A Retrospective Descriptive Study of Nursing Home Residents with Heel Eschar or Blisters

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Abstract
Pressure ulcers on heels are a serious problem in nursing home patients and can lead to complications. Current clinical guidelines recommend leaving dry heel eschar intact, but the evidence for this recommendation is largely based on expert opinion and not always followed. To examine outcomes of heel pressure ulcers in nursing home patients, a retrospective study was conducted by reviewing the charts of patients in 15 different nursing homes who had a heel eschar or a heel blister during a period of 50 months. In all facilities, standard protocol of care consisted of offloading the area and keeping eschar and blisters dry and debriding only if the eschar or blister became loose. A total of 263 heel wounds were identified. Of those, 179 (68%) had eschar and 84 (32%) were blisters. Almost half of all patients (41%) were lost to follow-up. All but one (amputation related to pain from ischemia) of the remaining wounds (n = 154) healed. Ninety-four of the 95 wounds with eschar and 57 of 57 wounds with blisters healed after an average of 11 (SD 9.44) weeks for wounds with eschar and 6 (SD 4.75) weeks for blister-covered wounds. These results suggest practitioners can follow current clinical guidelines for the management of these wounds until further research comparing different protocols of care has been conducted.

Keywords: heel eschar, heel blisters, healing rates, retrospective study, pressure ulcer


Potential Conflicts of Interest: none disclosed

Pressure ulcers (PUs) on heels pose a serious problem for patients in all care settings, including long-term care (LTC) facilities. Prevalence and incidence studies1-5 show a substantial number of PUs develop on the heels, and complications such as cellulitis, osteomyelitis, and amputation have been reported; Stage II blisters also are prevalent and also have been identified as problematic.6 Current recommendations, such as those promulgated by the National Pressure Ulcer Advisory Panel (NPUAP),1 recommend leaving heel eschar in place as a natural biological cover. However, research to support this recommendation is lacking and what is available is based on level C evidence—ie, indirect evidence and/or expert opinion.1 In clinical practice, the author has observed many practitioners removing dry eschar, leading to ulcer-related complications.

Blister on heels can be staged as Stage II (transparent blister) or deep tissue injury (DTI) if they present as purple blood blisters.1 These have been observed to go unnoticed, then are restaged as eschar/unstageable wounds.1 There has been discussion regarding whether these blisters should be left intact or unroofed.6

Literature Review
PU classification involves staging that reflects the level of tissue involved, plus two stages where depth of tissue cannot be visualized. Ulcers completely covered with necrotic tissue are classified as unstageable. This necrosis can be described as slough (yellow, tan, green, or gray) or eschar (tan, brown, or black).1 Blister on heels are considered partial-thickness, Stage II PUs if there are no signs of DTI.6

PU incidence and prevalence. Park-Lee and Caffrey6 analyzed the 2004 National Nursing Home Survey data and found 11% of 159,000 current nursing home patients had PUs, commonly on the heels. Bergstrom and Braden7 found 39% of the 147 nursing home patients in their prospective study developed a Stage II or greater PU. Horn et al6 conducted

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a retrospective cohort study with convenience sampling of 1,524 residents from 95 LTC facilities across the US who were considered at risk of developing a PU (Braden scale score <17). They identified interventions such as improved nutrition and more frequent repositioning; yet these residents still had a 29% incidence of new PUs in a 12-week period.

Barrios et al9 examined a sample of 3,314 patients in French hospitals who had at least one PU and found a PU prevalence rate of 9%, with the heel the most common location (46%). Of all the patients examined, most patients had one sacral ulcer (1,119 or 34%), but when multiple locations were considered, the prevalence of one or two heels ulcers was 933 (28%).

Lahmann et al10 analyzed data from two nationwide surveys of 4,846 German nursing homes and 16,728 hospital residents in 2002 and 2003 and reported 22.9% of the nursing home patients had PUs on their heels. Davis and Casey11 conducted both prevalence and incidence analyses in two separate nursing homes (95 and 92 residents, respectively) and found a PU prevalence of 38.8% in one home and 53% in the other home, with heels having the second highest incidence (12%).

