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Use of inpatient palliative care in metastatic urethral cancer

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Abstract

Background: In metastatic urethral cancer, temporal trends, and patterns of inpatient palliative care (IPC) use are unknown.

Methods: Relying on the National Inpatient Sample (2006−2019), metastatic urethral cancer patients were stratified according to IPC use. Estimated annual percentage changes (EAPC) analyses and multivariable logistic regression models (LRM) for the prediction of IPC use were fitted.

Results: Of 1,106 metastatic urethral cancer patients, 199 (18%) received IPC. IPC use increased from 5.8 to 28.0% over time in the overall cohort (EAPC +9.8%; $P < 0.001$), from <12.5 to 35.1% (EAPC +11.2%; $P < 0.001$), and from <12.5 to 24.7% (EAPC +9.4%; $P = 0.01$) in respectively females and males. Lowest IPC rates were recorded in the Midwest (13.5%) vs. highest in the South (22.5%). IPC patients were more frequently female (44 vs. 37%), and more frequently exhibited bone metastases (45 vs. 34%). In multivariable LRM, female sex (multivariable odds ratio [OR] 1.46, 95% confidence interval [CI] 1.05−2.02; $P = 0.02$), and bone metastases (OR 1.46, 95%CI 1.02−2.10; $P = 0.04$) independently predicted higher IPC rates. Conversely, hospitalization in the Midwest (OR 0.53, 95%CI 0.31−0.91; $P = 0.02$), and in the Northeast (OR 0.48, 95%CI 0.28−0.82; $P = 0.01$) were both associated with lower IPC use than hospitalization in the West.

Conclusion: IPC use in metastatic urethral cancer increased from a marginal rate of 5.8% to as high as 28%. Ideally, differences according to sex, metastatic site, and region should be addressed to improve IPC use rates.

Keywords: Palliative care; In-hospital mortality; Urothelial carcinoma; Metastatic stage; NIS

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1. Introduction

Inpatient palliative care (IPC) represents an interdisciplinary person-centered care that might decrease psychosocial distress and relieve symptoms of patients with serious illnesses [1,2]. Moreover, IPC may improve patient's quality of life [3,4]. Therefore, the early and routine integration of IPC does not only represent a favorable indicator of quality of care [5−7], it is also a well-established guideline recommendation for advanced cancers [1,8].

In general, IPC rates are very low across all cancer types [9−11]. In several urological malignancies, IPC rates are among the lowest [11−14]. However, to the best of our knowledge, IPC use as well as its temporal trends and patterns are unknown in metastatic urethral cancer patients. We addressed this knowledge gap and hypothesized that rates of guideline-recommended IPC use are low but may have increased over time. Moreover, we postulated that patient and hospital characteristics might represent determinants of IPC use in metastatic urethral cancer patients. To test these hypotheses, we relied on a contemporary population-based cohort of metastatic urethral cancer patients within the United States.

2. Material and Methods

2.1. Data source

To test for temporal trends and patterns of IPC use in metastatic urethral cancer patients, we relied on discharge data from the National Inpatient Sample (NIS 2006-2019). The NIS is a set of longitudinal hospital inpatient databases included in the Healthcare Cost and Utilization Project (HCUP) and formed by the Agency for Healthcare Research and Quality (AHRQ) through a Federal-State-Industry partnership [15]. All diagnoses and procedures were coded using the International Classification of Disease (ICD) 9th revision Clinical Modification (ICD-9-CM), ICD 10th revision Clinical Modification (ICD-10-CM), as well as ICD 10th revision Procedure Coding System (ICD-10-PCS).

2.2. Study population

We included adult patients with a diagnosis of urethral cancer (ICD-9-CM code 189.3, and ICD-10-CM code C68.0) and metastatic stage (ICD-9-CM codes 196.0-196.4, 196.7-196.9, 197.x, 198.x, and ICD-10-CM codes C77.0-C77.3, C77.6-C77.9, C78.x, C79.x). Since local invasion is common in patients with advanced urethral cancer and does not fulfill distant metastasis criteria, patients with exclusive secondary malignant neoplasm of genital (ICD-9-CM code 198.82, and ICD-10-CM code C79.82) or urinary organs (ICD-9-CM code 198.1, and ICD-10-CM code C79.1x), and large intestine or rectum (ICD-9-CM code 197.5, and ICD-10-CM code C78.5) were excluded.

