Yanık ve İnfeksiyon

Uzm. Dr. Nur Benzonana
Dr. Lütfi Kırdar Kartal Eğitim ve Araştırma Hastanesi

- «Benim yaptığımı sen yapamazsın, senin yaptığını ben yapamam , ihtiyaçlar çok fazla ve hiç birimiz ben dahil büyük şeyler yapamayız ama her birimiz sevgi ile küçük şeyler yapabiliriz ve hep beraber harikalar yaratabiliriz.»

  Rahibe Teresa

- «What I do you cannot do, but what you do I cannot do. The needs are great, and none of us, including me ever do great things. But we can all do small things with great love and together we can do something wonderful»

Butler DP. The 21st century burn care team BURNS 2013;39:375-79

Yanık hastası tedavisi, yanık üzerine eğitim almış kişilerden oluşmuş multidisipliner bir ekiple başarılı olur.

- Genel cerrahi
- Plastik ve rekonstüktif cerrahi
- Çocuk cerrahisi
- Anestezi ve reanimasyon
- Su altı hekimliği ve Hiperbarik tıp uzmanı
- Pratisyen hekim
- Anestezi teknisyenleri
- Yıkama hemşireleri
- Yoğun bakım ve servis hemşireleri
- Fizyoterapist
- HBOT teknisyeni
- Sterilizasyon ekibi
- Bilgi işlem elemanları
- Teknik elemanlar
- Yardımcı personel

Deri

- Vücuttaki en büyük organlardan biri
  - Sıvı hemostazı
  - Termoregülasyon
  - İmmünolojik fonksiyonlar
  - Nörosensör fonksiyonlar
  - Metabolik fonksiyonlar
  - Fiziki bariyer

Yanık

- Termal hasar
  - Alev
  - Sıcak sıvılar
  - Sıcak objeler
  - Buhar
- Kimyasal hasar
  - Asit
  - Alkali
  - Petrol ürünleri
- Radyasyon hasarı
  - Solaryum
  - X ray
- Elektrik
  - Isı
  - Hücre membran hasarı
    - Kaslar
    - Sinirler
    - Damarlar
- İnhalasyon hasarı
  - Sıcak duman
    Mekanik hasar
  - Toksik ürünler
    Kimyasal hasar

Sınıflama

- Yanığın derinliği
  - Birinci derece
    - Epidermis
  - Parsiyel yanık (2.ci derece)
    - Epidermis + Dermis
      - Yüzeyel parsiyel yanık
      - Derin parsiyel yanık
  - Tam kat (3.cü derece)
    - Epidermis + Dermis + Yağ tabakası + …….

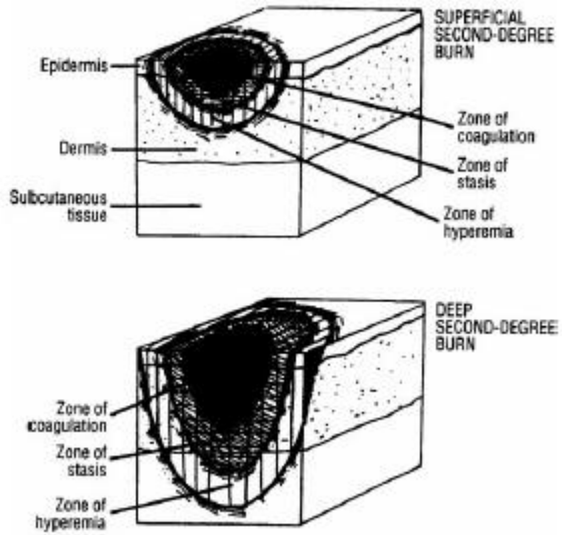


FIG. 2. Zones of injury for superficial and deep second-degree burns. (Adapted from reference 369 with permission of the publisher.)

Sınıflama

- Tüm vücut yüzey alanına oranı (TVYA)
- 9'lar kuralı

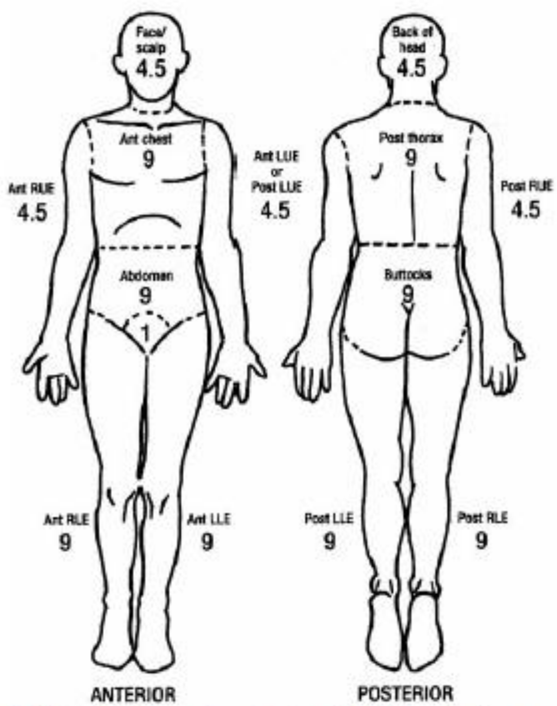


FIG. 3. Body diagram for estimation of total burned surface area (%TBSA) in adults, using the rule of nines (numbers are for anterior only and posterior only). (Adapted from reference 369 with permission of the publisher.)

Amerikan Yanık Derneği (ABA) – Minör Yanık

- Erişkinlerde TVYA: %10
- Çocuk ve yaşlılarda
  - %5inden daha az veya
  - %2 den az tam kat yanıkları

ABA – Orta yanık

- Erişkinlerde TVYA %10-20’si
- Çocuk ve yaşlılarda %5-10’u
- Yüksek-voltaj hasarı
- İnhalasyon hasarı şüphesi
- Sirküler yanık,
- Komorbiditelerin varlığı

ABA – Majör Yanık

- Erişkinlerde TVYA'nın %20sinden fazlasını
- Çocuk ve yaşlılarda %10 dan fazlasını tutan veya, %5'ten fazla tam kat yanığı,
- Yüksek voltaj yanığı,
- Bilinen inhalasyon yanığı
- Yüz, gözler, kulaklar, genital bölge veya eklemlerin üzerinde dikkate değer yanıklar
- Yanık hasarıyla birlikte kırık veya majör hasar gibi kayda değer diğer hasarların olması

Duyarlı hasta

- Küçük çocuklar ve yaşlılar
- İntihar girişimleri ve özürlüler
- Obes hastalar
- Altta yatan
- İmmün yetmezlikli hastalar

Komplikasyonlar

- Lokal
  - Eskar
  - Skarlar
  - Kontraksyonlar
  - Deformiteler
  - İnfeksiyon
- Sistemik
  - Hipovolemi
  - Metabolik problemler
    - Hipoalbüminemi
    - Elektrolit bozuklukları
    - Rabdomiyoliz
    - Hemoliz
  - Hipotermi
  - İleus
  - İnfeksiyon
  - Mortalite

Yanık - fizyopatoloji

3 karakteristik tutulum alanı

- Isı kaynağına en yakın olan eskar dokusu
- Staz zonu
  - Nekroz alanına komşu
  - Canlı
    - Perfüzyon defektleri nedeniyle nekroz ve iskemi riski
- Hiperemi zonu
  - Relatif olarak sağlıklı
  - Artmış kan akımı ve vazodilatasyon
  - Hücre hasarı minimum

Yanık - Fizyopatoloji

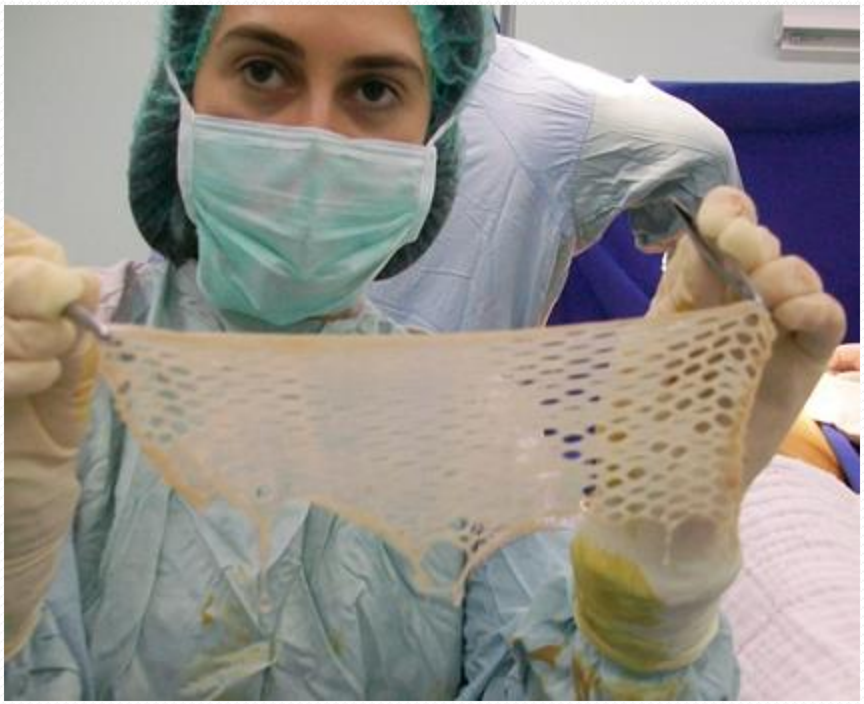
- İrreversbl protein denaturasyonu ve koagülasyon nekrozu
- Trombosit agregasyonu
- Vazokonstriksyon ve sonucunda doku perfüzyonunda bozulma
- Epidermal sıvı kaybı
- Ödem
- Termoregülasyonda bozulma
- Humoral ve hücresel bağışıklığa ciddi bir darbe
- Derinin doğal koruyucu özelliğinde bozulma

