program that we present and is currently in use, was designed in 2014. **Results**: In the last 27 years, we have collected data on EC patients treated at our institution. The Endometrial-Online computer program enables collection, processing, and analysis of 139 different data, that include patient's general data, history, diagnostic procedures, histopathological examination results, treatment methods, and post-treatment follow-ups in a rapid and reliable way. **Conclusions**: The purpose of the Endometrial-Online Registry is the collection of data on cancer patients with the intention of improving diagnosis and treatment. It enables improved day-to-day healthcare service, and comparison of our treatment outcomes with national and international standards. Limitations of such clinical registries can be in an incomplete or incorrect data entry as a consequence of several healthcare professionals taking part in diagnostic work up, treatment and post-treatment follow-up of endometrial cancer patients.

Keywords

Clinical registry; Computer program; Endometrial cancer

1. Introduction

Cancer registries are set up for different purposes. Broadly they can be divided into institution based and population-based registries. Institution or hospital-based registries collect patient data for a specific cancer unit, whereas population-based registries gather data on all patients in a certain population. The intention of population-based registries is to assess the extent of cancer burden in particular community. It is used to set public health priorities and signpost care priorities. Registries are also a source of data for etiological research and for evaluation health provider effectiveness in cancer control activities [1]. Our goal is to present a computer-based endometrial cancer registry that could serve as a model for those planning to develop similar registries.

The Cancer Registry of the Republic of Slovenia was established at the Institute of Oncology Ljubljana in 1950. It represents one of the oldest population-based cancer registries in Europe. The role of this registry is to record and analyze the burden of malignant and pre-malignant diseases in the country [2]. Clinical registries are required for collecting specific information on certain malignancies. In 2017 the Clinical Registry of Skin Melanoma was established in Slovenia, paving the way as the first special clinical registry in this country [3]. Our clinical registries for ovarian cancer and breast cancer were already presented [4–6].

Endometrial cancer (EC) is the most common gynaecological malignancy and the second most common female cancer, after breast cancer, in the developed world [7]. In 2012, the number of new cases and deaths due to EC worldwide was 319,605 and 76,160 respectively [7]. According to GLOBOCAN, in 2020, there were an estimated 417,367 new cases and 97,370 cancer deaths worldwide due to EC [8]. This shows a rising incidence of EC thus making it an even more important

issue.

In Slovenia, the crude incidence of EC in the period 2014-2018 was 34.2/100,000 and the age standardized incidence was 16.1/100,000. This amounts to approximately 350 new cases annually. During this period, the crude death rate was 6.4/100,000 and age standardized death rate was 2.2/100,000. The prevalence of women living with EC was 4845 women on 31 December 2018 [9].

Identifying risk factors and factors that provide protection against EC is critical to understand the disease aetiology and factors influencing it. Therefore, collection of patient history information is of great importance. Previous reports show, that the most prevalent histological subtype endometrioid endometrial adenocarcinoma has been associated with numerous risk factors such as obesity, insulin resistance, physical inactivity, excess exogenous oestrogen, and tamoxifen therapy after breast cancer. Furthermore, lifestyle choices such as daily coffee consumption have been inversely associated with EC [10]. Of many proposed risk factors, only three have strong association without hints of bias: body mass index (BMI) and waist-to-hip ratio increase the risk of EC, while parity reduces the risk of disease [10]. These findings led Raglan *et al*. [10] to the conclusion that identification of genuine risk factors associated with EC may be very important for policy-makers focusing on prevention strategies for women at high risk for EC. Studies show that the higher is the BMI the higher the risk for EC [11, 12].

Other already identified high-risk groups for EC include: (i) women with polycystic ovary syndrome (PCOS), who have a 9% lifetime risk of EC [13]; (ii) women with early menarche and late menopause, (iii) nulliparous women [14], (iv) women on tamoxifen therapy for the prevention or adjuvant treatment of breast cancer, which increases the risk of EC by two-to three-fold [15, 16].

Combined oestrogen-progestin therapy (combined oral contraceptive, COC and combined HRT) has been shown to have a protective effect on EC risk due to the progestin component, which suppresses endometrial proliferation [17, 18]. The benefit of COC persists for more than 30 years after treatment discontinuation [19]. Other protective effects for EC have been demonstrated by the use of progestogens in PCOS patients, which reduces the risk of developing endometrial hyperplasia and carcinoma [17, 20–22]. Breast feeding and childbearing at older age protect against EC [23–25]. Some studies also showed cigarette smoking has protective effect, but the health risks associated with smoking outweight the benefit (28,29,30). The use of hormone replacement therapy (HRT) however, shows a dose and duration dependent increase of EC risk with relative risks ranging from 1.1 to 15 [11, 26].

Understanding such lifestyle factors could be aided by comprehensive hospital-based clinical registries. Such registries could play an important role in monitoring and improving the quality of care for EC prevention and patient management. The collected data can also be used for research purposes.

The aim of this manuscript is to present the registry called Endometrial-Online. We present datasets that are reasonable and well structured. This report on our experience with establishing a patient registry for EC could be useful to other institutions at setting up their own registry for EC.

2. Materials and Methods

The University Medical Centre Maribor introduced in 1994 seven clinical registries for gynaecological cancers (cervical, endometrial, ovarian, tubal, vaginal, vulvar) and breast cancer at the Department of Gynaecological Oncology and Breast Oncology. We developed a computer program for all of them. Their use to follow-up patients with ovarian cancer and breast cancer was already presented in several publications [4–6].

In recent decades, there have been changes in the field of EC management, both in surgical and non-surgical management (radiotherapy and systemic therapy). Accordingly, to these changes and regarding our previous experience with collecting cancer patient's data using computer program developed by our gynaecologic oncologists, the context of the inquiry for endometrial cancer has been updated for current use. The updated inquiry protocol served as a model for developing an adequate computer program called Endometrial-Online in 2014 with the purpose to record data during diagnostics, treatment, and follow-up of patients. Program was developed and updated in actual versions of Microsoft Access. The program does not allow us to trace data entry. There are no mechanisms implemented to avoid mistakes in data collection. The program is updated by specialists in the field of endometrial cancer diagnosis and treatment who follow developments in the field and make appropriate changes.

