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Original contribution

Trends in reporting histological subtyping of renal cell carcinoma: association with cancer center type☆,☆☆

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Summary Histological classification of renal cell carcinoma (RCC) has become increasingly important for clinical management. We identified 295 483 RCC diagnosed from 1998-2014 in the National Cancer Database (NCDB) to examine temporal trends in proportions of RCC with unspecified histology and several specific histologies from the 1998 and 2004 World Health Organization classifications of RCC. Further, multivariable log binomial analysis of 101 062 RCC diagnosed from 2010 to 2014 was used to determine whether the association of diagnosing/treating facility type and the proportion of unspecified RCC is independent of patient demographic and clinical factors. Between 1998 and 2014, the proportion of histologically unspecified RCC decreased substantially in all facility types, with the decrease smallest in community programs (from 86.0% to 28.1%) and largest in National Cancer Institute–designated centers (from 85.1% to 9.8%). These decreases were offset by increases in percentages of papillary, clear cell, and chromophobe RCC cases. During 2010 to 2014, relative to community programs, RCCs were 21% less likely to be reported as unspecified histology (adjusted prevalence ratio [aPR] = 0.79; 95% CI, 0.68-0.92) in comprehensive community programs, 32% less likely in integrated network programs (aPR = 0.68; 95% CI, 0.57-0.92) and academic programs (aPR = 0.68; 95% CI, 0.54-0.87), and 63% less likely (aPR = 0.37; 95% CI, 0.26-0.52) in National Cancer Institute –designated programs. These results have implications for the optimal selection of targeted systemic therapies for patients with advanced disease, and for the potential value of cancer registry data in pathology quality improvement programs to promote more rapid and consistent adoption of new classifications of RCC and other neoplasms.

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1. Introduction

Classification of renal cell carcinoma (RCC) has become substantially more complex during the past two decades, with recognition of several new types of RCC based on progress in understanding the relationships among molecular pathology, morphology, and natural history. For more than a decade, National Comprehensive Cancer Network (NCCN) treatment guidelines have recommended that RCC histology be considered in selecting systemic molecularly targeted therapies [1], and the increasing number of drugs targeting specific molecular alterations present in subsets of RCC has further increased the importance of precise morphologic and molecular classification [2,3]. Because several RCC types are associated with inherited syndromes, precise histological characterization can also help identify families most likely to benefit from genetic counseling and testing [4-8]. In addition, some retrospective studies have noted prognostic differences among certain RCC subtypes, although these differences may not persist after consideration of other variables such as stage and grade [9-14].

Relatively little is known regarding the promptness with which the 1997 Heidelberg classification [15], the 1998 World Health Organization (WHO) classification [16], and the 2004 WHO classification [17] were adopted, and even less is known about the consistency of adopting this new terminology in various practice settings. This information could help in facilitating consistent use of new diagnostic categories introduced by the 2016 WHO classification of RCC and the 2013 International Society of Urological Pathology Vancouver classification [5-8] and, more generally, in quality measurement and quality improvement for other pathology-based disease classification systems.

In a previous study using the National Cancer Database (NCDB), we observed that relative to National Cancer Institute (NCI)–designated comprehensive programs, community programs were significantly more likely to record broader diagnoses (rather than narrower diagnoses) for cancers of several organs, and this association was particularly prominent for malignant neoplasms of the kidneys [18].

In the current study, we use the NCDB records to examine trends from 1998 through 2014 in the adoption by various cancer center categories of several of the most common RCC types in the 1997 Heidelberg, 1998 WHO, and 2004 WHO classifications. We also examined whether cancer center categories are independently associated with the prevalence of reporting histologically unspecified RCC during a period (2010-2014) when consideration of histological type is recommended in the selection of targeted therapies for patients with metastatic RCC. Unlike other databases such as the NCI's Surveillance, Epidemiology, and End Results Program, the NCDB provides information regarding the treatment center category and whether the patient was diagnosed at the treating facility [19-22].

2. Materials and methods

2.1. Study participants

We examined records in the NCDB of patients diagnosed with RCC from 1998 through 2014. The NCDB, a collaboration of the American College of Surgeons and the American Cancer Society, collects data from more than 1 450 Commission on Cancer (CoC)–approved hospitals and approximately 70% of all cancers of the kidneys and renal pelvis diagnosed in the United States [19]. The NCDB contains data on patient demographics, clinical characteristics, and facility type that are abstracted from medical records and recorded according to a standardized data dictionary [20-22]. The Morehouse University Institutional Review Board in Atlanta, Georgia determined that this study is exempt from review.

The International Classification of Diseases for Oncology version 3 (ICD-O-3) was first used by the NCDB in 2001 and although the International Classification of Diseases for Oncology version 2 (ICDO-2) included codes for papillary RCC and clear cell RCC, there was no code in the ICDO-2 for chromophobe RCC, cyst-associated RCC, sarcomatoid RCC, and renal collecting duct carcinoma [23]. By starting analyses in 1998, we were therefore able to include baseline data before adoption of ICDO-3. We limited some analyses to cases diagnosed from 2010 through 2014 to reflect patterns of pathology interpretation during the current era in which RCC histologic types are recognized by oncology guidelines as a factor in choosing systemic therapy for patients with metastatic RCC [1].

We initially selected patients diagnosed and reported by the same CoC-accredited facility, with a malignant neoplasm of the kidney confirmed by histology, and with ICD-O-3 histology codes 8260 (papillary adenocarcinoma, NOS), 8310 (clear cell adenocarcinoma, NOS), 8312 (renal cell carcinoma), 8316 (cyst-associated renal cell carcinoma), 8317 (renal cell carcinoma, chromophobe type), 8318 (renal cell carcinoma, sarcomatoid), 8319 (collecting duct carcinoma), or 8320 (granular cell carcinoma). Although there are several other types of RCC in the 2004 WHO classification, such as renal carcinomas associated with Xp11.2 translocation/*TFE3* gene fusions, RCC associated with neuroblastoma, and mucinous tubular and spindle cell carcinoma, there are no specific ICDO-3 codes to represent these histologies; therefore, these cases could not be identified in NCDB records. Thus, the ICD-O-3 histology code, 8312, includes (1) RCC cases diagnosed only as "RCC" by the pathologist but which actually had specific histologies with corresponding ICDO-3 codes (such as papillary, clear cell, and chromophobe), (2) a much smaller number of cases with rare RCC histologies that may have been diagnosed by the pathologist but which were assigned a more general code by the registry because there are no specific ICDO-3 codes for these entities, and (3) a small number of cancers meeting criteria for unclassified RCC, a diagnosis for which there is no corresponding ICDO-3 code.