

# Outcomes of complex burn injury patients managed at two primary and one tertiary level burns facilities in the Western Cape province of South Africa – a retrospective review

## Appendix

<b>Entry criteria for level 3 burns centre (complex burns)</b>	<b>Burns that may qualify for level 2 care</b>	<b>Burns that may qualify for level 1 care (non-complex injuries)</b>
<b>Age under 2 and over 60 years</b>	Children older than 2 years	
<b>TBSA:</b>		
All partial thickness burns > 15% TBSA in children	Burns that require debridement, skin grafting and dressing changes	Surgery: debridement, skin grafting, dressing changes (depending on the expertise of the available staff)
All partial thickness burns > 25% TBSA in adults	Partial thickness burns of up to 25% TBSA in adults and up to 15% in children	Partial thickness burn < 15% TBSA
All full thickness burns > 15% TBSA	Full thickness burns less than 10-15% TBSA in both adults and children excluding critical areas	Full thickness burn < 5% TBSA
<b>Anatomical site:</b>		
Face, hands, feet, genitalia, perineum, major joints, circumferential burns. These burns could also be dealt with at level 1 or 2 but discretion must be used.		Minor burns in anatomically important sites
<b>Inhalational injury requiring ventilation for more than 48 hours</b>		
<b>Mechanism of injury</b>	Inhalational burns requiring ventilation support for less than 48 hours	
Exposure to ionising radiation injury		Minor inhalational injury
High pressure steam injury /high tension electrical injury (> 1000 volts) 9		Electrical burns < 400 volts
Hydrofluoric acid injury > 1% TBSA		
Suspicion of non-accidental burn injury: paediatrics and adults		
<b>Existing co-morbidity:</b>		
Cardiac limitation and/or MI within 5 years		Manageable and stabilised co-morbidities
Respiratory limitation of exercise		
Uncontrolled type 1 diabetes		
Pregnancy		
Medically or disease induced immune-suppression for any reason		
Existing psychiatric or suicidal tendencies		
Suspected drug/alcohol abuse		
<b>Severe associated injuries e.g., polytrauma and crush syndrome</b>		

Table II: Abbreviated burns index score					
Tobiasen et al. – Abbreviated burn severity index score					
Parameters	Findings	Points	Parameters	Findings	Points
Sex	Male	0	TBSA %	0–10	1
	Female	1		11–20	2
Age	0–20	1		21–30	3
	21–40	2		31–40	4
	41–60	3		41–50	5
	61–80	4		51–60	6
	81–100	5		61–70	7
Inhalation injury	No	0		71–80	8
	Yes	1		81–90	9
Full thickness burns	No	0		91–100	10
	Yes	1			
ABSI score interpretation table					
ABSI score	Threat to life	% Survival probability			
2–3	Very Low	> = 99			
4–5	Moderate	98			
6–7	Moderately Severe	80–90			
8–9	Serious	50–70			
10–11	Severe	20–40			
> = 12	Maximum	< = 10			

