Does the use of the 'Pressure Sore Prediction Score' prompt nurses to initiate preventative strategies?

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Summary of Figures and Tables

Abbreviations

CHHC	Coffs Harbour Health Campus
CI	Confidence interval
CNC	Clinical Nurse Consultant
CNS	Clinical Nursing Specialist
EEN	Endorsed Enrolled Nurse
EN	Enrolled Nurse
HREC	Human Research and Ethics Committee
IRCST	Institute of Rural Clinical Services and Teaching
NCAHS	North Coast Area Health Service
OR	Odds Ratio
PSPS	Pressure Sore Prediction Score
RN	Registered Nurse
SAS	Statistical Analysis Software

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Abstract

The completion of a PSPS risk assessment results in the identification of risk factors known to be associated with pressure ulcer development and influences the development of a preventative management plan. New South Wales Health has recommended, as part of the Pressure Ulcer Prevention Clinical Guidelines the use of the Pressure Sore Prediction Score (PSPS), as the tool of choice, across all care settings. This paper will discuss whether there is a link between performing a PSPS risk assessment and nurses initiating preventative strategies.

A retrospective study was undertaken to determine compliance with risk assessments and to identify patients who received interventions. A standardised protocol was used to collect data from 1141 medical records from three adult units in a regional hospital.

The results indicate no significant relationship between risk assessment and the initiation of preventative strategies.

Keywords

pressure ulcer, risk assessment tools, decubitus ulcer, prevention strategies, repositioning schedule, pressure relieving devices.

Background

The European Pressure Ulcer Advisory Panel (1998) defines pressure ulceration as areas of localised damage to skin and underlying tissue caused by pressure, shear and friction.

Briggs (1997), states pressure damage results from force being applied to tissue over time. There is evidence to suggest the degree of damage caused is directly related to the amount of pressure and the length of time that pressure is applied. According to Berlowitz (2008), pressure relief is the most important factor in preventing pressure ulcers and is best achieved by patient positioning and appropriate use of pressure-reducing devices. Fox (2002) suggests pressure ulcers impact negatively on quality of life, as it is known that individuals with pressure ulcers frequently experience pain, combined with fear, isolation and anxiety regarding wound healing. Importantly, it has also been shown that pressure ulcers are associated with an increased risk of death according to Allman (1997). He suggested that the length of hospital stay may be two to three times greater for those with a pressure ulcer, than for similar cases without (30.4 days compared to 12.8 days). In a previous study by Berlowitz (1990), identified that the risk of dying for elderly patients with a pressure ulcer was three times greater than for those without a pressure ulcer. Increased costs associated with pressure ulcers, are a significant financial burden to health care systems according to Bennett (2004).

The use of a risk assessment tool is not effective in isolation. Benefit only arises when it is linked to action such as implementation of preventative strategies. Evidence suggests that use of a risk assessment tool by trained health care workers can help to identify “high risk” patients, resulting in the early implementation of preventative strategies. It is the implementation of preventative strategies which results in a reduction in pressure ulcer prevalence. (Flanagan, 1992).

Lowthian, (1987) states most pressure ulcers are preventable. Risk assessment tools must accurately and consistently identify those individuals who are at risk, as well as those not at risk (Defloor 2005). To date, there is little empirical evidence available concerning the reliability and validity of existing tools (Defloor 2005). This has far-reaching implications for practice, where clinical decisions - such as the use, or not, of pressure ulcer preventative strategies - are often made on the basis of the results of risk assessment. Therefore, it is

likely that some patients are receiving interventions that they do not require, and conversely, others are not receiving interventions that they do need (Defloor 2005). Inappropriate allocation of resources contributes to the increasing financial impact of pressure ulcers, and adds to spiralling health care costs (Moore, 2007).

The plethora of risk assessment tools includes Braden, Norton, Waterlow, Ramstadius and Pressure Sore Prediction Score (PSPS). Most risk assessment tools assign a numerical value based on clinical variables, to determine the level of risk. Variables include mobility, incontinence, activity, mental status, physical condition and nutritional status. Some risk tools, such as the Ramstadius tool, are designed to direct assessment and intervention and could be considered an algorithm (Carville 2001). The PSPS tool assesses risk, however does not suggest or direct intervention. New South Wales Health has recommended, as part of the Pressure Ulcer Prevention Clinical Guidelines the use of the Pressure Sore Prediction Score (PSPS), as the tool of choice, across all care settings (refer to hyperlink in references). Mitchell (2004) concludes that the Pressure Sore Prediction Score is an effective tool to use in the orthopaedic setting because it is simple and not time consuming, reducing inter-rater reliability problems.