After the patients complete their primary treatment, data are recorded using the Endometrial-Online computer program to process and analyse the data obtained in the process.

Paper forms are used first, during patient's interview with the attending physician, and the data are later transferred to the Endometrium-Online computer program by a medical specialist. At every following visit the form is filled with new information. The front page of Endometrial-Online contains basic information including stage of the disease, initial treatment and its results, relapses and their treatment. The next figure contains data about patient's history, clinical manifestation of the disease, the findings of clinical examination and outcomes of tests used to determine the stage of the disease. In the following three figures details about treatment modalities used are presented together with detailed pathologic and histologic report. Upon admission to the hospital, informed consent is given by the patient allowing the use of personal data or documentation for the purpose other than actual treatment.

3. Results

The inquiry for EC consists of 139 different items divided into seven sections that are presented in detail in figures. To date the registry has data recorded from 1060 endometrial cancer patients. General data are partly captured at the time of diagnosis and consist of the identification and of treatment overview at the end of primary treatment. Relapses and their management are described (Fig. 1).

Twenty-six items on patient history on known risk factors for EC, current symptoms, and signs were recorded. Patient's menstrual history, reproductive history, the use of hormones and smoking habits were recorded. Detailed data are listed in Fig. 2. The patient history includes signs and symptoms

ENDOMETRIUM

(endometrial and non-endometrial type, atypical endometrial hyperplasia, uterine sarcoma)

G1 Year/No.:

G2 NAME

G3 AGE **G4 PERS. NO.** **G5 INSURANCE**

G6 DATE OF RECENT EXAMINATION (or EX):

G7 CONDITION AT LAST CHECK-UP (or EX):

0 alive, no symptoms
1 alive, partial remission
2 alive, stable disease
3 alive, relapse
4 alive, progressive disease
5 alive, condition unknown
6 ex due to endometrial malignancy
7 ex during treatment
8 ex due to other disease, no signs of endometrial cancer
9 ex due to other disease, endometrial malignancy present
10 ex, cause unknown
11 condition unknown

G8 DG: **G9 Date of DG:**

G10 STAGE: 0 **0** 1 **IA** 2 **IB** 3 **II** 4 **IIIA** 5 **IIIB** 6 **IIIC1** 7 **IIIC2** 8 **IVA** 9 **IVB**

G11 DIFFERENTIATION: 1 **G1** 2 **G2** 3 **G3**

G12 TREATMENT:

0 none
1 radical surgery
2 non-radical surgery
3 complete CT
4 non-complete CT
5 neoadjuvant CT
6 second line CT
7 teleradiation
8 brachy-RT
9 hormonal therapy
10 other (specify):

G13 No. OF SURGERIES:

G14 PRIMARY TREATMENT RESULTS:

0 complete remission
1 partial remission
2 unaltered state
3 progression
4 exitus
5 other (specify):

G15 FIRST RELAPSE

0 no
1 yes, vagina
2 yes, pelvis
3 yes, distant
4 yes, other (specify):

G16 FIRST RELAPSE DATE

G17 FIRST RELAPSE TREATMENT

0 no
1 surgical
2 CT
3 RT
4 other (details)

G18 SECOND RELAPSE

0 no
1 yes, vagina
2 yes, pelvis
3 yes, distant
4 yes, other (specify):

G19 SECOND RELAPSE DATE

G20 SECOND RELAPSE TREATMENT

0 no
1 surgical
2 CT
3 RT
4 other (details)

PC No.:

FIGURE 1. General data. CT, chemotherapy; RT, radiotherapy.

as well as their duration. The most common symptoms are intermenstrual bleeding and postmenopausal bleeding. Also time since the last gynaecological check-up is also recorded.

Next section covers clinical examination with 41 parameters, including weight, height, outcomes of an abdominal examination, examination of genital organs, WHO and Karnofsky performance status, findings of ultrasound examination of the uterus, estimation of the depth of myometrial invasion, colposcopy, the results of last Pap smear test according to Bethesda System, chest radiograph, liver ultrasound scan, esophagogastroduodenoscopy, mammography, intravenous urography, cystoscopy, proctoscopy, hysteroscopy and laboratory tests focusing on haematology and tumour markers (Fig. 3).

HISTORY
NAME

H1 MENARCHE (age):

H2 MENSTRUAL CYCLES REGULARITY
0 regular
1 irregular

H3 LENGTH OF MENSTRUAL CYCLE (days)

H4 MENSES PHASE (days)

H5 MENSTRUAL FLOW
0 normal
1 low
2 heavy

H6 MENSTRUAL PAIN
0 no
1 yes

H7 IRREGULAR MENSTRUAL CYCLES
0 no
1 amenorrhea
2 oligomenorrhea (> 35 days)
3 polymenorrhea (< 21 days)
4 hypomenorrhea
5 hypermenorrhea
6 menorrhagia (> 7 days)
7 intermittent bleeding (spotting)
8 contact bleeding (postcoital bleeding)
9 continued bleeding (prolonged period)
10 pre-pubertal bleeding

H8 TIME SINCE LAST PERIOD (days)

H9 No. OF PREGNANCIES

H10 No. OF DELIVERIES

H11 NO. of MTOP

H12 NO. of MISCARRIAGES

H13 INFERTILITY
0 not present (go to A16)
1 yes

H14 DURATION of INFERTILITY (years)

H15 STEIN-LEVENTHAL SYNDROME
0 no
1 yes

H16 HORMONAL CONTRACEPTIVES
0 never (go to A18)
1 earlier
2 now

H17 No. of YEARS OF CHC (combined hormonal contraceptives)

H18 SMOKING
0 no
1 1–5 cigarettes/day, number of years ……..
1 1–6 cigarettes/day, number of years ……..
3 > 10 cigarettes/day, number of years ……..

