

Case Report

End-of-Life Skin Changes: Make Sure You Know What They Mean, a Case Study

Elsa Abreu ^{1, 2}, Catarina Simões ^{3, 4, ‡}, Rita Figueiredo ^{5, 6, ‡, *}

1. RN, at Serviço de Saúde da Região Autónoma da Madeira (SESARAM, EPERAM), Avenida Luís de Camões, nº 57 – 9004-514 Funchal, Portugal; E-Mail: elsitaabreu@gmail.com
2. Master's Student at Escola Superior de Enfermagem São José de Cluny, Rampa da Quinta de Sant'Ana nº22, 9000-535 Funchal, Portugal
3. Adjunct Professor at Escola Superior Saúde Santa Maria, Travessa de Antero de Quental 173 175, 4049-024 Porto, Portugal; E-Mail: catarina.simoese@santamariasaude.pt
4. Centro de Investigação Interdisciplinar em Saúde, Universidade Católica Portuguesa, Porto, Portugal
5. Adjunct Professor at Escola Superior de Enfermagem São José de Cluny, Rampa da Quinta de Sant'Ana nº22, 9000-535 Funchal, Portugal; E-Mail: rfigueiredo@esesicluny.pt
6. CINTESIS@RISE, Portugal.

‡ Current Affiliation: Escola Superior Saúde Santa Maria and Escola Superior de Enfermagem São José de Cluny.

* **Correspondence:** Rita Figueiredo; E-Mail: rfigueiredo@esesicluny.pt

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Abstract

Skin is the largest organ of the human body. Skin changes can result from natural ageing, as well as from acute or chronic diseases and failure of body systems. Various types of wounds are identified in Palliative Care, and terminal pressure ulcers are often incorrectly classified. This case study highlights the importance of recognizing skin ulcers in patients' last hours and days of life as a diagnostic indicator for impending death. The first focus of nursing care was pain management and maintaining skin integrity. On the 20th of December 2023, a pressure



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ulcer was identified on a patient in the sacral region with unknown further characteristics. A skin modification was observed three days later in the neck area, with intense redness and no heat felt. Approximately ten minutes later, several minor purple-type discolorations, like small bruises, appeared on the chest area as a symmetrical mirror image. This change suggested a Trombley-Brennan Terminal Tissue Injury. The patient died 14 hours after the first skin change was observed on the neck. After examining this case study, it becomes clear that it is essential to expand knowledge and actively involve nurses in the accurate assessment and classification of skin changes, especially regarding Kennedy Terminal Ulcers or Trombley-Brennan Terminal Tissue Injuries, as they are indicators of death's proximity.

Keywords

End of life care; nursing; palliative care; Trombley-Brennan terminal tissue injury

1. Introduction

Palliative Care (PC) involves providing holistic and active care to individuals experiencing intense suffering from a serious illness at any stage of their life. The aim is to manage symptoms and improve the Quality of Life (QoL) for patients and their families or caregivers [1]. PC is characterized by its comprehensiveness, reaching a wide range of people of different ages with progressive and advanced illnesses, and the support is extended to the bereaved [2-4].

Skin is the largest organ of the human body. In End-of-Life (EoL) patients, the development of wounds can indicate the damage and failure of multi-organ systems. Skin perfusion may become compromised as blood circulation is directed towards the vital organs, to maintain hemodynamic stability, and it is prevented from reaching the skin [4, 5].

Various types of wounds have been identified in PC, including malignant fungating wounds, terminal ulcers, chronic limb-threatening ischemia, or critical limb ischemia. Patients with wounds suffer the most from the impact of their symptoms [4-6]. However, families are also significantly impacted by these, which justifies their inclusion in this care sphere [5].

PC patients have a higher risk of developing wounds, primarily due to their fragile skin [6]. Wound care management is exhaustive, active, and in permanent progress to harmonize patient's and family's personal and individual PC needs [4, 5, 7].

Multidisciplinary care is fundamental in wound management, as it creates favorable conditions for patients according to their concerns and those of their families. The risk of skin injuries is expected to be reduced through prevention and by ensuring that existing ones do not deteriorate. Appropriate symptom control should be implemented while promoting psychosocial well-being, and wounds should be treated locally along with the associated symptoms [4, 5, 7-9].

