

# Online tumor conference in the clinical management of gynecological cancer: experience from a pilot study in Germany

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**Abstract.** Chekerov R, Denkert C, Boehmer D, Suesse A, Widing A, Ruhmland B, Giese A, Mustea A, Lichtenegger W, Sehouli J. Online tumor conference in the clinical management of gynecological cancer: experience from a pilot study in Germany. *Int J Gynecol Cancer* 2007.

The concept of the online tumor conference was established in 2004 as a pilot project. We developed specific web-based software to organize and conduct online tumor board meetings of gynecologists, surgeons, radiologists, oncologists, and pathologists from different hospitals and gynecological practitioners, discussing individual patient's cases, defining therapy options, and exchanging clinical experience. Following a didactic approach, patient data are presented to the participants, with a special focus toward patient's preference and late toxicity from prior therapy. Then different national (eg, Arbeitsgemeinschaft Gynaekologische Onkologie, Deutsche Gesellschaft für Gynaekologie und Geburtshilfe) and international guidelines (eg, American Society of Clinical Oncology, National Cancer Institute), current study results based on literature review and open clinical trials are discussed. An individual diagnosis and therapy recommendation for each patient is reached by consensus. All protocols, guidelines, and publication data are upgraded and dispersed via Internet for all participants. In the period from December 2004 to August 2006, 39 tumor board conferences were performed with a total of 667 participants. One hundred forty-four patients' cases were presented, and 121 peer-reviewed second-opinions were sought. In an anonymous survey, 84% of the participants reported to be satisfied with the information content and 72% with the technical support. Overall 98% of the individual therapy recommendations were accepted and implemented. The tumor board conference presents an optimal possibility for extensive scientific discussions and exchange (92%) and improves advanced educational training (81%). In conclusion, the online tumor conference is feasible and represents a time-saving possibility for gynecological oncologist to receive a treatment recommendation based on the best available clinical and scientific evidence.

KEYWORDS: gynecological cancer, online tumor conference, therapy management.

The management of gynecological malignancies requires a multimodal approach based on current individualized and risk adapted therapy concepts. Because of increasing incidence of cancer in the western world,

the guarantee of "state of the art" treatment for cancer patients becomes more important<sup>(1)</sup>. Tumor board meetings are a basic element in hospital procedures for treatment planning, follow-up care, and education.

Development of new multimodal treatment concepts marks a change in the management of gynecological cancers in the last years. Optimization of standards in patient care is only possible by systematic and permanent clinical research activities<sup>(2)</sup>. There is an increased need for development and widespread implementation

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of national and international guidelines in daily clinical practice. Different surveys reported an insufficient translation of guidelines and new study results in the clinical day of the physicians<sup>(3)</sup>.

Hospitals with focus on cancer treatment in gynecology are required to organize interdisciplinary tumor board meetings<sup>(4)</sup>. Tumor conferences can optimize the clinical cooperation and quality of therapy management. Tumor boards also play an important role as second-opinion centers and can help to increase the recruiting rates for clinical trials. They act as an important quality assurance instrument for patient care.

There is no doubt of the high need for tumor boards, whereas there are only few publications investigating the effects on the management for the clinical day. Surveys of treatment quality for ovarian cancer patients in Germany have shown that participation in clinical trials (by an institute) can be one of the selection criteria for patients and physicians when choosing an institution for treatment, because of the better quality of care even though individual factors might hamper enrolment in a study<sup>(4)</sup>.

Classic tumor conferences require a substantial amount of preparation time. Participation of general practitioners or colleges from other hospitals is restricted because of limited time resources and geographical distance. The organization and preparation of regular meetings requires enormous individual engagement from the involved medical personnel. Therefore many institutions have abandoned tumor conferences because the cost in preparation time outweighs the clinical benefits achieved<sup>(5,6)</sup>. Institutional studies reported the valuable role of tumor boards for final diagnosis and treatment planning especially in the palliative setting<sup>(7)</sup>.

