



# Burns

## Assessment

### Pediatric Pearls:

- Use pediatric dosing of medications or electrical therapy for a pediatric patient < 37 kg and as defined by the PEDIA Tape.
- Pediatric hypotension is defined as SBP < 70 + (age in years x 2) mmHg

### Signs & Symptoms:

- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension / shock
- Airway compromise / distress, singed facial or nasal hair, hoarseness / wheezing / stridor

### Differential:

- Superficial 1° – red and painful
- Partial thickness 2° - blistering
- Full thickness 3° - painless and charred or leathery skin
- Chemical
- Thermal
- Electrical
- Radiation

## Clinical Management Options

P	P	P	P	P	P
L	L	L	L	L	L
1	2	3	4	5	6

- [Oxygen](#), target SpO<sub>2</sub> 92 – 96%
  - Basic Airway Management as needed
  - Remove rings, bracelets, or other constricting items
  - If thermal burn: < 10% body surface area then cool down the wound [with isotonic crystalloid](#) or sterile water
  - If thermal burn: After cooling cover burn with a dry sheet or dressings
  - If chemical burn: Remove clothing or expose area, brush off any dry chemicals or powder, then flush area with large amount of water or isotonic crystalloid
  - Establish BSA, location(s), and type of burn
- 
- If airway burn: Nebulized [Epinephrine](#) for Respiratory Distress
- 
- Vascular access as appropriate for patient condition
  - 2<sup>nd</sup> or 3 degree burn area > 10% BSA then:
    - Adult: [Isotonic Crystalloid](#) per Rule of 10s formula
    - Children ≥ 14 years old: 2 mL LR x Kg x %TBSA with ½ infused in first 8 hours
    - Children ≤ 13 years old: 3 mL LR x Kg x % TBSA with ½ infused in first 8 hours
    - See Page 3 & 4 of this COG for infusion references
  - [Pain Management Guideline](#)
- 
- Continuous [ETCO<sub>2</sub>](#) and ECG monitoring
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- [Calcium Chloride](#) for hydrofluoric acid burns with unstable vital signs, such as hypotension, tachy/bradycardia, ectopic beats, and/or [ECG changes](#)

