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APPENDICES

APPENDIX A:

CASE RECORD FORM

Age..... Male Female Service.....

Diagnosis..... Operation.....

Admit to ICU from OR ER ward..... Others

Date of hospital admission..... Time.....

Date of ICU admission..... Time.....

Hospital length of stay.....ICU length of stay.....

Discharge status from ICU to ward..... Others

Dead in ICU Dead in ward.....

SAPS II calculation

Type of admission scheduled unscheduled medical

Chronic diseases none AIDS Metastatic CA hematologic CA

Body temperature < 39⁰ C >= 39⁰ C

Heart rate < 40 40 -69 70 -119 120 -159 >=160

SBP (mmHg.) < 70 70-99 100-199 >=200 mmHg.

PaO₂/FiO₂ ratio < 100 100-199 >=200

Urinary output (ml.) < 500 500-999 >=1000

BUN (mg/dl) < 28 28-83 >=84

WBC count < 1000 1000 -19000 >= 20000 /mm³

Potassium (mEq/l) < 3 3-4.9 >= 5 mEq/l

Sodium (mEq/l) >= 145 125-144 <125 mEq/l

Bicarbonate (mEq/l) < 15 15-19 >= 20

Bilirubin (mg/dl) < 4 4-5.9 >=6

GCS < 6 6-8 9-10 11-13 14-15

SAPS II score.....

Predicted Death rate.....

MPM₂₄ II Calculation

- Medical or unscheduled surgery admission yes no
- Metastatic neoplasm yes no
- Cirrhosis yes no
- Creatinine > 2.0 mg/dL yes no
- Urine output < 150 mL / 8 hours yes no
- Coma (Glasgow 3-5) yes no
- Confirmed infection yes no
- Intracranial mass effect yes no
- Mechanical ventilation yes no
- Vasoactive drugs > = 1 hour yes no
- PaO₂ < 60 mmHg yes no
- Prothrombin Time > standard + 3 sec yes no

MPM₂₄ II**Predicted Death rate.....**

APPENDIX B

DESCRIPTION OF COVARIATES AND REGRESSION COEFFICIENTS FOR MPM₂₄ II

Variables	regression coefficients (beta)
Acute Diagnoses	
- Intracranial mass effect	0.91314
- Confirmed infection	0.49742
Chronic Diagnoses	
- Metastatic neoplasm	1.16109
- Cirrhosis	1.08745
Physiology	
- Prothrombin time (>3 seconds)	0.55352
- Urine output (<150 ml in 8 hours)	0.82286
- PaO ₂ (<60 mmHg)	0.46677
- Serum creatinine (2.0 mg/dL)	0.72283
- Glasgow Coma Score (3-5)	1.6879
Other variables	
- Age (10-years periods)	0.03268
- Type of admission (non-elective surgery)	0.83404
- Mechanical ventilation	0.80845
- Vasoactive drug ≥1 hour	0.71628

The dichotomization condition of continuous variables is mentioned between brackets.

