The aim of this study was to evaluate the predictive validity of the Braden Scale for Preventing Pressure Sore Risk in elderly residents of long-term care facilities (LTCFs) in Brazil. The determination of the cutoff score for the Brazilian population is important for the comparison between Brazilian and international studies and establishment of guidelines for prevention of pressure ulcers in our health care facilities. This is the first study of its kind in Brazil. This was a secondary analysis of a prospective cohort study conducted with 233 LTCF residents aged 60 and over who underwent complete skin examination and Braden Scale rating every 2 days for 3 months. Two groups of patients were considered: the total group \((N = 233)\) and risk group \((n = 94, \text{total scores } \leq 18)\). Data from the first and last assessments were analyzed for sensitivity, specificity, and likelihood ratios. The best results were obtained for the total group, with cutoff scores of 18 and 17, sensitivity of 75.9\% and 74.1\%, specificity of 70.3\% and 75.4\%, and area under the receiver operating characteristic curve (AUC-ROC) of 0.79 and 0.81 at the first and last assessments, respectively. For the risk group, the cutoff scores of 16 (first assessment) and 13 (last assessment) were associated with a smaller AUC-ROC and, therefore, lower predictive accuracy. The Braden Scale showed good predictive validity in elderly LTCF residents. (Geriatr Nurs 2010;31:95-104)

In Brazil, the elderly population accounts for 8.6\% of the total population and has been increasing rapidly over the past few decades, as in many other countries.\(^1\) It is estimated that within 20 years the number of elderly persons in Brazil will be approximately 32 million.\(^2\) The aging of the population results in an increased demand for health care services and long-term care facilities (LTCFs) for the elderly.\(^3\)

Elderly LTCF residents are usually aged 60 to 85 years; often suffer from multiple comorbidities; have physical, psychological, and social dependency needs; require special management and treatments; and have high mortality rates.\(^6\)

Pressure ulcers are a secondary condition that may be associated with chronic degenerative diseases.\(^7\) Although the risk factors for the development of pressure ulcers are associated with many factors and clinical conditions, age has been indicated as a predictive factor or associated with risk factors for the development of pressure ulcers in certain conditions, including chronic degenerative diseases (e.g., cardiorespiratory diseases and urinary conditions that could cause incontinence) as in this study.\(^8\) The incidence of pressure ulcers is higher among the elderly compared with young populations.\(^1\) This fact may be attributed to the physiological characteristics of the aging skin and muscle, presence of systemic diseases (diabetes mellitus, arterial hypertension, vasculopathy, depression, and dementia), as well as changes in nutritional status, cognitive deficit, incontinences, and reduced mobility,\(^8\) among others.

A study conducted in Germany reported that 61.4\% of patients in nursing homes and 38.0\% of patients in hospitals were at risk for developing pressure ulcers, with a pressure ulcer prevalence (Stage I–IV) of 8.4\% in nursing homes and 15.7\% in hospitals.\(^9\) An Italian study reported a pressure ulcer prevalence of 27.0\% among elderly LTCF residents,\(^10\) and results from a study performed in 4 LTCFs for the elderly in southern Minas Gerais, Brazil, revealed a incidence of 39.45\%.\(^20\)
Another study conducted in the United States reported a higher mortality rate (50% at 1 year) among elderly LTCF residents with pressure ulcers at admission compared with 27% among those without pressure ulcers.11

Pressure Ulcer and Risk Assessment

The systematic evaluation of the risks for pressure ulcer development has played an important role in the prevention of this condition. Many tools, such as the Braden Scale for Predicting Pressure Sore Risk, Norton, Gosnell, and Waterlow scales have been developed for pressure ulcer risk assessment. These are the most commonly used measures; they have been tested in various populations and settings around the world.

