Prevention of infection in patients with burns

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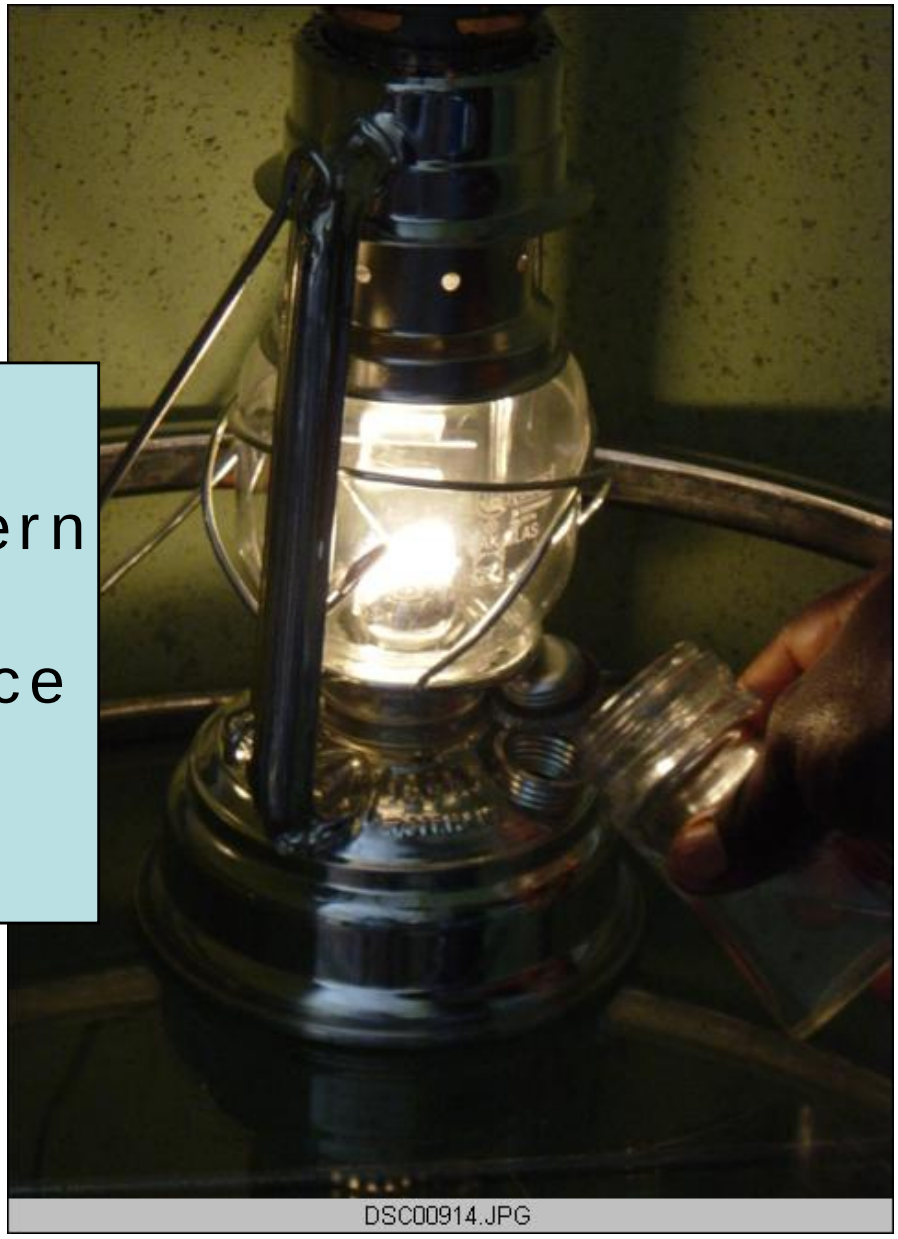
Burns: definition

- An area of coagulative necrosis usually due to

Burn injury: aetiology

- ✓Dry heat
- ✓Moist heat (scald)
- ✓Chemical
- ✓Electricity
- ✓Friction
- ✓Radiation: ultraviolet, Xray
- ✓Others (abroad):
  - cold

Careless lantern refill is a very common source of burning



Study	Number studied	Male: female ratio	Mean TBSA	Mortality	LA50 value
Mungadi, (Sokoto) 2002	108 children	1.6:1		6.5%	
Mzezewa, (Harare)	451	46:54	13% (median)	22%	
El-Badawy, (Cairo) 1998	305 children		87% had minor burns	4.3%	
Kalayi, (Zaria) 1996	84 children			27.4%	
Olabanji, (Ile-Ife) 2003	474	1.75:1	25.4	21.8%	
Adigun, (Ibadan) 2004	164	2:1	36	36%	68%
Sowemimo, (Lagos)					63%
Iregbulem (Enugu), 1993	644			9.87	