$$\text{Logit} = \text{Sum (values * beta)} + \text{age} * 0.03268 - 5.64592$$

$$\text{Predicted Death Rate} = (e^{\text{Logit}}) / (1 + e^{\text{Logit}})$$

APPENDIX C

DESCRIPTION AND SCORE OF COVARIATES USED IN SAPS II

Variables	score	Variables	score
Chronic disease		Type of admission	
- Metastatic neoplasm	9	- Unscheduled surgery	8
- AIDS	17	- Scheduled surgery	0
- Hematologic malignancy	10	- Medical	6
Heart rate		Glasgow Coma Score	
- < 40	11	- < 6	26
- 40 – 69	2	- 6 – 8	13
- 70 – 119	0	- 9 – 10	7
- 120 -159	4	- 11 – 13	5
- ≥ 160	7	- 14 - 15	0
Systolic blood pressure		Age	
- < 70 mmHg	13	- < 40	0
- 70 – 99 mmHg	5	- 40 – 59	7
- 100 – 199 mmHg	0	- 60 – 69	12
- 200 mmHg	2	- 70 – 74	15
		- 75 - 79	16
		- ≥ 80	18
Temperature		Serum BUN	
- < 39 Celsius	0	- < 28	0
- ≥ 39 Celsius	3	- 28 -83	6
		- ≥ 84	10
Urine output		White blood cell count	
- < 0.5 L/24hr.	11	- <1000 mm ³	12
- 0.5 – 0.999 L/24hr.	4	- 1000 – 19000 mm ³	0
- ≥ 1 L/24hr.	0	- ≥ 20000 mm ³	3
If mechanical ventilation or CPAP, PaO₂/FIO₂		Serum potassium	
- < 100	11	- < 3	3
- 100 – 199	9	- 3 – 4.9	0
- ≥ 200	6	- ≥ 5	3
Bilirubin		Serum sodium	
- < 4 mg/dl	0	- < 125	5
- 4 – 4.9 mg/dl	4	- 125 -144	0
- ≥ 6 mg/dl	9	- ≥ 145	1
Serum bicarbonate		formula	
- < 15	6	Logit = -7,7631+0,0737*(SAPS II)+0,9971*ln((SAPS II)+1)	
- 15 – 19	3	Predicted Death Rate = $e^{(\text{Logit})}/(1+e^{(\text{Logit})})$	
- ≥ 20	0		

APPENDIX D

CORRELATION COEFFICIENT (r) BETWEEN TWO ROC AREAS.

TABLE I: Correlation Coefficients*

Average Correlation between Ratings [†]	Average Area [‡]											
	.700	.725	.750	.775	.800	.825	.850	.875	.900	.925	.950	.975
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.02
0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.04	0.03
0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.06	0.06	0.04
0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.05
0.14	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.10	0.09	0.08	0.06
0.16	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.12	0.11	0.11	0.09	0.07
0.18	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.14	0.13	0.12	0.11	0.09
0.20	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.15	0.15	0.14	0.12	0.10
0.22	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.17	0.16	0.15	0.14	0.11
0.24	0.22	0.22	0.21	0.21	0.21	0.20	0.19	0.19	0.18	0.17	0.15	0.12
0.26	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.16	0.13
0.28	0.26	0.25	0.25	0.25	0.24	0.24	0.23	0.22	0.21	0.20	0.18	0.15
0.30	0.27	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.23	0.21	0.19	0.16
0.32	0.29	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.24	0.23	0.21	0.18
0.34	0.31	0.31	0.31	0.30	0.30	0.29	0.28	0.27	0.26	0.25	0.23	0.19
0.36	0.33	0.33	0.32	0.32	0.31	0.31	0.30	0.29	0.28	0.26	0.24	0.21
0.38	0.35	0.35	0.34	0.34	0.33	0.33	0.32	0.31	0.30	0.28	0.26	0.22
0.40	0.37	0.37	0.36	0.36	0.35	0.35	0.34	0.33	0.32	0.30	0.28	0.24
0.42	0.39	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.33	0.32	0.29	0.25
0.44	0.41	0.40	0.40	0.40	0.39	0.38	0.38	0.37	0.35	0.34	0.31	0.27
0.46	0.43	0.42	0.42	0.42	0.41	0.40	0.39	0.38	0.37	0.35	0.33	0.29
0.48	0.45	0.44	0.44	0.43	0.43	0.42	0.41	0.40	0.39	0.37	0.35	0.30
0.50	0.47	0.46	0.46	0.45	0.45	0.44	0.43	0.42	0.41	0.39	0.37	0.32
0.52	0.49	0.48	0.48	0.47	0.47	0.46	0.45	0.44	0.43	0.41	0.39	0.34
0.54	0.51	0.50	0.50	0.49	0.49	0.48	0.47	0.46	0.45	0.43	0.41	0.36
0.56	0.53	0.52	0.52	0.51	0.51	0.50	0.49	0.48	0.47	0.45	0.43	0.38
0.58	0.55	0.54	0.54	0.53	0.53	0.52	0.51	0.50	0.49	0.47	0.45	0.40
0.60	0.57	0.56	0.56	0.55	0.55	0.54	0.53	0.52	0.51	0.49	0.47	0.42
0.62	0.59	0.58	0.58	0.57	0.57	0.56	0.55	0.54	0.53	0.51	0.49	0.45
0.64	0.61	0.60	0.60	0.59	0.59	0.58	0.58	0.57	0.55	0.54	0.51	0.47
0.66	0.63	0.62	0.62	0.62	0.61	0.60	0.60	0.59	0.57	0.56	0.53	0.49
0.68	0.65	0.64	0.64	0.64	0.63	0.62	0.62	0.61	0.60	0.58	0.56	0.51
0.70	0.67	0.66	0.66	0.66	0.65	0.65	0.64	0.63	0.62	0.60	0.58	0.54
0.72	0.69	0.69	0.68	0.68	0.67	0.67	0.66	0.65	0.64	0.63	0.60	0.56
0.74	0.71	0.71	0.70	0.70	0.69	0.69	0.68	0.67	0.66	0.65	0.63	0.59
0.76	0.73	0.73	0.72	0.72	0.72	0.71	0.71	0.70	0.69	0.67	0.65	0.61
0.78	0.75	0.75	0.75	0.74	0.74	0.73	0.73	0.72	0.71	0.70	0.68	0.64
0.80	0.77	0.77	0.77	0.76	0.76	0.76	0.75	0.74	0.73	0.72	0.70	0.67
0.82	0.79	0.79	0.79	0.79	0.78	0.78	0.77	0.77	0.76	0.75	0.73	0.70
0.84	0.82	0.81	0.81	0.81	0.81	0.80	0.80	0.79	0.78	0.77	0.76	0.73
0.86	0.84	0.84	0.83	0.83	0.83	0.82	0.82	0.81	0.81	0.80	0.78	0.75
0.88	0.86	0.86	0.86	0.85	0.85	0.85	0.84	0.84	0.83	0.82	0.81	0.79
0.90	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86	0.85	0.84	0.82