In 1987, Braden and Bergstrom devised a conceptual framework describing the etiopathogeny of the development of pressure ulcers involving 2 critical etiological components: the intensity and duration of the pressure and the ability of tissues to withstand the pressure. High pressure applied for a short period of time or low pressure applied during a longer period of time both result in capillary closure. Capillary collapse occurs when the applied pressure is approximately 32 mm Hg for arterioles and 12 mm Hg for venules. When the applied pressure is higher than 32 mm Hg, there is a decrease in blood flow to the affected area; when an excessive pressure is applied, the capillaries collapse and the flow of blood and nutrients to the tissues is stopped.21-24 Pieper22 added that high pressures stop not only blood flow but also lymph flow and the flow of interstitial fluids. Tissues are deprived of oxygen and nutrients, and toxic metabolic products accumulate. Interstitial fluids retain proteins, dehydrate cells, and irritate tissues. All these factors lead to tissue acidosis, an increase in capillary permeability and edema, contributing to cellular death. The intensity and duration of pressure are also related to sensory perception, mobility, and activity as important factors in the development of pressure ulcers. Tissue tolerance, a second critical factor in the development of pressure ulcers, is related to the ability of the tissue to distribute and compensate for pressures exerted on the skin overlying bony prominences,25 which affect the conditions and integrity of the skin and support structures. Tissue tolerance is related to extrinsic factors, such as moisture, friction, and shear, and to intrinsic factors, such as nutrition, age, and arterial pressure.

The Braden Scale was developed by Braden and Bergstrom as a tool to improve pressure ulcer prevention strategies.26 It is composed of 6 subscales: sensory perception, activity, mobility, moisture, nutrition, and friction and shear. Each subscale is rated from 1 to 4, except for the friction and shear subscale, which is rated from 1 to 3. The sum of the ratings gives a total score ranging from 6 to 23, with lower scores indicating higher risk.27

In their original study, Bergstrom et al.26 found the cutoff score of 16 to be associated with optimal sensitivity (83–100%) and specificity (64–90%) for an adult hospitalized population. In a subsequent study, the same authors suggested the cutoff score of 18 as the most appropriate for elderly patients, as well as for those who are physiologically unstable or have limited access to individualized care.25 Other authors have suggested different cutoff scores (range, 16–19) as the most appropriate to identify elderly patients at risk for developing pressure ulcers.12-14,28

The Braden Scale has been translated into Portuguese, culturally adapted, and validated for use in Brazil by Paranhos and Santos,29 in a previous prospective cohort study conducted for 3 consecutive months in patients in an intensive care unit. The authors reported a cutoff score of 13 at both the first and third assessments, with sensitivity of 81% and 89% and specificity of 52% and 80%, respectively.

Although the Braden Scale is the most commonly used tool for pressure ulcer risk assessment in Brazil, its use is still limited not only because of the lack of knowledge by health professionals about this tool but also to the small number of publications by Brazilian researchers on its use and validity. Moreover, no Brazilian studies were found in the literature on the predictive validity of the Braden Scale in elderly LTCF residents including at-risk and nonrisk patients. The purpose of our study was to verify the applicability of the Braden Scale to the Brazilian elderly population and to determine the Braden cutoff score for LTCF residents in Brazil. We also intended to verify if the Braden cutoff score of 18 reported by some previous studies would be useful in systematically identifying patients at
risk of developing pressure ulcers in Brazil. There are marked differences between the Brazilian elderly population and the elderly population of other countries because of cultural, climatic, ethnic, and social and economic factors, which may affect the outcome. Results from a primary study revealed a high incidence of pressure ulcers (39.4%) in Brazilian LTCFs, the use of instruments for the assessment of risk factors for the development of pressure ulcers is limited in these facilities.

Methods

This was a secondary analysis of a prospective cohort study conducted in 4 LTCFs located in 3 cities (Pouso Alegre, Borda da Mata, and Santa Rita do Sapucaí) in Southern Minas Gerais, Brazil. The LTCFs had similar characteristics; they were all nonprofit, philanthropic institutions providing public and social services.

Although there was a nurse in charge at each institution, no protocols or use of instruments to evaluate risk factors had been implemented; prevention of pressure ulcers was limited to the change of the patient’s position and minimization of skin exposure to moisture. Because of ethical reasons, the nurses in charge were informed about risk factors and pressure ulcer development among the elderly residents, but the investigators did not interfere with patient care. However, the provided information did not lead to prophylactic measures because appropriate procedures for prevention and treatment of pressure ulcers were not part of the routine protocol of these institutions.