Frain12 conducted a 1-year prospective awareness prevention program to educate staff, implement a prevention program, and conduct regular assessment to show how to decrease the incidence of heel PUs. Forty patients were randomly selected to represent the population of a 470-bed LTC facility. The prevalence rate in the beginning was 22.5%. Interventions focused only on ways to properly offload the heels. At the end of 1 year, all the heel ulcers were resolved.

The results of nine international PU prevalence studies13 conducted from 1989 to 2005 regarding PUs in acute care, long-term acute care, and LTC, including 52 LTC facilities and 6,242 patients were analyzed. The results showed a median prevalence rate of PUs in LTC of 14.4%; 22.9% of those were heel PUs. It was interesting to note that PUs on feet were three times more common in nursing homes than in the other facility types.

In 2001, Cuddigan et al14 conducted a follow-up survey of PUs in the US to determine if the NPUAP goal of 50% reduction set in 1989 was met. Their Medline database search from 1990 to 2000 of PU incidence and prevalence in LTC, acute, and home care found data inconsistencies due to differences in methodologies used and populations studied, but that most PUs, regardless of setting, are partial-thickness (Stage II) and that the second most frequently occurring location is the heels.

PU patient mortality. Berlowitz et al15 conducted a retrospective, descriptive study of 19,981 nursing home residents in the VA system and found 59.5% of persons who developed a PU died within 1 year of developing the ulcer. The researchers were able to adjust for multiple measures of clinical and functional status and this decreased the relative risk from 2.37 to 1.45. Because this risk was not noted for patients with deeper PUs, it suggested that other unmeasured clinical conditions may have contributed to the increased mortality associated with all PUs. The development of new PUs appeared to be a marker of coexisting illnesses, impaired nutrition, and functional status and not an independent risk factor for increased mortality.

In a retrospective study among 301 nursing home admissions, Berlowitz and Wilking16 found the presence of any PU on admission, the development of a new ulcer, and failure of the ulcer to heal all were associated with a two- to three-fold increase in the risk of dying during a 6-week period following admission to the facility, most likely due to coexisting medical conditions.

Clinical practice guidelines and consensus. In 1994, the Agency for Health Care Policy and Research, now the Agency for Healthcare Research and Quality (AHRQ), developed guidelines for the prevention and treatment of PUs.1 These guidelines have served as a basis for wound care practice over the past 16 years and specifically address the management of eschar that has formed over a heel ulcer. The guidelines state:

Heel ulcers with dry eschar need not be debrided if they do not have edema, erythema, fluctuance, or drainage. Assess these wounds daily to monitor for pressure ulcer complications that would require debridement (eg, edema, erythema, fluctuance, drainage) (strength of evidence = C).

The AHCPR expert-based recommendation was grounded in the opinion that stable heel eschar is a natural protective cover and thus an exception to the recommendation to debride all eschar. More recently, the NPUAP, in collaboration with the European Pressure Ulcer Advisory Panel (EPUAP), developed a PU guideline that contains the same recommendation.1 Practitioners should not debride stable, hard, dry eschar in ischemic limbs, but instead continuously monitor heel eschar for signs and symptoms of infection including erythema, fluctuance, tenderness, edema, purulence, crepitance, and/or malodor. The strength of evidence for this recommendation is level C.
The Wound Ostomy Continence Nurses (WOCN) Society17 position statement on PU staging includes the same guidelines for heel eschar, and the WOCN education curriculum states that when dry eschar covers a PU located on the heel, debridement is contraindicated. The American Medical Directors Association18 clinical practice guideline also follows the original AHCPFR recommendations for the management of dry eschar on heels.

Other wound care experts also have described the maintenance of heel eschar in the literature.19-22 Martin,23 Dolynchuk,24 and Kirshen et al20 additionally discussed the controversy over debridement of heel ulcers, citing NPUAP recommendations that the eschar should not be removed without evidence of exudate or signs of infection (tenderness, slough around the edges, or febrile response without another identifiable cause). To underscore the controversy, Kirshen et al cited a 2004 article by Brem and Lyder25 on the treatment of diabetic foot ulcers that recommends debridement of necrotic heel ulcers.

