# Prevenzione delle lesioni cutanee tipo MARSI e CASI

Dr. Antonio Gidaro

U.O.C. Medicina Generale / Vascular Access Team

H. Sacco Milan

gidaro.antonio@asst-fbf-sacco.it

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Medical adhesive-related skin injury

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RESULTS BY YEAR

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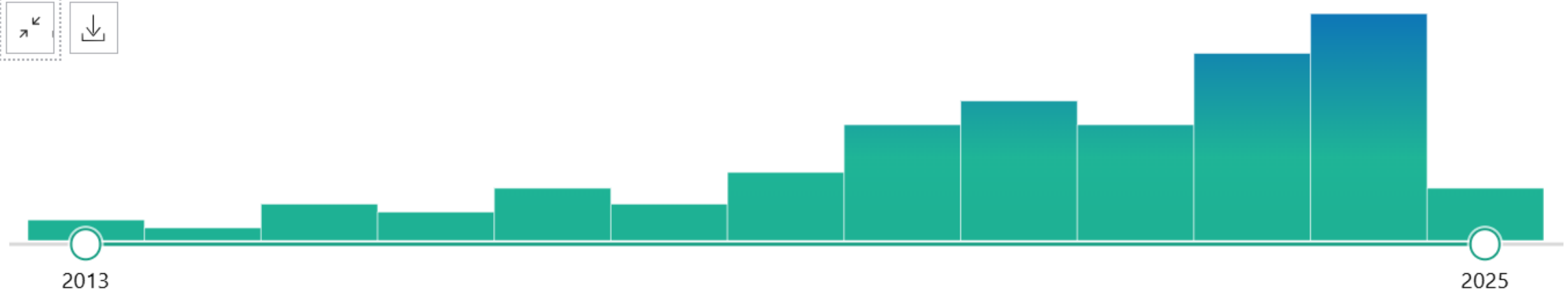

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Catheter Associated Skin Impairment

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RESULTS BY YEAR

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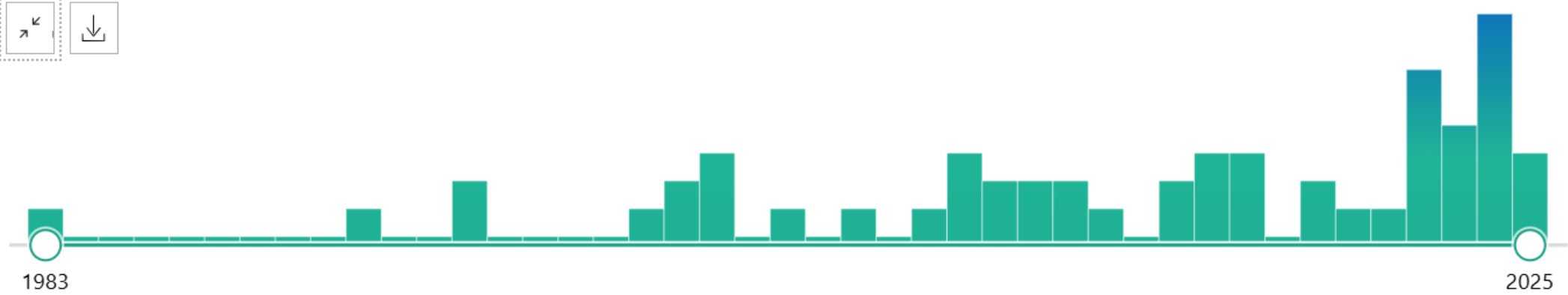
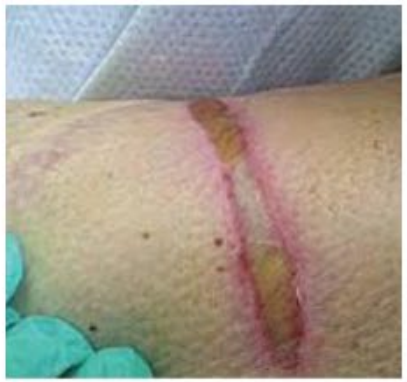
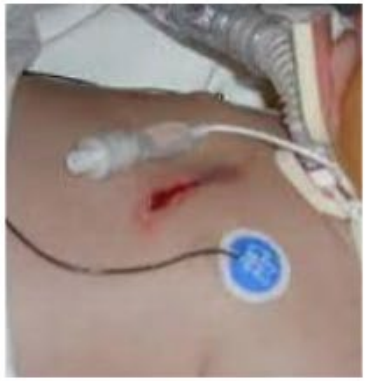


# CASI Catheter Associated Skin Impairment





All MARSIs are not CASIs.
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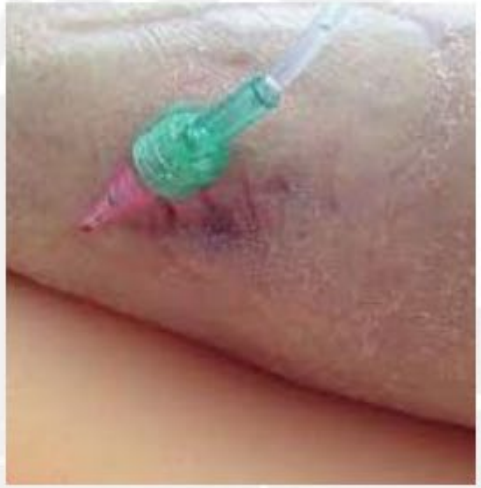
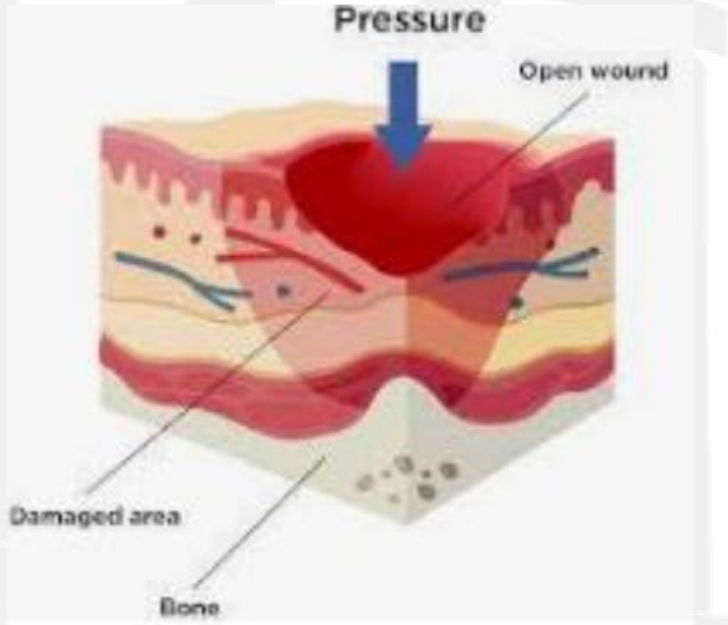
Greater risk in the very young or very old.

Often overlooked skin injuries associated with catheter hub or tubing due to pressure



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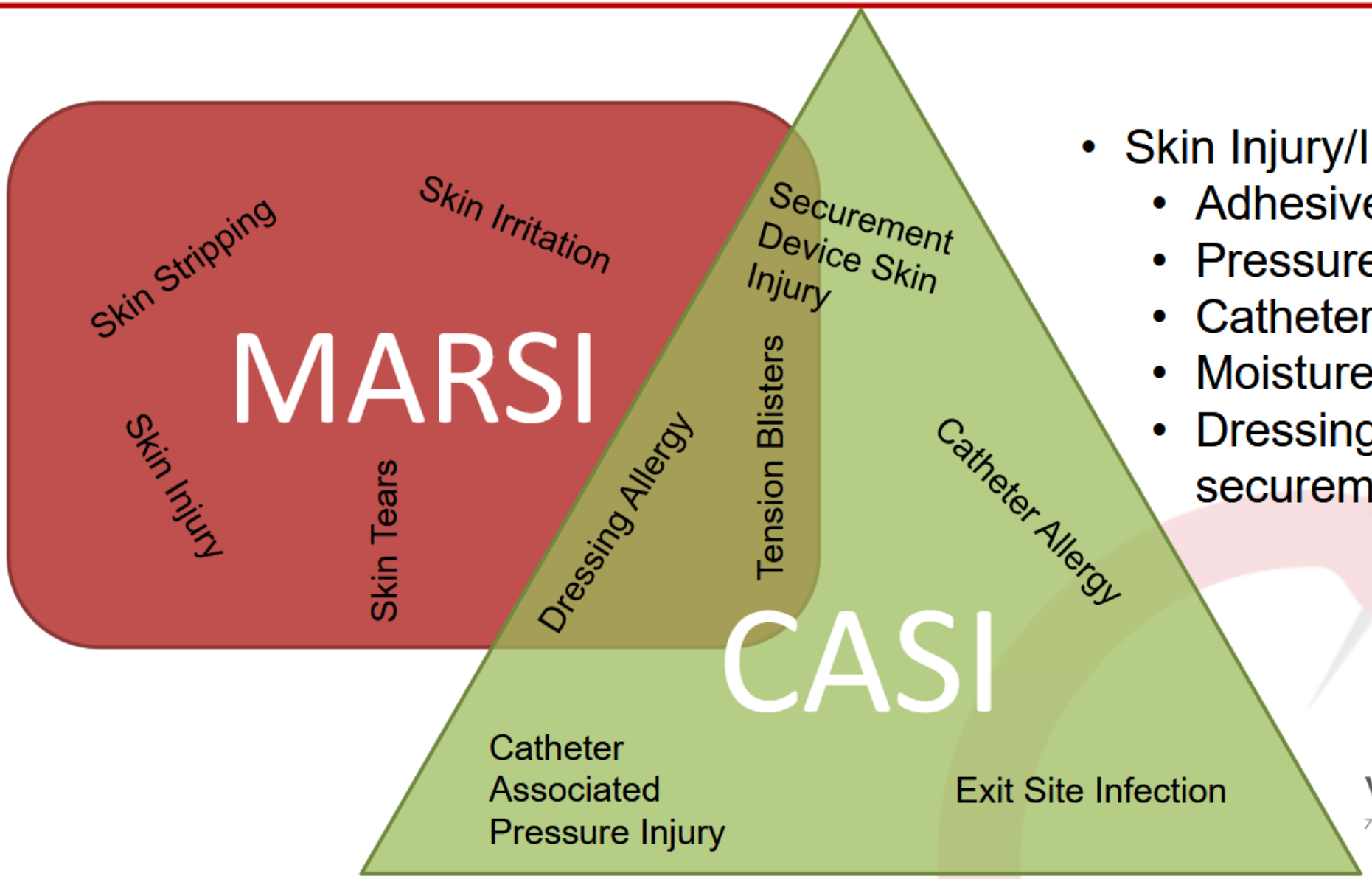
# Defining MARSI and CASI




- Skin Injury/Impairment
  - Adhesive related
  - Pressure related
  - Catheter related
  - Moisture
  - Dressing or securement

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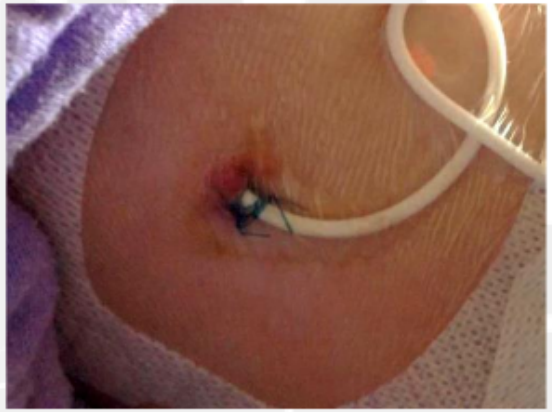
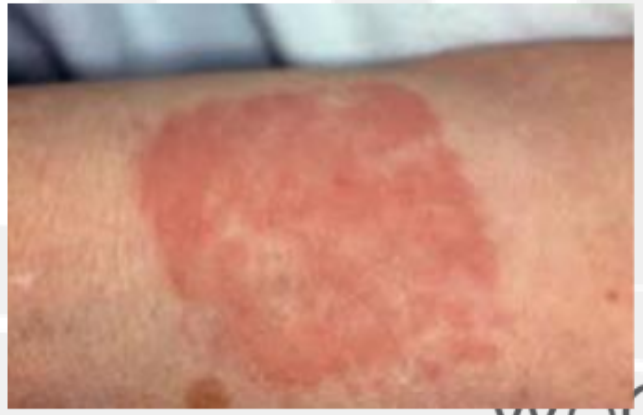
# Definizione WOCOVA 2024

## Catheter-Associated Skin Impairment (CASI)

- L'insorgenza di secrezioni,e/o eritema e/o altre anomalie cutanea, tra cui vescicole, bolle, erosioni o lacerazioni, all'EXIT site di un catetere all'interno dell'area sottostante la medicazione, che persistono per 30 minuti o più dopo la rimozione della medicazione

Commonly seen skin impairment conditions associated with CVADs:
(1) exit-site infection
(2) skin injury (including skin stripping, skin tears, pressure injury, and tension blisters);
(3) skin irritation (irritant or allergic contact dermatitis)
(4) weeping/oozing (noninfectious drainage).





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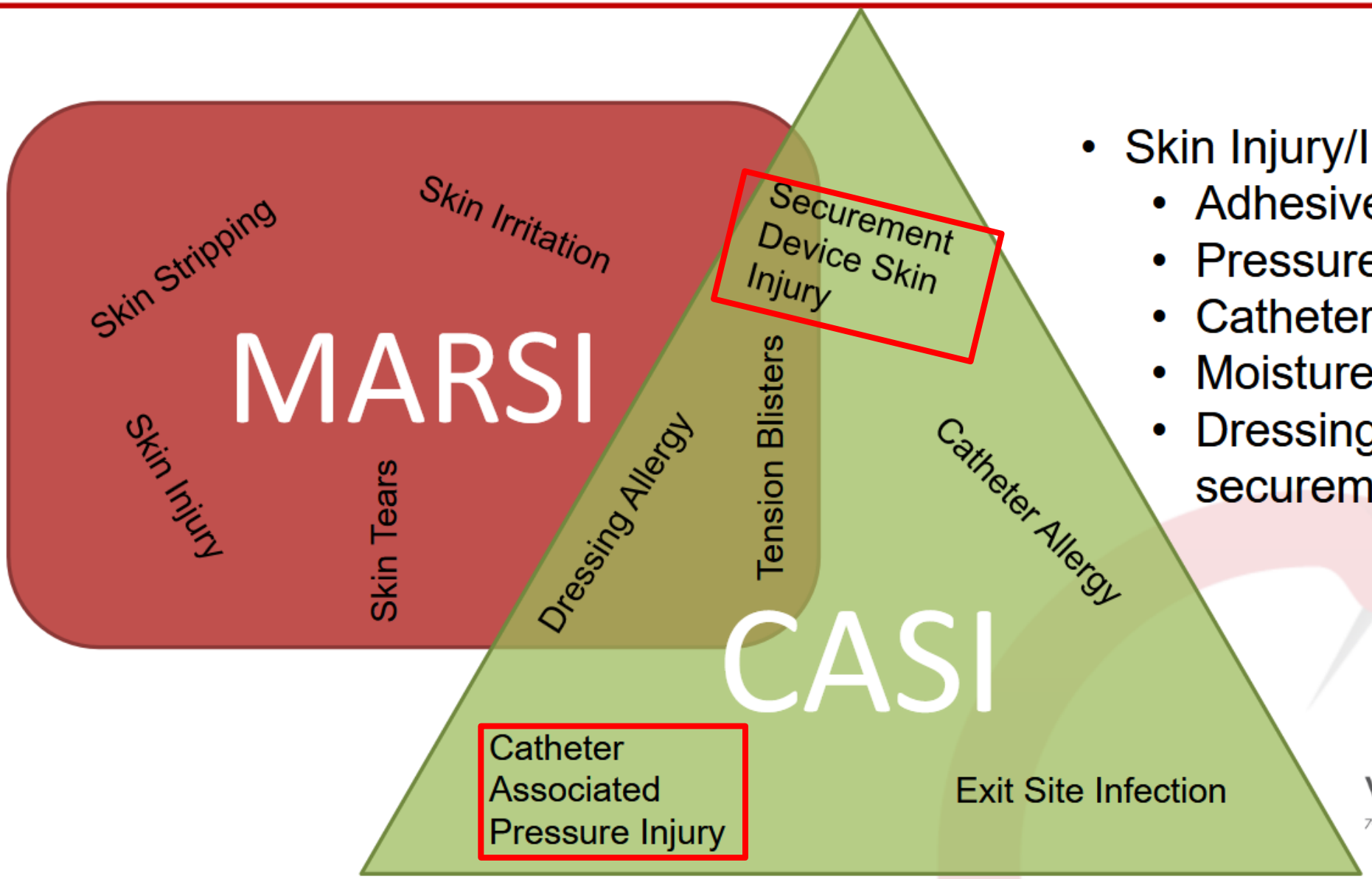


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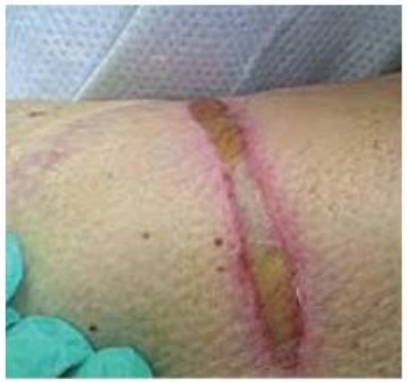

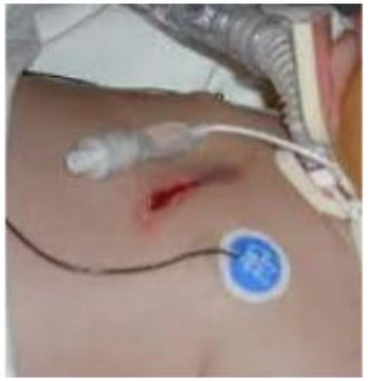

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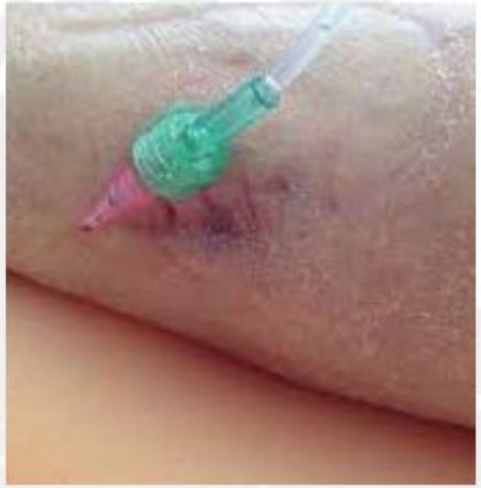