As an alternative to a risk assessment tool, in 2000, the Australian Wound Management Association developed a Pressure Ulcer Prevention Strategies Flowchart. The flowchart assists practitioners to select the most appropriate prevention strategies when a patient has been identified as at risk of pressure related damage. The flowchart aims to improve/maintain tissue tolerance to pressure, provide protection against forces of pressure, friction and shear and addresses documentation and communication. No risk assessment tools have been developed using statistical regression models to weight the factors which best predict development of pressure ulceration. This adversely affects their predictive validity. A further consideration is that some tools have been designed for use in a specific setting e.g. geriatrics, and may not transfer reliably to other settings e.g. post-operative orthopaedic patients (Cullum et al, 1995)

According to Carville (2001), there have been reported variances in the sensitivity, specificity and predictability of commonly used tools. Carville reiterates tools should be validated for use in each clinical setting and the use of a tool does not replace or eliminate the need for clinical judgement.

The importance of initial and ongoing skin assessment is highlighted in numerous clinical guidelines including the EPUAP guideline of 1998.

Ethics approval

An application for ethics approval was sought and received from the NCAHS Human Research and Ethics Committee HREC 400N.

Method

Study Design

The study design was a saturation sample of 1141 patients. Data was collected retrospectively from the medical records. The records were hand searched and data recorded using a standardised collection tool. The data collection period 1/4/2005 to 30/3/2006 was determined by changes to facility documentation processes where the PSPS risk assessment tool was no longer included as part of the nursing care plan.

Hypothesis

The hypothesis tested in this paper was that the use of the Pressure Sore Prediction Score (PSPS) tool does not increase the likelihood of nurses initiating preventative strategies. In other words, receiving a PSPS assessment neither increases nor decreases the chance the nurses will be prompted to initiate preventative strategies for patients.

Inclusion criteria

Three inclusion criteria were applied to the data to ensure only relevant records were selected.

These criteria were:

1. All patients who were admitted to the Surgical, Medical or Rehabilitation units between 1/4/2005–30/3/2006.
2. Patients had to be adults (i.e.15 yrs of age and over).
3. Had to have had a length of stay greater than 48 hours.

The data used in the following analyses were all inpatient records that met the inclusion criteria. Risk assessments which were not completed or incomplete after twenty four hours were not included. The Medical ward is a 48 bed unit; Surgical a 32 bed unit and Rehabilitation unit has 24 beds.

Data Collection

Variables collected from the medical record included:

- Age
- Sex
- Ward during admission
- Completion of the PSPS within 24 hours of admission
- High, Medium or low risk score
- Documented risk score
- Skin inspection conducted on admission
- Ongoing skin inspections documented
- Pressure relieving device insitu
- Repositioning schedule implemented
- Presence of pressure ulcer on admission
- Frequency of repositioning schedule (in hours)
- Assessment attended by – designation of staff member performing assessment
- Referral to Clinical Nurse Consultant/Specialist
- Stage of pressure ulcer
- Presence of pressure ulcer on admission

Treatment of data

The significance level used for all analyses was 5%.

All analyses were conducted using SAS version 9.

Descriptive statistics of the data used in the analyses are contained in the demographic list. Of the complete list of variables; only three were required to test the hypothesis. These were:

1. Pressure Sore Prediction Score (PSPS) completed within 24 hours of admission
2. Pressure reducing device insitu (Device)
3. Repositioning schedule initiated (Repositioning)

To enable the correct statistical technique to be applied, the data had to be reformatted. Specifically, Device and Repositioning were concatenated into a single variable, outcome (whether or not a preventative strategy was administered)

Pearson's Chi-squared statistic (chi-sq) and Fisher's exact statistic (Fisher's) were implemented to test for relationships between the two categorical variables of interest: PSPS and outcome. The variable PSPS was formatted as 1 (received within 24hrs) and 2 (not-received within 24hrs) (Table 1). The variable outcome was formatted as 1 (preventative strategy administered [either Device=1 or Reposition=1]) and 2 (preventative strategy not administered [Device=0 and Repositioning=0]).

