

SUPPLEMENTARY MATERIALS:

Supplementary Figure 1 to 12: Funnel plot showing unadjusted (panel A) and risk-adjusted (panel B) neonatal morbidity rates in Neonatal Intensive Care Units in NSW and the ACT between 2007-2020. A solid horizontal line represents the overall network average while the 95% (2.5th percentile represents the lower control limit and 97.5th percentile represents the upper control limit) and 99.8% (0.1th percentile represents the lower control limit and 99.9th percentile represents the upper control limit) control limits are represented by the curved dotted lines.

Figure 1: Proven early sepsis

Figure 2: Proven late sepsis

Figure 3: Intraventricular haemorrhage grade III and IV

Figure 4: Medically treated patent ductus arteriosus

Figure 5: Surgically treated patent ductus arteriosus

Figure 6: Necrotising enterocolitis clinically or proven radiologically or at surgery

Figure 7: Chronic lung disease

Figure 8: Postnatal steroid for chronic lung disease

Figure 9: Retinopathy of prematurity grade III to V

Figure 10: Surgery for retinopathy of prematurity

Figure 11: Hospital mortality

Figure 12: Home oxygen

Supplementary Table 1 to 12: Risk factors associated with each morbidity used for adjusted rates

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Figure 1: Proven early sepsis.

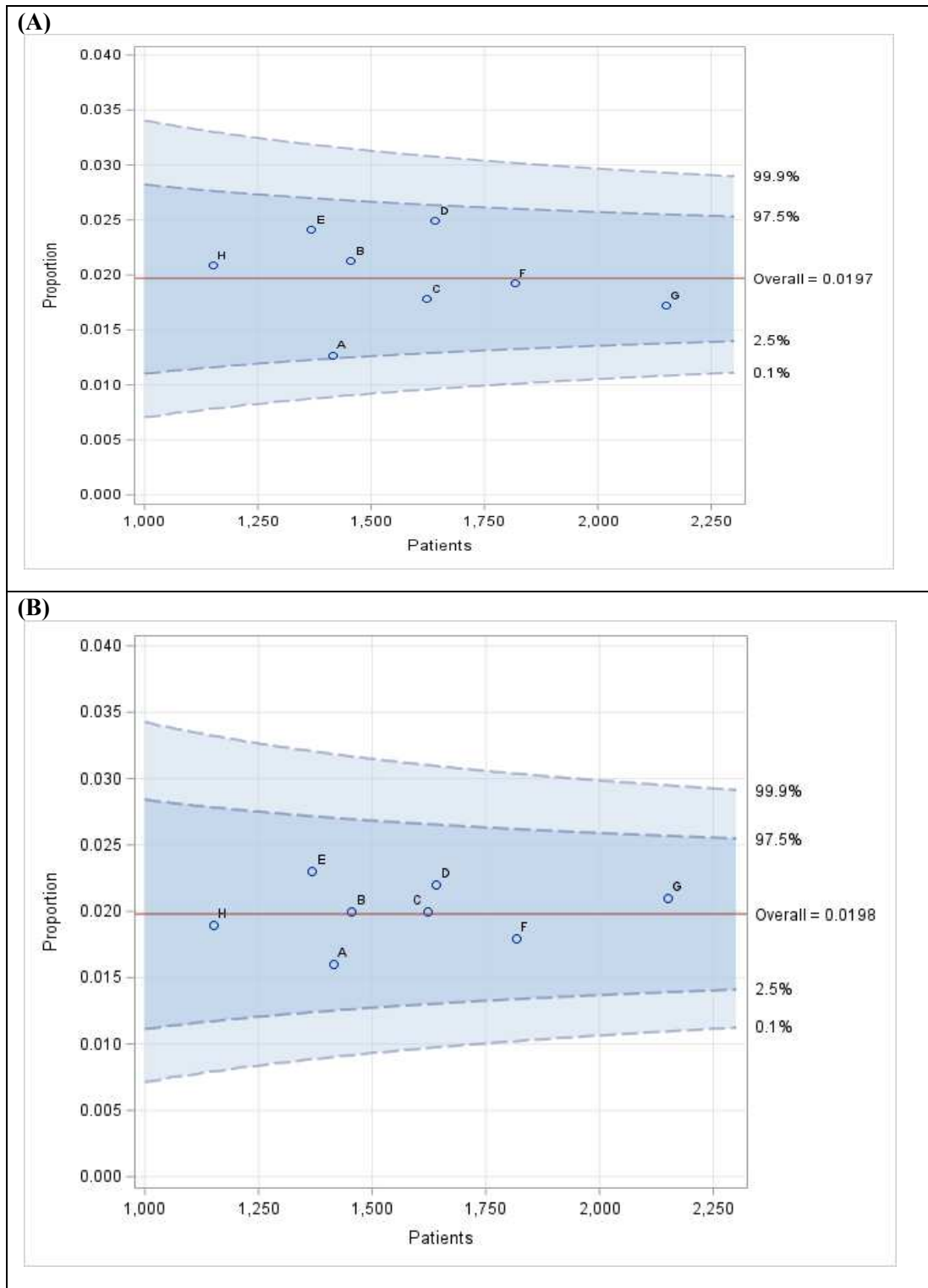


Figure 2: Proven late sepsis.