Study	Number studied	Male: female ratio	Mean TBSA	Mortality	LA50 value
Tokyo (Japan) 1983-2003	6401 (25% above 60yr)	63:37	18.8%	15.4%	53
Birmingham 1989-1998					54 (for 30yr old) 59 (for 15 year old)
Singapore 1997-2003	2019	2.2:1	11.5%	4.6%	

Pre-test

Rate of epithelialisation increases if: (answer True or False)

1. the wound requires debridement
2. the basal lamina is intact
3. the wound is kept moist.
4. the wound is managed by exposure
5. there is clinical colonization

Pre-test

Recommended for cleaning a clean wound before applying dressings

6. Normal saline
7. Potable water
8. Chlorhexidine gluconate 0.015 - 0.05% w/v
9. Povidone-iodine 10%
10. Cetrimide 0.15%

Post-test

T (True) or F (False) about burns

11. A non-healing wound is suggestive of a superficial infection in the wound.

12. Burn wound is initially colonized predominantly with gram-negative organisms.

13. Pass a urethral catheter using conform gloves early in management.

14. A urethral catheter when passed today should be changed next week.

15. Whenever possible, cannulas should be placed through unburned skin.

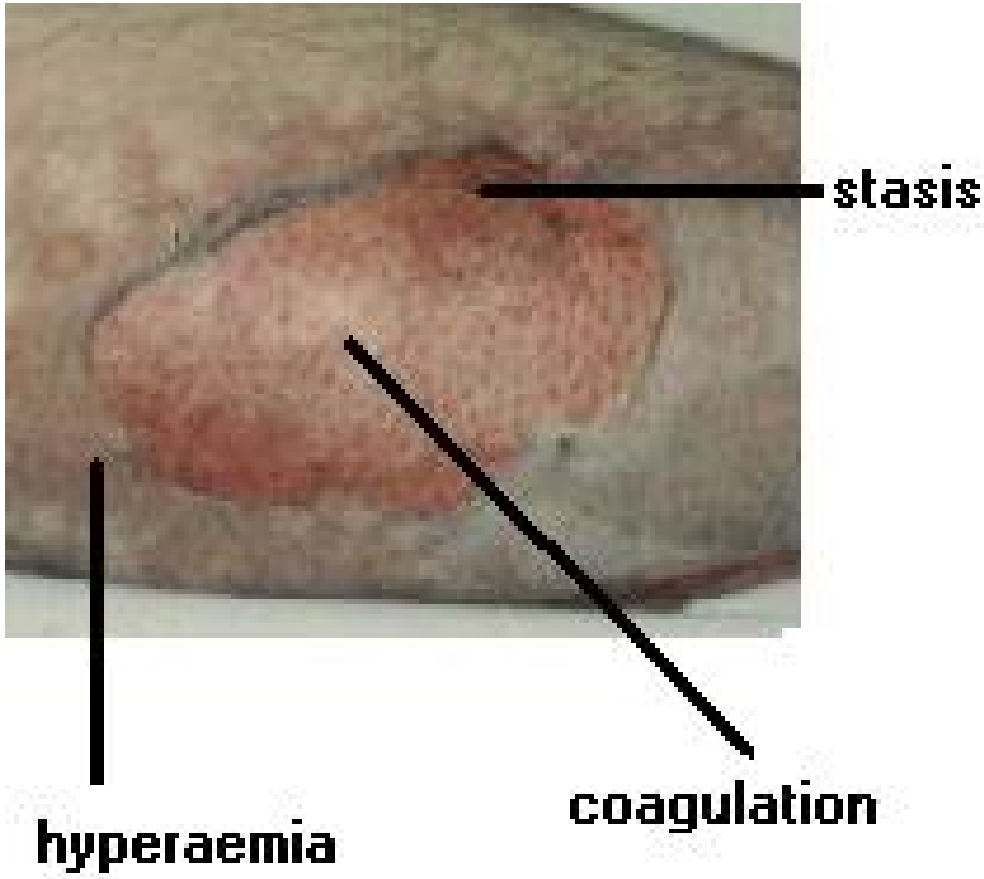
Mediators of the burn response:

