Development and Validation of a Risk Prediction Model of linezolid-induced thrombocytopenia in Vietnamese patients

Saturday, February 3, 2024

Objectives

1. Investigating risk factors of linezolid-induced thrombocytopenia (LI-TP)
2. Developing and validating a logistics regression model to predict LI-TP in Vietnamese patients

Data cleaning

Source: Article Notebook

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Rows: 780
Columns: 58
$ patient_age          <dbl> 90, 80, 79, 71, 72, 61, 60, 64, 92, 75, 86, 93, 6~
$ patient_sex          <lgl> TRUE, TRUE, FALSE, FALSE, TRUE, FALSE, FALSE, TRU~
$ LZD_dose_per_weight  <dbl> 25.00000, 30.00000, 30.00000, 13.33333, 17.14286,~
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$ dept_ER              <lgl> TRUE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, T~
$ dept_ICU             <lgl> FALSE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, FALSE,~
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$ baseline_WBC         <dbl> 6.75, 11.91, 14.05, 14.61, 7.92, 21.79, 13.27, 6.~
$ baseline_PLT         <dbl> 244, 180, 259, 179, 236, 113, 196, 154, 147, 101,~
$ LZD_duration         <dbl> 6, 8, 15, 3, 7, 8, 22, 4, 3, 16, 14, 7, 13, 20, 6~
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$ invasive_CVC         <lgl> FALSE, FALSE, TRUE, FALSE, TRUE, FALSE, TRUE, FAL~
$ invasive_IHD         <lgl> FALSE, FALSE, FALSE, FALSE, TRUE, FALSE, FALSE, F~
$ invasive_CRRT        <lgl> FALSE, FALSE, FALSE, TRUE, FALSE, FALSE, FALSE, F~
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$ site                  <chr> "TN1", "TN1", "TN1", "TN1", "TN1", "TN1", "TN1", ~
```

Source: Article Notebook

Descriptive statistics

Source: Article Notebook

Characteristic	**Overall**, N = 780	**FALSE**, N = 520	**TRUE**, N = 260	**OR**	**95% CI**	**p-value**
patient_age	62 (50 - 73)	61 (48 - 72)	64 (53 - 74)	1.02	1.01, 1.02	**<0.001**
patient_sex	292 (37%)	194 (37%)	98 (38%)	1.02	0.75, 1.38	>0.9
LZD_dose_per_weight	21.8 (20.0 - 24.0)	21.8 (20.0 - 24.0)	21.8 (19.4 - 24.5)	0.99	0.95, 1.03	0.5
baseline_CLCR	46 (21 - 83)	55 (26 - 88)	32 (15 - 64)	0.99	0.99, 0.99	**<0.001**
dept_ER	133 (17%)	89 (17%)	44 (17%)	0.99	0.66, 1.46	>0.9
dept_ICU	368 (47%)	221 (43%)	147 (57%)	1.76	1.30, 2.38	**<0.001**
baseline_HGB	102 (89 - 119)	105 (91 - 121)	97 (85 - 117)	0.99	0.98, 1.0	**<0.001**
baseline_WBC	12 (8 - 17)	12 (8 - 17)	12 (8 - 18)	1.01	0.99, 1.03	0.3