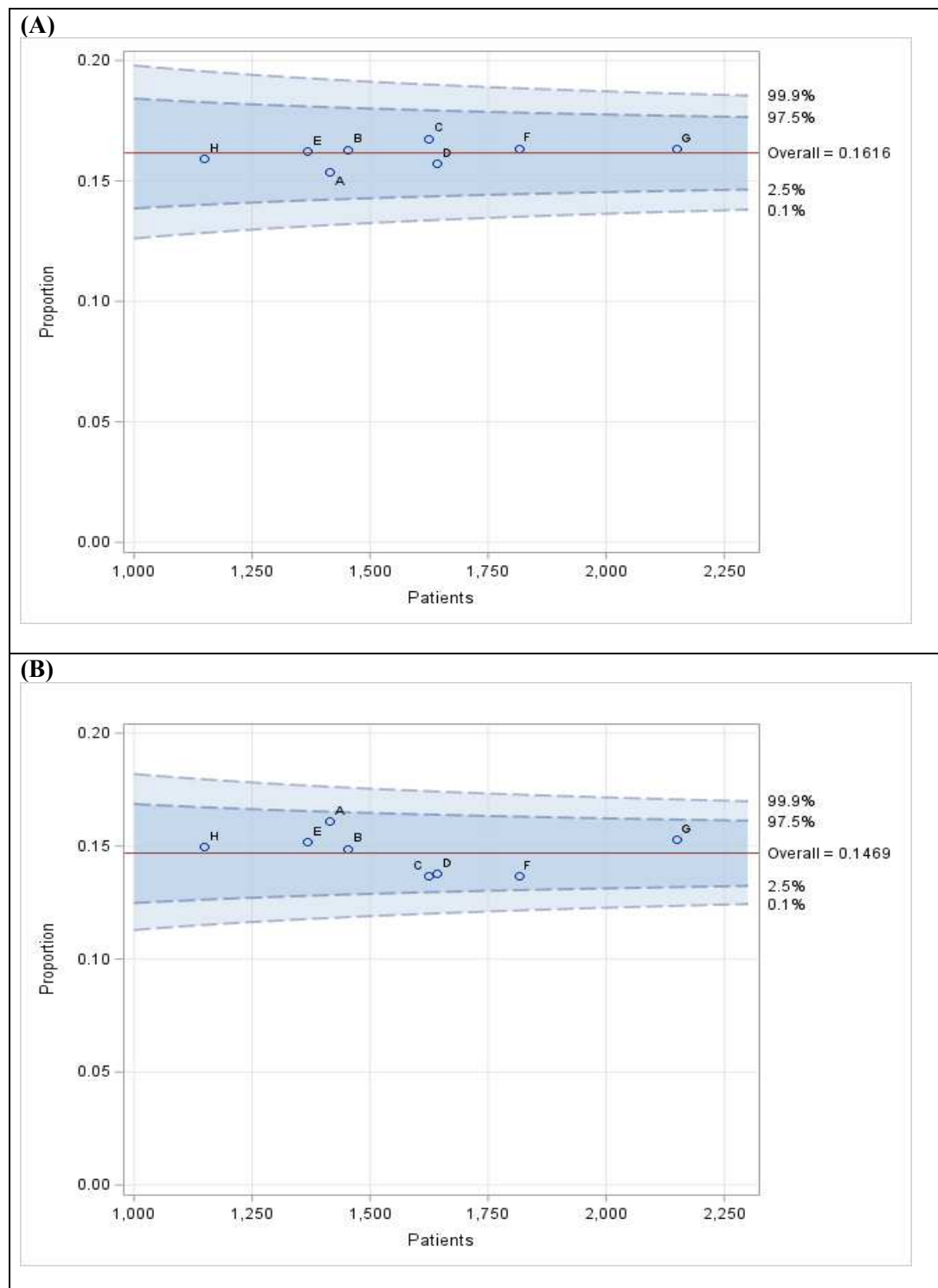


Figure 3: Intraventricular haemorrhage grade III and IV.

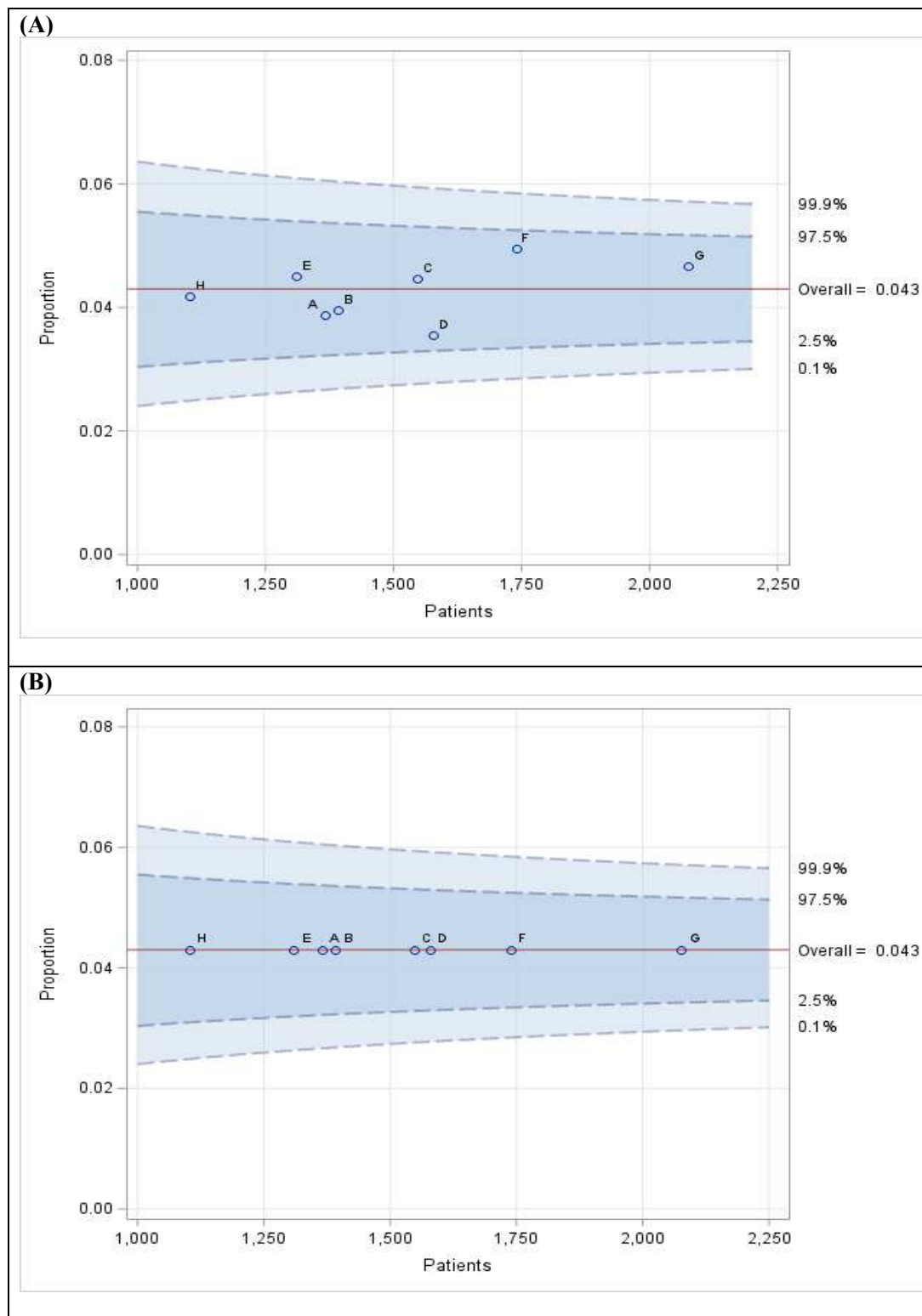


Figure 4: Medically treated patent ductus arteriosus.

