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Skin care for the prevention and treatment of lesions associated with the use of diabetes technology

The development of new technologies has represented a significant advancement in the treatment of diabetes, improving the patient's follow-up and quality of life. However, the systematic use of these devices has led to a parallel increase in dermatological lesions, which cause discomfort, change body image, and increase the risk of other complications, such as infection, lack of sleep, etc. These situations sometimes lead stop using the device

The complications most frequently seen include contact dermatitis, skin infections, unspecified rashes, hives, and edema. Although their prevalence is high and can occur at any age, there is a lack of studies that determine the actual incidence rate of this problem.

Although contact dermatitis can be categorized into 2 types, in practice, the clinical signs are indistinguishable in most cases, while both types may coexist:

1) Allergic: this is directly related to the skin cells reaction to direct exposure to an allergen. It seems widely demonstrated that acrylates have sensitizing power, with the most well-known being isobornyl acrylate (IBOA), which we can find in everyday products such as glues, adhesives, resins, inks, and solvents. These materials offer good flexibility, hardness, and resilience, making them ideal for manufacturing adhesives to attach continuous glucose monitoring and continuous insulin infusion devices to the skin.

2) Irritative: characterized by a skin rash in the region of contact with the device, with a reddish coloration, a sensation of tightness, burning or itching, and peeling. This is usually caused by a combination of individual factors (previous dermatological problems, dry skin, excessive sweating, etc.), mechanical factors (friction, pressure, prolonged occlusion), and device-related factors (adhesive components such as acrylates, prolonged use, etc.).

So, what can be done to prevent these skin reactions?

There are many challenges to this, so in most cases, measures are taken once the problem has already occurred, and often the "trial-and-error" method is the only option available. To prevent or achieve early detection of dermatological reactions, we can categorized the process into several phases:

Before starting to use the device:

In this phase, it is important to study the patient's dermatological history, looking for previous skin reactions to products they may have used in everyday life that may contain possible allergens known to be present in the devices. In such cases, it would be advisable to consult an allergist before the device is applied. However, this step is complicated by the lack of detailed information provided by device manufacturers regarding their composition.

Additionally, conducting a comprehensive and systematic assessment of the patient's »

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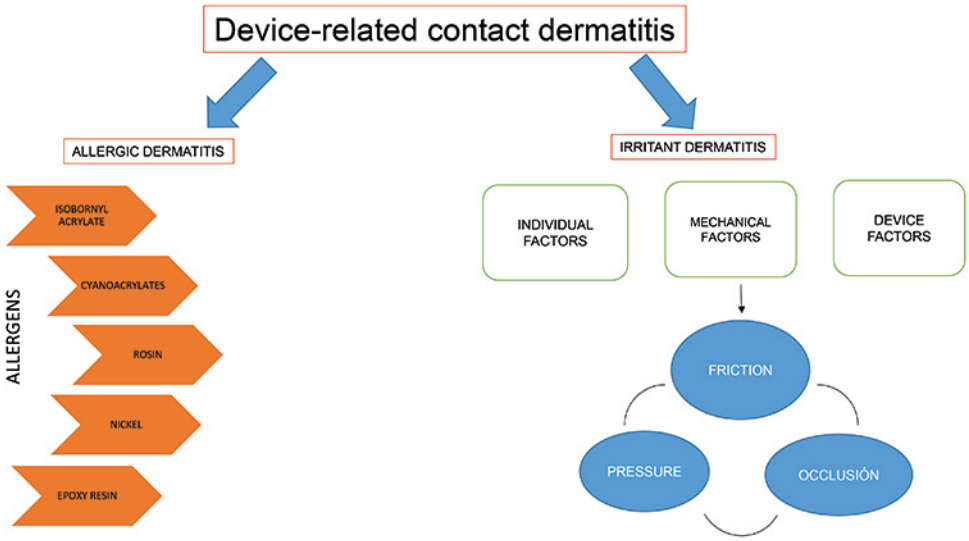
Figure 1. Factors triggering the onset of dermatitis



» skin condition will provide information about the existence of risk factors that increase the likelihood of experiencing skin reactions when using the devices. Of note that diabetes per se can cause changes in the skin, such as increased dryness—xerosis—or excessive sweating. This initial assessment should include the skin's hydration status and hygiene, as well as the products used on the skin. Creating a climate of trust between health care professionals and the patient is crucial for improving communication and gathering as much information as possible, as skin issues can sometimes cause the patient to feel embarrassed or guilty.

