



Brûlures thermiques

Prise en charge préhospitalière

ES ASUR

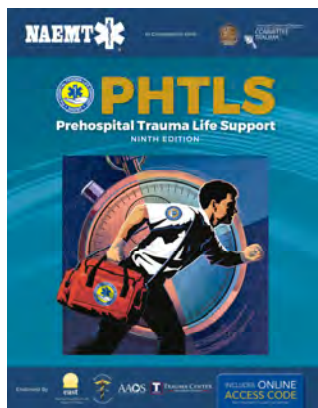


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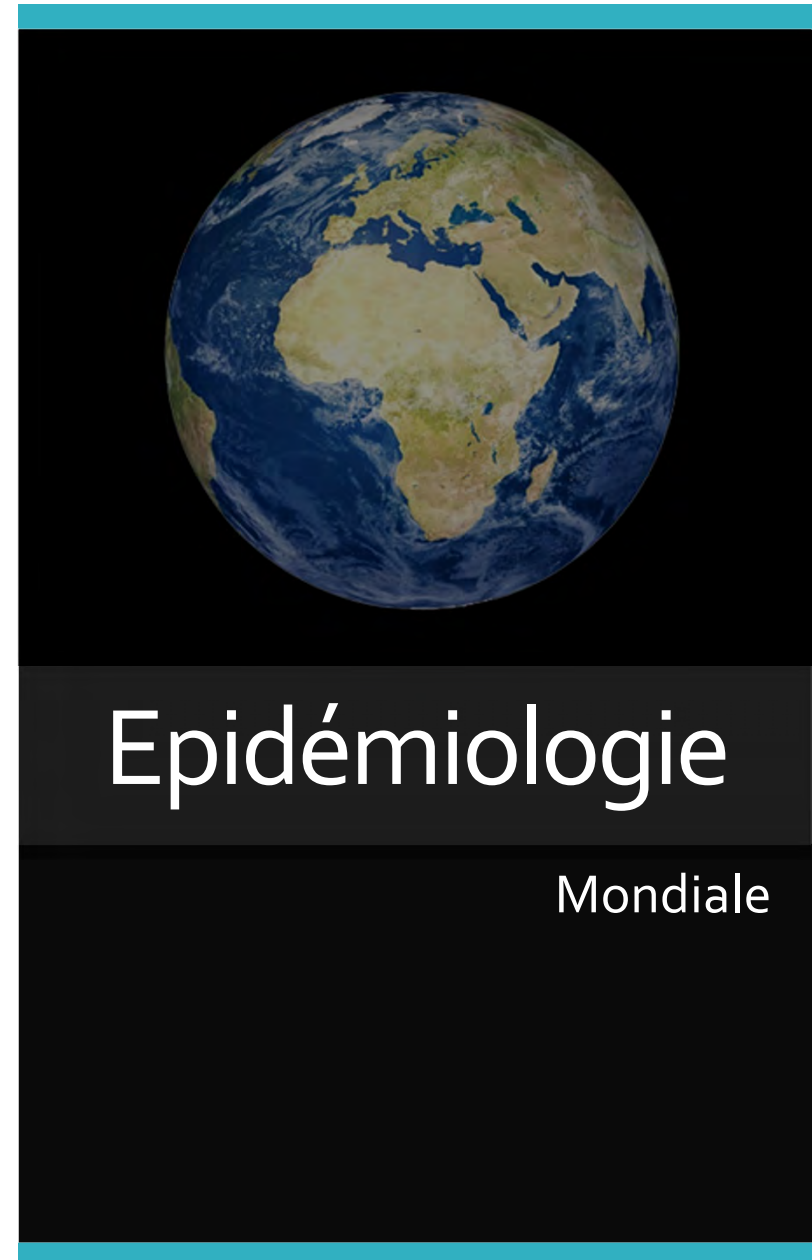
- Prise en charge préhospitalière
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Références

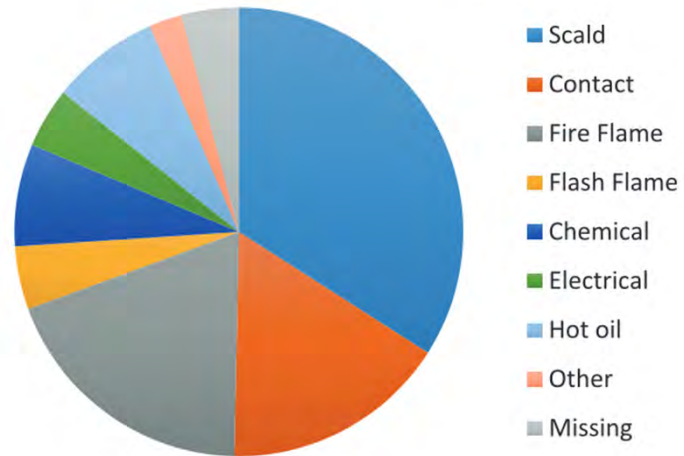
- 11 millions de personnes
- 180 000 morts par an
 - Enfants et personnes vulnérables
 - Pays à bas ou moyen revenu
 - Diminution dans les pays à haut revenu (0.2 à 2.9/10'000 en Europe)
- 4^e rang de tous les traumatismes
- 10-15% des brûlures traitées en centres spécialisés.

(WHO, 2017)

