Table S1: Independent risk factors for in-hospital death, as determined by multivariate Cox proportional hazard regression form two different model.

| Variables | Model$_1$* | | | Model$_2$* | | |
| --- | --- | --- | --- | --- | --- | --- |
| | B$_1$ | P$_1$ | HR$_1$ (95%CI$_1$) | B$_2$ | P$_2$ | HR$_2$ (95%CI$_2$) |
| PVTT, type | Ref | 0.132 | | | 0.273 | |
| II | -0.289 | 0.726 | 0.749 (0.149-3.764) | -1.788 | 0.093 | 0.167 (0.021-1.347) |
| III | -0.136 | 0.881 | 0.873 (0.145-5.238) | -1.674 | 0.059 | 0.188 (0.033-1.064) |
| IV | 1.76 | 0.103 | 5.81 (0.703-48.042) | -1.503 | 0.123 | 0.223 (0.033-1.503) |
| Blood Transfusion, yes vs no | -1.072 | 0.114 | 0.342 (0.091-1.292) | -0.907 | 0.182 | 0.404 (0.107-1.528) |
| Total albumin, per quarter# | 0.392 | 0.113 | 1.48 (0.911-2.406) | **0.500** | **0.044** | **1.649 (1.014-2.681)** |
| Tumor volume, per quarter, cm$^3$ | **0.863** | **0.014** | **2.37 (1.191-4.716)** | NA | NA | NA |
| Resection volume, per quarter, cm$^3$ | NA | NA | NA | 0.001 | 0.82 | 1.001 (0.995-1.006) |
| Intraoperative bleeding, per quarter,100ml | **1.384** | **0.011** | **3.993 (1.373-11.612)** | **1.383** | **0.007** | **3.987 (1.453-10.939)** |
| Frequency of hospitalization,yes vs no | **-2.174** | **0.001** | **0.114 (0.031-0.416)** | **-2.085** | **0.002** | **0.124 (0.033-0.467)** |

*: Model$_1$: the tumor volume was included in the model, not tumor resection volume; Model$_2$: tumor resection volume was included in the model, not the tumor volume; #: the total albumin was sort as descending order. NA: not available. Bold fonts mean that the p-value was less than 0.05. C-statistic with 95%CI for model1 and model2 were 0.872(0.807-0.937) and 0.842(0.773-0.911).

Table S2: The bootstrap validation for selecting the independent risk factors in Model1 and Model2 in training cohort.

| Variables | Model1 | | | Model2 | | |
|---|---|---|---|---|---|---|
| | $B_1$ | 95%CI for Bootstrap1 | P1 for Bootstrap | $B_2$ | 95%CI for Bootstrap2 | P2 for Bootstrap |
| PVTT, type | Ref | | | | | |
| II | -0.289 | (-2.175-10.506) | 0.600 | -1.788 | (-1.800-10.821) | 0.974 |
| III | -0.136 | (-2.829-10.805) | 0.679 | -1.674 | (-2.450-10.847) | 0.98 |
| IV | 1.76 | (-11.99-13.815) | 0.048 | -1.503 | (-12.118-14.11) | 0.058 |
| Blood Transfusion, yes vs no | -1.072 | (-2.736-1.106) | 0.093 | -0.907 | (-2.822-1.376) | 0.153 |
| Total albumin, per quarter# | 0.392 | (-0.130-1.277) | 0.134 | **0.500** | **(0.008-1.420)** | **0.048** |
| Tumor volume, per quarter, cm$^3$ | **0.863** | **(0.067-2.497)** | **0.035** | NA | NA | NA |
| Resection volume, per quarter, cm$^3$ | NA | NA | NA | 0.001 | (-0.182-1.287) | 0.189 |
| Intraoperative bleeding, per quarter,100ml | **1.384** | **(0.010-9.660)** | **0.029** | **1.383** | **(0.100-9.806)** | **0.023** |
| Frequency of hospitalization,one vs more | **-2.174** | **(-12.339--0.355)** | **0.021** | **-2.085** | **(-12.374--0.28)** | **0.020** |

*: Model1: the tumor volume was included in the model, not tumor resection volume; Model2: tumor resection volume was included in the model, not the tumor volume; #: the total albumin was sort as descending order.NA:not available. The number of sample of Bootstrap method was 1000. Bold fonts mean that the p-value was less than 0.05.

