



# Cost-effectiveness of early palliative care intervention in recurrent platinum-resistant ovarian cancer<sup>☆</sup>

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## HIGHLIGHTS

- Palliative care intervention may decrease resource utilization in patients with advanced cancer.
- We constructed a decision model evaluating routine care versus early palliative care intervention in platinum resistant ovarian cancer.
- Early palliative care intervention is potentially cost effective in end of life care in women with ovarian cancer.

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## ABSTRACT

**Objective.** To determine if early palliative care intervention in patients with recurrent, platinum-resistant ovarian cancer is potentially cost saving or cost-effective.

**Methods.** A decision model with a 6 month time horizon evaluated routine care versus routine care plus early referral to a palliative medicine specialist (EPC) for recurrent platinum-resistant ovarian cancer. Model parameters included rates of inpatient admissions, emergency department (ED) visits, chemotherapy administration, and quality of life (QOL). From published ovarian cancer data, we assumed baseline rates over the final 6 months: hospitalization 70%, chemotherapy 60%, and ED visit 30%. Published data from a randomized trial evaluating EPC in metastatic lung cancer were used to model odds ratios (ORs) for potential reductions in hospitalization (OR 0.69), chemotherapy (OR 0.77), and emergency department care (OR 0.74) and improvement in QOL (OR 1.07). The costs of hospitalization, ED visit, chemotherapy, and EPC were based on published data. Ranges were used for sensitivity analysis. Effectiveness was quantified in quality adjusted life years (QALYs); survival was assumed equivalent between strategies.

**Results.** EPC was associated with a cost savings of \$1285 per patient over routine care. In sensitivity analysis incorporating QOL, EPC was either dominant or cost-effective, with an incremental cost-effectiveness ratio (ICER) <\$50,000/QALY, unless the cost of outpatient EPC exceeded \$2400. Assuming no clinical benefit other than QOL (no change in chemotherapy administration, hospitalizations or ED visits), EPC remained highly cost-effective with ICER \$37,440/QALY.

**Conclusion.** Early palliative care intervention has the potential to reduce costs associated with end of life care in patients with ovarian cancer.

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## Introduction

Despite advances in the treatment of ovarian cancer, advanced stage disease carries a poor prognosis. It is estimated that in 2012, there will be 22,280 women diagnosed with ovarian cancer resulting in 15,500

deaths [1]. The majority of women will have a durable response to frontline treatment with a combination of surgery and chemotherapy, consisting of a taxane and platinum agent. However, approximately 20% of patients will have platinum-resistant disease, defined by the Gynecologic Oncology Group as the recurrence of disease less than 6 months from the completion of primary therapy, with a median life expectancy of approximately 12 months [2]. In patients with platinum-resistant disease, response to additional platinum-based therapies is approximately 10% [3]. Multiple nonplatinum chemotherapeutic and biologic agents have been evaluated in this subset of patients with only modest gains in overall life expectancy [4–8].

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Palliative care is patient/family centered care that focuses on maximizing quality of life by providing expert management of symptoms, psychosocial support, and assistance with complex medical decision-making. The prevalence of palliative care teams in US hospitals increased 148% between 2000 and 2010, and more than 87% of hospitals with greater than 300 beds have a palliative care team [9]. According to the National Comprehensive Cancer Network (NCCN) guidelines, palliative care begins at diagnosis and should be delivered concurrently with disease-directed, life-prolonging therapies. Palliative care should be initiated by the primary oncology team and augmented by the collaboration with an interdisciplinary team of palliative care experts [10]. Despite the increasing availability of palliative care and recognition that it can improve quality of life (QOL), there is often a delay in referral to a palliative care service, and when consultations are made it is often late in the disease course [11,12]. Kumar et al. interviewed cancer patients in a large outpatient academic practice and found that only 8.3% of patients had utilized specialty palliative care services, with the most commonly reported barrier being the lack of knowledge of these services and the lack of physician referral [11]. In a review of the women who died of gynecologic malignancies from 2006 to 2009 at their institution, Fauci et al. found that 70.5% of patients were referred to hospice or palliative care, but the median time between hospice enrollment and death was only 22 days [12]. The optimal role of the palliative care physician in the management of terminally ill cancer patients is still being defined.

A randomized controlled trial by Temel et al. in patients with metastatic non-small cell lung cancer has demonstrated that early palliative care intervention is effective in decreasing hospital admissions, emergency department (ED) visits, and chemotherapy administration in the last 30 days of life [13]. Patients who received early palliative care intervention had both a significant improvement in quality of life and an increase in median survival. Similar to ovarian cancer which has an average life expectancy of less than 12 months after diagnosis of platinum-resistance [4,14], metastatic non-small cell lung cancer demonstrates an aggressive clinical course with an average life expectancy of less than 12 months, and the majority of patients with both of these cancers experience symptoms of fatigue, anorexia, dyspnea, and pain [15]. The purpose of our study was to evaluate through modeling whether early palliative care intervention in patients with recurrent, platinum-resistant ovarian cancer has the potential to be cost saving or cost-effective.

