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Original Article

Prognostic role of hemoglobin, albumin, lymphocyte, platelet (HALP) and modified Glasgow prognostic score (mGPS) in predicting intensive care needs in cancer patients: a retrospective study

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ABSTRACT

Aims: Early identification of clinical deterioration and intensive care unit (ICU) needs in patients with solid tumors is crucial for improving outcomes. This study aimed to evaluate the predictive role of the HALP score and the modified Glasgow prognostic score (mGPS) in forecasting ICU admissions.

Methods: A retrospective analysis was conducted on 302 patients with solid tumors who were hospitalized between May and July 2024. HALP and mGPS scores were calculated using laboratory values obtained at admission. Patients were divided into two groups based on the median HALP score. ICU transfer status was compared between groups along with clinical and laboratory parameters.

Results: ICU transfer was required in 26.5% of the patients. ICU need was significantly more common in patients with low HALP scores and high mGPS values ($p=0.01$ and $p<0.01$, respectively). Metastatic patients had a significantly higher ICU transfer rate compared to non-metastatic patients ($p=0.01$). There was no significant association between ICU requirement and comorbidity status ($p=0.59$) or tumor type ($p=0.10$).

Conclusion: HALP and mGPS are simple, accessible prognostic tools reflecting systemic inflammation and nutritional status. These scores may contribute to the early identification of high-risk patients during hospitalization and support timely clinical decision-making regarding ICU admission in cancer patients.

Keywords: HALP score, mGPS, intensive care, cancer patients, prognostic marker, risk prediction

INTRODUCTION

Early prediction of clinical deterioration in oncology patients is crucial for improving patient management and ensuring the efficient use of intensive care unit (ICU) resources. Timely identification of ICU needs in hospitalized cancer patients may enhance patient survival and prevent unnecessary ICU utilization. However, there remains a need for simple, practical, and reliable biomarkers to predict ICU requirement and disease prognosis in this patient population.[1,2]

In this context, the HALP score (hemoglobin, albumin, lymphocyte, platelet) and the modified Glasgow prognostic score (mGPS) are two important laboratory-based, inexpensive, and easily calculable scoring systems that reflect systemic inflammation and nutritional status. The HALP score integrates the patient's hematologic and nutritional status with immune response capacity, allowing for meaningful clinical insights, while the mGPS reflects systemic inflammation based on C-reactive protein (CRP) and albumin levels.[3-5]

Previous studies have demonstrated that scoring systems used in various types of cancer have potential in predicting progression-free survival (PFS) and overall survival (OS).[3-5] In addition, these scoring systems have also been evaluated in predicting the prognosis of non-cancer-related diseases.[6-9] However, there is no existing study in the literature evaluating the ability of these two scoring systems to predict ICU requirement in oncology patients. In cancer patients, the need for intensive care is typically determined based on acute clinical parameters such as the number of organ dysfunctions, need for ventilatory support, hemodynamic instability, and sepsis. In this context, the aim of our study is to assess the predictive potential and reliability of the HALP score and mGPS in estimating ICU requirement among cancer patients.

METHODS

This retrospective observational study was conducted in accordance with the principles of the Declaration of Helsinki and received ethical approval from the Ankara Etlik City Hospital Scientific Researches Evaluation and Ethics Committee (Date: 12.02.2025, Decision No: AEŞH-BADEK-2025-0117).

The study included adult individuals who met the eligibility criteria among patients hospitalized in the Medical Oncology

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Department of Ankara Etlik City Hospital between May and July 2024.

Inclusion criteria;

- Aged 18 years or older
- Diagnosed with a solid tumor
- Hospitalized in the medical oncology department during the specified period
- Complete availability of clinical and laboratory data

Exclusion criteria;

- Repeated hospitalizations of the same patient (only the first admission was included)
- Hospitalizations solely for the administration of active systemic anticancer therapy (e.g., chemotherapy, radiotherapy, immunotherapy, targeted therapy, etc.)
- Patients with missing clinical or laboratory data

Following the application of these criteria, 455 patients were evaluated, of whom 153 were excluded (due to repeated hospitalizations and missing laboratory data). The remaining 302 patients were included in the study. Demographic characteristics of the patients, including age, sex, primary tumor type, disease stage (metastatic or non-metastatic), presence of comorbidities, type of admission (emergency, outpatient clinic, transfer from ICU, etc.), length of hospital stay, reasons for hospitalization, discharge status, and ICU transfer status, were obtained from electronic medical records. Biomarker-based scores were calculated based on laboratory findings obtained at the time of hospital admission, including the HALP score, and mGPS.