Citing multiple physiological factors (including perfusion problems, friction, shear, neuropathy, edema, paralysis, and immobility) that put the heel at risk for PU development, Langemo et al26 agreed with NPUAP guidelines not to remove intact, dry eschar. Her article presented a comprehensive review of the current literature of heel ulcers. Black27 acknowledged the NPUAP guidelines are controversial and need more research, but supported maintaining both dry eschar and blisters. She stated that because the heel has no vascular tissue beneath the eschar (only a fat pad), even a clean open wound can quickly become infected, leading to osteomyelitis. In reviewing the advantage of wound debridement in the tissue, inflammation/infection, moisture-balanced, edge-of-tissue (TIME) method, Beitz22 noted that stable eschar on lower limbs should be left intact, especially if the person is at the end of life and/or has poor tissue perfusion to the area. In these cases, Beitz believes eschar acts as a physiological barrier to infection. In a review of wound management in LTC patients, Doughty28 stated the removal of dry eschar in noninfected wounds is contraindicated in patients with advanced vascular disease or immobility (chair- or bedbound). In these situations, removal of the eschar converts a closed wound to an open wound, which increases the risk of infection. In summation, these authors advocate leaving eschar alone in patients with poor circulation.

Blisters. Ramsey29 presented an overview of the management of friction blisters on heels as part of an educational series. He advocated the best cover for an intact blister was its own roof and that an intact blister was more comfortable and less prone to infection. However, his article described friction blisters on active athletic persons and not PUs. Read30 presented a case study with discussion of treatment options. She also believed an intact blister is more comfortable and less prone to infection. Hollinworth6 suggested the most appropriate treatment is to leave the blister intact, and if it ruptures, to treat using current standards of care to promote healing. Thus, research on maintenance of intact blisters in nursing home patients is scant, and information is anecdotal at best, but the general consensus from these practitioners is to leave blisters intact whenever possible.

Nonguideline approach. Despite the growing body of evidence to support the maintenance of dry heel eschar, some practitioners recommend aggressive mechanical debridement of all nonviable tissue.25,51,32 Smith32 advised all necrotic tissue must be removed to establish the extent of disease and promote healing. Brem and Lyder25 outline protocol for treatment of all PUs and state that in the presence of necrotic tissue, wound healing is usually impossible.

Dosluoglu et al31 compared the outcomes of patients presenting with a diagnosis of ischemia and heel ulcers or gangrene to persons with ulcers on other parts of the foot. They evaluated 71 patients with heel necrosis and 237 patients with ulcers on other parts of the foot. Sharp debridement was performed when necessary, although it was not clear when or why, along with advanced wound care treatments. Researchers found heel ulcer patients had a lower overall 12-month survival rate (49%) than those with ulcerations elsewhere (74%) and subsequently recommended eschar removal from heels because the eschar was believed to contribute to mortality. Of 11 patients with heel gangrene, 10 required major limb amputations and had a high mortality rate (51%) at 12 months. Treiman et al33 routinely debrided eschar from wounds in a sample of 91 hospitalized patients with arterial insufficiency and found 73% of their patients healed within 6 months (mean of 3 months). However, 11% of these patients underwent below-the-knee amputations. These authors are vascular surgeons who felt that dry gangrene posed too much of a risk to be left intact.

Healing rates. The reported healing rates of heel ulcers vary and are difficult to compare due to many confounding variables, such as the type of patient care, modality of wound treatment, and existing comorbidities.33-35 Kramer and Kearney35 conducted a nonexperimental retrospective study using data from patients with all types of PUs in a LTC facility. They found the patient’s weight, body temperature, and wound stage accounted for 25% of variance in wound healing. Takahashi et al’s34 retrospective study of all wound types in 397 LTC residents described multiple factors affecting healing rate, including anemia, age, male gender, history of stroke, and peripheral vascular disease. Lahmann et al10 analyzed data from their prevalence study of hospitals and nursing homes (4,846 patients in 60 LTCs) and found 30% of all the wounds in the nursing home patients lasted for more than 3 months.

Chipchase et al36 found that among 157 patients with diabetes and heel ulcers, 65.6% healed after 200 days of what the authors called “conventional treatment,” revascularization was
provided in 17 patients, and sharp debridement was rarely used. Of the patients with nonhealed ulcers, 7.1% had major amputation, and 27% of the patients died. Backward, stepwise logistic regression analysis showed that most of the healing (70%) could be predicted by ulcer size and/or the presence of peripheral arterial disease. These authors compared their outcomes to Treiman et al13 and Smith12 and believed that although their approach was more conservative, the overall healing rate was similar.