- Cytokines
- Oxygen radicals
- Arachidonic acid metabolites
- Endotoxins

- Cathecholamines
- Aldosterone
- Growth hormone
- Antidiuretic hormone
- 5HT
- Histamine
- Thyroxin
- Adrenocortical steroids
- Glucagon
- Insulin

Skin:

- Coagulative necrosis
- Disruption of basement membrane
- Blistering
- Vascular changes
- 3 zones (Jackson):
  - coagulation
  - stasis
  - hyperaemia



- Cardiovascular
- Renal
- Gastro-intestinal
- Respiratory
- Neuro-endocrine

Action committee on organization of burn care

Individual care	1 patient
Burn service	2-10 patients
Burn unit	11-18 patients
Burn centre	19-26 patients
Extended burn centre	19-26 patients plus all the supporting structure necessary for study and research

Admission:

- Burns: >10-15% BSA
- Inhalation injury
- Burns affecting hands, feet, face, perineum, joint surfaces
- Electrical burn
- Associated injuries

Table 1.1 Classification of burns

Type of burn	Blistering	Appearance	Pinprick test
Superficial dermal	Present	Bright red	Sensitive to pain
Deep dermal	Blisters are broken	Creamy coloured/ mottled	Dullness to pain, sensitive to touch
Full thickness	Absent	Grey/white or brown	No sensation

Full thickness burn

Fluid resuscitation:

- Burns ≥ 10% BSA in children
- Burns ≥ 15% BSA in adults
- Inhalation injury
- Other associated injuries

Parkland formula

- Weight (kg) X % body burn X 4

  given in 1st 24 hours

  monitored by clinical appearance,

  urine output

Treatment of partial thickness burn

- Change dressing 5 days after or as necessary
- Wound heals in 14 days

Treatment by exposure

- Areas that are difficult to dress: face, genitalia and perineum
- Minimally discharging wound
- To allow for frequent monitoring: finger tips
- To allow for joint movement (polythene bag on the hand)

Modified exposure

plastic bag dressing.jpg

Treatment of full thickness burn wound

Years ago

- Burn wounds were allowed to separate by means of human and bacterial collagenases.

- Patients who survived sepsis, pain, and misery were subsequently subjected to autografting over granulating tissue.

Today

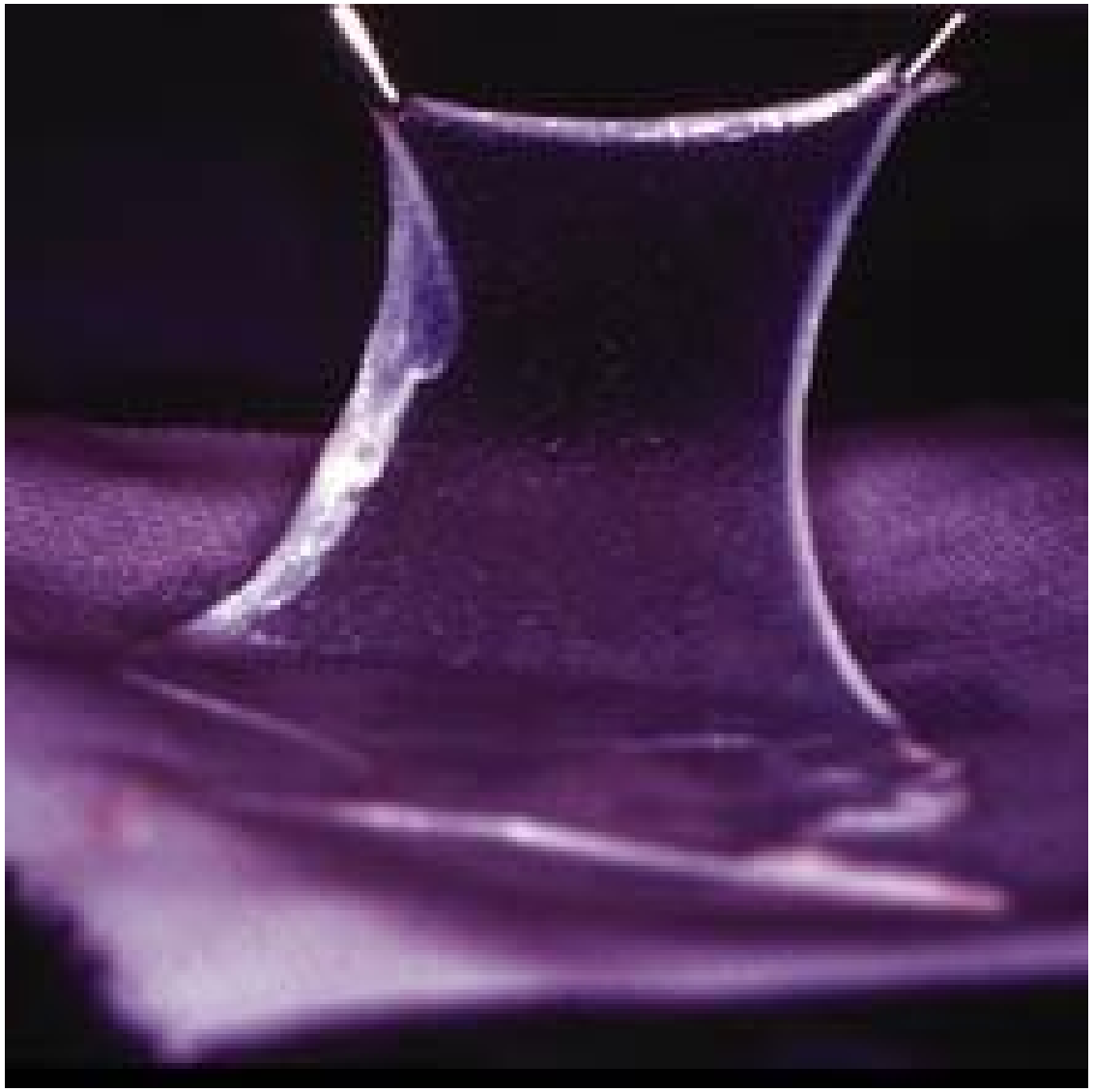
- Early tangential or fascial excision makes it possible to remove all dead tissue.
- Coverage of the burn wound with stored homologous human skin prevent infection, improve survival, and modulate the hypermetabolic response.
- Permanent coverage with cultured autologous skin or widely meshed skin graft.