To improve the clinical acceptance of tumor conference, we developed an online tumor conference as a pilot project using an innovative interdisciplinary concept. This new type of web-based tumor board enables clinicians and practicing gynecological oncologists from all parts of Germany to present their own patients' cases and to participate effectively in all discussions. The successful establishment of this concept in the clinical management of gynecological malignancies in hospital institutions in association with general practitioners and colleges from different hospitals is described in this paper.

## Materials and methods

The online tumor conference was established in 2004 as a pilot project for oncologic health care in the Department of Obstetrics and Gynecology, Campus

Virchow, Charité University Hospital, Berlin. This study includes all patients with adjuvant or recurrent gynecological cancer discussed in the online board meetings of the last 20 months. Specialists from the Departments of Surgery, Radiotherapy, Pathology, Oncology from Charité University Hospital, Berlin participate regularly in the meetings. Thirty-four other external gynecological hospitals, including four university hospitals, as well as 41 general practicing gynecological oncologists and medical oncologists were also involved in the project.

The online tumor conference is scheduled two times per month for 1 hour to discuss complex cancer cases, which require an interdisciplinary approach. All presented cases are submitted for receiving a recommendation for further treatment. The criteria for case presentation at the tumor board meeting include all gynecological cancers in adjuvant or recurrent disease stage, recently operated or otherwise pretreated patients, and patients with difficult comorbidity constellations.

The concept of the online tumor conference is based on an audiovisual communication approach. All participating colleagues are able to log in to the online sessions via Internet and to be involved in the case discussions (<http://www.online-tumorkonferenz.de>). In the coordinating center (Department of Obstetrics and Gynecology, Charité University Hospital, Berlin), all patient data are prepared on slides and presented during the session as powerpoint presentation (Microsoft Office PowerPoint 2000) on the tumor conference homepage. All interconnected participants can follow this audiovisual meeting live on their own computers. After the presentation the interactive discussion between all participants begins (Fig. 1).

The main time-consuming procedure during preparing the scenario for heavily pretreated patients is to get all relevant patient data. An exclusive tumor conference manager was established to organize the meetings. The tumor conference manager is a physician in training to gynecology and obstetrics. Most participants send the patient's data via facsimile. The conference manager reviews all documents and enters the relevant information into the electronic documentation tool, using a special screening protocol. Following this procedure, adequate documentation of all important prognostic and predictive clinical parameters, performance indices, quality of life aspects, and patient's preferences are entered in the patient presentation for the forthcoming meeting (see Table 1). All the patients' documents and prepared slides for the presentation will be also reviewed by an experienced and approved gynecological oncologist (J.S.). He is trained

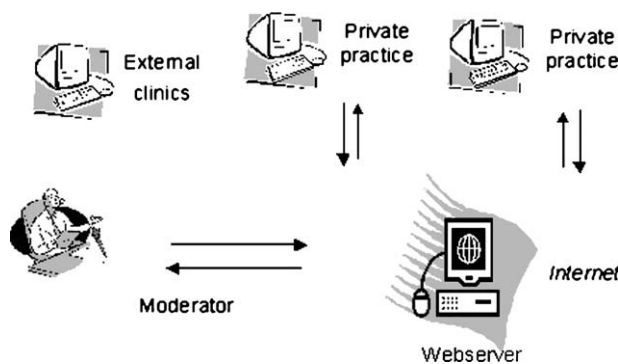
**Table 1.** Screening protocol schedule for the preparation and presentation of the patient data

Questionnaire for patient data screening and presentation
Diagnosis
Date of first diagnosis
Relevant comorbidity
Histologic classification
Tumor stage (TNM, FIGO-stage)
Tumor marker value (CA125, CA72-4, CA19-9, CEA, βHCG etc.)
Adjuvant therapy (surgery, chemotherapy, irradiation, etc.)
Response
Follow-up data (tumor-free period, time to recurrence)
Recurrence (date, diagnostic, therapy)
Recurrence therapy (surgery, chemotherapy, irradiation, etc.)
Response
Performance status (ECOG)
Actual clinic troubles
Ability for ambulant therapy
Patient's preference
Question/s to the tumor board