It is important to highlight two significant terms in PC related to skin care: skin failure and Skin Changes At Life's End (SCALE). These terms highlight the skin changes resulting from dying process [4, 5, 10, 11]. The first signs of skin breakdown are dark erythema, macular discoloration, and local temperature change [4, 5].

Studies have emphasized the lack of research on PC wounds [1, 4, 5, 7, 9]. As such, Kennedy's Terminal Ulcers (KTU) and Trombley-Brennan Terminal Tissue Injury (TB-TTI) are currently described

in the literature as terminal ulcers. These are specific to the person's terminal illness and should not be confused with Pressure Ulcers (PU) [4, 5].

KTUs were defined by Kennedy in 1983. They relate to patients' health, usually severe and irreversible. They develop rapidly and abruptly, and their onset is inevitable, with expected death within days or weeks [4, 5].

TB-TTI was described in 2010 by Mary R Brennan and Kathy Trombley. They also occur in individuals nearing the EoL in the form of skin changes, mainly discoloration. They appear naturally before death, developing rapidly within hours or days, especially in areas of the body under minimal or no pressure, and developing as a mirror image [4, 11]. Seventy-five percent (75%) of people die within 72 hours after the first injuries are identified [11].

This case study aims to gather knowledge about the care specialist nurses provide to patients in PC in the Last Days or Hours of Life (LDHL) with skin changes.

2. Materials and Methods

2.1 Case Study

This descriptive case study follows the Case Report (CARE) guidelines [12]. It involves a research methodology that allows us to identify skin changes in patients' LDHL, and how the expertise of the specialist nurse contributes to differentiating these skin changes. This enables the adjustment of care goals, as well as it facilitates, and the changes identified, as well as facilitates timely alerts to family and caregivers about the approach to death.

This case study embraces two theoretical nursing models: firstly, Dorothea Orem's Self-Care Deficit Theory, and secondly, Afaf Meleis' Transitions Theory. Dorothea Orem's theory comprises three theories. The second theory stands out in this case study because it involves the nurse's skills in establishing a therapeutic relationship with the person and their family/caregiver. This allows them to act, making themselves known and caring for the person, satisfying their self-care needs, and empowering the family/caregiver to develop the activities inherent to self-care [13]. In this context, the nurse can diagnose based on needs. Subsequently, the nurse can plan and support the patient in managing self-care, mobilizing nursing knowledge and skills to assist both the person and the family/caregiver [13].

Meanwhile, Afaf Meleis' theory emphasizes the transitions that occur in a person's life, in a total of four transitions: changes in life, health, relationships, and the environment. The case study reported in this article describes the process of health/illness and the organizational transitions as the patient migrated from a state of well-being to a state of disease with a change of context in between. In this case study, the patient remained at home for some periods, having also been admitted to the hospital across different wards, resulting in social changes and altering the roles played by all the family members [14, 15].

This case study emphasizes the importance of nurses in providing care to patients and families in alignment with their social and cultural context to promote health and/or well-being based on actions outlined in the nursing process and the implementation of therapeutic interventions [14].

Consent to participate in the case study was obtained from her daughter during the second home visit, as the patient could not give consent due to the recognition of imminent death. Confidentiality was ensured, as the patient could not comprehend and accept the relevant information about the study. Confidentiality and anonymity were guaranteed. It was clear that there would be neither risks

nor benefits for participants beyond the contribution to research in specialist nurses' knowledge in identifying skin modifications. No identifying data was recorded in this case study.

2.1.1 Selection Criteria

The selection criteria for this case study were the referral process for home PC, the medical diagnosis (lung neoplasm), the Palliative Performance Scale (PPS) score of 30-20 %, and uncontrolled symptoms (pain).

2.1.2 Measuring Instruments

The Instrument a Diagnostic for Complexity in Palliative Care (ICD-Pal) [16] was used to measure the complexity in PC; the Barthel scale [17] was used to assess self-care; the Pain Assessment in Advanced Dementia (PAINAD) [18] was used to evaluate pain; and the PPS [19] was used to determine patient performance in CP.

