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Cost-effectiveness of prophylaxis treatment strategies for febrile neutropenia in patients with recurrent ovarian cancer

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HIGHLIGHTS

- Primary prophylaxis with pegfilgrastim was cost effective compared to secondary prophylaxis in recurrent ovarian cancer patients receiving docetaxel.
- Primary prophylaxis with pegfilgrastim dominated other strategies in recurrent ovarian cancer patients receiving docetaxel.
- Primary prophylaxis with pegfilgrastim dominated all comparators in recurrent ovarian cancer patients receiving topotecan.

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ABSTRACT

Objective. Evaluate the cost-effectiveness of primary prophylaxis (PP) or secondary prophylaxis (SP) with pegfilgrastim, filgrastim (6-day and 11-day), or no prophylaxis to reduce the risk of febrile neutropenia (FN) in patients with recurrent ovarian cancer receiving docetaxel or topotecan.

Methods. A Markov model was used to evaluate the cost-effectiveness of PP vs SP from a US payer perspective. Model inputs, including the efficacy of each strategy (relative risk of FN with prophylaxis compared to no prophylaxis) and mortality, costs, and utility values were estimated from public sources and peer-reviewed publications. Incremental cost-effectiveness was evaluated in terms of net cost per FN event avoided, incremental cost per life-year saved (LYS), and incremental cost per quality-adjusted life-year (QALY) gained over a lifetime horizon. Deterministic and probabilistic sensitivity analyses (DSA and PSA) were conducted.

Results. For patients receiving docetaxel, the incremental cost-effectiveness ratio (ICER) for PP vs SP with pegfilgrastim was $7900 per QALY gained, and PP with pegfilgrastim dominated all other comparators. For patients receiving topotecan, PP with pegfilgrastim dominated all comparators. Model results were most sensitive to baseline FN risk. PP vs SP with pegfilgrastim was cost effective in 68% and 83% of simulations for docetaxel and in >99% of simulations for topotecan at willingness-to-pay thresholds of $50,000 and $100,000 per QALY.

Conclusions. PP with pegfilgrastim should be considered cost effective compared to other prophylaxis strategies in patients with recurrent ovarian cancer receiving docetaxel or topotecan with a high risk of FN.

Introduction

Febrile neutropenia (FN) is a serious side effect of myelosuppressive chemotherapy that often requires hospitalization and treatment with intravenous (IV) antibiotics. FN is associated with significant morbidity, mortality, and costs [1], as well as reduced chemotherapy relative dose intensity (RDI), which may adversely affect long-term outcomes such as survival [2–4].

Granulocyte colony-stimulating factors (G-CSFs) such as filgrastim (NEUPOGEN®) and pegfilgrastim (Neulasta®) have been shown to reduce FN risk when used as primary prophylaxis (PP) with the first and every chemotherapy cycle [5,6]. Filgrastim is approved for daily administration up to 14 days per chemotherapy cycle, until the absolute neutrophil count (ANC) has reached 10,000/mm^3 [7]. Though 10–11 days have been found to be effective in randomized