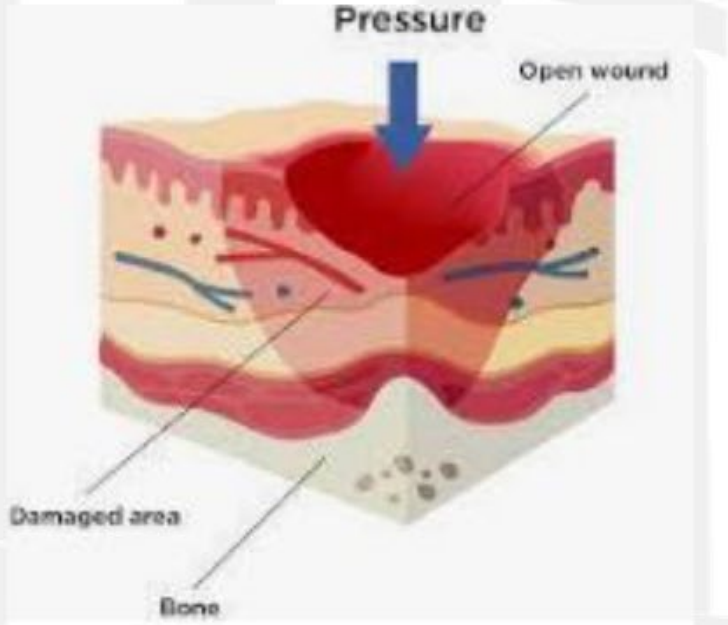


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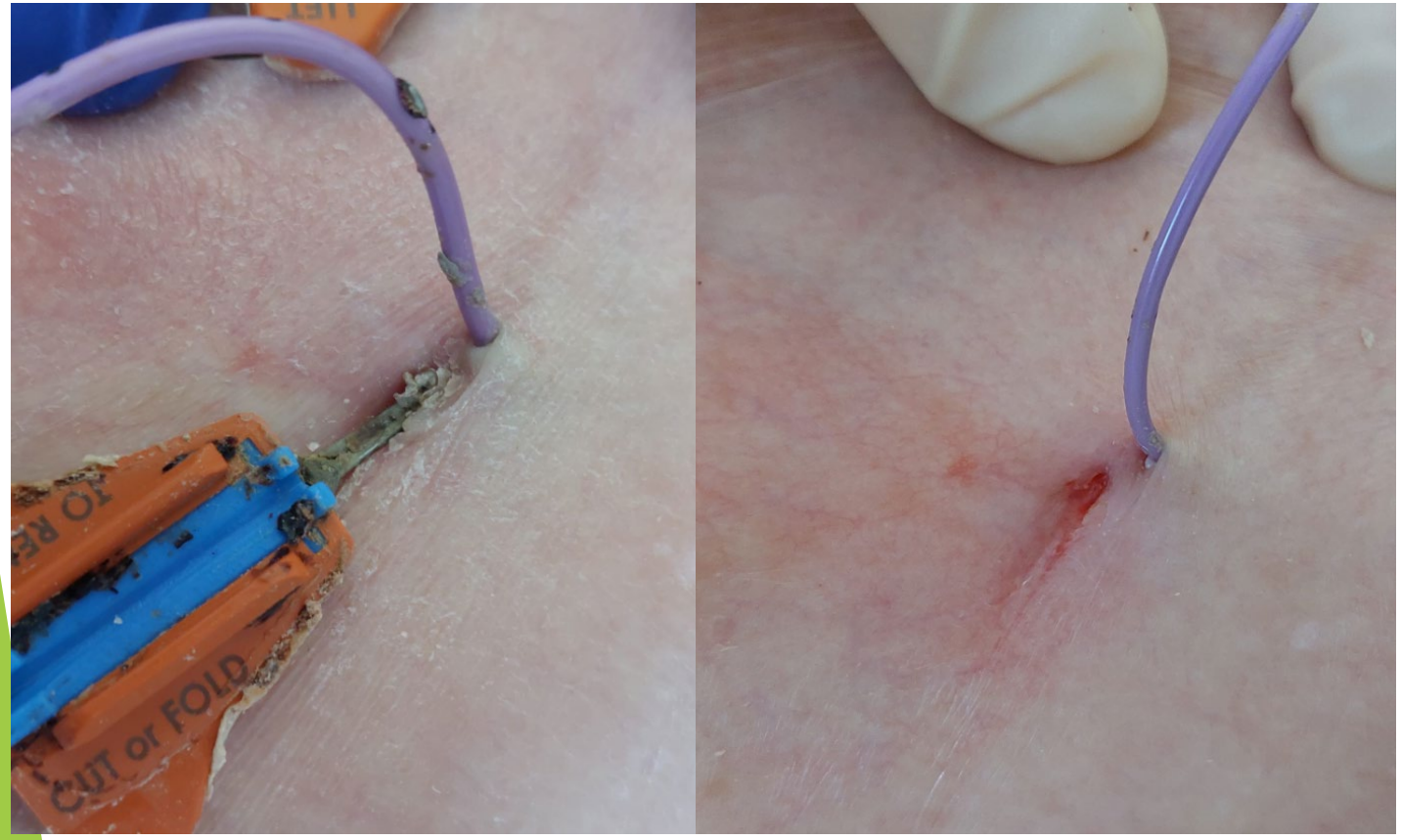
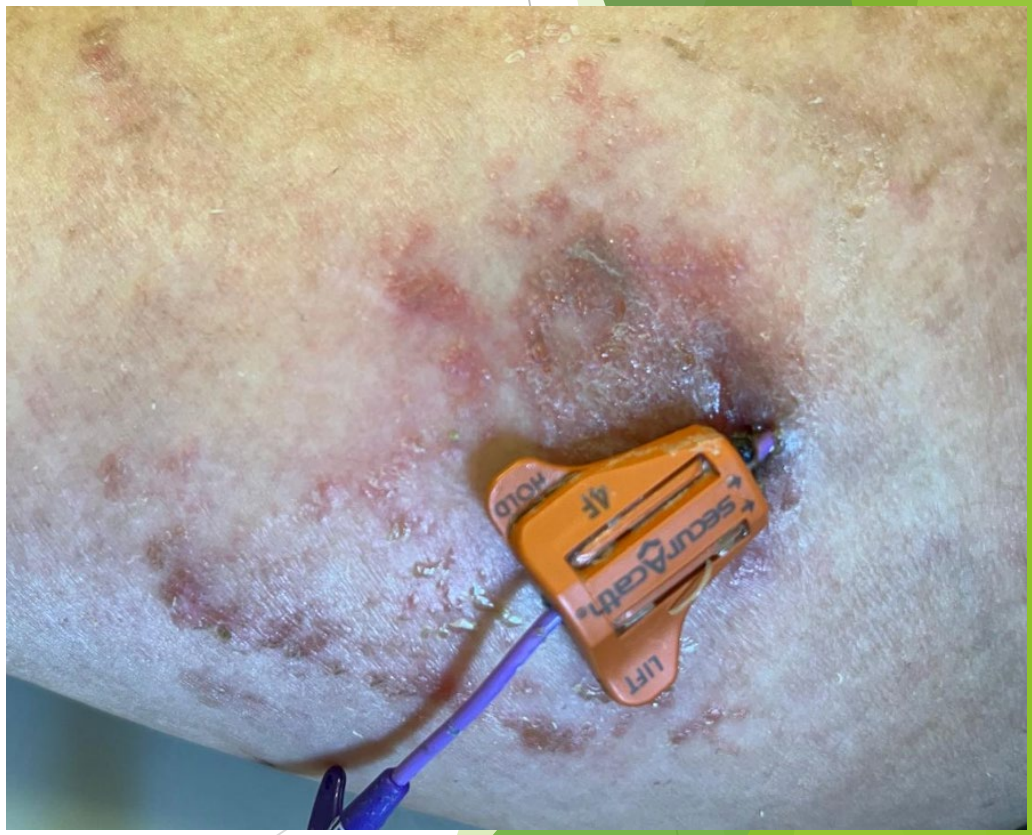
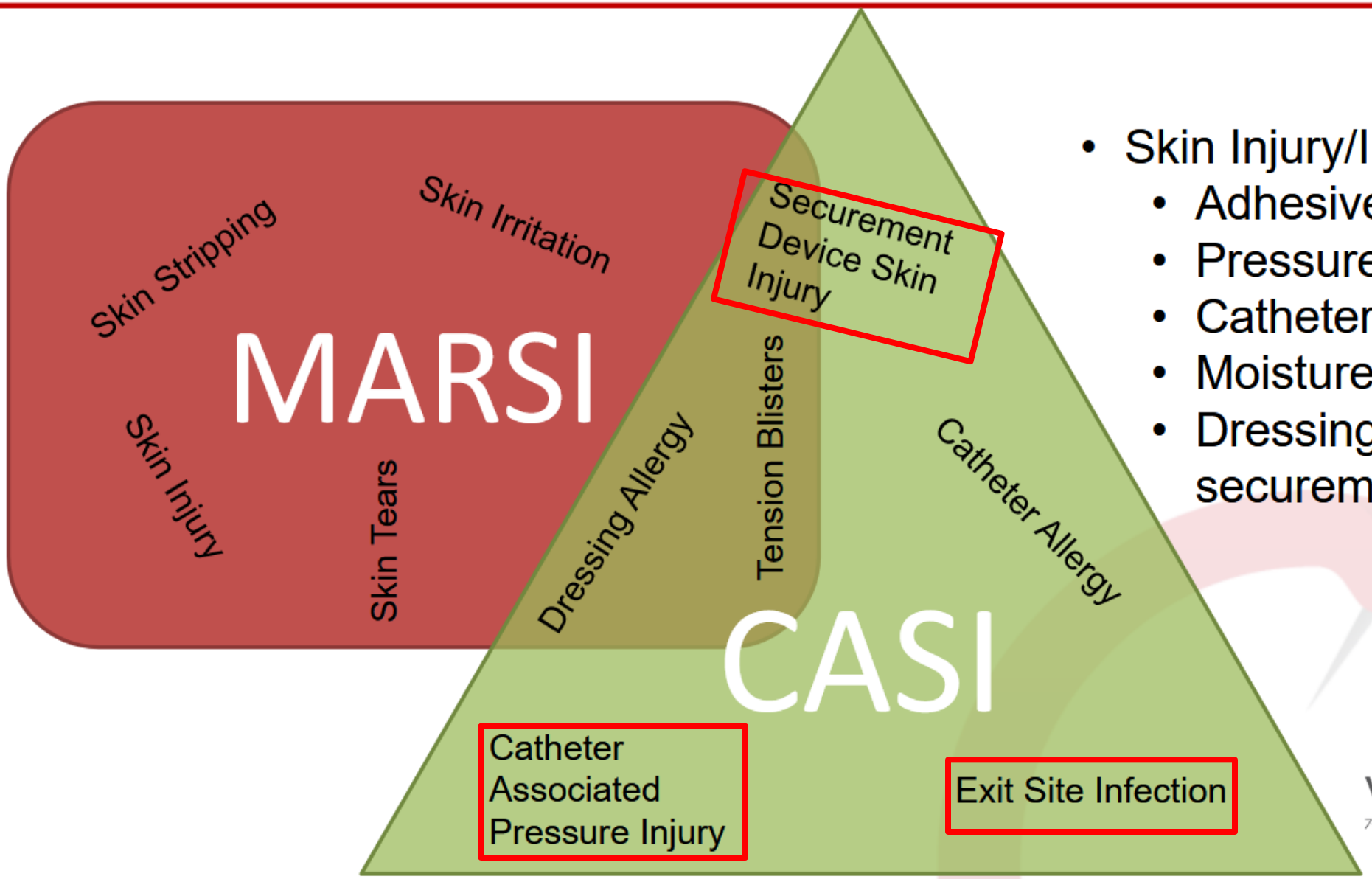
# CASI: pressure injury da securacath



# Defining MARSI and CASI

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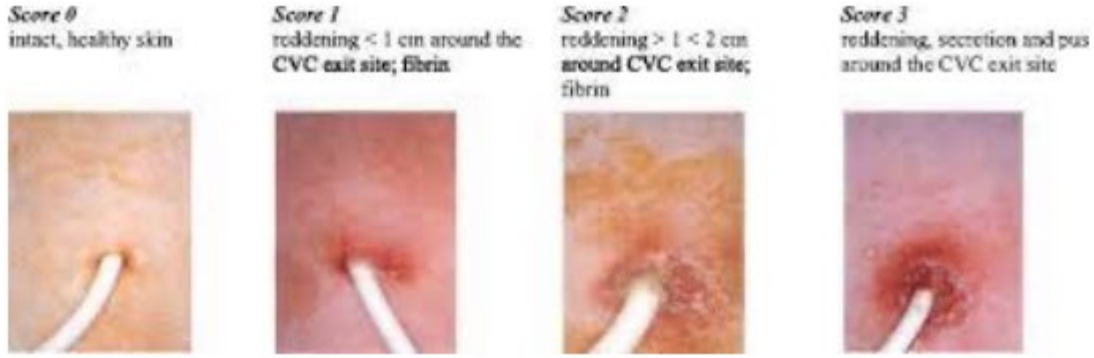
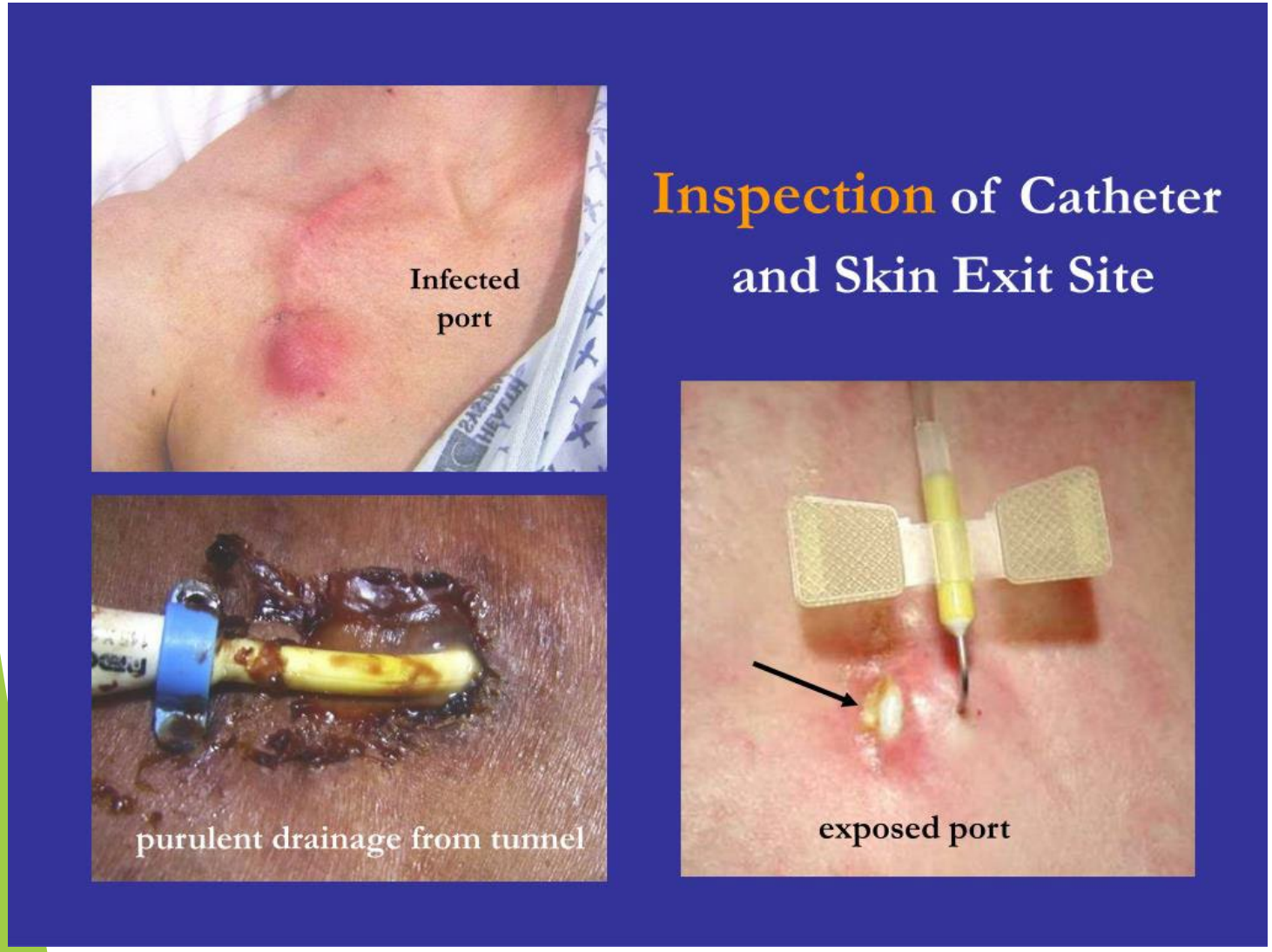
# Definizioni

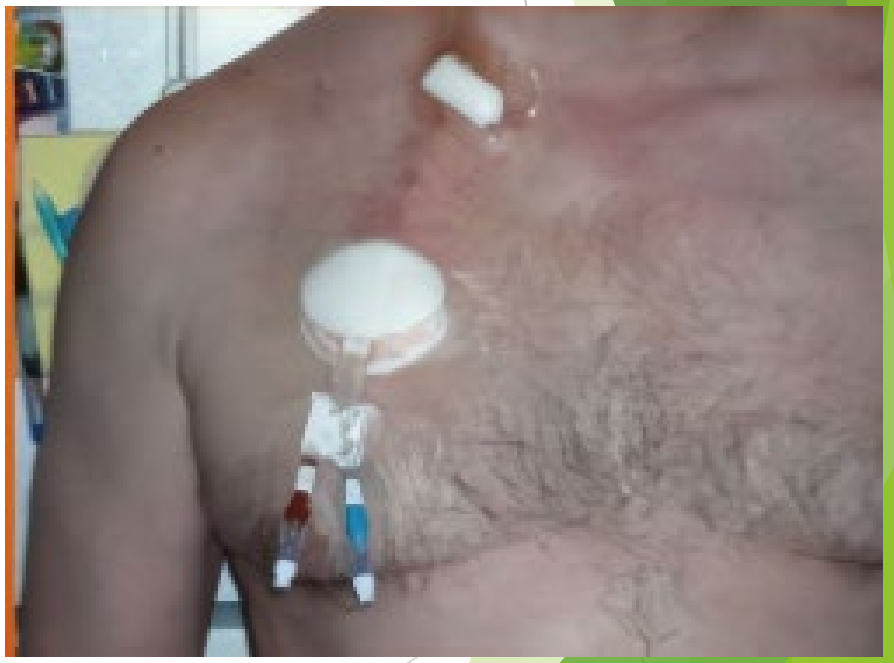
- Infezione del sito di emergenza
- Infezione del tunnel
- Infezione della tasca

| Punteggio | Condizioni della cute attorno l'exit site |
|---|---|
| 0 | Cute sana, integra, non segni di flogosi |
| 1 | Iperemia <1 cm + fibrina |
| 2 | Iperemia >1 cm + fibrina |
| 3 | Iperemia, secrezione pus ± presenza di fibrina |



# Nei cateteri a permanenza infezioni del tratto extra luminale



# Nelle agocannule infezioni del tratto extra luminale

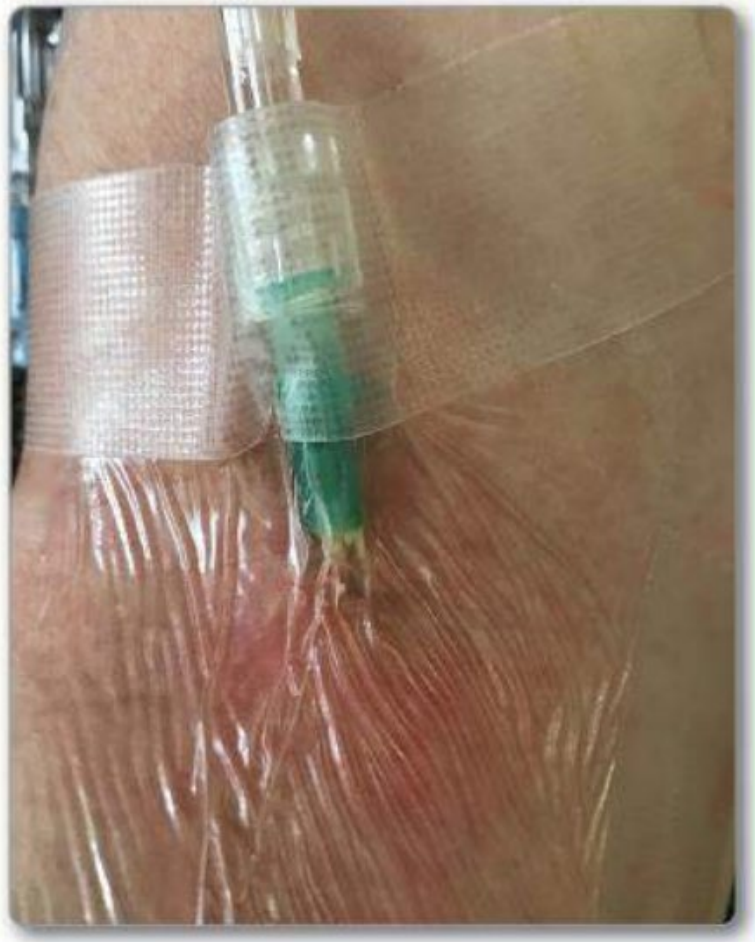


**Figure** Peripheral intravenous catheter site infection.

## Visual Infusion Phlebitis Score

Moisture Responsive Catheter Dressing

Policy Statement
All patients with an intravenous access device in place must have the IV site checked at least daily for signs of infusion phlebitis. The subsequent score AND action(s) taken (if any) must be documented. The cannula site must also be observed when:

- Bolus injections are administered
- IV flow rates are checked or altered
- Solution containers are changed

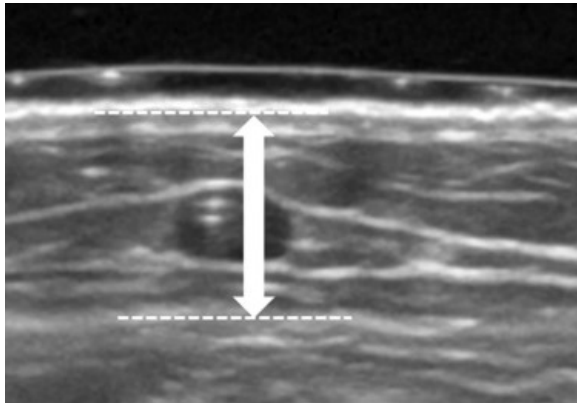
The incidence of infusion phlebitis varies. The following 'Good Practice Points' may assist in reducing the incidence of infusion phlebitis:

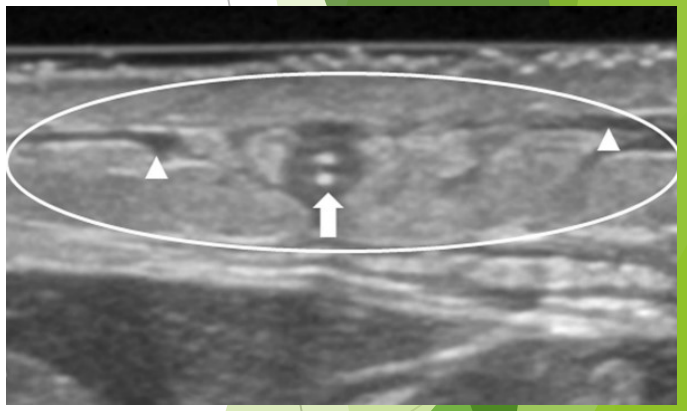
1 Observe cannula site at least daily
2 Secure cannula with a proven intravenous dressing
3 Replace loose, contaminated dressings
4 Cannula must be inserted away from the joints whenever possible
5 Aseptic technique must be followed
6 Consider your policy position on resiting of the cannula
7 Plan and document continuing care
8 Use the smallest gauge cannula most suitable for the patient's needs
9 Replace the cannula at the first indication of infusion phlebitis (Stage 2 on the VIP score)

| | | | |
|---|---|---|---|
| IV site appears healthy | 0 > | No signs of phlebitis | OBSERVE CANNULA |
| One of the following is evident:<br>- Slight pain near IV site or<br>- Slight redness near IV site | 1 > | Possible first signs | OBSERVE CANNULA |
| Two of the following are evident:<br>Pain at IV site<br>- Erythema<br>- Swelling | 2 > | Early stage of phlebitis | RESITE CANNULA |
| All of the following signs are evident:<br>- Pain along path of cannula<br>- Erythema<br>- Induration | 3 > | Mid-stage of phlebitis | RESITE CANNULA<br>CONSIDER TREATMENT |
| All of the following signs are evident and extensive:<br>- Pain along path of cannula<br>- Erythema<br>- Induration<br>- Palpable venous cord | 4 > | Advanced stage of phlebitis or start of thrombophlebitis | RESITE CANNULA<br>CONSIDER TREATMENT |
| All of the following signs are evident and extensive:<br>- Pain along path of cannula<br>- Erythema<br>- Induration<br>- Palpable venous cord<br>- Pyrexia | 5 > | Advanced stage of thrombophlebitis | INITIATE TREATMENT |

CVP normale


Edema sottocutaneo





Koichi Yabunaka et al., 2016

*Original research article*

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The Journal of Vascular Access
1–7

DOI: 10.1177/11297298241261146
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# Ultrasound assessment of short peripheral catheter failure

**Davide Giustivi[1], Rosita Celano[2], Manuela Cattalani[3], Claudia Camilli[3], Lucia Trombetta[2], Pietro Facchinetti[2], Arianna Bartoli[2], Emanuele Bizzi[4], Francesco Urso[2], Mattia Donadoni[2], Massimiliano Quici[2], Leyla La Cava[2], Maria Calloni[2], Elena Martini[2], Alba Taino[2], Chiara Cogliati[2] and Antonio Gidaro[2]**

## Abstract

**Introduction:** Short peripheral catheters (SPCs) are affected by a high complication rate that leads to catheter failure. Currently, the Visual Infusion Phlebitis score (VIP) is the most used tool to verify the presence of inflammatory complications (phlebitis and thrombophlebitis). However, ultrasound signs (US) may be an attractive alternative.

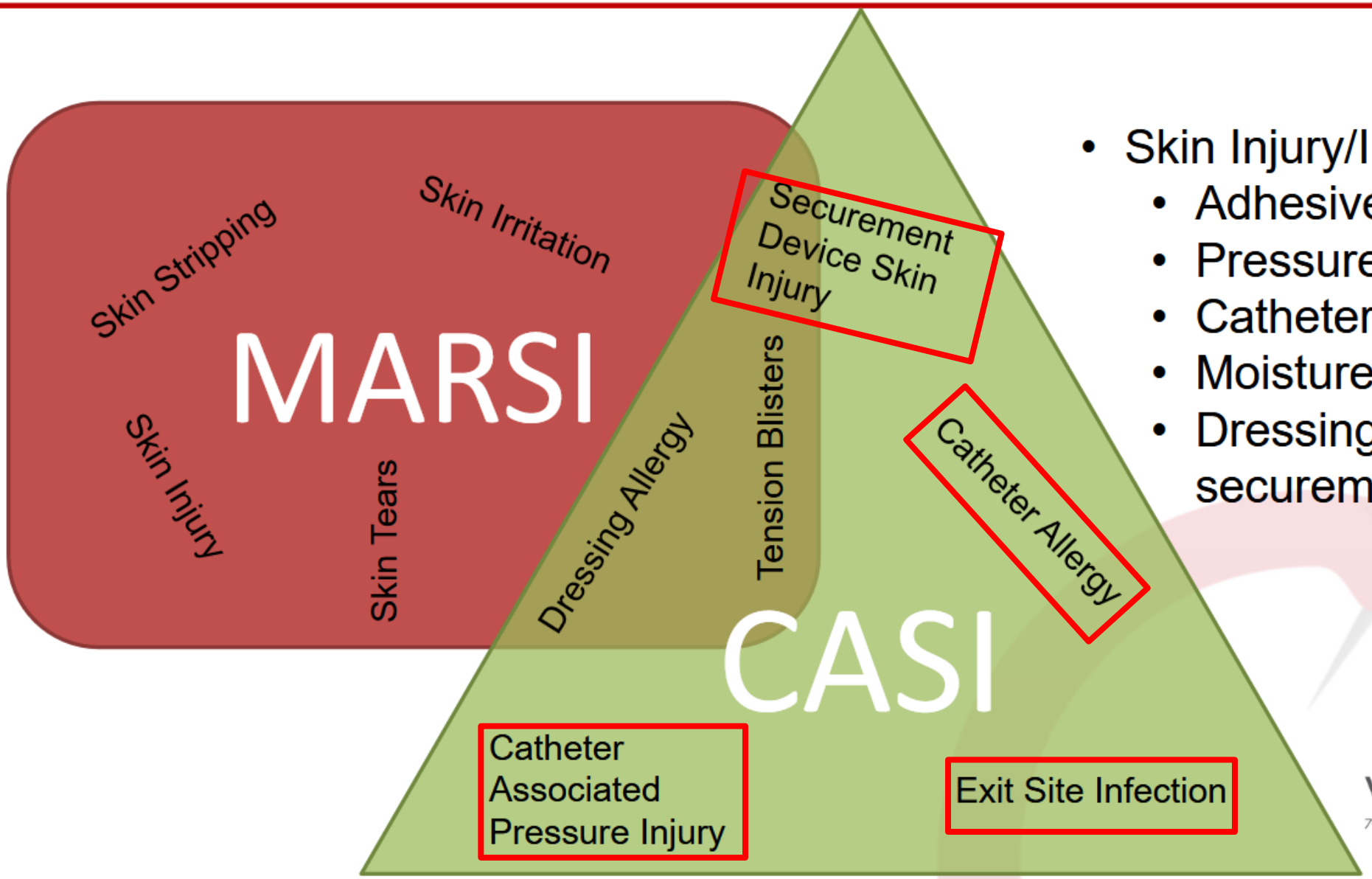
**Objective:** This study aims to evaluate the sensitivity and specificity of US and VIP score = 1 in identifying and recognizing early signs of SPC failure. The time to positivity for US and VIP scores was assessed as a secondary outcome.

