

# Intertriginous Dermatitis and Common Microorganisms

## Moisture and Skin Fold Management

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## Intertriginous Dermatitis

### Definition

- Intertriginous dermatitis (ITD) is inflammatory skin condition of opposing skin folds<sup>1</sup>
- A form of dermatitis from noncaustic body fluid (sweat) vs. caustic fluids (urine and stool)<sup>2</sup>

1 - Arndt K, Bowers K. *Manual of Dermatologic Therapeutics*. 6th ed. 2002. 1 - Jarringer CK et al. *Am Fam Physician*. 2005; 2 - Black

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## Epidemiology



Skin moisture is common in patients in the ICU

1. McMahon R. *Nurs Times*. 1991.  
2. Brown et al. *Nurs Stand*. 2004.

- 11.2% of 1116 women reported inflammatory ITD<sup>1</sup>
- 63% of 100 obese patients<sup>2</sup>
- Unknown in hospitalized patients

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### Anatomy and physiology of perspiration

- Sweat gland found in dermis
- Controlled by nerve from sympathetic nervous system (fight or flight)
- Body temperature regulation
- Profuse sweating leads to water and sodium loss

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### Etiology of skin damage

- Moisture from sweat is trapped in the skin fold
  - Normally, skin fold is dry due to body movement and air flow
  - Obese patients sweat excessively due to large body mass and relatively small skin surface to convect heat
- Excess moisture is absorbed by the keratinocytes
- Cells become boggy and do not glide easily
- Small open areas develop

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### Pathophysiology of ITD

- Obesity alters skin barrier function
  - Increased transepidermal water loss and erythema
  - Increased sweat gland activity
- Bacteria harbored in the sweat and oil gland
- Decreased blood flow in adipose tissue
- Skin pH increased in inguinal skin folds in obese women
- Diabetes, steroid use and broad spectrum antibiotics also contribute to ITD

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## Complications of ITD

- Candidiasis?
- Cellulitis
- Wound infection
- Surgical site infection?
- Odor/embarassment
- Pain

Janniger CK et al. *Am Fam Physician*. 2006.

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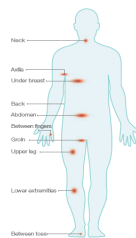
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## What's in that skin fold?

Organisms other than *Candida albicans* were cultured<sup>1</sup>

### Axilla

*Proteus mirabilis*  
*Enterococcus faecalis*  
*Staphylococcus coag. neg.*  
*Candida albicans*  
VRE



### Breast

*Proteus mirabilis*  
*Staphylococcus coag. neg.*  
Diphtheroids

### Groin

*Staphylococcus coag. neg.*  
*Candida albicans*  
Diphtheroids  
*Proteus mirabilis*  
*Enterococcus faecalis*

### Knee

*Proteus mirabilis*  
*Staphylococcus coag. neg.*

### Pannus

*Staphylococcus coag. neg.*  
*Proteus mirabilis*  
*Enterococcus faecalis*  
*Candida albicans*  
*Escherichia coli*

Identification of organisms colonized at sites of intertriginous dermatitis in hospitalized patients, preliminary results. J Black, K Edwards, J Cuddigan, T Heckmann, L McMullen.

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## Additional findings

- No relationship found between:
- Type or quantity of microorganism cultured
- Location
- Severity of the erythema
- Odor
- Skin temperature

1. Black, Edwards, Cuddigan, 2008.

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## HAI's are a major public health concern in the U.S.

- CDC estimates 1.7 million people develop HAI's yearly
- Patients who experience HAI's:
  - Longer hospital stays
  - Utilize more healthcare resources
  - Greater risk for readmission & death

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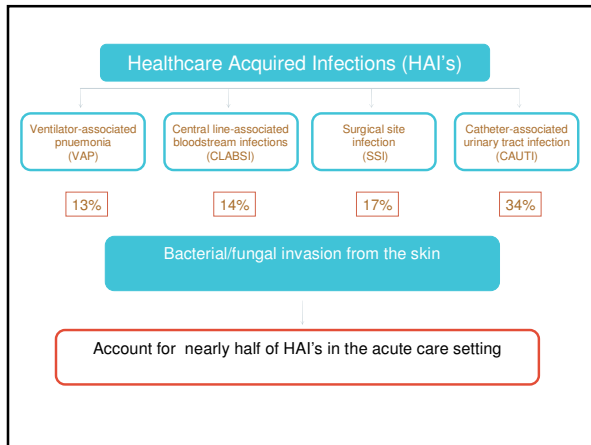
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## Skin is implicated as a source of infection.