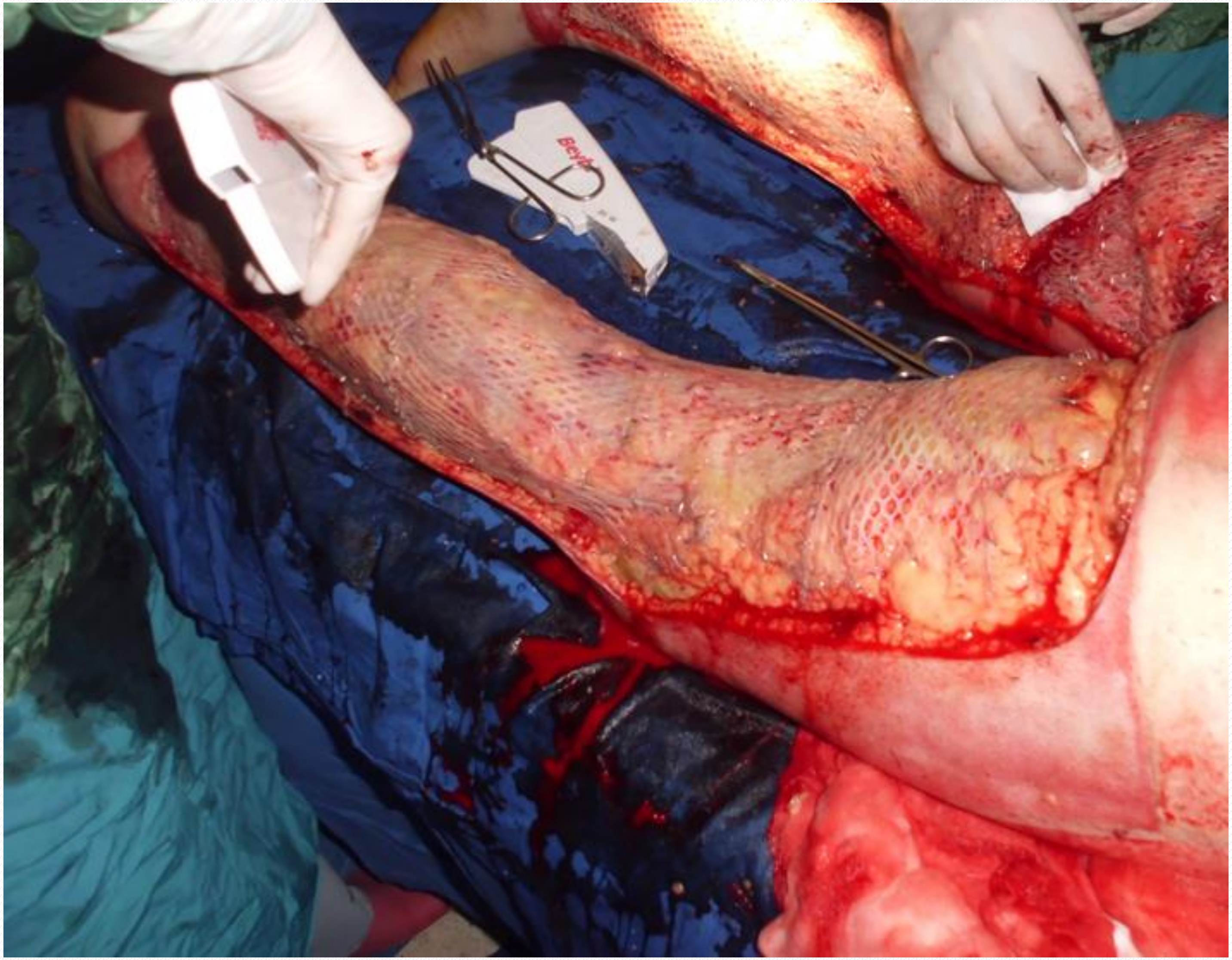
Eskar dokusu

- Derin parsiyel ve tam kat yanıklarda ortaya çıkan proteinden zengin avasküler sert nekrotik doku
  - Dairesel olduğu zaman
    - Doku ekspansiyonunu engelleyerek lokal iskemi
  - Mikrobiyal kolonizasyon
  - Mikrobiyal proliferasyon
  - Avasküler
    - Bağışık hücreler bölgeye göç edemez
    - Sistemik antibiyotikler ulaşamaz
    - Toksik maddeler lokal bağışık cevabı baskılar

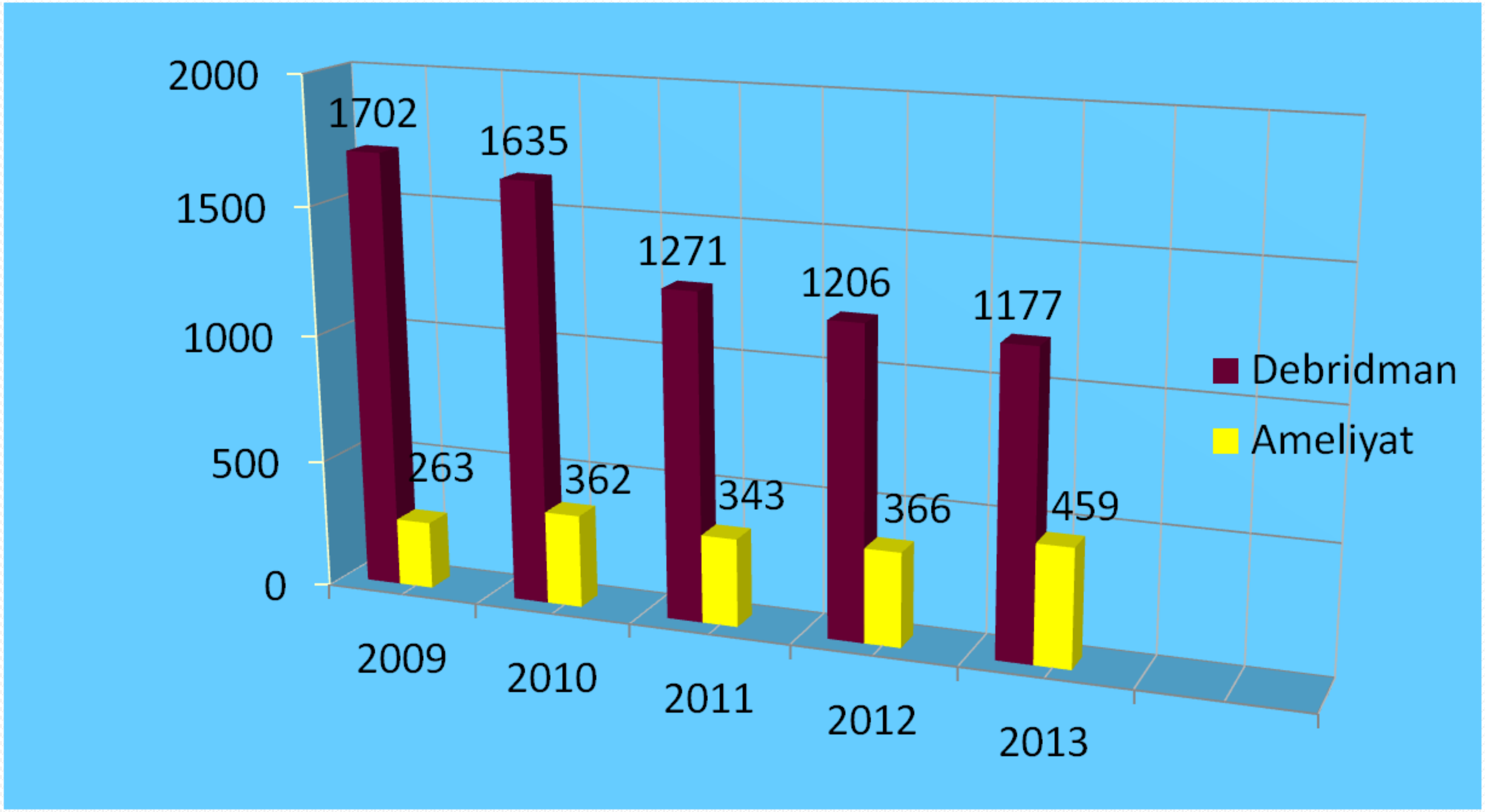
Cerrahi tedavi

- Derin parsiyel yanık ve tam kat yanıklarda
- Eskarektomi + Eksizyon
- Greftleme
  - Otogreft
  - Allogreft
- Fasiyotomi
  - Kompartman sendromunun önlenmesi
- Amputasyon





Yapılan ameliyat ve debridman sayıları



Yanık Tedavi Merkezi Yatan Hasta Sayıları

Yıllar	Yanık Servisi	Yanık YB	Toplam
2009	398	95	493
2010	487	152	639
2011	548	139	687
2012	596	155	751
2013	562	165	727
2014 (10)	520	116	636
Toplam	3111	822	3933
	79%	21%	

ABA 2014 Mortalite Oranları

Table 4 LIVED/DIED BY BURN GROUP SIZE (%TBSA)

