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Investigation of factors affecting the emergency care of oncology patients and the management of patients with head and neck squamous cell carcinoma during the COVID-19 pandemic

Doctoral (PhD) thesis

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1. Introduction

In developed countries, cancer is the second leading cause of death, with incidence rates projected to rise. Within our healthcare system, emergency departments serve as the cornerstone, functioning as a centralized access point for patient intake and facilitating referrals to specialized outpatient services or inpatient wards when necessary. Previous studies have indicated that cancer patients exhibit a higher frequency of emergency department (ED) utilization compared to patients without cancer. To mitigate this, various strategies have been implemented to minimize ED visits and enhance outpatient management. The development of efficient patient pathways necessitates a comprehensive understanding of the existing systemic factors, as these significantly impact the quality and efficacy of oncological care. Accordingly, our study aimed to analyze the characteristics of cancer patients presenting to the emergency department.

Research indicates that prolonged delays in the diagnosis and initiation of treatment are associated with a significantly increased risk of local tumor progression and/or recurrence. The COVID-19 pandemic substantially impacted oncological care, with multiple international studies reporting treatment delays in cancer patients, leading to adverse effects on survival outcomes and increased strain on healthcare systems. As an extension of our study, we analyzed the clinical characteristics and time to initial physician contact in patients diagnosed with head and neck squamous cell carcinoma before and during the COVID-19 pandemic.

2. Objectives

Concerning the study on „*Predictive factors for the emergency care of cancer patients*":

We aimed to determine the predictive factors of multiple ED visits of cancer patients, hospitalization, mortality within 36 months of an ED visit, and potentially preventable ED visits in a Hungarian tertiary care center. We also analyzed the association between the frequency of ED visits and the 3-year survival of cancer patients.

Concerning the study on „*Impact of the COVID-19 pandemic on clinical characteristics and time to initial physician contact of patients with head and neck squamous cell carcinoma*":

In our study, we aimed to analyze and compare the characteristics of patients diagnosed with head and neck squamous cell carcinoma and the time from symptom onset to initial physician contact in two study periods, before and during the COVID-19 pandemic. We also aimed to identify potential predictors of early and advanced cancer in the two study periods.

3. Methods

Concerning the study on „*Predictive factors for the emergency care of cancer patients*":

The study was conducted among adult cancer patients who presented to the Emergency Department of the Kaposi Mór Teaching Hospital, tertiary care center in 2018. In the study year, there were a total of 2,383 ED visits that met the inclusion criteria. Data were collected retrospectively, including demographic data (sex, age, place of residence) and clinical characteristics. We

recorded the date of admission to the ED, the number, date and time of ED visits for each patient, the type of tumor, the type and number of comorbidities, the date and time of the oncological treatment prior to the ED visit, the triage category, the chief complaint, the diagnosis given after the ED visit, and, where relevant, the date of death of the patient. Both descriptive and exploratory statistical analyses were performed. Mixed methods logistic regression was used to determine the predictive factors for hospitalization, for potentially preventable ED visits and for multiple ED visits. Binary logistic regression was used to identify potential predictors of mortality within 36 months of an ED visit.

Concerning the study on „*Impact of the COVID-19 pandemic on clinical characteristics and time to initial physician contact of patients with head and neck squamous cell carcinoma*”:

In a retrospective study, data were collected from 523 patients with head and neck squamous cell carcinoma treated at the University of Pécs, Clinical Centre, Department of Otorhinolaryngology and Head and Neck Surgery. 402 patients in the period from January 1, 2017 to March 15, 2020 (before the pandemic) and 123 patients in the period from March 16, 2020 to May 13, 2021 (during the pandemic). In addition to demographic and clinical characteristics, the specialty of the first examining physician, the time of symptom onset, and the date of the first visit to the physician were recorded. Time to initial physician contact (TTP) was defined as the time in days between symptom onset and first presentation. Descriptive statistical analysis was followed by exploratory analysis. Binary logistic regression analysis was used to identify factors influencing early and late presentation. The Mann-Whitney test was used for the comparison of the median values of the TTP.

