



Abstract

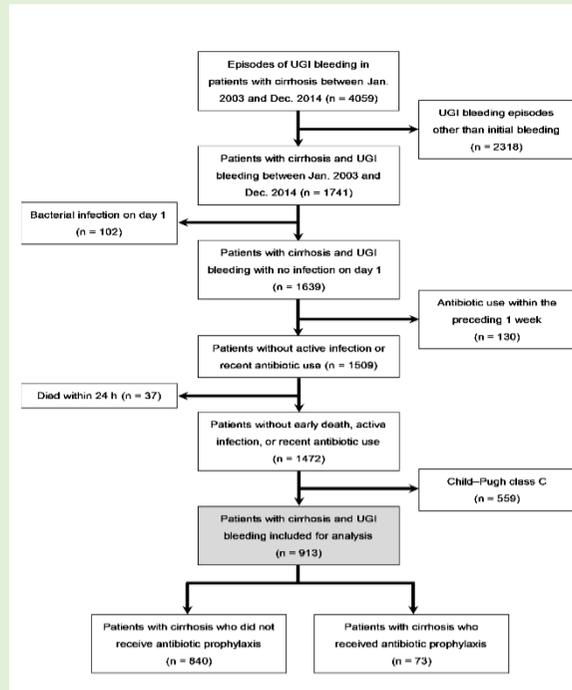
Background and Aim: Current guidelines recommend antibiotic prophylaxis for all patients with cirrhosis and upper gastrointestinal (UGI) bleeding. This study assessed the need for prophylactic antibiotic use in patients with low Child–Pugh scores.

Methods: All patients with cirrhosis who underwent upper endoscopies for UGI bleeding in a referral hospital in Taiwan between 2003 and 2014 were retrospectively reviewed to assess the effects of antibiotic prophylaxis on patients with Child–Pugh class A/B cirrhosis.

Results: A total of 1741 patients presented to this hospital with 4059 UGI bleeding episodes during the study period. Finally, 913 patients were enrolled after excluding patients with active bacterial infections, recent antibiotic use, early death, and Child–Pugh class C cirrhosis. Among these 913 patients, only 73 (8%) received prophylactic antibiotics, and 45 (4.9%) exhibited 14-day bacterial infection. Neither the Child–Pugh score nor model for end stage liver disease score were optimal for predicting bacterial infection because their areas under the receiver operator characteristic curves were only 0.610 (95% confidence interval [CI]: 0.529–0.691) and 0.666 (95% CI: 0.591–0.742), respectively. Antibiotic prophylaxis did not reduce the risks of 14-day bacterial infection (relative risk [RR]: 0.932, 95% CI: 0.300–2.891, $P = 0.902$), 14-day rebleeding (RR: 0.791, 95% CI: 0.287–2.181, $P = 0.650$), or 42-day mortality (RR: 1.121, 95% CI: 0.769–1.568, $P = 0.650$). The results remained similar after propensity score adjustment.

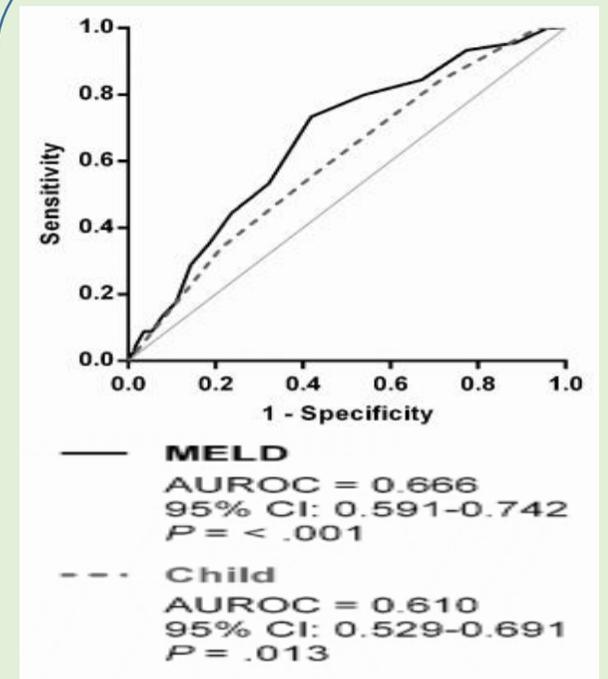
Conclusions: On-demand antibiotic treatment might suffice for patients with Child–Pugh class A/B cirrhosis and UGI bleeding.