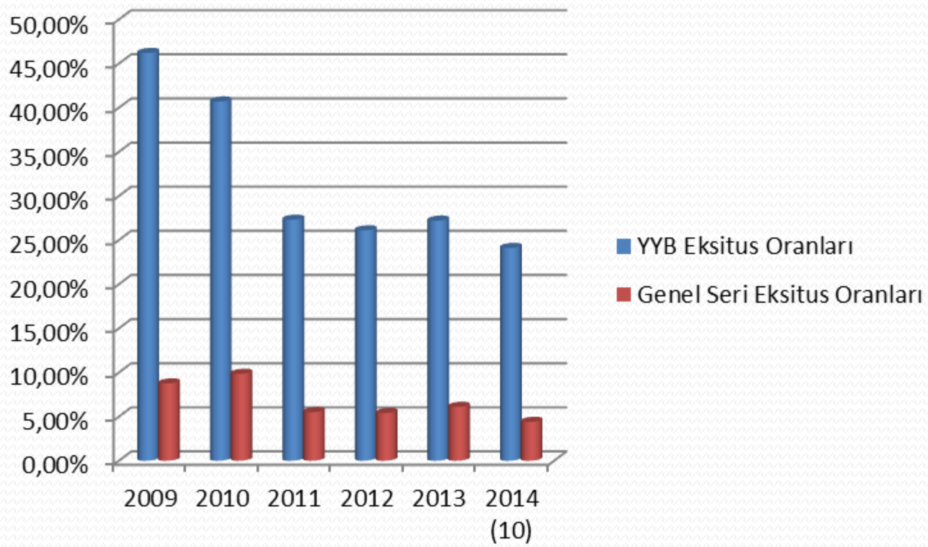
%TBSA	Lived Cases	Died Cases	Mortality Rate
0.1 - 9.9	123,097	787	0.6
10 - 19.9	24,940	703	2.7
20 - 29.9	7,116	651	8.4
30 - 39.9	3,059	608	16.6
40 - 49.9	1,501	553	26.9
50 - 59.9	782	461	37.1
60 - 69.9	527	411	43.8
70 - 79.9	273	333	55.0
80 - 89.9	197	425	68.3
> 90	105	548	83.9
Subtotal	**161,597**	**5,480**	**3.3**
Missing or 0%	23,877	894	3.6
TOTAL	**185,474**	**6,374**	**3.3**

Total N=191,848

10

Yıllara göre eks oranlarımız

Yıllar	YYB Eksitus Oranları	Genel Seri Eksitus Oranları %6.5
2009	46.20%	8.75%
2010	40.70%	9.84%
2011	27.30%	5.50%
2012	26.10%	5.40%
2013	27.20%	6.10%
2014 (10)	24.10%	4.40%


50,00%
45,00%
40,00%
35,00%
30,00%
25,00%
20,00%
15,00%
10,00%
5,00%
0,00%
2009
2010
2011
2012
2013
2014 (10)
YYB Eksitus Oranları
Genel Seri Eksitus Oranları

- TVYA %40'tan fazla olduğu ciddi yanıklarda ölümlerin %75inin nedeni sepsis

Murray CK. Infection in burns. J trauma 2007;62:73

Table 1. Tobiasen's Abbreviated Burn Severity Index (ABSI) score and prediction.

Parameter	Finding	Points
Sex	Female	1
	Male	0
Age (years)	0–20	1
	21–40	2
	41–60	3
	61–80	4
	81–100	5
Inhalation injury	Yes	1
	No	0
Presence of full-thickness burn	Yes	1
	No	0
BSA burn (%)	1–10	1
	11–20	2
	21–30	3
	31–40	4
	41–50	5
	51–60	6
	61–70	7
	71–80	8
	81–90	9
	91–100	10

ABSI score and prediction.

ABSI	Treat to Life	Probability of survival (%)
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

Yanık, Genel ve Travma Yoğun Bakım Sepsis ve Mortalite

Sepsis Oranları	%
Yanık Yoğun Bakım	**8 - 42.5**
Genel Yoğun Bakım	**19 - 38**
Travma Yoğun Bakım	**2.4 - 16.9**

Sepsis Nedeniyle Mortalite Oranları	%
Yanık Yoğun Bakım	**28 - 65**
Genel Yoğun Bakım	**21 - 53**
Travma Yoğun Bakım	**7 - 36.9**

Mann EA, Baun MM, Meininger JC, Wade CE. Comparison of mortality associated with sepsis in the burn, trauma and general intensive care unit patient: A systematic review of the literature. Shock. 2012;37(1):4-16

İnfeksiyona yatkınlık

- TVYA %30 dan fazla olması
- Tam kat yanıklar
- Bağışıklık sisteminde baskılanma
- Kolonize eden mikroorganizma
  - Virulans
  - Direnç paterni
- Greftin tutmaması
- Uzun süre açık kalmış yanık yarası
- Yetersiz yara bakımı
- Hospitalizasyonun uzaması
- İnvazif tanısal ve terapötik işlemler ve alet kullanımı

Yanıklı Hastalarda Görülen İnfeksiyonlar

- Yara infeksiyonları
- Kan dolaşımı infeksiyonları
- Pnömoni
- Üriner sistem infeksiyonları
- Süpüratif kondrit
- Subakut bakteriyel endokardit
- Süpüratif tromboflebit
- Süpüratif sinüzit
- İntraabdominal infeksiyon

Yanık – Mikrobiyal kolonizasyon

- Yanık yarası steril
- 5 – 7 gün
  - Ter bezleri ve kıl foliküllerindeki organizmalar
  - KNS, enterokoklar, A grubu β hemolitik streptokoklar, S. aureus
- 7 günden sonra
  - Gastrointestinal sistem
  - Solunum sistemi
  - Hastane ortamı

Yanık yara infeksiyonu

- İmpetigo
- Yanık ilişkili cerrahi yara infeksiyonları
  - Eksize edilmiş yanık alanları
  - Donör alanları
- Yanık yara selüliti
- İnvazif yanık yara infeksiyonları
  - Eksize edilmemiş derin parsiyel veya tam kat yanıklar
  - İnflamasyon bulguları
  - Patolojide canlı dokuda mikrobiyal invazyon
  - Kan kültüründe üreme
  - Sepsis

İnvazif yanık yara infeksiyonu?

- Parsiyel yanığın tam kat yanığa ilerlemesi
- Yaranın renginde değişiklik
- Sağlıklı dokuya hızla yayılan selülit
- Cilt altı yağ dokusunun yeşermesi
- Yara sınırlarında morarma ve ödem
- Greftin tutmaması

İnvazif yanık yara infeksiyonu?

- Eskar altında kanama
- Eskarın kolay ayrılması
- Yanık alanlarında aşırı sekresyon
- Yanık alanlarından kötü koku gelmesi
- Yanık alanlarında sabunlaşma görülmesi
- Pansumanların sık değiştirilme gereksinimi

Neden önemli?

- İyileşmede gecikme
- Skar oluşumu
- Bakteriyemi
- Sepsis
- Çoklu organ yetmezliği

Düzenli yara sürveyans kültürleri

- Klinik belirti ve bulgular tanı için yeterli değil
- Kolonizan mikroorganizmaların erken tanınması
- Tedavi etkinliğinin izlenmesi
- Empirik antibiyotik tedavisinin yönlendirilmesi
- Çapraz kolonizasyonların takibi

Yara kültürleri

- Altın standart
  - Doku biyopsi kültürleri
    - Eksize edilmemiş veya edilemeyen bölgelerden
    - $>10^5$cfu/g dan fazla bakteri hematojen yayılım riski
    - Emek yoğun
  - Histolojik tanı
    - Vaskülerizasyonu olmayan alanlarda bakteri kolonizasyon
    - Canlı dokuda bakteri varlığı infeksiyon
- Yanık yüzeyinin kalitatif ve semikantitatif sürüntü kültürleri
  - Eksize edilmiş alanlar
  - Derinin ince olduğu alanlar
    - Kulak, göz, parmak

İnvazif yanık yara infeksiyonları - etkenler

- Gram (+) bakteriler
  - KNS
  - *S. aureus*
  - *Enterococcus* spp.
- Gram(-) bakteriler
  - *Acinetobacter* spp.
  - *Pseudomonas* spp.
  - *Serratia marcescens*
  - *K. pneumoniae*
  - *E. coli*
  - *Proteus* spp.
- Mantarlar
  - *Candida* spp.
  - *Aspergillus* spp.
  - *Fusarium* spp.
  - *Alternaria* spp.
  - *Rhizopus* spp.
  - *Mucor* spp.
- Viruslar
  - Orf virus
  - Herpes simplex virus
  - Cytomegalovirus
  - Varicella-zoster virus

Yanık Yara İnfeksiyonu Etkenleri		
Gram Negatif	Sayı	%
A. baumanii	133	50
P. aeruginosa	81	30
K. pneumoniae	20	7
Enterobacter spp.	14	5
E. coli	9	3
P. mirabilis	5	2
Diğer	3	1
Toplam	265	

Yanık Yara İnfeksiyonu Etkenleri	
Gram Pozitif	Sayı
Enterococcus spp.	6
MRSA	5
MSSA	5
S. pyogenes	1
Toplam	9

Yanık yara infeksiyonları önlem

- Her pansumanda gözlem
  - Görüntü
  - Koku
  - Pürülan akıntı

- Kesinlikle aseptik teknik
- Yaranın durumuna göre pansuman sıklığının ayarlanması

Kan dolaşımı infeksiyonları

- En sık infeksiyöz komplikasyon
  - 7 kat fazla
- Anlamlı mortalite artışı
- Kateterler
  - Hematojen
  - Yanık yüzdesi yüksek hastalarda kateterlerin yaraların üzerinden veya yanından takılma zorunluğu

Kan Dolaşımı İnfeksiyonu Etkenleri		
	Sayı	%
A. baumanii	118	46
P. aeruginosa	38	14
MRKNS	32	12
MRSA	17	6
K. pneumoniae	13	5
Enterococcus spp.	12	4
Enterobacter spp.	9	3
Diğer	16	10
Toplam	255	100

Kan dolaşımı infeksiyonları - önlem

- Uygun yara bakımı
- Damar içi kateterlerin uygun kullanımı
  - Yanık yarasından olabildiğince uzakta
  - Kateter giriş yeri ıslatılmamalı
  - Gerekirse daha sık değişim

Pnömoni

- Gittikçe ön plana çıkmakta
- Atelektazi ve hipostatik akciğer riski
- Altta yatan akciğer hastalığı olan erişkinler yatkın
- İnhalasyon hasarı olan hastalarda
  - Entübasyon daha fazla
  - Uzun entübasyon → VİP

İSTANBUL KARTAL DR.LÜTFİ KIRDAR EĞİTİM VE ARAŞTIRMA HASTANESİ
İNVAZİV ARAÇ İLİŞKİLİ ENFEKSİYON HIZLARI (SERVİSLERE GÖRE)
2011-Ocak/2011-Aralık