2.3. Definition of variables for analyses

Use of IPC, the primary end point of the study, was coded using ICD-9-CM V66.7 and ICD-10-CM Z51.5 codes according to previous validation studies [16−18]. Risk factors consisted of age at admission (years, continuously coded), sex (male vs. female), hospital region (West vs. Midwest vs. Northeast vs. South), teaching hospital status (non-teaching vs. teaching), and hospital size (large [≥400 beds] vs. medium [200−399 beds] vs. small [<200 beds]). Additional risk factors consisted of metastatic sites (lung [no vs. yes], bone [no vs. yes], liver [no vs. yes], and brain [no vs. yes]).

2.4. Statistical analyses

To assess IPC use, 3 analytical steps were performed. First, baseline characteristics were tabulated. Medians and interquartile ranges (IQR) were recorded for continuously coded variables. Frequencies and proportions were recorded for categorical variables. Wilcoxon rank sum test, Pearson's Chi-square test, and Fisher's exact test were applied. Second, estimated annual percentage changes (EAPC) for IPC use and in-hospital mortality were tested with the least squares linear regression in the overall cohort and after stratification for patient sex. Third, univariable and multivariable logistic regression models (LRM) predicting IPC use were fitted after adjustment for clustering at the hospital level using generalized estimating equation methodology [12,14].

R software environment was used for statistical computing and graphics (R version 4.2.2; R Foundation for Statistical Computing, Vienna, Austria) [19]. All tests were 2-sided, with a significance level set at $P < 0.05$.

3. Results

3.1. Descriptive characteristics

Within the NIS (2006-2019), 1,106 metastatic urethral cancer patients were identified (Table 1). Of those, 199 (18%) received IPC. According to hospital region, IPC rates were lowest in the Midwest (13.5%) and in the Northeast (14.3%), and highest in the West (22.5%) and in the South (20.9%). IPC patients were more frequently female (44 vs. 37%; $P = 0.045$), and more frequently exhibited bone metastases (45 vs. 34%; $P = 0.004$). Median length of stay (6 vs. 5 days; $P = 0.03$) and in-hospital mortality (19 vs. 6%; $P < 0.001$) were both higher in IPC patients.

3.2. Temporal trends of inpatient palliative care use and inpatient mortality

In metastatic urethral cancer patients, IPC rate increased from 5.8% in 2006 to 28.0% in 2019 (EAPC +9.8%, 95% confidence interval [CI] +6.8 to +13.2%; P

Table 1
Descriptive characteristics of 1,106 metastatic urethral cancer patients, stratified according to inpatient palliative care (IPC) use.

Characteristic		Overall, $n = 1{,}106$[a]	IPC, $n = 199$ (18%)[a]	No IPC, $n = 907$ (82%)[a]	P-value[b]
Age at admission (in years)		68 (59, 77)	70 (62, 78)	68 (59, 77)	0.1
Male sex		686 (62%)	111 (56%)	575 (63%)	**0.045**
Length of stay (in days)		5 (3, 9)	6 (3, 11)	5 (3, 9)	**0.03**
Total hospital cost (in $USD)		39,855 (21,524, 80,283)	44,382 (23,859, 90,603)	38,802 (20,775, 78,627)	0.1
Hospital region	West	173 (16%)	39 (20%)	134 (15%)	**0.01**
	Midwest	244 (22%)	33 (17%)	211 (23%)	
	Northeast	259 (23%)	37 (19%)	222 (24%)	
	South	430 (39%)	90 (45%)	340 (37%)	
Teaching hospital status		760 (69%)	142 (71%)	618 (68%)	0.4
Hospital size	Large (≥400 beds)	706 (64%)	124 (62%)	582 (64%)	0.9
	Medium (200–399 beds)	234 (21%)	45 (23%)	189 (21%)	
	Small (<200 beds)	162 (15%)	30 (15%)	132 (15%)	
Location of metastasis	Lung	406 (37%)	74 (37%)	332 (37%)	0.9
	Bone	397 (36%)	89 (45%)	308 (34%)	**0.004**
	Liver	235 (21%)	41 (21%)	194 (21%)	0.8
	Brain	59 (5%)	11 (6%)	48 (5%)	0.9
In-hospital death		92 (8%)	38 (19%)	54 (6%)	**<0.001**

[a] Median (interquartile range); n (%).
[b] Wilcoxon rank sum test; Pearson's Chi-square test; Fisher's exact test.IPC, inpatient palliative care.