The sample consisted of 233 LTCF residents (total group), aged 60 and older, who underwent complete skin examination and Braden Scale rating every 2 days for 3 months, and agreed to participate in the study. Statistical analysis was performed considering 2 groups: the total group, in which all 233 LTCF residents were included and the risk group, which consisted of a subsample of 94 patients with total Braden Scale scores <18. Results from the total group reflected the performance of the Braden Scale in the Brazilian LTCF residents. With regard to the risk group, the intent was to verify if the Braden cutoff score of 18 (reported by some studies conducted in communities in the United States and Europe) would also be useful in systematically identifying patients at risk of developing pressure ulcer in Brazil. The evaluation of 2 groups (total and risk groups) was based on a previous study on the predictive validity of the Braden Scale.

Procedures

This study was approved by the Research Ethics Committee of the Sapucaí Valley University (UNIVAS) and was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. Prior authorization was obtained from the Administrative Council of each LTCF. Written informed consent was obtained from all patients or their representatives before inclusion in the study. Patients’ anonymity was carefully protected.

Data were collected for 90 consecutive days at each LTCF. All patients underwent complete skin examination and Braden Scale rating every 2 days, until 1 of the following outcomes occurred: death, transfer to another facility, transfer to a hospital, return to home, or end of the study period. For at-risk patients, the development of a pressure ulcer was another possible outcome.

Two instruments were used for data collection: a questionnaire assessing sociodemographic characteristics (name, sex, age, race, and length of stay in the LTCF) and clinical characteristics (weight, height, medical conditions, medications most used, and smoking history) of the patients, and the Braden Scale. Data were collected by the first author (DMSTS) and 9 collaborators (nurses and undergraduate nursing students). Before the study, the collaborators participated in a training program and were assessed for interrater reliability with respect to the administration of the Braden Scale and pressure ulcer detection.

Braden Scale Training

The training on the Braden Scale for Predicting Pressure Sore Risk consisted of 3 steps. In the first step, the authors presented to the collaborators a historical account of the motives that led to the elaboration of a conceptual framework used to explore the interrelationship between risk and causal factors in the development of pressure ulcers. The collaborators were also instructed
about the Braden Scale, which consists of 6 sub-
scales representing the causal factors for pres-
sure ulcers: intensity and duration (sensorial
perception, activity, and mobility subscales)
and tissue tolerance to pressure (moisture, nutri-
tion, and friction and shear subscales), and
trained in scoring the Braden Scale. The sum of
the ratings gives a total risk score (possible
range, 6–23); total scores equal or less than 11 in-
dicate high risk; scores of 12–15 indicate moder-
ate risk; scores of 15–18 indicate low risk; and
scores equal or greater than 19 indicate no risk.
In the second step, the nurses were evaluated re-
grading the acquired knowledge about risk fac-
tors for pressure ulcers, Braden subscales, and
Braden Scale rating system. In the third step,
each collaborator, under supervision of a re-
searcher, administered the Braden Scale to el-
derly LTCF residents. At the end, all doubts and
questions were clarified. Percent agreement be-
tween the collaborators and first author was
used as a measure of interrater reliability. The
collaborators were considered prepared for
data collection only after the percent agreement
of 100% was obtained.

Pressure Ulcer Verification Training

Pressure ulcer verification training consisted
of lectures covering the definition of pressure ul-
cers, classification of pressure ulcers according
to the National Pressure Ulcer Advisory Panel
(NPUAP),33 cause and risk factors, preventive
measures, and main locations (to be assessed
during the physical exam); hands-on classes on
staging and description of pressure ulcers; dis-
cussions on staging of pressure ulcers accompa-
nied by the projection of several photographs of
pressure ulcers in different stages of healing, all
previously validated by expert opinion; and clini-
cal evaluation of pressure ulcers with the use of
the Braden Scale. Percent agreement between
the collaborators and first author was used as
a measure of interrater reliability. The collabora-
tors were considered prepared for data collection
only after the percent agreement of 100% was
obtained.