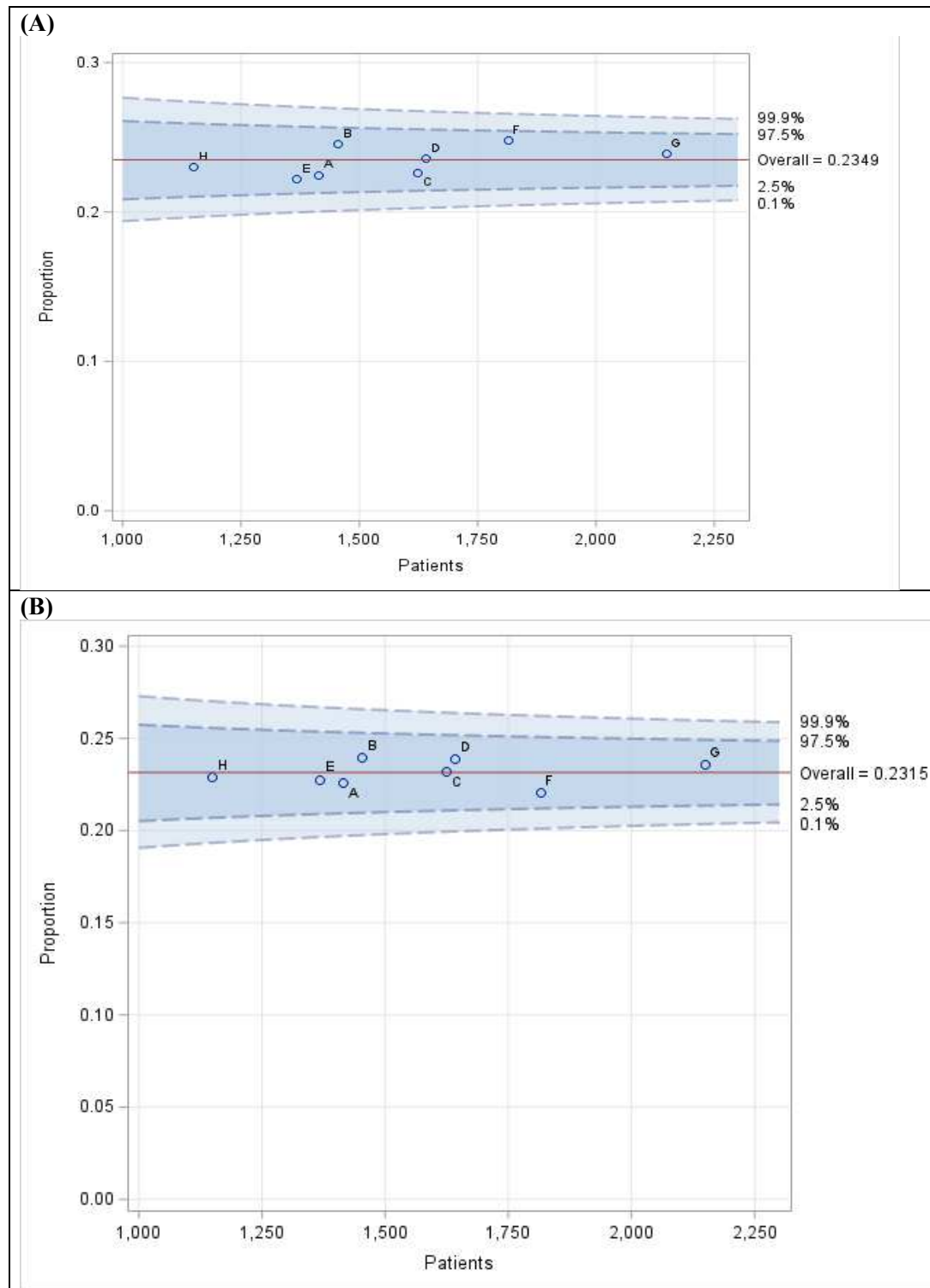


Figure 5: Surgically treated patent ductus arteriosus.

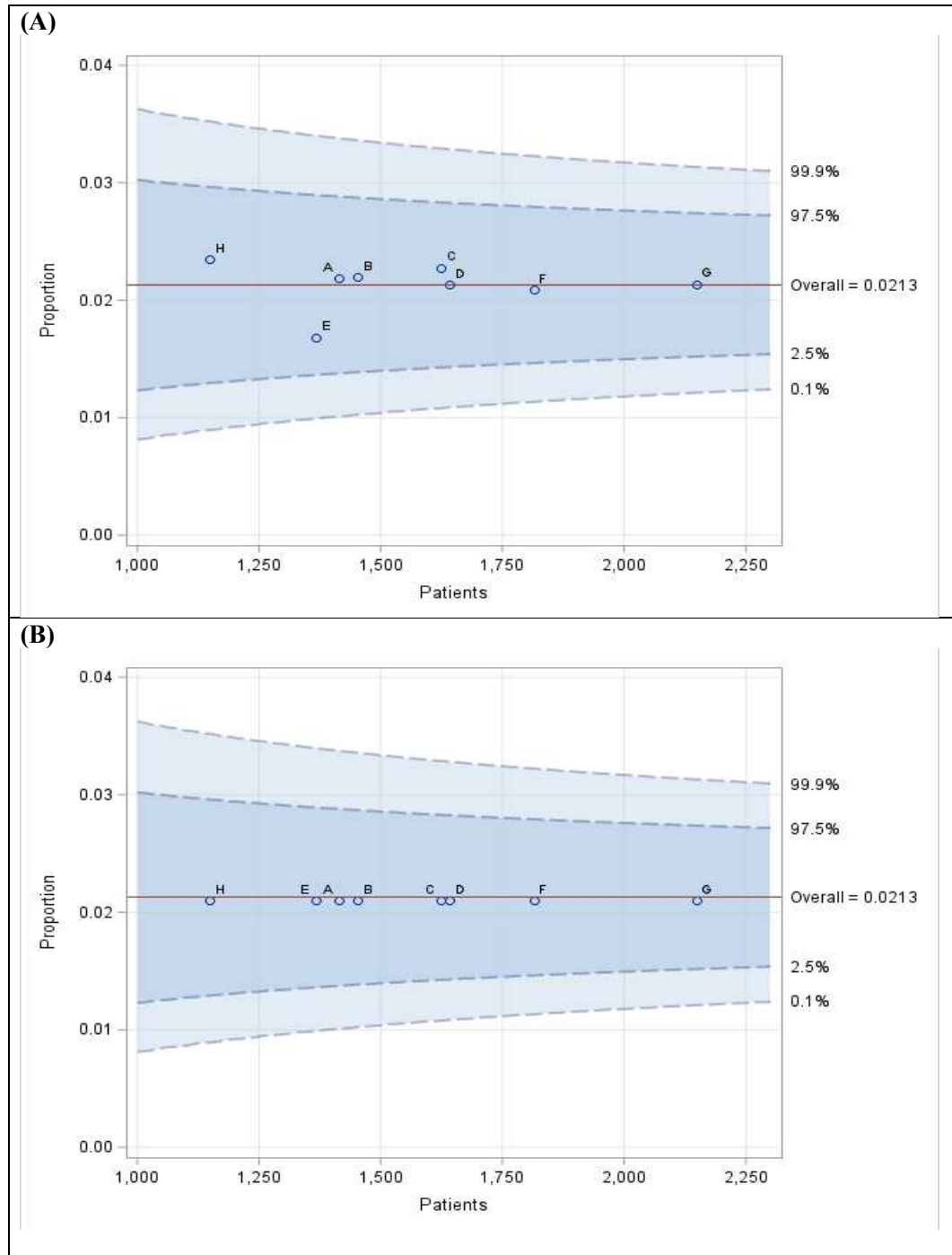


Figure 6: Necrotising enterocolitis diagnosed clinically or proven radiologically or at surgery.