Scoring Systems Used in the Study

HALP score was calculated using the following formula:

(Hemoglobin [g/dl]×albumin [g/dl]×lymphocyte count [/mm^3]) /platelet count [/mm^3]

mGPS was defined as:

- mGPS 0: CRP <10 mg/L and Albumin ≥3.5 g/dl
- mGPS 1: CRP ≥10 mg/L and Albumin ≥3.5 g/dl
- mGPS 2: CRP ≥10 mg/L and Albumin <3.5 g/dl

Patients who were transferred to the ICU were compared with those who were not. Clinical and laboratory parameters potentially associated with ICU transfer-including disease stage, presence of comorbidities, primary tumor type, reason for hospitalization, HALP score, and mGPS, were analyzed to evaluate their predictive potential.

Statistical Analysis

Statistical analyses were performed using SPSS (Statistical Package for the Social Sciences). Continuous variables were presented as median (minimum-maximum), while categorical variables were expressed as counts and percentages. The Chi-square test and Mann-Whitney U test were used for comparisons between groups.

The predictive potential of the HALP score for ICU requirement was evaluated by stratifying patients into low- and high-risk groups based on the median value. The mGPS was analyzed according to its predefined categorical levels. A p-value of <0.05 was considered statistically significant for all tests.

RESULTS

A total of 302 patients admitted to the oncology ward were included in this study. The median age was 63 years (range: 20-90), and 57.9% of the patients were male. The most common primary tumor types were lung cancer (23.2%), gastric cancer (16.6%), and colorectal cancer (12.6%). Metastatic disease was present in 73.5% of the patients, and 51.3% had at least one comorbid condition. The most frequently observed comorbidities were hypertension (33.1%), diabetes mellitus (20.5%), and coronary artery disease (9.3%). The clinical and sociodemographic characteristics of the patients are summarized in **Table 1**.

Table 1. Sociodemographic and clinical characteristics

Age median (range) year	63.0 (20.0-90.0)
Sex no (%)	
Male	175 (57.9)
Female	127 (42.1)
Primary no (%)	
Lung	70 (23.2)
Breast	33 (10.9)
Pancreas	19 (6.3)
Gastric	50 (16.6)
Colorectal	38 (12.6)
Cholangiocarcinoma	10 (3.3)
Gynecological	23 (7.6)
Head&neck	21 (7.0)
Other	38 (12.5)
Stage no (%)	
Metastatic	222 (73.5)
Non-metastatic	80 (26.5)
Comorbidity no (%)	
Yes	155 (51.3)
No	147 (48.7)
Comorbidity no (%)	
Hypertension	100 (33.1)
Diabetes mellitus	62 (20.5)
Coronary artery disease	28 (9.3)
Cerebrovascular disease	23 (7.6)
Asthma/COPD	28 (9.3)
Thyroid (hypo/hyper) disease	13 (4.3)
Other	36 (11.9)

COPD: Chronic obstructive pulmonary disease

The most common reasons for hospitalization were palliative care (29.8%) and infectious diseases (25.1%). Of the total cohort, 47.7% were admitted via outpatient services, while 37.4% were emergency admissions. The median length of hospital stay was 7 days (range: 1-43 days). Intensive care unit transfer occurred in 26.5% of patients, 4.6% were referred to palliative care, and 1% of patients died during hospitalization, as presented in **Table 2**.

There were significant associations between ICU transfer status and several clinical and laboratory parameters. ICU transfer was significantly more frequent among patients with a HALP score below the median value of 16.03 (p=0.01), and in those with metastatic disease compared to non-metastatic cases (29.2% vs. 16.3%, p=0.01). Conversely, no statistically significant associations were observed between ICU transfer

