

Nationwide validation of ASA-score and 30-day mortality after mild traumatic brain injury
Olivia Kiwanuka, Gabriel Sandblom

The author has chosen not to publish their abstract

	Parameter	Median [IQR] or n (%)
Pre-admission		
Age	Years	59 [39, 76]
Gender	Male	6,492 (63%)
ASA score	Healthy	4,251 (41%)
	Mild systemic disease	3,146 (31%)
	Severe systemic disease	2,756 (27%)
	Severe systemic disease with constant threat to life	147 (1.4%)
Mechanism of injury	High energy fall	2,541 (25%)
	Low energy fall	3,037 (29%)
	Blast injury	5 (<0.1%)
	Shot by firearm	16 (0.2%)
	Stabbed by sharp object	75 (0.7%)
	Struck by blunt object	714 (6.9%)
	Traffic: bicycle accident	1,531 (15%)
	Traffic: motor vehicle accident	1,177 (11%)
	Traffic: motorcycle accident	580 (5.6%)
	Traffic: other	178 (1.7%)
	Traffic: pedestrian	306 (3.0%)
	Other	87 (0.8%)
	Unknown	53 (0.5%)
Transport to hospital	Walk-in	280 (2.7%)
	Private/public vehicle	254 (2.5%)
	Ground ambulance	8,596 (83%)
	Police	25 (0.2%)
	Helicopter ambulance	448 (4.3%)
	Fixed-wing ambulance	1 (<0.1%)
	Other	130 (1.3%)
	Unknown	566 (5.5%)
Admission		
Trauma team activated	Yes	2,265 (22%)
	No	5,689 (55%)
	No formal trauma team available	2,336 (23%)
	Unknown	10 (<0.1%)
GCS	13	884 (8.6%)
	14	2,325 (23%)
	15	7,091 (69%)
Hypotension	Yes	100 (1.0%)
	Unknown	515 (5.0%)
Complicated mTBI	Yes	8,255 (80%)

	Parameter	Median [IQR] or n (%)
Isolated TBI	Yes	4,417 (43%)
Polytrauma	Yes	214 (2.1%)
Hospital care level	Emergency Department	2,243 (22%)
	General Ward	4,557 (44%)
	High Dependency Unit (HDU)	1,281 (12%)
	Critical Care Unit (CCU)	1,820 (18%)
	Operating Theatre	397 (3.9%)
	Unknown	2 (<0.1%)
Hospital stay	Days	3.0 [2.0, 6.0]
ISS		10 [5, 17]
NISS		12 [6, 22]
Outcome		
GOS at discharge	Good recovery	3,806 (37%)
	Moderate disability	4,087 (40%)
	Severe disability	1,992 (19%)
	Vegetative state	21 (0.2%)
	Death	353 (3.4%)
	Unknown	41 (0.4%)
Discharge destination	Home	7,425 (72%)
	Rehabilitation	1,377 (13%)
	Other intermediate ward	646 (6.3%)
	Other CCU, same level	105 (1.0%)
	Other CCU, higher level	167 (1.6%)
	Morgue	345 (3.3%)
	Other	222 (2.2%)
	Unknown	13 (0.1%)
30-day mortality	Yes	511 (5.0%)

Table 1: Demographic characteristics of the included cohort. ASA-score GCS ISS NISS GOS CCU

