

"There is considerable confusion at the present time regarding the first-aid treatment of burns. Many of the methods.....recommended are unsuitable and interfere with the subsequent treatment.....Many patients arrive at hospital with some domestic remedy applied and frequently covered by a non-sterile dressing.

First-aid should be reserved for burns of moderate or small extent.....In extensive burns, the first-aid treatment.....should consist of masterly inactivity, and the prime object should be to transfer the patient to hospital as soon as possible."

Post Graduate Medical Journal - Mr. Alfred M Clarke
- Surgeon to the Glasgow Royal Infirmary

April 1945





TOWARDS A STANDARD MODEL OF BURN 1ST AID – ONE STEP FORWARDS TWO STEPS BACK

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Systemic Roadblocks

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No consensus on parameters

- Burns associations
- Peak bodies
- Hospital Burns units
- EMS
- 1st aid organisations
- No central or stipulated recommending authorities across jurisdictions

Inadequate research

- Ethical roadblocks – additional problems in pre-hospital settings
- Paucity of pre-hospital EMS studies
- Evidence base – animal, observational and laboratory studies
- Assumptions and interpretations of the evidence base e.g. "G.R.A.D.E."

No "standard" model

- 1st aid bodies - commercial imperatives - 1st aid kits and conflicting recommendations
- To cool or not to cool – EMS variations – multiple models of practice
- Hydrogels in EMS skewing interpretations of model characteristics
- No common approach among the lay public - home "remedies", cultural practices, urban myths - the YouTube commentariat

Clinical controversies, knowledge gaps and problem areas

- Cooling **temperature, duration and delayed benefit** (Cuttle 2010, Wright 2015, Wood 2016)
- Better compliance but **inadequate public burn 1st aid knowledge continues** (Kattan 2016, BRANZ 2017, Ibrahim 2018)
- **Risk/benefit** of cooling in large TBSA or deep burns? (Clarke 1945)
- **"Minor" and "major" burns** – can the public tell the difference?
- **Perceptions** of hypothermia risk – significant factor impacting burn 1st aid practices in EMS (Weaver 2016)
- Lack of active and fluid **warming technologies in EMS** – cost, functionality, fit-out, the paralyzed airway patient
- **Hydrogels** – where is the evidence? - distorting 1st aid practices, unsupported adaptation to fit water cooling parameters, Included in 1st aid kits (Goodwin 2015)
- **Dressing alternatives** – **paucity of studies**. (Wasiak 2013)
- Seasonal variations – **winter burns** –implications for cooling (BRANZ 2017)
- Lower and middle income regions – **water quality/availability issues** – need for a separate model? (Bitter 2016)
- High rates of burn injury in **remote settings** and among **indigenous populations** (BRANZ 2017)
- Influence of internet and **social media commentariat** (Burgess 2016)



Consensus? (Recommending agencies)

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Burns Associations

	ANZBA	EBA (European BA)	ABA (American BA)	BBA (British BA)	SABC (South African Burn Society)	SBQ (Brazil BA)	JSBI (Japanese Society for burn injuries)	DGV (German Society for Burn medicine)
Cooling	20mins	10mins	5mins (minor burns)	20mins	30mins W or Hydrogel	"Until burn is cooled"	5-30mins	10mins (lukewarm water @ 20deg C <15% TBSA)
Dressing	CF/DD	CF/DD	DD	CF/DD	DD or H	DD	DD	DD

Resuscitation Councils, UN agencies, National or Regional Health Services

	ANZCOR	ERC	AHA	CDC	WHO	MSF Singapore	TMH (Turkish Ministry of Health)	Region H Capital region of Denmark Health Care Services
Cooling	20mins	10mins	15-30mins (or at least until pain is relieved)	10-15mins (Wet compresses /immersion)	30mins (immersion)	20mins (Singapore Health Exchange 15mins)	20mins (Minor burns)	Up to 60mins (or until pain subsides)
Dressing	CF/DD	CF/DD	DD	DD	DD	CF/ "clean wet cloth"	DD	?