Burn Surgery: Tangential Excision and Skin Grafting

Burn wound excision

Harvesting a partial thickness skin graft from the thigh

A SHEET OF CULTURED KERATINOCYTES READY FOR CLINICAL APPLICATION



Other aspects of management of acute burn injury:

- Initial investigation
- Anaelgesic, antitetanus, antibiotics
- Antiulcer drugs, anticoagulants.

Management in the subacute phase

- Blood transfussion
- Treatment of fever
- Treatment of psychiatric manifestations
- Physiotherapy
- Nutrition

Sources of organisms

- Endogenous (patient's own normal flora)
- Exogenous (environmental or from health care personnel).

Organisms associated with infection in burn patients

- Gram-positive
- Gram-negative
- Anaerobes
- Yeasts
- Molds
- Viruses
- Distribution of organisms changes over time in individual patients

Organisms associated with infection in burn patients

- Wound initially colonized predominantly with gram-positive organisms
- Rapidly replaced by antibiotic-susceptible gram-negative organisms usually within a week of the burn injury.
- If wound closure is delayed and the patient becomes colonized and requires treatment with broad-spectrum antibiotics, these organisms may be replaced by yeast, fungi and antibiotic-resistant bacteria

Organisms of particular concern

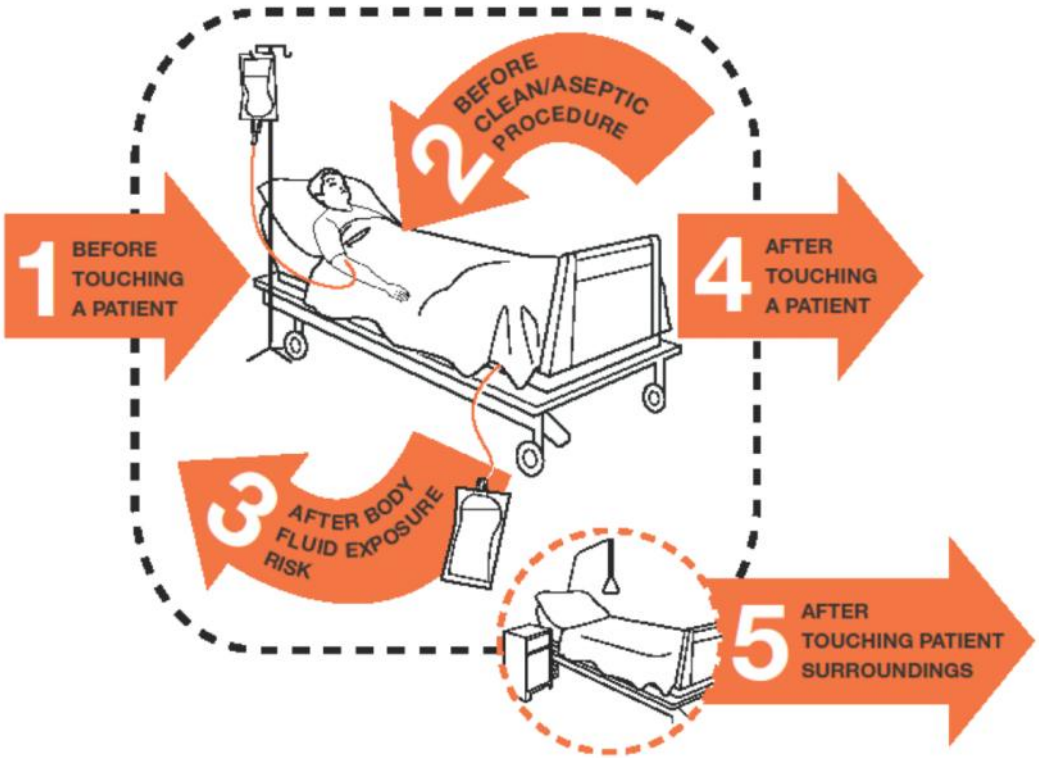
- Methicillin-resistant Staphylococcus aureus (MRSA)
- Enterococci
- Group A b-hemolytic streptococcus
- Gram-negative rods such as Pseudomonas aeruginosa and Escherichia coli

Modes of transmission

- Contact
- Droplet
- Airborne.
- Primary mode is direct or indirect contact:
- By the hands and gowns of personnel caring for the patient or
- from contact with inappropriately decontaminated equipment.

- Beds
- Side rails
- Tables
- All equipment used on the patient (blood pressure cuffs, thermometers, wheelchairs, IV pumps)

Your 5 Moments for Hand Hygiene



1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient when approaching him/her.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after an exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
5	AFTER TOUCHING PATIENT SURROUNDINGS	WHEN?	Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.

Hand Hygiene Technique with Soap and Water

Duration of the entire procedure: 40-60 seconds


How to handrub
Hand Hygiene Technique with Alcohol-Based Formulation
Duration of the entire procedure: 20-30 seconds
1a
1b
2
Apply a palmful of the product in a cupped hand, covering all surfaces;
Rub hands palm to palm;
3
4
5
Right palm over left dorsum with interlaced fingers and vice versa;
Palm to palm with fingers interlaced;
Backs of fingers to opposing palms with fingers interlocked;
6
7
8
Rotational rubbing of left thumb
Rotational rubbing, backwards and
Once dry, your hands are safe.
01/09/2011 1

Other sources

- Contaminated hydrotherapy equipment
- Common treatment areas
- Contaminated equipment, such as mattresses

Infection control protocols:

- Surveillance cultures as needed
- Cohort patient care teams
- Strict enforcement of patient and staff hygiene
- Alcohol-based hand washing product dispensers throughout the burn unit
- Patient isolation
- Monitoring of antibiotic use and monitoring antibiotic-susceptibility results.

Prevention of burn wound infection

- involves assessment of the wound at each dressing change for changes in the character, odor or amount of wound drainage.

- Strict aseptic technique should be used when handling the open wound and dressing materials and frequency of dressing should be based on wound condition.

- If the wound has necrotic material present, a debriding dressing should be chosen, whereas a protective dressing is preferable for clean healing wounds.

Prevention of burn wound infection

- Treatment of an existing wound infection includes considering changes to the topical agent being used along with changing the frequency of the dressing changes.