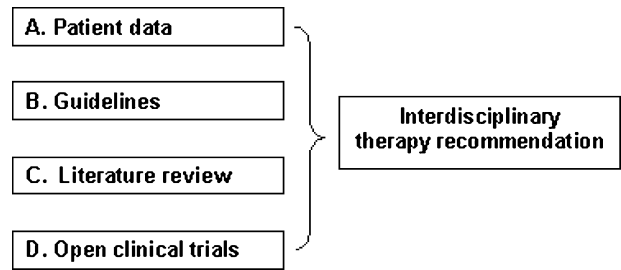
ECOG, Eastern Cooperative Oncology Group; HCG, human chorionic gonadotropin; TNM, Tumor, Nodes, Metastasis.

in teaching evidence-based medicine and is the principle investigator of various phase I, II, and III clinical trials. In particular, difficult pathology cases are verified by reference pathologist (C.D.). Some individual cases required review of all external diagnostic findings, like computed tomography or magnetic resonance imaging scans.

The meetings are moderated online from the Department of Obstetrics and Gynecology, Campus Virchow, Charité University Hospital, Berlin by the head of Gynecological Department (W.L.) or by his vice director (J.S.). The patient's presentation follows a predetermined scenario. The attending physician reviews systematically the case history, physical examination, surgical and diagnostic findings, and current symptoms at the beginning of each presentation (see Fig. 2, step A). A special focus is put on the patient's



**Figure 1.** For the online tumor board meetings, we use an Internet-based web server. The participants log in at the time of the session and discuss live the ongoing online anonymous patient's case.



**Figure 2.** The interdisciplinary therapy recommendation process is based on didactical scenario for the systematic case presentation: A) current data and patient's preferences with open questions to the conference, B) national and international guidelines, C) discussion of study results after literature review and new preclinical data, and D) presentation of open clinical trials.

preferences to therapy and relevant late toxicity of prior chemotherapy or other interventions (eg, irradiation). Guidelines of the German–Arbeitsgemeinschaft Gynaekologische Onkologie ([www.ago-online.com](http://www.ago-online.com)), NCI ([www.cancer.gov](http://www.cancer.gov)), and latest ASCO statements ([www.asco.org](http://www.asco.org)) are introduced in the form of brief teaching points relevant to the presented case (step B). Current study protocol and new scientific results are presented according to the Internet-based literature review ([www.pubmedcentral.nih.gov](http://www.pubmedcentral.nih.gov), [www.cochrane.org](http://www.cochrane.org), [www.ago-ovar.de](http://www.ago-ovar.de)) (step C). Suggestions for participation in open national and international clinical trials are offered in a pretrial screening process<sup>(8)</sup>. Based on this information, an individual diagnostic and therapy recommendation for each patient's case is formed by consensus (step D). All pooled data are summarized in patient's guideline, publication source, and clinical trial in an online accessible database for all members of the network.

Special web-based software has been developed for this project in cooperation with a professional contract research organization (Alcedis GmbH). The software provides all features for an efficient submission and management of clinical data. A main feature is the facility to process and convert different formats of patient's documents into a format that can be displayed in a conventional web-browser. Data security of the system complies with national standards and recommendations. All the patient's data are transmitted in an anonymous fashion.

Upon formal registration each participant may submit new cases for screening. The screening process and the monitoring of updates of international guidelines and national standards are conducted by the conference manager. Actualization of clinical data and access to all databases is possible online 24 hours a day. Within 48 hours after the conference, protocols are generated automatically and will be sent to all participants.

We prospectively reviewed in 6 months queries about the follow-up of the included patients and the therapy compliance. Furthermore, we performed this survey using a structured questionnaire. This questionnaire focused on the technical and qualitative aspects of the tumor conference. Critical feedback from the participating institutions was also requested.

