

Mortality Prediction Artificial Intelligence Model for Gastric Cancer Surgery Based on Body Morphometry, Nutritional, and Surgical Information: Feasibility study

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Figure S1. Diagram of the modeling process. Independent variables refer to quantitative indices of various patients’ characteristics, and dependent variables refer to survival outcome.

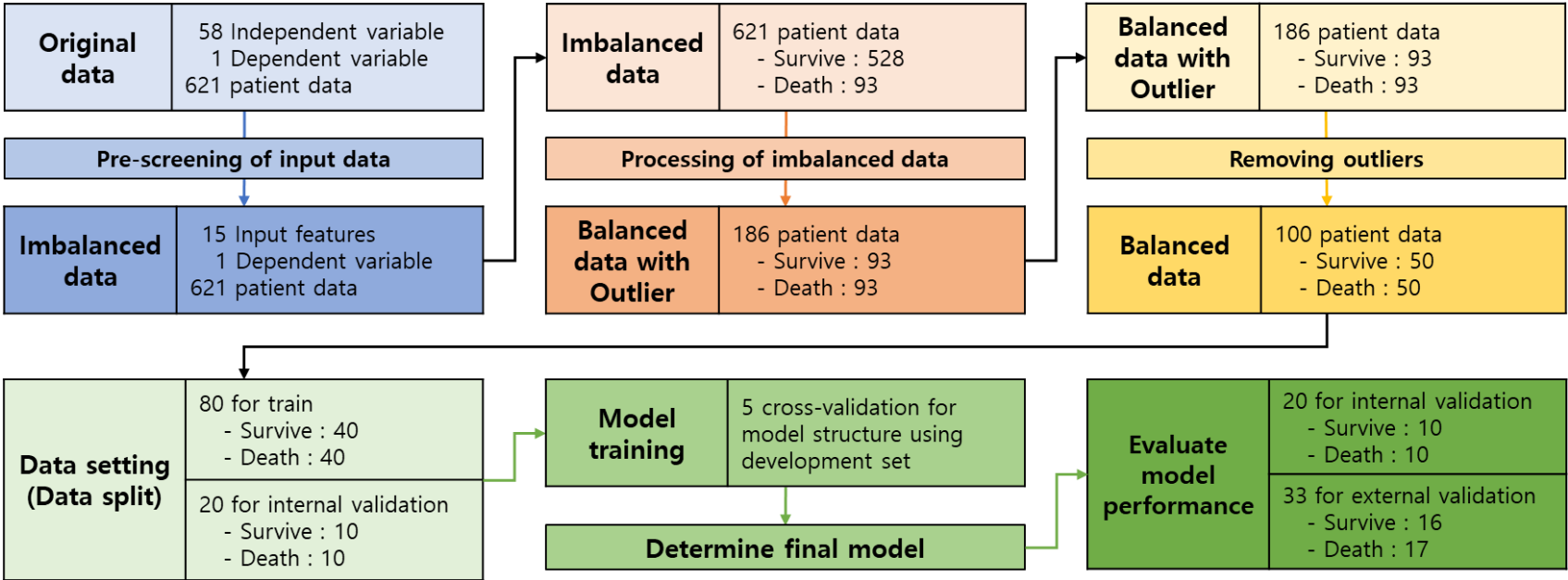


Table S1. Description of gastric surgery registries data.