Açıklama	Hasta Sayısı	Hasta Günü	Ventilatör Günü	VIP (Sayı)	Ventilatör Kullanım Oranı	VIP Hızı	Üriner Kateter Günü	Kİ-ÜSE (Sayı)	Üriner Kateter Kullanım Oranı	Kİ-ÜSE Hızı	Santral Venöz Kateter Günü
YANIK ÜNİTESİ YOĞUNBAKIM	151	1,599	682	6	0.43	8.80	1,599	1	1.00	0.63	1,292

İSTANBUL KARTAL DR.LÜTFİ KIRDAR EĞİTİM VE ARAŞTIRMA HASTANESİ
İNVAZİV ARAÇ İLİŞKİLİ ENFEKSİYON HIZLARI (SERVİSLERE GÖRE)
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YANIK ÜNİTESİ YOĞUNBAKIM	149	1,906	676	3	0.35	4.44	1,910	2	1.00	1.05	1,550

İSTANBUL KARTAL DR.LÜTFİ KIRDAR EĞİTİM VE ARAŞTIRMA HASTANESİ
İNVAZİV ARAÇ İLİŞKİLİ ENFEKSİYON HIZLARI (SERVİSLERE GÖRE)
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Açıklama	Hasta Sayısı	Hasta Günü	Ventilatör Günü	VIP (Sayı)	Ventilatör Kullanım Oranı	VIP Hızı	Üriner Kateter Günü	Kİ-ÜSE (Sayı)	Üriner Kateter Kullanım Oranı	Kİ-ÜSE Hızı	Santral Venöz Kateter Günü
YANIK ÜNİTESİ YOĞUNBAKIM	152	1,925	446	2	0.23	4.48	1,912	0	0.99	0.00	1,613

burns 40 (2014) 835–841

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/burns

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Nosocomial infection characteristics in a burn intensive care unit: Analysis of an eleven-year active surveillance

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ARTICLE INFO

Article history:
Accepted 6 November 2013

Keywords:
Burn intensive care unit
Nosocomial infection
Surveillance
Invasive device associated infection

ABSTRACT

Aims: The objective of this study was to describe nosocomial infection (NI) rates, risk factors, etiologic agents, antibiotic susceptibility, invasive device utilization and invasive device associated infection rates in a burn intensive care unit (ICU) in Turkey.

Methods: Prospective surveillance of nosocomial infections was performed according to Centers for Disease Control and Prevention (CDC) and National Healthcare Safety Network (NHSN) criteria between 2001 and 2012. The data was analyzed retrospectively.

Results: During the study period 658 burn patients were admitted to our burn ICU. 469 cases acquired 602 NI for an overall NI rate of 23.1 per 1000 patient days. 109 of all the cases (16.5%) died. *Pseudomonas aeruginosa* (241), *Acinetobacter baumannii* (186) and *Staphylococcus aureus* (69) were the most common identified bacteria in 547 strains.

Conclusion: Total burn surface area, full thickness burn, older age, presence of inhalation injury were determined to be the significant risk factors for acquisition of NI. Determining the NI profile at a certain burn ICU can lead the medical staff apply the appropriate treatment regimen and limit the drug resistance. Eleven years surveillance report presented here provides a recent data about the risk factors of NI in a Turkish burn ICU.

Table 2 – Infection agent distribution among infections.					
	BWI[a] (*n* = 223)	BSI[a] (*n* = 122)	Pneumonia (*n* = 69)	UTI[a] (*n* = 33)	Mixed (*n* = 155)
P. aeruginosa (*n* = 241)	97	73	12	17	42
A. baumannii (*n* = 186)	47	36	41	7	55
S. aureus (*n* = 69)	51	6	2	2	8
E. coli (*n* = 12)	5	3	–	2	2
Proteus spp. (*n* = 8)	5	–	–	1	2
Enterococcus spp. (*n* = 4)	2	–	–	2	–
Coagulase-negative staphylococci (*n* = 11)	7	2	–	–	2
Candida spp. (*n* = 13)	7	2	1	2	1
Klebsiella pneumoniae (*n* = 1)	–	–	1	–	–
Stenotrophomonas maltophilia (*n* = 1)	1	–	–	–	–
S. pyogenes (*n* = 1)	1	–	–	–	–
Total isolates (*n* = 547)	**223**	**122**	**57**	**33**	**112**

[a] BWI, burn wound infection; BSI, blood stream infection; UTI, urinary tract infection.

Öncül O, Öksüz S, Acar A, et al. Nosocomial infection characteristics in a burn intensive care unit: Analysis of an eleven-year active surveillance. Burns 2014;40:835-841

BURNS 36 (2010) 819–825

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BURNS

Prevalence of multidrug-resistant organisms recovered at a military burn center☆

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ARTICLE INFO

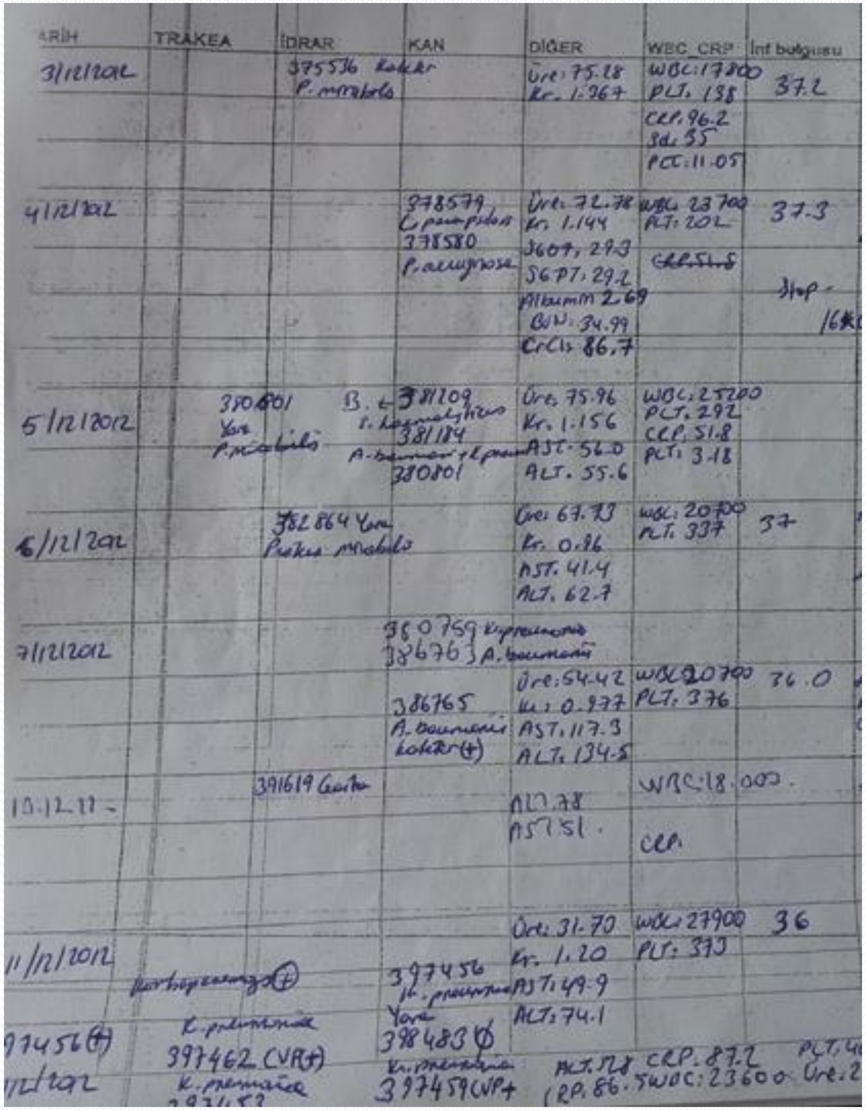
Article history:
Accepted 14 October 2009

Keywords:
Burn
Infection
Antibiotic resistance
Acinetobacter
Klebsiella
Pseudomonas
Staphylococcus

ABSTRACT

Infections caused by multidrug-resistant (MDR) pathogens are associated with significant morbidity and mortality in patients with burn injuries. We performed a 6-year antibiotic susceptibility records review from January 2003 to December 2008 to assess the prevalence of MDR isolates by pathogen at the US Army Institute of Surgical Research Burn Center. During the study period *Acinetobacter baumannii* (780 isolates [22%]) was the most prevalent organism recovered, followed by *Pseudomonas aeruginosa* (703 isolates [20%]), *Klebsiella pneumoniae* (695 isolates [20%]), and *Staphylococcus aureus* (469 isolates [13%]). MDR prevalence rates among these isolates were *A. baumannii* 53%, methicillin-resistant *S. aureus* (MRSA) 34%, *K. pneumoniae* 17% and *P. aeruginosa* 15%. Two isolates, 1 *A. baumannii* and 1 *P. aeruginosa*, were identified as resistant to all 4 classes of antibiotics tested plus colistin. *A. baumannii* isolates recovered from patients with burns greater than 30% of total body surface area (TBSA) were more likely to be MDR (61%) with no significant difference for *P. aeruginosa* and *K. pneumoniae*. A higher proportion of MDR *P. aeruginosa* isolates were recovered from respiratory specimens compared to blood specimens (24% vs. 9%) while the opposite was true for MRSA (35% vs. 54%). A comparison of *A. baumannii* recovered during hospitalization days 1–5 and 15–30 revealed higher MDR levels as length of stay increased (48% vs. 75%) while no significant trends were observed for *P. aeruginosa* and *K. pneumoniae*. A similar pattern was observed for MDR *A. baumannii* levels for the facility between 2003 and 2005 and 2006–2008 (39% vs. 70%), with no significant increase in MDR *P. aeruginosa* and MDR *K.*