Table III: Burns causes and severity								
Sample characteristics	“A” (n=71) n(%)	“B” (n=40), n(%)	p-value (“A” vs “B”)	Combined (n=111), n(%)	Tygerberg (n=812), n(%)	p-value (“A” vs TBU)	p-value (“B” vs TBU)	p-value (comb vs TBU)
Age	31 (25-39)	35 (28-50)	0.039	32 (25-42)	33 (27-43)	0.034	0.350	0.260
Sex								
Male	50 (70%)	22 (55%)	0.150	72 (64.9%)	551 (67.9%)	0.690	0.120	0.520
Female	21 (30%)	18 (45%)		39 (35.1%)	261 (32.1%)			
Hypertension								
No	69 (97%)	34 (85%)	0.025	103 (92.8%)	719 (88.5%)	0.026	0.450	0.200
Yes	2 (3%)	6 (15%)		8 (7.2%)	93 (11.5%)			
HIV								
No	56 (79%)	30 (75%)	0.640	86 (77.5%)	717 (88.3%)	0.037	0.023	0.004
Yes	15 (21%)	10 (25%)		25 (22.5%)	95 (11.7%)			
Epilepsy								
No	66 (93%)	39 (98%)	0.420	105 (94.6%)	767 (94.5%)	0.590	0.720	1.000
Yes	5 (7%)	1 (3%)		6 (5.4%)	45 (5.5%)			
Diabetes								
No	69 (97%)	40 (100%)	0.530	109 (98.2%)	781 (96.2%)	1.000	0.390	0.410
Yes	2 (3%)	0 (0%)		2 (1.8%)	31 (3.8%)			
Pregnancy								
No	69 (97%)	39 (98%)	1.000	108 (97.3%)	804 (99.0%)	0.190	0.350	0.140
Yes	2 (3%)	1 (3%)		3 (2.7%)	8 (1.0%)			
Reasons for burn								
Assault	16 (22.5%)	6 (15.0%)	0.140	22 (19.8%)	111 (13.7%)	< 0.001	0.36	0.005
Accidental	36 (50.7%)	20 (50.0%)		56 (50.5%)	490 (60.3%)			
Parasuicide	1 (1.4%)	0 (0.0%)		1 (0.9%)	25 (3.1%)			

Intimate partner violence	9 (12.7%)	2 (5.0%)		11 (9.9%)	29 (3.6%)			
Unknown	9 (12.7%)	12 (30.0%)		21 (18.9%)	157 (19.3%)			
<b>Type of burn injury</b>								
Flame	36 (50.7%)	17 (42.5%)	0.330	53 (47.7%)	518 (63.8%)	0.009	0.002	< 0.001
Electrical	2 (2.8%)	2 (5.0%)		4 (3.6%)	50 (6.2%)			
Chemical	3 (4.2%)	0 (0.0%)		3 (2.7%)	25 (3.1%)			
Hot liquid scald	25 (35.2%)	14 (35.0%)		39 (35.1%)	166 (20.4%)			
Mixed	4 (5.6%)	3 (7.5%)		7 (6.3%)	14 (1.7%)			
Oil	1 (1.4%)	3 (7.5%)		4 (3.6%)	14 (1.7%)			
Other/unknown	0 (0.0%)	1 (2.5%)		1 (0.9%)	25 (3.1%)			
<b>Presence of inhalation injury</b>								
No	61 (85.9%)	33 (82.5%)	0.780	94 (84.7%)	450 (55.4%)	< 0.001	< 0.001	< 0.001
Yes	10 (14.1%)	7 (17.5%)		17 (15.3%)	362 (44.6%)			
<b>Intubated/ Ventillated</b>								
Yes	9 (12.7%)	4 (10.0%)	0.770	13 (11.7%)	343 (42.2%)	< 0.001	< 0.001	< 0.001
No	62 (87.3%)	36 (90.0%)		98 (88.3%)	469 (57.8%)			
<b>Early/late/not intubated</b>								
Not intubated	62 (87.3%)	36 (90.0%)	0.670	98 (88.3%)	486 (59.9%)	< 0.001	< 0.001	< 0.001
Early	9 (12.7%)	4 (10.0%)		13 (11.7%)	299 (36.8%)			
Late	0 (0.0%)	0 (0.0%)		0 (0.0%)	27 (3.3%)			
<b>Full thickness burns</b>								
No	43 (60.6%)	28 (70.0%)	0.320	71 (64.0%)	515 (63.4%)	0.63	0.4	0.91
Yes	28 (39.4%)	12 (30.0%)		40 (36.0%)	297 (36.6%)			
<b>TBSA%</b>								
1–10	23 (32.4%)	14 (35.0%)	0.32	37 (33.3%)	245 (30.2%)	0.17	0.35	0.028
11–20	22 (31.0%)	15 (37.5%)		37 (33.3%)	200 (24.6%)			
21–30	18 (25.4%)	8 (20.0%)		26 (23.4%)	139 (17.1%)			
31–40	4 (5.6%)	1 (2.5%)		5 (4.5%)	110 (13.5%)			
41–50	4 (5.6%)	0 (0.0%)		4 (3.6%)	48 (5.9%)			
51–60	0 (0.0%)	1 (2.5%)		1 (0.9%)	38 (4.7%)			
61–70	0 (0.0%)	1 (2.5%)		1 (0.9%)	19 (2.3%)			
71–80	0 (0.0%)	0 (0.0%)		0 (0.0%)	9 (1.1%)			
81–90	0 (0.0%)	0 (0.0%)		0 (0.0%)	3 (0.4%)			
91–100	0 (0.0%)	0 (0.0%)		0 (0.0%)	1 (0.1%)			
<b>ABSI score</b>	5 (4–6)	5 (5–6)	0.450	5 (4–6)	6 (4–7)	0.001	0.074	< 0.001
<b>Probability of survival based on ABSI score</b>	2 (2–3)	2 (2–3)	0.530	2 (2–3)	3 (2–3)	0.001	0.077	< 0.001
<b>Threat to life score based on ABSI score</b>	2 (2–3)	2 (2–3)	0.580	2 (2–3)	3 (2–3)	0.002	0.086	< 0.001