4. Results

4.1. Concerning the research on „*Predictive factors for the emergency care of cancer patients*”:

Predictive factors for multiple (≥2) ED visits of cancer patients: Residence in a nursing home more than tripled the odds (OR: 3.09), prior hospice care increased the odds by 87% and a chief complaint of dyspnea by 75%, respectively, while 2 or more comorbidities increased the odds by 40% for multiple ED visits. Prior surgical or hormone treatment, prior chemotherapy, a diagnosis of injury, breast cancer were factors which significantly decreased the odds of multiple ED visits (OR: 0.59, 0.52, 0.71, 0.59 and 0.69, respectively). (Table 1)

Table 1: Predictive factors for multiple (≥2) ED visits among oncology patients at the Somogy County Kaposi Mór University Teaching Hospital Emergency Center in 2018

Predictors	OR	95% CI	Significance (p value)
Risk factors			
Number of comorbidities ≥2	1,40	1,16 – 1,69	< 0,001
Chief complaint is dyspnea	1,75	1,30 – 2,34	< 0,001
Prior hospice care	1,87	1,05 – 3,31	0,032
Residence type: nursing home	3,09	1,88 – 5,07	< 0,001

Protective factors			
New cancer diagnosis-related ED visit	0,39	0,28 – 0,56	< 0,001
Prior hormone therapy	0,52	0,35 – 0,77	0,001
Prior surgery	0,59	0,45 – 0,77	< 0,001
Diagnosis is injury	0,59	0,44 – 0,80	0,001
Breast cancer	0,69	0,49 – 0,98	0,037
Prior chemotherapy	0,71	0,54 – 0,94	0,015

Predictive factors for hospitalization of patients with cancer: Predictive factors for hospitalization following an ED visit included a diagnosis of gastrointestinal illness OR: 1.35), prior BSC/palliative treatment (OR: 1.53) and chief complaint of dyspnea (OR: 1.61), which all significantly increased the odds of subsequent hospitalization. Patients with a new cancer-related visit also had 86% higher odds of being hospitalized following their ED visit. (Table 2)

Table 2: Predictive factors for hospitalization among oncology patients presenting to the ED at Somogy County Kaposi Mór University Teaching Hospital in 2018

Predictors	**OR**	**95% CI**	**Significance (p value)**
Risk factors			
Diagnosis is gastrointestinal illness	1,35	1,01 – 1,79	0,040
Prior BSC/palliative care	1,53	1,01 – 2,33	0,045
Chief complaint is dyspnea	1,61	1,22 – 2,12	0,001
New cancer diagnosis-related ED visit	1,86	1,30 – 2,66	0,001
Protective factors			
Diagnosis is pain	0,28	0,19 – 0,40	< 0,001
Diagnosis is injury	0,57	0,41 – 0,80	0.001

Chief complaint is extremity	0,61	0,44 – 0,84	0.003
Prior hormone therapy	0,62	0,42 – 0,93	0.022
Chief complaint is pain (except extremity and abdominal pain)	0,64	0,47 – 0,88	0.006

Predictive factors for death within 36 months of patients with cancer visiting the ED: Prior hospice care (OR: 2.68), residence in a nursing home (OR: 2.45), prior BSC/palliative care (OR: 2.28), being hospitalized (OR: 2.23) and cancer of the respiratory tract (OR: 2.13) significantly increased the odds of death within 36 months after an ED visit. A new cancer-related ED visit more than tripled (OR: 3.28) the odds of death within 36 months. (Table 3)

Table 3: Predictive factors for death among oncology patients presenting to the ED at Somogy County Kaposi Mór University Teaching Hospital in 2018

Risk factors	**OR**	**95% CI**	**Significance (p value)**
Risk factors			
Frequency of ED visits ≥2	1,80	1,36 – 2,35	< 0,001
Cancer of respiratory tract	2,13	1,44 – 3,17	< 0,001
Hospitalization	2,23	1,68 – 2,94	< 0,001
BSC/palliative care	2,28	1,13 – 4,60	0,021
Residence type: nursing home	2,45	1,26 – 4,75	0,008
Hospice	2,68	1,11 – 6,46	0,028
New cancer diagnosis-related ED visit	3,28	2,09 – 5,14	< 0,001