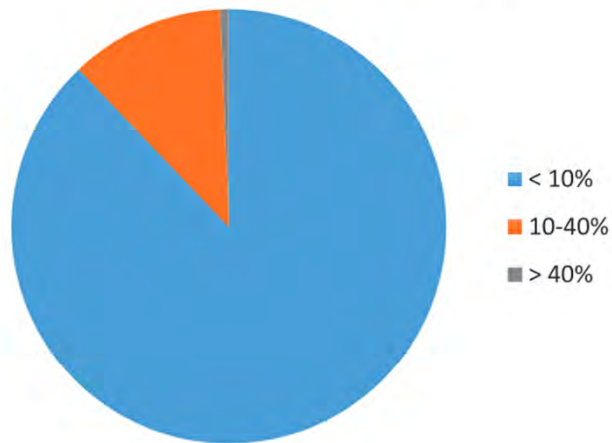


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Burn Injury Mechanism



Total Body Surface Area

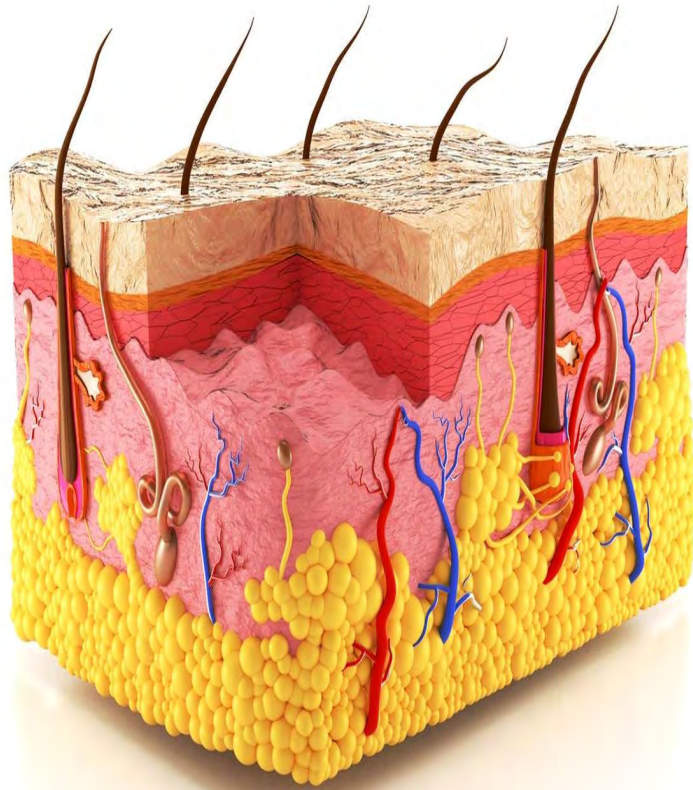


Oaie, Scars, Burns & Healing, 2018



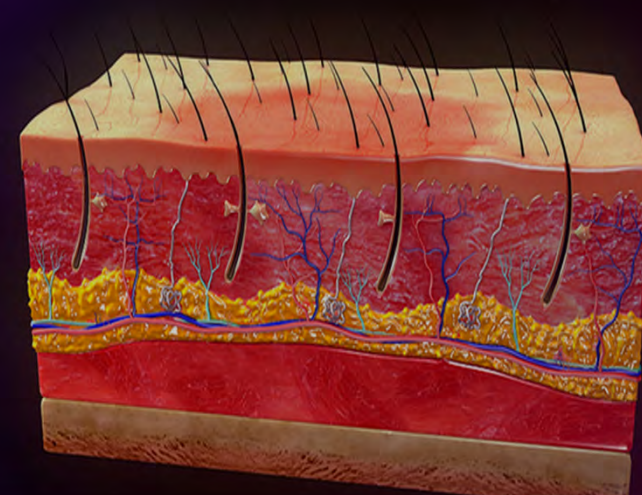
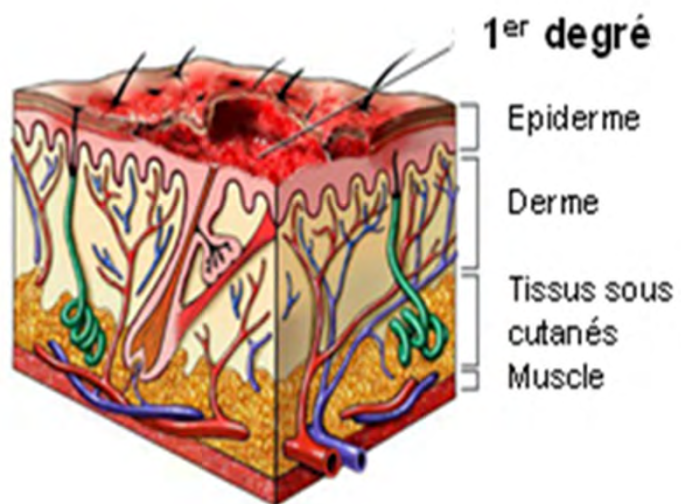
Etiologie

- A total of 461 adult patients were admitted to the Chelsea & Westminster Burns Service between January 2015 and December 2016



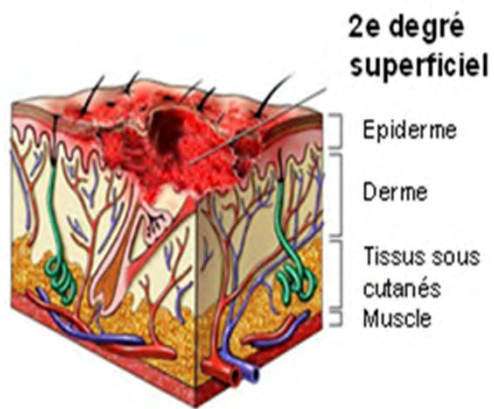
La peau

- Protège contre les infections
- Régule la température
- Régule les liquides
- Récepteur des sensation



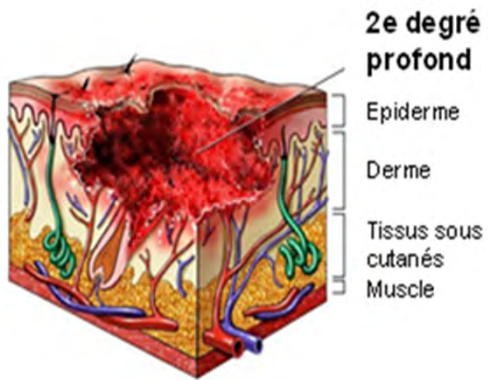
Brûlures superficielles (1^{er} degré)

- >40
- Rouge et chaude
- Douloureuse
- Pas dans le calcul du %TBSA, ni Parkland
- Grande surface = déshydratation



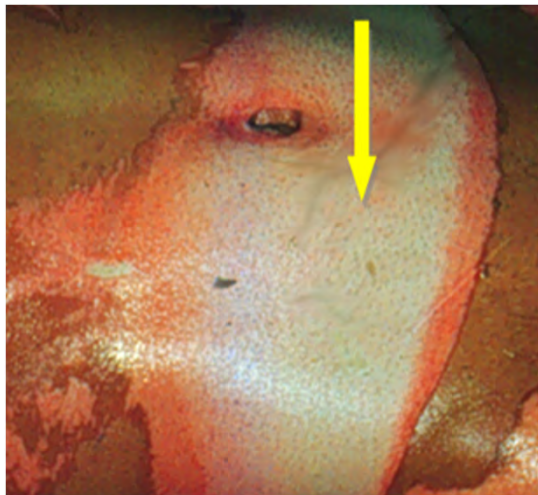
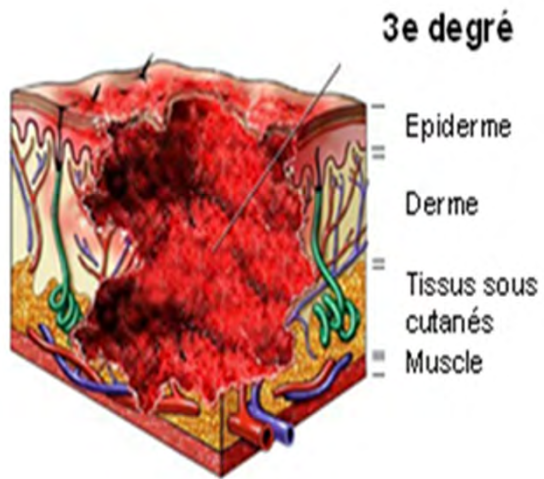
Brûlures partielles (2^e degré superficielle)