Data Analysis

The evaluation of a diagnostic test consists in
the determination of indicators of predictive val-
idity. The predictive validity of a test is deter-
mined by the sensitivity (the probability that the
test result will be positive when the test is applied
to a person who actually has pressure ulcer) and
specificity (the probability that the test result will
be negative when the test is applied to a person
who actually does not have pressure ulcer) of
the test.34 The positive predictive value (PPV) is
the probability that an individual with a positive
test result actually has pressure ulcer, whereas
the negative predictive value (NPV) is the proba-
bility that an individual with a negative test result
does not have pressure ulcer.35

Sensitivity and specificity can be graphically
represented by the receiver operating character-
istic (ROC) curve that plots the true-positive rate (sensitivity) against the false-positive rate
(1-specificity). The test is considered good
when the ROC curve falls above the diagonal
line. There is a quantitative and qualitative rela-
tionship between the area under the curve
(AUC) and accuracy, which may be classified as
excellent (0.80–0.90), very good (0.70–0.79),
good (0.60–0.69), and poor (0.50–0.59).36,37

In this study, we also used the likelihood ratio
(LR) to evaluate the performance (or predictive
validity) of the Braden Scale.37 The LR is defined
as sensitivity divided by (1-specificity). It can be
used to evaluate the power of the scale to dis-
criminate whether or not the patients are at risk
of developing pressure ulcer. The positive likeli-
hood ratio (+LR) is defined as the probability
that the test result will be positive when the test
is applied to a person who actually has the dis-
ease divided by the probability that the test result
will be positive when the test is applied to a per-
son who actually does not have pressure ulcer.
The higher the +LR, the higher is the probability
of an individual with a positive test result (total
Braden Scale score less than or equal to cutoff
score) to develop pressure ulcer. The negative
likelihood ratio (−LR) is defined as the probability
that the test result will be negative when the test
is applied to a person who actually has the dis-
ease divided by the probability that the test result
will be negative when the test is applied to a per-
son who actually does not have pressure ulcer.
The lower the −LR, the lower is the probability
of an individual with a negative test result (total
Braden Scale score greater than cutoff score) to
develop pressure ulcer. Therefore, the better
the test, the higher is +LR and the lower is −LR.
Fagan’s nomogram36 is a graphical tool that
represents the LR results, and shows the pretest probability, LR values, and posttest probability.

The patients were assessed for 3 consecutive months, and data from the first and last (before any of the aforementioned outcomes) assessments were used for statistical analysis.

Statistical analysis was performed using the StatsDirect 2.6.3, G-Stat 2.0, and MS Excel 2000 software. Data are presented as mean ± SD.

Results

The total group (N = 233) was predominantly female (n = 129, 55.4%), white (n = 164, 70.4%), with a mean age of 76.6 ± 9.2 years. The risk group (n = 94) was also predominantly female (n = 59, 62.8%), white (n = 64, 68.1%), with a mean age of 79.1 ± 9.6 years. The mean length of stay was higher in the risk group (3979.51 ± 5371.30 days) compared with the total group (3685.37 ± 4266.40 days; range, 1–23360 days). There was a predominance of cardiopulmonary diseases in the total group (61.8%). In the risk group, there was a predominance of urinary diseases (58.5%), although a high incidence of cardiopulmonary diseases (57.4%) was also found in this group. During the study period, 39.4% of patients in the risk group developed pressure ulcers.

Table 1 shows that Braden cutoff scores were higher in the total group than in the risk group at both the first (cutoff scores of 18 and 16, respectively) and last (cutoff scores of 17 and 13, respectively) assessments. Cutoff scores of 18 and 17 in the total group at the first and last assessments, respectively, yielded the best results for sensitivity, specificity, PPV, NPV, +LR, and –LR.

The Braden Scale demonstrated good validity (AUC-ROC, 0.81) in predicting the development of pressure ulcers in elderly LTCF residents with a cutoff score of 17, obtained for the total group at the last assessment (Figure 1).

Figures 2 and 3 show the probability of a patient developing pressure ulcers in the total and risk groups, respectively, on the basis of LR values. The probability of a patient in the total group developing pressure ulcers, according to data from the first assessment (cutoff score, 18), was 44% for a positive test and 9% for a negative test, and according to data from the last assessment (cutoff score, 17), the probability increased to