Table 2. Hospitalization and discharge features	
Referred department no (%)	
Oncology outpatient clinic	144 (47.7)
Emergency	113 (37.4)
Transfer from intensive care	22 (7.3)
Other	23 (7.6)
Cause for hospitalization no (%)	
Palliative care	90 (29.8)
Infection	76 (25.1)
Interventional procedures	66 (21.9)
Blood transfusion	33 (10.9)
Electrolyte imbalance	31 (10.3)
Other	6 (2.0)
Duration of hospitalisation median (range) days	7.0 (1.0-43.0)
Duration of hospitalisation no (%)	
1-7 days	121 (40.1)
8-21 days	116 (38.4)
>21 days	65 (21.5)
Discharge status no (%)	
Discharged	204 (67.5)
Transfer to intensive care ward	80 (26.5)
Transfer to palliative service	14 (4.6)
Transfer to other clinics	1 (0.4)
Deceased	3 (1.0)

and comorbidity status (p=0.59) or primary tumor type (p=0.10), although the ICU admission rate was relatively higher in patients with gastric cancer. These findings, including HALP score stratification, disease stage, and other clinical variables, are summarized in Table 3.

Table 3. Patient characteristics of patients transferred to intensive care unit and relationship with laboratory parameters			
Parameters	**Intensive care transfer**	**Intensive care non-transfer**	**p-value**
Cancer primary type			p=0.1
Lung	14	56	
Breast	4	29	
Pancreas	4	15	
Gastric	22	28	
Colorectal	9	29	
Cholangiocarcinoma	4	6	
Gynecological	8	15	
Head & neck	4	17	
Other	11	27	
Stage			p=0.01
Non-metastatic	13	67	
Metastatic	67	155	
Comorbidity			p=0.59
No	41	106	
Yes	39	116	
HALP score (median: 16.03)			p=0.01
Low	53	98	
High	27	124	
Modified Glasgow prognostic score			p<0.01
0	6	112	
1	12	54	
2	62	56	
Pearson's Chi-square test			

A strong statistical association was observed between the mGPS and ICU transfer status (p<0.01). Among patients with an mGPS score of 2, 52.5% required ICU admission, whereas only 5.1% of those with a score of 0 were transferred to the ICU. This distribution indicates that mGPS may serve as a useful determinant for clinical risk stratification, and this association is illustrated in Figure.

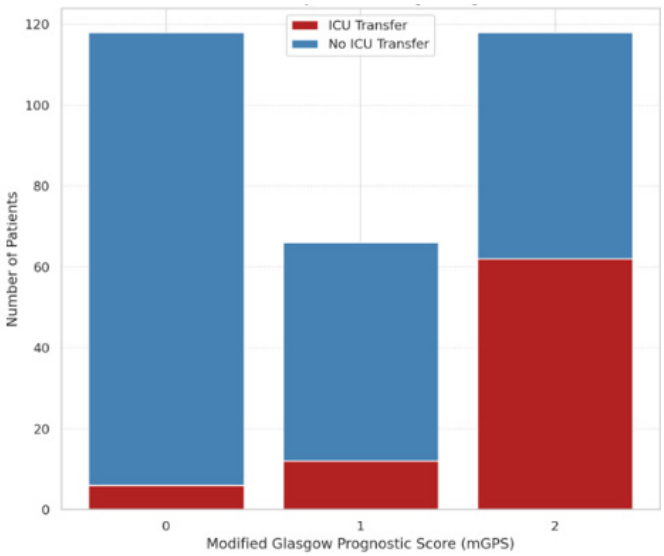

Figure. The association between modified Glasgow prognostic score and intensive care unit admission

DISCUSSION

This study demonstrated that the HALP score and mGPS have significant value in predicting ICU requirements in patients with solid tumors. Our findings revealed that patients who required ICU transfer had lower HALP scores and higher mGPS values. This suggests that inflammatory burden and malnutrition are associated with clinical deterioration in critically ill patients.

The results of our study are consistent with the existing literature regarding the prognostic significance of mGPS and HALP scores in oncology. Previous studies have repeatedly reported that deterioration in these scores is associated with poorer survival outcomes in cancer patients.[4,10-13] For instance, a comprehensive meta-analysis involving 13,110 patients demonstrated that a low HALP score is a reliable negative prognostic biomarker for survival outcomes in cancer patients.[3] Similarly, a recent review study demonstrated that high mGPS values are associated with poor overall and disease-specific survival across various malignancies.[5] These findings support the notion that worsening systemic inflammation and nutritional status, as reflected by both the HALP score and mGPS, have a significant impact on the course of malignancy. Moreover, both HALP and mGPS have emerged in the literature as prognostic markers in critical conditions outside of oncology. For example, a study conducted in patients presenting to the emergency department with acute heart failure reported that a low HALP score was associated with increased mortality.[7] Similarly, in patients with acute stroke, the HALP score has been shown to be associated with poor neurological outcomes and increased mortality.[8] These findings indicate that indices such as HALP and mGPS reflect not only cancer prognosis but also the overall burden of systemic disease and the clinical course of critically ill patients.