- Naturally occurring microorganisms on the skin's surface can enter:
  - Incision site
  - Bloodstream



The number one cause of bloodstream & SSI's

**Could skin fold contamination be contaminating our surgical sites?**

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## Skin folds and surgical sites

### Risk factors for surgical site infections (SSI)

- Chronic inflammation
- Obesity
- Organism overgrowth

### Organisms common to surgical site infections and skin folds

- *Staphylococcus* – 19%
- *Staphylococcus coagulase negative* – 14%
- *Enterococcus sp.* – 12%
- *Escherichia coli* – 8%
- *Pseudomonas aeruginosa* – 8%



Surgical Site Infections, Division of Critical Care and Trauma, Department of Surgery P713A, Weill Medical College of Cornell University, Surgical Clinics of North America, 83 (2009), Pg. 1115-1135.

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## Surgical procedures involving skin folds



Bariatric surgery

Cesarean section

Femoropopliteal bypass

Photos:  
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Babbitt & Son, Wrentham, MA, USA  
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## The first effective solution for skin fold management

- Textile designed to:
  - Wick fluid/sweat to a dry area on the fabric
  - Called translocation
- Silver impregnated fabric to control bacterial and Candidal overgrowth
- Designed to be placed in skin fold with 1 inch exposed fabric for "wicking"
- Designed to be worn for 5 days

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## Inhibition of growth with moisture wicking Ag-textile

Microbes recovered from body sites diagnosed with Intertrigo:	Inhibition in Kirby-Bauer Assay (mm)
Staphylococcus epidermidis (coagulase neg)	7
Proteus mirabilis	2
Diphtheroid (Corynebacterium xerosis)	3
Enterococcus sp (VRE)	3
Escherichia coli	2
Streptococcus sp.	5
Acinetobacter baumannii	3
<b>Other microbes possibly associated with Intertrigo:</b>	
Staphylococcus aureus (MRSA)	2
Pseudomonas aeruginosa	6
Klebsiella pneumoniae	4

1.Black Edwards, Cuddigan,2008.

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## Traditional methods

Ineffective, taking months to improve



Photos © Kenneth Brann, Queen's College/Corbis/Outright/Corbis

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## Skin fold management

- **Control hyperhidrosis**
  - Keep skin folds dry
  - Gently dry skin folds after bathing
- **Avoid using:**
  - Antiperspirants
  - Bed linens, shop towels, paper towels, baby blankets
  - Individual dressings ... can get lost in deep skin folds




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## Prevention and Management of Intertriginous Dermatitis



1. Multi-site feasibility study using a new textile with silver for management of skin conditions located in skin folds. D Smith, et al.  
2. Evaluation of a skin fold management textile with antimicrobial silver complex in a variety of clinical situations. E Vorbeck.

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## Identification of high risk patients

- Consider normal folds of tissue as “skin folds” when at bedrest
  - Redundant tissue in breast
  - Groin
- Consider skin beneath braces and splints as “skin folds”
  - The devices keeps the sweat from evaporating
- Consider the toe web space in patients with diabetes a skin fold

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## Inspecting skin folds

- Skin fold complications frequently overlooked
- Target at-risk areas
  - Posterior neck
  - Axilla (under the arm)
  - Breasts
  - Back folds
  - Abdomen
  - Perineal area
  - Thighs
  - Lower extremities
  - Between fingers and toes
  - **Surgical incision sites**
- Get help to assess all of the skin folds



Complications: cutaneous infection, cellulitis and sepsis

Photo © Elsevier Health Sciences. © 2007. Copyright © Elsevier. All rights reserved.