Characteristic		No N = 9,790 ¹	Yes N = 510 ¹	p-value ²
Pre-admission				
Age	Years	57 [38, 74]	83 [77, 89]	<0.001*
Sex	Male	6,174 (63%)	318 (62%)	0.8
ASA	Healthy	4,235 (43%)	16 (3.1%)	<0.001*
	Mild systemic disease	3,029 (31%)	117 (23%)	
	Severe systemic disease	2,432 (25%)	324 (64%)	
	Severe systemic disease with constant threat to life	94 (1.0%)	53 (10%)	
MOI	Low energy fall	2,703 (28%)	334 (65%)	<0.001*
	High energy fall	2,434 (25%)	107 (21%)	
	Blast injury	5 (<0.1%)	0 (0%)	
	Shot by firearm	16 (0.2%)	0 (0%)	
	Stabbed by sharp object	75 (0.8%)	0 (0%)	
	Struck by blunt object	708 (7.2%)	6 (1.2%)	
	Traffic: bicycle accident	1,518 (16%)	13 (2.5%)	
	Traffic: motor vehicle accident	1,152 (12%)	25 (4.9%)	
	Traffic: motorcycle accident	577 (5.9%)	3 (0.6%)	
	Traffic: pedestrian	294 (3.0%)	12 (2.3%)	
	Traffic: other	178 (1.8%)	0 (0%)	
	Other	83 (0.8%)	4 (0.8%)	
	Unknown	47 (0.5%)	6 (1.2%)	
Transport to hospital	Walk-in	277 (2.8%)	3 (0.6%)	<0.001*
	Private/public vehicle	249 (2.5%)	5 (1.0%)	
	Ground ambulance	8,134 (83%)	462 (91%)	
	Police	25 (0.3%)	0 (0%)	
	Helicopter ambulance	443 (4.5%)	5 (1.0%)	
	Fixed-wing ambulance	1 (<0.1%)	0 (0%)	
	Other	120 (1.2%)	10 (2.0%)	
	Unknown	541 (5.5%)	25 (4.9%)	
Admission				
Trauma team activated	Yes	2,162 (22%)	103 (20%)	<0.001*
	No	5,501 (56%)	188 (37%)	
	No formal trauma team available	2,118 (22%)	218 (43%)	
	Unknown	9 (<0.1%)	1 (0.2%)	
GCS	13	778 (7.9%)	106 (21%)	<0.001*
	14	2,169 (22%)	156 (31%)	
	15	6,843 (70%)	248 (49%)	
Hypotension	Yes	90 (0.9%)	10 (2.0%)	0.041*
	Unknown	485 (5.0%)	30 (5.9%)	
Complicated mTBI	Yes	7,751 (79%)	495 (97%)	<0.001*
Isolated TBI	Yes	4,165 (43%)	260 (51%)	<0.001*
Polytrauma	Yes	193 (2.0%)	21 (4.1%)	0.002*
Hospital care level	Emergency Department	2,217 (23%)	26 (5.1%)	<0.001*
	General Ward	4,320 (44%)	237 (46%)	
	High Dependency Unit (HDU)	1,228 (13%)	53 (10%)	
	Critical Care Unit (ICU)	1,647 (17%)	173 (34%)	
	Operating Theatre	375 (3.8%)	22 (4.3%)	
	Unknown	2 (<0.1%)	0 (0%)	
Hospital stay	Days	3.0 [2.0, 6.0]	5.0 [3.0, 10.0]	<0.001*

Characteristic		No N = 9,790 ¹	Yes N = 510 ¹	p-value ²
NISS		12 [6, 22]	25 [17, 33]	<0.001*
TRISS		0.98 [0.96, 0.99]	0.93[0.88, 0.97]	<0.001
Outcome				
GOS at discharge	Good recovery	3,786 (39%)	20 (3.9%)	<0.001*
	Moderate disability	4,043 (41%)	44 (8.6%)	
	Severe disability	1,882 (19%)	110 (22%)	
	Vegetative state	13 (0.1%)	8 (1.6%)	
	Death	24 (0.2%)	329 (64%)	
	Unknown	41 (0.4%)	0 (0%)	
Discharge destination	Home	7,357 (75%)	68 (13%)	<0.001*
	Rehabilitation	1,308 (13%)	69 (14%)	
	Other intermediate ward	633 (6.5%)	13 (2.5%)	
	Other CCU, same level	93 (1.0%)	12 (2.3%)	
	Other CCU, higher level	158 (1.6%)	9 (1.8%)	
	Other	211 (2.2%)	11 (2.2%)	
	Morgue	19 (0.2%)	326 (64%)	
	Unknown	10 (0.1%)	3 (0.6%)	

²Wilcoxon rank sum test; Pearson's Chi-squared test

	Univariable			Multivariable			N	events
	OR	CI	p	OR	CI	p		
Age	1.10	1.09–1.10	<0.001	1.09	1.08–1.10	<0.001	10300	510
Gender (M)	0.97	0.81–1.17	0.7				10300	510
ASA score >2	8.15	6.67–10.02	<0.001	2.24	1.76–2.86	<0.001	10300	510
LEF	5.12	4.24–6.20	<0.001	1.34	1.05–1.72	0.02	10300	510
GCS 13	3.76	2.95–4.76	<0.001	2.62	1.95–3.49	<0.001	10300	510
GCS 14	1.98	1.61–2.44	<0.001	1.43	1.12–1.81	<0.01	10300	510
Hypotension	2.18	1.06–4.01	0.02	1.37	0.61–2.77	0.4	9785	480
NISS	1.08	1.07–1.08	<0.001	1.08	1.07–1.10	<0.001	10300	510
AIS head >3	5.53	4.44–6.97	<0.001	0.84	0.62–1.14	0.3	10300	510
Isolated TBI	1.40	1.18–1.68	<0.001	1.19	0.94–1.50	0.2	10300	510
Polytrauma	2.24	1.38–3.47	0.001	1.31	0.72–2.29	0.4	10300	510
TRISS	0.00	0.00–0.00	<0.001				8661	417

Table 3. Uni- and multivariable analysis.