Protective factors			
Prior hormone therapy	0,45	0,29 – 0,72	0,001
Prior surgery	0,56	0,41 – 0,75	< 0,001
Preventable ED visits	0,59	0,40 – 0,87	0,007
Age is <65 years	0,64	0,49 – 0,84	0,001

Predictive factors for potentially preventable ED visits of patients with cancer:

Potentially preventable ED visits were considered to be patients in triage category 5. Out of the 2 383 ED visits, a total of 445 cases met the criteria for this approach, representing 18.67% of the total number of cases. Pain in the extremities (OR: 1.73) and elsewhere, excepting abdominal pain (OR 1.67) as chief complaints, or diagnosis codes of pain (OR: 1.47) and injury (OR: 1.46) significantly increased the odds of the ED visit being potentially preventable. (Table 4) A complaint of dyspnea, prior BSC/palliative care and a subsequent diagnosis of a cardiovascular illness or gastrointestinal disease significantly decreased the odds of the ED visit being potentially preventable, with ORs of 0.38, 0.43 0.61 and 0.55, respectively. (Table 4)

Table 4: Predictive factors for potentially preventable ED visits among oncology patients at Somogy County Kaposi Mór University Teaching Hospital Emergency Center in 2018

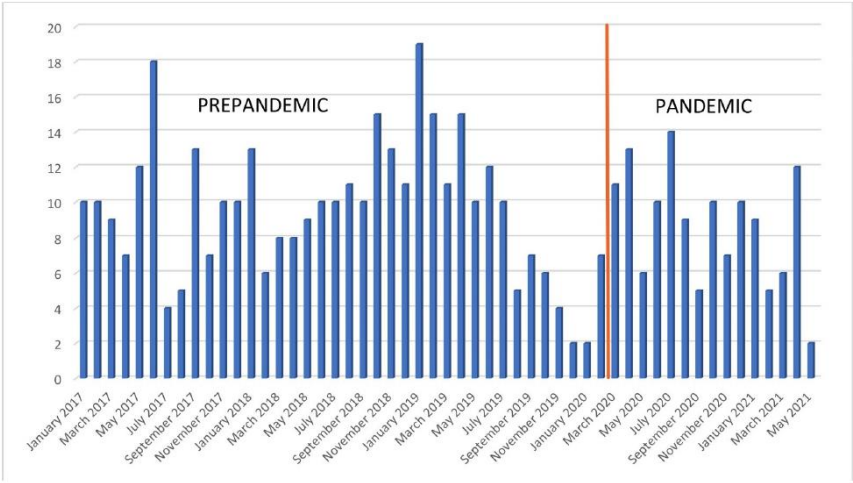
Predictors	**OR**	**95% CI**	**Significance (p value)**
Factors increasing the odds of preventability			
Diagnosis is injury	1,46	1,04 – 2,04	0,028
Diagnosis is pain	1,47	1,03 – 2,10	0,035
Chief complaint is pain (except extremity, abdominal pain)	1,67	1,20 – 2,32	0,002

	Chief complaint is extremity pain	1,73	1,24 – 2,40	0,001
Factors decreasing the odds of preventability				
	Chief complaint is dyspnea	0,38	0,22 – 0,64	< 0,001
	BSC/palliative treatment	0,43	0,19 – 0,96	0,040
	Diagnosis is gastrointestinal illness	0,55	0,34 – 0,87	0,012
	Diagnosis is cardiovascular illness	0,61	0,38 – 0,99	0,044
	Off-clinic hours/holidays	0,80	0,64 – 1,00	0,046

4.2. Concerning the research on „*Impact of the COVID-19 pandemic on clinical characteristics and time to initial physician contact of patients with head and neck squamous cell carcinoma*“:

On average, the number of patients diagnosed with HNSCC per month during the pandemic decreased by 12.4% compared with the pre-COVID-19 period; however, this change was not statistically significant. (Figure 1)