ARİH	TRAKEA	İDRAR	KAN	DİĞER	WBC_CRP	İnf bulgusu	AB
25/7/2013		3385439 ϕ	3385939 A.baumanii	ALT: 26 AST: 42 ~~Kr: 0.83~~ Üre: 33	WBC: 15110 PLT: 202 ~~CRP: 102~~	38.5	
26/7/2013 Operasyon		3389910 Dolu P.aeruginosa		ALT: 54 AST: 87 Kr: 0.73 Üre: 37	WBC: 13200 PLT: 149 CRP: 151 PRO: 3.876	378 ↓ kan 38.5	Col Tı
27/7/2013			3391326 A.baumanii				
28/7/2013 Pansuman		3392237 ϕ	3392237 A.baumanii	+ P.aeruginosa ⇒ CVP kanı			
29/7/2013		3394724 Kateter (CVP) ~~A.b~~ P.aeruginosa 3394728 Kateter ϕ	3392237 A.baumanii	ALT: 56 AST: 66 Kr: 0.76 Üre: 58	WBC: 15900 PLT: 138 CRP: 330 PRO: 2.063	37.7	(7) Col (6) Tı (3) Ty
30/7/2013			3401163 ϕ	ALT: 39 AST: 49 Kr: 0.78 Üre: 61	WBC: 21600 PLT: 133 CRP: 283 PRO: 0.037	37.8 ? 38.6	(8) Co (9) Me (4) Ty
31/7/2013			3403440	ALT: 43 AST: 52 Kr: 0.67 Üre: 50	WBC: 17700 PLT: 174 CRP: 221 PRO: 1.247	37.6 38.2	C M T
1/8/2013			3406451 P.aeruginosa	ALT: 204 AST: 324 Kr: 0.57 Üre: 41	WBC: 17700 PLT: 206	37.3	(10) C (6) T (4) M
2/8/2013	3411320 Dolu P.aeruginosa	3411692 P.aeruginosa 3410455 P.aeruginosa 3410455	Üre: 60 P.aeruginosa	ALT: 122 AST: 97 Kr: 0.59	WBC: 18100 PLT: 301 CRP: 160	PRO: 1.661	



TARİH	TRAKEA	İDRAR	KAN	DİĞER	WBC_CRP	İnf bulgusu
3/12/2012		375536 Kateter P. mirabilis		Üre: 75.28 Kr. 1.264	WBC: 17800 PLT: 138 CRP: 96.2 Sd: 35 PCT: 11.05	37.2
4/12/2012			378579 C. parapsilosis 378580 P. aeruginosa	Üre: 72.78 Kr. 1.144 SGOT: 29.3 SGPT: 29.2 Albumin 2.69 BUN: 34.99 CrCl: 86.7	WBC: 23700 PLT: 202 ~~CRP: 51.8~~	Ateş - 16[illegible]
5/12/2012	380801 Yara P. mirabilis		B. ← 381209 S. haemolyticus 381184 A. baumannii + K. pneumoniae 380801	Üre: 75.96 Kr. 1.156 AST: 56.0 ALT: 55.6	WBC: 25200 PLT: 292 CRP: 51.8 PCT: 3.18	
6/12/2012		382864 Yara Proteus mirabilis		Üre: 67.73 Kr. 0.96 AST: 41.4 ALT: 62.7	WBC: 20700 PLT: 337	37
7/12/2012			380759 K. pneumoniae 386763 A. baumannii 386765 A. baumannii Kateter (+)	Üre: 54.42 Kr: 0.977 AST: 117.3 ALT: 134.5	WBC: 20700 PLT: 376	36.0
10.12.12 -		391619 Gaita		ALT: 78 AST: 51.	WBC: 18.000. CRP	
11/12/2012	Karbapenemaz (+)		397456 K. pneumoniae Yara 398483 Ø	Üre: 31.70 Kr. 1.20 AST: 49.9 ALT: 74.1	WBC: 27900 PLT: 373	36
397456 (+) [illegible]/12/2012	K. pneumoniae 397462 CVP (+) K. pneumoniae 397453		K. pneumoniae 397459 CVP +	ALT: 128 CRP: 86.	CRP: 87.2 WBC: 23600	PLT: 4[illegible] Üre: 2[illegible]

TARİH	TRAKEA	İDRAR	KAN	DİĞER	WBC CRP
7/3/2013	Hemofiltrasyon	6110630	611063 A. baumanii 611066 A. baumanii	Kr: 0.68 AST: 54 ALT: 33	WBC: 18880 PLT: 249 CRP: 646 PRO: 1.682
8/3/2013	Hemofiltrasyon 613990 A. baumanii P. aeruginosa	613766 Yara Acinetobacter Pseudomonas	611611 A. baumanii	Üre: 75 Kr: 0.53 AST: 48.8 ALT: 30.1	WBC: 15900 PLT: 228
9/3/2013			615150 A. baumanii P. aeruginosa 615151 A. baumanii P. aeruginosa		
10/3/2013					
			6195[illegible]	Üre: 115.80	WBC: 14900

Available online at www.sciencedirect.com
SciVerse ScienceDirect
journal homepage: www.elsevier.com/locate/burns

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BURNS

Review

Colistin in burn intensive care: Back to the future?

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ARTICLE INFO

Article history:
Accepted 12 July 2012

Keywords:
Colistin
Literature trends
Redevelopment

ABSTRACT

Colistin is a venerable antibiotic whose fortunes have been revived by its excellent activity, the diminishing output of novel clinically effective antibiotics and the increasing importance of MDR infection in burn surgery, both in the civilian and military arenas. This review synthesizes current evidence on the usage of colistin in burn surgery including the structure-activity relationship; dosing, pharmacokinetics/pharmacodynamic (PK/PD), analytic methods, resistance and current research efforts into the redevelopment of this antibiotic, to distil recommendations for future research and clinical efficacy.

C547746

Kayıt d	Yatış ...	Hst/YBÜ yatış	ÇIKIŞ	TANI	AYH	Girişim	Antib
3/8/2013		3412562 P.aeruginosa	3412562 P.aeruginosa				
TARİH	**TRAKEA**	**İDRAR**	**KAN**	**DİĞER**	**WBC_CRP**	**İnf bulgusu**	**AB**
5/8/2013		3416721 P.aeruginosa	3416418 P.aeruginosa	ALT: 669 AST: 915	WBC: 18800 PLT: 488	38.6	(4) Colistin
				Kr: 0.59 Üre: 24	CRP: 179 PRO: 2.826	37.8	
	3416721 Yara P.aeruginosa	3416418 Doku P.aeruginosa	3416721 P.aeruginosa				
6/8/2013		Doku 3420199 P.aeruginosa		ALT: 402 AST: 243	WBC: 24800 PLT: 575		
Ameliyat				Kr: 0.6 Üre: 34			
						39.4	Amikac
7/8/2013				ALT: 197 AST: 101	WBC: 20.100 PLT: 508	37.2	(16) Colistin Imipene
				Kr: 0.6 Üre: 30	CRP: 175		(2) Amikac
		3430765 Ø					
12/8/2013		3430319 Doku S.haemolyticus	3428759 C.tropicalis	ALT: 65 AST: 30 Kr: 0.7 Üre: 40	WBC: 18400 PLT: 468 CRP: 97.2 PRO: 3.823		(21) Colistin ~~(1) Colistin~~ (1) Amik 8 Trena
	3430964 Yara C.tropicalis	3430586 Kateter C.tropicalis	3430586 C.tropicalis				
13/8/2013				ALT: 55 AST: 38 Kr: 0.65 Üre: 46	WBC: 25600 PLT: 462 PRO: 5.894	37.3	(1) Fluk (9) Trena (8) ~~Ami~~ Colist


118341330
MEM 10

Table 1 RIFLE classification system for acute kidney injury

RIFLE category	Criteria: Glomerular filtration rate	Criteria: Urine output
Grades of severity		
Risk	Serum creatinine level increased 1.5 times or glomerular filtration rate decreased >25%	<0.5 mL/kg for 6 hours
Injury	Serum creatinine level increased 2 times or glomerular filtration rate decreased >50%	<0.5 mL/kg for 12 hours
Failure	Serum creatinine level increased 3 times or glomerular filtration rate decreased >75% or serum creatinine level >4 mg/dL	<0.5 mL/kg for 12 hours or anuria for 12 hours
Outcomes		
Loss	Complete loss of renal function for >4 weeks	
End-stage kidney disease	Need for renal replacement therapy for >3 months	

- Spektrum daha geniş
- Minör böbrek fonksyon değişiklikleri olan hastalar da kapsama alanında

Table 3. Equations for Predicting Creatinine Clearance or GFR in Adults with Kidney Disease

Equation	*Variables*	*Sources*
Cockcroft-Gault	Age, weight, sex, serum creatinine	Nephron Information Center Web site: http://www.nephron.com/cgi-bin/CGSI.cgi
Modification of Diet in Renal Disease	Age, sex, race, serum urea nitrogen, serum albumin, serum creatinine	National Kidney Disease Education Program Web site: http://www.nkdep.nih.gov/professionals/gfr_calculators/index.htm Nephron Information Center Web site: http://www.nephron.com/cgi-bin/MDRDSI.cgi

GFR = glomerular filtration rate; PDA = personal digital assistant.