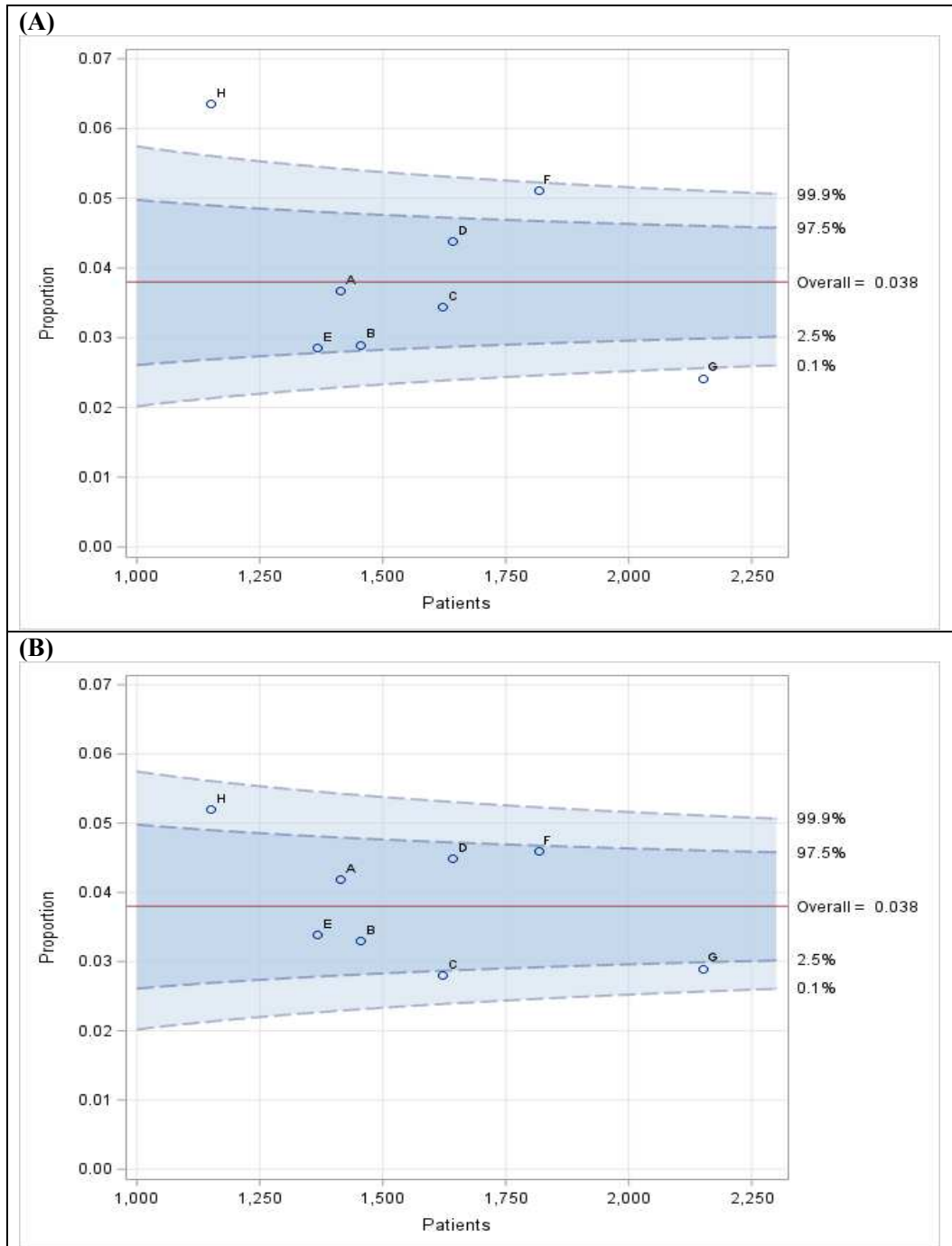


Figure 7: Chronic lung disease.

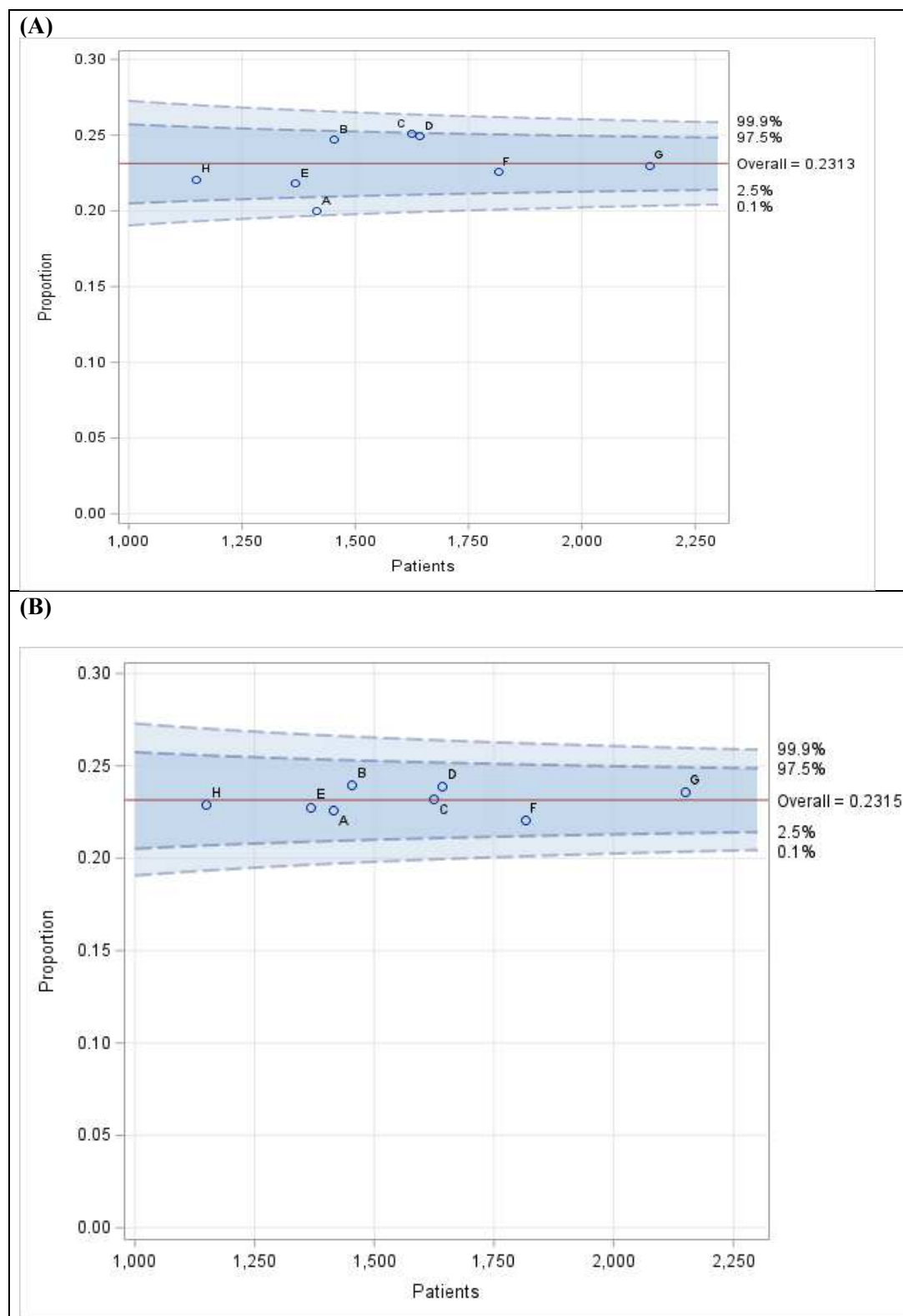


Figure 8: Postnatal steroid for chronic lung disease.