Figure 1: The number of patients diagnosed with head and neck squamous cell carcinoma who presented at the Pécs University, Clinical Centre, Department of Otorhinolaryngology and Head and Neck Surgery during the two study periods: before and during the COVID-19 pandemic



We investigated the relationship between the individual cancer stages I-II-III-IVa,b,c and the two study periods and found a significant association. During the pandemic there was a significant increase in stage I and stage II cancers, a decrease in stage III and IVa,c cancers, and a significant increase in stage IVb cancers. The greatest rise was in IVb cancers, where the percentage of cancer pre-COVID-19 increased from 6.0% to 17.9% in the pandemic, while the greatest decrease was among stage IVa cancers (44.3% pre-COVID-19 and 33.3% during COVID-19). The proportion of patients with stage I cancer significantly increased from 15.9% to 20.3% during the COVID-19 period. (Table 5)

Table 5: The distribution of disease stages among patients with head and neck squamous cell carcinoma who presented at the Pécs University, Clinical Centre, Department of Otorhinolaryngology and Head and Neck Surgery during the two study periods: before and during the COVID-19 pandemic

Stage	**I**	**II**	**III**	**IVa**	**IVb**	**IVc**	**p**
Before COVID-19 n=402 (%)	64 (15.9)	49 (12.2)	68 (16.9)	178 (44.3)	24 (6)	19 (4.7)	**<0.001**
During COVID-19 n=123 (%)	25 (20.3)	17 (13.8)	13 (10.6)	41 (33.3)	22 (17.9)	5 (4.1)	
Total n=525 (%)	89 (17)	66 (12.6)	81 (15.4)	219 (41.7)	46 (8.8)	24 (4.6)	

When comparing the number of days from the appearance of first symptoms to initial physician contact (TTP), we found that the median TTP before the COVID-19 pandemic was significantly shorter than the median TTP during COVID-19 (43 vs. 61 days, respectively; p = 0.032), indicating that during the COVID-19 period, the median time to see a doctor increased by about 40% compared with the previous period. (Table 6)

Table 6: A comparison of the waiting times from the onset of symptoms to the first physician contact for patients with head and neck squamous cell carcinoma who presented at the Pécs University, Clinical Centre, Department of Otorhinolaryngology and Head and Neck Surgery during the two study periods: before and during the COVID-19 pandemic.

		Before COVID-19 n=401	**During COVID-19 n=122**	**p**
TTP in days (range: 0-732)	**Mean**	77.67	83.82	**0.032**
	Median	43	61	

A laryngeal and an oral cavity tumor in the pre-COVID-19 period increased the odds of visiting a physician at an early stage of cancer by 2.4 times and 3.3 times, respectively, compared with having a tumor in a different location. During the COVID-19 period, these odds significantly increased, with an OR of 4.57 for laryngeal cancer and 5.89 or oral cancer. Thus, patients with HNSCC who had either laryngeal or oral cancer were more likely to contact a physician in an early stage of the disease during the pandemic than before the COVID-19 period. Conversely, having a neck lump or dysphagia as a presenting symptom both before and during the COVID-19 period significantly increased the odds of patients visiting a physician in an advanced stage of cancer. Having a neck lump or dysphagia in the pre-COVID-19 period increased the odds of visiting a physician in an advanced stage of cancer by 7.4 times and 3.01 times, respectively, compared with having any other symptom. During the COVID-19 period, the odds significantly increased, with an OR of 4.97 for dysphagia, implying that those with dysphagia were more likely to contact a physician with an advanced-stage cancer during the pandemic than prior to it. (Table 7)

Table 7: The predictive factors of disease stages in patients with head and neck squamous cell carcinoma who presented at the PTE KK Department of Otorhinolaryngology and Head and Neck Surgery during the two study periods: before and during the COVID-19 pandemic

		Before COVID-19 OR	**During COVID-19 OR**
Early stage	Larynx	2.41 (1.306-4.442)	4.57 (1.601-13.057)
	Oral cavity	3.31 (1.850-5.907)	5.89 (2.292-15.158)

Advanced stage	Neck lump	7.04 (3.236-15.299)	6.93 (1.932-24.861)
	Dysphagia	3.01 (1.572-5.760)	4.97 (1.351-18.250)

5. Discussion

Our study focuses on cancer patients. In our first study, we investigated the predictive factors of multiple ED visits made by cancer patients, hospitalization following ED visits, potentially preventable ED visits and mortality.

