Yanık Hastalarında İnfeksiyonlar

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

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

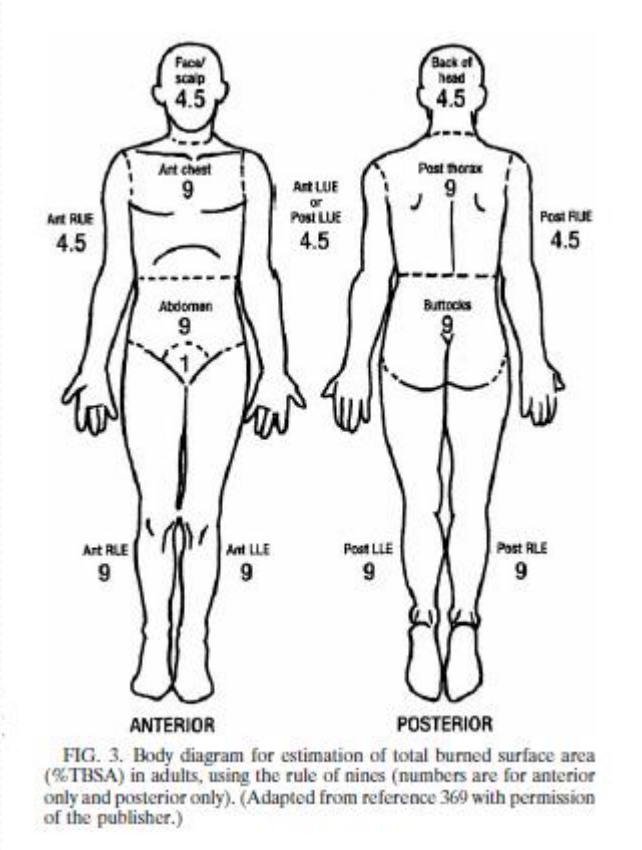


FIG. 3. Body diagram for estimation of total burned surface area (%TBSA) in adults, using the rule of nines (numbers are for anterior only and posterior only). (Adapted from reference 369 with permission of the publisher.)

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 + ...

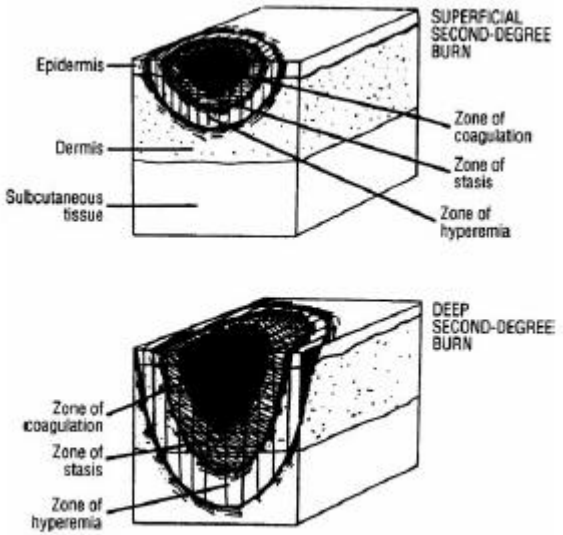


FIG. 2. Zones of injury for superficial and deep second-degree burns. (Adapted from reference 369 with permission of the publisher.)

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
- 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