Statistical analysis was performed using SPSS statistical software for Windows (SPSS Inc., Chicago, IL). A value of  $P < 0.05$  is described as statistically significant. Status reports were published every half a year. The Ethics Committee of the Charité University Hospital approved the study protocol. In addition, this project was approved as certified medical education by the Berlin Chamber of Physicians and was supported by various German societies: Nord-Ostdeutsche Gesellschaft fuer Gynaekologische Onkologie, Arbeitsgemeinschaft Gynaekologische Onkologie, and Bundesverband Niedergelassener Gynaekologischer Onkologen.

## Results

In the period from December 2004 to August 2006, 39 online tumor board meetings took place and 144 cases were presented. Per conference, an average of four patient's cases with a range from two to seven cases were presented for discussion. The mean age of the study population was  $57.5 \pm 14.3$  (SD) and the median age was 61.5 years. The youngest patient was 16 years and the oldest 82 years at the time of the case discussion.

To date, a total of 667 medical professionals have taken part in the meetings. Three hundred seventy-one were physicians from Charité University Hospital and 296 online participants were physicians from private practices and other hospitals. Many physicians take part regularly in the tumor board meetings and present several patient's cases. The median participation of all members of the network was six tumor conferences. The ranking list of all participants is published on the homepage of the tumor conference network ([www.online-tumorkonferenz.de](http://www.online-tumorkonferenz.de)). Per session, a median of 17 participants were logged online. Additionally 121 second-opinions were peer-reviewed in this network.

Table 2 describes the variety of the 144 patient's cases according to the primary histology. Ovarian cancer was the most common cancer (41 cases), followed by cervical cancer (21 cases), and 19 patients with endometrial cancer. At the adjuvant stage of the disease were 9 patients with ovarian cancer, 9 patients with cervical cancer, and 11 women with endometrial can-

**Table 2.** Characterization of the 144 presented patient's casuistics classified by histology in the period from December 2004 to August 2006

Localization	Histologic diagnosis	Incidence
Vulva	Squamous cell carcinoma	2
	Rhabdomyosarcoma	1
Vagina	Squamous cell carcinoma	2
	Gastrointestinal stromal tumor, initially from the vagina	1
Cervix	Squamous cell carcinoma	24
	Adenocarcinoma	2
	Malignant mixed müllerian tumor of the cervix	1
Uterus	Endometrioid adenocarcinoma	14
	Serous adenocarcinoma	6
	Endometrial stromal sarcoma	4
	Leiomyosarcoma	3
	Malignant mixed müllerian tumor of the uterus	2
Fallopian tube	Adenocarcinoma of the fallopian tube	2
Ovary	Borderline tumors of the ovary	4
	Serous ovarian carcinoma	32
	Endometrioid ovarian carcinoma	7
	Mucinous ovarian carcinoma	4
	Clear cell ovarian carcinoma	4
	Malignant mixed müllerian tumor of the ovary	3
	Transitional cell carcinoma	1
	Adenosquamous carcinoma	1
	Sarcoma of the ovary	1
	Granulosa-stromal cell tumor	6
	Sertoli-stromal cell tumors	2
	Wolffian adnexal tumor	1
	Dermoid-cyst with stromal carcinoid	1
	Yolk sac tumor	1
	Mature teratoma with struma ovarii)	1
	Immature malignant teratoma	1
	Neuroendocrine tumor of the ovary	1
	Metastatic colorectal adenocarcinoma (ovary)	2
	Metastatic carcinoid ovary (intestinal origin)	1
	Pseudomyxoma peritonei	1
Nevoid basal cell carcinoma syndrome	1	
Peritoneum	Primary peritoneal carcinoma	3
Others	Perivascular epithelioid cell tumor	1
Sum of all patient's cases		144

cer. In the recurrence setting, we discussed 16 patients with platinum sensitive and 16 with resistant ovarian cancers, as well as 12 recurrence cases of cervical cancer and 8 of endometrial cancer. Overall 24 patients with primary epithelial ovarian cancer were presented

in the online sessions, where 8 patients received prior neoadjuvant platin-based chemotherapy. Patients presenting with recurrent ovarian cancer ( $n = 25$ ) showed significant heavy pretreatment: 64% received two different antineoplastic therapies ( $n = 16$ ) and 36% (9 patients) were more than twice pretreated (mostly third- or fourth-line chemotherapy). From 26 cases with cervical cancer (squamous cell and adenocarcinoma), 9 patients at recurrent stage of the disease were pretreated as follows: 6 patients with progressive disease after first-line radiochemotherapy and 3 patients with more than two pretreatments. Overall 29 patients with adenocarcinoma, stromal sarcoma, or malignant mixed müllerian tumor of the uterus were discussed in the tumor conferences, where 8 patients were presented with progressive disease after first-line therapy and 10 patients were more than twice pretreated.