H19 MENOPAUSE
0 not yet (go to 41)
1 natural
2 induced

H20 AGE AT MENOPAUSE

H21 HORMONE REPLACEMENT THERAPY (ESTROGENS)
0 never (go to 43)
1 earlier (specify):
2 current (specify):

H22 No. of YEARS OF HORMONE REPLACEMENT THERAPY

H23 PREVIOUS OR PRESENT DISEASES
0 no
1 hypertension, not treated
2 hypertension, treated
3 diabetes, not treated
4 diabetes, treated
5 obesity
6 typical endometrial hyperplasia, excl. atypia
7 typical endometrial hyperplasia, incl. atypia
8 complex endometrial hyperplasia, excl. atypia
9 complex endometrial hyperplasia, incl. atypia
10 breast cancer
11 ovarian cancer
12 cervical cancer
13 GIT cancer
14 other (specify):

H24 SIGNS AND SYMPTOMS
0 asymptomatic
1 intermenstrual bleeding
2 postmenopausal bleeding
3 vaginal discharge
4 abdominal pain
5 lower back pain
6 urinary disorders
7 vomiting
8 alterations in body mass
9 other (specify):

H25 DURATION OF SIGNS AND SYMPTOMS (months)

H26 TIME SINCE LAST OB/GYN EXAM

FIGURE 2. Medical history. MPOT, medical termination of pregnancy.

Section containing data about the surgical procedure and postoperative care includes 15 parameters. Date of surgery, type of surgical procedure, complications during surgery, blood loss, blood transfusions, perioperative and postoperative use of antibiotics and postoperative complications are registered. The day of patient discharge from the hospital is also recorded (Fig. 4). Seventeen types of surgical procedures are listed. They are followed by the most

EXAMINATIONS

E1 WEIGHT (kg)

E2 HEIGHT (cm)

E3 ABDOMINAL WALL LEVEL
0 under chest level
1 chest level
2 above chest level

E4 ABDOMINAL PALPATION
0 within normal limits
1 palpable tumor
2 ascites
3 tenderness
4 other (specify):

E5 REGIONAL LYMPH NODES	**R**	**L**
0 not palpable (go to 54)	0	0
1 palpable inguinal	1	1
2 palpable subclavicular	2	2
3 palpable axillary	3	3

E6 LYMPH NODE HISTOLOGY	**R**	**L**
0 no	0	0
1 yes	1	1

E7 LYMPH NODE BIOPSY RESULT	**R**	**L**
0 negative	0	0
1 suspicious	1	1
2 positive	2	2

E8 LOWER LIMB OEDEMA	**R**	**L**
0 no	0	0
1 yes	1	1

E9 UTERINE POSITION
1 AVF
2 RVF
3 extended/straight
4 dextroposition
5 sinistroposition
6 not differentiated
7 other (specify):

E10 UTERINE SHAPE
0 correct
1 incorrect

E11 SIZE OF UTERUS (mm)
0 normal
1 smaller than normal
2 larger than normal

E12 UTERINE CONSISTENCY
0 solid
1 soft
2 elastic

E13 UTERINE SURFACE
0 smooth
1 folds and pits
2 ruffled

E14 UTERINE MOBILITY
0 satisfied
1 dissatisfied

E15 UTERINE SENSITIVITY/TENDERNESS
0 no
1 tender
2 severe pain

E17 OVARY	**R**	**L**
0 not palpable	0	0
1 palpable	1	1
2 tumor	2	2

E18 SIZE OF TUMOR (cm)

E19 PARAMETRIUM	**R**	**L**
0 free	0	0
1 shorter fibers	1	1
2 parametrial infiltration	2	2

E20 POUCH OF DOUGLAS
0 no resistance
1 knobbly, painless resistance
2 knobbly, painful resistance
3 other (specify):

E21 WHO – KARNOFSKY PERFORMANCE STATUS
0 100 Active, no evidence of disease
1 90 Active, minor signs or symptoms of disease
1 80 Reduced activity, some signs of symptoms of disease
2 70 Cares for self, unable to carry on normal activity
2 60 Requires occasional assistance
3 50 Requires considerable assistance and frequent medical care
3 40 Disabled; requires special care and assistance
4 30 Severely disabled; hospitalization is indicated
4 20 Very sick; hospitalization necessary, active supportive treatment necessary
4 10 Moribund
5 0 Exitus

E22 DIAGNOSIS ESTABLISHED

0	clinically	4	conization
1	smear (PAP)	5	hysterectomy
2	excision	7	HSC
3	abrasion	6	other (specify):

E23 LENGTH OF THE UTERINE CAVITY (cm)

E24 DEPTH OF MYOMETRIAL INVASION ASSESSED BY US

0	not evaluated	3	between 1/3 and 1/2
1	no invasion	4	more than 1/2
2	less than 1/3	5	not certain

E25 COLPOSCOPY 0 no 2 atypical TZ
1 norm. TZ 3 carcinoma

E26 CERVIX SMEAR CYTOLOGY

0	no	2	B	4	C 3, 4	6	other:
1	A	3	C1, 2	5	C 5, 6		

E27 CERVICAL ABRADANT HISTOLOGY 0 no 1 NAD 2 ca

E28 CHEST RADIOGRAPH
0 not performed 1 NAD 2 effusion 3 metastases 4 other:

E29 LIVER ULTRASOUND SCAN
0 not performed 1 NAD 2 steatosis 3 stones 4 meta 5 other:

E30 EGDS 0 not performed 1 NAD 2 inflammation 3 ulcer 4 ca 5 other:

E31 MAMMOGRAPHY 0 not performed 1 NAD 2 tumor R L 3 microcalcifications 4 carcinoma

E32 INTRAVENOUS UROGRAM 0 not performed 1 NAD 2 dilatation R L 3 dysfunction 4 other:

E33 CYSTOSCOPY 0 not performed 1 NAD 2 inflammation 3 ca

E34 RECTOSCOPY 0 not performed 1 NAD 2 hemorrhoids 3 ca

E35 HYSTEROSCOPY 0 not performed 1 yes, 1X 2 yes, 2X

E 36 SR E37 L E38 Hb E39 T

F I G U R E 3. Clinical examination and investigations prior to treatment. HSC, hyteroscopy; TZ, transformation zone; NAD, no abnormalitiy detected; SR, sedimantation rate; CEA, carcino embryonic antigen; CA 125, cancer antigen 125.

common postoperative complications (Fig. 4).