**Methods:** An observational prospective study was conducted. In each patient, US (subcutaneous edema; fibroblastic sleeve; thrombophlebitis) and VIP of the exit site were performed every 24 h until 96 h after insertion. Compared to catheter failure, Sensitivity, Specificity, and Predictive values in both US and VIP were calculated.

**Results:** Two hundred patients were enrolled. The presence of ultrasonic pattern suggestive of edema at 72 h ($p = 0.018$), fibroblastic sleeve at 24, 48, 72, and 96 h ($p < 0.001$), thrombosis at 48 ($p < 0.001$) and 72 h ($p = 0.005$), and at least one of an abovementioned US at all checkpoints ($p < 0.001$) were highly significant predictors of complications. Both US and VIP effectively detect inflammatory events; however, the US showed better sensitivity in overall checkpoints and earlier predictive ability than VIP (1.9 vs 0.47 days).

**Conclusions:** An ultrasound inflammatory pattern is correlated with SPC failure. An ultrasound protocol—requiring minimal training—is more effective than VIP in recognizing early signs of device failure.

# Defining MARSI and CASI

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  - Pressure related
  - Catheter related
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*Original research article*

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# A prospective observation of PICC related anaphylactoid reactions

The Journal of Vascular Access
2024, Vol. 25(5) 1474–1478

DOI: 10.1177/11297298211016118
journals.sagepub.com/home/jva
SAGE

**Xiuzhu Cao[1] and Linfang Zhao[1]**

**Table 2.** Comparison of the incidence of anaphylactoid reactions of different factors.

| Factors | Frequency/total | $\chi^2$ value | *p* Value |
|---|---|---|---|
| Gender | | | |
| Male | 14/2548 | 2.034 | 0.154 |
| Female | 16/1741 | | |
| Age(years) | | | |
| <60 | 21/1488 | 16.622 | 0.000 |
| ⩾60 | 9/2801 | | |
| Allergy history | | | |
| Yes | 5/454 | 1.181 | 0.277 |
| No | 25/3835 | | |
| Silicone catheter | | | |
| Uncoated | 0/1185 | 38.417 | 0.000 |
| Coated | 18/543 | | |
| Polyurethane catheter | | | |
| Uncoated | 0/1665 | 19.352 | 0.000 |
| Coated | 12/896 | | |

*Infection Control & Hospital Epidemiology* (2019), **40**, 1215–1221
doi:10.1017/ice.2019.237

**Original Article**

# Anaphylaxis and anaphylactoid reactions associated with the insertion of peripherally inserted central catheters: A multiyear comparative retrospective cohort study

Christina S. Thornton PhD, MD[1], Jody Dumanski RN[2], Cherylanne Margherit RN[2], Sandra Vaz-Gonsalves BN, RN[2], Sheryl McDiarmid RN, MBA, MEd, BScN[3], Michael D. Parkins MD, MSc[1,4] and John M. Conly MD[1,4,5,6]

[1]Department of Medicine, University of [illegible] Calgary, Alberta, Canada, [3]The Ottawa [illegible] and Infectious Diseases, University of C[illegible] Alberta Health Services, Calgary, Alberta, Calgary, Alberta, Canada

## Abstract

Objective: Peripherally inserted central catheters (PICCs) are a mainstay of nonpermanent vascular access devices. In this study, we assessed patients displaying anaphylaxis or anaphylactoid reactions to the PowerPICC SOLO and Groshong PICC (Bard Access Systems) using the Sherlock tip locating system (TLS).

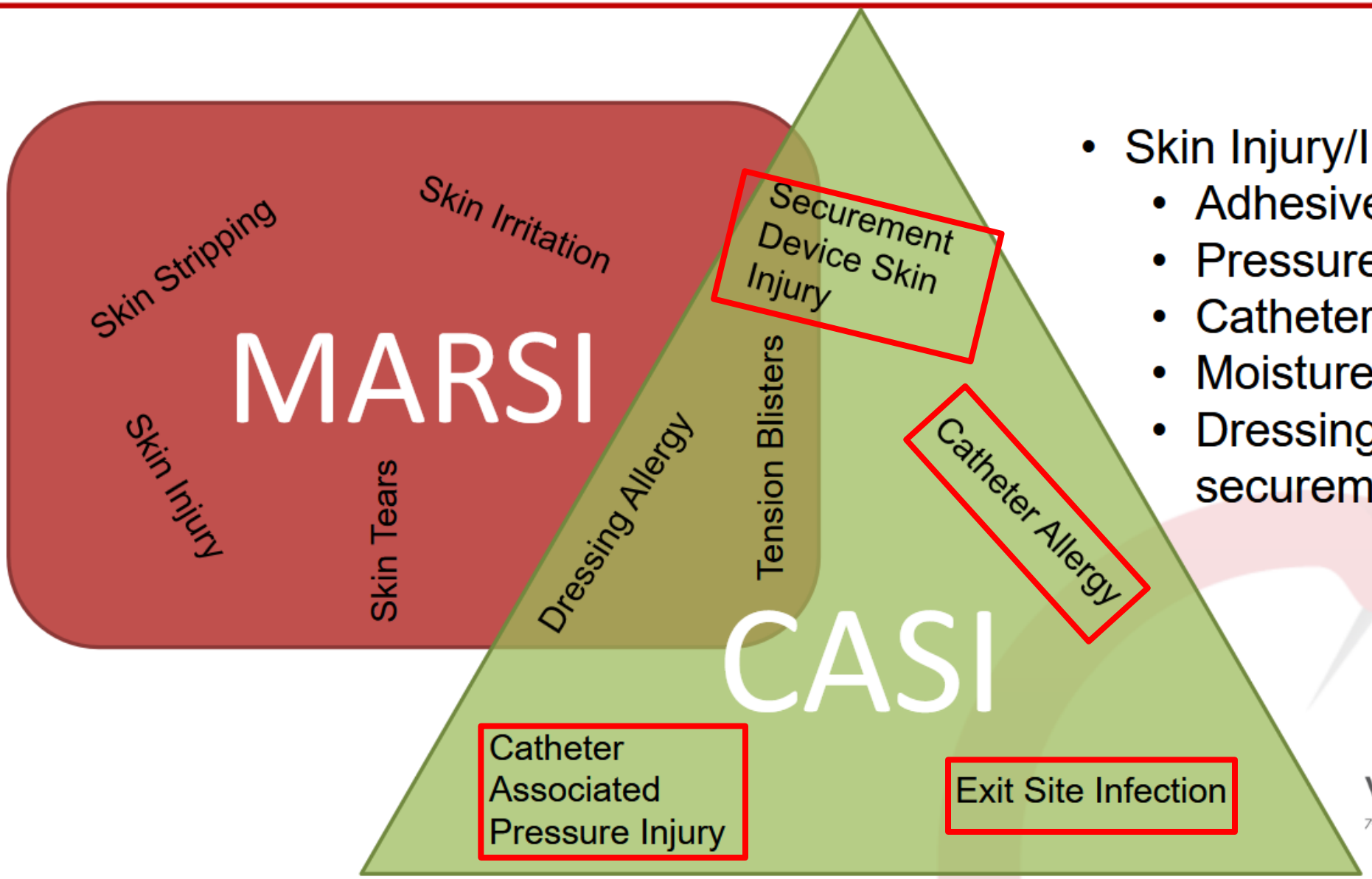
Methods: Patients from 2 tertiary-care hospitals were systematically monitored over 4 years for adverse events following the insertion of a PICC using the Sherlock TLS. Insertion data were also collected using the BioFlo PICC (Angiodynamics) from a third hospital site and from The Ottawa Hospital over 4 years as an additional comparator. Three definitions of anaphylaxis and anaphylactoid reactions were utilized, and the Cohen κ was used to assess interrater agreement. Analysis of reactions among the patient cohorts was performed using the $\chi^2$ test with Yates correction or the Fisher exact test as appropriate.

Results: Among 8,257 insertions using the TLS PICCs, 37 potential reactions (0.45%) were recorded. Using specific definitions for anaphylaxis or anaphylactoid reactions, 54.1%–91.9% met criteria. Comparator populations using data from Calgary (n = 491) and Ottawa (n = 7,889) using the BioFlo PICC insertion found no reactions. Anaphylactic or anaphylactoid reactions were significantly associated with the PowerPICC SOLO and Groshong PICC with the TLS compared to the BioFlo PICC ($P < .0001$) across all definitions. The largest subset of patients experiencing adverse reactions had cystic fibrosis (CF) (n = 4, 10.8%).

Conclusion: Our study results demonstrate significant adverse events associated with the PowerPICC SOLO and Groshong PICC using the Sherlock TLS inserted across a range of patient populations. The incidence rate of anaphylaxis or anaphylactoid reactions in the CF population at our center is significantly higher than in non-CF patients ($P < .001$).

(Received 18 April 2019; accepted 21 July 2019)

# Defining MARSI and CASI

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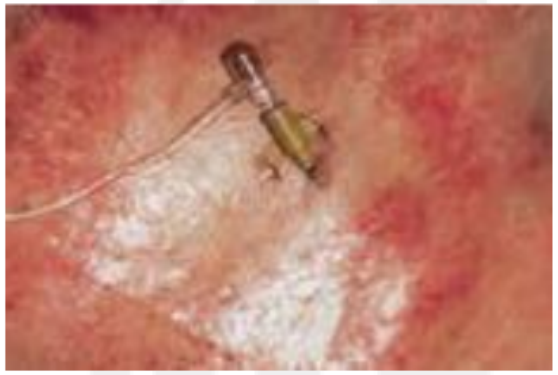
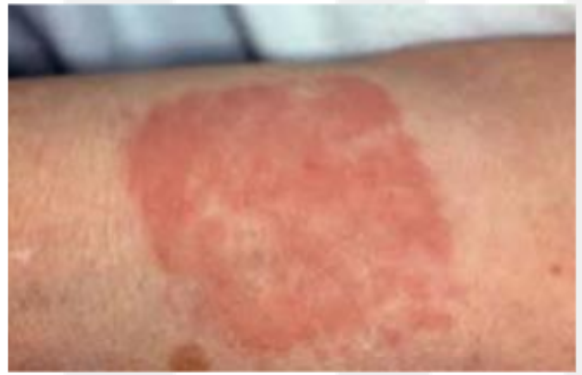
# Definizione WOCOVA 2024

## MARSI

'Medical adhesive-related skin injury' is a term used to define any skin damage related to the use of medical adhesive products or devices such as tape, catheter dressings, wound dressings, stoma products, electrodes, medication patches and wound closure strips. This type of injury is largely avoidable.[4]

Medical adhesive-related skin injury occurs when the attachment between the skin and an adhesive is stronger than that between individual cells, this results in epidermal layer separation or the epidermis to detach completely from the dermis (mechanical trauma)[4]





Any skin damage related to the use of medical adhesive products or devices such as tapes, wound dressings, stoma products, electrodes, medication patches and wound closure strips.[4,6]

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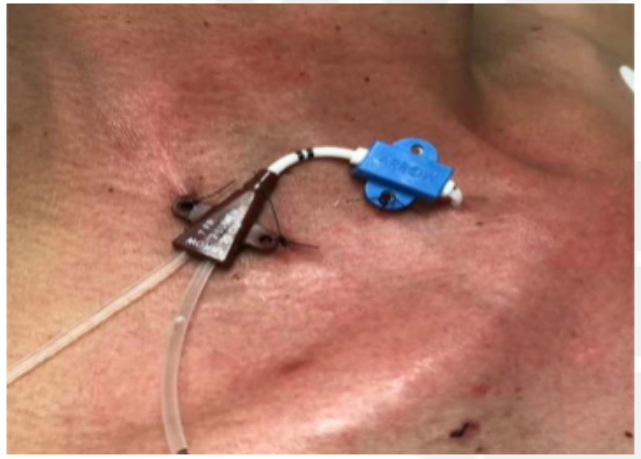
# MARSI with VASCULAR ACCESS DEVICES

There are three main categories of medical adhesive-related skin injury: mechanical (skin stripping, blistering, skin tears), dermatitis (irritation in response to the adhesive) and other (maceration and folliculitis).[4]

- Mechanical
- Dermatitis
- Maceration
- Folliculitis

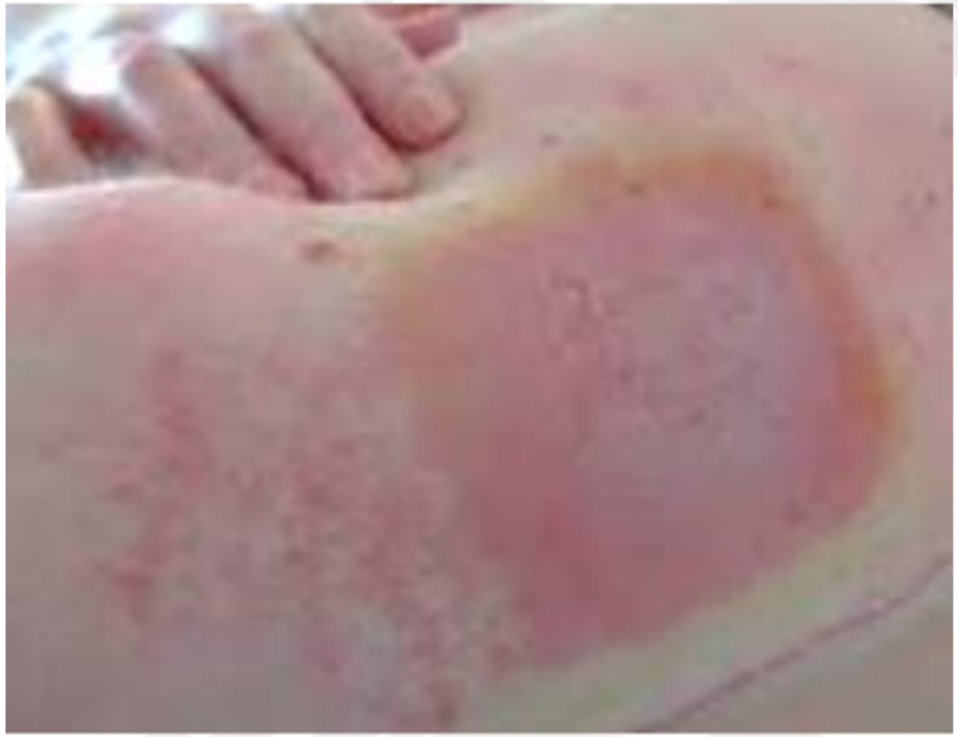


While all MARSI is not associated with VADs, dressings, and tape used for securement and protection of the area are primary contributors to these common types of skin irritations and injuries

# MECHANICAL

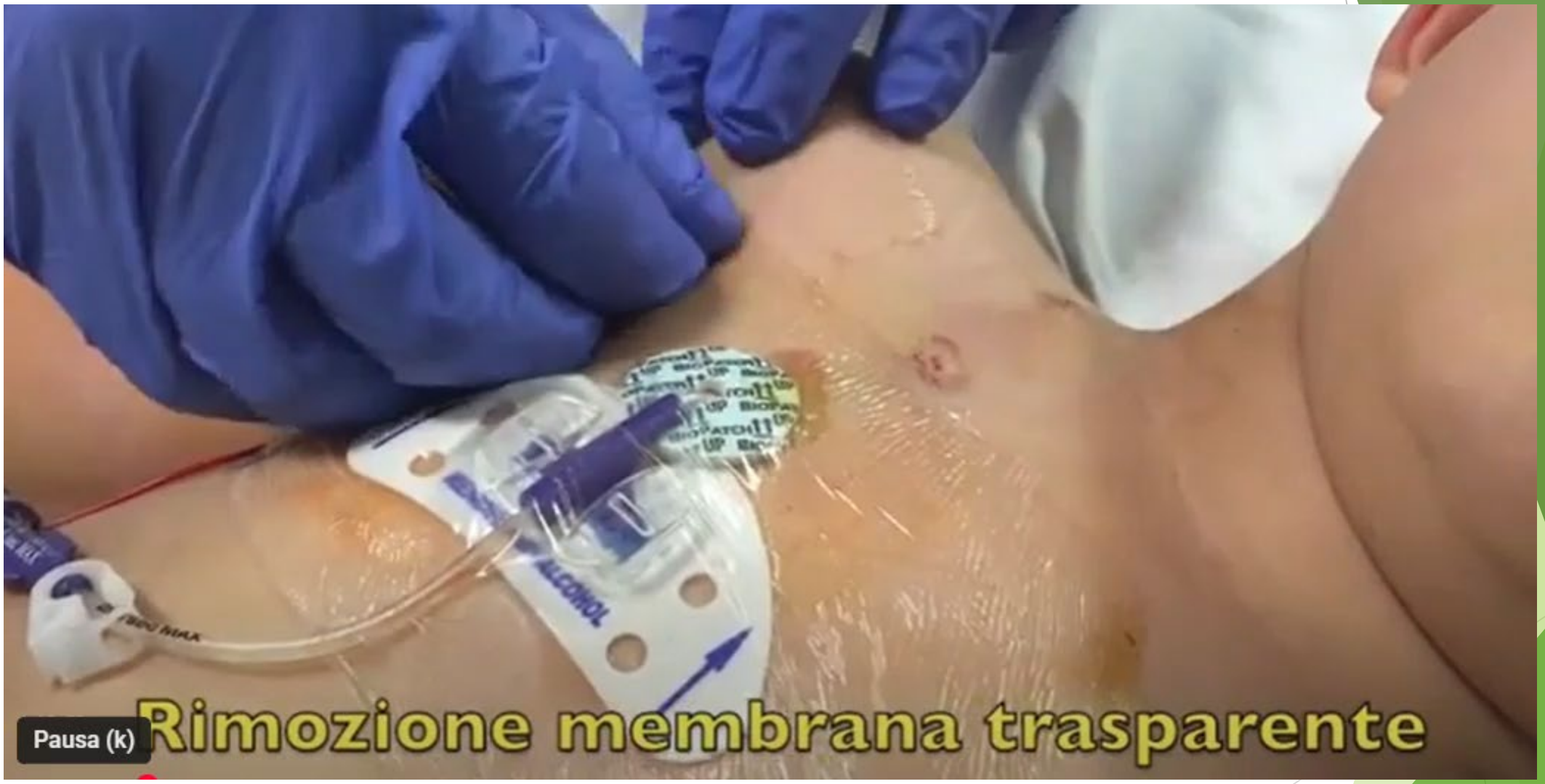
## Skin Stripping
(Epidermal/Dermal)

Removal adhesive tape or dressing resulting in separation of epithelial layer of the stratum corneum of skin. May occur in combination with other types of MARSI.



Results in shallow or irregular lesions that may develop into blisters.

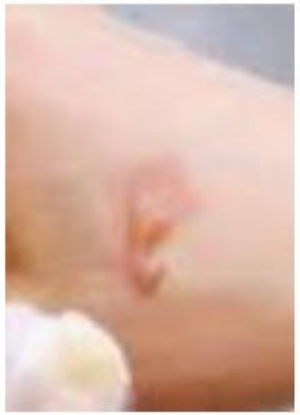
Often appears shiny with redness that does not resolve within 30 minutes.