- Zone dénudée
- Phlyctène
- Douloreuse



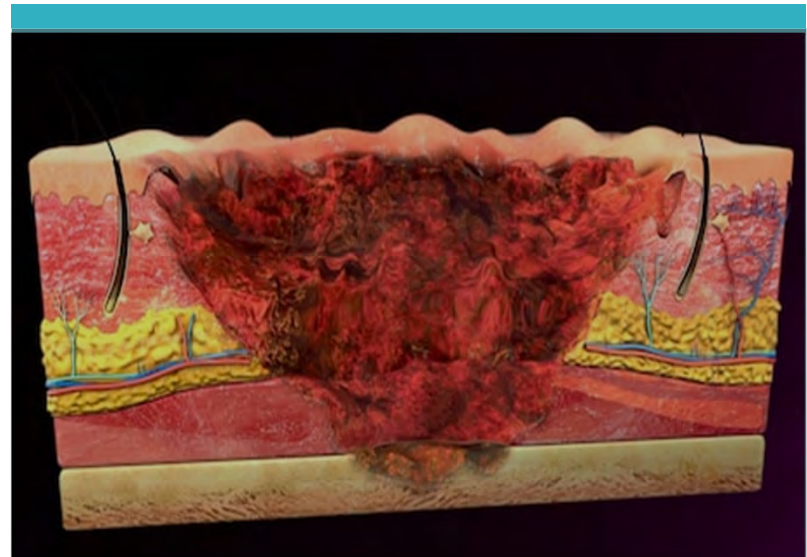
Brûlures partielles (2^e degré profond)

- Zone dénudée
- Brillante humide
- Douloureuse



Brûlures profondes (3^e degré)

- Peau épaisse
- Sèche
- Blanche tannée
- Carbonisée
- Caillots
- Perte de sensibilité
- Douleuruse



Brûlures profondes (4^e degré)

- Tissus graisseux
- Muscles
- Os
- Organes



À l'entrée



50 heures après



À l'entrée



3 jours après

Classification des brûlures

Burn Depth	Epidermal (1 st degree)	Superficial partial thickness (2 nd degree)	Deep partial thickness (2 nd degree)	Full thickness (3 rd degree)	4 th degree
Skin Involvement	Epidermis	Epidermis and superficial dermis	Epidermis and deep reticular dermis	Epidermis and entire dermis	Involving underlying structure (subcutaneous fat, muscle and bone)
Signs	Blanch to touch and are erythematous, no blisters	Blanch to touch and tend to blister	Do not blanch to touch, appear pale with large blisters	Can Appear white, black or cherry red. No blisters	Charred, skeletonized
Sensation	May be painful	Extremely painful	Maybe painful or reduced/absent sensation	No sensation	No sensation
Healing Capacity	Will heal spontaneously	Will heal spontaneously	Will not heal spontaneously, will need surgery	No healing capacity, will need surgery	No healing capacity
Healing Time	Within 7 days	Within 14 days	Over 21 days	Will not heal spontaneously	Will not heal spontaneously
Scar Formation	No scarring	Low to moderate risk of hypertrophic scarring	Moderate to high risk of hypertrophic scarring	Will scar	Usually requires amputation/ fasciotomy



Brûlure d'immersion

- 20 % / 20% des maltraitances
- 1 à 2 ans
- Mains et Pieds
- Brûlures symétriques
- Pas d'éclaboussures
- Zones de flexion
- Brûlures 2^e et 3^e degré

Age

Durée

Tempé
rature

Hight, DW., BakalarHR, Lloyd, JR. (1979). Inflicted burns in children : recognition and treatment

Hoyert, D., Kenneth, D., Murphy, S. (1999). Deaths : final data for 1997



Category	Definition	Typical Injuries
Primary	<ul style="list-style-type: none"> Produced by contact of blast shockwave with body Stress and shear waves occur in tissues Waves reinforced/reflected at tissue density interfaces Gas-filled organs (lungs, ears, etc.) at particular risk 	<ul style="list-style-type: none"> Tympanic membrane rupture Blast lung Eye injuries Concussion
Secondary	<ul style="list-style-type: none"> Ballistic wounds produced by: Primary fragments (pieces of exploding weapon) Secondary fragments (environmental fragments, e.g. glass) Threat of fragment injury extends further than that from blast wave 	<ul style="list-style-type: none"> Penetrating injuries Traumatic amputations Lacerations
Tertiary	<ul style="list-style-type: none"> Blast wave propels individuals onto surfaces/objects or objects onto individuals, causing whole body translocation Crush injuries caused by structural damage and building collapse 	<ul style="list-style-type: none"> Blunt injuries Crush syndrome Compartment syndrome
Quaternary	<ul style="list-style-type: none"> Other explosion-related injuries, illnesses, or diseases 	<ul style="list-style-type: none"> Burns Toxic gas and other inhalation injury Injury from environmental contamination
Quinary	<ul style="list-style-type: none"> Injuries resulting from specific additives such as bacteria and radiation ("dirty bombs") 	

Data from Departement of Défense Directive, (2014). Medical Research for Prevention, Mitigation, and treatment of blast injury



Explosion

- 5 phases du blast
- Brûlure et inhalation de fumée (phase 4)
- Parler fort
- Surveiller pneumothorax
- Hémostasie
- Déplacement



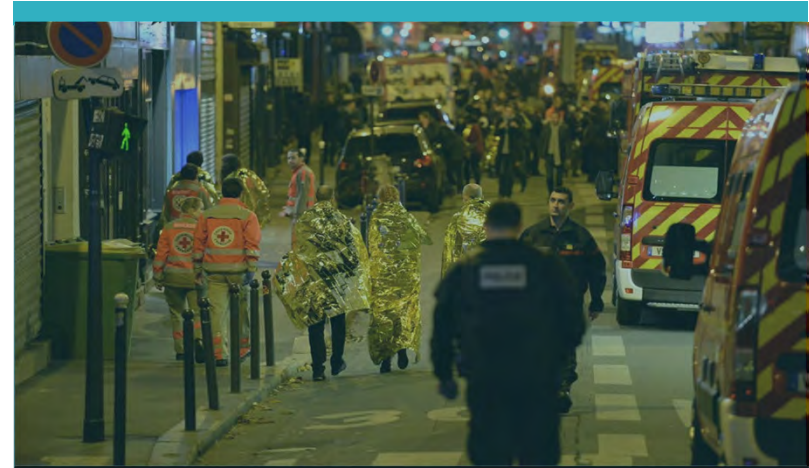
Los Flacques 1978



Volendam 2001



Ramstein 1988



Multiples

- Attentats
- Accidents d'aviations
- Transport de substances dangereuses
- Incendie en lieu public

Arturson, G. (1981). The Los Alfaques disaster : a boiling-liquid expanding-vapour explosion.