Please fill in the following data

MDRD GFR Calculator (Extended Version)	
Plasma creatinine (PCR) mg/dL umol/L	
Serum Urea Nitrogen (SUN) mg/dL mmol/L	
Serum Albumin (ALB) g/dL g/L	
Age	
Race	African-American All other races
Gender	Male Female
GFR value (Age, Race, Gender SUN, PCR, ALB):	
GFR value (Age, Race, Gender SUN, PCR):	
GFR value (Age, Race, Gender PCR):	
Submit Reset	

Kolistin

- 143 hasta
  - 31 Akut böbrek yetmezliği %21
  - 14 Hasar %9

Antibiyotik dozları

- Hastaya
- İlaca bağlı faktörlere
- Renal replasman tedavisine göre bireyselleştirilmeli

- Hastanın böbrek fonksyonları dinamik
- İlaç dozları sıklıkla gözden geçirilmeli

- Böbrek yetmezliği üremi ve oligüri noktasına ilerlediği zaman renal replasman tedavisi endikasyonu
  - Diyabetli hastalarda GFR 15ml/dak
  - Diğer hastalarda GFR 10ml/dak

INVITED ARTICLE CLINICAL PRACTICE

Ellie J. C. Goldstein, Section Editor

Antibiotic Dosing in Critically Ill Adult Patients Receiving Continuous Renal Replacement Therapy

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COLISTIN

Polymyxins have recently reemerged as therapeutic options for multidrug-resistant gram-negative organisms, such as *P. aeruginosa* and *Acinetobacter* species. Colistimethate sodium is the parenteral formulation of colistin and is the product for which dosing recommendations are made. Colistin is a large cationic molecule with a molecular weight of 1750 D, and it is tightly bound to membrane lipids of cells in tissues throughout the body [52]. These 2 properties suggest that the impact of CRRT on colistin elimination is minimal. Colistin dosing should be based on the following 2 patient-specific factors: underlying renal function and ideal body weight. No clinical data exist on colistin dosing for patients receiving CRRT. On the basis of clinical experience and the pharmacokinetic properties of colistin, we recommend using colistin at a dosage of 2.5 mg/kg q48h in patients undergoing CRRT.

Received 21 January 2005; accepted 19 June 2005; electronically published 12 September 2005.

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Clinical Infectious Diseases 2005; 41:1159–66

1058-4838/2005/4108-0013$15.00

Journal of Antimicrobial Chemotherapy (2009) **64**, 929–937
doi:10.1093/jac/dkp302
Advance Access publication 25 August 2009

JAC

A systematic review of antibiotic dosing regimens for septic patients receiving continuous renal replacement therapy: do current studies supply sufficient data?

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Received 15 April 2009; returned 29 May 2009; revised 26 July 2009; accepted 27 July 2009

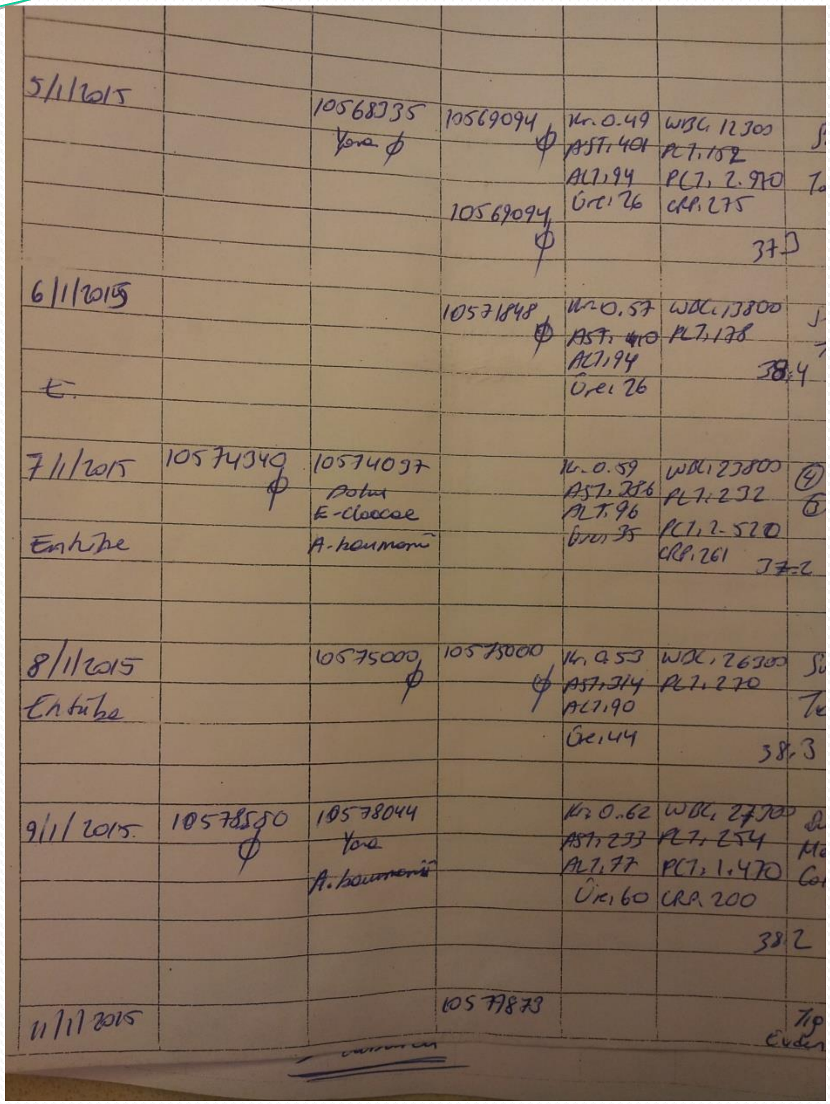
Background: Drug dosing for septic patients with acute renal failure receiving continuous renal replacement therapy (CRRT) is complicated, and failure to correctly dose may result in either drug toxicity or treatment failure and development of antibiotic resistance. The aim of this study was to establish an ideal dataset that needs to be reported when presenting pharmacokinetic data for these patients and review current literature for completeness of this dataset.

Methods: An ideal dataset was established of the parameters that should be reported when calculating a drug dosing regimen from first principles. A Medline search was performed of relevant literature producing 64 citations from which completeness of the specified criteria was examined.

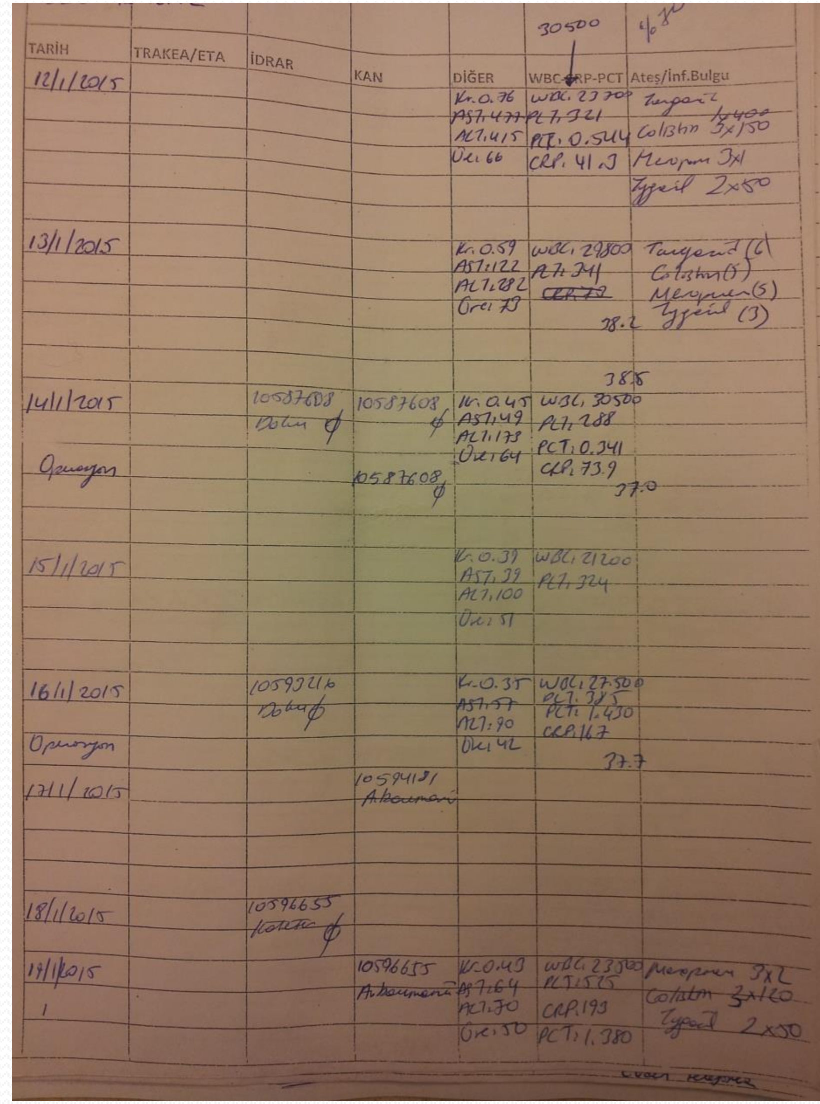
Results: None of the studies analysed presented the full dataset that we established as necessary. Of concern, basic pharmacokinetic parameters such as volume of distribution (V_d) and clearance (CL) were specified in only 79% and 81% of studies, respectively.

Conclusions: A large proportion of current studies do not report key information necessary to devise a rational dosing regimen for patients with acute renal failure receiving CRRT, and we hope this dataset will be a useful guide when reporting future pharmacokinetic data.