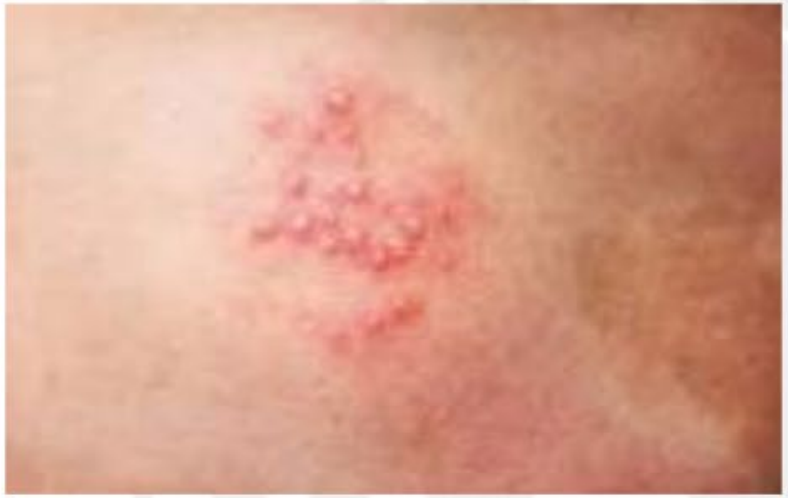

Pausa (k)
Rimozione membrana trasparente

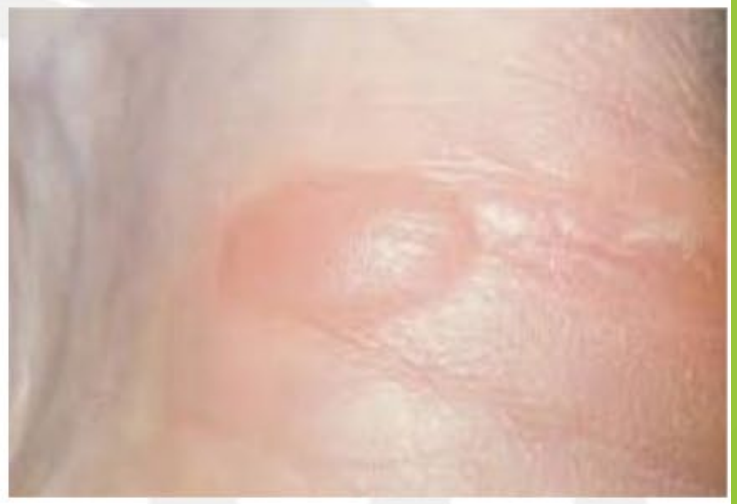
# MECHANICAL

## Skin Stripping

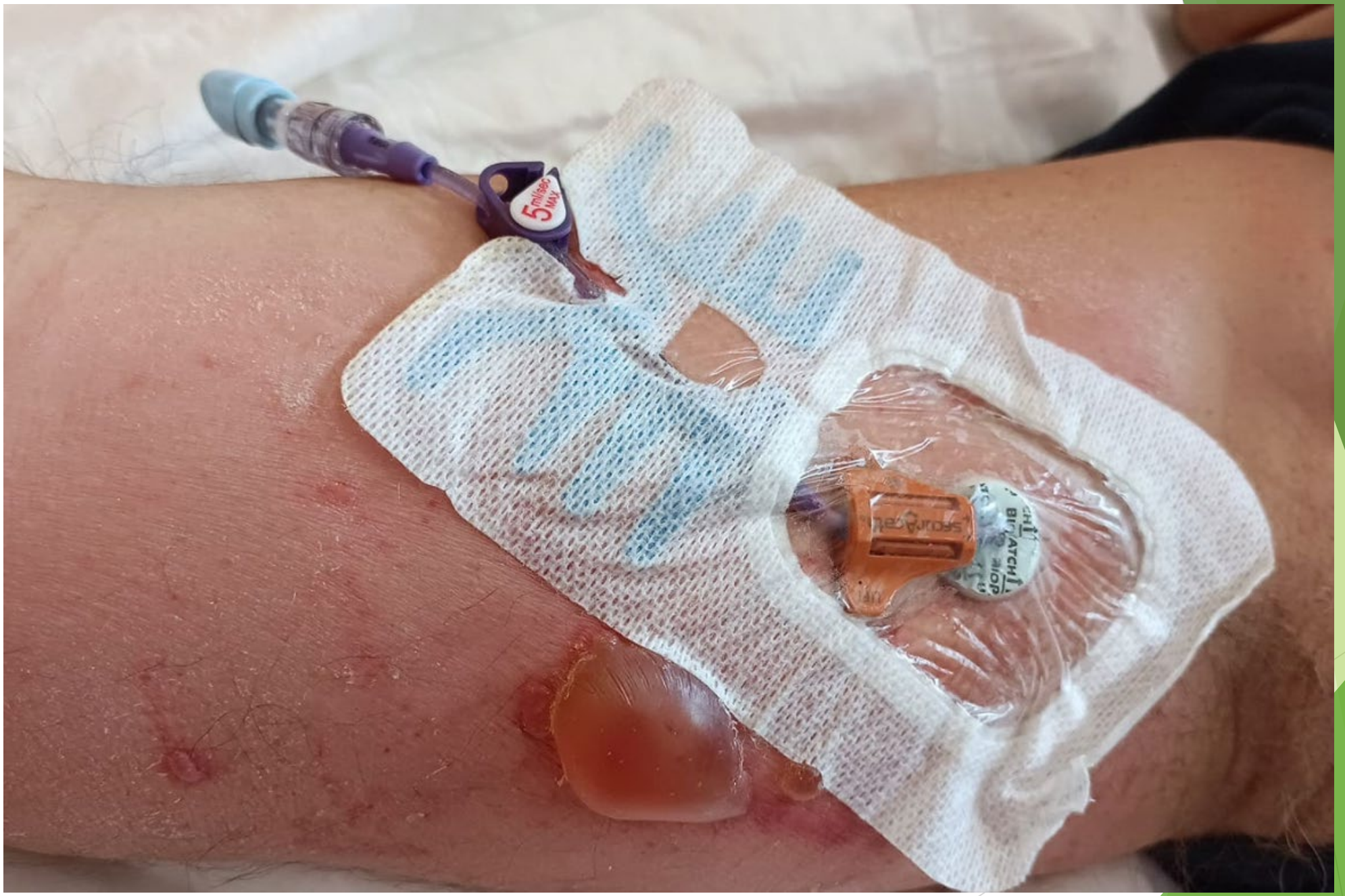
## Skin Injury or Blisters







- Skin blister formation caused from mechanical stress and dermal separation with subsequent fluid accumulation under the skin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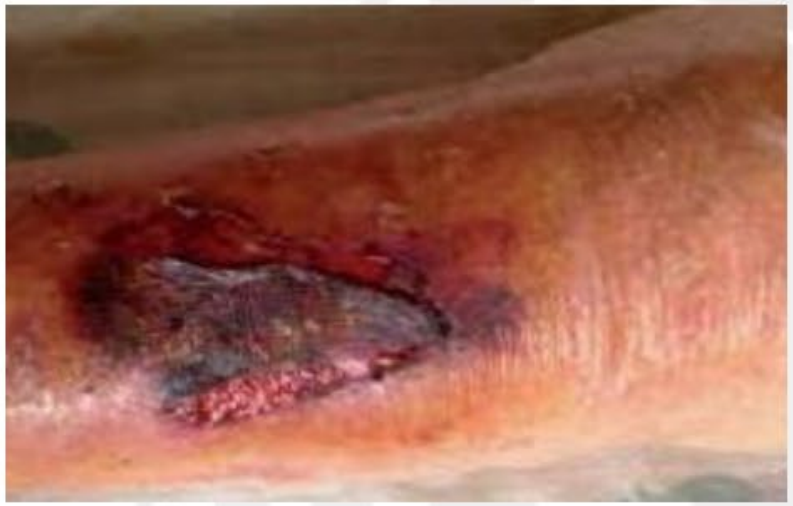
# MECHANICAL

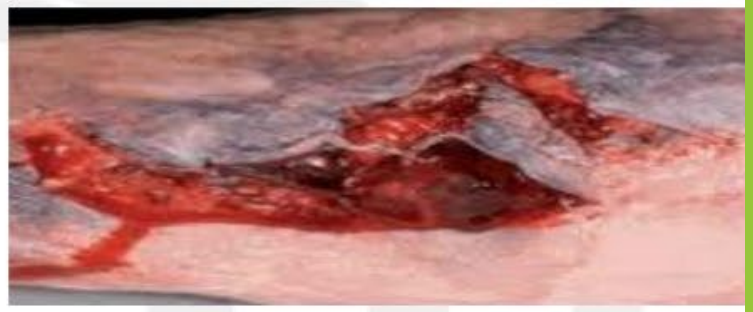
## Skin Stripping

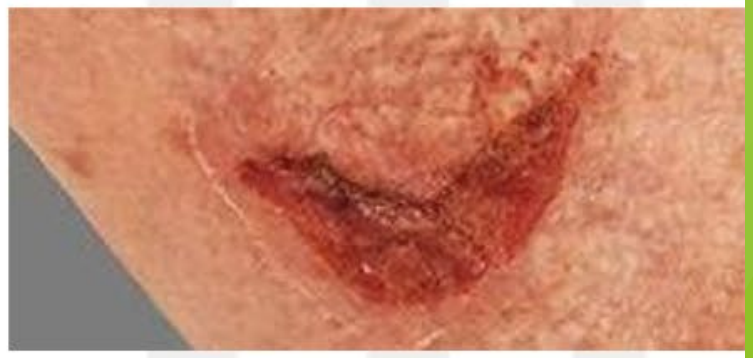
## Skin Injury or Blister

## Skin Tear



- Skin tears
  - Linear type 1 no skin loss and edges may be approximated together
  - Partial type 2 flap loss
  - Total flap type 3 complete flap loss

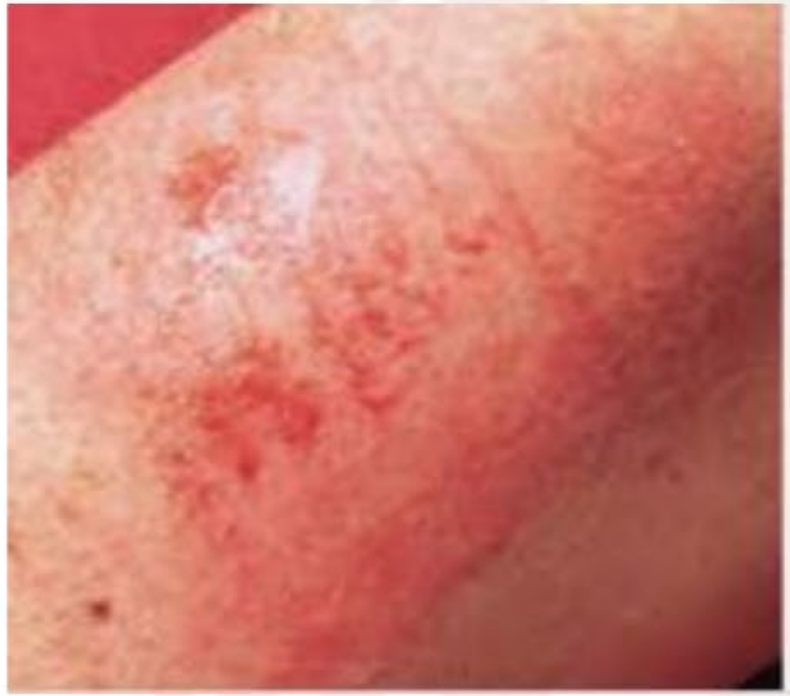


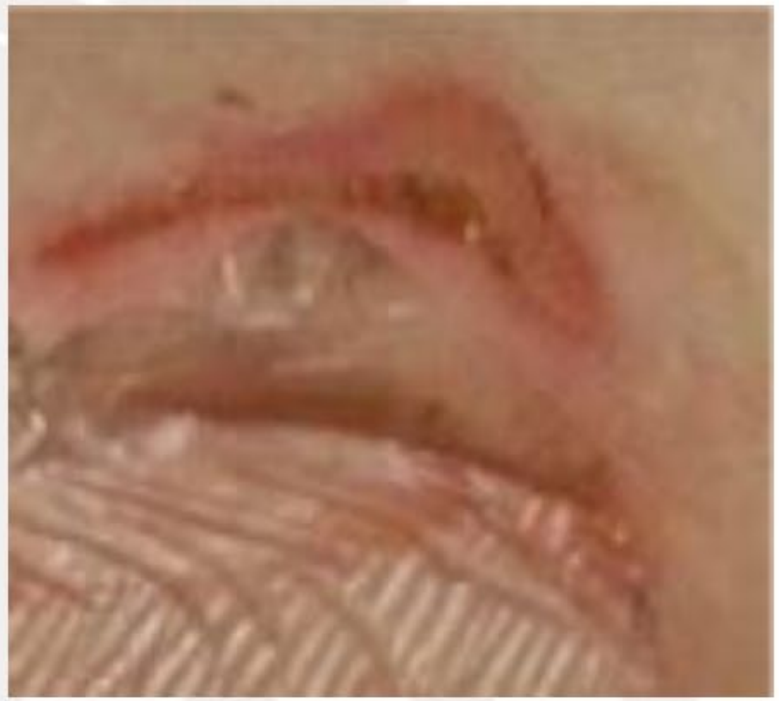


Separation of skin layers resulting in skin opening similar to lacerations

# MECHANICAL

- Skin Stripping
- Skin Injury or Blister
- Skin Tear
- Tension Injury





- Skin tension injuries relate to pulling on the skin caused by unyielding tape or dressing, or pulling caused by stretching transparent dressings during application
- Shearing forces on the skin resulting in dermal separation, deeper than skin stripping

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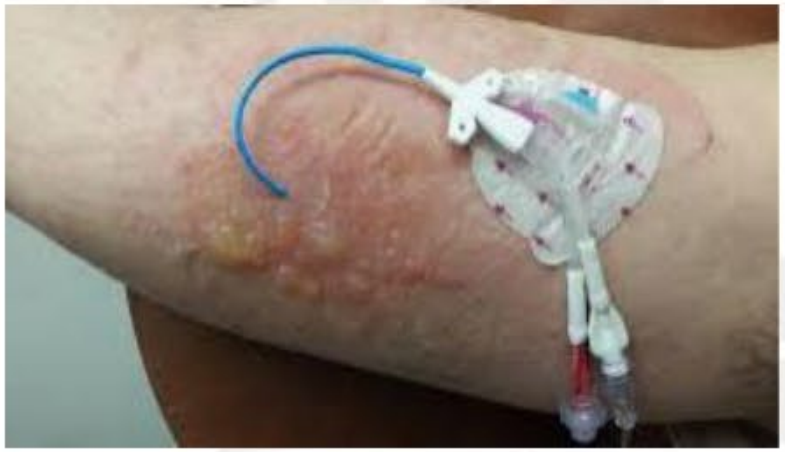
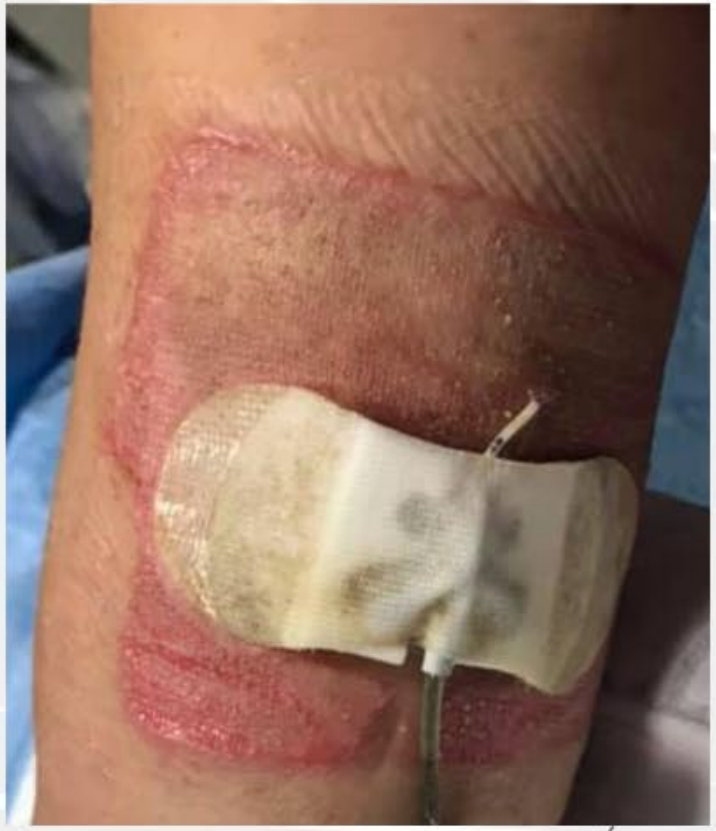
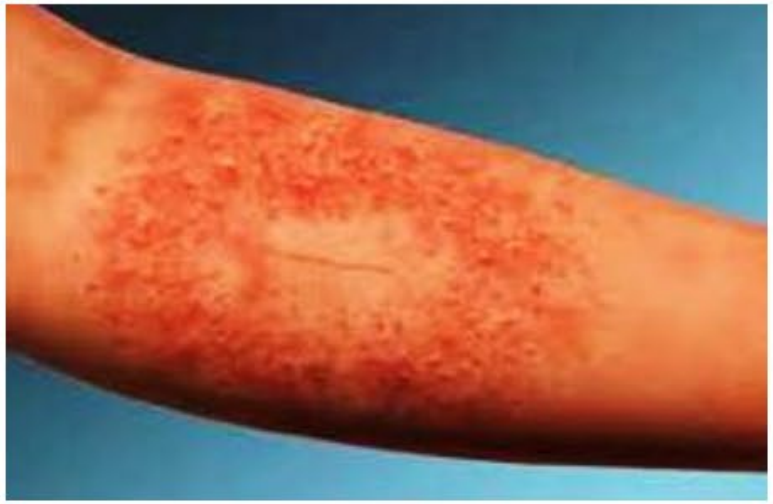
# DERMATITS

Well defined area, consistent with skin adhesive contact zone. May result in redness, edema, and or vesicles and manifest as rash type formation.

Skin irritation in response to an adhesive with repetitive removal or prolonged. May be allergic or non-allergic manifestation.

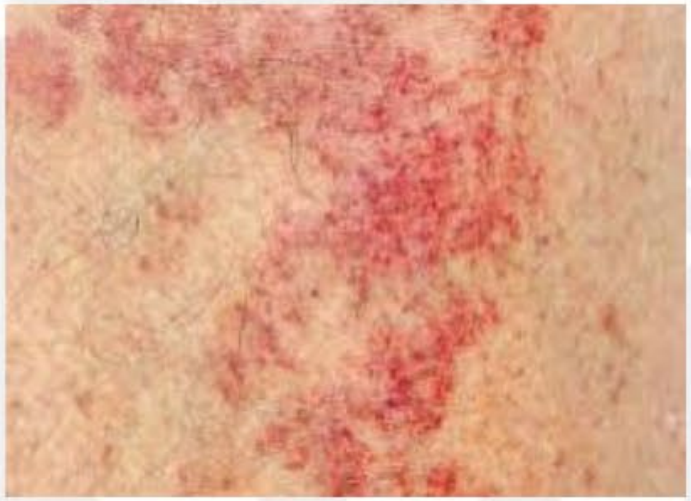




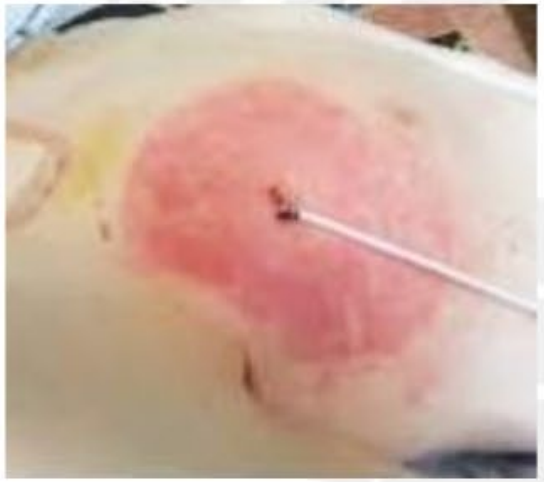


# DERMATITS

## Irritant Contact



## Allergic



- Well mediated immune response in and around the area of adhesive contact
- Pruritic response

- May persist a week or more

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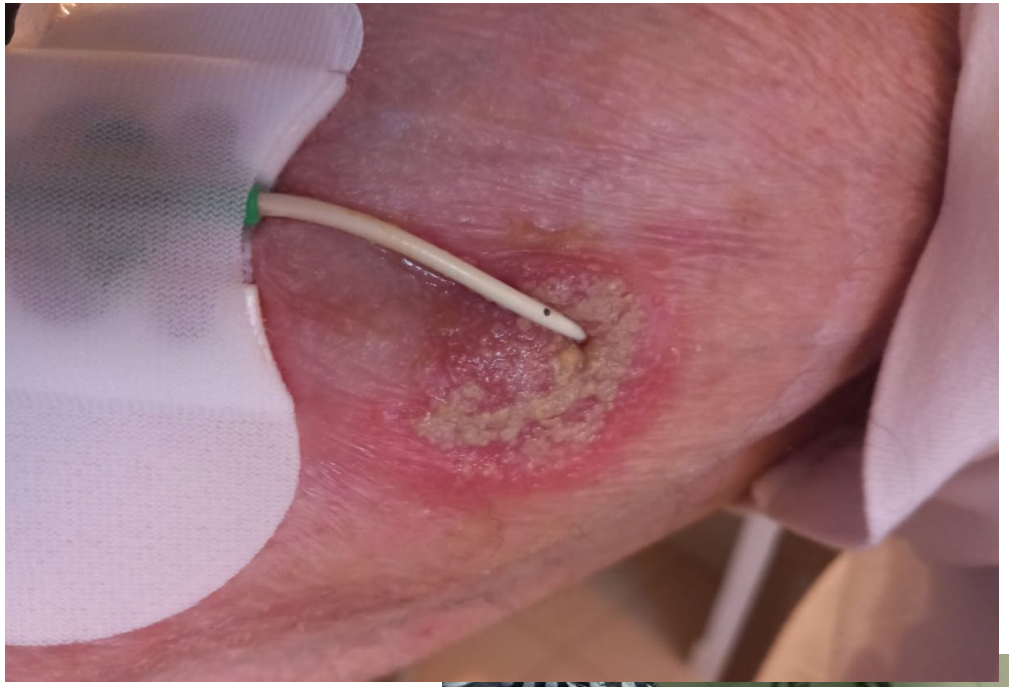