Prise en charge

- Assurer la sécurité des intervenants et victimes
- Retirer de/ou l'agent causal
- Arrêter l'hémorragie
- **Retirer les habits et bijoux**
- Maintenir la tête
- Evaluation ABCDE

Brûlures du visage

Brûlures des poils, vibrisses

Toux
Stridor
Dysphonie



Expectorations noires

Dépôts carbonisés dans
l'oropharynx

Brûlures du thorax

Brûlures circulaires du cou



Prise en charge

- Dégagement manuel VAS
- Canules oro-nasopharyngées
- Rechercher les signes d'inhalation
- **Réévaluer constamment**
- Intubation précoce
- Transport rapide

A

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Critères d'intubation

Pas d'intubation

- Brûlure cervico-faciales superficielle



Intubation discutable

- Suspicion d'inhalation de fumée sans insuffisance respiratoire
- Nécessité d'une analgésie profonde



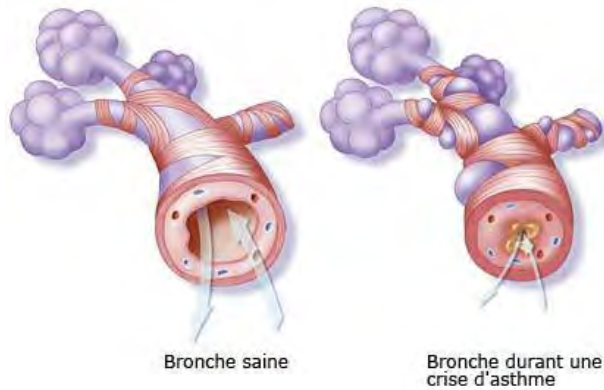
Intubation formelle

- Brûlures cervico-faciales profondes et étendues
- Détresse respiratoire
- Coma
- ACR





- Brochoconstriction
- Suies (chimiques) = destruction muqueuse
- Œdème pulmonaire




Prise en charge

- Oxygénothérapie
- Ventilation (compresses)
- Drainer un pneumothorax sous tension
- Aérosolothérapie (salbutamol)
- Intubation
- Antalgie

B

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Prise en charge

- Hémostase
- Ceinture pelvienne
- VVP, Intra osseuse zone non brûlé **Extravasation!**
- Hémorragie non contrôlable TAS 80-90 mmHg
Hémorragie contrôlable >90 mmHg
- Traumatisme médullaire et crânien >90 mmHg
- Acide tranexamique > 12 ans > 60 Kg = 1 g

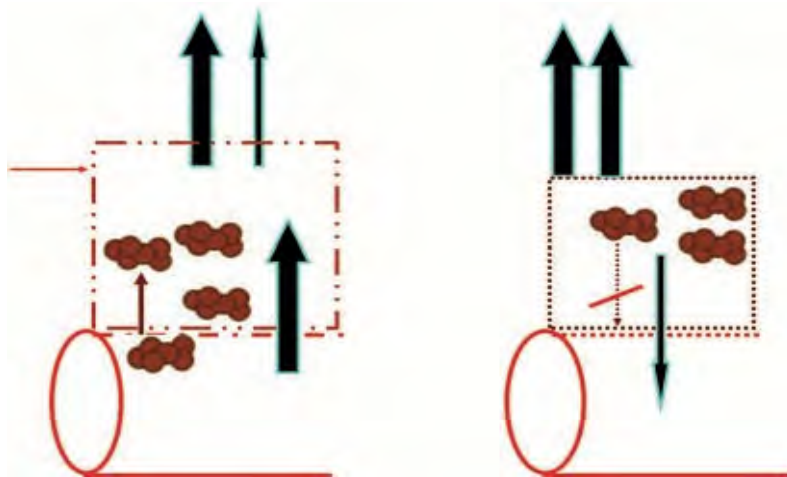


>20% BSA ou 10% BSA (enfant)

Histamine
radicaux libres

la bradykinine, les
cytokines..., la cascade de
la coagulation

Exudat de la
plaie



4-6 heures instable

Herriaratchy, S., Dziewulski, P. (2004). Pathophysiology and types of burns

Baxter, C., Shires, T. (1968). Physiological response to crystalloid resuscitation of severe burns



Prise en charge

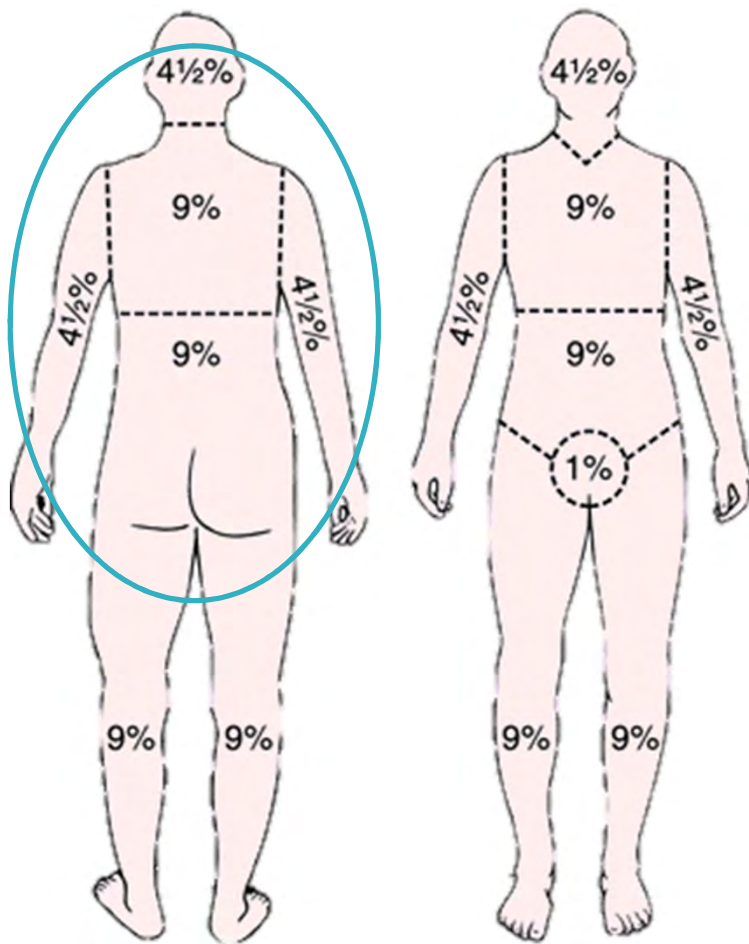
Parkland

- 2 à 4ml X kg X % TBSA / 24 heures
- Brûlure 2^e et 3^e degré
- La moitié en 8 heures
- Cristalloïde (Ringer lactate)
- Pas de colloïde