Data collection on radiotherapy contains also the source of radiation, total radiation dose (in Grays–Gy), the duration of radiotherapy and possible complications (Fig. 4). Data on radiotherapy are completed at the first follow-up visit after the treatment has been concluded, since radiotherapy is performed at the Department of Oncology.

Items examining chemotherapy focus on the most frequently used agents. These agents are already listed and categorized. The frequency and number of chemotherapy cycles is recorded, as well as data regarding granulocyte colony-stimulating factor (G-CSF) application, dose reduction, post-chemotherapy complications and results.

For hormonal therapy, data on hormonal therapy drug, dosage and duration, and the outcomes of hormonal therapy are recorded.

Findings about histopathologic examination of tumour, lymph nodes and any other tissues removed during surgery are collected in the next section. The first part of this section includes data about cervical and endometrial biopsy. Further part of the inquiry includes data on the endometrial, myometrial, ovarian, oviductal, vaginal cuff, parametrial and cervical histology. All relevant tumour characteristics, including size, depth of invasion, differentiation, lymphovascular invasion and lymph node status are recorded (Fig. 5). A International Federation of Gynecology and Obstetrics (FIGO) 2009 stage is determined after definitive histology, and marked at the end of this section, usually after the patient was already discharged.

Detailed information about adjuvant or neoadjuvant chemotherapy is collected on a separate inquiry page (Fig. 6). This section includes the date of chemotherapy, weight, height and body surface. It also records the wellbeing of the patient, outcomes of clinical examinations, ultrasound, abdominal CT, chest radiography, laboratory results, tumour marker Ca125, creatinine, dose reduction and the reason for it, cytostatic and antiemetic therapy and occurrence of vomiting.

The last section of the inquiry is designed for the follow-up (Fig. 7). Routine follow-up visits are recommended every 3–4 months for the first 2–3 years. After that period, 6-monthly visits are recommended for 5 years, and then annually for life. At each visit, history taking, and clinical examinations are carried out to detect treatment complications and psychosexual morbidity and to assess for recurrent disease. At every follow-up visit all 13 boxes should be filled describing the wellbeing of the patient and findings of examinations and tests.

All data collected with the paper inquiry are recorded with the Endometrial-Online computer program used for processing data and statistical analysis. Compilation rate is 80–85%. The most critical sector of the inquiry refers to postoperative complications. Missing data rate is 15–20%. The program gives us quick access to data so we can find and edit it. Data can be added or modified.

4. Discussion

Hospital-based cancer registries such as Endometrial-Online focus on recording of information of cancer patients seen in a certain institution. The main purpose of such an institution based registry is to support patient care by providing readily accessible information on women diagnosed with a malignant disease, the management modalities implemented and its result. The data are used mainly for administrative purposes and for clinical audits [1]. Our endometrial cancer inquiry collects extensive longitudinal patient data. It consists of 139 items connected to EC patient medical history, clinical status, histopathological results, treatment and its outcome.

Women with EC usually presents with abnormal uterine bleeding [27]. Endometrial sampling is required to decide the cause of abnormal uterine bleeding in perimenopausal women with high risk for EC to avoid delay in setting the diagnosis. Endometrial sampling is also necessary in all the cases of postmenopausal uterine bleeding depending on history, findings of clinical examination and imaging findings. Imaging is usually conducted through transvaginal ultrasound (TVUS) [28]. TVUS is considered as a method of screening in patients with postmenopausal uterine bleeding. It is connected with high accuracy in regards to myometrial invasion and probable extrauterine dissemination [29]. Items on the management of EC include all available types of EC treatment options (Fig. 4). Details about each type of treatment are listed in this section along with the most common complications.

The disease management strategy is based on information available before surgery: the tentative stage (apparent stage I or more advanced), grade (of endometrioid tumours; grade 1–3 or a binary system) and histotype (endometrioid versus non-endometrioid tumours) [30]. Total hysterectomy without colpectomy is the mainstay of treatment for EC patients. Ovarian preservation may be possible by individual assessment in young patients. This is due to the understanding that such patients usually have early-stage, low-grade tumours. The overall survival of young patients with early-stage endometrial cancer is not statistically significantly impacted by ovarian preservation [30].

The World Health Organization (WHO) classification is the gold standard for categorizing EC. The latest edition provides detailed understanding of each entity. Histologic classification WHO 2014 is recommended in the Slovene Recommendations for diagnosis, treatment and follow-up of patients with endometrial carcinoma from 2018 [31]. The fifth edition of the WHO classification of Tumours of the Female Genital Tract, published in 2020, highlights the use of integrated molecular classification systems for EC in clinical management [32]. Four new entities have been included within the EC classification: squamous cell carcinoma, mucinous carcinoma, intestinal type, mesonephric adenocarcinoma and mesonephric-like adenocarcinoma and neuroendocrine neoplasms have been separated from the EC chapter [33]. Significant improvements in understanding of genomic basis of EC have been included in the newest edition of EC. Morphological classification, with or without aid of immunohistochemistry, remains the mainstay of diagnosis [33].