A significant result indicates that the evidence suggests a relationship between the variables whereas a non-significant result would indicate that there is not enough evidence to suggest a relationship between the variables. Although the chi-sq and Fisher's methods test for relationships between categorical variables, they do not indicate the strength of any significant relationships detected.

To enable the strength of any relationship between PSPS and outcome to be determined, odds ratios (OR) were used:

- An OR<1 indicates persons with PSPS are less likely to receive preventative strategies when compared to those that didn't.
- An OR=1 indicates no difference in odds of a persons with and without a PSPS receiving preventative strategies.
- An OR>1 indicates persons with PSPS are more likely to receive preventative strategies when compared to those that didn't.

If the associated 95% confidence intervals (CI) include the value 1, then the results are not significant (i.e. inconclusive). If the value of 1 isn't included in the CI, then the results are significant (either positively or negatively so).

To adjust for possible spuriousness, the data were stratified by the following variables and ORs produced:

- sex
- age (71yrs was the mean age)

For the analyses by age, the data were split by mean age; patients age 15-70 formed one group and those aged 71 and over formed the other. Such a split was deemed necessary because not doing so caused the cell count assumption for chi-sq test to be violated too

frequently (i.e. in a 2x2 matrix, it is advisable to have each of the cell counts > 5). It is important to note that despite attempts to reduce the occurrence of such violations, they persist in some analyses. When such violations occur, the Fisher's method is used in place of the chi-sq, as this technique is more robust against violations of this nature. This will be discussed in more practical details below.

The accompanying output tables (Appendix 1) contain all the relevant chi-sq, Fisher's and OR statistics. To simplify interpretation, there are only four outputs of interest in relation to testing the hypothesis of interest on each page of the document:

1. 2x2 matrix containing cell counts for the variables of interest. Useful observational tool.

   This is the first table in on each page.

2. Chi-square statistics on the first row of the second table. Indicates whether significant relationships between the variables exist (i.e. if prob < 0.05).

3. Fisher's method on the last row of the third table. Same as the chi-squared statistic. To be used instead of the chi-squared statistic only when one of the cells in the 2x2 matrix is less than 5, otherwise this should be ignored.

4. OR statistics on the first row of the fourth table. Indicates the strength of the relationship between the variables and also whether the relationship is significant (i.e. if prob < 0.05). If the chi-squared or fisher's exact statistics do provide evidence of significance, it is usually unnecessary to comment on ORs, as there is no relationship to measure the strength of.

Results

Combined Analysis

Ward/Unit	Male	Female	Total
Medical	352	249	601
Surgical	243	203	446
Rehabilitation	41	53	94
Total	636	505	1141

Table 1: Distribution of sample by gender and ward/unit

There were a total of 1141 records used in this analysis, with 706 (62%) belonging to patients who received a PSPS risk assessment within 24hrs and 435 (38%) to patients who did not receive PSPS risk assessment. Of those who received a PSPS assessment, 34 (5%) received preventative strategies and 672 (95%) did not. Of those who did not receive a PSPS assessment, 11 (2.5%) received preventative strategies while 424 (97.5%) did not receive preventative strategies.

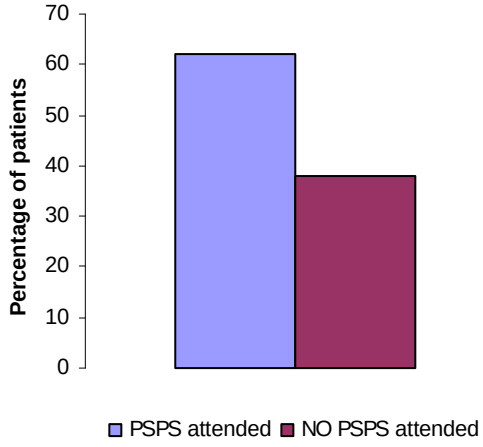

Figure 1: Percentage of patients who received a PSPS assessment compared to patients who did not receive an assessment