< 0.001; Fig. 1). Over time, no significant difference in in-hospital mortality was observed (EAPC +1.9%, 95%CI −1.5 to +5.6%; $P = 0.3$). In subgroup analyses addressing patient sex, IPC rate increased from <12.5 (actual data are not shown due to NIS data sharing agreement) to 35.1% in females (EAPC +11.2%, 95%CI +7.6 to +15.2%; $P < 0.001$), and from <12.5 (actual data are not shown due to NIS data sharing agreement)

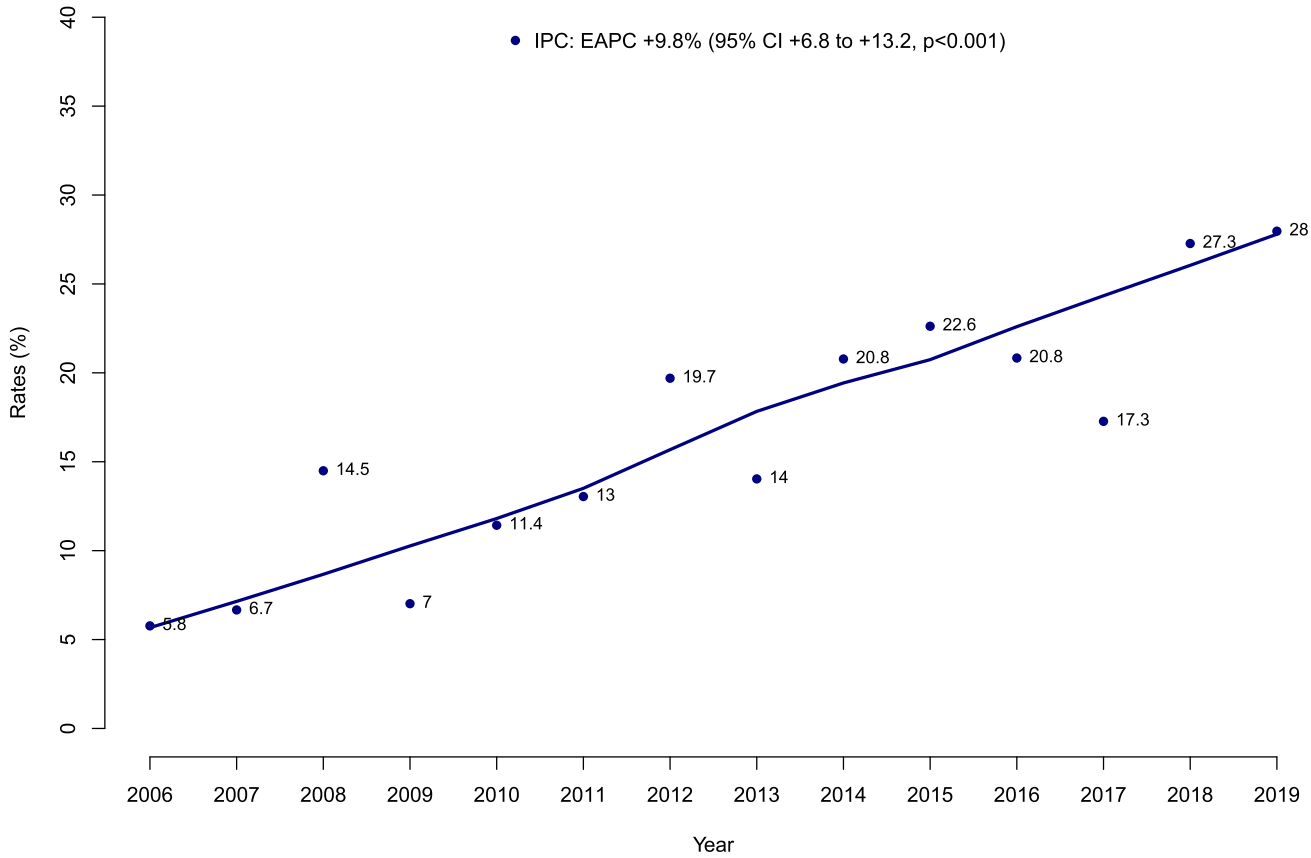

Fig. 1. Rates of inpatient palliative care (IPC) use over time in metastatic urethral cancer patients within the National Inpatient Sample (NIS) from 2006 to 2019.Abbreviations: CI, confidence interval; EAPC, estimated annual percentage change; IPC, inpatient palliative care.

Table 2
Univariable and multivariable logistic regression models predicting inpatient palliative care (IPC) use in metastatic urethral cancer patients after adjustment for clustering at the hospital level using generalized estimating equation methodology.

	Univariable		Multivariable[a]	
	OR (95%CI)	*P*-value	OR (95%CI)	*P*-value
Female sex (Ref. Male)	**1.45** (1.06, 1.97)	**0.02**	**1.46** (1.05, 2.02)	**0.02**
Hospital region (Ref. West)				
Midwest	**0.55** (0.32, 0.93)	**0.02**	**0.53** (0.31, 0.91)	**0.02**
Northeast	**0.52** (0.31, 0.87)	**0.01**	**0.48** (0.28, 0.82)	**0.01**
South	0.96 (0.62, 1.49)	0.9	0.95 (0.61, 1.48)	0.8
Teaching hospital status (Ref. Non-teaching hospital status)	1.19 (0.84, 1.68)	0.3	1.27 (0.88, 1.83)	0.2
Hospital size (Ref. Large)				
Medium	1.09 (0.74, 1.62)	0.6	0.97 (0.65, 1.43)	0.9
Small	1.06 (0.67, 1.67)	0.8	0.998 (0.62, 1.60)	1.0
Location of metastatic sites				
Lung (Ref. No)	1.07 (0.78, 1.46)	0.7	1.16 (0.83, 1.63)	0.4
Bone (Ref. No)	**1.48** (1.07, 2.05)	**0.02**	**1.46** (1.02, 2.10)	**0.04**
Liver (Ref. No)	0.97 (0.66, 1.40)	0.8	0.97 (0.65, 1.45)	0.9
Brain (Ref. No)	1.04 (0.54, 1.99)	0.9	0.95 (0.51, 1.77)	0.9