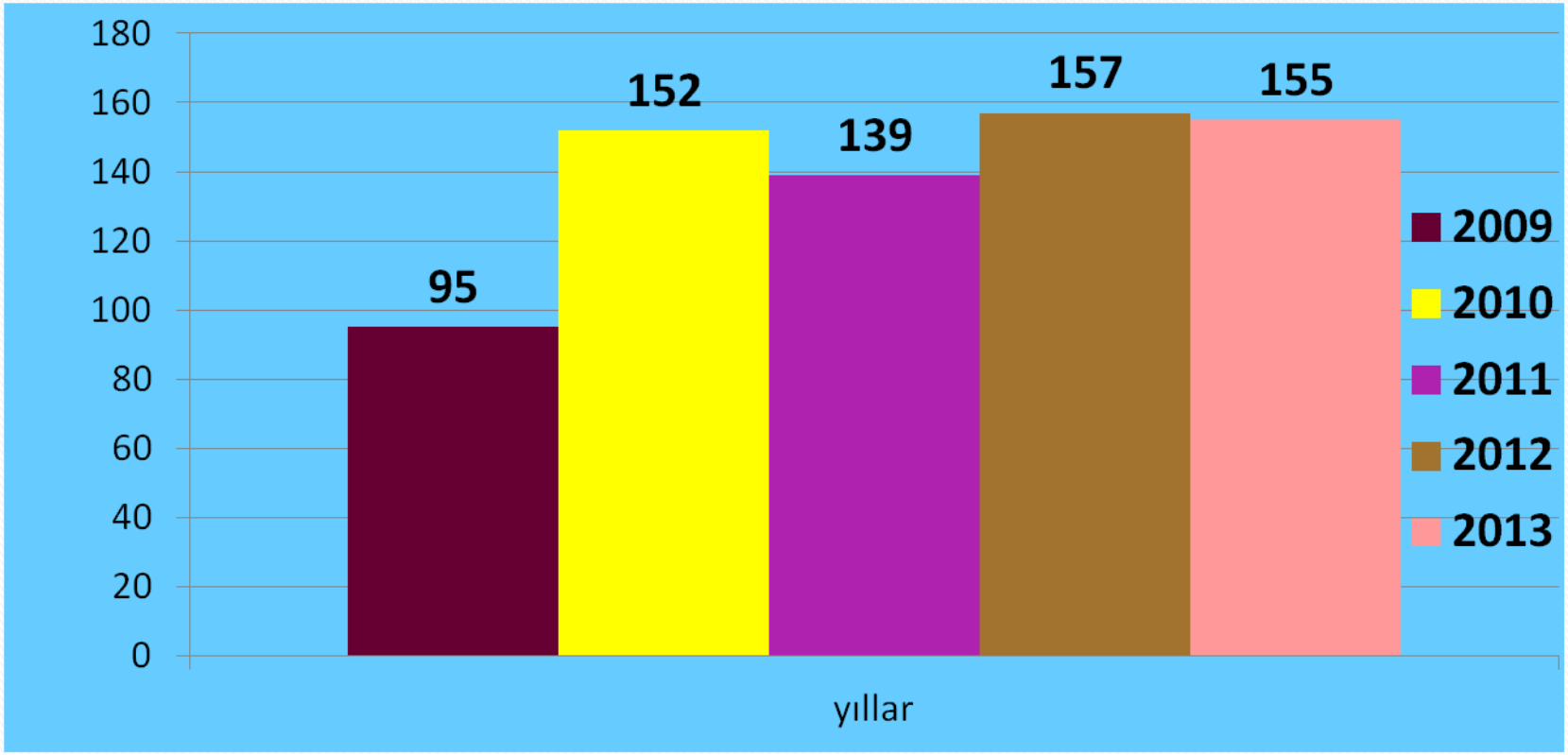
Yanık - Fizyopatoloji

- 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

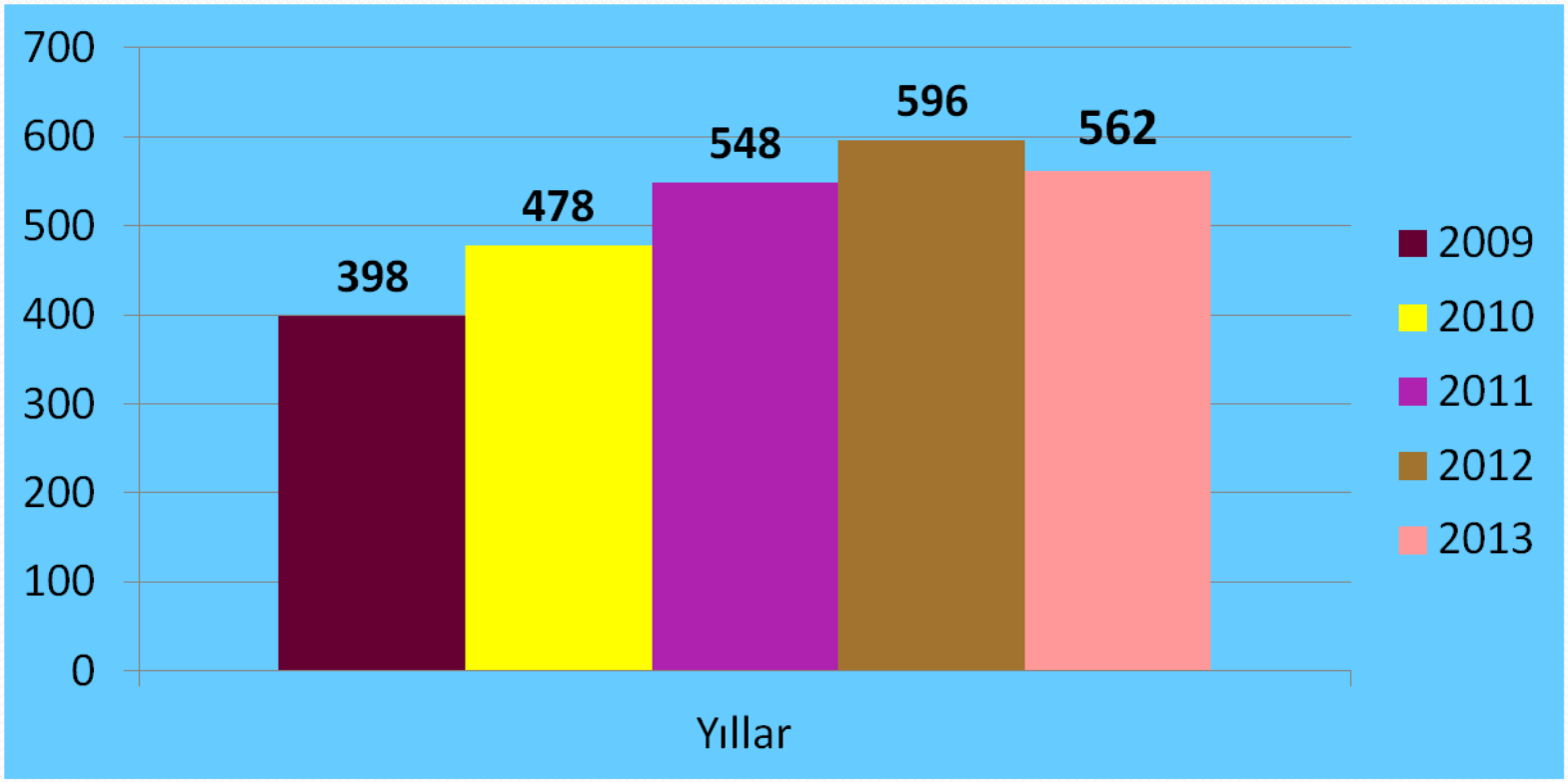
Eskar dokusu

- 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

Yanık Yoğun Bakım Ünitesine Yatan Hasta Sayıları

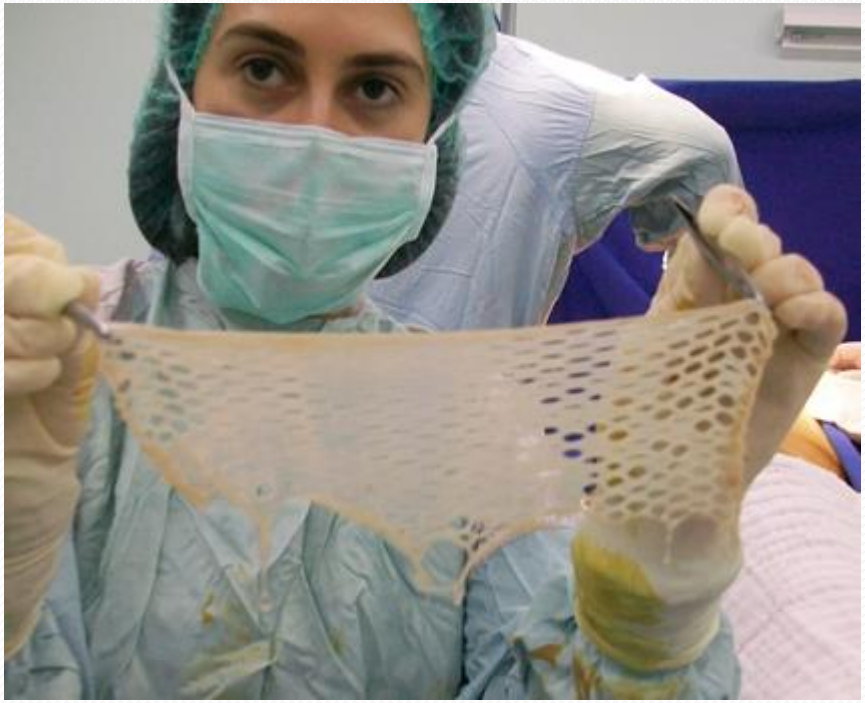


Yanık servisine yatan hasta sayıları

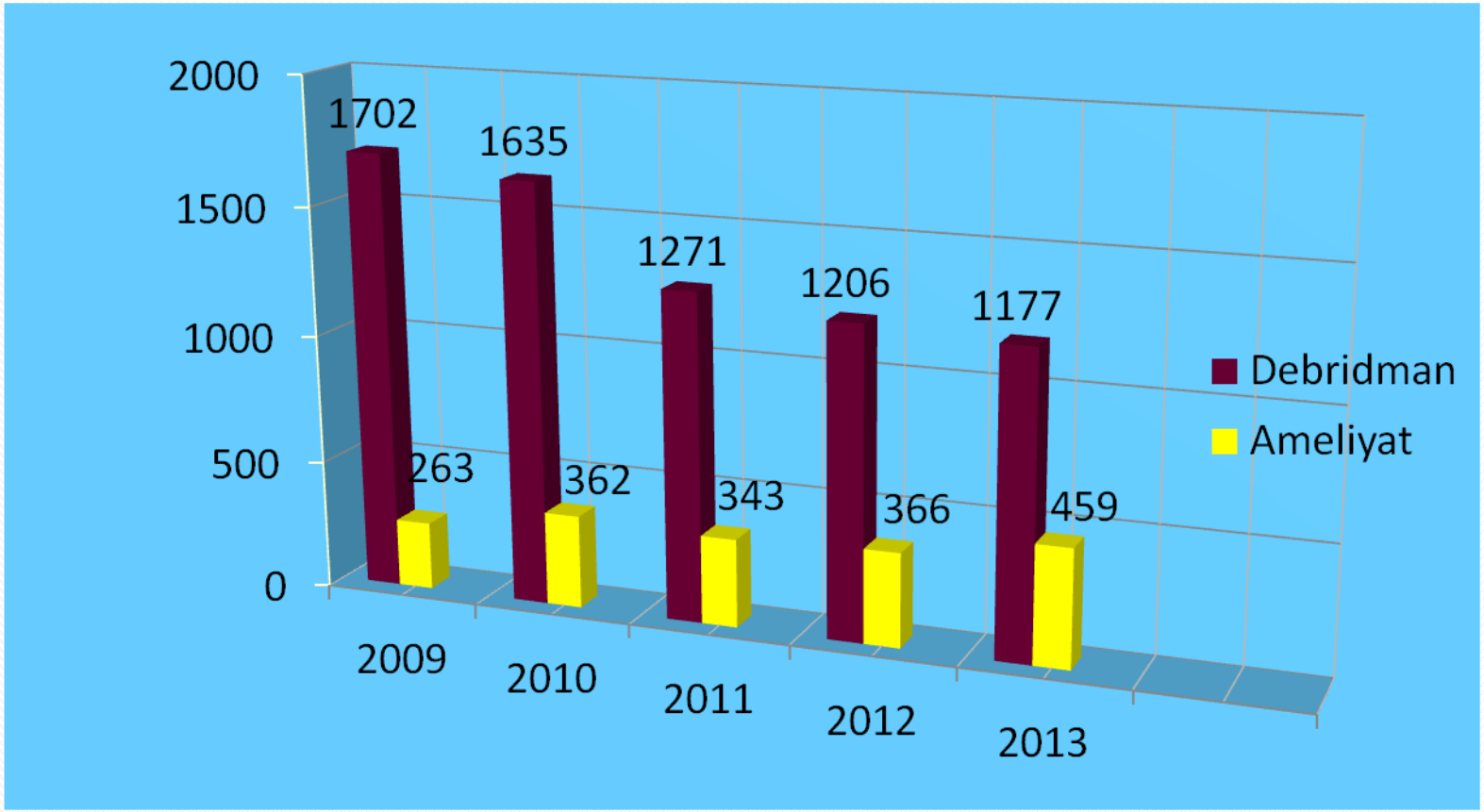


Cerrahi tedavi

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



Yapılan ameliyat ve debridman sayıları



İnfeksiyona yatkınlık

- TVYA %30 dan fazla olması
- Tam kat yanıklar
- 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

- Yara infeksiyonları
- Kan dolaşımı infeksiyonları
- Pnömoni
- Üriner sistem infeksiyonları

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

İnvazif 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.
- Virüsler
  - Orf virus
  - Herpes simplex virus
  - Cytomegalovirus
  - Varicella-zoster virus

Yara infeksiyonu

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

İnvazif 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
- Eskar altında kanama
- Eskarın kolay ayrılması

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
    - >10^5cfu/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

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 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

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

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ARTICLE INFO

Article history:
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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 carbapenems. *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.*