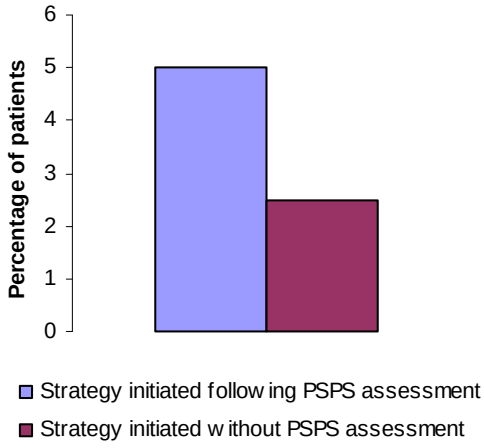

Figure 2: Percentage of patients who received an intervention following PSPS assessment compared to those who received an intervention without a PSPS assessment.

As there are no cells in this matrix that are less than 5, the chi-sq output is appropriate to use. It indicates that there is no evidence of a significant relationship between the variables PSPS and outcome (chi-sq=3.72, prob=0.054). As there is no evidence of a relationship to discuss the strength of, it follows that comment on the OR is not necessary.

Analysis by sex

From the data collected 636 patients were male (55.7%) and the remaining 505 (44.2%) were female. Of the 636 males 391 (61.4%) received a risk assessment compared to 245 (38.5%) who did not receive a risk assessment. Seventeen (4.3%) of the males who did receive an assessment received preventative strategies. Three males (1.2%), whilst not receiving an assessment did however have preventative strategies initiated. In the female population, 315 patients (62.3%) received a risk assessment and 190 did not (37.6%). Seventeen females (5.3%) who received a risk assessment had preventative strategies initiated, whilst eight women (4.2%) who did not receive an assessment did have preventative strategies initiated.

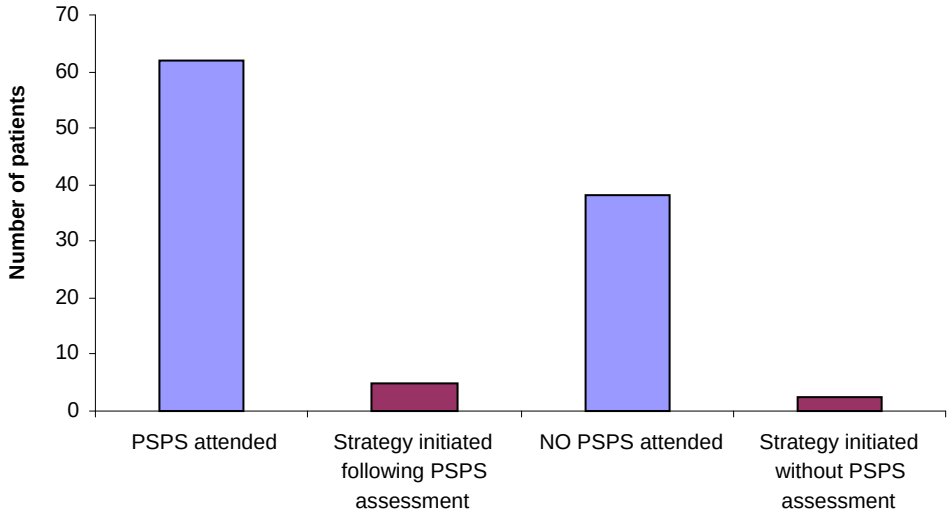

Figure 3: Number of patients who received preventative strategies with and without PSPS assessment stratified by sex (males left columns and females right columns)

Separate analyses were undertaken with the records discussed above stratified by sex. With reference to Appendix pg. 2, the 2x2 table shows one cell with a value of 3 (i.e. < 5). This suggests that the Fisher's, rather than the chi-sq statistics be used. Based on Fisher's output, the evidence suggests that there is a significant relationship between PSPS and outcome (prob=0.034) for males. The associated OR indicates that males who had a PSPS were as little as 1.06 and as much as 12.65 times more likely to receive a nurse initiated

preventative strategy when compared to males who did not have an PSPS. (OR=3.67, 95% CI: 1.06-12.65). For females, there appears to be no such significant relationship (chi-sq=0.35, prob=0.552).