Baxter, C. (1974). Fluid volume and electrolyte changes in the early postburn period

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Homme de 80 KG pour 30 % de TBSA

Wallace, A., McGill, M., Edin, M. (1951). The exposure treatment of burns




Prise en charge Parkland

- $2 \times 80 \times 30 = 4800$
- $4800 / 2 = 2400$
- 8heures = 300 ml/h



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Prise en charge

Règle de 10

- TBSA% Estimer à la dizaine
- 27 % = 30%
- Le TBSA % X 10 = ml/h
- >70kg = + 100ml/h / 10KG en plus
- 30 % X 10 = 300ml/h + 100ml/h = 400ml/h

Chung, K. et al. (2010). Simple Derivation of the Initial Fluid Rate for the Resuscitation of Severely Burned Adult Combat Casualties: In Silico Validation of the Rule of 10





Surréanimation

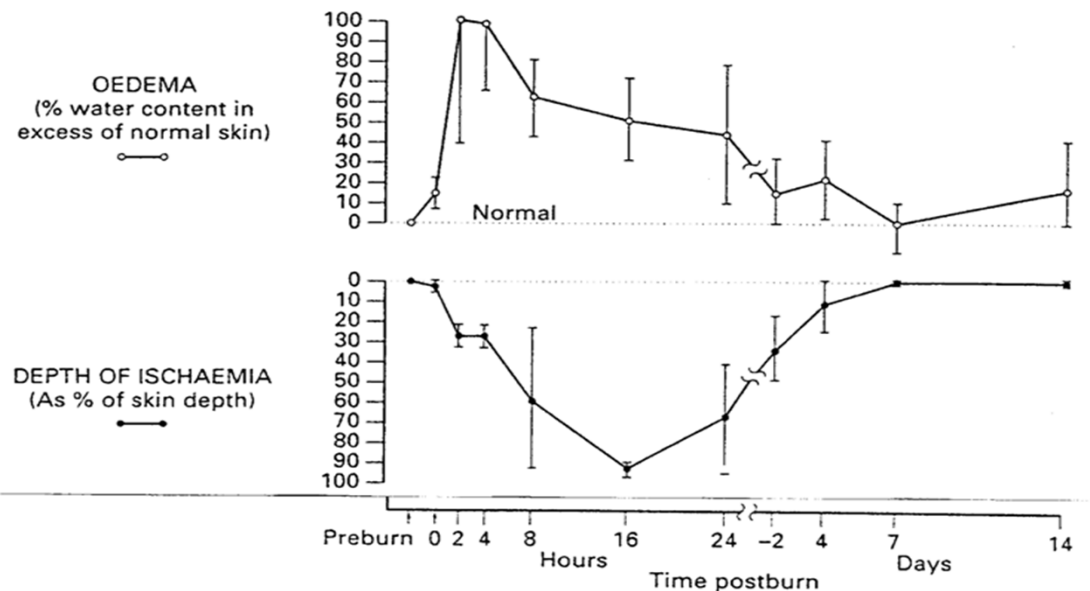
- Œdème pulmonaire
- Approfondissement des brûlures
- Augmentation des risques d'escarotomies
- Syndrome du compartiment abdominal

Arlati, S., Storti, E., Pradella, V., Bucci, L., Vitolo, A., Pulici, M. (2007). Decreased fluid volume to reduce organ damage: a new approach to burn shock resuscitation?