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Assessment</th>
<th>Score</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV</th>
<th>NPV</th>
<th>+LR</th>
<th>95% CI (range)</th>
<th>–LR</th>
<th>95% CI (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>First</td>
<td>18</td>
<td>75.9</td>
<td>43.6</td>
<td>70.3</td>
<td>56.8</td>
<td>36.8</td>
<td>69.1 (0.40–0.90)</td>
<td>43.6</td>
<td>70.3 (0.34–0.90)</td>
</tr>
<tr>
<td></td>
<td>Last</td>
<td>17</td>
<td>75.4</td>
<td>47.6</td>
<td>75.4</td>
<td>71.9</td>
<td>56.8</td>
<td>71.9 (0.40–0.90)</td>
<td>47.6</td>
<td>75.4 (0.34–0.90)</td>
</tr>
<tr>
<td>RISK</td>
<td>First</td>
<td>16</td>
<td>68.8</td>
<td>74.1</td>
<td>75.9</td>
<td>56.8</td>
<td>36.8</td>
<td>71.9 (0.40–0.90)</td>
<td>68.8</td>
<td>74.1 (0.34–0.90)</td>
</tr>
<tr>
<td></td>
<td>Last</td>
<td>13</td>
<td>56.8</td>
<td>74.1</td>
<td>75.9</td>
<td>56.8</td>
<td>36.8</td>
<td>71.9 (0.40–0.90)</td>
<td>56.8</td>
<td>74.1 (0.34–0.90)</td>
</tr>
</tbody>
</table>

AUC-ROC = area under the receiver operating characteristic curve; CI = confidence interval; LR = likelihood ratio; PPV = positive predictive value; NPV = negative predictive value.
48% for a positive test and remained 9% for a negative test. The cutoff score of 13 (last assessment) yielded the highest probability of a patient in the risk group developing pressure ulcers with a positive test (57%) and a probability of 28% with a negative test.

Discussion

Among the pressure ulcer risk assessment scales, the Braden Scale has been the most used and tested for predictive validity.\textsuperscript{15,16} However, there are few studies on the predictive validity of the Braden Scale focusing specifically on elderly LTCF residents, and this makes it difficult to compare our results with the literature.

Braden and Bergstrom\textsuperscript{12} conducted a study in a LTCF for 4 weeks, with 102 at-risk elderly patients with a mean age of 75.9 years and reported a Braden score of 18 as the best cutoff point for predicting the development of pressure ulcer, with sensitivity of 75% and 79%, specificity of 59% and 74%, and AUC-ROC of 0.64 and 0.75, at the first and last assessments, respectively. Subsequent studies reported higher sensitivity, specificity and accuracy at the cutoff score of 18.\textsuperscript{25,30,31} Higher cutoff scores were identified by Goodridge et al.\textsuperscript{13} and Bergquist and Frantz.\textsuperscript{14} Goodridge et al.\textsuperscript{13} reported that the cutoff score of 19 provided the best performance of the Braden Scale with sensitivity of 50%, specificity of 52.3%, PPV of 10.1%, and NPV of 90.7%. Bergquist and Frantz\textsuperscript{14} assessed 1711 at-risk elderly patients, with a mean age of 78.8 years, over 4 weeks. In the first week, a cutoff score of 19 provided sensitivity of 70%, specificity of 62%, PPV of 9%, and NPV of 97%. In the following weeks, the cutoff score ranged from 17 to 20, with lower predictive accuracy.

However, we found lower cutoff scores (16 and 13 at the first and last assessments, respectively) in the risk group with better specificity at the last assessment. It is important to note that the few studies found in the literature on the predictive validity of the Braden Scale in elderly LTCF residents were conducted only with risk groups, and reported cutoff scores higher than those identified in the present study for the risk group. In our study, cutoff scores obtained for the total group, which included at-risk and nonrisk elderly LTCF residents, were similar to those reported by other authors for at-risk patients.

The evaluation of the predictive validity of the Braden Scale using the LR is an original study. No Brazilian studies were found in the literature on pressure ulcer risk assessment scales. Our results showed the Braden scores of 17 and 18 (total group) as the best cutoff points for predicting development of pressure ulcers in elderly LTCF residents.

Although there is only a small number of studies on the predictive validity of the Braden Scale focusing specifically on elderly LTCF residents, the Braden Scale is widely used and has...
demonstrated validity in predicting pressure ulcer risk in a variety of settings in different countries based on level 1 evidence.\textsuperscript{15}

A recent systematic review showed that the Braden Scale has strong evidence supporting its validity and reliability, with a predictive odds ratio (likelihood of a patient with total Braden Scale score less than or equal to cutoff score to develop pressure ulcer) of 4.08 ($P < .05$), surpassing nurses’ clinical judgment (odds ratio $= 1.69$; $P < .05$).\textsuperscript{15}

Another recent study summarizes the reliability and validity of the instrument and discusses implications for its use in clinical and research settings.\textsuperscript{38} The author concluded that the Braden Scale generally performs well, demonstrating reliability and validity in different clinical settings, including LTCF,\textsuperscript{13,17} and that its compact format enhances incorporation into routine clinical practice.