Evidence from the literature to guide the treatment of heel eschar is limited, mostly opinion-based, and contradictory. Although there appears to be consensus regarding the maintenance of dry heel eschar on patients with poor tissue perfusion, the outcome of this approach for patients with adequate perfusion is largely unknown. The purpose of this retrospective study was to evaluate outcomes of maintaining dry heel eschar or heel blisters maintained following NPUAP guidelines of care.

Methods
Theoretical framework. Levine’s conservation model37 was originally developed based on the belief that nursing interventions should be aimed at conserving function; Leach38 used this framework in his approach toward the management of venous leg ulcers and argued that the nurse can create an external environment that preserves the patient’s energy and integrity through the application of topical dressings and an internal environment with the application of compression dressings, making the ulcer more likely to heal. Schaefer and Potylycki39 based their descriptive study of 38 patients with fatigue associated with congestive heart failure on Levine’s conservation model, using both qualitative and quantitative data. Results suggested a number of interrelated factors contribute to fatigue in these patients and emphasized the holistic approach to patient care.

Foreman40 categorized variables associated with confusion in the elderly according to Levine’s conservation principles. He evaluated 71 patients >60 years old to obtain information about the incidence, onset, and variables associated with the onset of confusion. Categorizing these variables according to Levine’s four conservation principles, Foreman was able to find relationships in their findings. This supports Levine’s model promoting a holistic approach to promote structural, personal, and social integrity.

Through these principles, Levine’s model emphasizes the nurse’s responsibility to maintain the patient’s integrity in the threat of assault through illness (internal) or environmental (external) influences. NPUAP guidelines on the maintenance of dry eschar, as well as blisters on heels, support all four principles. The conservation of energy includes the practice of offloading the heel, and maintenance of the eschar or blister would fall under the principle of structural integrity. Personal integrity promotes the patient’s self-image by reducing pain associated with painful, perhaps frequent, debridement and the absence of an open wound with potential malodorous exudate that may affect social interactions.

Study design. This retrospective study involved the review of existing data from charts of LTC patients with one or more intact heel eschar or blisters. The study protocol was submitted for review by the Robert Morris University IRB and was approved with an “Exempt” status. Informed consent was deemed unnecessary, and verbal permission to review the charts was obtained from each participating nursing home. Patients’ names were de-identified once the data review was completed.

The chart review encompassed residents in participating LTCs between October 2006 and December of 2010. Wound records were identified and data abstracted. Chart documentation supplied enough information to classify the ulcer as either unstageable eschar, DTI (ie, purple blood blister), or a Stage II transparent blister.

Participants. Data were extracted from charts of all 263 wounds on patients admitted to 15 nursing homes in the Western Pennsylvania area who had developed one or more wounds on their heels that were categorized as either eschar or blisters. Nursing home sizes ranged from 50 to 200 beds.

Data from heel wounds not entirely covered with eschar or a blister did not meet the inclusion criteria and were not included. Data from patients with heel eschar or blisters who were not treated by the principal investigator during the entire chart review period were not included, because different treatment methods may have been implemented.

Standard care procedures. In all residents, standard procedure to leave the eschar intact was followed. If the eschar loosened so it was no longer considered a protective cover, it was removed (ie, sharp debridement), and standards of care to promote healing were instituted. This follows NPUAP guidelines that recommend removal of eschar if edema, erythema, drainage, or fluctuance occur. This information was included in the data extrapolated in the chart review.

Heel blister management followed the recommendations of Hollinworth6; the blister was kept dry, intact, and offloaded unless it ruptured. It then was managed according to the institution’s wound care standards of care to promote healing. These standards were based on the NPUAP clinical guidelines for moist wound healing and included enzymatic debridement or use of a dressing that facilitates autolytic debridement.