The ICD-Pal instrument is a diagnostic tool for PC complexity. The version adapted for Portuguese was used. This integrates complexity variables, classified into two levels, namely (complexity or high complexity), in a predetermined way. This makes it possible to measure the complexity of each person in a palliative situation [16, 20].

In turn, the Barthel Scale assesses dependence in 10 Activities of Daily Living (ADLs). It assesses the level of autonomy, the ability or not to carry out a set of activities that are essential to daily life. For each activity, it considers between two and three hypotheses, classifying them as dependent or independent [17].

PAINAD, on the other hand, is a pain intensity assessment scale validated for Portugal. It can be used in adults and elderly people who are non-verbal communicators under acute and long-term care [18]. And PPS is a functional capacity assessment tool. It also has a predictive value [19].

In this case study, the patient had ICD-Pal: High Complexity, a Barthel Scale score of 10, a PAINAD score of 3 and a PPS score of 30-20%.

2.1.3 Patient Presentation

The case study refers to an individual being cared for at home by the PC home care team, referred since November 29, 2023. The first PC consultation took place at home on December 18, 2023.

Female patient, 65 years old, immigrant, living in Portugal since 2009. Able to communicate verbally and exclusively in her native language. Had a confused speech, and frequent forgetfulness. Her personal health history includes arterial hypertension, dyslipidemia, and surgical intervention to her lumbar spine as a consequence of a vertebral fracture that took place back in her home country at unknown date. Allergic to penicillin. Non-smoker. She was diagnosed with lung cancer in September 2023, brain metastases and bilateral pleural effusion.

Dependent on ADLs, bedridden since November of 2023. She had been hospitalized for two extended periods since her diagnosis.

Married to a Portuguese man who spent most of his time at work.

2.1.4 Timeline

Figure 1 illustrates the progression of events and critical moments in this case over time (timeline).