Figure 1.



Flowchart of all enrolled patients with cirrhosis and upper gastrointestinal (UGI) bleeding.

Figure 2.



ROC curves and AUCs for Child–Pugh scores of 5–9 and corresponding MELD scores for predicting bacterial infection.

Table 1. Baseline patient characteristics

Patient characteristics	Prophylaxis (n=73)	No prophylaxis (n=840)	All patients (n=913)	P ^a
Age, mean ± SD (years)	55.22 ± 12.46	59.86 ± 13.15	59.49 ± 13.15	0.003
Sex, male n (%)	57 (78.1)	592 (70.5)	646 (71.1)	0.169
HCC, n (%)	19 (26.0)	287 (34.2)	306 (33.5)	0.158
Blood transfused in 48 h, unit	3.38 ± 2.78	2.43 ± 2.44	2.51 ± 2.48	0.006
Ascites, n (%)	33 (45.2)	344 (41.0)	379 (41.3)	0.479
Hepatic encephalopathy, n (%)	6 (8.2)	41 (4.9)	47 (5.1)	0.216
Prior SBP, n (%)	1 (1.4)	17 (2.0)	18 (2.0)	0.700
Etiology of cirrhosis, n (%)				0.211
HBV	22 (30.1)	173 (20.5)	195 (21.3)	
HCV	28 (38.4)	404 (48.2)	431 (47.2)	
BC	8 (11.0)	77 (9.2)	85 (9.2)	
NBNC	15 (20.5)	186 (22.1)	201 (22.3)	
Platelet count, ×10 ³ /μL	114.51 ± 68.40	112.25 ± 70.31	112.43 ± 70.13	0.788
White blood cell count, ×10 ³ /μL	9.87 ± 4.28	7.92 ± 4.18	8.06 ± 4.22	<0.001
Hemoglobin, g/L	9.37 ± 2.26	9.21 ± 2.52	9.22 ± 2.50	0.593
International normalized ratio	1.32 ± 0.17	1.27 ± 0.45	1.28 ± 0.44	0.351
Sodium, mEq/L	137.00 ± 4.00	136.56 ± 10.81	136.59 ± 10.42	0.724
Creatinine, mg/dL	1.15 ± 0.76	1.28 ± 1.25	1.27 ± 1.22	0.379
Bilirubin, mg/dL	1.81 ± 1.04	1.78 ± 1.15	1.78 ± 1.14	0.829
ALT, IU/L	47.15 ± 24.89	65 ± 125.50	62.93 ± 120.40	0.229
Albumin, g/dL	2.97 ± 0.47	2.91 ± 0.55	2.91 ± 0.54	0.301
Systolic blood pressure, mmHg	112.47 ± 27.24	121.37 ± 31.03	120.62 ± 30.81	0.019
Heart rate, beats/min	105.01 ± 21.48	100.31 ± 21.60	94.68 ± 31.40	0.079
Etiology of bleeding, n (%)				0.001
Portal hypertension	68 (93.1)	648 (77.14)	716 (78.4)	
Peptic ulcer	5 (6.9)	192 (22.86)	197 (21.6)	
Hospitalization days	7.33 ± 6.79	6.50 ± 5.40	6.56 ± 5.53	0.218
ICU admission, n (%)	7 (9.6)	19 (2.3)	26 (2.84)	<0.001
MELD score	12.85 ± 3.84	12.53 ± 3.71	12.59 ± 3.79	0.480
Child–Pugh score	7.34 ± 1.20	7.32 ± 1.21	7.32 ± 1.21	0.855
Child–Pugh class A/B, n (%)	18/55 (24.77/3)	239/601 (28.57/15)	257/656 (28.17/1)	0.489
Infection within 14 days, n (%)	5 (6.8)	40 (4.8)	45 (4.9)	0.429
Rebleeding within 14 days, n (%)	5 (6.8)	71 (8.5)	76 (8.3)	0.634
Mortality within 42 days, n (%)	5 (6.8)	27 (3.2)	32 (3.5)	0.161