Prospective analysis of nosocomial infections in a Burn Care Unit, Turkey

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Received March 10, 2008

Background & objectives: **Prevention of infection in burned patients poses a great challenge as infection is the most common cause of mortality after burn injury. An analysis of burned patients, admitted and treated between January 2004 and December 2005 in a nine-bed burn unit in Turkey, was performed prospectively to identify the common pathogens and incidence of nosocomial infection in these patients.**

Methods: **Of the 182 burn cases admitted to Burn Care Unit during the study period, 169 met the inclusion criteria. Information related to nosocomial infection (NI) was collected. Samples were collected for culture and microorganisms isolated were tested for antimicrobial sensitivity.**

Results: **Of the 169 burn patients, 127 acquired 166 nosocomial infection (NI) (15.7% pneumonia, 56.0% burn wound infection, 8.4% urinary tract infection and 19.9% blood stream infection) with an overall NI rate of 18.2 per 1000 patient-days. The mean age (38 ± 21 yr), the mean length of hospitalization (45.06 ± 11.67 days) and the total burned surface area (TBSA) (34.58 ± 18.46%) of the patients with NI were higher than those of the patients with non NI (23 ± 17 yr), (16.38 ± 11.14 days) and (12.44± 8.69%) (*P*=0.03, *P*=0.001, *P*=0.01) respectively. By multiple logistic regression analysis, TBSA co-morbidities, broad spectrum antibiotic usage and invasive devices usage were significantly related to acquisition of NI. *Pseudomonas aeruginosa* (57%), *Acinetobacter baumannii* (21%) and *Staphylococcus aureus* (14%) were the most common resistant organisms isolated.**

Interpretation & conclusion: **Our findings emphasize the need for careful disinfection and more strict infection control procedures in areas that serve immunosupressed individuals, such as burn patients.**

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International Journal of Medical Sciences

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Research Paper

Three-year Review of Bacteriological Profile and Antibiogram of Burn Wound Isolates in Van, Turkey

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Abstract

The risk of infection in burns is well-known. In recent decades, the antimicrobial resistance of bacteria isolated from burn patients has increased. For this reason, a retrospective study was conducted at Van Training and Research Hospital to analyze the bacterial isolates from the wounds of patients admitted to the Burn Unit and to determine the susceptibility patterns of the commonly cultured organisms over a 3-year period, January 2009 to December 2011.

A total of 250 microorganisms were isolated from burn wounds of 179 patients. Our results revealed that the most frequent isolate was Acinetobacter baumannii (23.6%), Pseudomonas aeruginosa (12%), Staphylococcus aureus (11.2%), Escherichia coli (10%) respectively. Multidrug-resistance has emerged as an important concern in our burn unit. Tigecycline, and colistin were found to be the most active drugs against Acinetobacter baumannii. Carbapenems and amikacin, were found to be the most active drugs against other gram negative bacteria. Vancomycin and linezolid were active against gram positive bacteria.

Aggressive infection control measures should be applied to limit the emergence and spread of multidrug-resistant pathogens.

Key words: antibiotic, burns, resistance, wounds.

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

Review

Colistin in burn intensive care: Back to the future?

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Keywords:
Colistin
Literature trends
Redevelopment