[a] adjusted for age at admission, sex, hospital region, teaching hospital status, hospital size, and metastatic sites.CI, confidence interval; IPC, inpatient palliative care; OR, odds ratio; Ref, reference.

to 24.7% in males (EAPC +9.4%, 95%CI +3.5 to +16.9%; $P = 0.01$).

3.3. The association between patient and hospital characteristics and inpatient palliative care use

In multivariable logistic regression models, female sex (multivariable odds ratio [OR] 1.46, 95%CI 1.05−2.02; $P = 0.02$), and bone metastases (OR 1.46, 95%CI 1.02−2.10; $P = 0.04$) independently predicted higher IPC use Table 2. Relative to patients admitted in the West of the United States, admission in the Midwest (OR 0.53, 95%CI 0.31−0.91; $P = 0.02$), and in the Northeast (OR 0.48, 95%CI 0.28−0.82; $P = 0.01$) both independently predicted lower IPC use.

4. Discussion

Use of IPC in metastatic urethral cancer patients is unknown. To address this knowledge gap, we relied on a contemporary population-based cohort of metastatic urethral cancer patients within the NIS (2006-2019) and made several noteworthy observations.

First, urethral cancer represents a rare primary [20]. Among all stages, metastatic stage is even rarer [21−23]. Specifically, relying on the Surveillance, Epidemiology, and End Results (SEER) database, Sui et al. (SEER 1973-2002) and Wenzel et al. (SEER 2004-2016) reported that respectively 406 (15.6%) and 182 (9.5%) of urethral cancer patients exhibited metastatic stage [21,22]. Furthermore, Gakis et al. identified only 29 (18.8%) patients with distant metastases at initial diagnosis among 154 urethral cancer patients from ten tertiary care centers between 1993 and 2012 [23]. In the current study we reported on 1,106 metastatic urethral cancer patients over a period of 14 years. In consequence, large-scale datasets such as the NIS are required to study rare events, such as IPC use in metastatic urethral cancer, as was done in the present study.