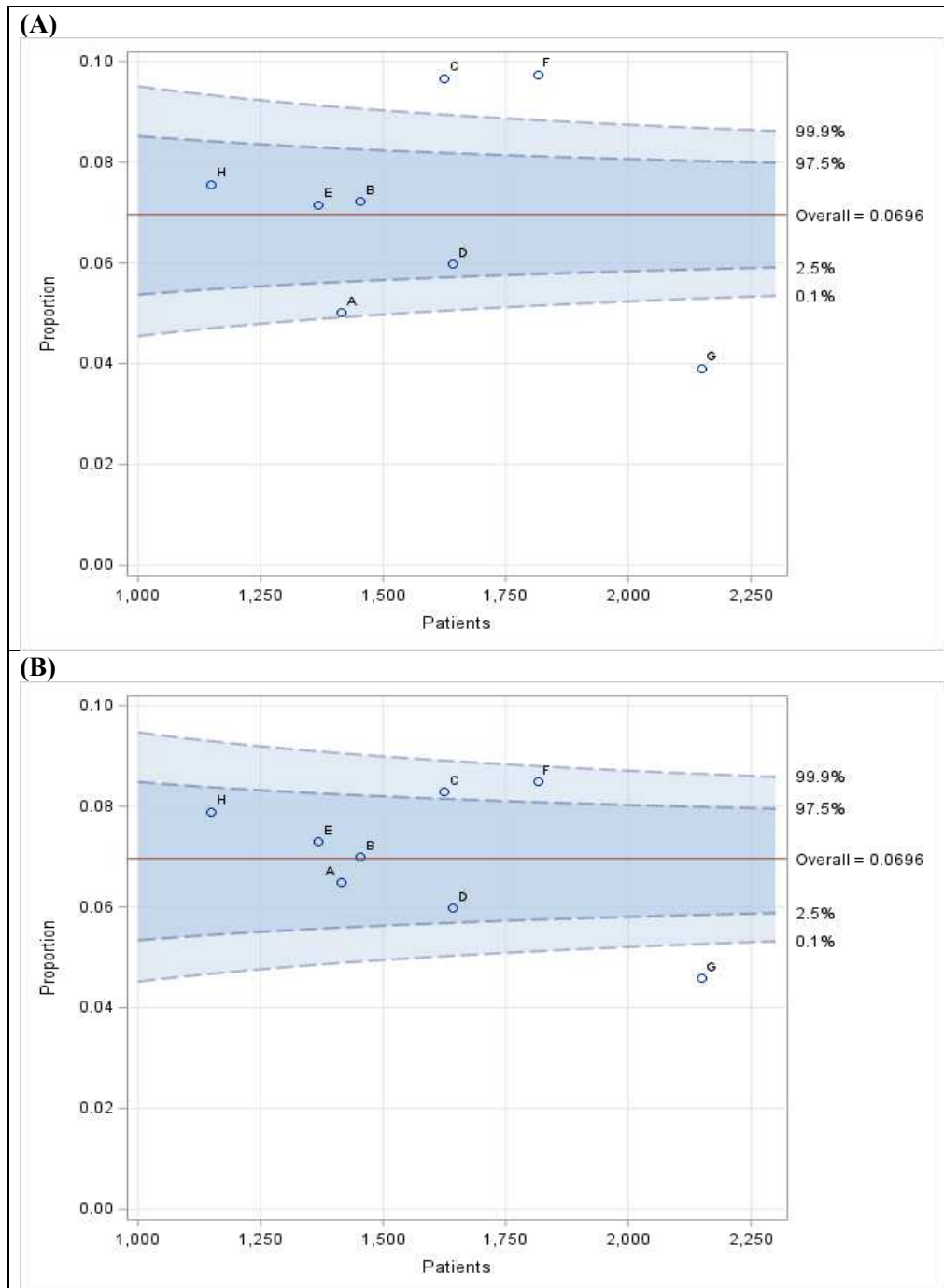


Figure 9: Retinopathy of prematurity grade III to V.

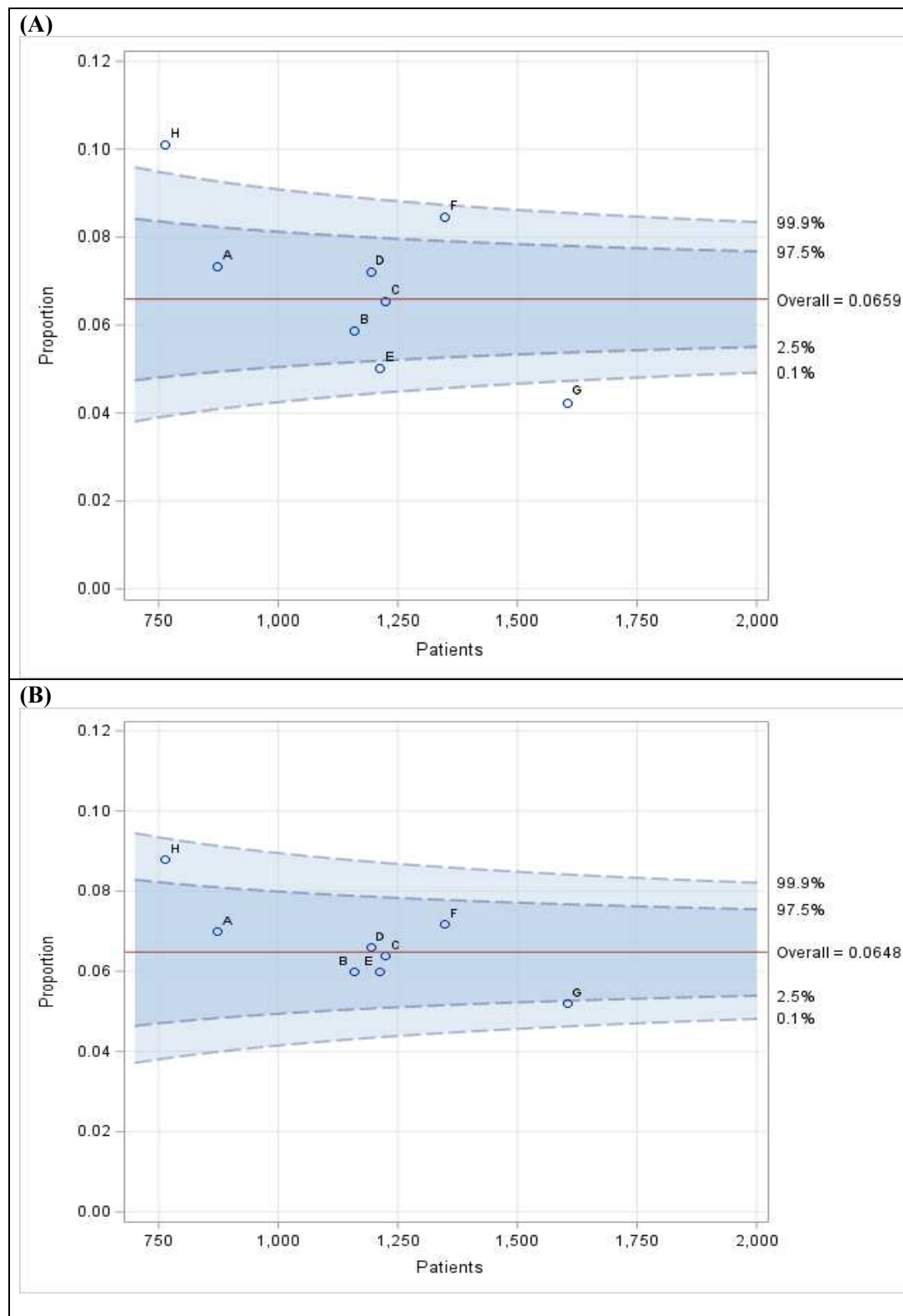


Figure 10: Surgery for retinopathy of prematurity.