Another systematic review on pressure ulcer risk assessment scales found that 22 of the 33 selected publications of studies conducted in various types of settings and different populations reported the use of the Braden Scale.\textsuperscript{16} The authors reported that the Braden Scale showed best validation and balance between sensitivity and specificity (57.1% and 67.5%, respectively), and that the cutoff score was a good pressure ulcer risk predictor (odds ratio $= 4.08$; 95% confidence interval $= 2.56–6.48$), confirming previous results.\textsuperscript{16}

This article is intended to contribute to the literature on the predictive validity of the Braden Scale in elderly LTCF residents. It is the first Brazilian study on this topic. We believe that the methodology used here can be replicated in future studies that may be conducted for a longer study period and involve a larger number of LTCFs in other regions of the country, thus overcoming one of the major limitations of the study, which was the sample size.

The high costs involved not only in the treatment of pressure ulcers but also in the reduction of their impact on the quality of life of the elderly, especially of those residing in LTCFs, justify the use of well-established preventive measures for early detection of at-risk patients, using standardized scales and specific cutoff scores properly tested in different settings and countries such as the Braden Scale. The major contribution of the Braden Scale is in the identification of factors

Figure 2. Fagan’s nomogram ratio for Braden cutoff scores for the total group at the first (left) and last (right) assessments.
that intervene in the development of pressure ulcers, and the assessment will be used to implement specific priority measures combined with preventive measures already in place. The identification of cutoff scores is essential for the correct interpretation of the data and successful establishment of preventive interventions (Level 2 evidence). One of the limitations of this study was the reduced number of participating LTCFs. However, it is important to note that, with the development of enterostomal therapy in Brazil, only now have pressure ulcer prevention protocols been implemented in health care facilities, and this implementation is still restricted to hospitals located in larger cities. This makes it difficult to conduct multicenter studies with larger samples. Both the primary study (on prevalence and incidence of pressure ulcers) and the secondary study (on the predictive validity of the Braden Scale) were the first of their kind in Brazil.

Conclusion

This study on the predictive validity of the Braden Scale in elderly LTCF residents, conducted in 4 Brazilian LTCFs, identified the total Braden Scale scores of 18 and 17 as the cutoff scores for the total group, and the scores of 16 and 13 as the cutoff scores for the risk group at the first and last assessments, respectively. The cutoff scores in the total group provided the best predictive accuracy with AUC-ROC of 0.79 and 0.81 at the first and last assessments, respectively. Positive likelihood values confirmed the cutoff score of 17 for the total group and 13 for the risk group as the most appropriate for the prediction of pressure ulcer risk among elderly LTCF residents in Brazil. These values differ from cutoff scores reported in previous studies conducted in developed countries. It is important to note that most of the previous studies on the predictive validity of the Braden Scale were conducted in the United States and other developed countries, and this may have resulted in distinct outcomes because the patients and clientele evaluated in these studies differed from those in our study because of cultural, climatic, ethnic, and social and economic factors. Further studies are necessary to confirm the Braden cutoff scores not only for LTCF residents, but also for other patient groups.

Figure 3. Fagan’s nomogram for Braden cutoff scores for the risk group at the first (left) and last (right) assessments.
(e.g., patients in intensive care units), so that the Braden cutoff scores could be used in Brazilian health care facilities. It is important for nurses to know the Braden cutoff score for groups of patients with similar characteristics. For instance, after administering the Braden Scale to an elderly population living in a LTCF, nurses should pay special attention to patients with total Braden Scale scores equal or less than the cutoff score (≥17, according to this study) and verify the subscales that had the lowest scores, so that appropriate care can be provided to reduce the patient’s risk for pressure ulcers. An elderly population at risk of developing pressure ulcers will require more human and technological resources and a multidisciplinary treatment approach to prevent the rapid development of the condition with severe systemic compromise.

References


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