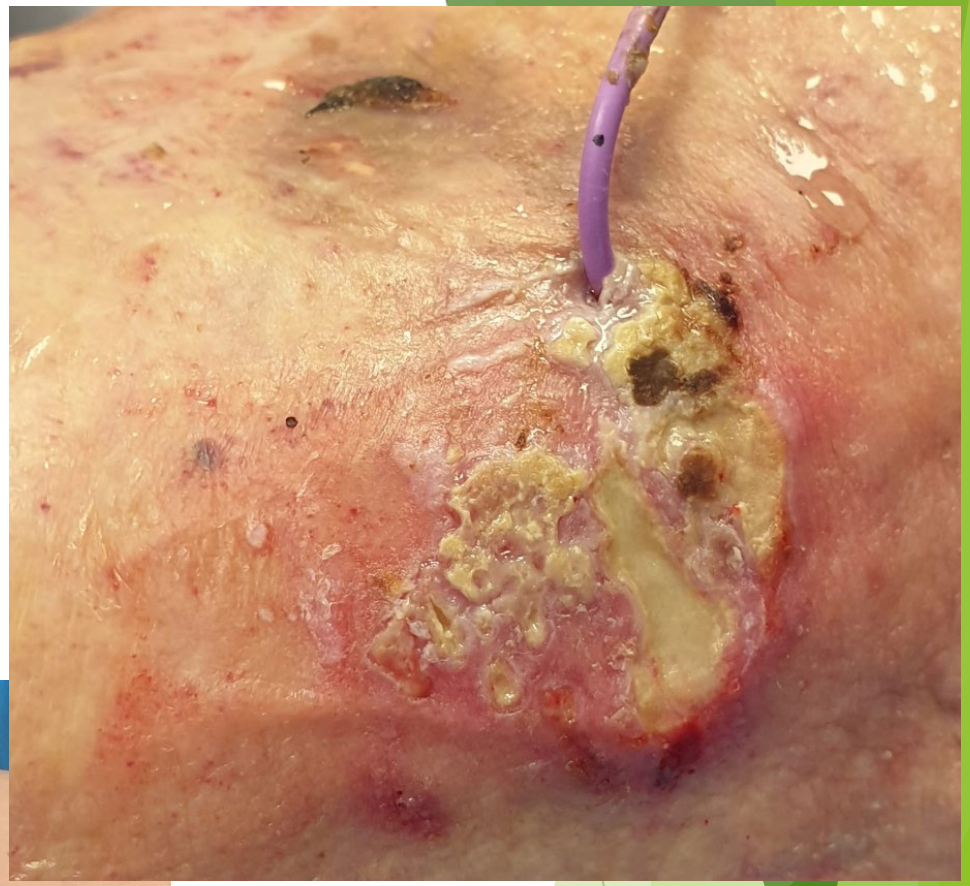

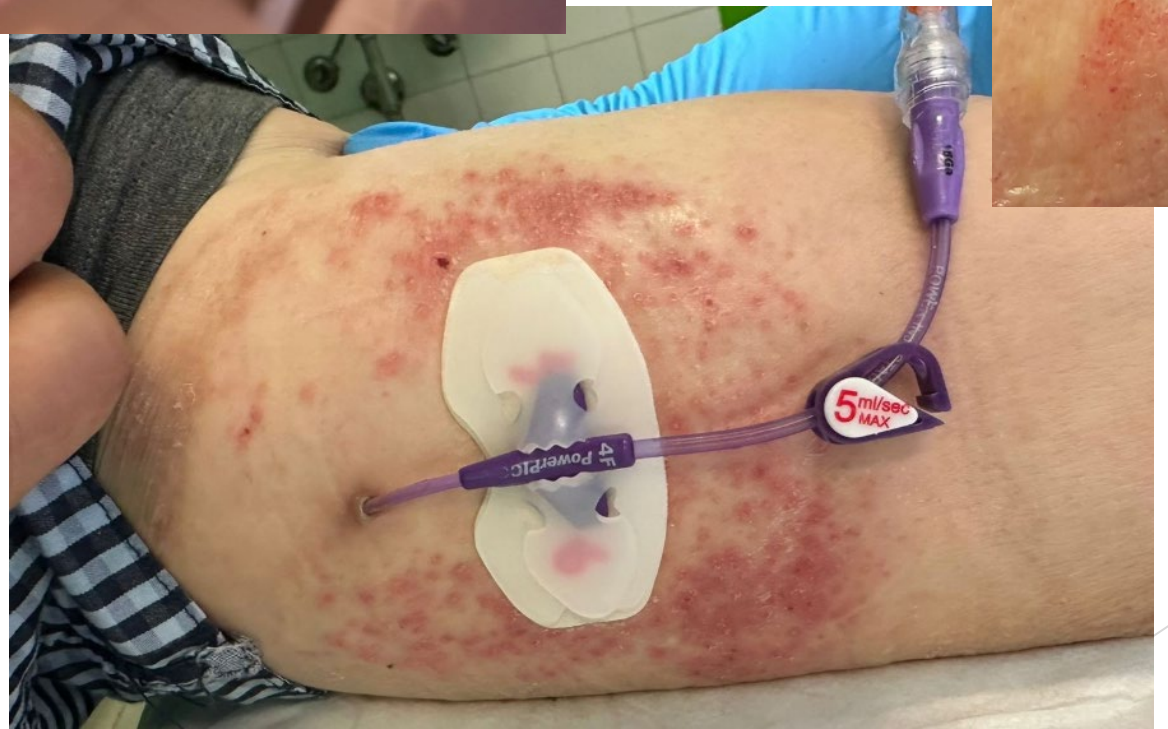
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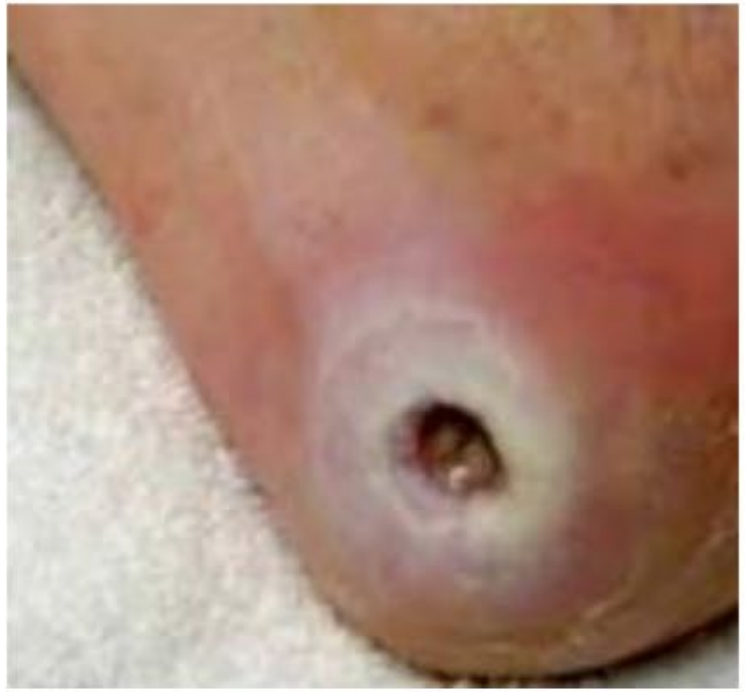
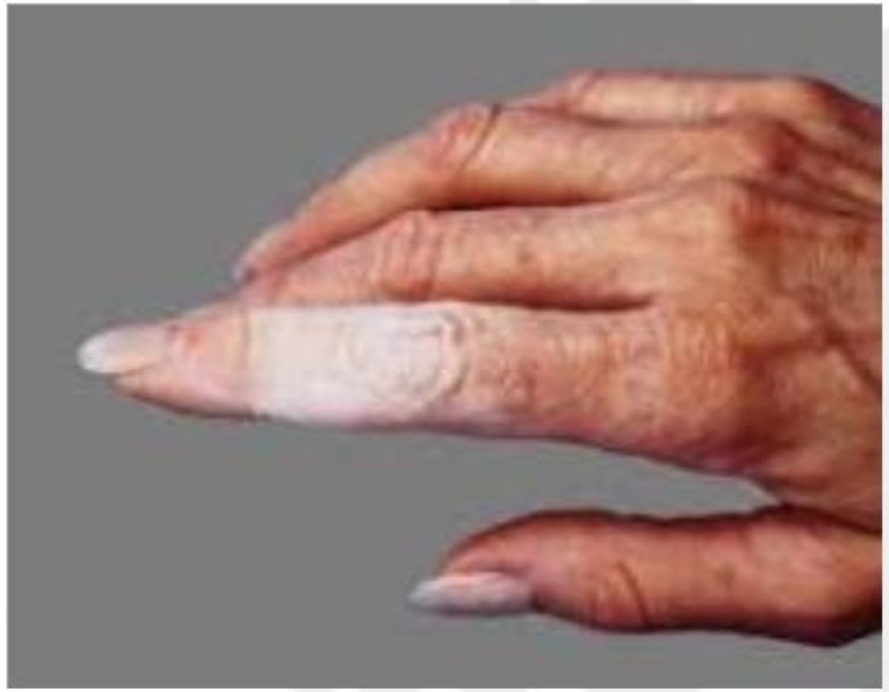




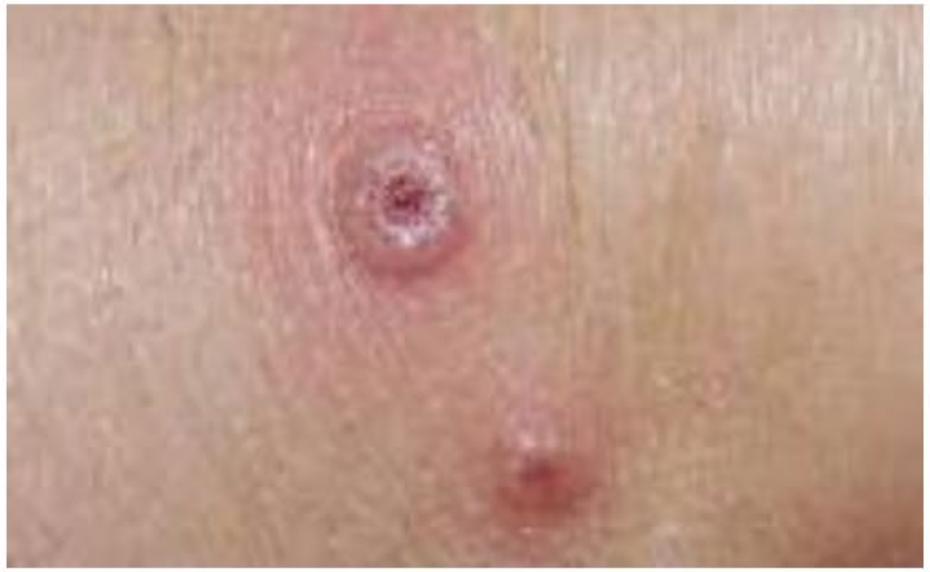
# OTHER

## Maceration

Moisture related skin injury in conjunction with a diaphoretic patient, and/or a non-breathable, occlusive dressing cover, bandage or dressing.

May resolve within a day or persist with defined area of skin injury, skin sloughing, or deadened skin requiring removal.

# OTHER



Skin irritation or infection from a hair follicle. Inflammation or infection in and/or around the follicle. May involve redness, drainage, vesicles and fungal contamination.

## Maceration

## Folliculitis

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# Development and Preliminary Validation of a Central Venous Access Device-Associated Skin Impairment Classification Tool Using Modified Delphi and Clinimetric Methods

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**TABLE 2** | The agreed central venous access device-associated skin impairment classification tool.

| Aetiology | CASI* Diagnosis | CASI* Definition | CASI* Signs and symptoms | Original definition reference(s) |
|---|---|---|---|---|
| Dermatitis | Contact dermatitis | Nonallergic reaction to chemical irritants. | Well-defined affected area correlates with the area of exposure; may be reddened and swollen and vesicles present; typically of shorter duration. | Broadhurst et al. (2017) |
| | Allergic dermatitis | Cell-mediated immunologic response to a component of a product (e.g., Chlorhexidine gluconate decontaminant and adhesive). | Typically area of erythematous, vesicular, pruritic dermatitis corresponding (initially) to an area of exposure and/or beyond, which may persist for up to a week. | Broadhurst et al. (2017) |

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| | | | | |
|---|---|---|---|---|
| Mechanical injury | Skin stripping | Separation or removal of one or more layers of the stratum corneum (outer layer of the epidermis or skin) occurring following removal of adhesives, tapes or dressing. | Lesions are frequently shallow and irregular in shape; skin may appear shiny or moist, dark pink or red with discomfort if exposed to nerve endings. May present as open lesions with erythema and/or blisters (intact or nonintact). | Broadhurst et al. (2017) |
| | Skin tears | A traumatic wound caused by mechanical forces, including removal of adhesives. Severity may vary by depth (not extending through the subcutaneous layer). | Visible separation of skin layers with underlying tissue exposed (dark pink or red in appearance), often with associated discomfort or pain. Skin tears are classified as type 1 no skin loss, type 2 partial skin/flap loss and type 3 total flap loss. | LeBlanc et al. (2018) |
| | Tension injury | Separation of the epidermal layers (e.g., epidermis from the dermis) caused by shear force. This can be caused as a result of distension of skin under an adhesive, tape or dressing; inappropriate strapping of tape or dressing during application, often when a joint or other area of movement is covered with an unyielding tape. | May present as intact blisters (with serum or blood-filled layer) or nonintact (burst fluid-filled layer) blisters. Often associated with discomfort or pain, especially on further contact. | Broadhurst et al. (2017) |

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**TABLE 2** | (Continued)

| Aetiology | CASI* Diagnosis | CASI* Definition | CASI* Signs and symptoms | Original definition reference(s) |
|---|---|---|---|---|
| Infection | Local infection | Symptomatic insertion site with organism(s) from skin or purulent fluid swab identified by a culture or nonculture based microbiologic testing method, which is performed for purposes of clinical diagnosis, or treatment catheter exit site yields a microorganism; OR other identifiers of local infection in accordance with National Health and Safety Network[a] (e.g., symptomatic patient, with a positive tip culture [>15 cfu]). Can occur with or without concomitant bloodstream infection. | Erythema, induration, heat and/or tenderness at/near the catheter exit site; may be associated with other signs and symptoms of infection, such as fever or purulent drainage emerging from the exit site. | Mermel et al. (2009) and European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance (2019) |
| | Other type of skin infection | Infection of the skin within the perimeter of the dressing, but not at the insertion site. Can include folliculitis, cellulitis, etc. | Individual signs and symptoms may vary depending on the type of skin infection. | |

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| | | | | |
|---|---|---|---|---|
| Pressure injury | Medical device-related pressure injuries | Result from the use of devices designed and applied for diagnostic and therapeutic purposes and nonmedical devices that inadvertently remain in contact with the skin. The resultant pressure injury generally conforms to the pattern of the device as a result of localised damage from the device to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear. | As per the categorisation below. | National Pressure Ulcer Advisory Panel (NPUAP), European Pressure Ulcer Advisory Panel (EPUAP), and PPIA (2019) |
| | Stage I pressure injury | Intact skin with nonblanchable redness of a localised area usually over a bony prominence. | Darkly pigmented skin may not have visible blanching; its colour may differ from the surrounding areas. The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. | |
| | Stage II pressure injury | Partial-thickness loss of dermis. | Presents as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister. | |
| | Stage III pressure injury | Full-thickness tissue loss. | Subcutaneous fat may be visible, but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss. | |

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| ɡnosis | CASI* Definition | CASI* Signs and symptoms | Original definition reference(s) |
|---|---|---|---|
| Stage IV pressure injury | Full-thickness tissue loss with exposed bone, tendon or muscle. | Slough or eschar may be present on some parts of the wound bed. Often include undermining and tunnelling. The depth of a stage IV pressure injury varies by anatomical location. | |
| Unstageable pressure injury | Full-thickness skin and tissue loss in which the base of the injury is covered by slough (yellow, tan, grey, green or brown) and/or eschar (tan, brown or black) in the wound bed. Until enough slough or eschar is removed to expose the base of the wound, the stage cannot be determined. Excludes pressure injury reclassified to stage III of IV after exposure/debridement. | Slough (yellow, tan, grey, green or brown) and/or eschar (tan, brown or black) present in the wound bed. | |
| Suspected deep tissue injury, depth unknown | Purple or maroon localised area of discoloured intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. | The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue. Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment. | |
| Complex clinical presentation | Complex clinical presentation | More than one aetiology and presentation and may include device-related pressure injury, mechanical injury, immunology-medicated reaction (e.g., dermatitis) or infection within the same CVAD site. May be difficult to determine primary and specific aetiology. | Individual signs and symptoms as above. These may overlap in symptomatology due to complex and interacting aetiologies. |

Abbreviation: CVAD, central venous access device.

[a]Central venous access device-associated skin impairment classification.

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**TABLE 5** | Inter-rater reliability for aetiology classifications.

| Aetiology classification | Percent agreement | Percent chance agreement | Gwet's AC2 | 95% low | 95% high |
|---|---|---|---|---|---|
| Contact dermatitis | 0.88 | 0.01 | 0.87 | 0.37 | 1.00 |
| Mechanical injuries | 0.94 | 0.01 | 0.94 | 0.64 | 1.00 |
| Infection | 1.00 | 0 | 1.00 | NA[a] | NA[a] |
| Device-related pressure injury | 1.00 | 0 | 1.00 | NA[a] | NA[a] |
| Complex clinical presentation | 0.96 | 0.09 | 0.96 | 0.91 | 0.99 |

*Note:* We used the evaluation criteria that are proposed by Ciccetti and Sparrow (1981): Fair = $k^*$ of 0.40–0.59; Good = $k^*$ of 0.60–0.74; and Excellent = $k^*$ of 0.75–1.00.
[a]Due to complete agreement.

**TABLE 6** | Inter-rater reliability of individual definitions and signs/symptoms.

| Outcome | Kappa | z | Prob>Z |
|---|---|---|---|
| Irritant contact dermatitis (1) | 0.97 | 23.23 | <0.01 |
| Allergic contact dermatitis (2) | 0.76 | 18.10 | <0.01 |
| Skin stripping (3) | 1.00 | 23.87 | <0.01 |
| Skin tears (4) | 1.00 | 23.87 | <0.01 |
| Tension blisters (5) | 1.00 | 23.87 | <0.01 |
| Local infection (6) | 0.94 | 22.36 | <0.01 |
| Other infection (e.g., folliculitis, cellulitis) (14) | 1.00 | 23.87 | <0.01 |
| Device-related pressure injury, stage I (7) | 1.00 | 23.87 | <0.01 |
| Device-related pressure injury, stage II (8) | 1.00 | 23.87 | <0.01 |
| Device-related pressure injury, stage III (9) | — | — | — |
| Device-related pressure injury, stage IV (10) | — | — | — |
| Device-related pressure injury, unstageable (11) | — | — | — |
| Device-related suspected deep tissue injury, depth unknown (12) | — | — | — |
| Complex clinical presentation (13) | 0.93 | 22.24 | <0.01 |
| Overall | 0.95 | 50.96 | <0.01 |

*Note:* We used the evaluation criteria that are proposed by Ciccetti and Sparrow (1981): Fair = $k^*$ of 0.40–0.59; Good = $k^*$ of 0.60–0.74; and Excellent = $k^*$

# Epidemiologia

**Table 3. Evidence on the occurrence of medical adhesive-related skin injury**

| Reference | Study design | Findings |
|---|---|---|
| Ousey and Wasek[46] | Survey of 918 UK-based wound-care health professionals | 71% said the occurrence of medical adhesive-related injuries was not reported in their facility<br>Only 31% were aware of the term 'medical adhesive-related skin injury' (sometimes abbreviated as MARSI) |
| Konya et al.[47] | Survey of 155 people aged ≥65 years in a long-term care facility in Japan | 24 people developed medical device related-skin injuries across 34 sites |
| Wang et al.[48] | Prevalence survey involving 232 patients in a paediatric intensive care unit in China | Over 2 weeks, the prevalence ranged from 25.53% to 54.17% (mean: 37.15%) |
| Farris et al.[49] | Survey of two inpatient acute care units (total number of beds: 65) in the US | Daily prevalence ranged from 3.4% to 25.0% (mean: 13.0%; median: 12.7%) |
| Zhao et al.[20] | Two-week prevalence survey involving 419 Chinese patients with vascular access devices (peripherally inserted central catheters) | Prevalence was 29.89% |

*Best practice consensus document on prevention. J .W. Care 2020*

J Wound Ostomy Continence Nurs.
2018 Jan/Feb;45(1):22-25. doi
10.1097/WON.0000000000000394.

**Medical Adhesive Related Skin Injury Prevalence at the Peripherally Inserted Central Catheter Insertion Site: A Cross-sectional, Multiple-Center Study**

Zhao H, He Y, Wei Q, Ying

**TABLE 2.**
**Prevalence of MARSI**

| Items | n (%) |
|---|---|
| Total MARSI | 137 (19.7) |
| Mechanical skin injury | [illegible] |
| CD | 103 (14.8) |
| Folliculitis | 7 (1.0) |
| Moisture-associated skin damage | 9 (1.3) |
| Types of mechanical skin injury | |
| Skin tear | 6 (0.9) |
| Skin stripping | 9 (1.3) |
| Tension injury/blister | 17 (2.4) |
| Others (subcutaneous ecchymosis) | 4 (0.6) |
| Severity of CD | |
| Mild | 46 (6.6) |
| Moderate | 39 (5.6) |
| Severe | 18 (2.6) |
| Skin tear category | |
| Category 1 | 3 (0.4) |
| Category 2 | 1 (0.1) |
| Category 3 | 2 (0.3) |

Abbreviations: CD, contact dermatitis; MARSI, medical adhesive–related skin injury.

**Medical adhesive-related skin injury in cancer patients: A prospective cohort study***

José Ferreira Pires-Júnior[I]
https://orcid.org/0000-0002-6019-0198
Tânia Couto Machado Chianca[I]
https://orcid.org/0000-0002-8313-2791
Eline Lima Borges[I]
https://orcid.org/0000-0002-0623-5308
Císsa Azevedo[I]
https://orcid.org/0000-0001-5881-5710
Giovana Paula Rezende Simino[I]
https://orcid.org/0000-0002-9814-3004

**Objective:** to estimate the incidence of medical adhesive-related skin injury in the peripheral venous catheter fixation region in critical cancer patients, to identify risk factors, and to establish a risk prediction model for its development. **Method:** a prospective cohort study with a sample of 100 adult and aged patients hospitalized in an intensive care unit. The data were analyzed using descriptive, bivariate and multivariate statistics with Cox regression. **Results:** the incidence of medical adhesive-related skin injury was 31.0% and the incidence density was 3.4 cases *per* 100 people-days. The risk factors

*Ferreira et al., 2021*

Review

JVA The Journal of Vascular Access

# The prevalence and risk factors of medical adhesive-related skin injury in cancer patients with peripherally inserted central catheter: A systematic review and meta-analysis

Jialu Li, Qiuxia Qian, Jinhan Nan, Wenyuan Li, Tong Zhang, Hongyan Zhang, Yuxia Ma and Lin Han

The Journal of Vascular Access
1–10

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| Study | Country | Number of patients (*n*) | Age (mean ± SD, years) | Tumor type | PICC duration | Comorbidities (%) | Type of adhesive used | Incidence of MARSI | Study center |
|---|---|---|---|---|---|---|---|---|---|
| Qi et al. (2024) | China | 340 | 59.6 ± 15.0 (males)/54.0 ± 15.6 (females) | Gynecological, hematological, respiratory, digestive, other | NA | NA | IV3000 (56.76%), Tegaderm HP (43.24%) | 9.7% (33/340) | Single-center |
| Wang et al. (a) (2023) | China | 1245 | Over 18 years old | Thoracic neoplasms, breast cancer, abdominal neoplasms, female reproductive system cancers, hemolymphatic system cancers, others. | 45.6% had an indwelling catheter for >90 days, 35.0% for 31–90 days, and 19.3% for ⩽30 days. | Allergic history (12.04%), history of dermatitis (4.01%), history of eczema (4.74%). | NA | 22% (274/1245) | Multi-center |
| Yang et al. (2023) | China | 382 | 49.0 (males)/50.0 (females) | Lung cancer, liver cancer, stomach cancer, breast cancer, pancreatic cancer, nasopharyngeal cancer | NA | Hypertension (48.55% males/50.00% females), diabetes (2.90% males/6.56% females) | Tegaderm™ HP transparent film (types 1679 and 1685) | 15.7% (60/382) | Single-center |
| Wang et al. (b) (2023) | China | 252 | 63.51 ± 7.93 | Lung cancer, esophageal cancer, other chest tumors | 116.63 ± 83.72 days | Hypertension (38.8%), diabetes (45.2%) | Tegaderm™ HP transparent film | 40.8% (103/252) | Single-center |
| Liu et al. (2023) | China | 233 | 52.5 ± 10.7 | Gastrointestinal cancer, lung cancer, head and neck cancer, breast cancer, lymphoma, other | 118.9 days (range: 3–302 days) | NA | NA | 11.6% (27/233) | Single-center |
| Li et al. (2023) | China | 1172 | 55.7 ± 13.9 | NA | NA | NA | NA | 24.1% (282/1172) | Single-center |
| Zhao et al. (2022) | China | 156 | Over 18 years old | NA | NA | NA | NA | 19.9% (31/156) | Single-center |
| Yang et al. (2022) | China | 382 | Over 18 years old | Lung cancer, liver cancer, breast cancer, stomach cancer, pancreatic cancer | 86.30 ± 6.73 days | NA | Types 1679 and 1685 from 3M company | 15.71% (60/382) | Single-center |
| Huang et al. (2020) | China | 264 | 56.48 ± 9.84 | Colon cancer | NA | NA | NA | 33.3% (88/264) | Single-center |
| Zhang et al. (2019) | China | 237 | 53.83 ± 13.12 | Lymphoma, ovarian cancer, digestive system cancer, endocrine system cancer, reproductive system cancer, immune system cancer, and other | 70.15 ± 25.53 days | NA | NA | 5.5% (13/237) | Single-center |
| Wang et al. (2019) | China | 396 | 59.6 ± 12.5 | Gynecological cancer, hematological cancer, respiratory cancer, digestive cancer, and others | NA | NA | NA | 26.8% (106/396) | Single-center |
| Zhao et al. (2018) | China | 679 | 48.86 (18–89) | Gynecological cancer, hematological cancer, respiratory cancer, digestive cancer, and others | NA | NA | NA | 19.7% (137/697) | Multi-center |
| Wang et al. (2018) | China | 200 | 45.35 ± 11.47 | Lung cancer | NA | NA | Tegaderm HP from 3M company | 31.5% (63/200) | Single-center |
| Lin et al. (2018) | China | 356 | 48.73 ± 9.41 | Breast cancer | NA | NA | NA | 26.4% (94/356) | Multi-center |
| Zhao et al. (a) (2017) | China | 153 | 41.81 ± 17.47 | Hematological cancer | NA | NA | Tegaderm HP from 3M company | 33.99% (52/153) | Single-center |
| Zhao et al. (b) (2017) | China | 419 | 51.1 (18–78) | Oncology patients | NA | NA | NA | 29.83% (125/419) | Single-center |
| Wang et al. (2020) | China | 116 | Over 18 years old | Oncology patients | NA | NA | NA | 30.17% (35/116) | Single-center |
| Zhu et al. (2019) | China | 270 | Over 18 years old | Oncology patients | NA | NA | NA | 7.41% (20/270) | Single-center |
| Lu et al. (2019) | China | 187 | Over 18 years old | Oncology patients | NA | NA | NA | 33.15% (62/187) | Single-center |
| Wu et al. (2018) | China | 972 | Over 18 years old | Oncology patients | NA | NA | NA | 8.23% (80/972) | Single-center |

PICC: peripherally inserted central catheter; MARSI: medical adhesive-related skin injury; NA: no available.