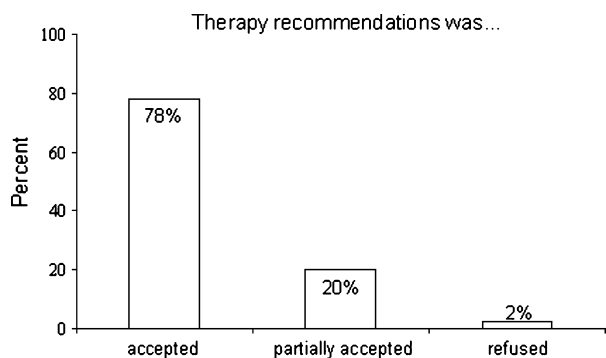
Besides these common diagnoses, we also had presented a lot of "interesting" rare tumor cases and some patients with complex comorbidities. For example, a special interest case was that of a 16-year-old woman in the 29th week of pregnancy with accidentally diagnosed alveolar rhabdomyosarcoma of the left labia majora. We discussed also the case of a woman with rare (less than 50 cases published) diagnosis of a Wolffian adnexal tumor<sup>(9,10)</sup>. We presented and discussed prospectively and interdisciplinary also a case of perivascular epithelioid cell tumor<sup>(11)</sup>, a rare gastrointestinal stromal tumor patient<sup>(12)</sup>, and a Struma ovarii casuistic<sup>(13)</sup>. Also rare sex cord-stromal and germ cell ovarian tumors were presented among patients' cases in our online boards (see Table 2). Additionally, during the process of casuistic preparation, each histologic diagnosis was short-reviewed by our partner pathologist (C.D.). In 33 cases (22.9%) a second histology survey was organized. Here, three cases were reclassified and revised diagnosis had significant impact on the clinical management of the disease.

Within all 144 patients the therapy recommendations were as follows: 55% (93 patients) chemotherapy, 20.7% ( $n = 35$ ) surgical intervention, 14.2% ( $n = 24$ ) further diagnostics, 8.3% ( $n = 14$ ) irradiation and chemotherapy, 5.3% ( $n = 9$ ) hormonal/biological therapy, and 2.4% ( $n = 4$ ) irradiation alone, where some patient recommendations were multiple counted. From all 144 patients, 29 received recommendation for treatment in clinical trial. Seventeen of the patients (58%) were included and successfully treated in clinical trials. Most frequent barrier for nonparticipating into a clinical trial was based on organizational difficulties, like unacceptable geographical distance to study centers.

Within the 121, peer-reviewed second opinions following diagnoses were evaluated: 68% ovarian carcinoma and other nonepithelial ovarian malignancies, 14% cervical cancer, 10% uterine cancers, and 8% vulva or vaginal cancer. In five cases, recommendation for inclusion into clinical trials was given. Two patients (40%) conformed to the study protocol and included in the trials.

Specialists from the Departments of Surgery, Radiotherapy, Pathology, Oncology from the Charité, Campus Virchow and Mitte of the University Hospital in Berlin participate regularly in the meetings. In special cases with specific constellation of multiple comorbidity and discussion of surgery or question of pain management, anesthesiologists were invited to the conferences ( $n = 7$ ). In the case of the 16-year-old patient with rhabdomyosarcoma of the vulva, in multiple sessions pediatricians took part in the discussion. Other disciplines like urology and gastroenterology are invited in only specific cases ( $n = 5$  and  $n = 3$ , respectively).