Ivy, M. et al. (1999). Abdominal compartment syndrome in patients with burns

C

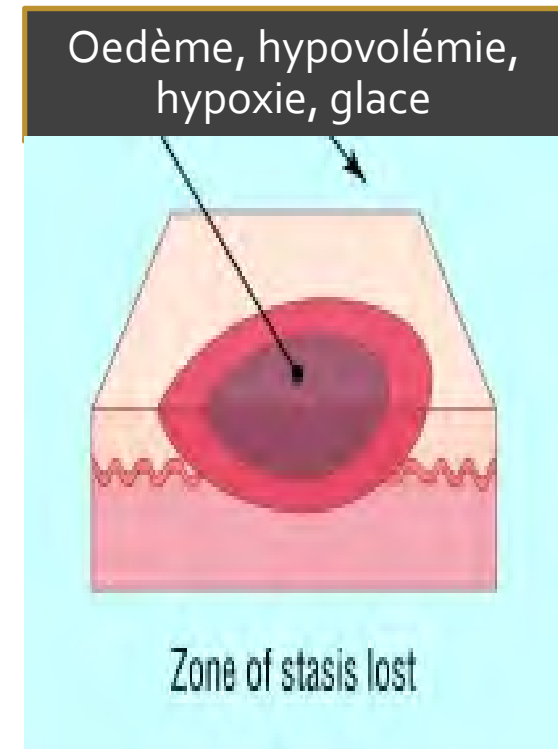
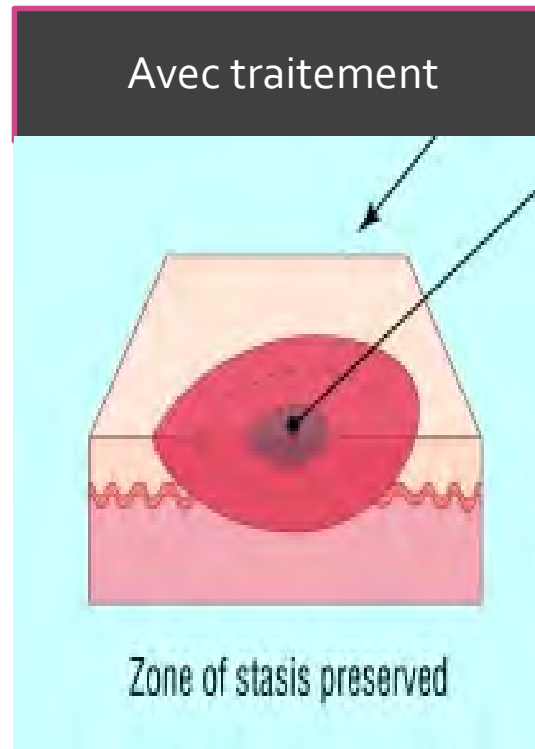
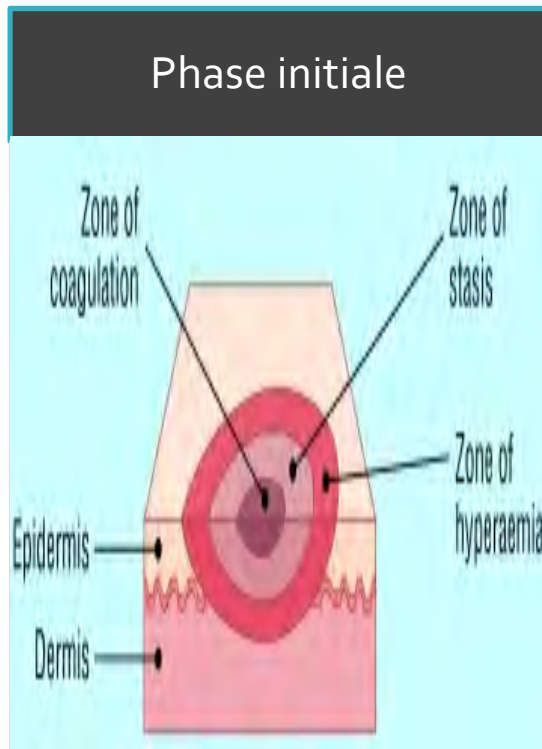
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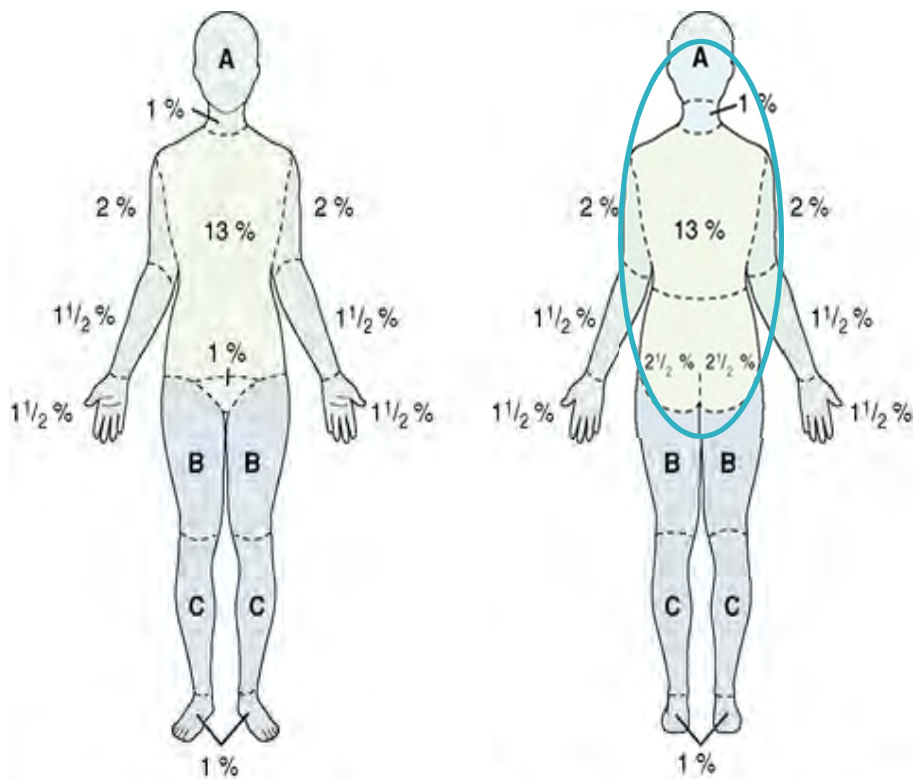


Zawacki, B. (1984). Efficacy of crystalloid and colloid resuscitation on hemodynamic response and lung water following thermal injury

Théorie des 3 zones

(Jackson 1947)





Zone	Âge 0	1	5	10	15	Adulte
A - 1/2 de la tête	9 1/2 %	8 1/2 %	6 1/2 %	5 1/2 %	4 1/2 %	3 1/2 %
B - 1/2 de la cuisse	2 3/4 %	3 1/4 %	4 %	4 1/4 %	4 1/2 %	4 1/4 %
C - 1/2 d'une jambe	2 1/2 %	2 1/2 %	2 3/4 %	3 %	3 1/4 %	3 1/2 %




Pédiatrie

- >10%TBSA
- 6ml/kg/TBSA %
- Glucose 5%

MerrellSW, Saffle JR, SullivanJJ.(1986)Fluid resuscitation in thermally injured children

Fill Line



NDC 11704-370-01

NDC 11704 370 01

Vial Contents
Hydroxocobalamin
lyophilized powder, 5 g
Hydrochloric acid for pH
adjustment

Storage
Store at 25°C (77°F)
Excursions permitted to
15-30°C (59-86°F)
Stable up to 6 hours after
reconstitution at
temperatures not
exceeding 40°C (104°F)

CYANOKIT
(hydroxocobalamin for injection)

5 g per vial

For Intravenous Use
To be reconstituted with 200 mL of 0.9% Sodium Chloride Injection
Diluent Not Included

Rx Only
Manufactured by
Merck Santé s.a.s.
Semoy, France

Distributed by
Meridian Medical Technologies®, Inc.
Columbia, MD 21046
1-800-438-1985

Meridian Medical Technologies

Reconstitute before use.
See Package Insert
for full prescribing
information.

This vial contains not
less than 90% (4.5 g)
of the nominal 5 g of
hydroxocobalamin.
Reconstituted solution
has a pH ranging from
3.5 to 6.0.