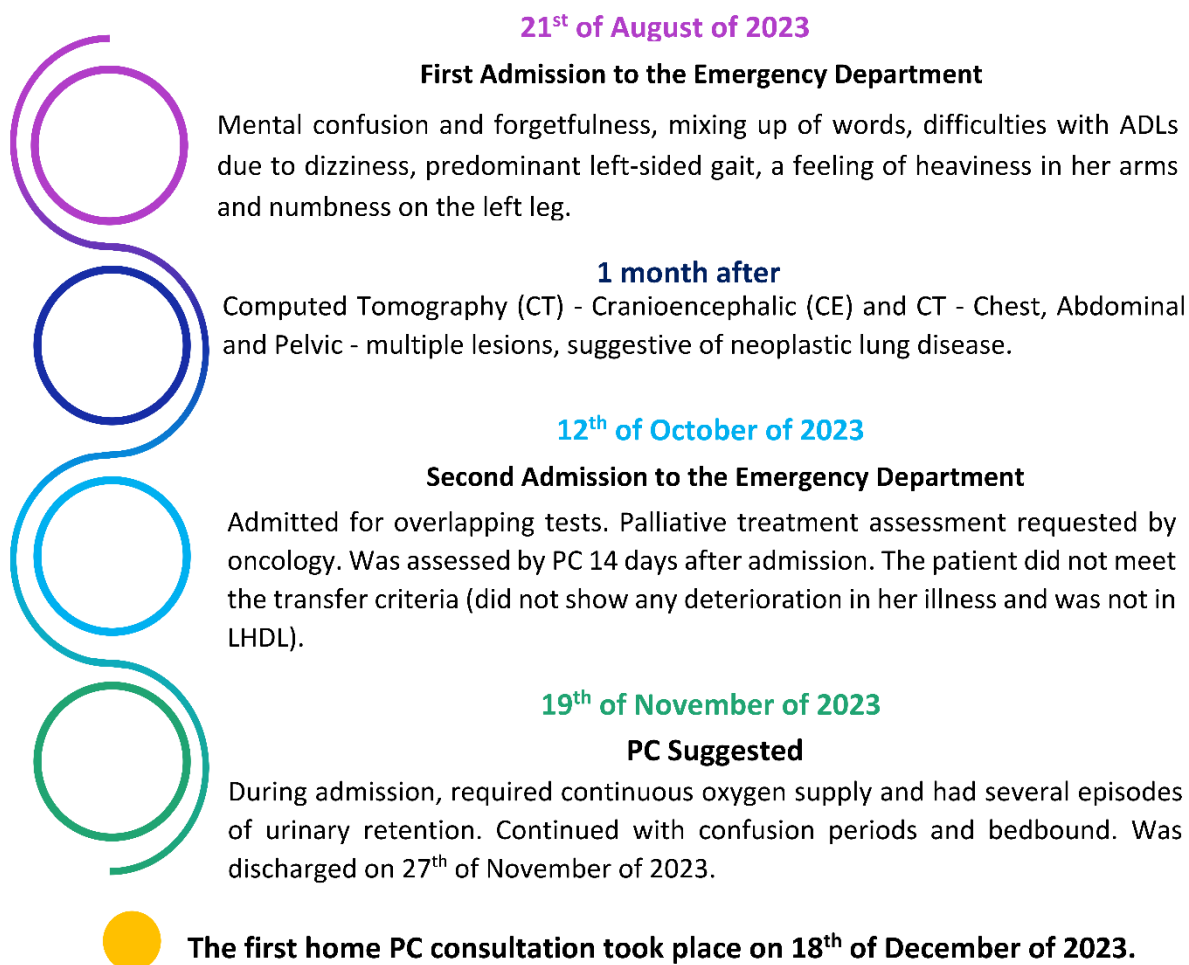


Figure 1 Timeline of hospitalization and PC follow-up.

2.1.5 First Assessment in PC

In the first appointment, the patient was accompanied by her two daughters, who had decided to travel to Portugal due to their mother's worsening health condition.

During this initial assessment, it was observed that there was a lack of knowledge regarding hygiene care, PU prevention, and the operation of the Alternating Pressure Mattress and Oxygen[®] Therapy Machine. Therefore, basic training was provided to promote the patient's comfort and QoL.

According to one of her daughters, in previous days, the patient had constantly removed her nasal cannula due to discomfort. The patient complained of pain without being able to specify the location or intensity, as well as difficulties swallowing and reduced appetite. However, these were not the focus of this consultation, although nursing education and interventions were carried out.

In accordance with the theorists mentioned above, the most relevant areas of attention were pain control and skin integrity. Although the patient did not mention the pain's location or intensity, it was clear that she was not comfortable in bed, as shown in Figure 2.

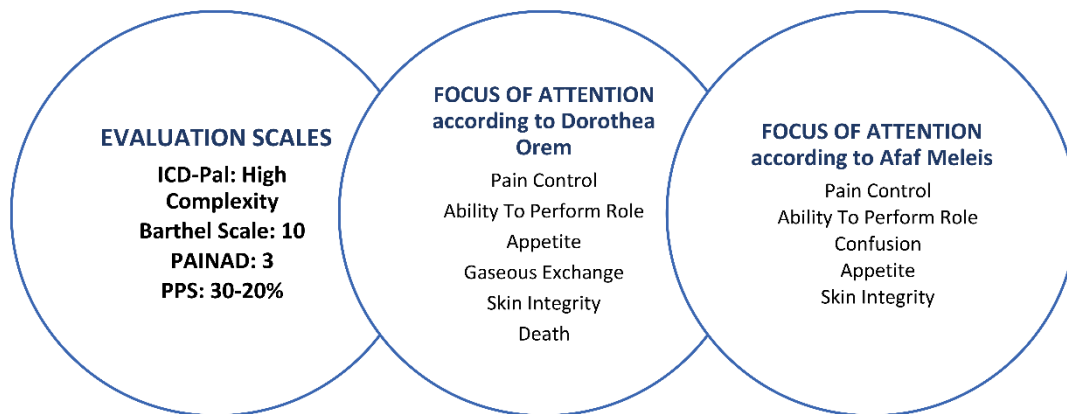


Figure 2 First Assessment in PC.