Finally, the patient should be informed about aspects to keep in mind during the use of the device, as we will discuss below.

While the device is being used:

As we saw before, during the use of the device, several factors contribute to the onset of dermatitis, including friction, pressure, and prolonged occlusion, largely influenced by the development of devices with longer durations, which increase the exposure time to these factors. Strategies to preserve skin integrity during the use of these devices include:

1) Prophylactic skin care: giving patients recommendations on skin care, including the use of appropriate personal care products, with Syndet-type soaps and body oils being the basis of body hygiene. Additionally, the systematic use of fragrance-free moisturizers should be part of the skincare routine in general and particularly in sensor insertion areas.

2) Proper placement of the device: during the insertion process, care should be taken to avoid placing the device in areas with pre-existing skin lesions—rashes, eczema, etc.—as damaged skin is more permeable to allergens »

» from the devices, which can trigger sensitization and the development of an allergic reaction. Moreover, in some cases, skin reactions may be related to the antiseptic used to disinfect the area before insertion—chlorhexidine, etc—so it is very important to share this information with the specialist during the consultation.

3) Removal of the device: when it comes to removing a device, either because it has reached the end of its useful life or because there is an issue, caution is required to protect the skin.

The "pull-off" method should be avoided, and instead, the adhesive should be moistened well with water, or specific adhesive removal products should be used to facilitate the process and prevent friction injuries. However, the use of these products is hindered by their high cost.

4) Promotion of skin healing: once the sensor has been removed, the area should still be taken care of. The first and most important step is to avoid reapplying the device to the same area for, at least, 4 to 6 weeks to allow the area to recover properly and try to avoid injuries caused by prolonged occlusion and pressure. It is estimated that the mean time for complete recovery is 30 days. In pediatric patients, this is a complicated issue because the areas available for device placement are smaller. Additionally, maintaining proper hygiene and hydration of the area is essential to promote healing and prevent any possible complications.

5) Other considerations: it is common to use adhesives such as waterproof dressings, Tensoplast, kinesiotape, etc., to achieve better device adhesion and prevent accidental removal. This routine presents several drawbacks that should be taken into consideration: they increase the occlusion area during the device lifespan, as they cannot be removed, increasing the exposure area to potential allergens contained in them. They also make it difficult to assess the area in case of potential issues. Finally, when removed, they increase the skin region affected by the adhesives. Other less aggressive methods regarding occlusion, such as cohesive bandages, do not adhere »

TABLE 1. Ways to protect the skin while the devices are in use

PRODUCT	ADVANTAGES	DISADVANTAGES	ADVICE
NASAL CORTICOSTEROIDS APPLIED TO THE SKIN (off-label use)	MAY REDUCE SENSITIVITY REACTIONS	UNKNOWN CONSEQUENCES OF CHRONIC USE	APPLY 1-2 PUFFS ON SKIN AND LET DRY COMPLETELY
BARRIER FILMS Esenta® Brava®	• WATERPROOF AND BREATHABLE • MAY HELP PREVENT MILD SKIN IRRITATION	• MAY HINDER DEVICE ADHERENCE • LIMITED EFFECTIVENESS IN ALLERGIC REACTIONS	• NOT RECOMMENDED TO PIERCE THROUGH THE FILM, SO A SMALL CIRCLE CAN BE LEFT UNCOVERED FOR INSERTION. ALLOW TO DRY COMPLETELY.
WATERPROOF DRESSINGS Tegaderm® Fixomul® Operfilm®	• TRANSPARENT, THIN, AND DISCREET • MORE PROTECTION VS IRRITATION THAN BARRIER FILMS	• TENDENCY TO PEEL OFF WITH WATER, SWEATING • MOISTURE POSSIBLE AMPLIFICATION OF ALLERGIC REACTIONS • INCREASED RISK OF ISSUES DURING INSERTION	• IT IS RECOMMENDED TO CUT A SMALL HOLE IN THE DEVICE INSERTION AREA AND NOT TO PIERCE IT.
WATERPROOF DRESSINGS Tegaderm® Fixomul® Operfilm®	• TRANSPARENT, THIN, AND DISCREET • MORE PROTECTION VS IRRITATION THAN BARRIER FILMS	• INCREASED RISK OF ISSUES DURING INSERTION • • POSSIBLE AMPLIFICATION OF ALLERGIC REACTIONS	• CUT A SMALL HOLE IN THE DEVICE INSERTION AREA AND DO NOT PIERCE IT. • USE EXTRA-THIN VERSION
KINESIOLOGY TAPE	• CUSTOM CUT • SOFT	• INCREASED LESIONS UPON REMOVAL • POSSIBLE AMPLIFICATION OF ALLERGIC REACTIONS CANNOT BE REMOVED DURING DEVICE USE • POSSIBLE INCREASE IN FRICTION-RELATED INJURIES.	• NOT RECOMMENDED FOR COVERING LARGE DEVICES
COHESIVE NON-ADHESIVE BANDAGE	• NON-ADHESIVE. CAN BE USED FOR SHORT PERIODS AND REMOVED TO UNCOVER THE AREA	• PRESSURE MAY INCREASE DURING USE	• DO NOT TIGHTEN DURING APPLICATION. REMOVE AT NIGHT