**Consult Online Medical Control As Needed**

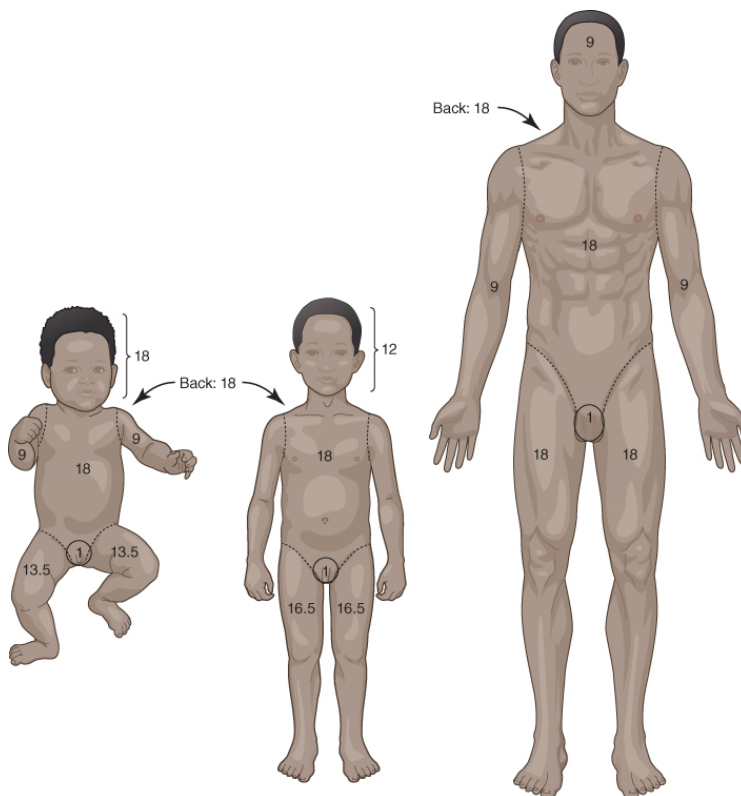


## Burns

### Pearls:

- Refer to drug formulary charts for all medication dosing for both adults and pediatric patients.
- Consider nebulized epinephrine for respiratory distress early in airway burns when hoarse/muffled voice, stridor, etc. are presenting.
- Evaluate BSA: Use chart or use palm side of patient's hand = 1% BSA
- Critical Burns:
  - >20% 2° and 3° body surface area (BSA) age > 10;
  - >10% BSA age < 10 or > 50;
  - 3° burns >5% BSA;
  - 2° and 3° burns to face, eyes, hands or feet or genitalia; electrical burns; respiratory burns; deep chemical burns;
  - Burns with extremes of age or chronic disease; and burns with associated major traumatic injury.
- Non-critical burns (< 5% BSA 2nd and 3rd) not complicated by airway compromise or trauma do not require transport to a trauma center.
- Potential CO exposure should be treated with 100% oxygen.
- Circumferential burns to extremities are dangerous due to potential vascular compromise 2° to soft tissue swelling.
- Burn patients are prone to hypothermia - Never apply ice or cool burns that involve >10% body surface area.
- Do not overlook the possibility of multiple system trauma or child abuse with burn injuries.
- Hydrofluoric acid burns of 3% BSA may be fatal and may have little to no external signs

### Rule of 9s for BSA





# Burns

## Adults Rule of 10s Formula

Amount of isotonic crystalloid in mL to be *infused over 1<sup>st</sup> hour*

<b>Patient Weight 40 to 80 Kgs (~88 to 176 lbs)</b>										
Estimate TBSA % to Nearest 10%, then TBSA x 10 = mL/hr										
<b>TBSA %:</b>	10	20	30	40	50	60	70	80	90	100
<b>1st Hour Volume:</b>	100	200	300	400	500	600	700	800	900	1000
<b>Drops per minute (10 gtts):</b>	17	33	50	67	83	100	117	133	150	167

<b>Patient Weight 81 to 90 Kgs (~178 to 198 lbs)</b>										
Estimate TBSA % to Nearest 10%, then TBSA x 10 = mL/hr + 100 mL/hr										
<b>TBSA %:</b>	10	20	30	40	50	60	70	80	90	100
<b>1st Hour Volume:</b>	200	300	400	500	600	700	800	900	1000	1100
<b>Drops per minute (10 gtts):</b>	33	50	67	83	100	117	133	150	167	183

<b>Patient Weight 91 to 100 Kgs (~200 to 220 lbs)</b>										
Estimate TBSA % to Nearest 10%, then TBSA x 10 = mL/hr + 200 mL/hr										
<b>TBSA %:</b>	10	20	30	40	50	60	70	80	90	100
<b>1st Hour Volume:</b>	300	400	500	600	700	800	900	1000	1100	1200
<b>Drops per minute (10 gtts):</b>	50	67	83	100	117	133	150	167	183	200

<b>Patient Weight 101 to 110 Kgs (~222 to 242 lbs)</b>										
Estimate TBSA % to Nearest 10%, then TBSA x 10 = mL/hr + 300 mL/hr										
<b>TBSA %:</b>	10	20	30	40	50	60	70	80	90	100
<b>1st Hour Volume:</b>	400	500	600	700	800	900	1000	1100	1200	1300
<b>Drops per minute (10 gtts):</b>	67	83	100	117	133	150	167	183	200	217