The medical team adjusted the therapy to the symptoms described, and due to decreased appetite, the form of administration was changed to an oral solution. The importance of administering the medication in “pro re nata” (PRN) during a seizure event (Intranasal Midazolam®) and during episodes of pain (Morphine Sulphate® Oral Solution) was explained to the daughters. In addition, contact with the community care system was established. The PC team member of this system provided continuity of care.

3. Results

3.1 Identifying a Skin Change

On the 22nd of December, 2023, the follow-up PC appointment was performed. During the visit, we were contacted by the community health center nurse. She informed me that a PU had appeared in the sacral region on the 20th of December, 2023. No further details about classification and characteristics were provided. The nurse emphasized that, at the time of her visit, the patient's state of health was deteriorating. She appeared more prostrated and attempted to make eye contact but then immediately closed her eyes and emitted constant moaning sounds. Her daughter administered PRN medication in accordance with the therapeutic guidance provided. The community nurse emphasized that death was approaching.

At the patient's home, we found the patient moaning constantly, in a loud voice, and alone in her room. The patient's daughter was in another room of the house, looking after her three children independently. The patient's husband was at work.

According to the patient's daughter, since the previous day, the patient had shown a decline in her health status. She reported dyspnea, decreased diuresis, and loss of oral intake. Analgesic medication (Oramorph® 20 mg/ml – 2 drops) was administered every four hours, as per the therapeutic guide, with slight effectiveness (sic).

The observation showed a marked and generalized pallor of the skin. The patient had a facial grimace and could not achieve a comfortable position. She communicated with her eyes, blinking them as requested, but did not communicate verbally. She presented Cheyne-stokes respiration, and oxygen therapy was being administered. Even though the bed head was raised, the oxygen saturation fluctuated. Some periods of sniffing were observed and audible, but no sputum was

present. The oral cavity was dry, with dry and cracked lips, moistened with a soft sponge several times during the visit. The patient had no oral intake.

Since the last visit, the urine output had decreased, with concentrated urine draining into the collection bag. According to her daughter, the patient had defecated the day before.

A cutaneous alteration was observed in the neck area, as it showed an intense redness without heat and extending to the chest area. The skin was kept intact.

Approximately 10 minutes after pain control interventions, it was observed that the redness subsided. However, several discolorations spontaneously appeared in the same area, starting red but gradually intensifying in tone, presenting a final purple color.

The discolorations were minor, approximately 1cmx1cm, similar to small hematomas. They were circular, with regular, well-defined edges scattered across the chest. Still, they acquired a mirror-like distribution, i.e., they reflected the same number and location of injuries on both sides of the chest. It should also be noted that these injuries did not progress to an open wound, i.e., the skin remained intact, only increasing in diameter in some of the injuries. In addition, the surrounding skin remained slightly reddened but without heat or edema.

Given the patient's general condition, obtaining her consent to photograph these injuries was impossible.

Due to the rapid progression, the fact that they were not related to pressure zones (as the patient was initially unclothed, wearing only a nightgown), and the absence of evidence of venous insufficiency, we considered these injuries to be suggestive of cutaneous insufficiency, specifically TB-TTI injuries.

As for the lower limbs, they were cold to the touch and had purple spots with a marble-like appearance, particularly from the knees to the malleoli.

Within four days, the patient's clinical condition noticeably worsened. During the first contact at home, on the 18th of December 2023, the nurse focused on pain control and skin integrity, particularly regarding the potential risk of a PU. Most nursing interventions involved establishing a therapeutic relationship and educating the family about these two focuses of attention, as shown in Table 1.

Table 1 PC Care Plan.

Attention Focus:	Pressure Ulcer (18/12/2023)	Pain (18/12/12023)	Skin Integrity (18-20/12/2023)	Pressure Ulcer (22/12/2023)	Pain (22/12/2023)
Nursing Diagnosis:	Risk for Pressure Ulcer	Altered Perception: Pain	Impaired Skin Integrity	Pressure Ulcers on the Sacrum and Neck	Inadequate Pain Control
Nursing Interventions:	Teaching About Pressure Ulcer Prevention (use alternative pressure mattresses).	Collaborating On Pain Management Plan	Assessing Skin Integrity	Assessing Pressure Ulcer (classify injury)	Assessing Knowledge of Pain Management