Studies from the United States and Australia have shown that a significant proportion of cancer patients (between 44-63%) visit the emergency department more than once, which is similar to our findings that 57% of cancer patients who visited the emergency department made more than one visit during the study year. Previous studies have described the presence of multiple comorbidities, more severe symptoms (such as dyspnea) and advanced cancer stage as being associated with higher rates of multiple ED visits. In line with these findings, our results also showed that having at least 2 or more comorbidities, having dyspnea as a symptom and having previously initiated hospice care, were significant risk factors for multiple ED visits. In addition, residence in a nursing home more than tripled the odds and was a strong risk factor for multiple ED visits. An epidemiological analysis in Australia showed that a significant proportion of deaths in nursing homes could have been prevented by appropriate preventive measures.

Some US and Canadian studies have estimated that between 2.8% and 51% of emergency department presentations are potentially preventable, compared

with 18.67% in our study. Pain and injury diagnoses and extremity pain as the chief complaint were found to be predictive factors of potentially preventable ED visits in our study. The explanation for this lies partly in falls and the resulting injuries, which—at least to some extent—could be prevented with proper precautions. Additionally, the ED is often burdened by cases involving minor injuries, where imaging diagnostics are in many cases unnecessary.

The hospitalization rate for patients with advanced cancer was 76% according to a study in the Netherlands, while in a Canadian study 58% of all oncology patients were hospitalized after their emergency visit. BSC or palliative care and dyspnea, as a consequence of advanced respiratory cancer, were found to be predictive factors for hospitalization after presentation to the ED, similar to the results of several international studies. A recent study found that patients diagnosed with tumors presenting to the emergency department had more advanced diseases and a worse prognosis. The findings of significantly worse survival have been reported in more recent publications, including a population-based study by the International Cancer Benchmarking Partnership (ICBP).

Our results also showed that emergency treatment for newly diagnosed cancers more than tripled the odds of dying within 3 years. According to the literature, older cancer patients who presented to the ED more than once had higher rates of hospital admission and increased mortality after admission. Consistent with these studies, earlier initiation of BSC or hospice care, respiratory cancer, hospitalization after presentation, and multiple ED visits increased the odds of death within 3 years among cancer patients in our analysis.

As a continuation of our research, we investigated the demographic and clinical characteristics of patients with head and neck squamous cell carcinoma

and the impact of the COVID-19 pandemic. The COVID-19 pandemic significantly disrupted healthcare delivery, leading to a reduction in personal physician-patient interactions, the postponement of non-urgent medical interventions, and the reallocation of substantial healthcare resources toward the management of patients with coronavirus infection. According to the results of international studies, more than 55% of healthcare institutions reported some reduction in the care of cancer patients. During the COVID-19 pandemic, decreases in newly diagnosed head and neck squamous cell carcinoma cases ranging from 7.5% to as much as 50% were reported, while our own results showed that the average monthly number of newly diagnosed head and neck squamous cell carcinoma patients decreased by 12.4% during the pandemic, however this decrease was not statistically significant. Most studies have found that the proportion of advanced-stage cancers increased during the pandemic, while the proportion of early-stage cancers decreased. One explanation for this may be that the delay in diagnosis allowed early-stage cancers to progress to more advanced stages before patients sought medical attention. Analyzing our own data separately for each stage of disease, we found that during the COVID-19 period, the proportion of early stage (I-II) tumors increased significantly, the proportion of stage III and IVa tumors decreased, and the proportion of stage IVb tumors increased significantly. Therefore, during the COVID-19 pandemic, our results showed a bipolar shift towards very early and very advanced stage cancers.