Keywords: antibiotics, drug dosing, pharmacokinetics, renal replacement therapy, sepsis



5/1/2015		10568335 Yara ϕ	10569094 ϕ 10569094 ϕ	Kr. 0.49 AST: 401 ALT: 94 Üre: 26	WBC: 12300 PLT: 152 PCT: 2.970 CRP: 275 37.3	S… T…
6/1/2015 E.			10571848 ϕ	Kr. 0.57 AST: 410 ALT: 94 Üre: 26	WBC: 13800 PLT: 178 38.4	J…
7/1/2015 Entübe	10574340 ϕ	10574037 Dolu E-cloacae A-baumanii		Kr. 0.59 AST: 286 ALT: 96 Üre: 35	WBC: 23800 PLT: 232 PCT: 2.520 CRP: 261 37.2	4 6
8/1/2015 Entübe		10575000 ϕ	10575000 ϕ	Kr. 0.53 AST: 314 ALT: 90 Üre: 44	WBC: 26300 PLT: 270 38.3	S… T…
9/1/2015	10578550 ϕ	10578044 Yara A. baumanii		Kr: 0.62 AST: 233 ALT: 77 Üre: 60	WBC: 27700 PLT: 254 PCT: 1.470 CRP: 200 38.2	D… Me… Co…
11/1/2015			10577873			T/p Evde…

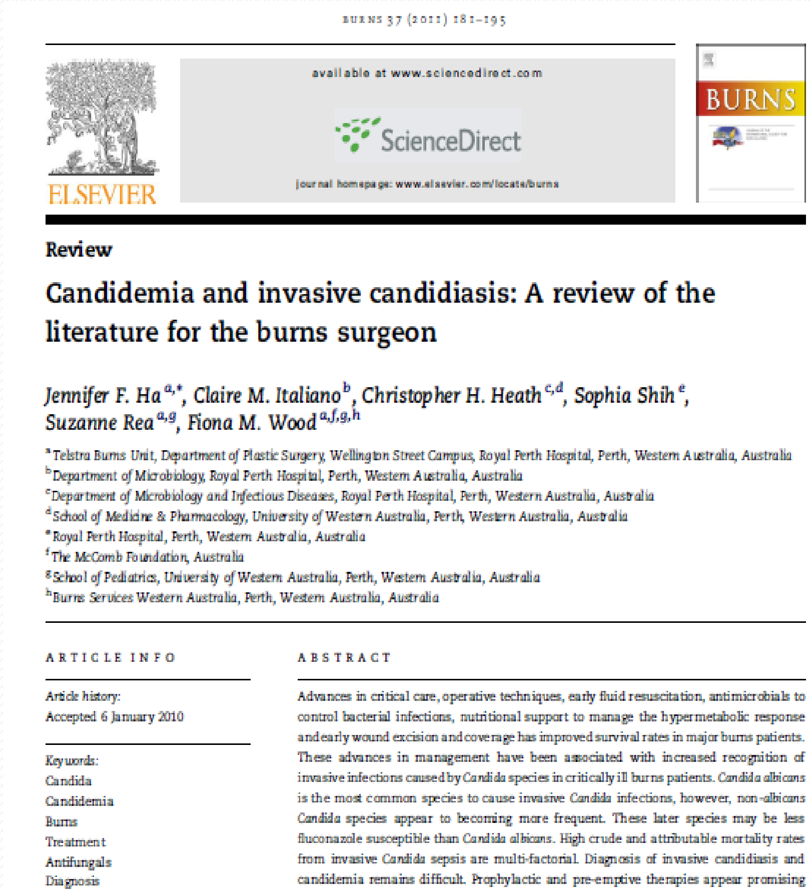


TARİH	TRAKEA/ETA	İDRAR	KAN	DİĞER	WBC-CRP-PCT	Ateş/İnf.Bulgu
					30500	%80
12/1/2015				Kr. 0.76 AST: 477 ALT: 415 Üre: 66	WBC: 23700 PLT: 321 PCT: 0.544 CRP: 41.3	Tygacil Colistin 3x150 1x400 Meropem 3x1 Tygacil 2x50
13/1/2015				Kr. 0.59 AST: 122 ALT: 282 Üre: 73	WBC: 29800 PLT: 341 ~~CRP: 73~~ 38.2	Tygacil (6) Colistin (5) Meropenem (5) Tygacil (3)
14/1/2015 Opere oldu		10587608 Dolu ϕ	10587608 ϕ 10587608 ϕ	Kr. 0.45 AST: 49 ALT: 173 Üre: 64	38.5 WBC: 30500 PLT: 288 PCT: 0.341 CRP: 73.9 37.0	
15/1/2015				Kr. 0.39 AST: 39 ALT: 100 Üre: 51	WBC: 21200 PLT: 324	
16/1/2015 Opere oldu		10593216 Dolu ϕ		Kr. 0.35 AST: 57 ALT: 90 Üre: 42	WBC: 27.500 PLT: 385 PCT: 1.430 CRP: 167 37.7	
17/1/2015			10594181 A. baumanii			
18/1/2015		10596655 Katater ϕ				
19/1/2015 1			10596655 A. baumanii	Kr. 0.49 AST: 64 ALT: 70 Üre: 50	WBC: 23500 PLT: 525 CRP: 193 PCT: 1.380	Meropenem 3x2 Colistin 3x120 Tygacil 2x50

Fungal infeksiyonlar

- En sık etken *Candida* spp.

- Yanık yüzey alanı
- Cerrahi
- Hastanede yatış süresi
- Antibiyotik kullanımı
- TPN
- Damar içi kateter
- Mesane kateteri
- Kolonizasyon
- Sepsis
- İleri yaş
- Entübasyon



BURNS 37 (2011) 181–195

available at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/burns

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Review

Candidemia and invasive candidiasis: A review of the literature for the burns surgeon

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ARTICLE INFO

Article history:
Accepted 6 January 2010

Keywords:
Candida
Candidemia
Burns
Treatment
Antifungals
Diagnosis

ABSTRACT

Advances in critical care, operative techniques, early fluid resuscitation, antimicrobials to control bacterial infections, nutritional support to manage the hypermetabolic response and early wound excision and coverage has improved survival rates in major burns patients. These advances in management have been associated with increased recognition of invasive infections caused by *Candida* species in critically ill burns patients. *Candida albicans* is the most common species to cause invasive *Candida* infections, however, non-*albicans* *Candida* species appear to becoming more frequent. These later species may be less fluconazole susceptible than *Candida albicans*. High crude and attributable mortality rates from invasive *Candida* sepsis are multi-factorial. Diagnosis of invasive candidiasis and candidemia remains difficult. Prophylactic and pre-emptive therapies appear promising

Fungemi etkenleri	Sayı
C. albicans	11
C. parapsilosis	8
C. glabrata	6
C. famata	3
C. tropicalis	3
C. lusitaniae	2
Diğer nonalbicans *Candida spp.*	4
Toplam	37

BURNS 36 (2010) 57–64

available at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/burns

Factors affecting survival in adult patients with massive burns

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ARTICLE INFO

Article history:
Accepted 6 April 2009

Keywords:
Burns-mortality
Outcome
Burns

ABSTRACT

Objective: To identify treatment-related factors associated with mortality in massively burned adult patients. *Methods:* This retrospective cohort study examined survival outcomes at a burn unit of 54 beds and 10 burn ICU beds, totaling 900 admissions per year. The cases of 102 adult patients, admitted consecutively from January 1993 to October 2007, with massive burns (burn area > 70% of the total body surface area, TBSA) were studied. Relevant variables were recorded from the initial injury and throughout the hospital course. Survival analysis, based on univariate and stepwise multivariate Cox proportional hazards regression, was performed to determine which variables predicted mortality. *Results:* The overall mortality rate was 30.4%. Burn size, severe inhalation injury, full-thickness burns, serum creatinine levels, inotropic support, platelet counts < 20,000 per mm^3, sepsis and ventilator dependency were significantly associated with mortality as determined by univariate analysis. Only sepsis, ventilator dependency and platelet counts were significant independent predictors of mortality as determined by multivariate analysis. *Conclusions:* Sepsis, ventilator dependence (indicating severe respiratory complications), and low platelet counts (indicating thrombocytopenia) are associated with increased mortality risk in adult patients with massive burns. Methods should be sought to ameliorate these complications during treatment in burn-care units.

SPECIAL REPORT

American Burn Association Consensus Conference to Define Sepsis and Infection in Burns

The American Burn Association Consensus Conference on Burn Sepsis and Infection Group; David G. Greenhalgh, MD,* Jeffrey R. Saffle, MD,† James H. Holmes, IV, MD,‡ Richard L. Gamelli, MD,§ Tina L. Palmieri, MD,* Jureta W. Horton, PhD,¶ Ronald G. Tompkins, MD,‖ Daniel L. Traber, PhD,** David W. Mozingo, MD,†† Edwin A. Deitch, MD,‡‡ Cleon W. Goodwin, MD,§§ David N. Herndon, MD,** James J. Gallagher, MD,** Art P. Sanford, MD,** James C. Jeng, MD,¶¶ David H. Ahrenholz, MD,‖‖ Alice N. Neely, PhD,*** Michael S. O'Mara, MD,* Steven E. Wolf, MD,††† Gary F. Purdue, MD,¶ Warren L. Garner, MD,‡‡‡ Charles J. Yowler, MD,§§§ Barbara A. Latenser, MD¶¶¶

Because of their extensive wounds, burn patients are chronically exposed to inflammatory mediators. Thus, burn patients, by definition, already have "systemic inflammatory response syndrome." Current definitions for sepsis and infection have many criteria (fever, tachycardia, tachypnea, leukocytosis) that are routinely found in patients with extensive burns, making these current definitions less applicable to the burn population. Experts in burn care and research, all members of the American Burn Association, were asked to review the literature and prepare a potential definition on one topic related to sepsis or infection in burn patients. On January 20, 2007, the participants met in Tucson, Arizona to develop consensus for these definitions. After review of the definitions, a summary of the proceedings was prepared. The goal of the consensus conference was to develop and publish standardized definitions for sepsis and infection-related diagnoses in the burn population. Standardized definitions will improve the capability of performing more meaningful multicenter trials among burn centers. (J Burn Care Res 2007;28:776–790)

Large burns (>20% total body surface area) lead to the most profound response to injury. Hypermetabolism developing after burn injury leads to an increase in caloric needs that may double normal resting energy expenditure. No other injury or illness approaches this degree of perturbation. As in other critical illnesses, burn patients are at high risk for infection and sepsis. The major cause of death, if the burn patient survives the first 24 hours, is multiple

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This study was supported by the American Burn Association.

Proceedings of the Consensus Conference to Define Sepsis and Infection in Burns, Loew's Ventana Canyon Resort, Tucson, Arizona, January 20, 2007.