Second, the overall rate of IPC use was only 18% in metastatic urethral cancer patients. However, the IPC rate increased from 5.8 to 28.0% between 2006 and 2019 (EAPC +9.8%; $P < 0.001$). This observation is encouraging and might imply stronger adherence to guideline recommendations aimed at improving patient care [1,8]. To the best of our knowledge, no previous study examined IPC use in metastatic urethral cancer patients. In consequence, no direct comparison of the currently reported IPC rate is possible. However, the present IPC rate in metastatic urethral cancer patients is lower than the IPC rates reported in metastatic lung (50.1%) [24] or advanced esophageal cancer (26.1%) [25], where IPC rates are among the highest. To increase and ideally reach these IPC rates, further sensitization of all caregivers as well as broader patient information is required.

Third, we identified important differences in IPC use according to sex. Although IPC use increased in both sexes (EAPC +11.2 vs. 9.4%), IPS rates were generally higher in female vs. male (21 vs. 16%; OR 1.5) metastatic urethral cancer patients. The currently observed positive association between female sex and IPC use is consistent with previous reports addressing other cancer types [9,10,26]. However, these sex-specific differences are worrisome and might be explained by better knowledge of palliative care among women than men [10]. Moreover, these findings do not only validate our hypothesis that patient characteristics might be determinants of IPC use in metastatic urethral cancer patients. They further validate the need to promote awareness and use of palliative care among men to avoid

barriers to IPC use in specific patient subgroups that may equally well benefit from IPC.

Fourth, we identified important regional differences in IPC use among metastatic urethral cancer patients. Compared to hospitals in the West, IPC rates in the Midwest (13.5 vs. 22.5%; multivariable OR 0.53) and in the Northeast (14.3 vs. 22.5%; multivariable OR 0.48) were significantly lower. The existence of regional differences in IPC use in the United States is also worrisome. Therefore, along with rising awareness among hospital staff, infrastructural measures should also be considered to avoid systematic barriers to IPC access.

Taken together, the currently recorded IPC use in metastatic urethral cancer patient is low but has gradually increased over the study period (2006−2019). However, it is worrisome that male metastatic urethral cancer patients benefitted less frequently from IPC than their female counterparts. Furthermore, IPC rates were significantly lower in some regions than in others. Since such disparities in IPC use according to patient and hospital characteristic should ideally not exist, their presence should encourage all caregivers to broader IPC use in metastatic urethral cancer patients.

The present study has limitations. First, we relied on a retrospective database with its inherent limitations. Despite systematic adjustment for biases and confounders, a potential for selection and reporting biases remained. However, this limitation is shared by all studies using retrospective databases such as the NIS [9−12,14] or SEER [21,22,26]. Second, to identify IPC use we relied on both ICD-9 and ICD-10 codes according to established and validated methodologies [16−18]. Due to varying IPC definitions and methodological approaches, IPC rates may considerably differ between studies and cannot be directly compared. Third, palliative care can be delivered in inpatient, outpatient, or home-based settings [3,5]. Since the NIS exclusively provides inpatient data, such as inpatient palliative care, it is unable to address and quantify outpatient palliative care delivery. In consequence, this report underestimates the overall rates of palliative care use. However, the current methodology adheres to the methodology used in similar previous studies addressing IPC use [13,16−18]. Finally, the NIS only provides a limited amount of detail. Other covariates such as education and/or social status that may have driven medical decision-making including IPC use are not available in the NIS. However, we relied on multivariable adjustment with clinically meaningful characteristics offered by the NIS.

5. Conclusions

IPC use in metastatic urethral cancer increased from a marginal rate of 5.8% to as high as 28%. Ideally, differences according to sex, metastatic site, and region should be addressed to improve IPC use rates.

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Declaration of competing interest

The authors declare no conflict of interest.