E3180_US
FR2582341

Lot: _____
Exp: _____

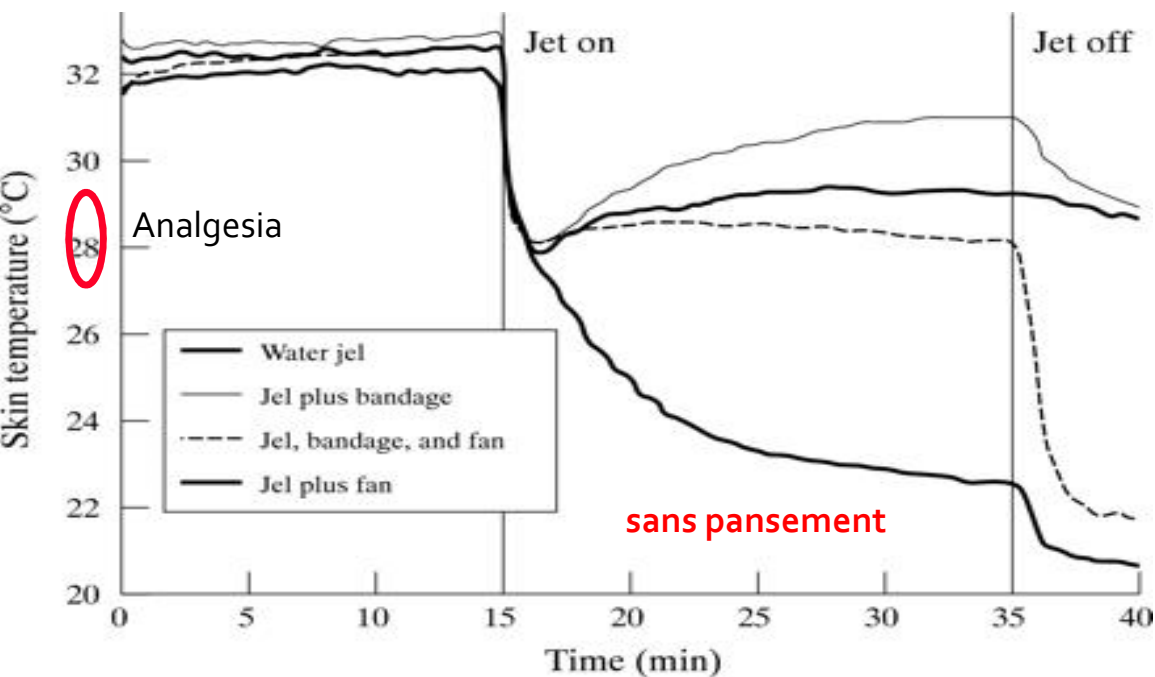


Prise en charge

- Précaution de la colonne colonne
- Evaluation GCS
- Réaction pupillaire
- Recherche déficit moteur sensitif
- Recherche signes HITC
- Recherche d'intoxication
- **Monoxyde de carbone /cyanure**

D

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Prise en charge

- Déshabiller complètement le patient
- Si habit collé fondu laisser sur la brûlure
- Retirer les bijoux
- Règle : 15/15/15

E

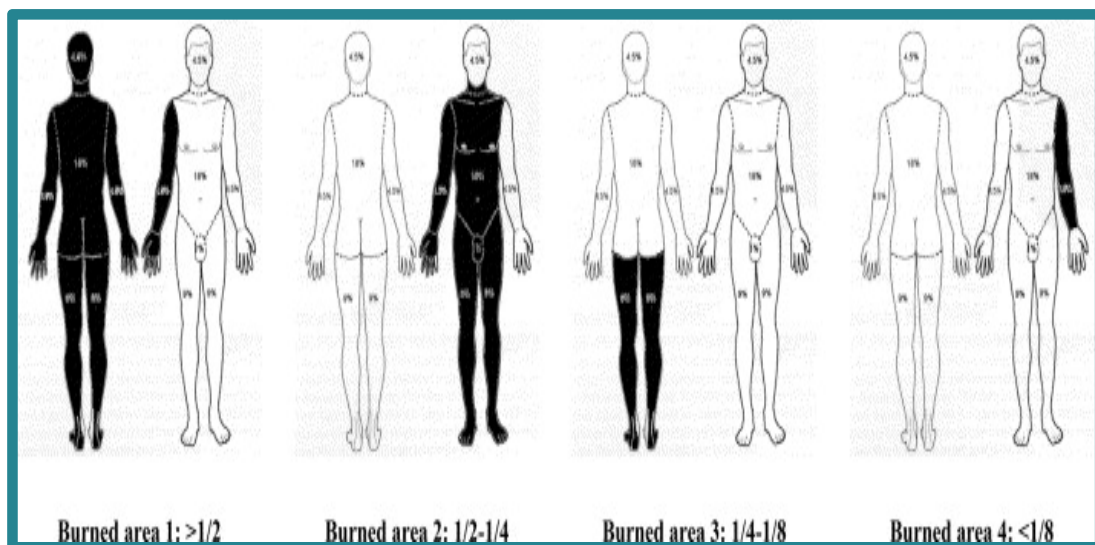
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Venter, T., Karpelowsky, J, Rode, H. (2007). Cooling of the burn wound : the ideal temperature of the coolant

Coats, T., Edwards, C., Newton, R. Staun, E. (2002). The effect of gel burns dressings on skin temperature

Cuttle, L., Pearn, J. McMillan, J., Kimble, R. (2009). A review of first aid treatments for burn injuries

Serial halving



Smith, J., Malyon, A., Scerri, G., Burge, T. (2005). A comparison of serial halving and the rule of nines as a pre-hospital assessment tool in burns

Allison, K., Porter, K. (2004). Consensus on the prehospital approach to burns patient management




Prise en charge

- Pas de cooling si TBSA $>10\%$
- Pas de cooling si âge extrême ou état de choc
- Envelopper dans des linges propres
- Pas de glace et pommade