1st Aid Organisations, state burns services, NGO bodies

	StJohns (AU)	IFRC	StJohns (UK)	VABS	NSWBIS	Dutch Burns Foundation	Childhood Burn Foundation (Taiwan)	Belgian Red Cross (African 1 st aid materials – Guidelines)
Cooling	20mins	10mins	10mins	20mins	20mins	20mins (lukewarm water)	15 +15mins (Irrigation +Immersion)	15-20mins (or until pain is relieved)
Dressing	CF/DD	CF/DD	CF/DD	CF/DD	CF/DD	CF/DD	DD	Wet wound dressing

Consensus? (Emergency Responders and Hospitals)

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EMS									
	QAS	ACTAS	SJWA	NSWAS	SAAS	SABC	UK AS JRCALC	Ireland	South Africa
Cooling	20mins or H <10%P <20%A)	20mins ~ large TBSA	20mins or H<10% P <15% A	20mins (or NaCl if no water)	20mins	20mins/H	20mins/H	"Common sense cooling of local area"	20mins (or H if no water)
Dressing	CF	H/DD	DD	CF or H if no water	CF	CF/DD	CF/DD	CF/DD/H	CF/DD

EMS										
	Alabama	Alaska	Arizona	Connecticut	D of C	Delaware	Idaho	Illinois	Iowa	Kansas
Cooling	NS	"water immersion"	NS	<10%PT 15mins	H	NS	NS	<10% 5mins or H/WD	<10% cool with NS	NS
Dressing	DD	DD	"Clean dry sheets"	DD	H	"Clean dry sheets"	DD	DD	CF/DD	DD

EMS										
	Maine	Maryland	Massachusetts	Michigan	Montana	Nebraska	New Hampshire	Nth Carolina	NY State	Pennsylvania
Cooling	<10% H/WD >10% DD	NS	NS	NS	NS	"<10% Cool Burn Area"	NS	NS	<10% H/WD >10% DD	"Cool unless large BSA area involved"
Dressing	DD	DD	DD	DD	DD	DD	DD	DD	DD	"Dry Sterile Sheet"

EMS										
	Rhode Island	Utah	Vermont	W Virginia	Alberta	Manitoba	N Brunswick	Nova Scotia	Ontario	Saskatchewan
Cooling	NS	NS	NS	"Irrigate with tepid water. Immerse small burns"	"Cool burn"	"Irrigate with room temp water"	<10% 15mins >10% DD	"Irrigate with water"	<30mins for TBSA <15%	Clean dry sheet
Dressing	DD	DD	DD	DD	<10% WD >10% DD	DD/"commercial" burns dressings"	DD	DD	WD <15% DD>15%	DD

National EMS Guidelines (US) and Hospital Burns Units									
	NAEMSO	RPH	RAH	WMCH	RCH	POWH	WCHA		
Cooling	No cooling	20mins	20mins	20-30mins	20mins	"Up to 30mins"	20mins (or H if no water)		
Dressing	"DD or sheet"	CF	CF	"simple non-stick dressing"	CF	DD	CF		

Suggested components of a standard model of burn 1st aid – general principles

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1. **A single block of gentle cooling with clean running water for 20 mins as soon as possible after the primary burn event.** Single cooling block reduces hypothermia risk – provides greatest clinical benefit – use of modern fixtures (e.g. pictured right), where available, also aids in reducing risk). Gentle application respects tissue integrity.
2. **One-size-fits-all no caveats cooling approach.** Pre EMS cooling makes caveats on EMS cooling redundant. Lay persons cannot accurately assess burn wound severity. Caveats are arbitrary, risk averse and based on assumptions regarding hypothermia risk with no supporting evidence. There is no consistent rationale applied to specific caveats on burn wound cooling with many variations evident in practice.
3. **Defined roles - first responder carries out cooling prior to EMS arrival.** Cooling is undertaken preferably under direction from emergency call taker staff. First responder is directed to observe for signs of emerging hypothermia such as excessive shivering, pallor or very cold skin to touch. First responders to moderate cooling accordingly - to be further directed by EMS on arrival. Cooling temperature can also be moderated based upon local environmental factors – i.e. cold environs.
4. **Once-on-never-off single application of early wound dressing.** Primary sterilization of burn wounds impels expedited application of occlusive burn dressing to reduce time frame for organismal colonization and infection and provide augmented analgesic benefit. Evidence lacking to suggest complex dressing alternative or hydrogels. Clingfilm/clean or sterile dry dressing is the ideal choice in pre-hospital settings due to functional, practical and cost related superiority. Ideal transitional dressing.
5. **Maximise time frame for warming component of care.** Early mild hypothermia an inevitable bi-product of cooling - burn 1st aid approach must enable the longest practicable time frame for the warming whilst retaining the proven clinical benefits from a block of water cooling.