Decisions on management of EC are taken by multidisciplinary tumour boards. Decision about the need for adjuvant radiotherapy therapy is based on cancer stage, patient's age, type, and grade of the tumour as well as lymphovascular space invasion (LVSI) [30]. In patients with high-risk, non-endometrioid cancers (serous and clear cell after comprehen-

ST1 SURGERY
0 not present (go to RT1)
1 yes

ST2 DATE OF SURGERY

ST3 FREE FLUID IN THE ABDOMEN/ASCITES
0 not present (go to 90)
1 yes

ST4 ASCITES AMOUNT (mL)

ST5 MACROSCOPIC

1	pelvic peritoneum	NEG	SUSP	POS
2	omentum	NEG	SUSP	POS
3	dome of the diaphragm	NEG	SUSP	POS
4	surface of the liver	NEG	SUSP	POS
5	colon and small intestine	NEG	SUSP	POS
6	stomach, pancreas	NEG	SUSP	POS

ST6 PERITONEAL LAVAGE

1	surface of the diaphragm	NEG	SUSP	POS
2	paracolic right	NEG	SUSP	POS
4	paracolic left	NEG	SUSP	POS
5	pelvic peritoneum	NEG	SUSP	POS

ST7 PROCEDURE

1	laparoscopy			10	pelvic LND
2	exploratory laparotomy			11	paraaortic LND
3	cyst enucleation	R	L	12	bladder resection
4	ovariectomy	R	L	13	bowel resection
5	salpingectomy	R	L	14	colostomy
6	adnexectomy	R	L	15	ileostomy
7	hysterectomy			16	metastasectomy
8	apendectomy			18	adhesiolysis
9	omentectomy			17	other (specify):

ST8 RESIDUAL TUMOR
0 none
1 0–2 cm^3
2 > 2 cm^3

ST9 COMPLICATIONS DURING SURGERY
0 no
1 other (specify):

ST10 BLOOD LOSS DURING SURGERY (ml)

ST11 BLOOD TRANSFUSION DURING/AFTER SURGERY
0 no
1 yes

ST12 PERIOPERATIVE ANTIBIOTICS
0 no
1 yes

ST13 POSTOPERATIVE ANTIBIOTICS
0 no
1 yes

ST14 POSTOPERATIVE COMPLICATIONS

0	none	7	ileus
1	bleeding	8	urinary fistula
2	urinary tract infection	9	bowel fistula
3	febrile condition	10	deep vein thrombosis
4	intra-abdominal abscess	11	pulmonary embolism
5	bladder atony	12	exitus
6	bowel atony	13	other (specify):

ST15 PATIENT DISCHARGE AFTER SURGERY ON DAY

RT1 RADIATION THERAPY

0	not performed (go to KT1)	3	radical
1	preoperative	4	palliative
2	postoperative	5	other (specify):

FROM…….. UNTIL……

RT2 TYPE OF RADIATION THERAPY

0	teleradiotherapy	2	interstitial radiotherapy
1	intracavitary radiotherapy	3	other (specify):

RT3 SOURCE OF RADIATION

RT4 TOTAL RADIATION DOSE (Gy)

RT5 COMPLICATIONS DURING/AFTER RADIATION THERAPY

0 none	5 lymphoedema
1 rectal bleeding	6 fistula
2 stenosis of rectum	7 pyometra
3 vaginal stenosis	8 other (specify):
4 incontinence	

CT1 CHEMOTHERAPY

0 none (go to HT1)	3 neoadjuvant
1 primary	4 palliative
2 secondary	

FROM…….. UNTIL……

CT2 CHEMOTHERAPY DRUG

1 cisplatin	6 treosulfan
2 carboplatin	7 etoposide
3 cyclophosphamide	8 bleomycine
4 methotrexate	9 paclitaxel
5 adriamycine	10 other (specify):

CT3 NO. OF CT CYCLES

CT4 NO. OF CT CYCLES

CT5 G-CSF 0 no 1 yes

CT6 CT DOSE REDUCTION 0 no 1 yes

CT7 POST-CHEMOTHERAPY COMPLICATIONS

0 no	7 nerve damage
1 anemia	8 liver damage
2 leukopenia	9 alopecia
3 thrombocytopenia	10 enanthema
4 nausea	11 exitus
5 vomiting	12 other (specify):
6 kidney damage	

KT8 RESULTS OF CHEMOTHERAPY

0 not assessed	4 clinically stable
1 not known	5 progression
2 clinically complete response	6 exitus
3 clinically partial response	

HT1 HORMONE THERAPY
0 none (go to HIST1) 1 yes

HT2 HORMONE THERAPY DRUG

HT3 HORMONE THERAPY DOSAGE

HT4 HORMONE THERAPY DURATION
FROM…….. UNTIL……

HT5 RESULTS OF HORMONE THERAPY

0 not assessed	4 clinically stable
1 not known	5 progression
2 clinically complete response	6 exitus
3 clinically partial response	

FIGURE 4. Surgery, radiotherapy, chemotherapy, and hormonal therapy. LND, lymph node dissection.

sive staging) chemotherapy can also be considered. In these cases clinical trials are encouraged. In carcinosarcoma and undifferentiated tumours chemotherapy is recommended. There is no standard of care for second-line chemotherapy in EC [30].

In advanced or recurrent endometroid EC hormone therapy is indicated [30]. Hormone receptor status (PgR and ER) should be determined before hormone therapy is initiated [30].

According to the 2009 FIGO staging formulation for EC and

HIST1 HISTOLOGY OF THE CERVICAL BIOPSY/ABRADANT
0 not performed
1 epithelium normal
2 carcinoma
3 other (specify):

HIST2 HISTOLOGY OF THE CORPUS BIOPSY/ABRADANT
0 not performed
1 epithelium normal
2 infection
3 hyperplasia without atypia
4 hyperplasia with atypia
5 complex hyperplasia without atypia
6 complex hyperplasia with atypia
7 adenocarcinoma G1 G2 G3
8 clear cell carcinoma
9 planocellular carcinoma
10 adenosquamous (mucoepidermoid) ca
11 undifferentiated carcinoma
12 leiomyosarcoma
13 endometrial stromal sarcoma
14 other (specify):

HIST3 FREE FLUID CYTOLOGY
0 not performed 2 suspicious
1 negative 3 positive
Note: positive cytology should be reported separately, without any stage modification