E

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Prise en charge

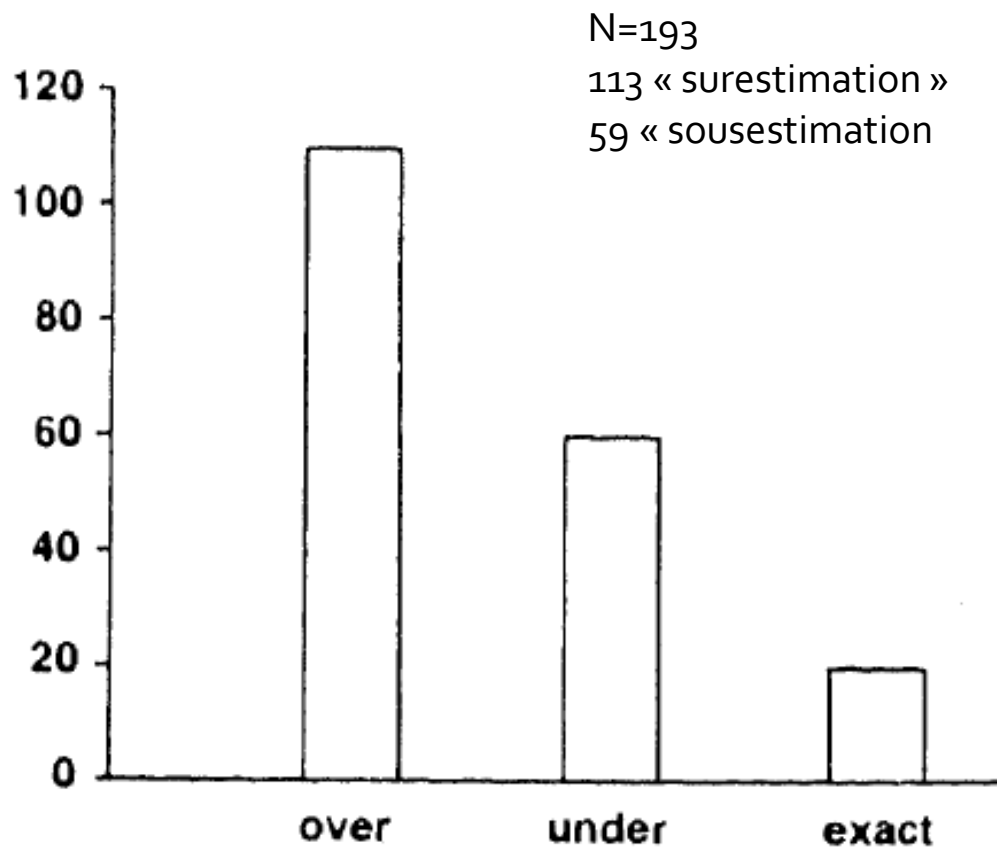
La main

- Petite ou grande surface
- Main de la victime
- 0,7 % femme
- 0.8% homme

E

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Berkebile, B., Goldfarb, I., Slater, H. (1986). Comparison of burn size estimates between prehospital reports and burn center evaluations

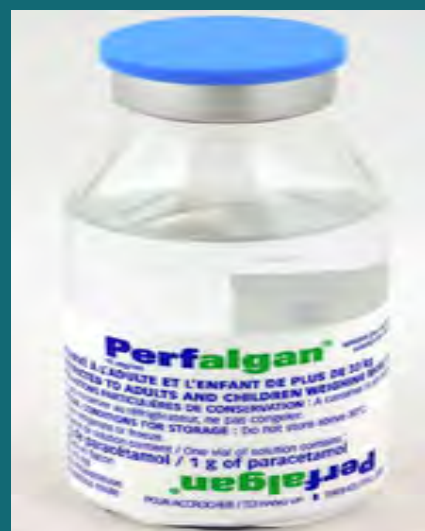
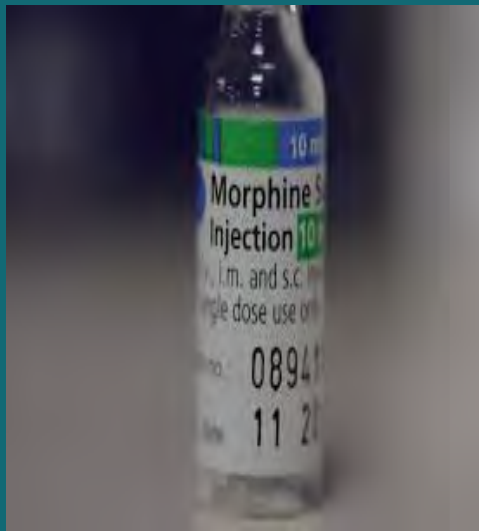
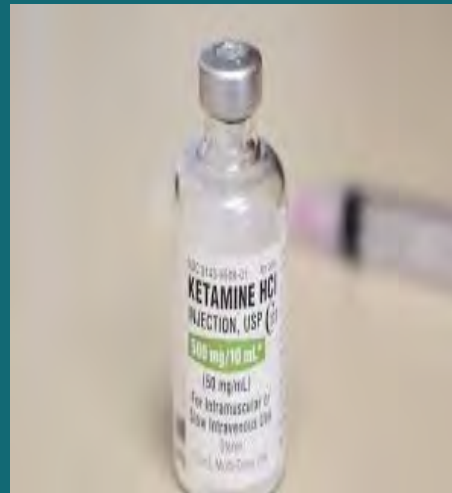
Prise en charge

- Pas de perte de temps
- Estimation globale
- Estimation précise après >48 heures

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Antalgie

- Analgésie multimodale.
- Surveiller l'état respiratoire et hémodynamique
- Eviter l'hyperalgésie

E

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Critères de gravité et mortalité

Age

Les enfants
Les personnes âgées
Peau plus fines
Petites Voies aériennes

Contexte

Temps d'exposition
Etiologie

Inhalation de fumée


10 X mortalité

Profondeur

2^e et 3^e degré

Surface

>10 % centre approprié
>20 % réaction systémique
La localisation

- 
- Brûlure partielle (2e degré) > 10%
 - Toute brûlure profonde (3e degré)
 - Brûlure de la face, les mains, les pieds, les zones génitales, les articulations
 - Brûlure d'origine électrique ou chimique
 - Inhalation de fumée
 - Brûlure chez un patient présentant des comorbidités
 - Brûlure et traumatismes associés
 - Brûlure d'un patient nécessitant une intervention particulière au plan social, psychologique ou rééducatif
 - Les enfants



Critères d'admission centre de traitement des brûlés

Prise en charge hospitalière

Daa from american College of surgeons (ACS) Committee on trauma: Resources for optimal care of the injured patient : 1999. Chicago: ACS 1998



Critères d'admission centre de traitement des brûlés

Prise en charge hospitalière

De Brouker V,(2010) Réanimation et traitement médical: traitement préhospitalier et orientation in :Latarjet J, Eichinard C(eds) « Les brûlures, 79-87,Elsevier, Paris

- Brulure partielle (2e degré) > 20%
- Toute brulure profonde (2e degré profond ou 3e degré) >10%
- Brulure <10% et :
 - Brulure de la face, les mains, les pieds, les zone génitales, les articulations
 - Brulure d'origine électrique ou chimique
 - Inhalation de fumée
 - Brulure chez un patient présentant des comorbidités
 - Brulure et traumatismes associés
 - Brulure d'un patient nécessitant une intervention particulière au plan social,psychologique ou rééducatif
- Les enfants

	Vollendam	Control	
	Group 1 (n = 111)	Group 2 (n = 425)	P Value
Intensive care patients, %	50	36	
Time in ICU, days	11 (1–36)*	2 (1–365)*	<.001
Ventilation time, days	11 (2–32)*	4 (1–365)*	.01
Time in hospital, days	11 (1–157)*	16 (1–365)*	.1
Major complications, %	13	1	<.001
Mortality, %	0	0.5	.99



Orientation

- Augmentation des complications si pas de centre approprié


Welling, L. et al. (2006). Impact of Modification of Burn Center Referral Criteria on Primary Patient Outcome


- Sécurité
- Retirer les habits et bijoux
- Evaluer et traiter XABCDE
- Rechercher les signes d'inhalation
- Pas de Parkland
- 15/15/15
- Pas de cooling >10% TBSA
- Règle de Wallace
- Couvrir
- Transporter vers centre approprié







QUESTIONS

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