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Retrospective Observational RWS In Oncology Based On EMR Data

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ABSTRACT

With the support of national policies and the development of medical informatization, the generation and usage of real-world data (RWD) have entered a new stage. RWD includes hospital information system data, medical claims data, registry data, etc., and real-world evidence (RWE) has been used to support regulatory decisions and the clinical. NMPA has released guidance on the applicability evaluation of RWD. However, there is no paper to introduce how to evaluate the applicability of RWD from EMR in oncology. This paper focuses on using electronic medical records (EMR) data to implement the observational study in the field of oncology, mainly including applicability evaluation and RWD-related projects.

INTRODUCTION

RWD and RWE can be used in the multiple stages of clinical development. Generally, the use of RWD is mainly focused on clinical research based on the RWD databases, such as comparative effectiveness and safety studies, and external control arm studies. Innovatively, real-world study (RWS) is also applied to digital innovation and pre-marketing clinical development. The diseases of interest in RWD applications include cancer, diabetes, cardiovascular disease, or multiple diseases. With the rapid development of hospital information systems, electronic medical records (EMR) data still is the main data source of RWD.

《用于产生真实世界证据的真实世界数据指导原则(试行)》 (2021) clearly states that the applicability of RWD needs to be evaluated before using RWD, which contains the evaluation of source data and governed data. However, there is no paper to introduce how to evaluate the applicability of RWD from EMR in oncology. Therefore, based on the implementation experience of the RWD projects, this paper will focus on how to evaluate the applicability of RWD in oncology based on EMR data and introduce the RWD projects in oncology, such as treatment pattern, effectiveness, and safety study.

APPLICABILITY EVALUATION OF RWD

According to different types of assessment, the applicability evaluation of RWD in oncology includes the data assessment of oncology-specific databases and RWS projects.

The assessment of the oncology-specific database includes multiple dimensions, such as the construction process of the database, key variables, consistency, and frequently asked questions (FAQs) about RWD. Firstly, the construction process of the database includes the governed process of RWD, data security, patient privacy protection, and related quality assurance and quality control measures. Further, the governed process of RWD consists of data collection, data transmission, data cleaning, and data storage. The key issues in these processes include the method and frequency of collection and transmission, data linkage technology, structured methods and effect of unstructured information, and the names of the common data model and terminology. Secondly, the key variables are assessed based on variable definitions, data format, data sources, and completeness, which contain variables related to inclusion and exclusion criteria, drug information, line of therapy, biomarker variables, and clinical characters. Third, consistency includes two dimensions, compliance with clinical guidelines and consistency with other data sources, such as drug safety databases and national survey results. Lastly, the following are FAQs.

- Is there follow-up information, such as follow-up start date, follow-up end date, and follow-up days?
- Is there death information, such as death date and the specific cause?

- How do you deal with unstructured information, using manual methods or automated tools?
- Can you share the proportion of patients with the different numbers of records?

In addition, computer system management is also an important aspect of the quality assessment of oncology-specific databases. The main points are as follows.

- Computerized system to manage and record queries during data curation.
- Formally validated NLP tool, data cleaning tool, and data standardization tool.
- All the actions during data curation could be captured by the system audit trail and recorded.
- Formal/written system/tool access control matrix or management requirement.
- Specific data safety protection measures in the hospital and its internet environment.

Data assessment based on RWS projects generally includes five steps. Firstly, the number of patients with study disease or drug in each candidate data source should be calculated. Then determine which data source should be selected based on the number of patients. Second, assess the availability of key variables of interest, such as demographic characteristics, clinical characteristics, treatment patterns, health care resource use (HCRU), clinical outcomes, and adverse events related to research projects. Third, is there an approximation method for key variables that may not be directly available, such as ECOG score and KPS score? Fourth, how do you deal with possible bias and limitations, such as information bias and missing death information? Last, there are operational issues regarding site selection and timelines, such as the date of the kick-off meeting, the number of days required to pass the ethical review, and contract signing progress.

RWD-RELATED PROJECTS

Based on the applicability assessment of RWD, next, we will introduce some RWD-related projects, mainly including the construction projects of two oncology-specific databases, one RWS project about epidemiology, treatment pattern, and treatment effect, and two other RWS projects on comparative effectiveness and safety.

The construction projects of two oncology-specific databases were about prostate cancer (PC) and lung cancer (LC). The objectives of PC-specific database projects were to realize the standardization of clinical data by building a PC-specific database by combining gene, pathology, image, and other multi-omics information, help medical workers manage patient data effectively and provide a simple and practical research platform. There were 10 000 patients from 3 centers in Phase 1 in the database and the PC-specific database could be converted to CDISC or OMOP model. Up to now, the Chinese standard dataset for prostate cancer (version 2022) had been published in March 2022. Moreover, two research projects based on the PC database were under preparation, namely research on the characteristics of diagnosis and treatment of PC patients related to PARP inhibitors and research to explore commercial insurance for PC patients in China. LC-specific database was constructed based on EMR data and contains all the data of LC patients diagnosed in 2013 - 2020 from specialized hospitals in Shanghai, including 280 000 non-small cell lung cancer (NSCLC) patients. More importantly, the main endpoints, PFS and OS, were collected through manual follow-up which were rarely recorded in EMR.

the RWS project about epidemiology, treatment patterns, and treatment effect was about patients with ROS1-mutant NSCLC. The objectives of this project were as follows.

- Determine the real-world treatment regimens used in the 1st line, 2ed line, 3rd line, and subsequent line of treatment in NSCLC patients with ROS1 mutation.

- Determine the real-world Overall Response Rate (ORR), Progression-Free-Survival (PFS), and Overall Survival (OS) by the most common 1st line, 2ed line, 3rd line, and subsequent treatment modality identified in the primary objective.
- Describe the patient's demography and clinical characteristic in advanced NSCLC patients with ROS1 mutation.
- Currently, this project is in progress and the research results will be submitted to National Medical Products Administration for support of new drug approval.

The two other RWS projects on comparative effectiveness and safety were about NSCLC and Breast cancer (BC). The objectives of this NSCLC project were to explore the comparative effectiveness and safety of the study drug combined with different chemotherapy regimens and different administration routes. The study design was a multicenter, retrospective cohort study based on EMR data and the research endpoints were ORR, Disease Control Rate (DCR), and PFS. What's more, the multivariable regression and propensity score were used for adjusting confounding factors, and several conference abstracts and SCI papers had been published. The objectives of the BC project were to evaluate the effectiveness and safety of the new drug specifications in BC patients at different treatment stages, at 12 weeks and 24 weeks of treatment. The study design was also a multicenter, retrospective cohort study based on EMR data, and currently, the project is still under implementation.

CONCLUSION

The applicability evaluation of RWD in oncology based on EMR should be conducted from the aspects of the database construction process, availability of variables, consistency, control of bias, and FAQs, and in industry RWD could be applied to multiple periods of clinical research.

CONTACT INFORMATION

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