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## Treatment of Intertriginous Dermatitis

- **Actions**

1. Cleanse skin fold gently
2. Apply textile to wick moisture from skin fold



Photos Courtesy of Dr. Joyce Black

Topical antifungal application may not solve the problem

- **Organisms other than *Candida albicans* were cultured**

Bed linens do not wick the sweat from the skin fold

- **Over 50% of organisms cultured from were pathogenic**

1. Black, Edwards, Cuddigan, 2008.

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## Case study



**Symptoms**

- Erythema
- Odor
- Satellite lesions
- Maceration
- Itching/burning

**Treatment**

- Antifungal ointment

Multi-site feasibility study using a new textile with silver for management of skin conditions located in skin folds. D Smith, K Kennedy-Evans, B Viggiano, T Henn.



**Symptoms**

- All symptoms 100% resolved
- Rash resolved in 5 days

**Solution**

- Silver wicking textile

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## Case study



**Symptoms**

- Erythema
- Satellite lesions
- Maceration
- Itching/burning

**Treatment**

- Diflucan® and Nystatin

Evaluation of a skin fold management textile with antimicrobial silver complex in a variety of clinical situations. E Vorbeck, ISJ Clinic, Mayo Health System, Minneapolis, MN. Photo: E Vorbeck.



**Symptoms**

- All symptoms 100% resolved
- Rash completely resolved

**Solution**

- Silver wicking textile

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### Case study



- 60-year-old female-right sided mastectomy
- Erythema, denudement at right axillary fold
- Complaints of pain, odor and drainage
- Condition present x2 weeks
- Prior treatment: Nystatin powder

No resolution. Rash persisted.



- Significantly less drainage and redness
- Denuded skin nearly resolved
- No odor

Significant improvement in 7 days with silver wicking textile

A case study using a polyurethane coated polyester mesh incorporated with an antimicrobial silver complex in the management of maceration, odor and exudate. In: J. K. Kim, K. Kim, et al. American Center for Wound Healing and Tissue Management University of Texas Health Science Center, Houston, TX.

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### Case study

- 42-year-old male with chronic, recurrent venous dermatitis in lower extremities
- Diagnosis: NIDDM (Type 2) with diabetic neuropathy and venous insufficiency
- Treated with compression wraps, but resulted in venous dermatitis and new ulceration due to maceration caused by excessive sweating



Photo: Freyberg, Natch, Tessler. ©2007 Copyright Corp. Used with permission.

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ITD develops in skin damaged by sweat combined with bacterial and fungal overgrowth

ITD is common but fortunately is easily managed!

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### Roadblocks to timely, appropriate care

- Inconsistent implementation of proven infection prevention and control measures.
- Everyone is doing his or her own thing.
- Adherence to current prevention recommendations is suboptimal.
- Lack "top-down" mandate
- Bureaucracy → delays timeliness of interventions.

Photo: © iStock.com/Corbis Medical Inc. via the American Medical Association  
Photo: Shutterstock.com/Artemio2008

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### Develop a standard of care for treating skin folds

#### Skin Fold Guidelines

Patient name \_\_\_\_\_

1. Gently cleanse the skin with a no-rinse cleanser and soft cloth daily
2. Pat dry or air dry
3. Place Silver wicking textile in the skin fold or under medical device
4. Allow 2 inches to be exposed to the air
5. Date and initial InterDry
6. Reposition as needed
7. Replace if soiled with urine, stool or blood.
8. Discard after 5 days of use

Date \_\_\_\_\_

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### Goals of Care

Decrease frequency of expensive-to-manage complications

- Implement new measures and anti-infective products
- Adherence to recommended practices
- Belief in "ZERO"
- Incentivize
- Standardize methods
- Innovative practice

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### Key Points

- Skin fold inspection is an important part of skin assessment
- Effective skin fold management begins by identifying the cause
- Proper care of skin folds is critical to reducing the risk of SSIs
- Silver Wicking Textile:
  - Improves outcomes
  - Simplifies protocols
  - Reduces treatment time and cost

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**Thank You!!**



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