Table 2. Factors associated with risk of bacterial infection within 14 days^a

Factors	All patients (n=913)			PPS matched patients (n=138)		
	RR	95% CI	P	RR	95% CI	P
Prophylaxis, y/n	0.932	0.300–2.891	0.902	0.962	0.147–6.288	0.968
Age, years	1.015	0.985–1.047	0.902	1.011	0.907–1.128	0.840
Sex, male/female	0.671	0.317–1.418	0.296	2.233	0.184–27.056	0.528
Prior SBP, y/n	1.213	0.138–10.682	0.826	–	–	0.999
Ascites, y/n	1.300	0.563–3.003	0.539	0.964	0.048–19.292	0.981
HCCs, y/n	1.197	0.592–2.419	0.616	0.394	0.032–4.869	0.468
Blood transfusion, unit	1.011	0.874–1.169	0.885	0.919	0.619–1.364	0.676
Encephalopathy, y/n	1.084	0.282–4.169	0.906	0.070	0.001–6.825	0.255
Blood pressure, mmHg	1.001	0.989–1.012	0.930	1.024	0.985–1.064	0.224
Hemoglobin, g/L	1.119	0.933–1.342	0.227	1.156	0.611–2.187	0.655
WBC count, ×10 ³ /μL	1.102	1.016–1.194	0.019	1.260	0.832–1.910	0.275
Platelet count, ×10 ³ /μL	0.991	0.983–0.998	0.019	0.955	0.908–1.005	0.078
Albumin, g/dL	0.434	0.195–0.965	0.041	0.920	0.055–15.374	0.954
ICU admission, y/n	0.298	0.077–1.145	0.078	17.131	0.557–526.696	0.104
MELD score	1.132	1.033–1.241	0.008	0.979	0.665–1.441	0.913
Child Pugh score	0.890	0.563–1.409	0.619	3.514	0.489–25.242	0.212
Etiology of cirrhosis			0.670			0.767
NBNC	1.000			1.000		
HBV	2.046	0.641–6.532	0.227	1.220	0.062–24.122	0.896
HCV	1.693	0.573–5.001	0.341	3.477	0.242–49.912	0.359
BC	1.395	0.301–6.463	0.670	–	–	0.998
Treatment			0.544			0.988
No treatment	1.000			1.000		
APC	1.892	0.496–7.209	0.350	1.150	0.008–170.674	0.956
EVL	0.929	0.385–2.242	0.870	0.728	0.064–8.229	0.798
EIS	1.395	0.301–6.463	0.670	1.058	0.082–13.609	0.965
Etiology of bleeding			0.250			0.999
Portal hypertension	1.000			1.000		
Peptic ulcer	0.468	0.128–1.705	0.250	–	–	–

PPS: propensity score; CI: confidence interval; y/n: yes/no; SBP: spontaneous bacterial peritonitis; HCC: hepatocellular carcinoma; WBC: white blood cell; ICU: intensive care unit; MELD: model for end stage liver disease; APC: argon plasma coagulation; EVL: endoscopic variceal ligation; EIS: endoscopic injection sclerotherapy.
^aNumber of patients with 14-day infection: 45 of all 913 patients and 9 of the 138 PPS matched patients.

Table 3. Types of bacterial infection within 42 days (45 patients)

Type	No	Site and bacteria
SBP	7	Blood
	1	Bacteroides thetaiotaomicron
	2	Escherichia coli
	1	Group B streptococcus
Pneumonia	7	Blood
	1	Haemophilus influenzae
	1	Acinetobacter baumannii
	1	Staphylococcus aureus –ORSA
UTI	12	Blood
	1	Acinetobacter baumannii, Escherichia coli
	1	Gram positive cocci (2 kinds)
	1	Klebsiella pneumoniae
Cellulitis	2	Blood
	1	Staphylococcus aureus
	1	Klebsiella pneumoniae
	1	Staphylococcus aureus, Viridans streptococcus
Arthritis	2	Blood
	1	Staphylococcus aureus
	1	Group B streptococcus
	1	Synovial fluid
Unknown	15	Blood
	2	Stenotrophomonas maltophilia
	1	Klebsiella pneumoniae
	1	Salmonella enterica Serogroup B, Viridans streptococcus, Peptostreptococcus species
	3	Staphylococcus aureus
	1	Aeromonas caviae
	1	Vibrio vulnificus
	2	Escherichia coli
	2	Viridans group streptococci
	1	Streptococcus pneumoniae
	1	Enterobacter cloacae

