Seminars article

Use of administrative data for comparative effectiveness research in the treatment of non-prostate genitourinary malignancies

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Abstract

Comparative effectiveness research (CER) is imperative for objective and balanced assessment of treatment outcomes. CER that uses administrative databases (AD-CER) affords unique opportunities for large scale data analyses that potentially transcend limitations of small institutional datasets. Prostate cancer has received much attention from the AD-CER research community, whereas non-prostate genitourinary malignancies are less well-studied. The objective of this article is to review the currently available AD-CER that has been published in the non-prostate genitourinary malignancies space. © 2017 Elsevier Inc. All rights reserved.

Introduction

In the era where healthcare costs account for 17.8% of the United States Gross Domestic Product [1], quality-based metrics are increasingly stressed as payers, consumers and healthcare providers seek to maximize healthcare outcomes, while minimizing the economic burden on an already strained system [2,3]. Yet, some estimates suggest that ≥30% of American healthcare expenses have no quantifiable benefits [3]. As such, comparative effectiveness research (CER) is a valuable tool for evaluation of competing treatment approaches [3].

CER is defined by the Institute of Medicine of the National Academies (IOM) as a research strategy that "compares the benefits and harms of alternative [treatment] methods." [3]. In 2009, the United States government passed the American Recovery and Reinvestment Act, which designated $1.1 billion to create and evaluate CER in various aspects of the healthcare system [3]. Despite

kidney and bladder cancer incidence being ranked in the top of all United States malignancies, the Institute of Medicine of the National Academy's list of 100 priorities for CER research only referenced 3 urologic focuses, all of which pertained to prostate cancer care [4]. Indeed, no other urologic malignancies are mentioned despite the significant healthcare burden that these conditions represent. For example, bladder cancer not only remains the fourth most common cancer among men, but it also accounts for the highest per-patient cost of therapy among all cancers [5,6]. Undoubtedly, non-prostate genitourinary malignancies (NPGUM) deserve attention from the CER research community.

There exists a notable dearth of level 1 evidence comparing efficacy and utility of treatment strategies for the management of genitourinary malignancies. Although prospective, randomized trials addressing CER-related questions provide the highest quality data, such studies can be logistically extremely challenging, lengthy and cost-prohibitive to perform [7,8]. Observational studies harness large-volume, prospectively maintained administrative clinical datasets, such as National Cancer Database (NCDB) and the Surveillance, Epidemiology and End Results

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database (SEER), which utilize claims data and are based on billing, procedural and diagnoses codes [2]. These databases are readily accessible, generally devoid of barriers that stem from cost or patient accrual, and have an additional benefit of heterogeneity and generalizability [8]. However, data generated by such datasets are observational and retrospective in nature and have inherent selection and detection biases [9,10]. Complex statistical models attempt to control for measured and unmeasured confounders; however, limitations inherent to these datasets of preselected cohorts are often extremely challenging to overcome [11]. Moreover, there is less granularity in administrative clinical data than that obtained by prospective clinical trials and administrative datasets often have missing or incomplete data [9,10]. No matter the limitations, the significance of such analyses for hypothesis generation and testing is undeniable.

NPGUM have been under-represented in this research domain suggesting that unharnessed research opportunities may exist. This review seeks to evaluate the current body of literature in administrative dataset-based CER research focusing on NPGUM to illustrate research gaps and identify opportunities for novel inquiry.

Methods

Defining CER in administrative datasets

Consistent with the Institute of Medicine 2009 CER definition [3], this review defined CER as a study that reported patient specific outcomes for 2 or more different therapeutic approaches or interventions. Meanwhile, a database was considered "administrative" if it was collected, populated and maintained by a non-institutional entity for administrative purposes, such as billing or insurance claims, or for tracking outcomes [8].

Search strategy and review protocol

A systematic review of the literature was completed to identify English language articles pertaining to CER for NPGUM utilizing Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) standards [12]. Using PUBMED, search terms included individual categories of malignancy and nomenclature derivatives such as "renal" and "kidney," "malignancy" and "cancer," and "testis," "testicle" and "testicular," among others. In order to catalog all appropriate CER literature, multiple additional search terms were employed to improve the search fidelity. These included "comparative effectiveness research" and "database," as well as specific individual databases, such as "NCDB," "SEER," "NIS," "ACS-NSQIP," and the full expansion of their acronyms. Additionally, we utilized iterative cited reference searches from selected articles to help identify additional manuscripts.

All abstracts were screened for relevance. Included studies answered a clearly defined comparative effectiveness question and utilized an administrative database. Included articles were read in their entirety.

Results

The initial search returned 3,896 abstracts across all GU malignancies, and 95 studies met inclusion criteria. Table 1 summarizes search result findings, while Fig. 1 highlights malignancy topic and the administrative dataset employed for manuscripts reporting on CER in the NPGUM space. In summary, renal and bladder malignancies were the most commonly investigated at 49% ($n = 46$) and 25% ($n = 24$), respectively, with all other malignancies comprising the other 26% ($n = 25$) of articles.

Overall, SEER and SEER-Medicare (SEER-M) represented 38% ($n = 36$) and 22% ($n = 20$) of the studies included, respectively. The other 40% of indexed studies employed the following databases: NCDB, Nationwide Inpatient Sample (NIS), National Surgical Quality Improvement Project (NSQIP), Veterans Administration-NSQIP (VA-NSQIP), Premier Hospital Database, Florida Inpatient Database, Dutch Cancer Registry, International Metastatic Renal Cell Carcinoma Database Consortium (IMDC), Netherlands Task Force for Liver Surgery-Dutch Pathology Database, Danish Testicular Cancer Database, Ontario Cancer Registry, and the National Registry of Hospital Discharge Diagnosis. Fig. 2 summarizes the frequency of individual dataset employment for each NPGUM malignancy. Studies investigating renal malignancies utilized SEER (48%, $n = 22$) and SEER-M (24%, $n = 11$) data most commonly. However, studies focusing on bladder cancers predominately employed SEER-M (38%, $n = 9$) and NCDB (25%, $n = 6$) data. UTUC-related studies employed SEER (46%, $n = 6$) and NIS (23%, $n = 3$), whereas testicular cancer articles utilized SEER (40%, $n = 2$) and NCDB (40%, $n = 2$). A small number of manuscripts reporting on CER in the adrenal space included 25% ($n = 1$) each from SEER, NSQIP, NCDB and "other." All reports on penile cancer ($n = 3$) harnessed SEER data.

Table 1
Total number of manuscripts queried by the literature search and the final number of manuscripts included for the review

Malignancy	Manuscripts returned by search query	Manuscripts included in review
Renal	1,891	46
Bladder	1,139	24
UTUC	173	13
Testicular	288	5
Adrenal	243	4
Penile	82	3
Urethral	80	0
Total	3,896	95