Review

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The Journal of Vascular Access
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**Jialu Li, Qiuxia Qian, Jinhan Nan, Wenyuan Li, Tong Zhang, Hongyan Zhang, Yuxia Ma and Lin Han**

## Abstract

**Background:** Medical adhesive-related skin injury (MARSI) is a significant but underreported complication, particularly in cancer patients with peripherally inserted central catheters (PICC). This systematic review and meta-analysis aimed to estimate the prevalence of MARSI and identify key risk factors in this patient population.

**Methods:** A systematic search of PubMed, Embase, the Cochrane Library, CNKI, Wanfang, and VIP was conducted to identify studies reporting MARSI prevalence and risk factors in cancer patients with PICC. Pooled prevalence estimates and odds ratios (ORs) for risk factors were calculated using a random-effects model. Heterogeneity was assessed using the $I^2$ statistic, and subgroup analyses were performed to explore potential sources of heterogeneity. Publication bias was assessed using funnel plots and Egger's test.

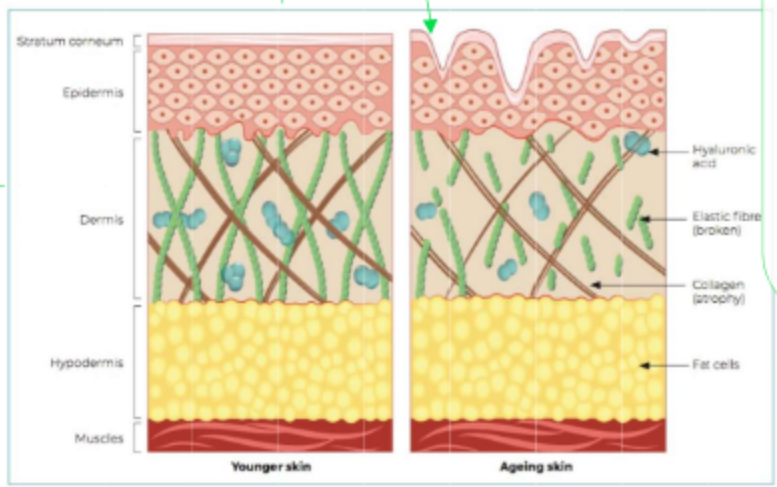
**Results:** A total of 20 studies met the inclusion criteria, encompassing 8411 patients. The pooled prevalence of MARSI was 22% (95% CI: 18–26), with substantial heterogeneity across studies ($I^2 = 96.3\%$). Subgroup analysis revealed that retrospective studies reported higher prevalence (25%) compared to prospective studies (16%). Key risk factors included advanced age (OR: 2.593, 95% CI: 1.322–5.089), higher BMI (OR: 2.927, 95% CI: 2.029–4.223), pre-existing skin conditions (OR: 2.487, 95% CI: 1.693–3.650), and the use of transparent film dressings (OR: 3.228, 95% CI: 2.086–5.001). Funnel plot and Egger's test showed no significant publication bias.

**Conclusions:** MARSI is prevalent in cancer patients with PICC. Modifiable risk factors should guide prevention strategies, including careful adhesive selection and regular skin assessments to improve patient outcomes.


# MARSI, Fattori di rischio

## INTRINSECI

- Età: alto rischio neonati e **anziani**
- Razza
- Disidratazione
- Malnutrizione
- Patologie dermatologiche
- Edema
- Immunosoppressione
- Diabete
- Insufficienza renale




## ESTRINSECI

- Secchezza della cute: es. detergenti aggressivi
- Prolungata esposizione all'umidità
- Radioterapia
- Esposizione a luce ultravioletta
- Ripetuta rimozione dispositivi adesivi (medicazioni/cerotti),
- Prurito
- Uso prolungato di: Corticosteroidi, Antiinfiammatori, Anticoaugulanti e Chemioterapici

*Jan Hitchcock, 2021*

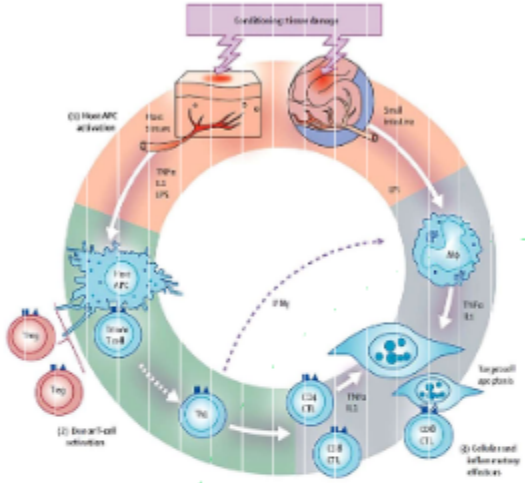
# Paziente oncologico, chemioterapia e MARSI

Accesso venoso centrale, aplasia midollare prolungata, tossicità cutanea

| | |
|---|---|
| Metotrexato, Vinblastina, Fluoro-Uracile 5-FU, Doxorubicina, Dacarbazina Bleomicina, Idrossiurea | **Fotosensibilità**:<br>• Iperpigmentazione, Eruzione cutanea, Rash<br>• Zone esposte alla luce solare |
| Metotrexato, Bleomicina, Busulfan, Etoposide, Arsenico T. | **Eritema Multiforme**:<br>• Macule, Papule, Vescicole, Bolle, desquamazione cutanea<br>• Distribuzione simmetrica e concentrica |
| Bleomicina, Asparaginasi, Anticorpi moclonali (Rituximab o Trastuzumab) | **Ipersensibilità cutanea**:<br>• Rash, Pomfi, striature eritematose<br>• Reazione cutanea mediata Ige, può evolvere in anafilassi sistemica |
| Metotrexato, Doxorubicina | **Richiamo delle radiazioni**:<br>• Eruzioni Maculo Papulari, Rash, Vescicole, Desquamazione, Necrosi<br>• Reclutamento radioattività tessuti esposti a Radio Terapia |

Viale P. H. (2006). *Chemotherapy and cutaneous toxicities: implications for oncology nurses. Seminars in oncology nursing.*/Sanborn, R. E., & Sauer, D. A. (2008). *Cutaneous reactions to chemotherapy: commonly seen, less described, little understood. Dermatologic clinics*

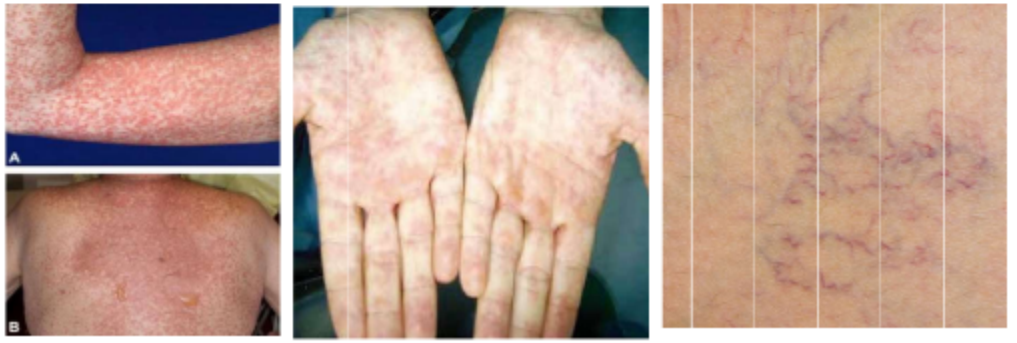
# Graft Versus Host Disease (GVHD)



- La più frequente complicanza del trapianto di midollo
- conseguenza dell'attivazione delle cellule T del donatore nei confronti del ricevente
- Compare nonostante la profilassi
- Anche se il donatore è perfettamente *matched*

**CUTE**

- Poichilodermia (atrofia, alterazione pigmentazione, teleangectasia)
- Eritema
- *Rash* maculo papulare
- Lesioni papulo squamose
- Prurito
- Onicolisi



*Review of Graft Versus Host Disease*, Ramachandran et al., 2019

Infusion Therapy Standards of Practice

Barbara Nickel, APRN-CNS, CCRN, CRNI®
Lisa Gorski, MS, RN, HHCNS-BC, CRNI®, FAAN
Tricia Kleidon, PhD(c), MNSc, RN
Amy Kyes, MSN, APRN, AG-CNS, CV-BC™, CRNI®
Michelle DeVries, MPH, CIC, VA-BC, CPHQ, FAPIC
Samantha Keogh, PhD, RN, FACN
Britt Meyer, PhD, RN, CRNI®, VA-BC, NE-BC
Mary Jo Sarver, MSN, ARNP, AOCN, CRNI®, LNC, VA-BC
Rachael Crickman, DNP, ARNP-CNS, AOCNS, OCN, RN
Jenny Ong, PharmD
Simon Clare, MRes, BA, RGN
Mary E. Hagle, PhD, RN-RB, FAAN

9TH EDITION
REVISED 2024

## TABLE 1

# Population Risks for CASI

| Population | CASI Risk Factors Include (But Are Not Limited To) |
|---|---|
| General | Extremes of age, decreased mobility, history of CASI, dwell time of VAD, obesity, low BMI, altered cognitive status, malnutrition, dehydration, comorbidities (eg, diabetes, infection, renal insufficiency, venous insufficiency, immune deficiency), smoking, history of chronic dermatological conditions (including allergies), ethnicity (eg, darker pigment), medications (eg, chemotherapy, long-term steroid use, anticoagulants), use of phototherapy.[1,2,4-6,9,10,13-17] (II)<br>• Dry skin has been found to be an independent risk factor for MARSI, with one study noting that patients with dry skin had over 5-fold greater risk of MARSI.[2,13,14,18,19] (IV) |
| Neonates | Immature stratum corneum (not fully mature until at least 34 weeks' gestation), immature immunity, cardiovascular compromise.[5,20-22] (IV) |
| Pediatrics | Particularly critically ill, have high reported rates of contact dermatitis and skin injury due to impaired dressing integrity.[8,12,23] (III)<br>• In an observational study in the pediatric intensive care unit, MARSI occurred in 58.3 per 100 cases.[12] (IV) |
| Older | Loss of dermal matrix and subcutaneous tissue, epidermal thinning, reduced cohesion between dermis and epidermis, suboptimal hydration, and reduced vasculature and tensile strength of skin.[5,14,18,24] (IV) |
| Critically Ill | Altered immunity, malnutrition, hemodynamic instability (reduced tissue perfusion), longer length of stay, low Braden scale.[2,10,14,18,25] (IV)<br>• Edema was found to be predictive of MARSI risk.[10] (IV) |
| Oncology | Hormone use, chemotherapy-induced skin toxicity, female gender.[6,10,16,17,26-28] (IV) |

*BMI, body mass index; CASI, CVAD-associated skin impairment; MARSI, medical adhesive-related skin injury; VAD, vascular access device.*

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EMPIRICAL RESEARCH QUANTITATIVE

NursingOpen Open Access WILEY

# Development and validation of medical adhesive-related skin injury risk assessment scale at peripherally inserted central catheter insertion site in oncology patients

Yuling Li[1] | Huijiao Zhang[2] | Shuqing Zhang[3] | Xiaoya Hou[4] | Lina Feng[5]

TABLE 2 Weight and assignment of MARSI risk assessment entries for PICC insertion sites in oncology patients.

| | Entries (weight) | | Importance score ($\bar{x} \pm s$) | Coefficient of variation | Portfolio weight | Assignment (score) | I-CVI |
|---|---|---|---|---|---|---|---|
| Patient general condition | I-1 age (0.212) | II-1 50–65 years old (0.250) | 4.16 ± 0.86 | 0.207 | 0.001 | 1 | 1.00 |
| (0.092) | | II-2 ≥ 65 years old (0.750) | 4.45 ± 0.81 | 0.182 | 0.015 | 2 | 1.00 |
| | I-2 Past medical history (0.212) | II-3 History of skin allergies (including allergies to disinfectants and dressings) (0.614) | 4.97 ± 0.18 | 0.036 | 0.012 | 1 | 1.00 |
| | | II-4 History of drug allergy (0.117) | 4.23 ± 0.92 | 0.217 | 0.002 | 1 | 1.00 |
| | | II-5 History of MARSI (0.268) | 4.65 ± 0.76 | 0.162 | 0.005 | 1 | 1.00 |
| | I-3 Nutritional status (0.511) | II-6 Body mass index (BMI) <18.5 (0.110) | 4.16 ± 0.90 | 0.216 | 0.005 | 1 | 1.00 |
| | | II-7 BMI ≥28 (0.072) | 4.03 ± 1.14 | 0.187 | 0.003 | 1 | 0.83 |
| | | II-8 Albumin <35 mg/dL (0.369) | 4.58 ± 0.56 | 0.123 | 0.017 | 2 | 1.00 |
| | | II-9 Anaemia (0.185) | 4.39 ± 0.76 | 0.173 | 0.009 | 1 | 0.83 |
| | | II-10 Dehydration[a] (0.264) | 4.45 ± 0.72 | 0.162 | 0.012 | 1 | 1.00 |
| | I-4 Mental state (0.066) | II-11 Negative emotions (1.000) | 3.58 ± 1.39 | 0.237 | 0.006 | 1 | 0.83 |
| Disease factors | I-5 Basic illness | II-12 Diabetes (0.177) | 4.58 ± 0.67 | 0.147 | 0.024 | 2 | 1.00 |
| (0.184) | (0.750) | II-13 Skin disease[b] (0.507) | 4.94 ± 0.25 | 0.051 | 0.070 | 7 | 1.00 |
| | | II-14 Autoimmune diseases (0.250) | 4.65 ± 0.80 | 0.172 | 0.035 | 4 | 1.00 |
| | | II-15 Renal insufficiency (0.065) | 4.03 ± 0.98 | 0.187 | 0.009 | 1 | 1.00 |
| | I-6 oncology type | II-16 Blood system (0.594) | 4.16 ± 1.07 | 0.207 | 0.027 | 3 | 1.00 |
| | (0.250) | II-17 Reproductive system (0.157) | 3.71 ± 1.13 | 0.222 | 0.007 | 1 | 0.83 |
| | | II-18 Digestive system (0.249) | 3.81 ± 0.98 | 0.219 | 0.011 | 1 | 0.83 |
| Skin condition | I-7 Oedema (0.528) | II-19 Moderate oedema[c] (0.250) | 4.61 ± 0.50 | 0.107 | 0.055 | 6 | 1.00 |
| (0.418) | | II-20 Severe oedema[d] (0.750) | 4.90 ± 0.40 | 0.081 | 0.166 | 17 | 1.00 |
| | I-8 Dry skin (0.140) | II-21 Localized skin exfoliation (0.117) | 4.13 ± 0.89 | 0.214 | 0.007 | 1 | 0.83 |
| | | II-22 Extensive skin exfoliation (0.268) | 4.55 ± 0.62 | 0.137 | 0.016 | 2 | 1.00 |
| | | II-23 Cracked skin (0.614) | 4.81 ± 0.48 | 0.099 | 0.036 | 4 | 1.00 |
| | I-9 Wet skin (0.333) | II-24 Mild moisture[e] (0.25) | 4.52 ± 0.57 | 0.126 | 0.035 | 4 | 1.00 |
| | | II-25 Severe moisture[e] (0.75) | 4.90 ± 0.30 | 0.061 | 0.104 | 10 | 1.00 |
| Therapeutic factors (0.184) | I-10 Treatment mode (0.333) | II-26 Chemoradiotherapy (0.333) | 4.29 ± 0.94 | 0.219 | 0.020 | 2 | 1.00 |
| | | II-27 Chemotherapy cycle ≥ four times (0.667) | 4.52 ± 0.63 | 0.138 | 0.041 | 4 | 1.00 |
| | I-11 Drug factors | II-28 Chemotherapy drugs (0.365) | 4.61 ± 0.62 | 0.133 | 0.045 | 5 | 1.00 |
| | (0.667) | II-29 Targeted drugs (0.059) | 3.97 ± 1.11 | 0.248 | 0.007 | 1 | 1.00 |
| | | II-30 Anticoagulant drugs (0.084) | 4.00 ± 1.16 | 0.250 | 0.010 | 1 | 1.00 |
| | | II-31 Corticosteroids (0.174) | 4.26 ± 0.73 | 0.171 | 0.021 | 2 | 1.00 |

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# Development and validation of medical adhesive-related skin injury risk assessment scale at peripherally inserted central catheter insertion site in oncology patients

Yuling Li[1] | Huijiao Zhang[2] | Shuqing Zhang[3] | Xiaoya Hou[4] | Lina Feng[5]

## Abstract

**Aims and objectives:** To construct a risk assessment scale for medical adhesive-related skin injuries (MARSI) at the peripherally inserted central catheter (PICC) insertion site in oncology patients and test its reliability and validity.

**Design:** The STARD 2015 statement guided this study.

**Methods:** Literature research and a modified Delphi method were adopted in this study. A total of 31 experts participated in two rounds of consultation to build the assessment scale. A convenient sampling method was used to select 195 oncology patients at the PICC clinic from January to June 2022. Inter-rater reliability was used to test the reliability of the scale. Validity was evaluated using the content validity index (CVI) and predictive validity.

**Results:** After the two rounds of consultation, the assessment scale with five dimensions and 13 primary entries and 36 secondary entries was developed, and the expert authority coefficients for both were 0.90. The inter-rater reliability was 0.968. The CVIs of the items ranged from 0.83 to 1.00. The area under the subject's work characteristic curve was 0.757, and the sensitivity and specificity of the scale were 80.0% and 65.6%, respectively, at a cutoff score of 15.5.

TABLE 2 (Continued)

| | Entries (weight) | | Importance score ($\bar{x} \pm s$) | Coefficient of variation | Portfolio weight | Assignment (score) | I-CVI |
|---|---|---|---|---|---|---|---|
| | | II-32 Nonsteroidal Anti-inflammatory Drugs (0.084) | 4.00 ± 0.93 | 0.233 | 0.010 | 1 | 1.00 |
| | | II-33 Immunosuppressant (0.235) | 4.42 ± 0.67 | 0.152 | 0.029 | 3 | 1.00 |
| Catheter insertion factors | I-12 Number of punctures (0.250) | II-34 ≥ two times (1.000) | 4.32 ± 1.19 | 0.234 | 0.030 | 3 | 1.00 |
| (0.121) | I-13 Days with tube | II-35 three—six months (0.250) | 4.29 ± 0.82 | 0.192 | 0.023 | 2 | 1.00 |
| | (0.750) | II-36 > six months (0.750) | 4.74 ± 0.51 | 0.108 | 0.068 | 7 | 1.00 |

[a]Manifested as dry mouth, loose skin, thick and dry body secretions, little or no urine and dark urine, headache, dizziness, etc.
[b]Including eczema, dermatitis, psoriasis, and epidermolysis bullosa.
Refers to oedema in the loose tissues of the whole body, obvious or deep tissue depression may appear after acupressure, and the recovery is slow.
Refers to the severe oedema of the whole body tissue, and the tight shiny skin on the lower part of the body.
Place a 20×20 double-layered paper towel at the skin of the catheter insertion side; mild humidity is less than half the area of sweat-impregnated paper towels, and more than half is severe moisture.

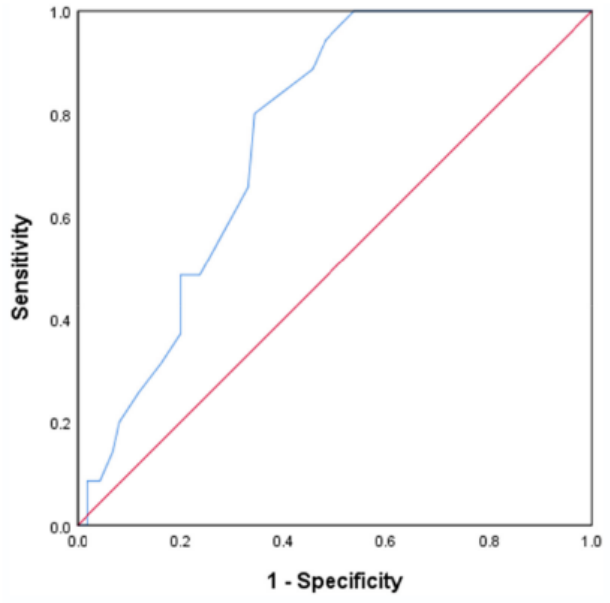


FIGURE 1 Subject work characteristic (ROC) curve of the scale.

*J Wound Ostomy Continence Nurs*. 2017;44(3):211-220.
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# Management of Central Venous Access Device–Associated Skin Impairment

## *An Evidence-Based Algorithm*

Daphne Broadhurst ◆ Nancy Moureau ◆ Amanda J. Ullman ◆ The World Congress of Vascular Access (WoCoVA) Skin Impairment Management Advisory Panel

**TABLE 1.**
**Summary of Literature Review Articles**

| Author (Year) | Country, Organization | Design | Scope of Article |
|---|---|---|---|
| Bourke et al (2009)[17] | United Kingdom, British Association of Dermatologists | Clinical practice guideline | Identification and management of contact dermatitis |
| Brandt et al (1996)[25] | United States, NA | Randomized controlled trial | Comparison of dressing types for hematology, oncology patients requiring bone marrow transplantation |
| Haffejee et al (1991)[26] | Durban, NA | Prospective cohort | Comparison of hydrocolloid dressings for CVADs used for parenteral nutrition |
| Infusion Nurses Society (2011)[19] | United States, Infusion Nurses Society | Clinical practice guideline | Standards of practice for infusion nurses |
| Kramer et al (2011)[20] | United States, NA | Clinical practice guideline | Management of CVADs for patients in the home care setting |
| Kutzscher (2012)[8] | United States, NA | Expert opinion | Management of irritant dermatitis for patients with peripherally inserted central catheters |
| LeBlanc and Baranoski (2011)[9] | United States, NA | Clinical practice guideline | Identification and management of patients at risk for skin tears |
| McNichol et al (2013)[7] | United States, NA | Clinical practice guideline | Assessment, prevention, and management of adhesive-related skin injuries |
| Mermel et al (2009)[18] | United States, Infectious Diseases Society of America | Clinical practice guideline | Diagnosis and management of intravascular catheter-related infections |
| Nikoletti et al (1999)[24] | Australia, NA | Randomized controlled trial | Comparison of dressing types for patients in intensive care settings with multilumen, percutaneous CVAD |
| O'Grady et al (2011)[5] | United States, Centers for Disease Control and Prevention (CDC) | Clinical practice guideline | Prevention of intravascular catheter-related infections |
| Pittiruti et al (2009)[22] | Europe, European Society for Clinical Nutrition and Metabolism (ESPEN) | Clinical practice guideline | Insertion, management, and diagnosis of complications associated with CVADs used for parenteral nutrition |
| Royal College of Nursing (2010)[21] | United Kingdom, Royal College of Nursing | Clinical practice guideline | Standards of practice for infusion therapy |
| Thayer (2012)[2] | United States, NA | Expert opinion | Skin damage associated with vascular access devices |
| Waterhouse and Winterbottom (2010)[27] | United Kingdom, NA | Prospective cohort | Identification of CVAD site infections across ethnic groups |
| Wittich (2001)[28] | United Kingdom, NA | Expert opinion | Management of exit sites for patients with hemocatheters undergoing dialysis |
| World Union of Wound Healing Societies (2008)[23] | International, World Union of Wound Healing Societies | Clinical practice guideline | Identification and management of wound infections |

Abbreviations: CVAD, central venous access device; NA, not applicable.