A study in Croatia also reported a significant increase in time to initial physician contact (ENT specialist) during the pandemic, while some Turkish and Japanese studies did not find a difference in waiting times. The median waiting times between symptom appearance and initial physician contact

increased from 43 to 61 days during COVID-19, indicating that patients waited longer with their symptoms to contact a physician.

Some studies have reported a change in the types of symptoms and tumor sites within HNSCC due to the pandemic. In our study, we found that laryngeal and oral cavity tumors were predictive factors for early-stage cancers, while neck lump and dysphagia were predictive factors for advanced-stage tumors. During the pandemic, there were changes in the odds ratios for stage prediction: patients with tumors in the oral cavity and larynx consulted a doctor earlier, probably because the symptoms were easier to recognize. Our results indicated that patients with dysphagia waited longer to contact a physician than patients with other symptoms during the COVID-19 period than before. We hypothesize that the pandemic possibly influenced patients' patterns of seeking medical advice - on the one hand by raising awareness of upper respiratory symptoms through the media, and on the other hand by reducing the personal consultations by „lockdown", which may explain our findings on stage shift and the identified predictive factors observed in our study.

6. Thesis

6.1. Concerning the research on „*Predictive factors for the emergency care of cancer patients*":

1. Residence in a nursing home was associated with a more than threefold increase in the odds of multiple (≥2) emergency department visits among cancer patients (OR: 3.09). Prior hospice care and dyspnea as the primary complaint increased the risk of multiple ED visits by 87% and 75%, respectively, while the presence of two or more comorbidities also significantly increased the odds, albeit to a lesser extent (OR: 1.40). In contrast,

factors such as prior surgical or hormonal therapy, chemotherapy, injury as a diagnosis at the ED, and breast cancer were all significantly associated with a reduced probability of multiple ED visits (OR: 0.59, 0.52, 0.71, 0.59, and 0.69, respectively).

2. Predictive factors for hospitalization following an emergency department visit included a diagnosis of gastrointestinal disease (OR: 1.35), prior BSC or palliative treatment (OR: 1.53), and dyspnea as the primary complaint (OR: 1.61). Patients presenting ED with a newly diagnosed malignancy had 86% higher odds of hospitalization following ED visit.

3. Prior hospice care (OR: 2.68), residence in a nursing home (OR: 2.45), BSC of palliative treatment (OR: 2.28), prior hospitalization (OR: 2.23), and respiratory malignancies (OR: 2.13) were all significant predictors of mortality within 36 months following an ED visit among cancer patients. Additionally, presentation to the ED with a newly diagnosed malignancy was associated with a more than threefold increase in the odds of mortality within 36 months (OR: 3.28). In contrast, younger age (<65 years), potentially preventable ED visits, and prior hormonal or surgical treatment were significantly associated with a reduced risk of mortality within the same period.

4. Dyspnea as primary complaint (OR: 0.38), prior BSC or palliative treatment (OR: 0.43), and a subsequent diagnosis of cardiovascular disease (OR: 0.61) or gastrointestinal disease (OR: 0.55) were significantly associated with a decreased odds of potentially preventable ED visits. In contrast, pain in the extremities (OR: 1.73), pain elsewhere, excepting abdominal pain as chief complaints (OR: 1.67), as well as diagnosis codes of pain (OR: 1.47) and injury

(OR: 1.46), were statistically significant predictors of an increased odds of potentially preventable ED visits among cancer patients.

6.2. Concerning the research on „*Impact of the COVID-19 pandemic on clinical characteristics and time to initial physician contact of patients with head and neck squamous cell carcinoma*”:

1. During the pandemic, the average monthly incidence of patients diagnosed with squamous head and neck cell carcinoma decreased by 12.4% compared to the pre-pandemic period; however, this change was not statistically significant.

2. The most commonly reported symptoms among patients with head and neck squamous cell carcinoma were neck lump, pain, dysphagia, and oral mucosal ulcers. No statistically significant differences in the frequency of these symptoms were observed between the two periods.