In the first 6-month evaluation 43 (57%) participants responded to our questionnaire. It includes different group of questions with the possibility of several answers. All of the questions were answered and received via facsimile to us. On the second evaluation 51 (68%) participants took part. One part of the questions asked the acceptance and implementation of the therapy recommendations. Here 30 institutions and gynecological oncologists took part. Ninety-six percent of the participants were satisfied with the methodical and didactical assemblage of the suggested topics, 92% found the case selection relevant, and for 88% there was a benefit for their clinical practice. Seventy-two percent found the technical support good and 28% satisfying. The software was easy to operate for 80% of the participants. Eighty-four percent described the design of the web user interface as good. Also the service management of the moderation unit was evaluated as good (84%). The possibility for taking part on an online tumor board was evaluated as very important because of its time saving (72% large, 20% moderate, and 8% no) benefit. For 92% of the participants, the online tumor conference is an optimal instrument to support difficult diagnostic and therapeutic decisions. An important outcome of participation was that 78% of the individual recommendations were accepted, 20% of the recommendations were partially accepted and implemented after the session (Fig. 3). In the case of partial acceptance of the recommendation, we asked the participants what the reason was and which part exactly was accepted from the patient. The most common reasons were that patients



**Figure 3.** Results of the anonymous survey about the compliance rate of the therapy recommendation and implementation: 78% of the therapy recommendations were accepted, 20% were partially accepted, and 2% of the recommendations were refused.

become clinically worse and are not able to receive the recommended therapy. In only some cases the patients accepted chemotherapy but not the recommended surgery ( $n = 3$ ). The participation in the online conference gave an optimal possibility for extensive scientific discussion, exchange of information (for 92% of the participants), and advanced educational training (81%). We presented these data in a separate meeting where we discussed with our conference partners various possibilities for changes in the online system, aimed at increasing our efficacy.

## Discussion

Tumor conferences are an important element in the multimodal management of gynecological malignancies. Therefore, an interdisciplinary discussion is a cornerstone for a clinical management<sup>(1,3)</sup>. Despite the fact that most national and international guidelines for cancer treatment demand the establishment of interdisciplinary tumor boards, there is very limited data about results of tumor conferences in clinical practice<sup>(7,14)</sup>.

In this pilot study using web-based technology, we could demonstrate a high acceptance and the feasibility of this approach. In our opinion, one main advantage of this concept seems to be the easy participation by private practices and clinicians via Internet without the necessity to physically join the tumor board. Different surveys reported the high importance of the Internet in clinical practice for physicians<sup>(15,16)</sup>.

The increase of medical knowledge is in contrast to the limited time resources of the physicians in daily clinical practice. Chen and Siu<sup>(17)</sup> reported that 50% of all physicians are updating their medical knowledge through use of the Internet. In this context, we believe that our systematic approach to discussion of current

guidelines and recent study results offers an optimal tool of continuous education integrated into clinical routine. Coleman<sup>(14)</sup> reported at the ASCO 2003 annual meeting on the role of the multidisciplinary tumor board as a successful educational opportunity for treatment teams and postgraduate staff.

Based on the virtual connection of practice and hospital, we think we can reduce the cost of clinical management. Patients do not have to visit the clinic for second opinion personally. Redundant and unnecessary diagnostic measurements will be avoided. A detailed cost and efficiency analyses were not performed in the present study but should be investigated in future concepts.

In this project, we attempt to formulate transparently an individual recommendation for therapy. So, all relevant guidelines and studies were presented with detailed references. We believe that this is also a reason for the high compliance rate of our treatment recommendation. The median follow-up in our present analysis is 10 months. A significant longer observation time is required to evaluate progression-free survival and overall survival. These results will be published. The high heterogeneity of the tumors and the limited number of patients will impede the interpretation. Nevertheless, the impact of our conference on education and study enrollment are also important objectives and should be analyzed.

In conclusion, our concept of multi-institutional online tumor conference is feasible and offers an effective medium for the discussion of individual cases based upon the best available clinical and scientific evidence. Further analyses should focus on cost-efficacy and the effects on study recruitment.

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