Burn 1st Aid Chronology of Care

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Call time to activation of emergency ambulance dispatch 1-2mins

Est average time from event to ambulance intervention approx. 30-40 mins

Burn 1st Aid defined roles

Average on-scene time for EMS approx. 10-30 mins

Emergency Call Centre

- Gather information on extent/type of injury
- Activate and coordinate emergency response
- Coach responder
- Liaise with health services

First responder

- Apply cooling
- Commence warming
- Wound dressing?
- Provide further information

EMS

- Assessment Airway Mx
- Specialist service activation
- Wound dressing
- Further warming IV access Analgesia
- Fluid Resuscitation Extrication and Transport

Health services

- Liaison with EMS crews
- Interact with emergency services
- Coordinate specialist services
- In-hospital patient care
- Public education and training
- Collaborative research with stakeholders

Cooling Phase

Warming Phase

Timeline from notification to hospital care

Median ambulance response times for 90th percentile approx. 10-15 mins – x 2 for rural areas. NHS Ambulance Quality Indicators 2018 US NHTSA 2009

Median turn around time from scene arrival to burn ICU in metropolitan areas approx. 60-100 mins Schiefer 2016



Advantages of a standard model of burn 1st aid

Practice

- Facilitates compliance and consistent standards of care
- Makes training and education easier
- Reduces the confusion caused by the current lack of consensus
- Reduces impact of "human factors"
- Benefits largest cohort of patients
- Allows prioritization of EMS care
- Enables promotion of an "international standard" as a selling point in education, on social media, internet forums etc.

Research and evidence

- 20 minute water cooling duration supported by best body of evidence.
- Simplifies analysis of data from electronic patient care records/registries and databases
- Facilitates larger study populations and sample sizes - enhanced statistical power
- Simplifies and improves comparative analysis across differing jurisdictions and study populations
- Improves likelihood of recruitment, paramedic participation, compliance and data collection factors for study design
- Facilitates multi centre studies with larger patient enrolments
- Decreases likelihood of clinical heterogeneity of paramedic practices impacting study findings
- Makes pre-hospital burn 1st aid research more feasible economically
- Removal of caveats in the new model reduces confounding impact of these inconsistent variables in studies.

Strategic goals of a standard model

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1. **Move burn 1st aid from a consensus approach to an “evidence based care” model** in order to achieve best possible clinical outcomes for patients through: best evidence and incorporation of clinical expertise whilst addressing patient values and preferences
2. **Facilitate further research, sector investment and development**
3. **Provide basis for future refinement/modification of practices** as new research findings and approaches emerge
4. **Achieve standardisation, improved competency, compliance and clinical consistency among all pre-hospital responders**

A historical timeline of changes in burn 1st aid

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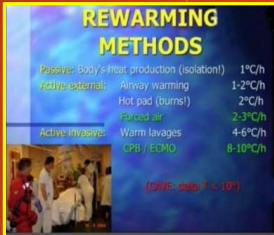
“COOL, COVER AND CARRY” (1969)

“COOL THE BURN, WARM THE PATIENT” (2000)

“COOL RAPIDLY, COOL ONCE, DRESS ONCE” (2018)

✓ "It's not rocket science" ✗

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