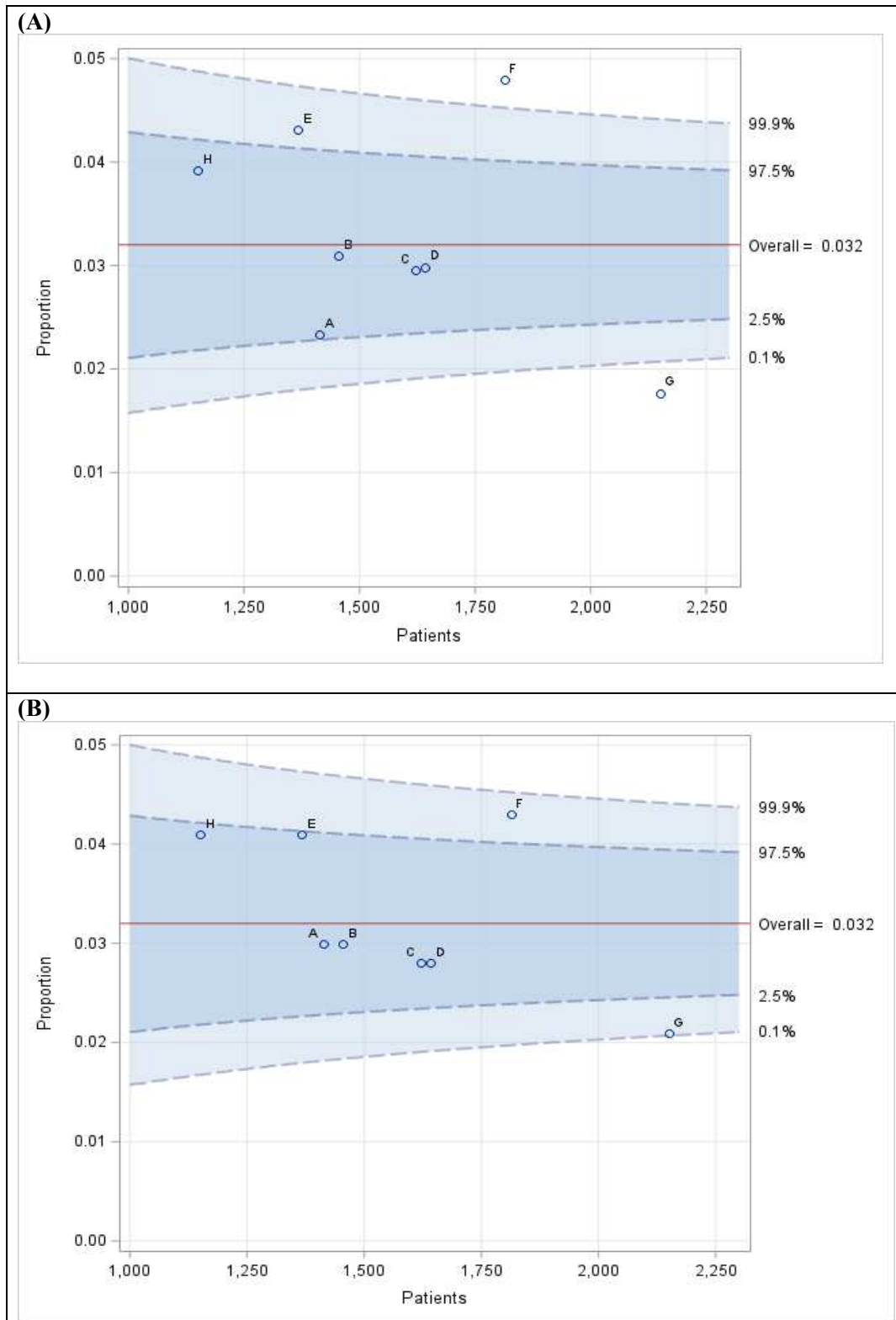


Figure 11: Hospital mortality.

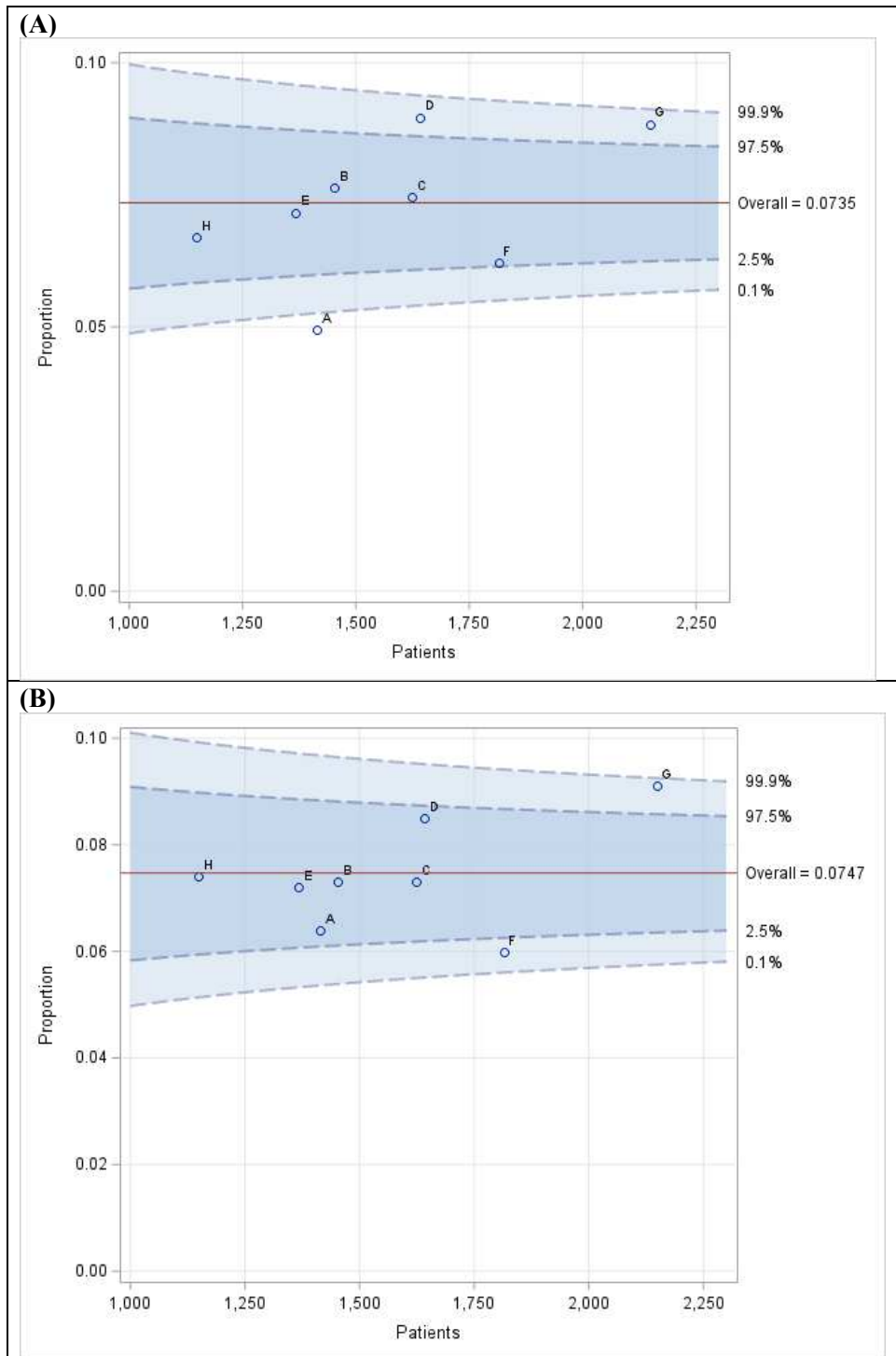
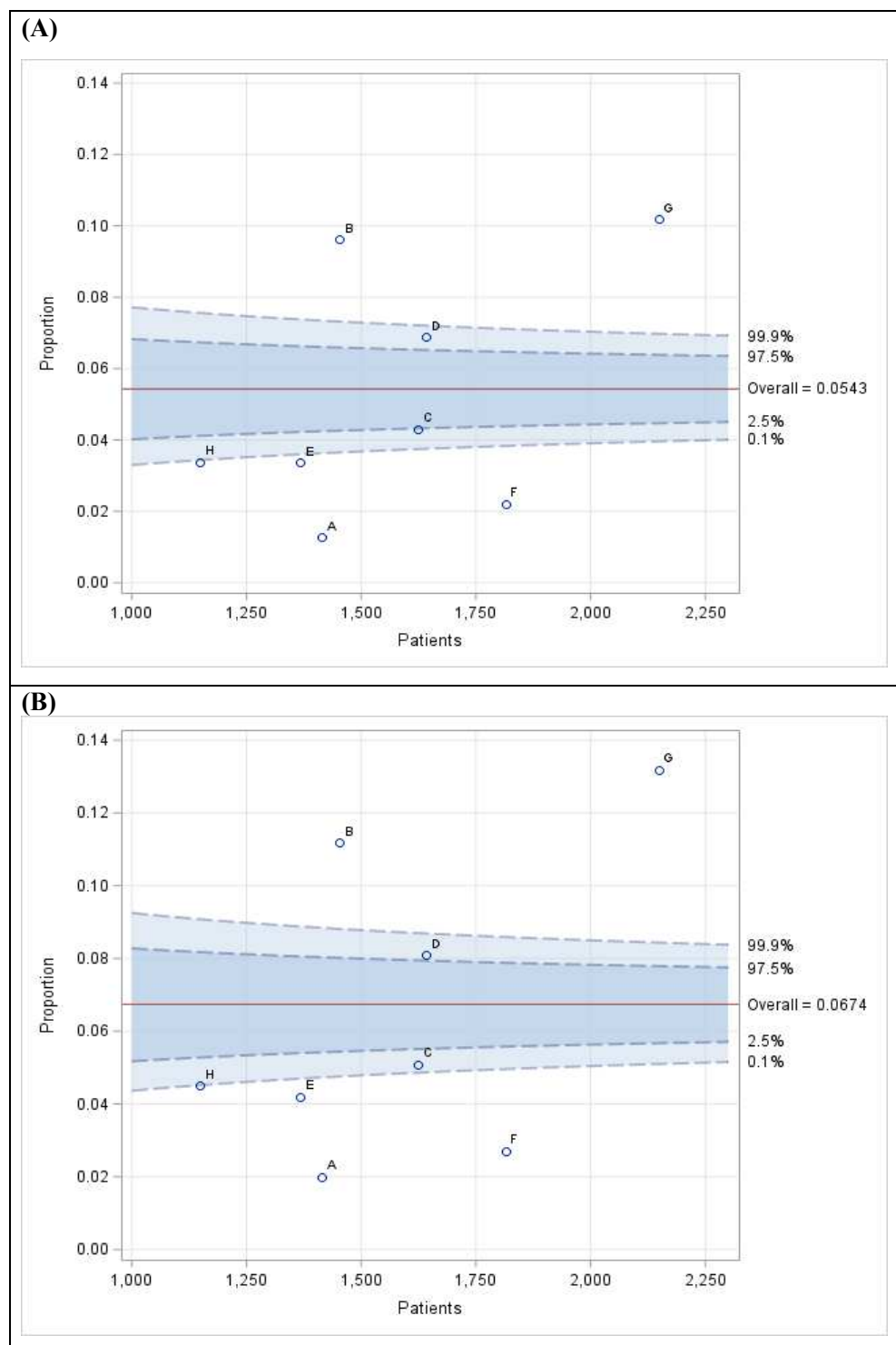


Figure 12: Home oxygen.