\*Probability of survival: 2 = 98%, 3 = 80–90%; Threat to life: 2 (moderate), 3 (moderately severe), TBSA% total body surface area percentage

Characteristic	“A” (n=71), n(%)	“B” (n=40), n(%)	p-value
<b>Reasons for non acceptance to TBU</b>			0.41
Poor prognosis	1 (1%)	1 (3%)	
No bed available	29 (41%)	12 (32%)	
Did not meet referral criteria (according to TBU Dr)	5 (7%)	5 (14%)	
Unavailable surgery space	1 (1%)	0 (0%)	
OPD burns clinic review	13 (19%)	3 (8%)	
TBU consultant discretion	5 (7%)	2 (5%)	
Unknown	2 (3%)	4 (11%)	
Not discussed with TBU	13 (19%)	10 (27%)	
Down referred back	1 (1%)	0 (0%)	
<b>Was this patient transferred later on to TBU</b>			0.2
Yes	12 (18%)	3 (8%)	
No	56 (82%)	33 (92%)	
<b>How long after admission until transfer to TBU/ICU</b>	6 (2–8)	3 (3–10)	0.79

Characteristic	“A” (n=71), n(%)	“B” (n=40), n(%)	Tygerberg (n=812), n(%)	p-value (“A” vs TBU)	p-value (“B” vs TBU)	Combined (n=111), n(%)	p-value (comb vs TBU)	p-value (“A” vs “B”)
<b>Managed on at base hospital</b>				< 0.001	0.048		< 0.001	
Yes	69 (97.2%)	33 (82.5%)	547 (67.6%)			102 (91.9%)		
No	2 (2.8%)	7 (17.5%)	262 (32.4%)			9 (8.1%)		
<b>Management plan at base hospital</b>				< 0.001	< 0.001		< 0.001	
1 Dressings	40 (57.1%)	9 (27.3%)	307 (55.5%)			49 (47.6%)		
2 Surgical debridement only	1 (1.4%)	0 (0.0%)	31 (5.6%)			1 (1.0%)		
3 Dressings and surgical debridement	29 (41.4%)	22 (66.7%)	37 (6.7%)			51 (49.5%)		
4 Palliation	0 (0.0%)	2 (6.1%)				2 (1.9%)		
5 Unknown	0 (0.0%)	0 (0.0%)	24 (4.3%)			0 (0.0%)		
6 ICU/ventilation care	0 (0.0%)	0 (0.0%)	134 (24.2%)			0 (0.0%)		
7 ICU and surgical management	0 (0.0%)	0 (0.0%)	20 (3.6%)			0 (0.0%)		
<b>Initial presentation to first operation (days)</b>				< 0.001			< 0.001	
Day 1	2 (8.3%)	1 (4.5%)	13 (2.3%)			3 (6.5%)		
Day 2	9 (37.5%)	9 (40.9%)	36 (6.4%)			18 (39.1%)		
Day 3	1 (4.2%)	4 (18.2%)	71 (12.7%)			5 (10.9%)		
Day 4	2 (8.3%)	2 (9.1%)	59 (10.5%)			4 (8.7%)		
Day 5	2 (8.3%)	3 (13.6%)	48 (8.6%)			5 (10.9%)		
Day 6	2 (8.3%)	0 (0.0%)	44 (7.8%)			2 (4.3%)		
Day 7	0 (0.0%)	0 (0.0%)	39 (7.0%)			0 (0.0%)		
2nd week	6 (25.0%)	2 (9.1%)	193 (34.4%)		< 0.001	8 (17.4%)		
after 2nd week	0 (0.0%)	0 (0.0%)	57 (10.2%)			0 (0.0%)		
unknown	0 (0.0%)	1 (4.5%)	1 (0.2%)			1 (2.2%)		
<b>Single/multiple debridements</b>				0.43			0.15	
Single	17 (56.7%)	14 (63.6%)	273 (49.3%)			31 (59.6%)		

