Table S1. Treatment regimens and dosage in the Model

|  |  |  |  |
| --- | --- | --- | --- |
| Regimens | Dose Sizes | Infusion Timing | Ref |
| 1st-line pembrolizumab plus EP | pembrolizumab, 200 mg;  etoposide, 100 mg/m2;  carboplatin, AUC 5.0 mg/ml/min; or cisplatin, 75 mg/m2 | pembrolizumab, 3weeks up to 35 cycles;  EP, 3 weeks for the fist 4 cycles | Charles, et al., 20201 |
| 1st-line placebo plus EP | etoposide, 100 mg/m2;  carboplatin, AUC 5.0 mg/ml/min; or cisplatin, 75 mg/m2 | saline placebo, 3 weeks up for 35 cycles;  EP, 3 weeks for the fist 4 cycles | Charles, et al., 20201 |
| 2nd-line nivolumab plus ipilimumab | nivolumab, 3 mg/kg;  ipilimumab,1 mg/kg | nivolumab, 2 weeks;  Ipilimumab, 6 weeks | Hellmann, et al., 20192 |
| 2nd-line etoposide plus carboplatin | etoposide,100 mg/m2;  carboplatin, AUC 5.0 mg/ml/min | 3 weeks up to 6 cycles | Nathalie, et al., 20203 |
| 2nd-line topotecan | topotecan, 2.3 mg/m2 | 3 weeks up to 6 cycles | Nathalie, et al., 20203 |
| 2nd-line irinotecan | irinotecan, 50 mg/m2;  carboplatin, AUC5.0 mg/ml/min | 3 weeks up to 6 cycles | Schmittel, et al., 20064 |

EP, etoposide-platinum; AUC,area under the curve.

Table S2. Survival functions fitted and extrapolated

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Survival function | Pembrolizumab plus EP | | | | placebo plus EP | | | |
|  | OS | | PFS | | OS | | PFS | |
|  | AIC | BIC | AIC | BIC | AIC | BIC | AIC | BIC |
| Exponential | -193.0 | -189.1 | -197.8 | -192.6 | -217.4 | -212.2 | -99.8 | -94.7 |
| Weibull | -228.1 | -222.2 | -280.6 | -272.8 | -389.6 | -381.7 | -287.9 | -280.3 |
| Log-normal | -293.3 | -284.7 | -334.9 | -327.1 | -435.7 | -427.6 | -311.8 | -304.2 |
| Log-logistic | -283.6 | -277.6 | -357.3 | -349.5 | -578.1 | -570.3 | -326.7 | -319.0 |

Table S3. Cost and Utility Parameters

|  |  |  |
| --- | --- | --- |
| Parameters | Baseline values | Source |
| Cost(2020 $US) |  |  |
| Regimen related costs |  |  |
| Pembrolizumab price/mg | 49.39 | CMS 2020 ASP Drug Pricing Files5 |
| Etoposide price/mg | 1.51 | CMS 2020 ASP Drug Pricing Files5 |
| Carboplatin price/mg | 0.06 | CMS 2020 ASP Drug Pricing Files5 |
| Cisplatin price/mg | 0.19 | CMS 2020 ASP Drug Pricing Files5 |
| Nivolumab price/mg | 27.81 | CMS 2020 ASP Drug Pricing Files5 |
| Ipilimumab price/mg | 153.13 | CMS 2020 ASP Drug Pricing Files5 |
| Topotecan price/mg | 414.63 | CMS 2020 ASP Drug Pricing Files5 |
| Irinotecan price/mg | 0.12 | CMS 2020 ASP Drug Pricing Files5 |
| Chemotherapy infusion 1 hour | 142.55 | CMS.gov6, HCPCS code 96413 |
| Chemotherapy infusion additional hour | 30.68 | CMS.gov6, HCPCS code 96415 |
| Adverse event management costs |  |  |
| Neutropenia | 12365 | hcupnet.ahrq.gov7 |
| Anemia | 7248 | hcupnet.ahrq.gov7 |
| Thrombocytopenia | 11198 | hcupnet.ahrq.gov7 |
| Pneumonia | 9057 | hcupnet.ahrq.gov7 |
| Other disease management costs |  |  |
| Outpatient follow-up visit | 52.33 | [Zhang](https://pubmed.ncbi.nlm.nih.gov/?term=Zhang+L&cauthor_id=33344252),et al.,20208 |
| Monthly supportive care | 637.00 | Criss,et al.,20198 |
| Death associated costs | 9433 | Criss,et al.,20198 |
| Utilities |  |  |
| >12 months prior to death | 0.834 | Insinga, et al., 201810 |
| 6-12 months prior to death | 0.765 | Insinga, et al., 201810 |
| 1-6 months prior to death | 0.709 | Insinga, et al., 201810 |
| 1 month prior to death | 0.563 | Insinga, et al., 201810 |

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