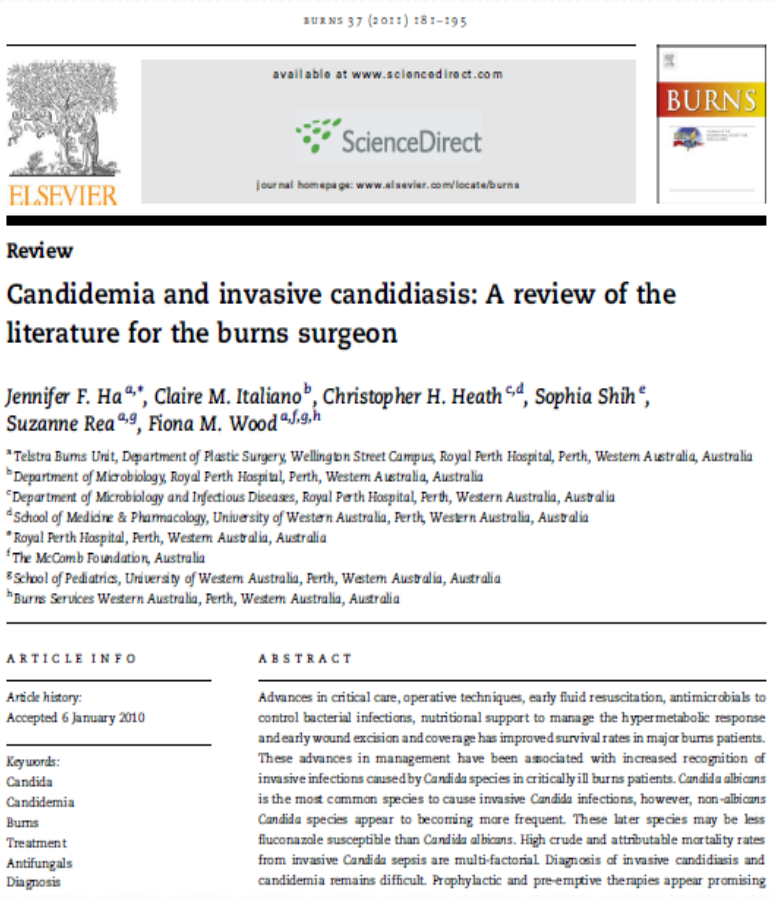
ABSTRACT

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.

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



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

ELSEVIER

BURNS

Review

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

Jennifer F. Ha [a,*], *Claire M. Italiano* [b], *Christopher H. Heath* [c,d], *Sophia Shih* [e], *Suzanne Rea* [a,g], *Fiona M. Wood* [a,f,g,h]

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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

Mortalite ABA verileri

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

	Lived	Died	
%TBSA	Cases	Cases	Mortality Rate
0.1 - 9.9	89,884	566	0.6
10 - 19.9	21,986	634	2.8
20 - 29.9	6,516	627	8.8
30 - 39.9	2,774	543	16.4
40 - 49.9	1,362	465	25.5
50 - 59.9	729	418	36.4
60 - 69.9	479	366	43.3
70 - 79.9	237	323	57.7
80 - 89.9	126	364	74.3
> 90	103	495	82.8
Subtotal	**124,196**	**4,801**	**3.7**
Missing or 0%	33,189	1,585	4.6
TOTAL	**157,385**	**6,386**	**3.9**

Total N=163,771

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ScienceDirect

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

Factors affecting survival in adult patients with massive burns

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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.

SIRS

- Ateş >38°C veya < 36°C
- Kalp atım sayısı >90/dak
- Solunum sayısı >20/dak veya $PaCO_2$ <32mmHg
- Lökosit sayısı >12 000/mm^3 veya <4 000/mm^3 veya >%10 bant varlığı

Yanık hastası

- Normal stres yanıtı
  - Hipermetabolizma
    - Takikardi
    - Takipne
- Sürecin ağırlığını yansıtmayabilir
- SIRS varlığında infeksiyon olmayabilir, infeksiyon varlığında SIRS olmayabilir

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

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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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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.

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

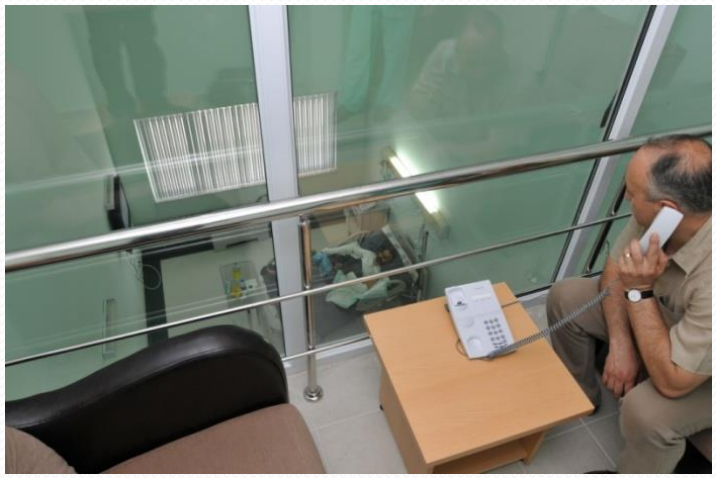
- Tüm hasta temaslarında
  - Koruyucu gömlek
  - Steril işlemlerde maske, bone , eldiven
  - Odadan çıkmadan önce tüm koruyucu ekipmanın çıkartılmalı
- Vücutta temiz bir bölgede işlem yapılacaksa kontamine eldivenin değiştirilmeli
- Tüm ekipman ve yüzeyler kontamine kabul edilmeli

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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Review

Honey in modern wound care: A systematic review

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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

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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