HIST4 SIZE OF UTERUS (mm)
1 length
2 thicknes
3 width

HIST5 ENDOMETRIAL HISTOLOGY
0 not performed
1 epithelium normal
2 infection
3 complex hyperplasia with atypia
4 endometrioid carcinoma
5 clear cell carcinoma
6 papillary serous adenocarcinoma
7 mucinous adenocarcinoma
8 ciliary body adenocarcinoma
9 secretory adenocarcinoma
10 mixed adenocarcinoma
11 planocellular carcinoma
12 adenosquamous (mucoepidermoid) ca
13 undifferentiated carcinoma
14 leiomyosarcoma (LMS)
15 endometrial stromal sarcoma (ESS)
16 carcinosarcoma (MMMT)
17 other (specify):

HIST6 TUMOR DIFFERENTIATION
0 not specified
1 G1
2 G2
3 G3

HIST7 DEPTH OF INVASION (mm)
0 no invasion
1 less than 1/2 of myometrial thickness
3 equal or more than 1/2 of myometrial thickness
4 on uterine surface (serous)
9 not specified

HIST8 CERVICAL HISTOLOGY
0 not performed
1 epithelium normal
2 carcinoma
3 other (specify):

HIST9 VAGINAL CUFF HISTOLOGY
0 not performed
1 epithelium normal
2 carcinoma
3 other (specify):

HIST10 LYMPHOVASCULAR INVASION
0 not performed
1 absent
2 present

HIST11 OVARIAN HISTOLOGY	**R**	**L**
0 normal tissue	0	0
1 retention cysts	1	1
2 benign tumor	2	2
3 malignant tumor	3	3
4 other (specify):		

HIST12 OVIDUCTAL HISTOLOGY	**R**	**L**
0 normal tissue	0	0
1 infection	1	1
2 malignant tumor	2	2
3 other (specify):	3	3

HIST13 SECONDARY SPREAD
0 none
1 adnexa 3 bowel
2 bladder 4 distant (specify):

HIST14 NO. of PELVIC NODES

HIST15 NO. of POSITIVE PELVIC NODES

HIST16 NO. of PARA-AORTIC NODES

HIST17 NO. of POSITIVE PARA-AORTIC NODES

HIST18 LYMPH NODE STATUS
0 negative
1 left pelvic pos. 3 para-aortic pos.
2 right pelvic pos. 4 N/A

HIST19 FIGO 2009 STAGE AFTER DEFINITIVE HISTOLOGY

0 atypical endometrial hyperplasia, pre-invasive carcinoma (carcinoma in situ)

tumor confined to corpus uteri
1 IA tumor limited to endometrium or invasion to less than 1/2 myometrial thickness
2 IB tumor invades 1/2 or > of myometrial thickness

cervical stromal invasion of tumor
3 II tumor invades cervical stroma, but does not extend beyond the uterus
(endocervical gland invasion is considered Stage I)

tumor invades beyond the uterus, but within pelvis minor and/or retroperitoneal lymph nodes
(local and/or regional extension)
4 IIIA tumor invades uterine serosa and/or adnexa

5 IIIB vaginal and/or parametrial involvement

IIIC pelvic and/or para-aortic lymph node involvement

6 IIIC1 pelvic lymph node involvement

7 IIIC2 para-aortic lymph node involvement, with or without pelvic node involvement

distant metastases or spread of the growth to bladder and/or rectal mucosa
8 IVA tumor invasion to bladder and/or rectal mucosa
9 IVB distant metastases including abdominal extrapelvic

FIGURE 5. Histopathology.

CYCLE	1	2	3	4	5	6
DATE						
WEIGHT (kg)						
HEIGHT (cm)						
SURFACE (m^2)						
WELLBEING 0 satisfied 1 neutral 2 dissatisfied						
EXAMINATION						
ULTRASOUND 0 NAD 2 ascites 1 tumor 3 other						
ABDOMINAL CT 0 NAD 2 tumor 1 ascites 3 other						
CHEST RADIOGRAPH 0 NAD 2 meta 1 hydrothorax 3 other						
PUNCTION 1 abdominal 2 chest						
CA 125						
S-creatinine (SC) ***creatinine clearance (CrCl)***						
DOSE REDUCTION (%)						
REASON FOR REDUCTION 1 ↓L 3 liver dysfunction 2 ↓T 4 renal dysfunction						
CYTOSTATIC 1 (mg)						
CYTOSTATIC 2 (mg)						
CYTOSTATIC 3 (mg)						
G-CSF (dose)						
ANTIEMETIC (mg)						
VOMITING 0 no 2 6–10x 1 1–5x 3 > 10x						

FIGURE 6. Adjuvant or neoadjuvant chemotherapy.

carcinosarcoma, a simplification from the 1988 FIGO classification, the task of pathologists has changed: they no longer need to distinguish superficial and no myometrial invasion; use cytological peritoneal washing assessment to inform stage; or differentiate between endocervical mucosal and endometrial involvement by tumor [33]. Interpathologist discrepancy rate of approximately 30% is reported proving that assessment of myometrial invasion can be difficult. Gynecological pathologists show a tendency to report smaller measurements than non-specialized pathologists [34].

Surgical staging in EC has evolved and sentinel lymph node (SLN) mapping has replaced a full pelvic and paraaortic

DATE	ENDOMETRIUM	EXAMINATION A outpatient H hospital	WELLBEING 0 satisfied 1 neutral 2 dissatisfied	PAIN 0 absent 1 mild/minimal 2 moderate 3 severe	DISCHARGE 0 absent 1 minimal 2 moderate 3 severe	BLEEDING/FLOW 0 absent 1 minimal 2 moderate 3 severe	MICTION 0 normal 1 dysuria 2 pollakiuria 3 incontinence 4 retention 5 fistula 6 other (details)	DEFECATION / BOWEL MOVEMENT 0 regular 1obstipation/constipation 2 diarrhea 3 fistula 4 ileus 5 artificial anus (anus praeter) 6 other (details)	BODY WEIGHT (kg)	EXAMINATION 0 NAD 1 tumor (size) 2 ascites 3 hydrothorax 4 vaginal metastasis 5 pelvic metastasis 6 other metastasis 7 necrosis 8 fistula 9 lymphoedema 10 cachexia 11 other (details)	ULTRASOUND 0 NAD 1 tumor 2 ascites 3 other (details)	PATHOLOGY LAB. RESULTS 0 bp 1 elevated SR 2 anemia 3 leukopenia 4 leukocytosis 5 thrombocytopenia 6 thrombocytosis 7 elevated CA 125 8 elevated CEA 9 elevated ferritin 10 UTI 11 other (details)	CONDITION ASSESSMENT 0 alive, no symptoms 1 alive, partial remission 2 alive, stable disease 3 alive, relapse 4 alive, progressive disease 5 alive, condition unknown 6 ex due to endometrial malignancy 7 ex during treatment 8 ex due to other disease, no endometrial cancer 9 ex due to other disease, endometrial cancer present 10 ex, cause unknown 11 condition unknown	NOTES
	BEFORE TH													
	MONTHS AFTER TH													