Analysis by age group

Analyses were undertaken with the same 1141 records stratified by age groups. With reference to pg.4, the 2x2 table shows one cell with a value of 1 (i.e. < 5). This suggests that the Fisher's, rather than the chi-sq statistics should be used. Based on Fisher's output, the evidence suggests that there is a significant relationship between PSPS and outcome (prob=0.020) for those aged 15-70yrs. The associated OR indicates that people in this age group who received a PSPS were as little as 1.02 and as much as 60.89 times more likely to receive a nurse initiated preventative strategy when compared to those in this group who did not have a PSPS (OR=7.86, 95% CI: 1.02-60.89). No such significance was evidenced by the analysis on pg. 5 (chi-sq=0.53, prob=0.468).

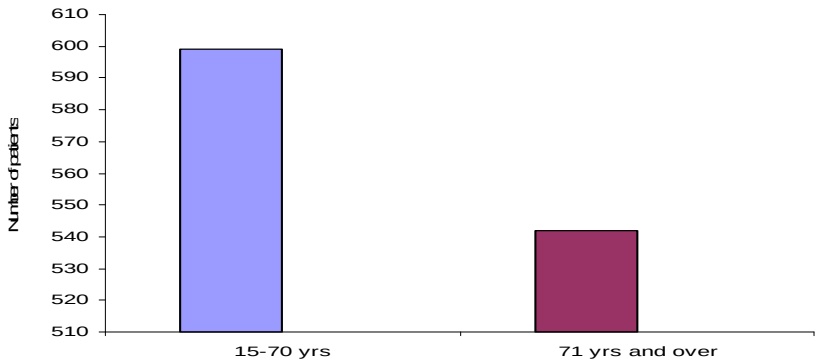

Figure 4: Patient distribution following stratification of data by age group

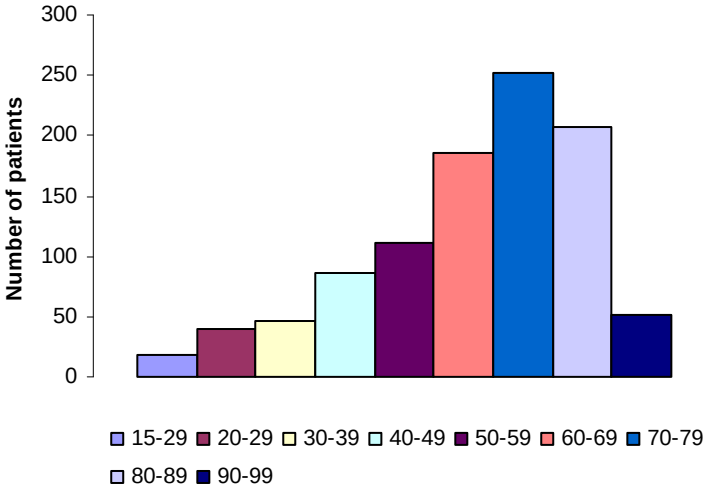

Figure 5: Patient distribution categorised by age percentile

Analysis by staff designation of the assessor

Of the patients who received a PSPS assessment, the assessment was attended by staff members of different designations. The graph below details the distribution of assessment as conducted by the different staff groups. In the category of “not stated” were patients who received an assessment but the risk assessment tool was either unsigned or the designation section not completed. The following graph indicates the majority of PSPS assessments were conducted by Registered Nurses. From the data collected, there doesn’t appear to be any evidence to suggest there is any connection between the designation of the assessor and the patient receiving interventions. Although Registered Nurses (RN) appear to have completed a higher number of assessments, this is reflects the higher ratio of RN’s to other staff designations. Of those patients who received an intervention, the staff designation of the assessor did indicate Endorsed Enrolled Nurses (EEN) initiated preventative strategies more often than any designated group.

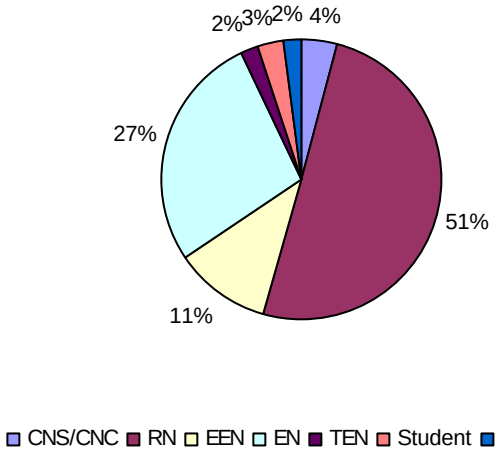

Figure 6: Percentage of PSPS assessments performed categorised by staff designation

Further Data

Fifty six patients were assessed as at risk of developing a pressure ulcer. These were divided into three distinct groups according to their level of risk. Eleven patients were deemed “high” risk; 13 as “medium” and 32 as “low” risk. Of those patients 14 were nursed on a pressure relieving device and thirty one were assigned a repositioning schedule. Patients were turned at second hourly (14), third hourly (11) and fourth hourly intervals (6).