Supplementary Table 1 to 12: Risk factors associated with each morbidity used for adjusted rates

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Table 1: Proven early sepsis

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.321	0.246	0.419	<.0001
Birth weight percentile (≥ 10 vs. < 10 percentile)	0.883	0.492	1.582	0.6749
Chorioamnionitis (yes vs. no)	0.294	0.223	0.388	<.0001
Type of delivery (non-caesarean vs. caesarean section)	1.073	0.815	1.412	0.6163
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.136	0.676	1.911	0.63
Gestational age (27-29 vs. ≤ 26 weeks)	0.962	0.669	1.383	0.8333
Gestational age (30-31 vs. ≤ 26 weeks)	0.96	0.676	1.364	0.821
Sex (male vs. female)	1.048	0.807	1.361	0.7253
Multiple pregnancy (yes vs. no)	1.551	1.098	2.19	0.0127
Major congenital anomaly (yes vs. no)	0.738	0.454	1.199	0.2199
Major surgery (yes vs. no)	1.431	0.797	2.57	0.2296
Place of birth (outborn vs. inborn)	0.871	0.547	1.386	0.5605
Antenatal corticosteroids (yes vs. none)	0.977	0.589	1.62	0.9281

*C-statistic 0.72.

Table 2: Proven late sepsis

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	1.109	0.973	1.264	0.1228
Birth weight percentile (≥ 10 vs. < 10 percentile)	1.038	0.851	1.266	0.7127
Chorioamnionitis (yes vs. no)	0.949	0.84	1.072	0.3999
Type of delivery (non-caesarean vs. caesarean section)	1.072	0.959	1.199	0.2202
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.106	0.91	1.344	0.311
Gestational age (27-29 vs. ≤ 26 weeks)	0.279	0.249	0.313	$< .0001$
Gestational age (30-31 vs. ≤ 26 weeks)	0.088	0.076	0.101	$< .0001$
Sex (male vs. female)	0.978	0.881	1.085	0.6698
Multiple pregnancy (yes vs. no)	0.971	0.864	1.091	0.6243
Major congenital anomaly (yes vs. no)	0.79	0.623	1.003	0.0526
Major surgery (yes vs. no)	1.143	0.913	1.43	0.2434
Place of birth (outborn vs. inborn)	1.094	0.911	1.312	0.336
Antenatal corticosteroids (yes vs. none)	1.001	0.816	1.228	0.9935

*C-statistic 0.74.

Table 3: Intraventricular haemorrhage grade III and IV

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	1.025	0.81	1.297	0.8382
Birth weight percentile (≥ 10 vs. < 10 percentile)	1.363	0.927	2.005	0.1157
Chorioamnionitis (yes vs. no)	1.039	0.84	1.284	0.7255
Type of delivery (non-caesarean vs. caesarean section)	1.013	0.833	1.232	0.8978
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.053	0.749	1.48	0.7677
Gestational age (27-29 vs. ≤ 26 weeks)	1.03	0.748	1.418	0.8566
Gestational age (30-31 vs. ≤ 26 weeks)	1.085	0.788	1.493	0.6171
Sex (male vs. female)	1.292	0.873	1.913	0.2004
Multiple pregnancy (yes vs. no)	0.924	0.771	1.108	0.396
Major congenital anomaly (yes vs. no)	0.754	0.607	0.936	0.0103
Major surgery (yes vs. no)	0.837	0.551	1.27	0.403
Place of birth (outborn vs. inborn)	1.14	0.77	1.687	0.5128
Antenatal corticosteroids (yes vs. none)	1.018	0.74	1.4	0.9147

*C-statistic 0.552.

Table 4: Medically treated patent ductus arteriosus

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.987	0.87	1.12	0.8389
Birth weight percentile (≥ 10 vs < 10 percentile)	1.087	0.9	1.313	0.3874
Chorioamnionitis (yes vs. no)	0.913	0.813	1.026	0.1271
Type of delivery (non-caesarean vs. caesarean section)	1.03	0.926	1.145	0.5891
Ethnicity (Indigenous vs. non-Indigenous Australian)	0.93	0.767	1.127	0.46
Gestational age (27-29 vs. ≤ 26 weeks)	0.197	0.177	0.219	$< .0001$
Gestational age (30-31 vs. ≤ 26 weeks)	0.025	0.021	0.029	$< .0001$
Sex (male vs. female)	0.923	0.835	1.019	0.1116
Multiple pregnancy (yes vs. no)	0.971	0.869	1.084	0.6003
Major congenital anomaly (yes vs. no)	0.814	0.653	1.015	0.0681
Major surgery (yes vs. no)	1.3	1.051	1.607	0.0156
Place of birth (outborn vs. inborn)	1.048	0.879	1.249	0.6029
Antenatal corticosteroids (yes vs. none)	0.855	0.705	1.037	0.1112

*C-statistic 0.82.

Table 5: Surgically treated patent ductus arteriosus

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	1.171	0.863	1.589	0.3115
Birth weight percentile (≥ 10 vs. < 10 percentile)	1.01	0.641	1.591	0.9647
Chorioamnionitis (yes vs. no)	1.118	0.838	1.492	0.4464
Type of delivery (non-caesarean vs. caesarean section)	0.761	0.577	1.003	0.0522
Ethnicity (Indigenous vs. non-Indigenous Australian)	0.968	0.598	1.568	0.8948
Gestational age (27-29 vs. ≤ 26 weeks)	0.23	0.174	0.305	$< .0001$
Gestational age (30-31 vs. ≤ 26 weeks)	0.063	0.041	0.096	$< .0001$
Sex (male vs. female)	1.083	0.842	1.391	0.536
Multiple pregnancy (yes vs. no)	1.032	0.782	1.36	0.8255
Major congenital anomaly (yes vs. no)	0.773	0.436	1.37	0.3778
Major surgery (yes vs. no)	1.516	0.94	2.446	0.0882
Place of birth (outborn vs. inborn)	0.913	0.574	1.452	0.7003
Antenatal corticosteroids (yes vs. none)	0.888	0.545	1.445	0.632

*C-statistic 0.77.

Table 6: Necrotising enterocolitis clinically or proven radiologically or at surgery

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.702	0.559	0.883	0.0024
Birth weight percentile (≥ 10 vs. < 10 percentile)	2.789	2.082	3.736	$< .0001$
Chorioamnionitis (yes vs. no)	0.674	0.536	0.849	0.0008
Type of delivery (non-caesarean vs. caesarean section)	1.066	0.85	1.336	0.58
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.588	0.999	2.524	0.0506
Gestational age (27-29 vs. ≤ 26 weeks)	1.182	0.898	1.556	0.2325
Gestational age (30-31 vs. ≤ 26 weeks)	1.131	0.869	1.474	0.3598
Sex (male vs. female)	0.759	0.617	0.934	0.0092
Multiple pregnancy (yes vs. no)	1.064	0.844	1.342	0.5971
Major congenital anomaly (yes vs. no)	2.06	1.457	2.913	$< .0001$
Major surgery (yes vs. no)	0.043	0.035	0.054	$< .0001$
Place of birth (outborn vs. inborn)	1.099	0.733	1.648	0.6484
Antenatal corticosteroids (yes vs. none)	0.934	0.61	1.43	0.7538

*C-statistic 0.77.