FIGURE 7. Follow-up form. UTI, urinary tract infection; NAD, nothing abnormal detected.

lymphadenectomy in several cases [35].

Usually, a closer clinical follow-up after treatment is carried out for more high-risk EC. No evidence from randomized or prospective study about the effect of routine follow-up on survival is available. Current approach to follow-up is based on results from retrospective trials with inherent risk of bias. The most important method for recurrence detection remains review of patient symptoms. Use of routine physical examinations, additional tests, or imaging does not improve survival. One in three of the women attending follow-up are faced with unmet needs, and alternative models for follow-up focused on survivorship care and empowerment should be tested [36].

It seems that soon along with changes in WHO classification, additions to inquiry will be required: genomic studies have led to better molecular classification of endometrial cancers, although translation into clinical practice has lagged behind these efforts. Molecular changes have potential clinical implications regarding diagnosis, treatment, and prognosis assessment [37]. Classifications are not set in stone. They evolve as new information appears. Updates should incorporate an evidence-based medicine approach regarding new knowledge [38–40].

Original data in Endometrial-Online are gathered in paper forms, so possibility always exists of an overwriting error. To keep the overwriting error as low as possible, the filling out of forms is always done by a medical specialist.

Hospital-based clinical registries cannot provide measures of the occurrence of cancer in a defined population. Regardless, collected data may be used to a certain extent, for epidemiological purpose.

5. Conclusions

Hospital-based clinical cancer registries play a vital role in evaluating clinical practice. It serves to enhance clinical work organisation, quality and disease management. They allow continuous comparison of treatment results with national and international standards. Data can also be used for research purposes and studies on cancer survivorship.

The Endometrial-Online computer program enables fast access and reliable processing of 139 different data obtained from EC patients, covering their general information, detailed history, pretreatment evaluation, treatment, and follow-up.

Limitation of the clinical registry might represent incomplete or incorrect data entry, which depends on several healthcare professionals involved in the diagnostic procedures, treatment, and follow-up of EC patients.

AUTHOR CONTRIBUTIONS

IT and DA designed the study, DA provided help in collecting data. IT and VGL wrote the manuscript. VGL and MS performed edits to the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] Dos Santos Silva I. Cancer Epidemiology: principles and methods. World Health Organization. International Agency for research on cancer: Lyon, France. 1999.

[2] Oncology Institute. Cancer Registry of Republic of Slovenia and Other Registries. 2022. Available at: https://www.onko-i.si/eng/crs/ (Accessed: 29 January 2022).

[3] Hočevar M. Klinični registri v onkologiji. Onkologija. 2011; 15: 14–17.

[4] Takač I, Ferletič M, Arko D, Gorišek B. Follow-up computer program for patients with ovarian malignancy. Računalniški program za spremljanje bolnic z rakom jajčnikov. In Bigec M, Lavrenčič D, Kokol P (eds.) Zbornik referatov II del. Proceedings part II (pp. 43–46). IMS. 1996.

[5] Takač I, Gorišek B. User friendly inquiry and computer program for following patients with ovarian malignancy. Archives of Gynecology and Obstetrics. 1999; 263: 60–68.

[6] Arko D, Takac I. Inquiry and computer program Onko-Online: 25 years of clinical registry for breast cancer at the University Medical Centre Maribor. Radiology and Oncology. 2019; 53: 348–356.

[7] Howlader N, Noone AM, Krapcho M, *et al*. SEER Cancer Statistics Review, 1975–2014. 2017. Available at: https://seer.cancer.gov/csr/1975_2014/ (Accessed: 29 January 2022).

[8] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, *et al*. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. A Cancer Journal for Clinicians. 2021; 71: 209–249.

[9] Zadnik V, Žagar T. SLORA: Slovenija in rak. Epidemiologija in register raka. Onkološki inštitut Ljubljana. 2021. Available at: www.slora.si (Accessed: 1 November 2021).

[10] Raglan O, Kalliala I, Markozannes G, Cividini S, Gunter MJ, Nautiyal J, *et al*. Risk factors for endometrial cancer: an umbrella review of the literature. International Journal of Cancer. 2019; 145: 1719–1730.

[11] Crosbie EJ, Zwahlen M, Kitchener HC, Egger M, Renehan AG. Body Mass Index, Hormone Replacement Therapy, and Endometrial Cancer Risk: a Meta-Analysis. Cancer Epidemiology Biomarkers & Prevention. 2010; 19: 3119–3130.

[12] Renehan AG, Tyson M, Egger M, Heller RF, Zwahlen M. Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies. Lancet. 2008; 371: 569–578.

[13] Haoula Z, Salman M, Atiomo W. Evaluating the association between endometrial cancer and polycystic ovary syndrome. Human Reproduction. 2012; 27: 1327–1331.

[14] McPherson CP, Sellers TA, Potter JD, Bostick RM, Folsom AR. Reproductive factors and risk of endometrial cancer. the Iowa Women's Health Study. American Journal of Epidemiology. 1996; 143: 1195–1202.