Multiple	13 (43.3%)	8 (36.4%)	281 (50.7%)			21 (40.4%)		
<b>Split skin grafts (SSG)</b>				< 0.001			< 0.001	
Yes	5 (16.7%)	10 (45.5%)	529 (95.5%)			15 (28.8%)		
No	25 (83.3%)	12 (54.5%)	25 (4.5%)			37 (71.2%)		
<b>Single/multiple SSG</b>				0.025			0.003	
Single	5 (100.0%)	9 (81.8%)	269 (49.8%)			14 (87.5%)		
Multiple	0 (0.0%)	2 (18.2%)	271 (50.2%)		0.19	2 (12.5%)		
<b>Total number of operations done</b>				0.93			0.68	
1	12 (50.0%)	10 (55.6%)	271 (48.9%)			22 (52.4%)		
2	5 (20.8%)	4 (22.2%)	144 (26.0%)		< 0.001	9 (21.4%)		
3	5 (20.8%)	4 (22.2%)	68 (12.3%)			9 (21.4%)		
4	2 (8.3%)	0 (0.0%)	39 (7.0%)			2 (4.8%)		
5	0 (0.0%)	0 (0.0%)	17 (3.1%)		0.036	0 (0.0%)		
6	0 (0.0%)	0 (0.0%)	9 (1.6%)			0 (0.0%)		
7	0 (0.0%)	0 (0.0%)	4 (0.7%)			0 (0.0%)		
8	0 (0.0%)	0 (0.0%)	1 (0.2%)		0.86	0 (0.0%)		
13	0 (0.0%)	0 (0.0%)	1 (0.2%)			0 (0.0%)		
<b>Length of admission</b>	10 (5–17)	7 (3–12)	17 (8–35)	< 0.001	< 0.001	8 (4–17)	< 0.001	0.140

**Table VI: Mortality, morbidity and complications**

Complications	“A” (n=45)	% (n= 45)	“B” (n=23)	% (n=23)	Comb (n=68)	% (n=68)	TBU (n=1060)	% (n=1060)
Failed graft	2	4,4	0	0,0	2	2,9	10	0,9
Graft sepsis	0	0,0	1	4,3	1	1,5	4	0,4
Wound sepsis	12	26,7	7	30,4	19	27,9	125	11,8
Amputation	1	2,2	0	0,0	1	1,5	17	1,6
Lower respiratory tract infection	2	4,4	2	8,7	4	5,9	64	6,0
Urinary tract infection	2	4,4	1	4,3	3	4,4	8	0,8
Contractures	2	4,4	1	4,3	3	4,4	16	1,5
Endocarditis	0	0,0	0	0,0	0	0,0	2	0,2
Acute respiratory distress syndrome	1	2,2	1	4,3	2	2,9	52	4,9
Renal failure	4	8,9	1	4,3	5	7,4	93	8,8
Blood transfusion	8	17,8	5	21,7	13	19,1	238	22,5
Death as percentage of complications	1	2,2	2	8,7	3	4,4	164	15,5
Crush syndrome	2	4,4	2	8,7	4	5,9	17	1,6
Bacteraemia/septicaemia	5	11,1	0	0,0	5	7,4	177	16,7
Other	3	6,7	0	0,0	3	4,4	73	6,9
<b>Total number of complications</b>	<b>45</b>		<b>23</b>		<b>68</b>		<b>1060</b>	
<b>Did this patient develop complications from burn or procedures</b>					<b>“A” &amp; “B”</b>	<b>%</b>	<b>TBU</b>	<b>%</b>
			<b>p-value</b>	Yes	44	39,6	456	56,2
			0.015	No	58	52,3	355	43,7
<b>How Long After Burn Injury Did Complication Develop</b>	<b>“A”</b>	<b>%</b>	<b>“B”</b>	<b>%</b>	<b>Comb</b>	<b>%</b>	<b>TBU</b>	<b>%</b>