**Rule of 10s: TBSA x 10 = mL/hr, plus 100 mL/hr for every 10 kg above 80 kg**  
 TBSA, Total Body Surface Area



# Burns

## Children ≥ 14

Children ≥ 14 Years Old																						
2 mL x Kg x TBSA = Total for 24 Hours with 1/2 over First 8 Hours																						
TBSA%	LBS	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200
	Kg	45	48	50	52	55	57	59	61	64	66	68	70	73	75	77	80	82	84	86	89	91
10	Gtts	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19
	1 hr mL	56	60	63	65	69	71	74	76	80	83	85	88	91	94	96	100	103	105	108	111	114
20	Gtts	19	20	21	22	23	24	25	25	27	28	28	29	30	31	32	33	34	35	36	37	38
	1 hr mL	113	120	125	130	138	143	148	153	160	165	170	175	183	188	193	200	205	210	215	223	228
30	Gtts	28	30	31	33	34	36	37	38	40	41	43	44	46	47	48	50	51	53	54	56	57
	1 hr mL	169	180	188	195	206	214	221	229	240	248	255	263	274	281	289	300	308	315	323	334	341
40	Gtts	38	40	42	43	46	48	49	51	53	55	57	58	61	63	64	67	68	70	72	74	76
	1 hr mL	225	240	250	260	275	285	295	305	320	330	340	350	365	375	385	400	410	420	430	445	455
50	Gtts	47	50	52	54	57	59	61	64	67	69	71	73	76	78	80	83	85	88	90	93	95
	1 hr mL	281	300	313	325	344	356	369	381	400	413	425	438	456	469	481	500	513	525	538	556	569
60	Gtts	56	60	63	65	69	71	74	76	80	83	85	88	91	94	96	100	103	105	108	111	114
	1 hr mL	338	360	375	390	413	428	443	458	480	495	510	525	548	563	578	600	615	630	645	668	683
70	Gtts	66	70	73	76	80	83	86	89	93	96	99	102	106	109	112	117	120	123	125	130	133
	1 hr mL	394	420	438	455	481	499	516	534	560	578	595	613	639	656	674	700	718	735	753	779	796
80	Gtts	75	80	83	87	92	95	98	102	107	110	113	117	122	125	128	133	137	140	143	148	152
	1 hr mL	450	480	500	520	550	570	590	610	640	660	680	700	730	750	770	800	820	840	860	890	910
90	Gtts	84	90	94	98	103	107	111	114	120	124	128	131	137	141	144	150	154	158	161	167	171
	1 hr mL	506	540	563	585	619	641	664	686	720	743	765	788	821	844	866	900	923	945	968	1001	1024
100	Gtts	94	100	104	108	115	119	123	127	133	138	142	146	152	156	160	167	171	175	179	185	190
	1 hr mL	563	600	625	650	688	713	738	763	800	825	850	875	913	938	963	1000	1025	1050	1075	1113	1138

Gtts calculated using 10 drop set

## Children ≤ 13

Children ≤ 13 Years Old																						
3 mL x Kg x TBSA = Total for 24 Hours with 1/2 over First 8 Hours																						
TBSA%	LBS	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	100	110	120
	Kg	2	5	7	9	11	14	16	18	20	23	25	27	30	32	34	36	39	41	45	50	55
10	Gtts	1	2	2	3	3	4	5	6	6	7	8	8	9	10	11	11	12	13	14	16	17
	1 hr mL	4	9	13	17	21	26	30	34	38	43	47	51	56	60	64	68	73	77	84	94	103
20	Gtts	1	3	4	6	7	9	10	11	13	14	16	17	19	20	21	23	24	26	28	31	34
	1 hr mL	8	19	26	34	41	53	60	68	75	86	94	101	113	120	128	135	146	154	169	188	206
30	Gtts	2	5	7	8	10	13	15	17	19	22	23	25	28	30	32	34	37	38	42	47	52
	1 hr mL	11	28	39	51	62	79	90	101	113	129	141	152	169	180	191	203	219	231	253	281	309
40	Gtts	3	6	9	11	14	18	20	23	25	29	31	34	38	40	43	45	49	51	56	63	69
	1 hr mL	15	38	53	68	83	105	120	135	150	173	188	203	225	240	255	270	293	308	338	375	413
50	Gtts	3	8	11	14	17	22	25	28	31	36	39	42	47	50	53	56	61	64	70	78	86
	1 hr mL	19	47	66	84	103	131	150	169	188	216	234	253	281	300	319	338	366	384	422	469	516
60	Gtts	4	9	13	17	21	26	30	34	38	43	47	51	56	60	64	68	73	77	84	94	103
	1 hr mL	23	56	79	101	124	158	180	203	225	259	281	304	338	360	383	405	439	461	506	563	619
70	Gtts	4	11	15	20	24	31	35	39	44	50	55	59	66	70	74	79	85	90	98	109	120
	1 hr mL	26	66	92	118	144	184	210	236	263	302	328	354	394	420	446	473	512	538	591	656	722
80	Gtts	5	13	18	23	28	35	40	45	50	58	63	68	75	80	85	90	98	103	113	125	138
	1 hr mL	30	75	105	135	165	210	240	270	300	345	375	405	450	480	510	540	585	615	675	750	825
90	Gtts	6	14	20	25	31	39	45	51	56	65	70	76	84	90	96	101	110	115	127	141	155
	1 hr mL	34	84	118	152	186	236	270	304	338	388	422	456	506	540	574	608	658	692	759	844	928
100	Gtts	6	16	22	28	34	44	50	56	63	72	78	84	94	100	106	113	122	128	141	156	172
	1 hr mL	38	94	131	169	206	263	300	338	375	431	469	506	563	600	638	675	731	769	844	938	1031

Gtts calculated using 10 drop set