[15] Kitson SJ, Evans DG, Crosbie EJ. Identifying High-Risk Women for Endometrial Cancer Prevention Strategies: Proposal of an Endometrial Cancer Risk Prediction Model. Cancer Prevention Research. 2017; 10: 1–13.

[16] Fleming CA, Heneghan HM, O'Brien D, McCartan DP, McDermott EW, Prichard RS. Meta-analysis of the cumulative risk of endometrial malignancy and systematic review of endometrial surveillance in extended tamoxifen therapy. The British Journal of Surgery. 2018; 105: 1098–1106.

[17] MacKintosh ML, Crosbie EJ. Prevention Strategies in Endometrial Carcinoma. Current Oncology Reports. 2018; 20: 101.

[18] Tao MH, Xu WH, Zheng W, Zhang ZF, Gao YT, Ruan ZX, *et al*. Oral contraceptive and IUD use and endometrial cancer: a population-based case-control study in Shanghai, China. International Journal of Cancer. 2006; 119: 2142–2147.

[19] Allen N, Peto R, Beral V, Kan S, Reeves G, Sweetland S, *et al*. Endometrial cancer and oral contraceptives: an individual participant meta-analysis of 27 276 women with endometrial cancer from 36 epidemiological studies. The Lancet Oncology. 2015; 16: 1061–1070.

[20] Weiderpass E, Adami H-, Baron JA, Magnusson C, Bergstrom R, Lindgren A, *et al*. Risk of Endometrial Cancer Following Estrogen Replacement with and without Progestins. JNCI Journal of the National Cancer Institute. 1999; 91: 1131–1137.

[21] Rodriguez GC, Rimel B, Watkin W, Turbov JM, Barry C, Du H, *et al*. Progestin treatment induces apoptosis and modulates transforming growth factor-beta in the uterine endometrium. Cancer Epidemiology Biomarkers and Prevention. 2008; 17: 578–584.

[22] Dumesic DA, Lobo RA. Cancer risk and PCOS. Steroids. 2013; 78: 782–785.

[23] Jordan SJ, Na R, Johnatty SE, Wise LA, Adami HO, Brinton LA, *et al*. Breastfeeding and Endometrial Cancer Risk: an Analysis from the Epidemiology of Endometrial Cancer Consortium. Obstetrics and Gynecology. 2017; 129: 1059–1067.

[24] Zhan B, Liu X, Li F, Zhang D. Breastfeeding and the incidence of endometrial cancer: a meta-analysis. Oncotarget. 2015; 6: 38398–38409.

[25] Setiawan VW, Pike MC, Karageorgi S, Deming SL, Anderson K, Bernstein L, *et al*. Age at last birth in relation to risk of endometrial cancer: pooled analysis in the epidemiology of endometrial cancer consortium. American journal of epidemiology. 2012; 176: 269–278.

[26] Royal College of Obstetrics and Gynaecology, Guideline. Long-term consequences of polycystic ovary syndrome. 2014. Available at: https://www.rcog.org.uk/media/qmtlp2b0/gtg_33.pdf (Accessed: 29 January 2022).

[27] Neacşu A, Marcu ML, Stănică CD, Brăila AD, Pacu I, Ioan RG, *et al*. Clinical and morphological correlations in early diagnosis of endometrial cancer. Romanian Journal of Morphology and Embryology. 2018; 59: 527–531.

[28] Zuber TJ. Endometrial biopsy. American Family Physician. 2001; 63: 1131–1141.

[29] Develioglu OH, Bilgin T, Yalcin OT, Ozalp S. Transvaginal ultrasonography and uterine artery Doppler in diagnosing endometrial pathologies and carcinoma in postmenopausal bleeding. Archives of Gynecology and Obstetrics. 2003; 268: 175–180.

[30] Colombo N, Creutzberg C, Amant F, Bosse T, González-Martín A, Ledermann J, *et al*. ESMO-ESGO-ESTRO Consensus Conference on Endometrial Cancer: diagnosis, treatment and follow-up. Annals of Oncology. 2016; 27: 16–41.

[31] Šegedin B, Merlo S, Smrkolj S, Bebar S, Blatnik A, Cerar O, *et al*. Priporočila za obravnavo bolnic z rakom maternicnega telesa. Onkologija. 2018; 22: 96–114.

[32] WHO Classification of Tumours Editorial Board. Female Genital Tumours. WHO Classification of Tumours (pp. 632). 5th edn. World Health Organization: Switzerland. 2020.

[33] Masood M, Singh N. Endometrial carcinoma: changes to classification (WHO 2020). Diagnostic Histopathology. 2021; 27: 493–499.

[34] Ali A, Black D, Soslow RA. Difficulties in assessing the depth of myometrial invasion in endometrial carcinoma. International Journal of Gynecological Pathology. 2007; 26: 115–123.

[35] Bellaminutti S, Bonollo M, Gasparri ML, Clivio L, Migliora P, Mazzucchelli L, *et al*. Sentinel lymph node intraoperative analysis in

endometrial cancer. Journal of Cancer Research and Clinical Oncology. 2020; 146: 3199–3205.

[36] Jeppesen MM, Mogensen O, Hansen DG, Bergholdt SH, Jensen PT. How do we Follow up Patients with Endometrial Cancer? Current Oncology Reports. 2019; 21: 57.

[37] Lu KH, Broaddus RR. Endometrial Cancer. New England Journal of Medicine. 2020; 383: 2053–2064.

[38] Cree IA, White VA, Indave BI, Lokuhetty D. Revising the WHO classification: female genital tract tumours. Histopathology. 2020; 76: 151–156.

[39] Raffone A, Travaglino A, Raimondo D, Boccellino MP, Maletta M, Borghese G, *et al*. Tumor-infiltrating lymphocytes and POLE mutation in endometrial carcinoma. Gynecologic Oncology. 2021; 161: 621–628.

[40] Habiba M, Pluchino N, Petignat P, Bianchi P, Brosens IA, Benagiano G. Adenomyosis and Endometrial Cancer: Literature Review. Gynecologic and Obstetric Investigation. 2018; 83: 313–328.

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