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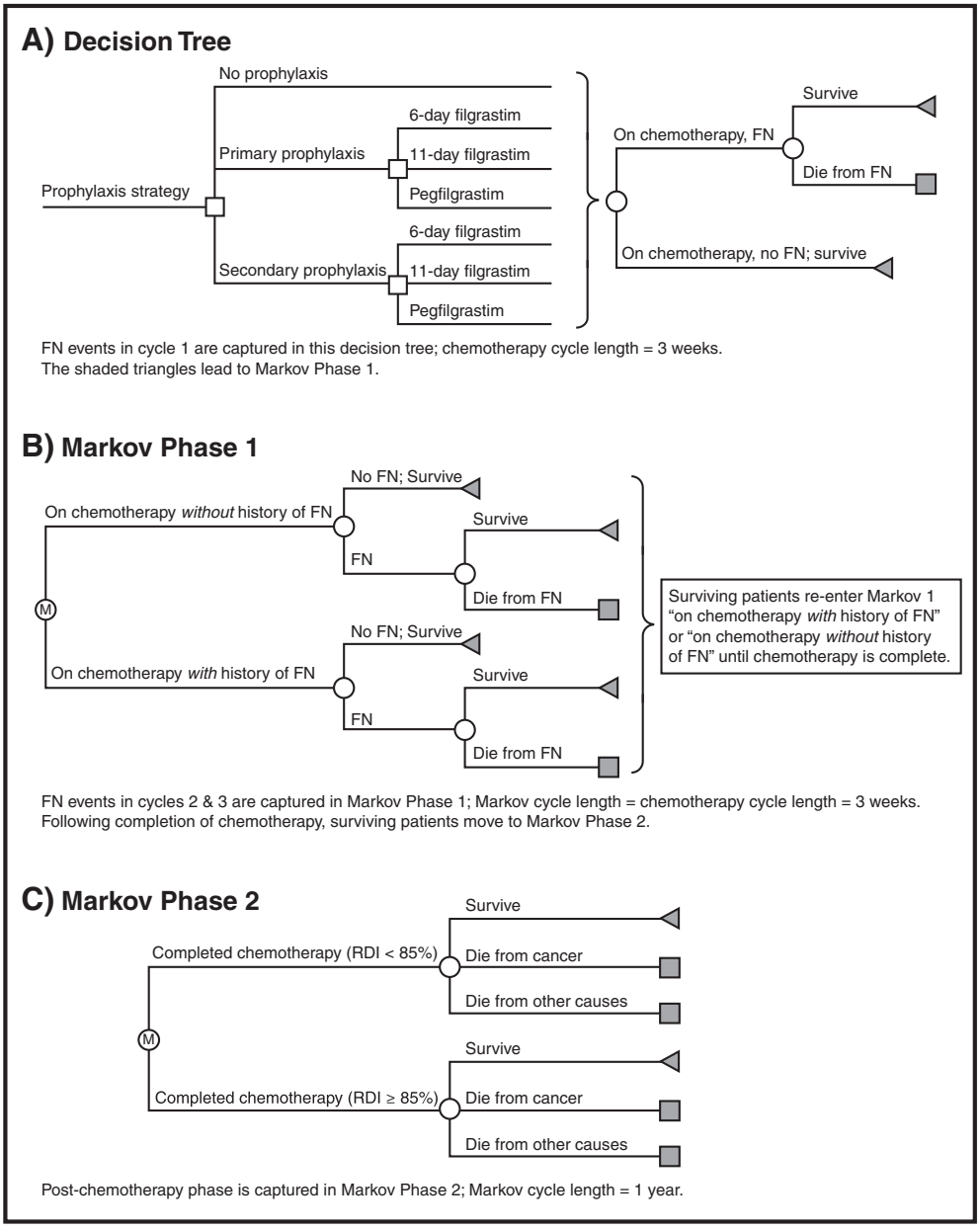

Fig. 1. Model structure.

clinical trials [8,9], filgrastim is often administered for 4–6 days in clinical practice, albeit with reduced effectiveness [10]. Pegfilgrastim, a pegylated form of filgrastim, is approved for administration once per chemotherapy cycle [11].

The American Society for Clinical Oncology (ASCO) and the National Comprehensive Cancer Network (NCCN) recommend G-CSFs as PP in patients receiving myelosuppressive chemotherapy associated with >20% FN risk and as secondary prophylaxis (SP) following an FN event [12,13]. An individual patient's FN risk depends on demographics (e.g., age and comorbidities), disease-specific factors (e.g., tumor stage and bone marrow involvement), and treatment-related factors (e.g., chemotherapy type and intensity) [12].

Cost-effectiveness analysis is increasingly being used to compare the costs and health outcomes of different interventions to inform policy decisions. A previous cost-effectiveness analysis of pegfilgrastim in epithelial ovarian carcinoma patients receiving taxane/platinum-based chemotherapy reported that PP with pegfilgrastim dominated (i.e., resulted in better outcomes at lower costs) SP and no prophylaxis in terms of incremental cost per FN hospitalization [14]. Despite these results, the clinical benefit of pegfilgrastim to reduce infection-related mortality and support chemotherapy dose intensity may have been underestimated, as methods used to derive FN risk and efficacy parameters were not transparent and mortality was not modeled. Further, the incremental cost per quality-adjusted life-year (QALY), a common measure used in healthcare decision-making, was not evaluated.

The objective of this study was to evaluate the cost-effectiveness of PP and SP with pegfilgrastim or filgrastim (6-day and 11-day) and no prophylaxis to reduce the risk of FN in recurrent ovarian cancer patients receiving docetaxel or topotecan from a US payer perspective. This study focuses on docetaxel and topotecan because these regimens are recommended by the NCCN for treatment of recurrent ovarian cancer [15] and are associated with an FN risk >20% [12,16–18].