CRediT authorship contribution statement

Carolin Siech: Conceptualization, Methodology, Writing − original draft. **Andrea Baudo:** Formal analysis, Writing − review & editing. **Mario de Angelis:** Formal analysis, Writing − review & editing. **Letizia Maria Ippolita Jannello:** Formal analysis, Writing − review & editing. **Francesco Di Bello:** Formal analysis, Writing − review & editing. **Jordan A. Goyal:** Formal analysis, Writing − review & editing. **Zhe Tian:** Data curation, Methodology, Writing − review & editing. **Fred Saad:** Validation, Writing − review & editing. **Shahrokh F. Shariat:** Validation, Writing − review & editing. **Nicola Longo:** Validation, Writing − review & editing. **Luca Carmignani:** Validation, Writing − review & editing. **Ottavio de Cobelli:** Validation, Writing − review & editing. **Alberto Briganti:** Validation, Writing − review & editing. **Séverine Banek:** Validation, Writing − review & editing. **Philipp Mandel:** Validation, Writing − review & editing. **Luis A. Kluth:** Validation, Writing − review & editing. **Felix K.H. Chun:** Supervision, Writing − review & editing. **Pierre I. Karakiewicz:** Conceptualization, Supervision, Writing − review & editing.

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References

[1] Dans M, Kutner JS, Agarwal R, Baker JN, Bauman JR, Beck AC, et al. NCCN Guidelines® Insights: Palliative Care, Version 2.2021: Featured Updates to the NCCN Guidelines. J Nation Comprehensive Cancer Netw 2021;19:780–8. https://doi.org/10.6004/jnccn.2021.0033.

[2] Iversen K, Oechsle K, Oing C, Bokemeyer C, Seidel C. Specific characteristics of patients with advanced genitourinary cancer receiving specialized inpatient palliative care. Oncol Res Treatm 2017;40:609–15. https://doi.org/10.1159/000478934.

[3] Hugar LA, Wulff-Burchfield EM, Winzelberg GS, Jacobs BL, Davies BJ. Incorporating palliative care principles to improve patient care and quality of life in urologic oncology. Nat Rev Urol 2021;18:623–35. https://doi.org/10.1038/s41585-021-00491-z.

[4] Temel JS, Greer JA, Muzikansky A, Gallagher ER, Admane S, Jackson VA, et al. Early palliative care for patients with metastatic non−small-cell lung cancer. N Engl J Med 2010;363:733–42. https://doi.org/10.1056/NEJMoa1000678.

[5] Castro JA, Hannon B, Zimmermann C. Integrating palliative care into oncology care worldwide: the right care in the right place at the right time. Curr Treat Options Oncol 2023;24:353–72. https://doi.org/10.1007/s11864-023-01060-9.

[6] Janberidze Elene, Poláková Kristýna, Motlová Lucie Bankovská, Loučka Martin. Impact of palliative care consult service in inpatient hospital setting: a systematic literature review. BMJ Support Palliat Care 2021;11:351. https://doi.org/10.1136/bmjspcare-2020-002291.

[7] Bajwah S, Oluyase A, Yi D, Gao W, Evans C, Grande G, et al. The effectiveness and cost-effectiveness of hospital-based specialist palliative care for adults with advanced illness and their caregivers. Cochrane Datab Systemat Rev 2020;9:1465–858. https://doi.org/10.1002/14651858.CD012780.pub2.

[8] Ferrell BR, Temel JS, Temin S, Alesi ER, Balboni TA, Basch EM, et al. Integration of palliative care into standard oncology care: american society of clinical oncology clinical practice guideline update. JCO 2017;35:96–112. https://doi.org/10.1200/JCO.2016.70.1474.

[9] Ruck JM, Canner JK, Smith TJ, Johnston FM. Use of inpatient palliative care by type of malignancy. J Palliat Med 2018;21:1300–7. https://doi.org/10.1089/jpm.2018.0003.

[10] Yadav S, Turner K, Xie Z, Chen G, Islam JY, Suk R, et al. Utilization of inpatient palliative care services among adolescents and young adults with cancer: evidence from National Inpatient Sample 2016−2019. Palliat Supportive Care 2023:1–8. https://doi.org/10.1017/S1478951523000354.