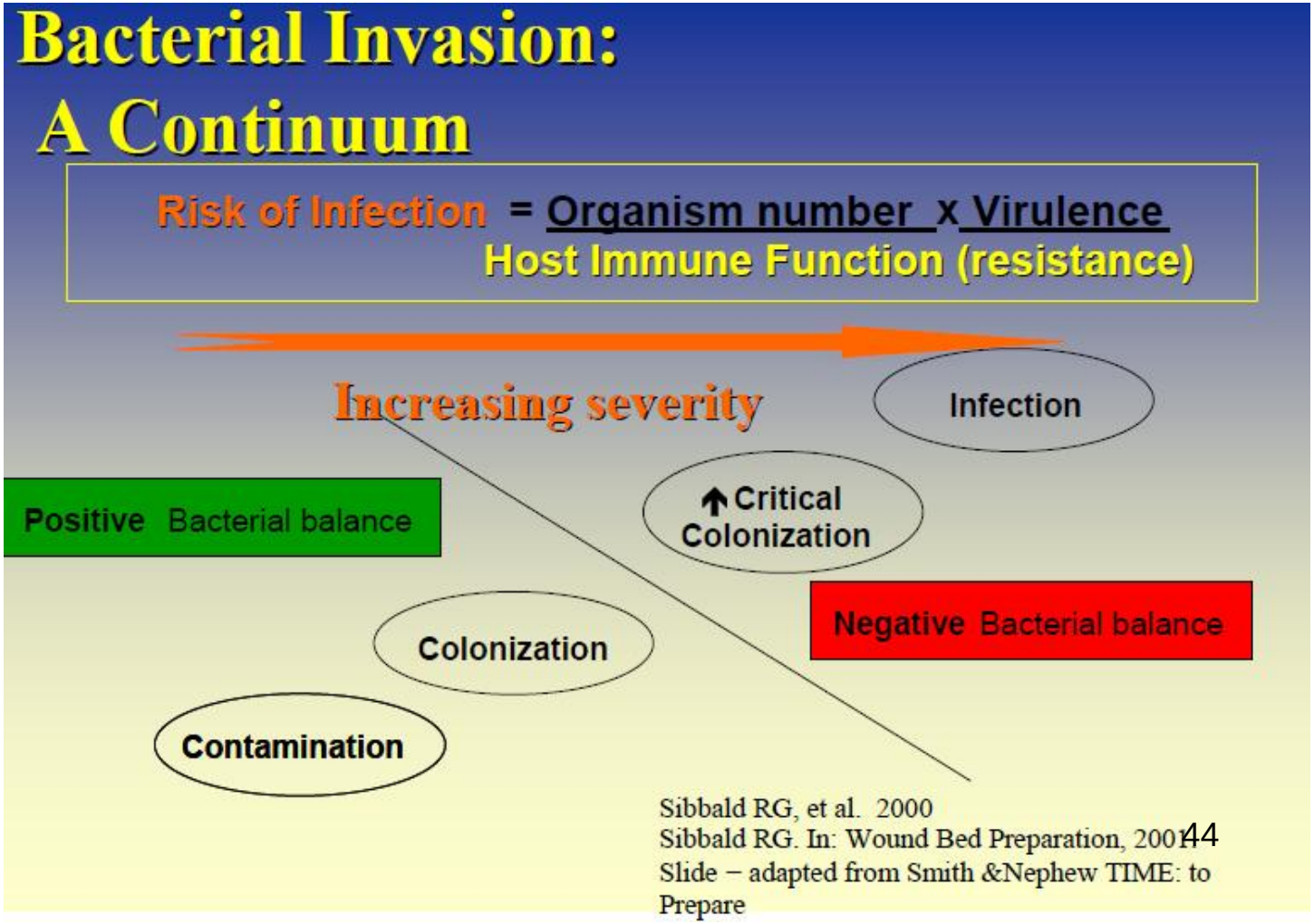
- In cases where invasive infection is present, surgical debridement of the infected wound and appropriate systemic antimicrobial therapy may be required

Prevention of bloodstream infection

- Appropriate care of the burn wound, to minimize the extent of haematogenous seeding
-
- Appropriate handling of intravascular devices. Whenever possible, cannulas should be placed through unburned skin, preferably at a sufficient distance from the wound to prevent contamination of the insertion site.

- Frequent change of the catheter may be required.

INFECTION
INFLAMMATION



Diagnosis of infection

NERDS

- Nonhealing
- Exudative
- Red and bleeding surface
- Debris (yellow or black necrotic tissue)
- Smell or unpleasant odor

STONES

- Size is bigger
- Temperature increased
- Os [probe to or exposed bone]
- New or satellite areas of breakdown
- Exudate, erythema, edema
- Smell.

Investigation of a burn patient with fever

- Wound swab
- Wound biopsy
- Throat swab
- Urine M/C/S
- Blood culture
- Full Blood Count
- Blood film for malaria parasites

Treatment of infection

- Antibiotics
- Topical antiseptics
- Debridement
- Escharectomy
- Dressings
- Skin graft
- Nutrition

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Test answers

1. F
2. T
3. T
4. F
5. F
6. T
7. T
8. F
9. F
10. F
11. T
12. F
13. F
14. F
15. T