Figure S1: Kaplan-Meier analysis for risk factors in the internal validation cohort(n=325)
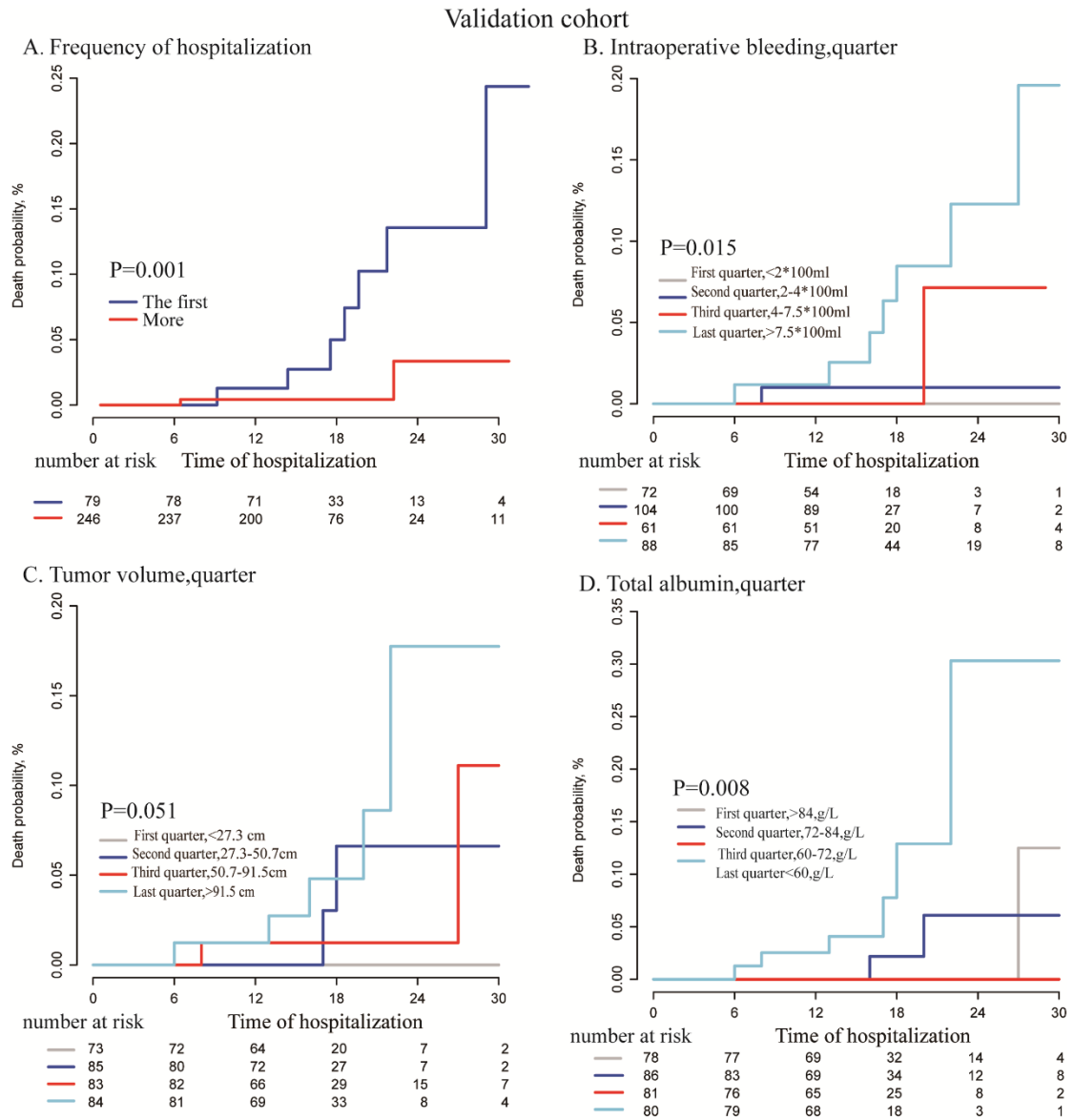


Kaplan-Meier analysis for different variables: A: Frequency of hospitalization (first vs more ,P=0.001); B: intraoperative bleeding volume (Per quarter, P=0.015); C: tumor volume (per quarter, P=0.051); D: total albumin (per quarter, P=0.008)