* Correlation coefficient r between two ROC areas A_1 and A_2 as a function of average correlation between ratings (rows) and average area (columns).

[†] $(r_N + r_A)/2$.

[‡] $(A_1 + A_2)/2$.

From: Hanley J, McNeil B. A method of comparing the areas under receiver operating characteristic curves derived from the same cases. Radiology 1983; 148(3): 839-43.

APPENDIX E

Hosmer-Lemeshow Goodness-of-Fit Statistic:

(Hosmer DW and Lemeshow S (1989). Applied Logistic Regression. New York: John Wiley & Sons, Inc.)

For the Hosmer-Lemeshow goodness-of-fit statistic, the patients are usually grouped into "deciles of risk" by first using the logistic scoring system to calculate each patient's predicted probability of death and then ranking the patients according to this risk probability. The patients are then divided into 10 groups, with each group containing approximately 10% of the total number of patients.

A modified version of the Hosmer-Lemeshow goodness-of-fit statistic is described by Phibbs, Romano, Luft, Brown, and Radany (Phibbs et al. (1992). If the outcome of interest is death, or another rare event, then using the "deciles-of-risk" method for the Hosmer-Lemeshow statistic will result in uneven numbers of expected deaths in the 10 groups. The alternative is to rank the patients according to their risk probability and then to divide them into (usually) 10 groups so that each group has the same number of expected deaths.

The modified version of the Hosmer-Lemeshow goodness-of-fit statistic can then be calculated as described in Hosmer and Lemeshow (Hosmer & Lemeshow (1989), and compared to a Chi-square distribution with $g-2$ degrees of freedom, where g is the number of groups.

Hosmer-Lemeshow Statistic The Hosmer-Lemeshow Statistic is another measure of lack of fit. Hosmer and Lemeshow recommend partitioning the observations into 10 equal sized groups according to their predicted probabilities. Then

$$G_{HL}^2 = \sum_{j=1}^{10} \frac{(O_j - E_j)^2}{E_j(1 - E_j/n_j)} \sim \chi_8^2$$

where

$$\begin{aligned} n_j &= \text{Number of observations in the } j^{\text{th}} \text{ group} \\ O_j &= \sum_i y_{ij} = \text{Observed number of cases in the } j^{\text{th}} \text{ group} \\ E_j &= \sum_i \hat{p}_{ij} = \text{Expected number of cases in the } j^{\text{th}} \text{ group} \end{aligned}$$

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