“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

NICHOLAS GOODWIN | A.N.Z.B.A. 2018
Systemic Roadblocks

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

No “standard” model
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. (Wasik 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 2014)
## Consensus? (Recommendng agencies)

<table>
<thead>
<tr>
<th>Burns Associations</th>
<th>ANZBA</th>
<th>EBA (European BA)</th>
<th>ABA (American BA)</th>
<th>BBA (British BA)</th>
<th>SABC (South African Burn Society)</th>
<th>SBQ (Brazil BA)</th>
<th>JSBI (Japanese Society for burn injuries)</th>
<th>DGV (German Society for Burn medicine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>20mins</td>
<td>10mins</td>
<td>5mins (minor burns)</td>
<td>20mins</td>
<td>30mins W or Hydrogel</td>
<td>“Until burn is cooled”</td>
<td>5-30mins</td>
<td>10mins (lukewarm water @ 20deg C &lt;15% TBSA)</td>
</tr>
<tr>
<td>Dressing</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>DD</td>
<td>CF/DD</td>
<td>DD or H</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resuscitation Councils, UN agencies, National or Regional Health Services</th>
<th>ANZCOR</th>
<th>ERC</th>
<th>AHA</th>
<th>CDC</th>
<th>WHO</th>
<th>MSF Singapore</th>
<th>TMH (Turkish Ministry of Health)</th>
<th>Region H</th>
<th>Capital region of Denmark Health Care Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>20mins</td>
<td>10mins</td>
<td>15-30mins (or at least until pain is relieved)</td>
<td>10-15mins (Wet compresses /immersion)</td>
<td>30mins (immersion)</td>
<td>20mins (Singapore Health Exchange 15mins)</td>
<td>20mins (Minor burns)</td>
<td>Up to 60mins (or until pain subsides)</td>
<td></td>
</tr>
<tr>
<td>Dressing</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>CF/ &quot;clean wet cloth&quot;</td>
<td>DD</td>
<td>?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1st Aid Organisations, state burns services, NGO bodies</th>
<th>StJohns (AU)</th>
<th>IFRC</th>
<th>StJohns (UK)</th>
<th>VABS</th>
<th>NSWBIS</th>
<th>Dutch Burns Foundation</th>
<th>Childhood Burn Foundation (Taiwan)</th>
<th>Belgian Red Cross (African 1st aid materials – Guidelines)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>20mins</td>
<td>10mins</td>
<td>10mins</td>
<td>20mins</td>
<td>20mins</td>
<td>20mins (lukewarm water)</td>
<td>15 +15mins (irrigation +immersion)</td>
<td>15-20mins (or until pain is relieved)</td>
</tr>
<tr>
<td>Dressing</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>DD</td>
<td>Wet wound dressing</td>
</tr>
</tbody>
</table>
### Consensus? (Emergency Responders and Hospitals)

<table>
<thead>
<tr>
<th>EMS</th>
<th>QAS</th>
<th>ACTAS</th>
<th>SJWA</th>
<th>NSWAS</th>
<th>SAAS</th>
<th>SABC</th>
<th>UK AS JRCALC</th>
<th>Ireland</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>20mins or H &lt;10%P &lt;20%A</td>
<td>20mins ~ large TBSA</td>
<td>20mins or H&lt;10% P &lt;15% A</td>
<td>20mins (or NaCl if no water)</td>
<td>20mins</td>
<td>20mins/H</td>
<td>20mins/H</td>
<td>&quot;Common sense cooling of local area&quot;</td>
<td>20mins (or H if no water)</td>
</tr>
<tr>
<td>Dressing</td>
<td>CF</td>
<td>H/DD</td>
<td>DD</td>
<td>CF or H if no water</td>
<td>CF</td>
<td>CF/DD</td>
<td>CF/DD</td>
<td>CF/DD/H</td>
<td>CF/DD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMS</th>
<th>Alabama</th>
<th>Alaska</th>
<th>Arizona</th>
<th>Connecticut</th>
<th>D of C</th>
<th>Delaware</th>
<th>Idaho</th>
<th>Illinois</th>
<th>Iowa</th>
<th>Kansas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>NS</td>
<td>&quot;water immersion&quot;</td>
<td>NS</td>
<td>&lt;10%PT 15mins</td>
<td>H</td>
<td>NS</td>
<td>NS</td>
<td>&lt;10% 5mins or H/WD</td>
<td>&lt;10% cool with NS</td>
<td>NS</td>
</tr>
<tr>
<td>Dressing</td>
<td>DD</td>
<td>DD</td>
<td>&quot;Clean dry sheets&quot;</td>
<td>DD</td>
<td>H</td>
<td>&quot;Clean dry sheets&quot;</td>
<td>DD</td>
<td>DD</td>
<td>CF/DD</td>
<td>DD</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>EMS</th>
<th>Maine</th>
<th>Maryland</th>
<th>Massachusetts</th>
<th>Michigan</th>
<th>Montana</th>
<th>Nebraska</th>
<th>New Hampshire</th>
<th>Nth Carolina</th>
<th>NY State</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>&lt;10% H/WD &gt;10% DD</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>&quot;&lt;10% Cool Burn Area&quot;</td>
<td>NS</td>
<td>NS</td>
<td>&lt;10% H/WD &gt;10% DD</td>
<td>&quot;Cool unless large BSA area involved&quot;</td>
</tr>
<tr>
<td>Dressing</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>&quot;Dry Sterile Sheet!&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMS</th>
<th>Rhode Island</th>
<th>Utah</th>
<th>Vermont</th>
<th>W Virginia</th>
<th>Alberta</th>
<th>Manitoba</th>
<th>N Brunswick</th>
<th>Nova Scotia</th>
<th>Ontario</th>
<th>Saskatchewan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>&quot;Irrigate with tepid water, Immerse small burns&quot;</td>
<td>&quot;Cool burn&quot;</td>
<td>&quot;Irrigate with room temp water&quot;</td>
<td>&lt;10% 15mins &gt;10% DD</td>
<td>&quot;Irrigate with water&quot;</td>
<td>&lt;30mins for TBSA &lt;15%</td>
<td>Clean dry sheet</td>
</tr>
<tr>
<td>Dressing</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>DD</td>
<td>&lt;10% WD &gt;10% DD</td>
<td>DD/&quot;commercial&quot; burns dressings&quot;</td>
<td>DD</td>
<td>DD</td>
<td>WD &lt;15% DD&gt;15%</td>
<td>DD</td>
</tr>
</tbody>
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<thead>
<tr>
<th>National EMS Guidelines (US) and Hospital Burns Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
</tr>
<tr>
<td>No cooling</td>
</tr>
<tr>
<td>Dressing</td>
</tr>
</tbody>
</table>
Suggested components of a standard model of burn 1\textsuperscript{st} aid – general principles

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**

**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

**Burn 1st Aid defined roles**
- Average on-scene time for EMS approx. 10-30 mins

**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. 80-100 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

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

“COOL, COVER AND CARRY” (1969)


“COOL RAPIDLY, COOL ONCE, DRESS ONCE” (2018)
"It's not rocket science"
THANKS FOR LISTENING

Acknowledgements:

Jason Wasiak, Krissie Stiles, Yvonne Singer, Anneliese Spinks, Leila Cuttle, Jeff Kenneally

This PowerPoint presentation will be made available as a full text download on ResearchGate