Wounds were identified and coded as to left or right heel, eschar or blister, nursing home, and outcome. These outcomes included wound closure, amputation, death, and whether a patient may have been lost to follow-up. Measurements (length, width, and depth if needed) in centimeters were obtained bi-weekly using a paper ruler, and wound assessment variables were recorded. Characteristics and amount of the eschar and drainage were collected and scored according to the Pressure Ulcer Scale for Healing41,42 (PUSH) tool guidelines, available at www.npuap.org. This instrument uses size, presence of ne-
crosis, and amount of drainage to determine a score by which healing is measured and compared. The PUSH tool was recommended by the NPUAP in 1997. Users generally found the PUSH tool easy to use and helpful in PU management.41 Other studies suggest tool validity42 and that it is best suited for measuring overall patient and facility outcomes.43

If the eschar loosened and required removal, measurements continued as well as assessment including percentage of necrosis remaining in the wound bed and the amount of wound drainage.

Study data. All study data were abstracted by the principal investigator and entered in Microsoft Excel spreadsheets. Wound measurement data, drainage amount and type (i.e., serous versus serosanguinous), and amount and type of necrosis also were scored per PUSH tool guidelines. Information on each wound was abstracted until wound closure (100% epithelialization) or the patient could no longer be followed (e.g., discharge from facility or death).

Data analysis. Recorded wound variables (length and width, exudate amount, and tissue type) were used to calculate PUSH scores.41,42 Data analysis used descriptive statistics to categorize the data and examine the sum total of each category. Lesions in patients with bilateral heel ulcers were analyzed as separate wounds. PUSH tool scores were averaged. Average healing times and rates were calculated using the PUSH tool. A two-sample t-test assuming unequal variances was used to compare the means of healing times of the wounds with eschar versus the wounds with blisters.

Descriptive analysis listed the number of wounds that healed and patients that underwent amputation, died, or were lost to follow-up. Of the number lost to follow-up, information was analyzed to see how and why the wound was lost to follow-up. Complications (cellulitis, osteomyelitis) were identified and their outcomes tracked to see if this had an impact on the final outcome of the particular wound.

Results

Data from 263 wounds were reviewed and abstracted. Of those, 179 were identified as heel eschar (67.8%) and 84 (31.8%) were identified as blisters. Thirty-five (35) patients (13.3%) had bilateral heel ulcers. These were all identified as separate wounds, and the fact that several wounds belonged to one patient was not included as a consideration.

Forty-six (46, 17.5%) wounds were lost to follow-up. Reasons for attrition included discharge to home (20, 7.6%), hospital (five, 1.9%), another facility (two, 0.8%), or unknown destination (13, 4.9%), or care was transferred to another wound care specialist (six, 2.3%). Sixty-four (64, 24.3%) wounds (58 patients) could not be followed further because the patient died. Twelve of these patients had two wounds, but wounds had healed in six of these patients before they died. The deaths occurred at all intervals along the course of having the heel wound, and no deaths were directly attributed to the wound itself.

Outcomes. Of the remaining 155 patients in the study, the wounds of 154 (99.3%) healed. One patient had her leg amputated. The amputation was not related to deterioration of the wound, but rather due to intolerable ischemic pain, causing the patient to request the surgery.

Three patients developed complications: one patient developed osteomyelitis, received IV antibiotic therapy, and the wound went on to heal; and two patients developed cellulitis, were treated with oral antibiotics, and the cellulitis resolved. Of these two patients, one wound healed, and the other patient died 3 months later with the wound essentially unchanged.

Within the group of wounds with eschar, 34 wounds (19.1%) were lost to follow-up and 49 patients (27.4%) died. All of the remaining 95 wounds healed completely during an average of 11 weeks (range 2 to 50 weeks) except the patient who had the amputation. In the group with blisters, 12 patients were lost to follow-up (14.2%) and 15 (17.9%) died. The remaining patients in this group (n = 57) that were followed throughout the 4-year review went on to heal during an average of 6 weeks (range 2 to 26 weeks) (see Figure 1).

Overall mean healing time of the two combined groups was 9 ± 8.605 weeks (range 2 to 48 weeks). A two-sample t-test assuming unequal variances for healing time means showed blisters healed after an average of 5.55 weeks (SD 4.75) and wounds with eschar that healed took an average of 10.64 weeks (SD 9.44) to heal (P = 0.000).

PUSH scores decreased consistently until resolution of the wound (score of 0) (see Figure 2). The scores did not decrease at the same amount each week. The range of mean change in biweekly scores was generally larger when ulcer was first diagnosed (average decrease 1.9 in eschar and 1.4 in blisters) and smaller when the wounds were almost healed (average decrease 0.2 in eschar and 0.1 in blisters).