No of variables	Variable name	Description of variable	Code	No of features	Feature name	Description of feature	Selected feature for AI training
1	SUBJID	Unique subject ID		1	SUBJID	Unique subject ID	
2	OVERALLSUR	Survival or not	0: Survival, 1: Death	2	OVERALLSUR	Survival or not	
3	AGE	Age		3	AGE_standardized	Age	Yes
4	SEX	Sex	1: Male, 2: Female	4	SEX	Sex	Yes
5	HT	Height at the time of gastric cancer diagnosis (cm)		5	HT_standardized	Height at the time of gastric cancer diagnosis (cm)	Yes
6	WT	Weight at the time of gastric cancer diagnosis (kg)		6	Δ WT_standardized	Standardized difference between WT and WT_1yr	
7	WT_1yr	Weight one year after surgery (kg)					
8	AJCC7	Classification of cancer staging according to AJCC Cancer Staging Manual 7 th Edition		7	AJCC7	Classification of cancer staging according to AJCC Cancer Staging Manual 7 th Edition	Yes
9	CUREINTENT	Treatment intention	1: Curative, 2: Palliative	8	CUREINTENT	Treatment intention	
10	COMORBIDTY	Underlying disease	1: DM, 2: HTN, 3: CAH, 4: Liver cirrhosis, 5: TB, 6: MI, 7: CVA, 8: Valvular HD, 9: COPD, 10: Asthma, 11: CRF	9	COMORBIDTY	Underlying disease	
11	GASOPHIS	Past history of stomach operation	0: No, 1: Yes	10	GASOPHIS	Past history of stomach operation	
12	ESDHIS	Past history of ESD	0: No, 1: Yes	11	ESDHIS	Past history of ESD	
13	OPDATE	Date of operation	YYYYMMDD	12	OPDATE	Date of operation	
14	LAPVSOPEN	Operation method	1: Laparoscopy, 2: Open	13	LAPVSOPEN	Operation method	
15	TY_OP	Type of operation	1: Distal gastrectomy, 2: Total gastrectomy, 3: Etc	14	TY_OP	Type of operation	Yes
16	TY_AN	Type of anastomosis	1: GD (gastroduodenostomy), 2: RYGJ (Roux en Y gastrojejunostomy), 3: GJ (gastrojejunostomy), 4: GJJJ (gastrojejunostomy with jejunojejunostomy), 5: RY (Roux-en-Y), 6: Delta (Billoth 1),	15	TY_AN	Type of anastomosis	Yes

			7: Etc				
17	LND	Lymph Node Dissection	1: D1, 2: D1+a, 3: D1+b, 4: D2	16	LND	Lymph Node Dissection	
18	LASTSURVDATE	Confirmation date of last survival	YYYYMMDD	17	LASTSURVDATE	Confirmation date of last survival	
19	TUSIZE	Tumor size (mm)		18	TUSIZE	Tumor size (mm)	
20	TULONGLOC	location of tumor (longitudinal)	1: Upper third, 2: Middle third, 3: Lower third, 4: GEJ, 5: Entire, 6: UM, 7: ML	19	TULONGLOC	location of tumor (longitudinal)	
21	TUAXILOC	location of tumor (axial)	1: LC (lesser curvature), 2: GC (greater curvature), 3: AW (arterial wall), 4: PW (posterior wall), 5: CIR (circle)	20	TUAXILOC	location of tumor (axial)	
22	TUNUM	Number of tumors		21	TUNUM	Number of tumor	
23	AGC_TYPE	Advanced gastric cancer	1: AGC-B1 2: AGC-B2 3: AGC-B3 4: AGC-B4 5: AGC-B5	22	AGC_TYPE	Advanced gastric cancer	
24	EGC_TYPE	Early gastric cancer	1: EGC-I, 2: EGC-IIa/EGC-IIb/EGC-IIc, 3: EGC-III	23	EGC_TYPE	Early gastric cancer	
25	PATHO_TYPE	Pathological tumor type	1: PAP, 2: TUB1, 3: TUB2, 4: TUB3, 5: SRC, 6: MUC, 7: Etc	24	PATHO_TYPE	Pathological tumor type	
26	LAUREN	Classification of Lauren	1: Intestinal, 2: Diffuse, 3: Mixed, 4: Indeterminate	25	LAUREN	Classification of Lauren	
27	DEPTHINV	T stage	1: Mucosa, 2: Submucosa, 3: Proper muscle, 4: Subserosa, 5: Serosa exposure, 6: Adjacent organ invasion	26	DEPTHINV	T stage	
28	NSTAGE	N stage	0: N0, 1: N1, 2: N2, 3: N3a, 4: N3b	27	NSTAGE	N stage	
29	NOMETALN	Number of Metastatic lymph nodes		28	NOMETALN	Number of Metastatic lymph nodes	