CONDUCTING A COMPREHENSIVE AND SYSTEMATIC ASSESSMENT OF THE PATIENT'S SKIN CONDITION WILL PROVIDE INFORMATION ABOUT THE PRESENCE OF RISK FACTORS THAT INCREASE THE LIKELIHOOD OF EXPERIENCING SKIN REACTIONS WITH THE USE OF THE DEVICES

» to the skin and can be removed without damaging the device, thus allowing them to be used when protection is needed and then removed to prevent occlusion or friction injuries ***(table 1)***.

And if the injury appears, what can be done?

Unfortunately, despite taking all precautions, the appearance of skin lesions associated with the use of devices occurs frequently with varying intensities. It is essential that the patient communicates the appearance of the lesion to the health care professional so that an evaluation can be conducted, including allergy and dermatology assessments.

In cases of allergic contact dermatitis, the only effective treatment is to avoid exposure to allergens, so relocating the device to a different bodily region is not useful. Although changing the device should be considered, this decision is limited by the lack of data provided by manufacturers, which often leads to decisions being made based on trial and error.

In cases of irritative contact dermatitis, a possible way to reduce symptoms is to change the device more frequently, thereby reducing exposure time. However, the number of infusion systems and sensors the patient can have on a monthly basis is limited, thus complicating this approach.

Since avoiding allergens is difficult—if not impossible—in many cases, barrier methods are ultimately used with very variable results. These methods include barrier sprays, hydrocolloid dressings, waterproof dressings, and others.

These methods have significant drawbacks that should be taken into consideration:

1) The application of protective layers under the device could affect glucose readings.

2) If the skin is not sufficiently dry before application, there is an increased risk that the device will detach.

3) Sometimes, the barrier method per se can »

IN CASES OF ALLERGIC CONTACT DERMATITIS, THE ONLY EFFECTIVE TREATMENT IS TO AVOID EXPOSURE TO ALLERGENS

» cause allergic or irritative contact dermatitis or exacerbate it.

4) Finally, it is recognized that acrylates can penetrate protective barriers such as latex or nitrile gloves, which could explain why some users allergic to devices containing them do not experience the desired relief with their use. Even occlusive skin methods could lead to greater exposure to acrylates.

Short-term treatment of these reactions may include the use of topical corticosteroids, and there are other treatments for long-term use, which should always be prescribed and monitored by a specialist.

SUMMARY

The conclusions we can draw from everything presented are:

- Due to the increased use of technological devices for diabetes management and treatment, there has been a significant rise in associated skin lesions.
- Proper skin care is key to preventing these reactions.
- The number of factors influencing these reactions and the lack of accessible information from manufacturers regarding components complicates the prevention and treatment of the issues at stake.
- It is important to conduct systematic and individualized assessments of the patient's skin condition before and while using the device, as well as provide proper training.
- If a skin reaction occurs, consult with health care personnel. D

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