baseline_PLT	203 (141 - 286)	233 (165 - 310)	151 (102 - 208)	0.99	0.99, 0.99	**<0.001**
LZD_duration	9.0 (6.0 - 14.0)	9.0 (6.0 - 13.0)	10.0 (6.0 - 14.0)	1.03	1.01, 1.06	**0.016**
invasive_ETI	363 (47%)	210 (40%)	153 (59%)	2.11	1.56, 2.86	**<0.001**
invasive_CVC	399 (51%)	226 (43%)	173 (67%)	2.59	1.90, 3.54	**<0.001**
invasive_IHD	105 (13%)	60 (12%)	45 (17%)	1.60	1.05, 2.44	**0.027**
invasive_CRRT	133 (17%)	53 (10%)	80 (31%)	3.92	2.67, 5.79	**<0.001**
comorb_HTN	321 (41%)	208 (40%)	113 (43%)	1.15	0.85, 1.56	0.4

Characteristic	**Overall**, N = 780	**FALSE**, N = 520	**TRUE**, N = 260	**OR**	**95% CI**	**p-value**
comorb_DM	214 (27%)	142 (27%)	72 (28%)	1.02	0.73, 1.42	>0.9
comorb_HF	218 (28%)	126 (24%)	92 (35%)	1.71	1.24, 2.37	**0.001**
comorb_angina	31 (4.0%)	19 (3.7%)	12 (4.6%)	1.28	0.59, 2.64	0.5
comorb_cirr	48 (6.2%)	20 (3.8%)	28 (11%)	3.02	1.67, 5.54	**<0.001**
comorb_COPD	38 (4.9%)	24 (4.6%)	14 (5.4%)	1.18	0.58, 2.28	0.6
comorb_CVA	90 (12%)	64 (12%)	26 (10%)	0.79	0.48, 1.27	0.3
comorb_MI	20 (2.6%)	15 (2.9%)	5 (1.9%)	0.66	0.21, 1.73	0.4
comorb_K	64 (8.2%)	41 (7.9%)	23 (8.8%)	1.13	0.66, 1.92	0.6
comorb_hematological	46 (5.9%)	27 (5.2%)	19 (7.3%)	1.44	0.77, 2.63	0.2
comorb_hema	60 (7.7%)	36 (6.9%)	24 (9.2%)	1.37	0.79, 2.33	0.3
infect_sepsis	130 (17%)	62 (12%)	68 (26%)	2.62	1.78, 3.84	**<0.001**
infect_CAP	112 (14%)	66 (13%)	46 (18%)	1.48	0.98, 2.22	0.062
infect_HAP	352 (45%)	236 (45%)	116 (45%)	0.97	0.72, 1.31	0.8
infect_SSTI	128 (16%)	95 (18%)	33 (13%)	0.65	0.42, 0.99	**0.049**
infect_CNS	68 (8.7%)	45 (8.7%)	23 (8.8%)	1.02	0.60, 1.72	>0.9
infect_IAI	49 (6.3%)	33 (6.3%)	16 (6.2%)	0.97	0.51, 1.77	>0.9
infect_UTI	53 (6.8%)	37 (7.1%)	16 (6.2%)	0.86	0.46, 1.54	0.6
infect_BJI	10 (1.3%)	9 (1.7%)	1 (0.4%)	0.22	0.01, 1.18	0.2
infect_septicemia	231 (30%)	143 (28%)	88 (34%)	1.35	0.98, 1.86	0.068
comed_aspirin	46 (5.9%)	29 (5.6%)	17 (6.5%)	1.18	0.63, 2.17	0.6

Characteristic	Overall, N = 780	FALSE, N = 520	TRUE, N = 260	OR	95% CI	p-value
comed_diclofenac	27 (3.5%)	20 (3.8%)	7 (2.7%)	0.69	0.27, 1.58	0.4
comed_ibuprofen	25 (3.2%)	14 (2.7%)	11 (4.2%)	1.60	0.70, 3.56	0.3
comed_paracetamol	338 (43%)	230 (44%)	108 (42%)	0.90	0.66, 1.21	0.5
comed_penicillin	114 (15%)	71 (14%)	43 (17%)	1.25	0.83, 1.88	0.3
comed_cepha	197 (25%)	141 (27%)	56 (22%)	0.74	0.52, 1.05	0.092
comed_carbapenem	554 (71%)	355 (68%)	199 (77%)	1.52	1.08, 2.14	**0.017**
comed_cotrimoxazol	63 (8.1%)	36 (6.9%)	27 (10%)	1.56	0.92, 2.62	0.10
comed_vancomycin	67 (8.6%)	40 (7.7%)	27 (10%)	1.39	0.83, 2.31	0.2