SBP: Spontaneous bacterial peritonitis; UTI: Urinary tract infection

Table 4. Factors associated with risk of rebleeding within 14 days^a

Factors	All patients (n=913)			PPS matched patients (n=138)		
	RR	95% CI	P	RR	95% CI	P
Prophylaxis	0.791	0.287–2.181	0.650	0.292	0.050–1.171	0.173
Age, years	0.992	0.287–2.181	0.483	0.990	0.905–1.083	0.825
Sex, male/female	1.891	0.9807–3.648	0.057	11.969	0.737–194.294	0.081
Prior SBP, y/n	–	–	0.998	–	–	0.999
Ascites, y/n	1.944	0.950–3.980	0.069	0.524	0.022–12.606	0.690
HCCs, y/n	1.131	0.640–1.998	0.672	0.461	0.047–4.564	0.508
Blood transfusion, unit	1.185	1.055–1.332	0.004	1.242	0.861–1.792	0.247
Encephalopathy, y/n	0.690	0.189–2.514	0.573	1.166	0.057–23.708	0.920
Blood pressure, mmHg	0.996	0.987–1.005	0.379	1.104	0.968–1.403	0.320
Hemoglobin, g/L	1.039	0.909–1.187	0.578	1.057	0.649–1.721	0.824
WBC count, ×10 ³ /μL	0.927	0.853–1.008	0.076	0.828	0.621–1.015	0.200
Platelet count, ×10 ³ /μL	1.002	0.999–1.006	0.240	1.103	0.995–1.032	0.168
Albumin, g/dL	0.500	0.255–0.981	0.004	0.988	0.097–10.106	0.992
ICU admission, y/n	0.914	0.236–3.530	0.896	0.426	0.014–12.662	0.622
MELD score	0.910	0.910–0.831	0.042	0.674	0.447–1.016	0.059
Child Pugh score	0.978	0.657–1.455	0.912	5.330	0.827–34.348	0.078
Etiology of cirrhosis			0.262			0.421
NBNC	1.000			1.000		
HBV	1.019	0.411–2.527	0.968	7.168	0.420–122.290	0.174
HCV	1.830	0.831–4.027	0.133	2.762	0.156–48.989	0.489
BC	1.750	0.641–4.777	0.275	0.754	0.014–40.663	0.885
Treatment			0.098			0.669
No treatment	1.000			1.000		
APC	0.991	0.334–2.944	0.988	–	–	0.999
EVL	0.455	0.240–0.865	0.016	3.403	0.165–70.014	0.427
EIS	0.809	0.367–1.782	0.599	6.578	0.311–139.036	0.226
Etiology of bleeding			0.294			0.213
Portal hypertension	1.000			1.000		
Peptic ulcer	0.585	0.214–1.599	11.041	0.250	0.250–496.156	

PPS: propensity score; CI: confidence interval; y/n: yes/no; SBP: spontaneous bacterial peritonitis; HCC: hepatocellular carcinoma; WBC: white blood cell; ICU: intensive care unit; MELD: model for end stage liver disease; APC: argon plasma coagulation; EVL: endoscopic variceal ligation; EIS: endoscopic injection sclerotherapy.
^aNumber of patients with 14-day rebleeding: 76 of all 913 patients and 12 of the 138 PPS matched patients.

Table 5. Factors associated with risk of mortality within 42 days^a

Factors	All patients (n=913)			PPS match (n=138)		
	RR	95% CI	P	RR	95% CI	P
Prophylaxis, y/n	1.121	0.769–1.568	0.273	–	–	0.998
Age, years	0.991	0.951–1.032	0.656	–	–	0.994
Sex, male/female	0.860	0.295–2.508	0.782	–	–	0.998
Prior SBP, y/n	–	–	0.998	–	–	1.000
Ascites, y/n	0.994	0.329–3.001	0.992	–	–	0.999
HCCs, y/n	5.300	1.850–15.187	0.002	–	–	0.997
Blood transfusion, unit	1.085	0.901–1.305	0.389	–	–	0.999
Encephalopathy, y/n	2.218	0.575–8.557	0.247	–	–	0.999
Blood pressure, mmHg	0.997	0.982–1.013	0.736	–	–	0.997
Hemoglobin, g/L	1.043	0.830–1.309	0.720	–	–	1.000
WBC count, ×10 ³ /μL	0.915	0.807–1.038	0.169	–	–	0.999
Platelet count, ×10 ³ /μL	1.006	1.002–1.010	0.003	–	–	1.000
Albumin, g/dL	0.407	0.143–1.				