However, the role of HALP and mGPS in predicting progressive clinical deterioration among oncology inpatients has not been clearly established to date. To the best of our knowledge, there has been no prior study in the literature specifically evaluating these two scores in the context of predicting ICU transfer requirements. In this respect, our study provides a novel contribution to the literature. The results we obtained suggest that HALP and mGPS, as objective scores calculated from simple laboratory parameters, may aid in risk stratification of patients followed in oncology wards. In our study, the HALP score was analyzed by dividing patients into two groups based on the median value, and lower scores were significantly associated with ICU transfer. This indicates that such scoring systems may play a supportive role in clinical decision-making. In a study conducted among critically ill breast cancer patients admitted to the ICU, it was reported that those with an mGPS score of 2 had approximately 20 times higher mortality risk compared to those with a score of 0.[14] In this context, the association of HALP and mGPS with ICU requirement observed in our study further highlights the importance of these scores in clinical risk assessment. In particular, a high mGPS value in patients with advanced-stage cancer may warrant closer clinical monitoring and consideration for early ICU admission.

In our study, the rate of ICU transfer was significantly higher in patients with metastatic disease (29.2% versus 16.3% in non-metastatic patients; p=0.01). These findings suggest that patients with a higher tumor burden may be more prone to clinical deterioration requiring intensive care.

One of the most important clinical contributions of our study is the demonstration that HALP and mGPS scores can serve as early warning indicators that are easily calculable at the bedside using routine laboratory data. In current oncology practice, it is often challenging to predict early clinical deterioration in hospitalized patients under ward follow-up. Existing decision-making is largely based on vital signs, changes in laboratory parameters, and the overall clinical course; however, an objective and standardized risk scoring system is not widely used in routine practice.[15] In this context, easily accessible scores such as HALP and mGPS may serve as practical and reliable tools for the early identification of high-risk patients. Indeed, the literature has shown that early ICU transfer in cancer patients is associated with improved survival outcomes.[2] Therefore, early intervention, prophylactic strategies, or timely intensive care support in patients identified with high-risk scores may support prevent adverse outcomes. Similarly, the use of these scores may contribute to more efficient utilization of healthcare resources by reducing unnecessary ICU admissions.[16] In our study, only 5% of patients with an mGPS score of 0 required ICU care, whereas more than half of those with a score of 2 were transferred to the ICU. This finding suggests that the mGPS score may serve as a useful tool in guiding clinical decision-making.

Limitations

Our study has several limitations. First, it was conducted retrospectively at a single center. Therefore, the findings demonstrate associations rather than causal relationships. Additionally, multicenter and prospective studies are needed to determine whether these results are applicable to other patient populations. Second, although the HALP and mGPS scores reflect the overall condition of the patient, certain important factors that may influence ICU admission decisions such as performance status, changes in vital signs, and physicians' clinical evaluations were not included in our analysis. Furthermore, ICU transfer decisions may also be affected by institutional differences such as local protocols and ICU bed capacity. This study included only patients with solid tumors; patients with hematological malignancies were not analyzed. Since the ICU management of this subgroup may differ, this limitation should be taken into account when generalizing the results to the entire oncology population. Despite all these limitations, our study provides meaningful and guiding evidence that the HALP and mGPS scores may assist in identifying patients at risk of clinical deterioration in the oncology ward setting.

CONCLUSION

The HALP and mGPS scores may serve as valuable tools in predicting ICU transfer requirements in cancer patients. By reflecting systemic inflammation and nutritional status, these scores can serve as early indicators of clinical deterioration risk. Our study offers a novel perspective to the literature, suggesting that the use of these easily applicable scores in oncology practice may aid in the early identification and management of critically ill patients. Future large-scale prospective studies are needed to validate the predictive power of these scores and facilitate their integration into clinical protocols.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Ankara Etlik City Hospital Scientific Researches Evaluation and Ethics Committee (Date: 12.02.2025, Decision No: AEŞH-BADEK-2025-0117).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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