3. No statistically significant differences were observed between the two study periods regarding the distribution of tumor localization (oral cavity, larynx, epipharynx, mesopharynx, hypopharynx, and CUP) and cancer stages (early stages I-II vs. late stages III-IV).

4. A statistically significant association was found between tumor stages (I–II–III–IVa,b,c) and the two study periods. During the pandemic, the proportion of patients with stage I and II HNSCC significantly increased (from 15.9% to 20.3%), while the proportion of stage III and IVa tumors decreased. Conversely, the proportion of stage IVb tumors showed a significant increase (from 6.0% to 17.9%) ($p < 0.001$). The most pronounced percentage difference was observed in stage IVb tumors.

5. The median time from symptom onset to the first physician contact was significantly shorter before the pandemic than during the pandemic (43 vs. 61 days; $p = 0.032$), indicating that the median time to seek medical attention increased by approximately 40% during the COVID-19 pandemic compared to the pre-pandemic period.

6. Two tumor locations, oral cavity and laryngeal cancer, along with two main symptoms, neck lump and dysphagia, were identified as predictive factors for seeking medical attention at early or advanced disease stages. Patients with laryngeal or oral cavity cancer were more likely to present at an early stage during the pandemic compared to the pre-COVID-19 period. In contrast, patients experiencing dysphagia were more likely to seek medical attention at an advanced disease stage during the pandemic than before.

7. Conclusions

In Hungary, emergency departments play a crucial role in the identification of newly diagnosed cancer patients, the management of treatment-related adverse effects, and the recognition of the acute worsening of the patient's medical condition. Our study identified independent predictive factors for multiple emergency department (ED) visits, hospitalization, mortality within 36 months following a cancer-related ED visit, and potentially preventable ED visits. These findings highlighted the increased vulnerability of certain patient populations, including individuals residing in long-term care facilities, those with respiratory malignancies, and patients receiving palliative or hospice care, emphasizing the necessity for more focused and specialized interventions. Adopting the model of international oncology centers, the establishment of

same-day emergency oncology outpatient units and the expansion of palliative and hospice services may reduce the strain on emergency departments while enhancing patient outcomes. Our study identified key factors influencing the emergency management of cancer patients and underscored essential considerations for optimizing oncology care pathways.

In our study investigating the characteristics of patients diagnosed with head and neck squamous cell carcinoma, we observed a notable shift in tumor stage distribution during the COVID-19 pandemic compared to the pre-pandemic period. Specifically, there was an increase in both stage I and stage IVb diagnoses. Moreover, the total number of newly diagnosed head and neck cancer cases decreased during the pandemic. Additionally, we found a delay in the time from symptom onset to initial physician contact during the pandemic period. Neck lump and dysphagia were identified as independent predictors of advanced-stage disease, while oral and laryngeal cancers were associated with early-stage diagnosis. Our study explored the presentation of head and neck cancer patients in the context of a major healthcare disruption, emphasizing the pandemic's dual and disproportionate impact on this patient group. While further research is required to gain a more thorough understanding of this phenomenon, our findings provide valuable insights into the pandemic's effects and may aid the development of strategies for more effective management of future healthcare crises.

8. Publications

Publications related to the topic of the thesis and on which the thesis is based

Szabó, É.; Kopjár, E.; Rumi, L.; Boronkai, Á.; Bellyei, S.; Gyöngyi, Z.; Zemplényi, A.; Sütő, B.; Girán, J.; Kiss, I.; Pozsgai, É.; Szanyi, I. Changes in Time to Initial Physician Contact and Cancer Stage Distribution during the COVID-19 Pandemic in Patients with Head and Neck Squamous Cell

Carcinoma at a Large Hungarian Cancer Center. Cancers 2024, 16, 2570. doi.org/10.3390/cancers16142570
Q1, IF: 4,5

Koch M*, **Szabo E***, Varga C, Soos V, Prenek L, Porcsa L, Bellyei Sz, Giran K, Giran J, Kiss I, Pozsgai E. Retrospective study of cancer patients' predictive factors of care in a large, Hungarian tertiary care centre. BMJ Open 2023;13:e070320. doi:10.1136/ bmjopen-2022-070320
Q1, IF: 2,4