Teaching About Pressure Ulcer Prevention (skin positioning and hydration).	Teaching Family About Managing Pain	Implementing Skin Care Regime (Application of moisturizing cream after hygiene care and whenever justified)	Pressure Ulcer Care	Evaluating Response to Pain Management
Care Planning: Positioning client every 3 hours. Massage the skin with moisturizing cream. Check Alternating Pressure Mattress Pressure.	Implementing Pain Guideline Monitoring Pain Administering Pain Medication Teaching About Hospice	Monitoring Skin Integrity	Providing Palliative care	Evaluating Psychosocial Response to Instruction About Pain Monitoring Pain Administering Pain Medication (subcutaneous route) Transferring to a palliative care unit

Source: based on the ICN - International Council of Nurses [21].

During this second home visit, the focus of the specialist nurse was pain control and skin integrity. However, interventions were carried out to address other focal points, as shown in Figure 3.

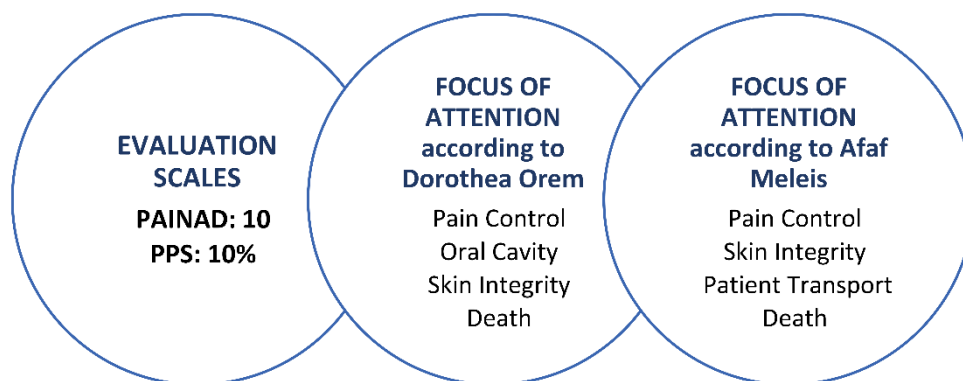


Figure 3 PC Follow-up assessment.

While in the first contact, the intervention involved educating the family, in this second contact, it involved assessing the identified lesion and pain control, which was inadequate.

During the visit, following medical advice, the oxygen[®] supply was increased from 2 L/min to 4 L/min, achieving an oxygen saturation of around 83 percent. Medication was administered subcutaneously, as the loss of the oral route was evident.

As a technical procedure, two n^o24G catheters were used for subcutaneous administration of the following medication: 40 mg of Furosemide[®] 20 mg/2 ml (4 ml); 3 mg of Morphine Sulphate 1%[®] 10 mg/ml (0.3 ml); 5 mg of Midazolam[®] 15 mg/3 ml (1 ml).

The patient's daughter was informed of the reasons for the medication changes, the procedure for subcutaneous medication administration, and the expected effects on the patient's condition.

The focus of attention and the PC care plan during both assessments are shown in Table 1.

Following this deterioration, the medical team considered the patient's admission to the PC unit to provide comfort. Thus, no home-based comfort care plan was outlined for the LHDL, as the patient fulfilled the criteria for hospitalization in this assessment.

As a result, it was essential to ask the daughter if she knew what the advance directives would be regarding the place of care and the place of death of her mother in the EoL process, which she was unaware of. However, the patient had said that she did not want to suffer, so the daughter expressed her desire to ensure comfort since now it was distressing to see her suffering. Additionally, it was impossible for the daughter to provide full time support to her mother, as she was caring for her children independently.

While awaiting transport, the care plan was based solely on pain management and administering drugs according to the doctor's instructions.

The daughter was informed that the patient met the criteria for admission, as she was in the final hours of her life, with uncontrolled symptoms, and required the administration of drugs with greater care and professional monitoring. It was explained that it was not possible to predict/determine the moment of death. The patient's daughter was receptive and agreed to her hospitalization.

While the transfer was being organized, the daughter was given a moment to speak privately with her mother to discuss any relevant issues and say her goodbyes.