30	NORETNL	Number of Retrieved lymph nodes		29	NORETNL	Number of Retrieved lymph nodes	
31	LVINV	Lymphovascular invasion	0: Negative, 1: Positive	30	LVINV	Lymphovascular invasion	
32	PERININV	Perineural invasion	0: Negative, 1: Positive, 2: Not evaluated	31	PERININV	Perineural invasion	
33	ENE	Extranodal extension of metastatic lymph node (pathological findings)	0: Negative, 1: Positive	32	ENE	Extranodal extension of metastatic lymph node (pathological findings)	
34	DIA_ENE	Diameter of extranodal extension of metastatic lymph node (mm)		33	DIA_ENE	Diameter of extranodal extension of metastatic lymph node (mm)	
35	PRM	Proximal resection margin (mm)		34	PRM	Proximal resection margin (mm)	
36	DRM	Distal resection margin (mm)		35	DRM	Distal resection margin (mm)	
37	Sfat_preop	Subcutaneous fat area before surgery (cm ²)		36	Δ Sfat_standardized	Standardized difference between Sfat_preop and Sfat_1yr	Yes
38	Sfat_1yr	Subcutaneous fat area one year after surgery (cm ²)					
39	Muscle_preop	Skeletal muscle area before surgery (cm ²)		37	Δ Muscle_standardized	Standardized difference between Muscle_preop and Muscle_1yr	
40	Muscle_1yr	Skeletal muscle area one year after surgery (cm ²)					
41	Vfat_preop	Visceral fat area before surgery (cm ²)		38	Δ Vfat_standardized	Standardized difference between Vfat_preop and Vfat_1yr	Yes
42	Vfat_1yr	Visceral fat area one year after surgery (cm ²)					
43	Chol_preop	Cholesterol value before surgery (mg/dL)		39	Δ Chol_standardized	Standardized difference between Chol_preop and Chol_1yr	Yes
44	Chol_1yr	Cholesterol value one year after surgery (mg/dL)					
45	Protein_preop	Protein value before surgery		40	Δ Protein_standardized	Standardized difference between Protein_preop and Protein_1yr	
46	Protein_1yr	Protein value one year after surgery					
47	Albumin_preop	Albumin value before surgery		41	Δ Albumin_standardized	Standardized difference between Albumin_preop and Albumin_1yr	Yes

48	Albumin_1yr	Albumin value one year after surgery					
49	Hb_preop	Hemoglobin value before surgery		42	Δ Hb_standardized	Standardized difference between Hb_preop and Hb_1yr	Yes
50	Hb_1yr	Hemoglobin value one year after surgery					
51	SURVDUR	Survival duration (Month)	Confirmation date of last survival - Date of operation	43	SURVDUR	Survival duration (Month)	
52	NRI_preop	Nutritional risk index before surgery		44	Δ NRI_standardized	Standardized difference between NRI_preop and NRI_1yr	Yes
53	NRI_1yr	Nutritional risk index one year after surgery					
54	BMI_preop	BMI before surgery (kg/m ²)		45	Δ BMI_standardized	Standardized difference between BMI_preop and BMI_1yr	Yes
55	BMI_1y	BMI one year after surgery (kg/m ²)					
56	MuH_preop	Skeletal muscle index before surgery (cm ² /m ²)		46	Δ MuH_standardized	Standardized difference between MuH_preop and MuH_1yr	Yes
57	MuH_1yr	Skeletal muscle index one year after surgery (cm ² /m ²)					
58	MuBMI_preop	Skeletal muscle index before surgery		47	Δ MuBMI_standardized	Standardized difference between MuBMI_preop and MuBMI_1yr	Yes
59	MuBMI_1yr	Skeletal muscle index one year after surgery					

Table S2. Standardization of time-dependent continuous features in the development and all validation sets

Features	Development set (n = 80)	All validation set (n = 53)	<i>p</i> -value
BMI	-0.08 ± 0.01	-0.01 ± 0.01	0.42
SFA	-0.35 ± 0.26	-0.22 ± 0.87	0.22
VFA	-0.57 ± 0.20	-0.39 ± 0.83	0.07
SMA/height ²	-0.05 ± 0.07	-0.06 ± 0.06	0.52
SMA/BMI	0.04 ± 0.08	0.04 ± 0.08	0.77
NRI	-0.03 ± 0.06	-0.02 ± 0.08	0.90
Cholesterol	-0.06 ± 0.16	-0.02 ± 0.27	0.27
Hemoglobin	-0.07 ± 0.09	-0.02 ± 0.21	0.06
Albumin	0.02 ± 0.10	0.03 ± 0.13	0.65

Data are mean ± standard deviation. BMI = body mass index, NRI = nutritional risk index, SFA = subcutaneous fat area, SMA = skeletal muscle area, VFA = visceral fat area.