comed_levofloxacin	230 (29%)	144 (28%)	86 (33%)	1.29	0.93, 1.78	0.12
comed_teicoplanin	26 (3.3%)	13 (2.5%)	13 (5.0%)	2.05	0.93, 4.54	0.072
comed_ethambutol	8 (1.0%)	5 (1.0%)	3 (1.2%)	1.20	0.25, 4.94	0.8
comed_pyrazinamid	12 (1.5%)	6 (1.2%)	6 (2.3%)	2.02	0.63, 6.53	0.2
comed_rifampin	17 (2.2%)	10 (1.9%)	7 (2.7%)	1.41	0.51, 3.72	0.5
comed_heparin	189 (24%)	94 (18%)	95 (37%)	2.61	1.86, 3.66	**<0.001**
comed_clopidogrel	38 (4.9%)	28 (5.4%)	10 (3.8%)	0.70	0.32, 1.42	0.3
comed_enoxaparin	327 (42%)	213 (41%)	114 (44%)	1.13	0.83, 1.52	0.4
comed_dexamethason	92 (12%)	60 (12%)	32 (12%)	1.08	0.67, 1.69	0.8
comed_amiodaron	33 (4.2%)	15 (2.9%)	18 (6.9%)	2.50	1.24, 5.12	**0.010**
comed_furosemid	417 (53%)	244 (47%)	173 (67%)	2.25	1.65, 3.08	**<0.001**
comed_haloperidol	45 (5.8%)	28 (5.4%)	17 (6.5%)	1.23	0.65, 2.27	0.5

Characteristic	Overall, N = 780	FALSE, N = 520	TRUE, N = 260	OR	95% CI	p-value
comed_valproic	29 (3.7%)	21 (4.0%)	8 (3.1%)	0.75	0.31, 1.66	0.5
comed_aceclofenac	0 (0%)	0 (0%)	0 (0%)			
comed_naproxen	0 (0%)	0 (0%)	0 (0%)			
comed_daptomycin	1 (0.1%)	0 (0%)	1 (0.4%)			
comed_cetirizin	6 (0.8%)	5 (1.0%)	1 (0.4%)			
comed_simvas	0 (0%)	0 (0%)	0 (0%)			
comed_bisoprolol	6 (0.8%)	4 (0.8%)	2 (0.8%)			
comed_diltiazem	0 (0%)	0 (0%)	0 (0%)			
comed_eptifibatid	0 (0%)	0 (0%)	0 (0%)			
comed_quinidin	0 (0%)	0 (0%)	0 (0%)			
comed_carbamazepi	7 (0.9%)	7 (1.3%)	0 (0%)			
comed_phenytoin	0 (0%)	0 (0%)	0 (0%)			
comed_mirtazapin	0 (0%)	0 (0%)	0 (0%)			
comed_quetiapin	3 (0.4%)	3 (0.6%)	0 (0%)			
comed_ondansetron	6 (0.8%)	4 (0.8%)	2 (0.8%)			
comed_palonosetron	0 (0%)	0 (0%)	0 (0%)			
comed_oseltamivir	3 (0.4%)	1 (0.2%)	2 (0.8%)			
comed_quinin	0 (0%)	0 (0%)	0 (0%)			
comed_pembrolizumab	0 (0%)	0 (0%)	0 (0%)			
comed_trastuzumab	0 (0%)	0 (0%)	0 (0%)			
comed_atezolizumab	0 (0%)	0 (0%)	0 (0%)			
comed_durvalumab	0 (0%)	0 (0%)	0 (0%)			
comed_IVIG	0 (0%)	0 (0%)	0 (0%)			
comed_tacrolimus	1 (0.1%)	0 (0%)	1 (0.4%)			
comed_fluorouracil	0 (0%)	0 (0%)	0 (0%)			
comed_irinotecan	0 (0%)	0 (0%)	0 (0%)			
comed_leucovorin	0 (0%)	0 (0%)	0 (0%)			
comed_oxaliplatin	0 (0%)	0 (0%)	0 (0%)			

Source: Article Notebook

Model Performance

performance_type	C_index	calibration_intercept	calibration_slope
Apparent	0.7779549	0.0000000	1.0000000
Bootstrap	0.7456938	-0.0001972	0.8176676
Fold	0.7641578	-0.0084625	0.9584548

performance_type	C_index	calibration_intercept	calibration_slope

Source: Article Notebook