<b>From insult</b>	2	6,7	2	14,3	4	8,2	41	8,9
<b>Day 1–7</b>	14	46,7	6	42,9	20	40,8	224	48,5
<b>2nd week</b>	7	23,3	5	35,7	12	24,5	136	29,4
<b>After 2nd week</b>	7	23,3	1	7,1	13	26,5	61	13,2
<b>Outcome</b>	<b>“A”, (n=71)</b>	<b>“A” p-value vs TBU</b>	<b>“B”, (n=40)</b>	<b>“B” p-value vs TBU</b>	<b>Comb, n=111(%)</b>	<b>p-value Comb vs TBU</b>	<b>Tygerberg, n=812 (%)</b>	
Death (true death rate per facilities)	1 (1.4%)	< 0.001	3 (7.5%)	0.076	4 (3.6%)	< 0.001	164 (20.2%)	
Discharged	53 (74.6%)		31 (77.5%)		84 (75.7%)		600 (73.4%)	
Transferred	14 (19.7%)		5 (12.5%)		19 (17.1%)		25 (3.1%)	
Refused further hospital treatment	3 (4.2%)		1 (2.5%)		4 (3.6%)		23 (2.8%)	

**Table VII: Predictors of positive outcome (survival and discharge)**

Sample characteristics	ARR (95% CI)	p-value	Sample characteristics	ARR (95% CI)	p-value
<b>Sex: male</b>	1.03 (0.94–1.12)	0.518	<b>Sex: male</b>	1.09 (1.00–1.20)	0.06
<b>Hypertension</b>	1.06 (0.91–1.23)	0.452	<b>Hypertension</b>	0.75 (0.47–1.22)	0.254
<b>Diabetes</b>			<b>Pregnancy</b>	1.10 (1.00–1.22)	0.06
<b>Pregnancy</b>	1.37 (1.03–1.80)	0.029	<b>Epilepsy</b>	1.00 (0.94–1.07)	0.925
<b>Epilepsy</b>			<b>Total ABSI</b>	0.92 (0.85–1.00)	0.061
HIV	1.10 (0.98–1.22)	0.097	<b>ABSI survival index</b>	1.13 (0.98–1.32)	0.086
<b>Intent</b>			Factors influencing good outcomes at primary level hospitals		
Accidental					
Assault	1.04 (0.94–1.15)	0.411			
Parasuicide	0.76 (0.52–1.12)	0.163			
Intimate partner violence	0.99 (0.84–1.16)	0.876			
<b>Burn mechanism</b>					
Flame					
Electrical	1.09 (0.99–1.19)	0.067			
Chemical	0.98 (0.81–1.20)	0.872			
Hot liquid scald	1.12 (1.04–1.21)	0.005			
Mixed	1.06 (0.91–1.25)	0.44			
Oil	1.08 (0.86–1.36)	0.489			
<b>Age risk category</b>					
0–20					
21–40	1.17 (1.02–1.35)	0.023			
41–60	1.18 (0.99–1.40)	0.057			
61+	0.90 (0.63–1.28)	0.548			
<b>Total ABSI</b>	0.92 (0.86–0.98)	0.007			
<b>ABSI survival index</b>	1.01 (0.89–1.13)	0.922			
<b>Time to theatre</b>	1.02 (1.004–1.03)	0.014			
Factors influencing good outcomes at TBU					