Table 7: Chronic lung disease

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.518	0.466	0.576	<.0001
Birth weight percentile (≥ 10 vs. < 10 percentile)	3.33	2.875	3.858	<.0001
Chorioamnionitis (yes vs. no)	0.65	0.587	0.721	<.0001
Type of delivery (non-caesarean vs. caesarean section)	0.951	0.861	1.05	0.323
Ethnicity (Indigenous vs. non-Indigenous Australian)	0.864	0.728	1.025	0.0929
Gestational age (27-29 vs. ≤ 26 weeks)	1.018	0.898	1.153	0.7841
Gestational age (30-31 vs. ≤ 26 weeks)	1.039	0.92	1.172	0.5382
Sex (male vs. female)	0.878	0.801	0.962	0.0054
Multiple pregnancy (yes vs. no)	1.116	1.005	1.239	0.0393
Major congenital anomaly (yes vs. no)	0.535	0.451	0.635	<.0001
Major surgery (yes vs. no)	0.181	0.153	0.215	<.0001
Place of birth (outborn vs. inborn)	1.301	1.092	1.551	0.0033
Antenatal corticosteroids (yes vs. none)	0.843	0.698	1.019	0.0768

*C-statistic 0.72.

Table 8: Postnatal steroid for chronic lung disease

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.41	0.35	0.481	<.0001
Birth weight percentile (≥ 10 vs. < 10 percentile)	2.454	1.948	3.092	<.0001
Chorioamnionitis (yes vs. no)	0.525	0.446	0.618	<.0001
Type of delivery (non-caesarean vs. caesarean section)	0.748	0.637	0.879	0.0004
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.135	0.837	1.539	0.4136
Gestational age (27-29 vs. ≤ 26 weeks)	1.058	0.863	1.296	0.5891
Gestational age (30-31 vs. ≤ 26 weeks)	1.095	0.899	1.334	0.3686
Sex (male vs. female)	0.711	0.609	0.829	<.0001
Multiple pregnancy (yes vs. no)	0.996	0.838	1.184	0.9666
Major congenital anomaly (yes vs. no)	0.704	0.553	0.896	0.0043
Major surgery (yes vs. no)	0.166	0.136	0.202	<.0001
Place of birth (outborn vs. inborn)	1.441	1.059	1.962	0.0202
Antenatal corticosteroids (yes vs. none)	0.887	0.649	1.212	0.4529

*C-statistic 0.74.

Table 9: Retinopathy of prematurity grade III to V

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.429	0.355	0.518	<.0001
Birth weight percentile (≥ 10 vs. < 10 percentile)	2.485	1.881	3.283	<.0001
Chorioamnionitis (yes vs. no)	0.474	0.392	0.574	<.0001
Type of delivery (non-caesarean vs. caesarean section)	0.579	0.478	0.7	<.0001
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.169	0.815	1.676	0.3963
Gestational age (27-29 vs. ≤ 26 weeks)	0.964	0.756	1.228	0.7642
Gestational age (30-31 vs. ≤ 26 weeks)	0.997	0.787	1.262	0.9768
Sex (male vs. female)	1.065	0.893	1.27	0.4821
Multiple pregnancy (yes vs. no)	0.969	0.791	1.188	0.7624
Major congenital anomaly (yes vs. no)	0.813	0.605	1.091	0.1678
Major surgery (yes vs. no)	0.208	0.166	0.261	<.0001
Place of birth (outborn vs. inborn)	1.206	0.855	1.701	0.2864
Antenatal corticosteroids (yes vs. none)	0.92	0.63	1.342	0.6647

*C-statistic 0.66.

Table 10: Surgery for retinopathy of prematurity

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.421	0.339	0.524	<.0001
Birth weight percentile (≥ 10 vs. < 10 percentile)	2.734	1.987	3.762	<.0001
Chorioamnionitis (yes vs. no)	0.62	0.494	0.777	<.0001
Type of delivery (non-caesarean vs. caesarean section)	0.561	0.448	0.702	<.0001
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.089	0.719	1.649	0.688
Gestational age (27-29 vs. ≤ 26 weeks)	1.067	0.805	1.414	0.6538
Gestational age (30-31 vs. ≤ 26 weeks)	1.097	0.834	1.442	0.5077
Sex (male vs. female)	1.144	0.929	1.409	0.2052
Multiple pregnancy (yes vs. no)	1.134	0.886	1.452	0.3163
Major congenital anomaly (yes vs. no)	1.083	0.757	1.548	0.6633
Major surgery (yes vs. no)	0.173	0.133	0.224	<.0001
Place of birth (outborn vs. inborn)	1.284	0.861	1.916	0.2208
Antenatal corticosteroids (yes vs. none)	1.144	0.772	1.694	0.5027

*C-statistic 0.73.

Table 11: Hospital mortality

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	5.473	4.732	6.332	<.0001
Birth weight percentile (≥ 10 vs. < 10 percentile)	0.447	0.356	0.561	<.0001
Chorioamnionitis (yes vs. no)	1.245	1.06	1.463	0.0077
Type of delivery (non-caesarean vs. caesarean section)	1.531	1.313	1.785	<.0001
Ethnicity (Indigenous vs. non-Indigenous Australian)	0.966	0.731	1.276	0.8059
Gestational age (27-29 vs. ≤ 26 weeks)	0.861	0.708	1.047	0.133
Gestational age (30-31 vs. ≤ 26 weeks)	0.911	0.756	1.099	0.3313
Sex (male vs. female)	1.22	1.054	1.412	0.0076
Multiple pregnancy (yes vs. no)	1.072	0.909	1.264	0.4089
Major congenital anomaly (yes vs. no)	2.588	2.069	3.236	<.0001
Major surgery (yes vs. no)	1.056	0.813	1.373	0.6818
Place of birth (outborn vs. inborn)	0.782	0.61	1.002	0.0519
Antenatal corticosteroids (yes vs. none)	0.52	0.413	0.655	<.0001

*C-statistic 0.74.

Table 12: Home oxygen

Characteristics*	aOR	95%CI		p-value
Apgar score at 5mins ≤ 7 (yes vs. no)	0.51	0.427	0.608	<.0001
Birth weight percentile (≥ 10 vs. < 10 percentile)	2.497	1.961	3.179	<.0001
Chorioamnionitis (yes vs. no)	0.724	0.604	0.867	0.0005
Type of delivery (non-caesarean vs. caesarean section)	0.751	0.63	0.896	0.0014
Ethnicity (Indigenous vs. non-Indigenous Australian)	1.087	0.785	1.505	0.6161
Gestational age (27-29 vs. ≤ 26 weeks)	0.991	0.796	1.235	0.9359
Gestational age (30-31 vs. ≤ 26 weeks)	1.103	0.889	1.368	0.3748
Sex (male vs. female)	0.784	0.664	0.926	0.0042
Multiple pregnancy (yes vs. no)	1.37	1.123	1.671	0.0019
Major congenital anomaly (yes vs. no)	0.819	0.617	1.088	0.1679
Major surgery (yes vs. no)	0.378	0.295	0.483	<.0001
Place of birth (outborn vs. inborn)	1.308	0.945	1.811	0.1057
Antenatal corticosteroids (yes vs. none)	0.749	0.525	1.069	0.1109

*C-statistic 0.68.