Other publications (other than those on which the thesis is based) related to the topic of the thesis

Varga Cs, Springo Z, Koch M, Prenek L, Porcsa L, Bellyei S, Rumi L, **Szabo E**, Ungvari Z, Giran K, Kiss I, Pozsgai E. Predictive factors os basic palliative and hospice care among patients with cancer visiting the emergency department in a Hungarian tertiary care center. Heliyon;2024,10 e29348. doi.org/10.1016/j.heliyon.2024.e29348
Q1, IF: 3,8

Szabó, É.; Kopjár, E.; Rumi, L.; Bellyei, S.; Zemplényi, A.; Mátyus, E.; Édes, E.; Girán, J.; Kiss, I.; Szanyi, I.; Pozsgai E. Shorter Time to Biopsy of Patients with Head and Neck Squamous Cell Carcinoma During the COVID-19 Pandemic in Hungary. Cancers 2025, 17, 360. https://doi.org/10.3390/cancers17030360
Q1, IF: 4,5

Non-topic related publications

Balazs S, Kolumban B, **Szabo E**, Pasztor S, Nemeth T, Bagoly T, Botz B, Pinter E, Helyes Zs. Plasma Somatostatin Levels Increase during Scoliosis Surgery, but Not Herniated Disc Operations: Results of a Pilot Study. Biomedicines 2023, 11(8), 2154; doi.org/10.3390/biomedicines11082154
Q1, IF: 3,9

Fodor, D.; Pozsgai, É.; Schally, A.V.; László, Z.; Gömöri, É**.; Szabó, É.**; Rumi, L.; Lőcsei, D.; Boronkai, Á.; Bellyei, S. Expression Levels of GHRH-Receptor, pAkt and Hsp90 Predict 10-Year Overall Survival in Patients with Locally Advanced Rectal Cancer. Biomedicines 2023, 11, 719. https://doi.org/10.3390/biomedicines11030719

Q1, IF: 3,9

Gerlinger I, **Szabó É**, Szanyi I, Rostás T, Pap I, Révész P, Kopjár E. Mastoidobliterációhoz használt csontpor és bioaktív üveggranulátum a cholesteatoma sebészetében [Use of bone pate and bioactive glass granules for mastoid obliteration in cholesteatoma surgery]. Orv Hetil. 2022 May 22;163(21):838-845. Hungarian. doi: 10.1556/650.2022.32477. PMID: 35598213.

Q4, IF: 0,8

Szabó É, Kaszás B, Bellyei Sz, Szanyi I. CASTLE-tumor: Esetbemutatás és irodalmi áttekintés. [CASTLE-tumor: Case presentation and literature review] Fül-Orr- Gégegyógyászat 2022; 68 (2): 56–x.

Szabó É, Molnár K, Kovács M, Németh A, Beke Zs, Gerlinger I, Szanyi I, Bakó P. Tág aquaeductus vestibuli okozta harmadikablak-szindróma komplex sebészeti ellátása. Fül-Orr-Gégegyógyászat 2022; 68: 4 pp. 153-155.

Szabó É, Hankovszky A, Kapi Zs, Kolat N, Keresztesi M, Rüll M, Vida I. Intraparotidealis metasztázisok áttekintése egy esetismertetés kapcsán [Overview of intraparotid metastases in a case report] Fül-Orr-Gégegyógyászat 2025; 71 (1): 18–x.

Presentations related to the topic of the thesis

„The impact of the COVID-19 pandemic on the demographic, clinical characteristics and time to initial physician contact of head and neck cancer patients”/„A COVID-19 világjárvány hatása a fej-nyaki daganatos betegek demográfiai és klinikai jellemzőire, valamint az orvoshoz fordulásig eltelt időre”
(A Magyar Fül-, Orr-, Gége Fej-, Nyaksebész Orvosok Egyesülete 48. Kongresszusa, Eger, 2024.10.13.)

Cumulative impact factor of topic related articles and on which the thesis is based: 6,9
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