The patient was admitted to the PC ward on the 22nd of December 2023 at 13h30. She was on a stretcher for EoL care, and a more significant number of minor purple bruises was noticeable in the same area as previously.

Death was declared and certified at 00h27 on 23rd of December, 2023.

4. Discussion

It is expected that after being referred for PC, the patient and family are approached within 48 hours and that a systematic assessment is carried out, however, in this case, this did not happen [22]. This is due to inadequate investment in PC, which results in an inefficient system with insufficient responses to patients with palliative needs and their families/caregivers, mainly due to insufficient human resources to ensure optimal and timely care [23].

This case study revealed the identification of a person in the LHDL, as on the second visit, a change in the PPS score, initially 30-20% and was then 10% was noticed. PAINAD score also increased, from 3 on the first visit to 10 on the second. The deterioration in the patient's state of health was evident.

As a result of these changes, the focus of the specialist nurse also changed, as the symptoms differed in both assessments. However, some of these focuses were maintained throughout the evaluation.

Although the institution uses Dorothea Orem's theory in a domiciliary context, we would like to emphasize that Afaf Meleis' theory is the most prominent in this case study. This is mainly because of the transition in the health/illness process, specifically in terms of pain and skin integrity, which is one of the focus of attention maintained in both assessments.

According to Dorothea Orem's theory, the patient was effective in the second theory, where the nurse's intervention was essential to meet the patient's needs. The training provided during the first appointment was pivotal, as it made it possible to obtain symptom control, even for a short time. On the second visit, the patient's pain was uncontrolled [13].

In Afaf Meleis' theory, there is a transition in the health/illness and organizational process. Considering the health/illness process, the patient was independent until about a month before and was currently bedridden, with a change in family roles. This included the arrival of her daughters to accompany her during this more debilitating phase because her husband remained at work most of the day.

In terms of organizational transition, in the last four months, she had alternated between home and the hospital, with frequent visits to the emergency department and two long hospital admissions, resulting in greater dependency. It is worth noting that the patient remained at home during the last three weeks of her life. On the second visit, she was admitted again, but already in the PC ward, in an LHDL, due to the symptom control (pain) and social maladjustments [14, 15].

Therefore, skin alterations were noted during the assessments, and a PU appeared in the sacral area between both visits.

Wounds/injuries in PC are known to be diverse, but all of them involve symptomatic control, where the comfort and QoL of the person should be the primary objectives of the nurse's approach.

It is also important to emphasize that although quality skin care is provided to people in a palliative situation at the EoL, it is impossible to predict the occurrence of lesions or wounds, let alone the occurrence of TB-TTI. They are known to occur spontaneously, hours or days before death, with rapid progression, related or not to hypoperfusion and rupture of superficial vessels [4, 11].

This highlights the specialized nurse's knowledge level, who identifies the skin alteration, classifies it, and then establishes a nursing diagnosis based on the alteration and the evident uncontrolled symptoms. It makes sense that when these injuries are identified, they are immediately associated with the proximity of imminent death and that they are not confused with PU. It is also essential to pay attention to changes in the skin, associating them with the SCALE phenomenon. They subsequently adjust their interventions based on a conscious decision-making process regarding the EoL [4] in collaboration with the attending physician, where comfort and QoL take precedence.

Caring for a person with wounds poses a challenge, not only because of the difficulties intrinsic to the healing process but also because of the associated comorbidities. It is essential to always consider the person's right to know and choose treatment options when possible and to consider comfort, the person's needs and QoL. In this context, "giving up on healing does not imply giving up on the person; on the contrary, it maintains and enhances the promotion of comfort and quality of life" [11].

Likely, the cutaneous insufficiency had already developed when the PU in the sacral region appeared. The community nurse had classified this as a Grade II PU (blister). However, details of its classification are unknown, particularly the dimensions and content of the blister. Most PUs are incorrectly classified, mainly due to the lack of knowledge of the characteristics of terminal ulcers and the lack of investment by health professionals, including nurses, in this area [4].

In this case study, the term SCALE stands out, as skin changes result from the death process. These changes affected the skin and tissues, mainly resulting in color alterations, integrity, and pain (patients with constant negative vocalizations). These changes were inevitable and occurred even

with proper care, especially with using an alternating pressure mattress and applying moisturizing cream, which was found to be present during the punctures [4].