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Yanık hastasında sepsis (Erişkin) (En az 3'ü)

- Ateş
  - >39°C veya < 36.5°C
- Progresif takipne
  - SS >25/dak
- Trombositopeni
  - <100 000/mm³
- Hiperglisemi
  - Plasma glükozu >200mg/dl
  - İnsülin direnci
- 24 saatten uzun süre enteral beslenememe
  - Abdominal distansyon
  - Enteral beslenme intoleransı
  - Kontrol edilemeyen diyare

- Kültür pozitif infeksiyon veya
- Patolojik tanı veya
- Antimikrobiyallere cevap

Special Articles

Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012

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Objective: To provide an update to the "Surviving Sepsis Campaign Guidelines for Management of Severe Sepsis and Septic Shock," last published in 2008.

Design: A consensus committee of 68 international experts representing 30 international organizations was convened. Nominal

Methods: The authors were advised to follow the principles of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system to guide assessment of quality of evidence from high (A) to very low (D) and to determine the strength of recommendations as strong (1) or weak (2). The potential draw-

Infection, documented or suspected, and some of the following:
General variables
Fever (> 38.3°C)
Hypothermia (core temperature < 36°C)
Heart rate > 90/min^{-1} or more than two SD above the normal value for age
Tachypnea
Altered mental status
Significant edema or positive fluid balance (> 20 mL/kg over 24 hr)
Hyperglycemia (plasma glucose > 140 mg/dL or 7.7 mmol/L) in the absence of diabetes
Inflammatory variables
Leukocytosis (WBC count > 12,000 µL^{-1})
Leukopenia (WBC count < 4000 µL^{-1})
Normal WBC count with greater than 10% immature forms
Plasma C-reactive protein more than two SD above the normal value
Plasma procalcitonin more than two SD above the normal value
Hemodynamic variables
Arterial hypotension (SBP < 90 mm Hg, MAP < 70 mm Hg, or an SBP decrease > 40 mm Hg in adults or less than two SD below normal for age)
Organ dysfunction variables
Arterial hypoxemia (Pao_2/Fio_2 < 300)
Acute oliguria (urine output < 0.5 mL/kg/hr for at least 2 hrs despite adequate fluid resuscitation)
Creatinine increase > 0.5 mg/dL or 44.2 µmol/L
Coagulation abnormalities (INR > 1.5 or aPTT > 60 s)
Ileus (absent bowel sounds)
Thrombocytopenia (platelet count < 100,000 µL^{-1})
Hyperbilirubinemia (plasma total bilirubin > 4 mg/dL or 70 µmol/L)
Tissue perfusion variables
Hyperlactatemia (> 1 mmol/L)
Decreased capillary refill or mottling

BURNS 37 (2011) 549–558

available at www.sciencedirect.com

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Review

Use of procalcitonin for the detection of sepsis in the critically ill burn patient: A systematic review of the literature☆

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ARTICLE INFO

Article history:
Accepted 22 April 2010

Keywords:
Procalcitonin
Sepsis
Intensive care
Burn
Diagnosis

ABSTRACT

The purpose of this systematic review was to assess the evidence for use of routine procalcitonin testing to diagnose the presence of sepsis in the burn patient. The electronic databases MEDLINE, Cochrane, CINAHL, ProQuest, and SCOPUS were searched for relevant studies using the MeSH terms burn, infection, procalcitonin, and meta-analysis. The focus of the review was the adult burn population, but other relevant studies of critically ill patients were included as data specific to the patient with burns are limited. Studies were compiled in tabular form and critically appraised for quality and level of evidence. Four meta-analyses, one review of the literature, one randomized controlled trial, nine prospective observational, and three retrospective studies were retrieved. Six of these studies were specific to the burn population, with one specific to burned children. Only one meta-analysis, one adult burn and one pediatric burn study reported no benefit of procalcitonin testing to improve diagnosis of sepsis or differentiate sepsis from non-infectious systemic inflammatory response. The collective findings of the included studies demonstrated benefit of incorporating procalcitonin assay into clinical sepsis determination. Evaluation of the burn specific studies is limited by the use of guidelines to define sepsis and inconsistent results from the burn studies. Utility of the procalcitonin assay is limited due to the lack of availability of rapid, inexpensive tests. However, it appears procalcitonin assay is a safe and beneficial addition to the clinical diagnosis of sepsis in the burn intensive care unit.

Burns. 2014 Jun;40(4):664-9. doi: 10.1016/j.burns.2013.08.024. Epub 2013 Sep 26.

Evaluation of soluble CD14 subtype (presepsin) in burn sepsis.

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Abstract

BACKGROUND: Diagnosing sepsis is difficult in burn patients because of the inflammatory mediators that alter postburn metabolic profile. Here, we compare a new marker presepsin with procalcitonin (PCT), c-reactive protein (CRP) and white blood cell (WBC) in diagnosis and follow up of sepsis in burn patients.

METHODS: Patients admitted to burn center of our institute were prospectively investigated. Presepsin, PCT, CRP and WBC levels were measured at admission and every 6h for first day and daily thereafter. At all timing samples, patients were classified as sepsis or non-sepsis according to the current American Burn Association Consensus Criteria (ABA) 2007.

RESULT: 37 adult patients were evaluated. A total data of 611 time points were supplied. Sepsis time points differ significantly from non-sepsis in presepsin ($p < 0.0001$), PCT ($p = 0.0012$) and CRP ($p < 0.0001$) levels. Non-surviving patient results differ significantly from survivors in presepsin ($p < 0.0001$), PCT ($p = 0.0210$) and CRP ($p = 0.0008$). AUC-ROC % values for diagnosing sepsis were 83.4% for presepsin, 84.7% for PCT, 81.9% for CRP and 50.8% for WBC. Sepsis patients had significantly different presepsin, CRP and WBC but not PCT levels on their first day of sepsis compared to previous days.

CONCLUSION: Plasma presepsin levels have comparable performance in burn sepsis.

Antibiyotik kullanımı

- Profilaktik antibiyotik kullanımı cerrahi profilaksi dışında önerilmez
- Kolonizasyon tedavi edilmeye kalkılmamalı
- Empirik antibiyotik kullanımı hedefe yönelik olmalı
  - Hasta ve hastane florası
  - Hastanın önceden kullandığı antibiyotikler
  - Hastanın hastanede kalma süresi
  - Hastaya ait faktörler
- Ciddi infeksiyonda antibiyotik hemen başlanmalı
- Bakterisidal antibiyotikler seçilmeli
- Farmakokinetik ve farmakodinamik parametrelere dikkat

Yanık ünitesi bulaş yolları

- Temas
  - Direkt
  - İndirekt
- Damlacık
- Hava yolu

Yanık ünitesi bulaş

- Personel
  - Eller
  - Gömlekler
    - Yataklar
    - Yatak kenarları
    - Masalar
    - Ekipman
- Yeterli dekontamine edilmemiş ekipman ve yüzeyler

Yanık ünitesi bulaş yolları

- En önemli rezervuar hasta
  - Çevre kontaminasyonu
    - Yara boyutuyla orantılı %25-30
    - Çoklu dirençli mikroorganizmalarla kolonize hastalar

  - Su veya personelin eliyle hastanın vücudundaki diğer riskli bölgelerin kolonizasyonu

Yanık ünitesi ve bulaş yolları

- Kontamine veya iyi dekontamine edilmemiş ekipman
  - Tansiyon aletleri
  - Termometre
  - Tekerlekli sandalye
  - Sedye
  - Röntgen cihazı
- Kontamine hidroterapi ekipmanı
  - Organizma koruyucu glikokaliks oluşturur
    - Borular, tahliye boruları
  - Yeterli dekontaminasyon güçlüğü
    - Yıkama masaları
    - Tanklar
- Ortak tedavi alanları

Önlem

- Tüm hasta temaslarında
  - Koruyucu gömlek
  - Steril işlemlerde maske, bone , eldiven
  - Odadan çıkmadan önce tüm koruyucu ekipmanın çıkartılmalı
- Vücutta temiz bir bölgede işlem yapılacaksa kontamine eldivenin değiştirilmeli
- Tüm ekipman ve yüzeyler kontamine kabul edilmeli

Önlem

- Bitkilere izin verilmez
- Rutin temizlik, atık yönetimi, çarşaf değişimi
- El yıkama

Yanık ünitesi

- İzole odalar
  - Laminer akım
- Bakım personeli kohortlaması
- Tüm işlemler ünitede yapılmalı
  - Yoğun bakım
  - Ameliyathane
- Personel ve ziyaretçi trafiği minimum olmalı


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BURNS 39 (2013) 1514–1525

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/burns

Review

Honey in modern wound care: A systematic review

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ARTICLE INFO

Article history:
Accepted 19 June 2013

Keywords:
Honey
Wound healing
Design
Methodology

ABSTRACT

Honey, known for centuries as a topical treatment for a wide range of wounds, has recently known a revival in modern wound care. The objective of this systematic review is to evaluate the available evidence and the role of honey in contemporary wound care. The search strategy was developed in the databases PubMed and ISI Web of Science. Fifty-five studies of any design, evaluating the use of honey in human burns, ulcers and other wounds, written in English, French, German or Dutch were eligible for inclusion. In all three wound categories honey seems to be a dressing with wound healing stimulating properties. In burns there is also evidence for its antibacterial capacity. In general, honey is also been mentioned to have deodorizing, debridement, anti-inflammatory and wound pain reducing

Journal of Medical Microbiology (2012), **61**, 662–671

DOI 10.1099/jmm.0.038638-0

Garlic ointment inhibits biofilm formation by bacterial pathogens from burn wounds

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When thermal injury damages the skin, the physical barrier protecting underlying tissues from invading micro-organisms is compromised and the host's immune system becomes supressed, facilitating colonization and infection of burn wounds with micro-organisms. Within the wound, bacteria often develop biofilms, which protect the bacteria from the immune response and enhance their resistance to antibiotics. As the prophylactic use of conventional antibiotics drives selection of drug-resistant strains, the use of novel agents to prevent biofilm formation by wound pathogens is essential. In the present study, we utilized our recently developed *in vitro* wound biofilm model to examine the antibiofilm activity of garlic (*Allium sativum*). Wound pathogens were