## Materials and methods

A decision model was constructed with a time horizon of 6 months to evaluate two clinical management strategies: (1) routine care; and (2) early palliative care intervention in patients with recurrent platinum-resistant ovarian cancer. A time horizon of 6 months was chosen to reflect the early effects of palliative care intervention as late intervention has not been shown to meaningfully alter quality of life [16,17]. In both strategies, a patient would receive routine care at the discretion of the treating oncologist. We defined early palliative care as the initiation of outpatient palliative care at the time of diagnosis of platinum-resistance. Patients randomized to early palliative care would meet with a palliative care provider monthly to address symptoms, goals of care, and to assist with decision making regarding proposed treatments. Patients receiving routine care would only be referred to a palliative care provider at the discretion of the treating physician or at the request of the patient or family. The primary model outcome was the average cost of care in each strategy. Data from a published randomized controlled trial (RCT) by Temel et al. evaluating early palliative care intervention in patients with metastatic non-small cell lung cancer were used to inform the model [13]. The simplifying key assumptions of a decision model are made in the absence of concrete data to allow us to compare strategies. In formulating the key assumptions, we made conservative estimates in order to err on

the side of favoring the routine care strategy. Key assumptions of the model: (1) for purposes of cost calculation, all patients who were admitted to the hospital were assumed to be admitted once and all patients seen in the emergency department were assumed to be seen once during the 6 month time horizon; (2) we assumed that the chemotherapy regimen was identical in both arms; for simplicity we assumed the use of liposomal doxorubicin in this population; (3) patients receiving early palliative care were seen as outpatients for an initial visit followed by 5 subsequent monthly visits; (4) QOL was not incorporated into the base case model; and (5) given that there are no data regarding the impact of early palliative care intervention on overall survival in patients with platinum-resistant ovarian cancer, we assumed equivalent survival between those receiving EPC and those receiving routine care. Key assumptions were examined in sensitivity analysis.

## Clinical estimates

Clinical estimates and their ranges are listed in Table 1. Outcomes that differed significantly between the EPC and usual care strategies in the prior RCT by Temel et al. (rates of inpatient admissions, ED visits, and chemotherapy administration) were included in the model (Fig. 1). We estimated inpatient hospitalizations, ED visits, and chemotherapy administrations in the routine care group based on available ovarian cancer data [12,13,18,19]. We calculated odds ratios (ORs) for reductions in these events when EPC was introduced, based on what was observed in the prior RCT. The ORs for each clinical event (0.69 for hospitalizations, 0.74 for ED visits, and 0.77 for chemotherapy administration) were applied to the baseline event rates in ovarian cancer to determine their rates in the EPC group. This resulted in the base case assumption that EPC in the ovarian cancer population would potentially result in a reduction in hospitalizations from 70% to 48%, in ED visits from 30% to 22% and in chemotherapy administration from 60% to 46% during the last 6 months of life.

## Costs

Costs are in US dollars and listed in Table 2. The cost of palliative care was estimated as the 2012 Medicare reimbursement for an initial high complexity encounter (CPT 99215) followed by moderately high complexity visits (CPT 99214) every 4 weeks (four follow up visits; [www.cms.gov](http://www.cms.gov)). The cost of hospitalization was estimated as the mean cost of inpatient hospitalization for a diagnosis of small bowel obstruction, one of the most common reasons for admission at the end of life in ovarian cancer, using the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project (<http://hcupnet.ahrq.gov>). The cost of an ED visit was derived as the average total payment from all sources for an ED visit using the AHRQ's Medical Expenditure Panel Survey ([http://meps.ahrq.gov/mepsweb/data\\_files/publications/st111/stat111.shtml](http://meps.ahrq.gov/mepsweb/data_files/publications/st111/stat111.shtml)). The cost of chemotherapy was estimated using Medicare reimbursement data using CPT codes and drug J codes and included

**Table 1**  
Clinical parameter estimates. Ranges were used for sensitivity analysis.

| Clinical parameter                            | Estimate | Range*                    | Source  |
|---|----------|---------------------------|---------|
| Routine care                                  |          |                           |         |
| Hospitalization rate                          | 70%      | 53–87%                    | [12]    |
| Emergency department visit rate               | 30%      | 23–37%                    | [18]    |
| Chemotherapy administration rate              | 60%      | 45–75%                    | [12,19] |
| Health-related QOL utility score              | 0.67     | Sensitivity analysis only | [20]    |
| OR with introduction of early palliative care |          |                           |         |
| Hospitalizations                              | 0.69     | 0.52–0.86                 | [13]    |
| Emergency department visit                    | 0.74     | 0.56–0.94                 | [13]    |
| Chemotherapy administration                   | 0.77     | 0.58–0.96                 | [13]    |
| Quality of life                               | 1.07     | Sensitivity analysis only | [13]    |

\* The range of the clinical estimates was varied  $\pm 25\%$  for the sensitivity analysis.

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