[11] Loh KP, Abdallah M, Shieh M-S, Stefan MS, Pekow PS, Lindenauer PK, et al. Use of inpatient palliative care services in patients with advanced cancer receiving critical care therapies. J Natl Compr Canc Netw 2018;16:1055–64. https://doi.org/10.6004/jnccn.2018.7039.

[12] Mazzone E, Knipper S, Mistretta FA, Palumbo C, Tian Z, Gallina A, et al. Trends and social barriers for inpatient palliative care in patients with metastatic bladder cancer receiving critical care therapies. J Natl Compr Canc Netw 2019;17:1344–52. https://doi.org/10.6004/jnccn.2019.7319.

[13] Han H, Yu F, Wu C, Dai L, Ruan Y, Cao Y, et al. Trends and utilization of inpatient palliative care among patients with metastatic bladder cancer. J Palliat Care 2021;36:105–12. https://doi.org/10.1177/0825859720924936.

[14] Mazzone E, Mistretta FA, Knipper S, Tian Z, Palumbo C, Gandaglia G, et al. Temporal trends and social barriers for inpatient palliative care delivery in metastatic prostate cancer patients receiving critical care therapies. Prostate Cancer Prostatic Dis 2020;23:260–8. https://doi.org/10.1038/s41391-019-0183-9.

[15] Agency for Healthcare Research and Quality, Rockville, MD. HCUP Nationwide Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). 2008-2019 n.d. www.hcup-us.ahrq.gov/nisoverview.jsp (accessed September 2, 2023).

[16] Feder SL, Redeker NS, Jeon S, Schulman-Green D, Womack JA, Tate JP, et al. Validation of the ICD-9 diagnostic code for palliative care in patients hospitalized with heart failure within the veterans health administration. Am J Hosp Palliat Care 2018;35:959–65. https://doi.org/10.1177/1049909117747519.

[17] Hua M, Li G, Clancy C, Morrison RS, Wunsch H. Validation of the V66.7 Code for palliative care consultation in a single academic medical center. J Palliat Med 2017;20:372–7. https://doi.org/10.1089/jpm.2016.0363.

[18] O'Keefe S, Czaja AS. Validation of administrative codes for palliative care consultation among critically ill children. Hospital Pediatr 2021;11:179–82. https://doi.org/10.1542/hpeds.2020-001263.

[19] R Core Team. R: a language and environment for statistical computing. https://www.R-project.org/(accessed August 27, 2023).

[20] Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. CA Cancer J Clin 2019;69:7–34. https://doi.org/10.3322/caac.21551.

[21] Sui W, RoyChoudhury A, Wenske S, Decastro GJ, McKiernan JM, Anderson CB. Outcomes and prognostic factors of primary urethral cancer. Urology 2017;100:180–6. https://doi.org/10.1016/j.urology.2016.09.042.

[22] Wenzel M, Nocera L, Collà Ruvolo C, Würnschimmel C, Tian Z, Shariat SF, et al. Incidence rates and contemporary trends in primary urethral cancer. Cancer Causes Control 2021;32:627–34. https://doi.org/10.1007/s10552-021-01416-2.

[23] Gakis G, Morgan TM, Efstathiou JA, Keegan KA, Mischinger J, Todenhoefer T, et al. Prognostic factors and outcomes in primary urethral cancer: results from the international collaboration on primary urethral carcinoma. World J Urol 2016;34:97–103. https://doi.org/10.1007/s00345-015-1583-7.

[24] Chang J, Han K-T, Medina M, Kim SJ. Palliative care and healthcare utilization among deceased metastatic lung cancer patients in U.S. hospitals. BMC Palliat Care 2022;21:136. https://doi.org/10.1186/s12904-022-01026-y.

[25] Cichon GJ, Betts LJ, McKillip KM, Silberstein PT. Patterns of palliative treatments in stage IV esophageal cancer. Am J Hosp Palliat Care 2023;40:1331–8. https://doi.org/10.1177/10499091231159365.

[26] Huo J, Hong Y-R, Turner K, Bian J, Grewal R, Wilkie DJ. Utilization pattern and service settings of palliative care for patients with metastatic non−small cell lung cancer. Cancer 2019;125:4481–9. https://doi.org/10.1002/cncr.32478.