Eight patients did progress to developing a pressure ulcer during their admission, whilst two others were admitted with a pre-existing pressure ulcer. Both ulcers were stage 3 and both patients were nursed on a pressure relieving device immediately upon admission. Only one however had a repositioning schedule initiated. The remaining patients who developed pressure ulcers four were Stage 1; five were Stage 2 and three were Stage 3.

Eight patients had a documented initial skin assessment on admission and nine patients had ongoing skin assessments documented in their notes. Six of the patients who had a pressure ulcer and were on a pressure relieving device had an ongoing skin assessment documented in their medical records.

No patient referrals were made to the Clinical Nurse Specialist / Consultant for wound management or specialist advice for preventative strategies.

Discussion

Data analysis demonstrates a compliance rate of approximately 60% for the completion of the PSPS risk assessment within 24 hours of admission in accordance with NSW Health policy.

Previous research emphasises the importance of early identification of risk in order for effective preventative strategies to be initiated. The fact 11 patients were allocated preventative strategies without having an assessment performed, indicates that some nurses do initiate preventative strategies based on their clinical judgement alone. The two patients who were admitted with a pre-existing pressure ulcer were placed on pressure relieving devices immediately upon admission. Whilst the patients who were deemed to be at risk were all allocated a preventative strategy of either a pressure relieving device or a repositioning schedule none received both. Eleven patients of the 706 patients who received a PSPS assessment had an initial skin assessment documented in their nursing notes. Nine patients had ongoing skin assessments documented in their nursing notes. The use of the PSPS tool does no harm but is likely to be ineffective. There does not appear to be any association with the use of the PSPS and the initiation of preventative strategies.

It may be the case that, with the increasing number of risk tools requiring completion, health care workers no longer identifies the tools as a risk assessment designed to drive care but simply as another piece of documentation that needs to be completed to meet our legal requirements. The results indicate an ad hoc approach to pressure ulcer prevention. Not one patient who was determined to be “at risk” had a combination of risk assessment, an initial and ongoing skin assessment documented, pressure relieving device insitu and

repositioning schedule initiated. It would appear nurses need a more structured approach to identifying and responding to patients who are at risk of developing a pressure ulcer.

Limitations

Although stratifying the data appeared to provide evidence of significant relationships, these are likely to be artefactual for two reasons. The first is that confidence intervals for the ORs were wide (the wider the confidence interval the less precise the estimate) and the second is that, in each of these cases, there existed cell counts < 5 (generally, the higher the cell counts the more believable the results are).

These results can not be extrapolated beyond the test hospital. The fact that the cell counts in some 2x2 matrices were relatively small, especially when comparing the total number of persons who received preventative strategies with those that did not (e.g. 45 vs.1096, pg. 11) may be biasing the results.

Conclusions

The data suggest that there is no significant relationship between the use of the PSPS and the prompting of nurses to initiate preventative strategies; patients who received a PSPS assessment were, as evidenced by the majority of analyses, equally likely to receive nurse initiated preventative strategies when compared to patients who did not receive a PSPS assessment.

Recommendations

An increasing aged population will have a significant impact on health care providers and hospital resources in the future. Therefore it will be essential that resources are managed effectively whilst providing a high standard of care. The use of a risk tool which incorporates an algorithm to direct and or guide care may prove more effective than a stand alone style tool such as the PSPS. The Australian Wound Management Associations' Pressure Ulcer Prevention Strategies Flowchart may be the most suitable alternative as it is based on the individuals risk rather than any particular clinical setting. The provision of ongoing education to health care workers is necessary to maximise positive outcomes. During education, particular emphasis should be placed on the importance of a holistic approach to prevention of pressure related damage.

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