In this particular study, patients with heel eschar were more likely to die (49, 27.4%) than patients who had blisters (15, 17.9%), an odds ratio of 1.53.

Discussion

Outcomes. Results of this study show 154 out of 155 wounds (93.6%) in patients who were followed went on to heal, supporting expert opinion7 that heel eschar can be left intact for healing. Outcomes were positive in almost all cases not lost to follow-up. Only one had an unfavorable outcome (amputation). These results compare favorably with other retrospective, descriptive studies that involved heel eschar debridement.31 The low infection rate supports the NPUAP guidelines recommending that heel eschar should be treated as a natural biological cover and left intact.

Standards for heel blister management have not been identified. However, most expert opinion5,6,9,30 including retrospective case studies, recommends leaving the blister intact. When this protocol was followed, 100% of the wounds with blisters (N = 57) resolved. Positive healing outcomes in
this study support these recommendations. No complications were observed.

An interesting finding was the number of patients with heel eschars or blisters who died (N = 58, 24%) while they had heel eschar or blisters. These patients were not exhibiting any outward signs of complications from their wounds, suggesting other disease processes affected the patients’ ability to survive. Mortality rates from this study mirror Takahashi et al; are lower than other retrospective, descriptive studies; and concur with these previous studies that the patients’ multiple comorbidities played a role in their mortality.

Wounds with eschar are classified as full-thickness tissue damage as compared to a partial-thickness blister. However, the extent of the tissue damage may not contribute to the death of the patient; instead, it may be an indicator of the patient’s overall physical health. Perhaps heel eschar should be considered a forecast of pending decline.

Healing rates. Heel wounds with eschar took a longer time to heal than blisters (11 versus 6 weeks, respectively). This seems to confirm the presence of underlying tissue damage in an unstageable heel ulcer compared to the partial-thickness depth of heel blisters. Due to the presence of the eschar, it is also difficult to gauge how the wound is evolving underneath. Healing rates were followed using the PUSH tool scores. As shown in Figure 2, the rates do not decline in a linear fashion. This is suggested in the literature as well, although no studies that evaluate only heel ulcers are available.

Information on when the wound developed, if the wound was present on nursing home admission, was limited. However, if the eschar or blister was intact on initial assessment, the researcher used inclusion criteria and followed the wound for the study.

Management of the wound in between the provider’s biweekly visits also was a concern. Staff members were aware of the need to keep the eschar dry and maintain offloading, and they were instructed on proper wound care after the eschar was removed. However, it would be difficult to know if every wound had always been correctly cleansed, dressed, and offloaded. This could affect outcomes and healing rates. Without a standardized (and followed) wound care protocol in every facility, controlling for such factors is difficult.

The PUSH tool has limitations in this study. Although it is widely considered to be a reliable tool for measuring healing rates, it may not be the best for tracking eschar. Eschar and blisters have intact covers, potentially showing little change for extended periods of time. Underlying tissue changes cannot be visualized or measured. Sometimes the eschar or blister will expand slightly but still remain dry and intact. As a result, healing rates can show little change for a few weeks followed by an abrupt change when the eschar or blister is removed. Therefore, assessing the healing rate of these types of ulcers is challenging, and the final outcome may be the more important issue to identify.

Another limitation of the study was the inability to provide a comparison group to benchmark outcomes. The literature review did not find any comparable studies that included a control group or evaluate outcomes of heel wounds where the eschar or blisters were removed. Ethical considerations made it impossible to develop a comparison group where NPUAP guidelines were not followed.

**Conclusion**

This study was conducted to examine outcomes in the maintenance of dry heel eschar as well as blisters. The
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NPAP and EPUAP guidelines have long advocated maintaining dry heel eschar. However, these guidelines lack strong evidence. The opinion is supported by some, but not by all experts in the field.

The use of reliable guidelines when managing patients with difficult heel wounds is critical. Considering the dynamic state of clinical practice, it is imperative to promote quality patient care through the establishment and implementation of evidence-based practice guidelines.1

Although this study supports current recommendations, further research is needed. In this retrospective study, the outcomes of dry heel eschar and blister management were good, suggesting wound care practitioners can follow this plan of care until more evidence is available.  

References