There are no specific published guidelines regarding the approach to unavoidable wounds [4]. However, in this particular case, by integrating the term SPECIAL (S – Stabilize the wound; P – Prevent new wounds; E – Eliminate odor; C – Control Pain; I – Infection prevention; A – Absorb exudates; L – Less dressing changes), interventions are not applied to the entire term, as there is no open wound, since TB-TTI does not evolve into loss of skin integrity.

In this sequence, TB-TTI injuries become inevitable. The progression of the disease justifies this. These observed injuries also prove what the literature has shown in that they do not arise from pressure. [4, 11].

To this end, it is essential to recognize these skin alterations in PC patients as related to death. These lesions should be considered a unique phenomenon and cannot traditionally be classified as a PU, because they indicate imminent death [4, 5, 11].

We would emphasize that the care plan only covered "C - Controlling pain" [4], which was the main focus of the care plan.

These skin alterations are related to organ failure at the EoL, and this patient died within the established number of hours mentioned above, i.e., from the identification of the skin changes to the time of the patient's death, 14 hours had passed. This is per current publications [4, 5, 11].

5. Conclusions

KTU and TB-TTI are indicators of the proximity of death in days/weeks of life or hours/days, respectively. The correct identification of skin changes allows the nurse to anticipate and establish a diagnosis and a care plan adjusted to the proximity of death, to prepare the family/caregivers for the anticipatory grieving process, as well as respond to the personal and individual needs of both the person and the family/caregiver.

When reporting this skin alteration, the nurse's role in identifying it was highlighted, as it not only made it possible to control pain by continuously adjusting the PC plan but also provided an opportunity to anticipate the death process, allowing the family to accompany and say farewell during this crucial time.

In this specific case, the death process took place within hours, a total of 14 hours, after its identification, corresponding to the current evidence. Cutaneous insufficiency causes skin alterations, most of which are devalued due to lack of knowledge but also because they go unnoticed in the set of other, more intense symptoms. Thus, it is necessary to increase the training and awareness of nurses on this subject so that nurses can identify them, guarantee the correct classification and better management of the PC plan, adapt it to the individuality of each person, as well as provide the best response to the personal needs of each patient who presents any EoL skin alteration.

Considering that this case study is restricted to just one person, it is impossible to generalize the results. It is, therefore, essential to carry out further investigation with a more extensive number of patients.

As for the strengths, we would highlight the recognition of this skin alteration, which enhanced clinical reasoning in recognizing imminent death. The intervention of the specialist nurse will not be directly at the lesion itself, as it is inevitable and will not disappear. Their intervention should be

based on symptomatic control due to skin insufficiency, multi-organ failure, and the needs mentioned by the patient for comfort, whenever possible.

In turn, the lack of recognition of these injuries as indicators of imminent death among the peers of the PC team and the medical team is a limitation.

Abbreviations

ADLs	Activities of Daily Living
CE	Cranioencephalic
CT	Computed Tomography
EoL	End-of-Life
ICD-Pal	Instrument a Diagnostic for Complexity in Palliative Care
KTU	Kennedy's Terminal Ulcers
L/min	Liter per minute
LHDL	Last Hours Days of Life
mg	milligrams
ml	milliliter
PAINAD	Pain Assessment in Advanced Dementia
PC	Palliative Care
PPS	Palliative Performance Scale
PRN	“pro re nata”
PU	Pressure Ulcers
QoL	Quality of Life
SCALE	Skin Change At Life's End
SPECIAL	S - Stabilize the wound; P - Prevent new wounds; E - Eliminate odor; C - Control Pain; I - Infection prevention; A - Absorb exudates; L - Less dressing changes
TB-TTI	Trombley-Brennan Terminal Tissue Injury

Author Contributions

The contribution of each author is as follows: Elsa Abreu, the identification of the person for case study and the writing of the article; Catarina Simões, the analysis and revision of the article; Rita Figueiredo the final revision of the article. All authors reviewed and approved the article before submission and provided final approval of the article.

Competing Interests

The authors have declared that is no conflict of interests.

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