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## *An Evidence-Based Algorithm*

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CE 1.5 ANCC Contact Hours

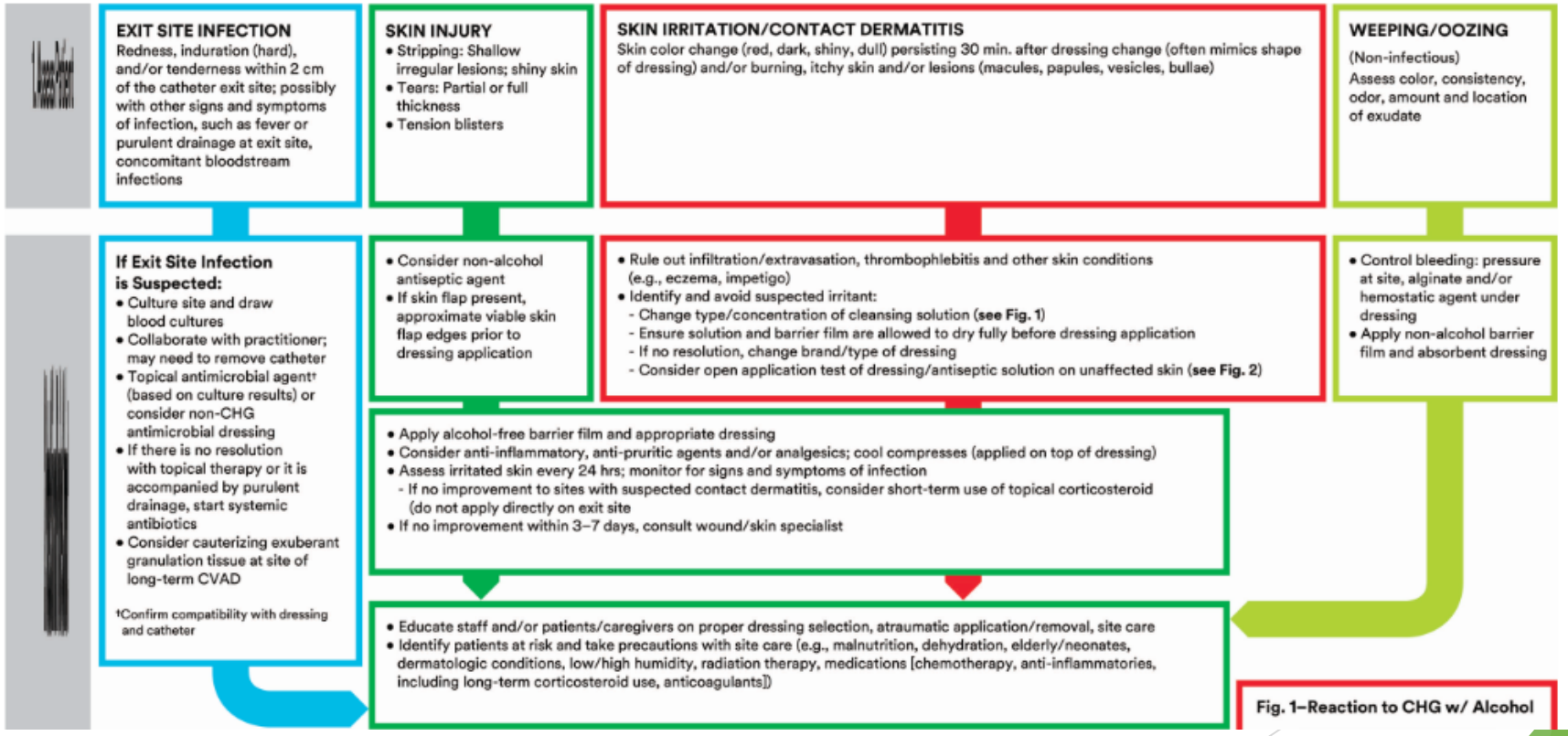


Fig. 1–Reaction to CHG w/ Alcohol

Wound Care

*J Wound Ostomy Continence Nurs.* 2017;44(3):211-220.
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# Management of Central Venous Access Device–Associated Skin Impairment

## *An Evidence-Based Algorithm*

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CE 1.5 ANCC Contact Hours

including long-term corticosteroid use, anticoagulants])

**Dressing Usage Guide for CVAD Skin Impairment Management**

| Dressing* | Skin Injury (e.g., tear/blister) | Skin Irritation | Drainage | | | Able to see site |
|---|---|---|---|---|---|---|
| | | | Low | Med | High | |
| Non-adherent non-woven gauze** (if skin intact or topical agent applied) | | • | • | | | |
| Transparent film | | • | | | | Yes |
| Absorbent clear acrylic | • | • | • | • | • | Yes |
| Hydrocolloid (do not apply directly on CVAD exit site) | | • | • | • | | |
| Foam (silicone or low-tack) | • | • | • | • | • | |
| Alginate (also has hemostatic properties) | • | | | • | • | |
| Skin glue (2-octylcyanoacrylate alcohol-free topical bandage) + Cover Dressing | if skin flap can be approximated | | | | | Yes |
| Antimicrobial dressing*** | | | • | • | • | |

- Apply sterile alcohol-free skin barrier film prior to dressing (let dry before applying dressing)
- If skin damage/drainage is away from the exit site, isolate wound and exudate from exit site: apply absorbent dressing over area of injury and transparent dressing over exit site and prepped skin.
- If exudate leakage, use a different dressing with higher fluid handling capacity

*Stabilize catheter with securement device/dressing
**Does not provide a microbial barrier
***Assess manufacturer's contraindications. Recommend consult wound/skin specialist and/or physician.

**Fig. 1–Reaction to CHG w/ Alcohol**

Try CHG w/o alcohol
↓
No improvement?
↓
Try Povidone Iodine
↓
No improvement?
↓
Try sterile normal saline

**Fig. 2–Open Application Test**

1. Apply product to forearm
2. Monitor for 30–60 min.
3. Reassess in 3–4 days for signs of dermatitis

CVAD-associated skin impairment (CASI) algorithm.

# Prevenzione e Gestione MARSI

## Adhesive

| Tipologie di adesivi utilizzati nei dispositivi medici | | |
|---|---|---|
| **Tipo** | Vantaggi | Svantaggi |
| **Silicone** | • Biocompatibilità Cutanea<br>• Rimozione Atraumatica<br>• Riposizionabile<br>• Medicazioni Ripetute<br>• Resistente e Permeabile<br>• Latex-free<br>• Ipoallergenico | • >costoso vs Acrilico<br>• <resistente nell'assicurare "critical tubing"<br>• <resistente all'umidità vs acrilico |
| **Acrilico** | • Più economico vs silicone<br>• Alta aderenza<br>• Biocompatibilità Cutanea<br>• Traspirante<br>• Resistente a calore e umidità<br>• Latex-free | • Non riposizionabile<br>• >traumi cutanei durante la rimozione<br>• <stabilità nel tempo |
| **Idrocolloide** | • Gestione modesti essudati<br>• Buona tenuta<br>• Biocompatibilità cutanea | • Ridotta tenuta all'>dell'umidità<br>• Traumi cutanei nel tempo |

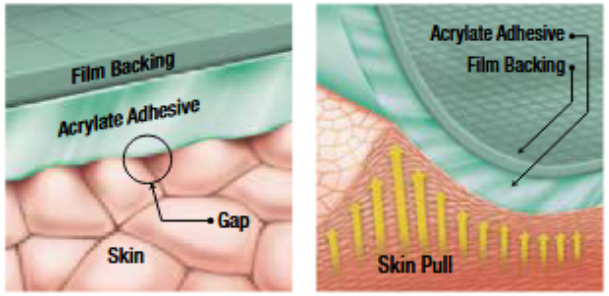
*Tipologie Adesivi, fonte Fumarola et al., 2020*

## Adhesive Removers

- **Alcohol-Based**
- **Silicone-Based**

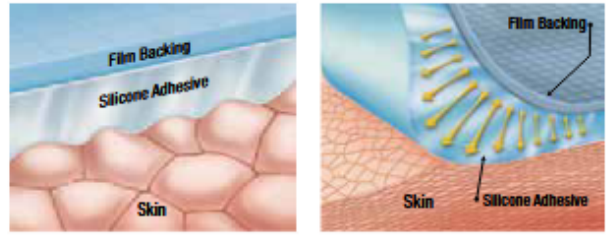
### Acrylate tape adhesive

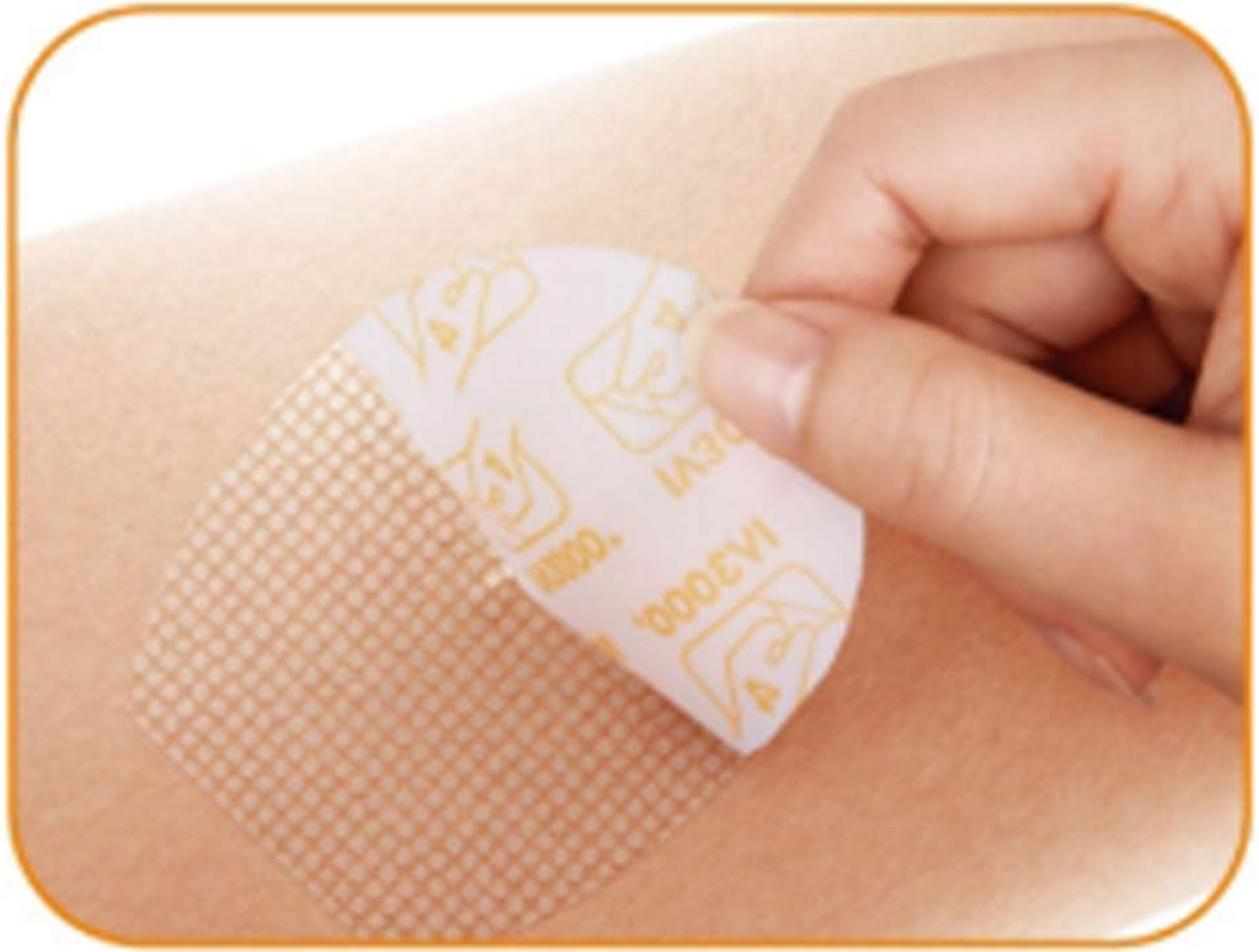
Acrylate adhesive initially adheres to the skin cells closest to the top, leaving some gaps in adherence. Over time the adhesive fills the gaps and strengthens as it forms a tighter bond with the skin, making it ideal for situations where increased securement or longer wear are needed.




### Silicone tape adhesive

Silicone adhesive has a lower surface tension, allowing the silicone to conform quickly to the skin's natural profile. The adhesive strength is more consistent over time, maintaining the same level of adhesion from application through to removal. This makes silicone adhesive the preferred choice for those patients with at-risk or fragile skin or when more frequent dressing changes are required.





*Original research article*

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# Comparing test methods for moisture-vapor transmission rate (MVTR) for vascular access transparent semipermeable dressings

**Paul Bainbridge[1], Paul Browning[2], Stéphanie F Bernatchez[3], Casey Blaser[3] and Guido Hitschmann[1]**

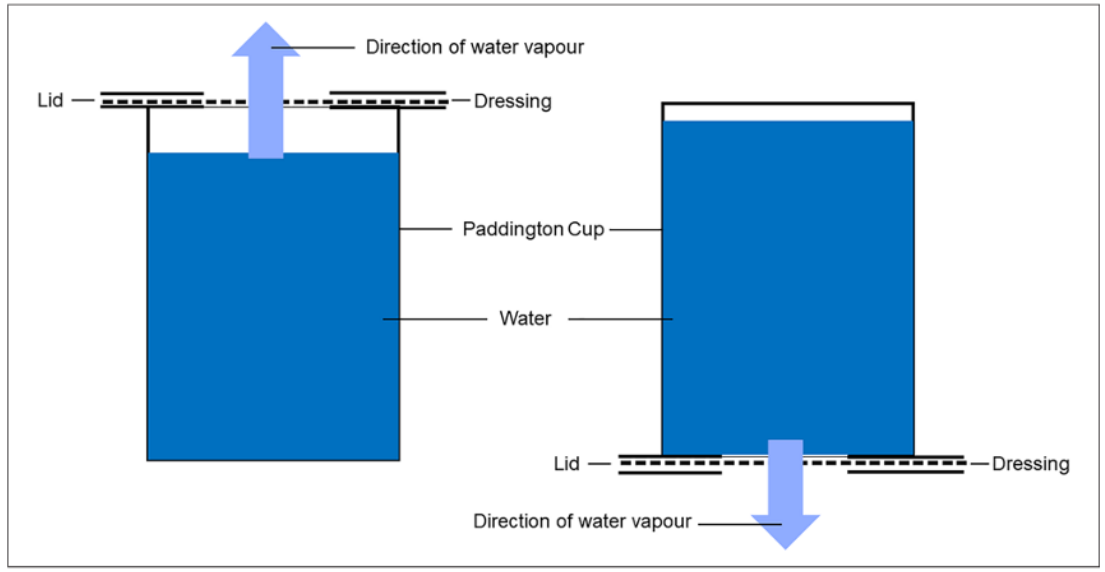



**Figure 2.** Left: Test method EN 13726-2:2002 section 3.2: Paddington cup in the upright orientation. The standard states that this test is intended for the evaluation of the MVTR of a wound dressing when in contact with water vapor (upright method). The standard specifies this test method as being appropriate for "thin film dressings."[13] Right: Test method EN 13726-2:2002 section 3.3: Paddington cup in an inverted orientation. The standard states that this test is intended for the evaluation of the MVTR of a waterproof wound dressing when it is in contact with liquid (inverted method).[13]

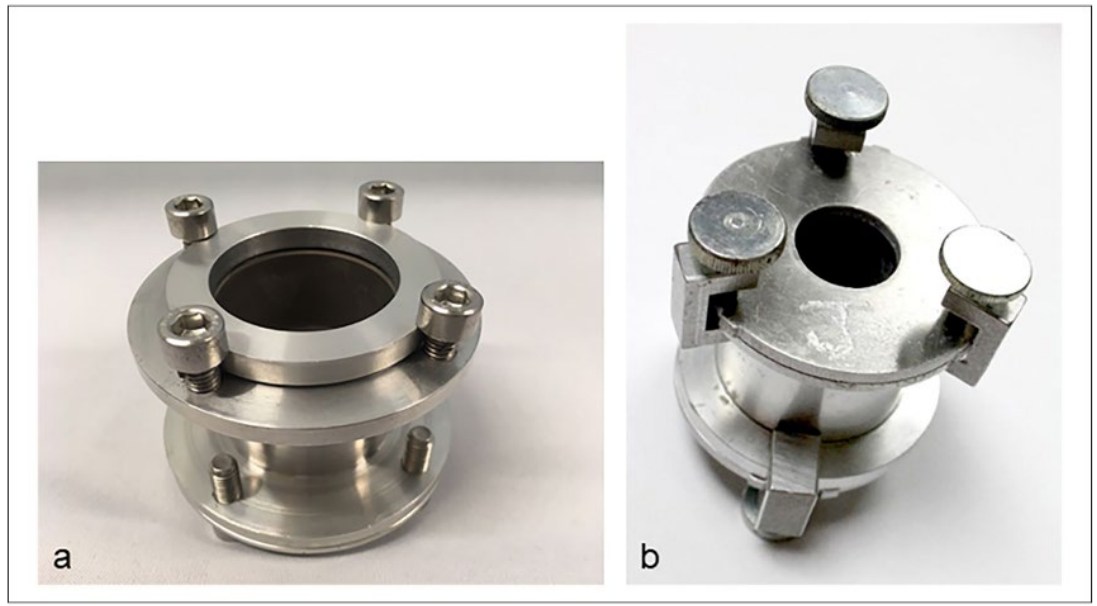



**Figure 1.** (a) Standard Paddington cup. The film dressing is clamped across the open annular plate which provides a 10 $cm^2$ area for evaporation. A volume of 20 ml is used. (b) Modified cup used in this study (3.14 $cm^2$ area for evaporation; a volume of 10 ml is used).
Water is added to the cup leaving a 5 ± 1 mm air gap at the top of the cup (shown in upright position).

We compared the results obtained from EN 13726 Part 2 sections 3.2 and 3.3 (e.g. vapor contact vs liquid contact) on several transparent film dressings intended for IV sites: Dressing A: 3M™ Tegaderm™ I.V. Advanced Securement Dressing (3M Company); Dressing B: 3M™ Tegaderm™ I.V. Transparent Film Dressing with Border (3M Company); Dressing C: 3M™ Tegaderm™ HP Transparent Film Dressing (3M Company); Dressing D: ClearFilm I.V. dressing (Richardson Healthcare); Dressing E: Leukomed I.V. film (BSN Medical GmbH); Dressing F: IV3000 Ported 7 cm × 9cm (Smith and Nephew); and Dressing G: SorbaView SHIELD Window Dressing, Medium (Centurion). The testing was performed on five replicates.

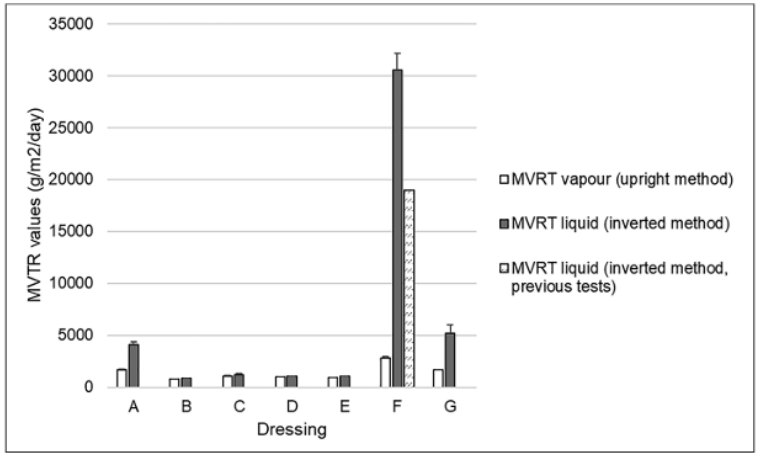



**Figure 4.** Mean MVTR value (±standard error) of dressings A–G tested using both methods of EN 13726-2:2002. Because of the fact that the Paddington cup was found empty at the end of the test for Dressing F using the inverted method, Dressing F is displayed with both the value obtained in this assay (30,000) and the value obtained in a previous assay by the same test laboratory (19,000), which matches the published manufacturer's value. Statistical analysis of data: for the upright method, all dressings were significantly different from each other except for the following three paired comparisons: A–G, C–D, and D–E. For the inverted method, the majority of dressings were different from each other except for the following seven paired comparisons: A–G, B–C, B–D, B–E, C–D, C–E, and D–E. When comparing for each dressing the MVTR values obtained by both methods, the difference was statistically significant for Dressings A, F, and G.

**Table 1.** Statistical analysis of differences in MVTR by test method within dressings using Tukey's test.

| Dressing | MVTR liquid (inverted method) | MVTR vapor (upright method) | Difference Calculation between MVTR test methods (liquid—vapor)[a] | *t* Value | *p* Value |
|---|---|---|---|---|---|
| A | 4089 | 1682 | 2407 | 7.58 | <0.0001 |
| B | 845 | 773 | 72 | 0.23 | 0.8224 |
| C | 1225 | 1079 | 146 | 0.46 | 0.6465 |
| D | 1047 | 976 | 71 | 0.22 | 0.8238 |
| E | 1031 | 936 | 95 | 0.30 | 0.7668 |
| F[b] | 30,530 | 2838 | 27,692 | 87.23 | <0.0001 |
| G | 5164 | 1644 | 3520 | 11.09 | <0.0001 |

[a]Standard error (SE): 317; degrees of freedom (DF): 56.
[b]Analysis made with the MVTR value of 30,000 for Dressing F (the analysis cannot be done with the 19,000 value published by others since we do not know the variability of that data set).

# Prevenzione e Gestione MARSI

***Skin-Barrier Product***

***Film-Forming Polymers***

***Vantaggi***

- Forma barriera meccanica
- Molto sottile e uniforme
- Mantiene aderenza medicazione
- Protegge lesioni meccaniche rimozione
- Compatibile con cute intatta o lesa

**Svantaggi**

- Alcuni contengono alcool o etilacetato
- Altamente Infiammabile
- Non compatibile con lesioni a profondità totale

***Silicone Barriers***

**Vantaggi**

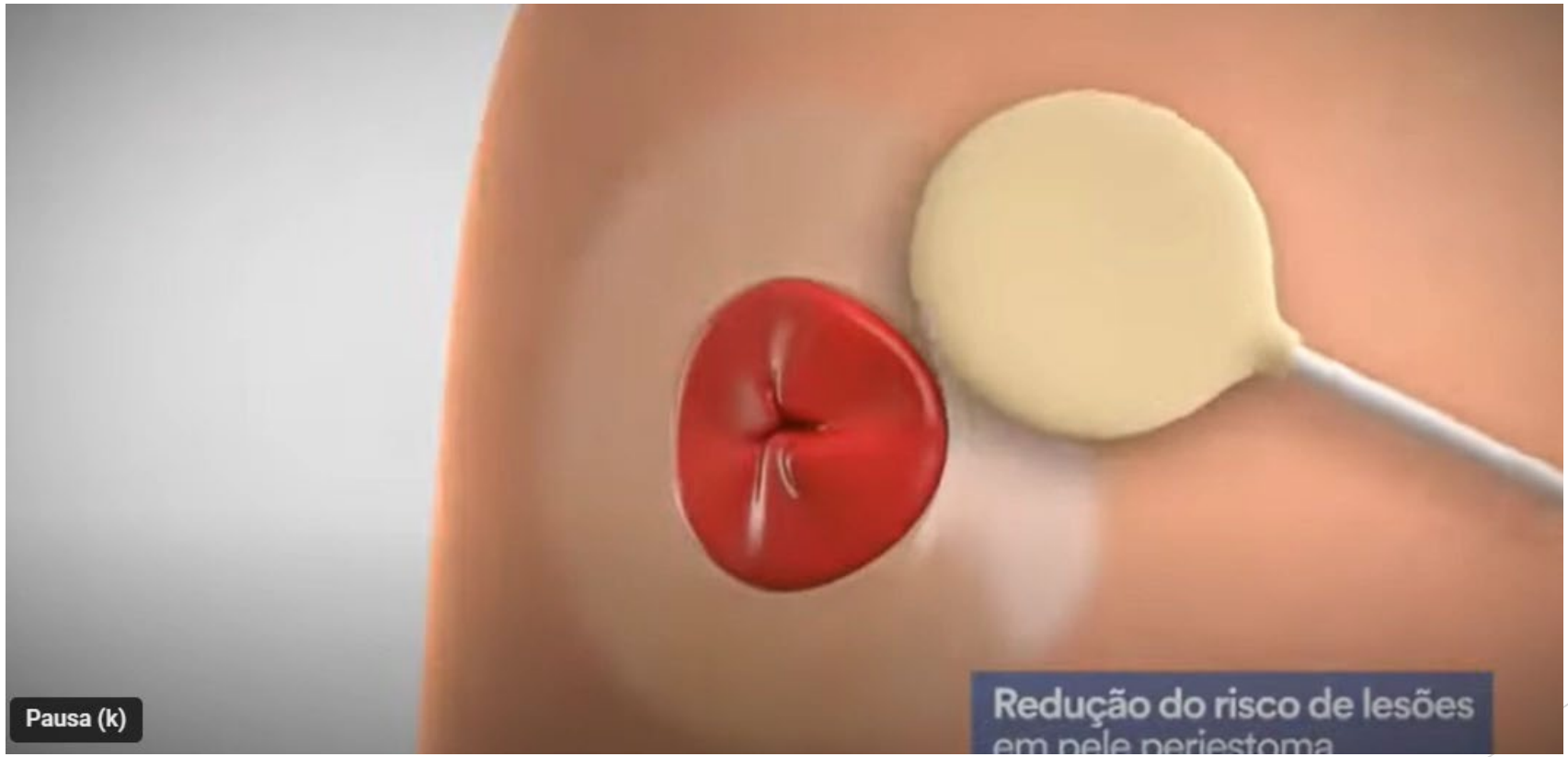
- Buona conformabilità alla cute
- Crea barriera idro repellente e traspirante
- Compatibile con cute irritata
- Asciuga rapidamente

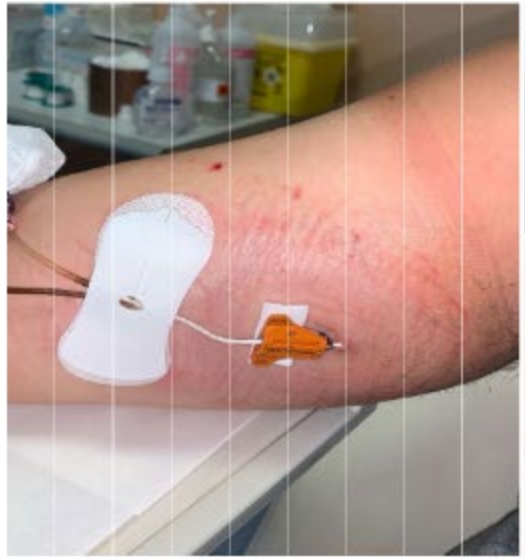
**Svantaggi**

- Se applicata scorrettamente interferisce con aderenza medicazione
- Non tutte le creme siliconiche sono compatibili con cute lesa

*Best practice consensus document on prevention. J Wound Care Fumarola et al., 2020*

# Film Forming Polymers/ silicone barriers





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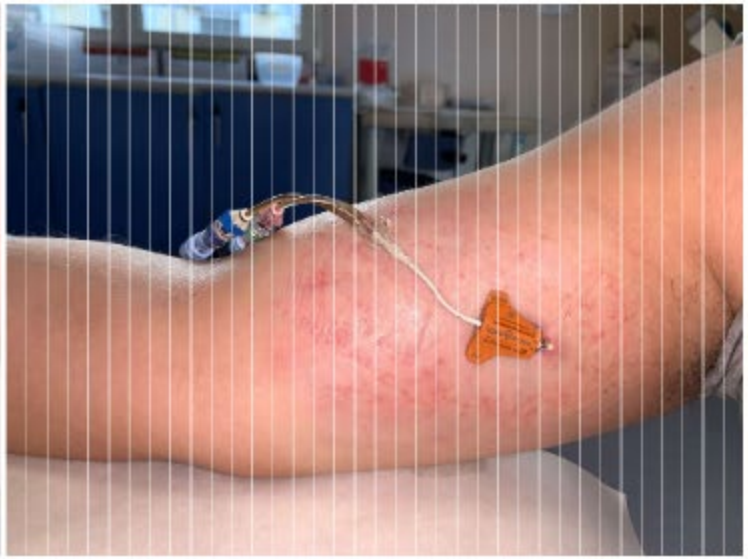

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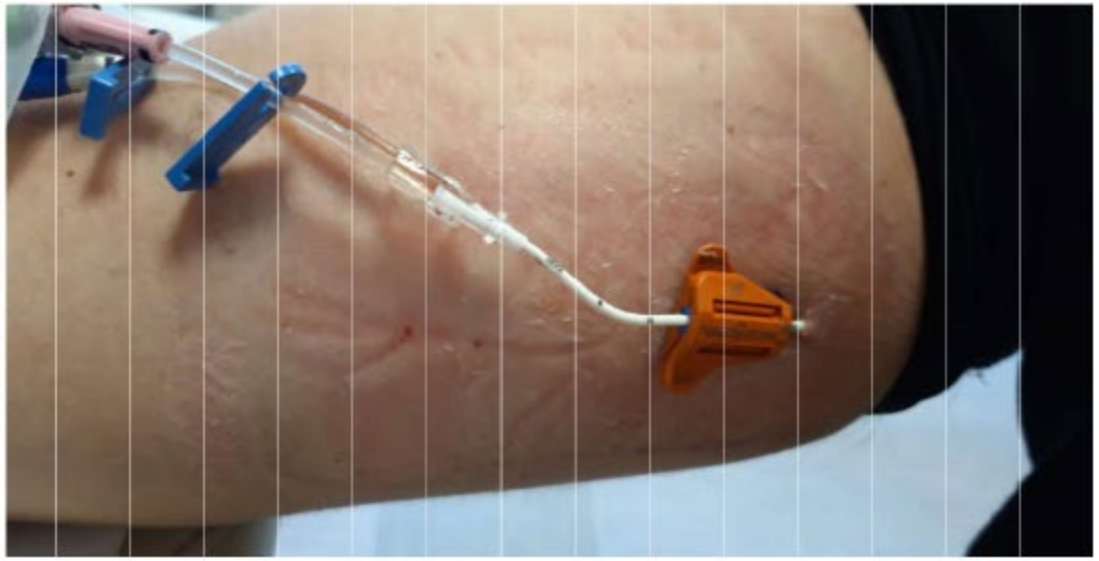


14/08/2023

**D.O. 21/05/1996 - età 27aa - sesso M**

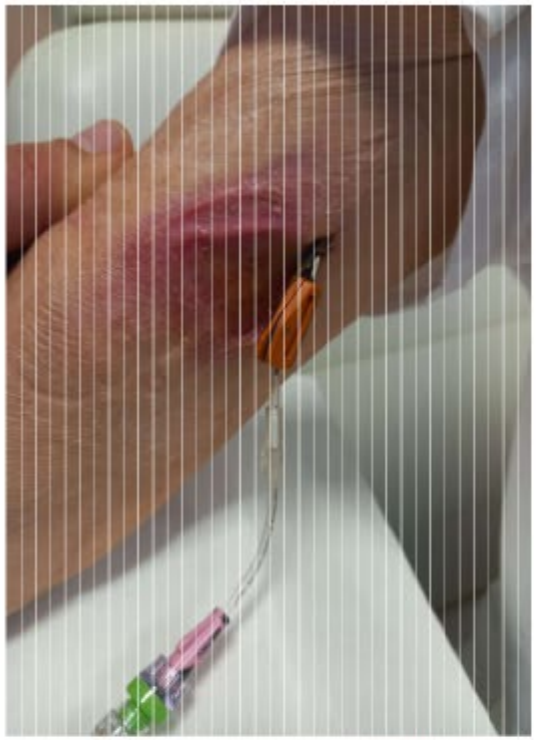
Leucemia Promielocitica Acuta

Anamnesi: muta

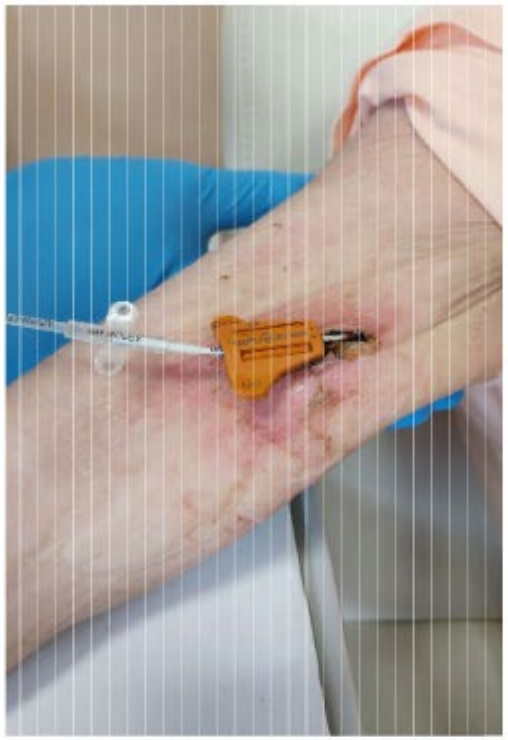
Terapia: Arsenico Triossido, Metilprednisolone, Acido Retinoico, Idrossiurea

Trattamento con
***Film-Forming Polymers*** composto da:

- Tetrapolimero Acrilico
- 2 Octil Cianoacrilato
- HMDS



07/06/2023



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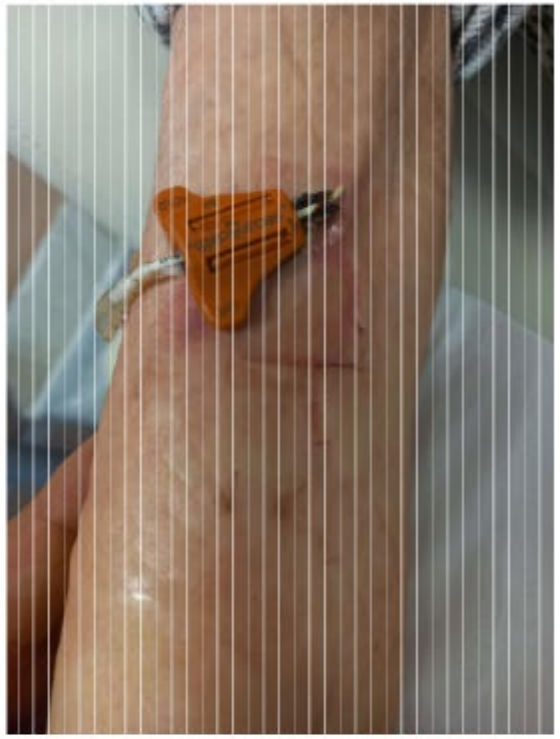


21/06/2023

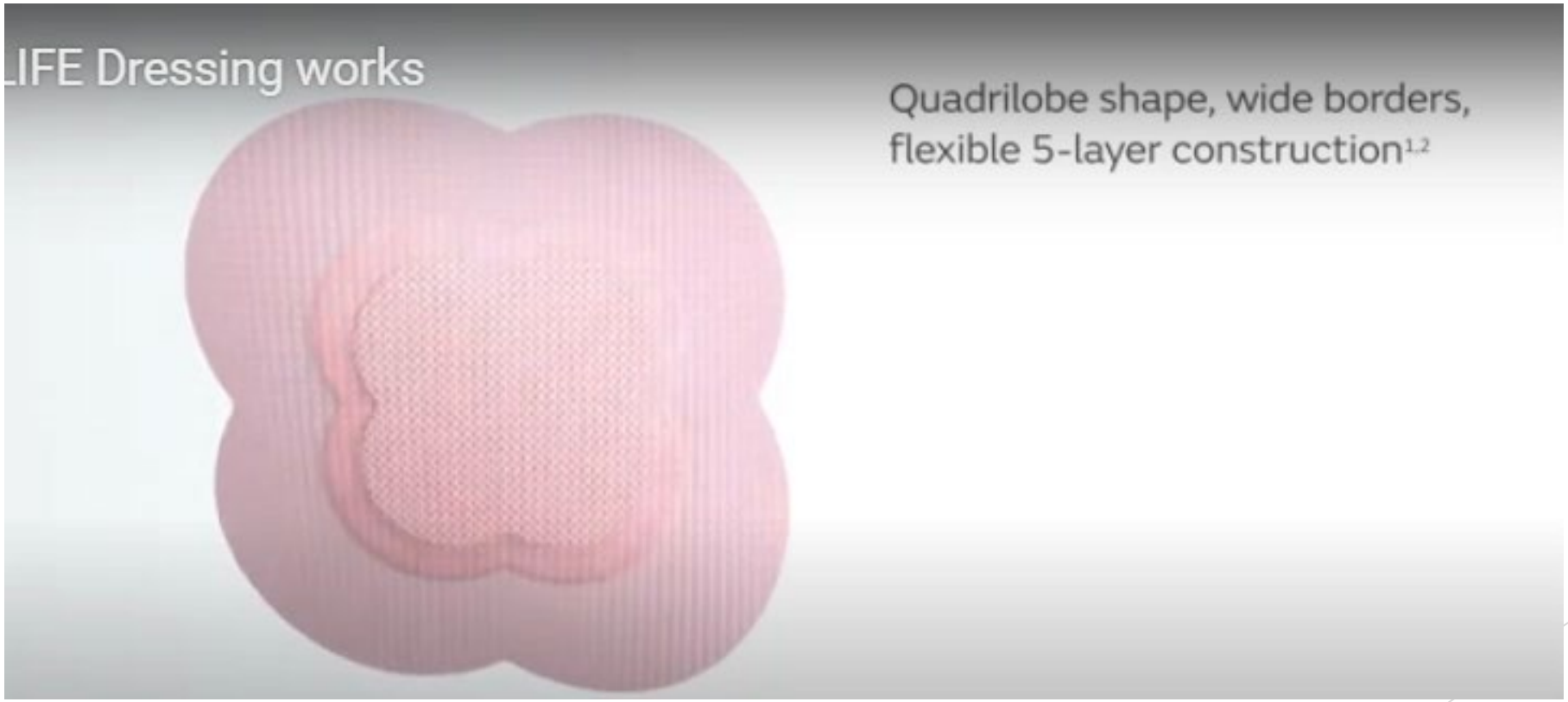
**C.D. 09/03/1946 - età 77aa - sesso F**

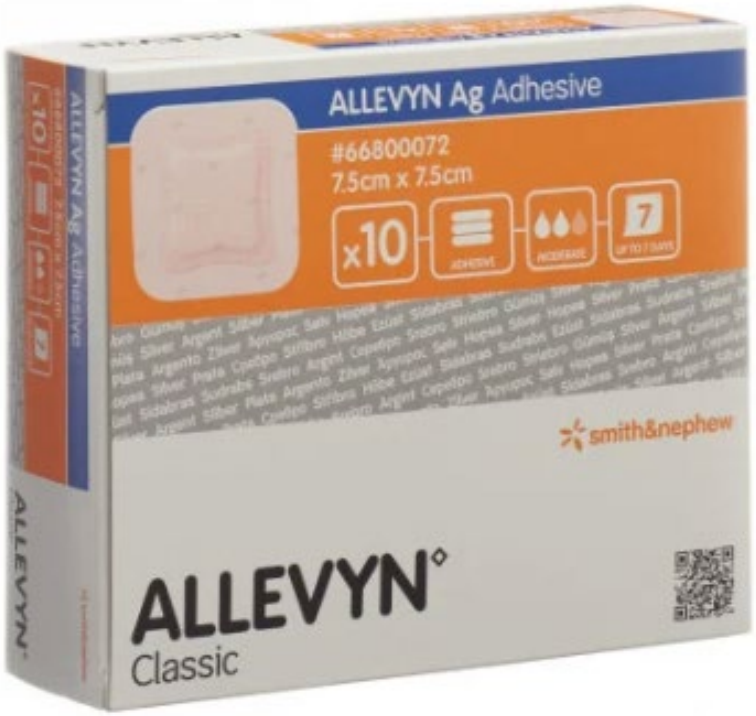
NHL (DLBCL) stadio IV

Anamnesi: Ictus ischemico, IA, Aterosclerosi

Terapia :4 cicli R-CHOP (Rituximab, Doxorubicina, Vincristina, Metilprednisolone)

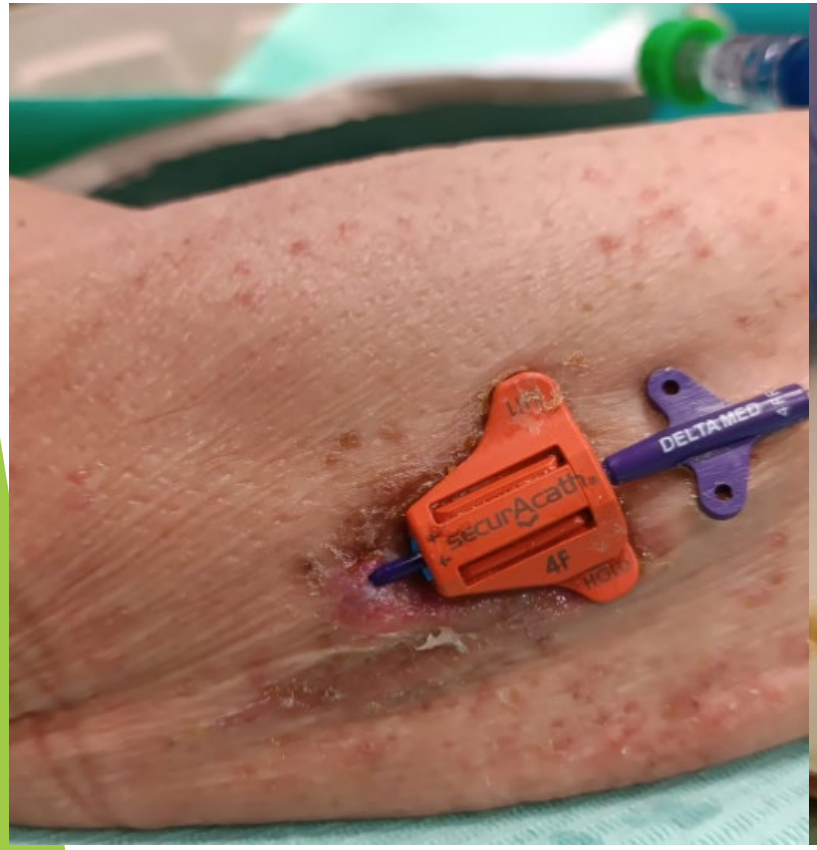
# Silicone Barriers




ALLEVYN Ag Adhesive
#66800072
7.5cm x 7.5cm
x10
7
smith&nephew
ALLEVYN
Classic


Mepilex Ag
Safetac
Mepilex Ag
Safetac


Atrauman Ag
SILVER
10cm x 10cm
10 ST/PCS/PZ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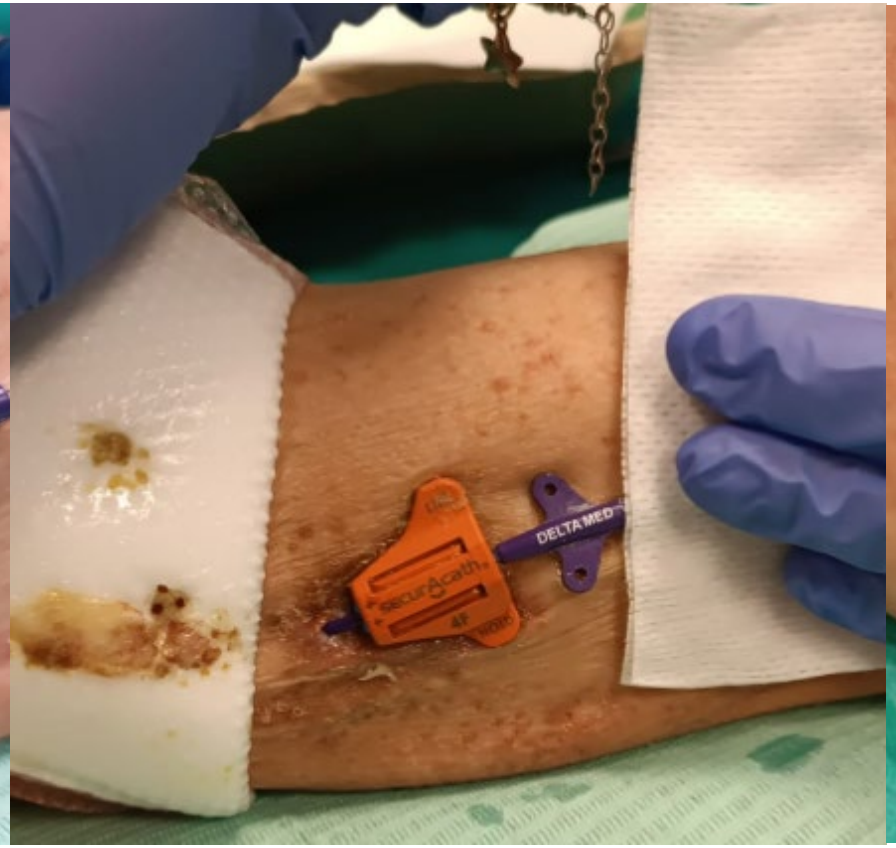
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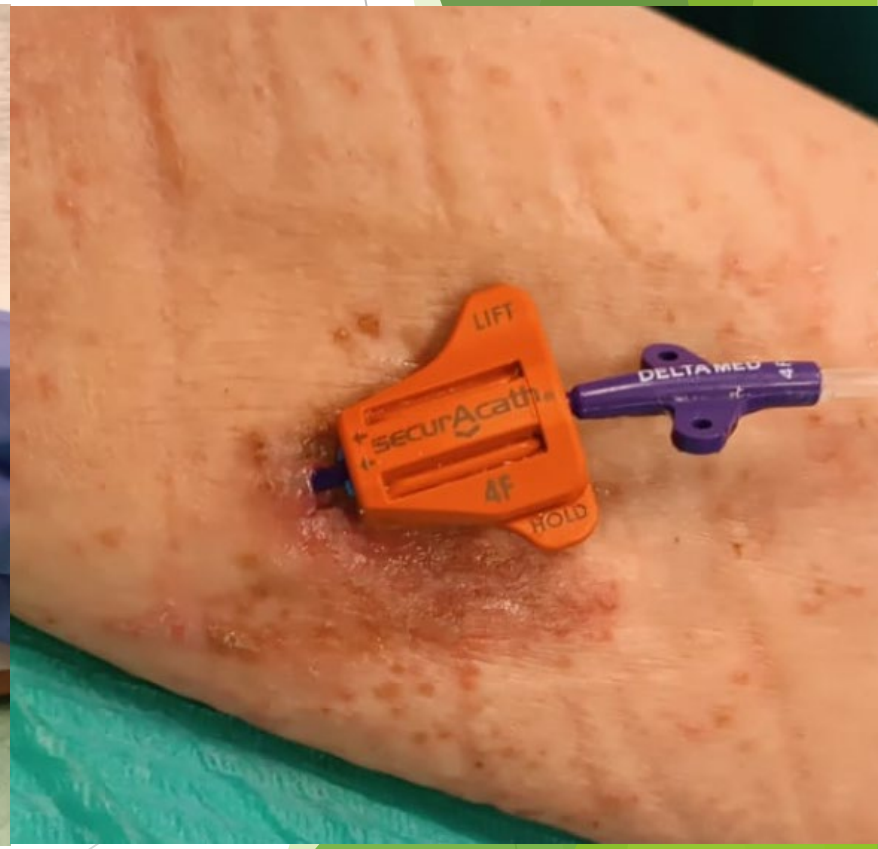
LIFT
securAcath
4F
HOLD

# Survey Infezioni catetere relate