Taipei Medical University Clinical Research Database (TMUCRD): A New Application Platform that Integrates Multi-center Electronic Medical Record Systems in Taiwan

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Abstract

Introduction:

Taipei Medical University (TMU), established in 1960, is a research university based on medical education, bio-pharmaceutical R&D and clinical practice. Its educational goal is to cultivate biomedical talents with humanistic care, innovation and internationalization capabilities. TMU has performed outstandingly in teaching, research, clinical practice, industry-university cooperation, etc., and has continued to advance toward the goal of a top international university in recent years. TMU established Office of Data Science (the first university in Taiwan) in 2019. It has a clinical data center, a health and welfare data center, a statistics center, and a school affairs research center, providing instant and high-quality data services.

Three affiliated hospitals of Taipei Medical University:

Taipei Medical University has three affiliated hospitals, including Taipei Medical University Hospital (T), Shuang-Ho Hospital (S) and Wan Fang Hospital (W). The three hospitals have a total of 1,351 physicians (T: 456, S: 477, W: 448), and a total of 3,160 hospital beds (T: 892, S: 1,367, W: 901). From 2008 to 2020, the three hospitals have a total of 3,659,572 patients (T: 1,557,001, S: 1,246,672, W: 1,553,445). The patient characteristics (including gender and age distribution) of the three hospitals are summarized in Table 1

Table 1. Patient characteristics in the three TMU affiliated hospitals

Table. Characteristics or TMU hospitals (N=3,659,572) 2020/9/9

	T		S		W	
	N(%)		N(%)		N(%)	
Total	1,557,001	(100)	1,246,672	(100)	1,553,445	(100)
Death	127,224	(8.2)	61,534	(4.9)	117,845	(7.6)
Cancer registry	18,577	(1.2)	16,500	(1.3)	17,051	(1.1)
Gender						
Male	661,194	(42.5)	567,858	(45.5)	740,791	(47.7)
Female	895,759	(57.5)	678,790	(54.4)	812,585	(52.3)
Missing	48	(0.0)	24	(0.0)	69	(0.0)
Age, mean(SD)	49.1	(19.4)	46.7	(19.8)	47.7	(19.3)
0-12	45,443	(2.9)	69,981	(5.6)	42,860	(2.8)
13-19	41,130	(2.6)	43,074	(3.5)	46,252	(3.0)
20-39	420,616	(27.0)	350,028	(28.1)	466,323	(30.0)
40-64	699,063	(44.9)	534,711	(42.9)	678,912	(43.7)
65-79	238,720	(15.3)	188,718	(15.1)	216,371	(13.9)
80-89	81,109	(5.2)	45,278	(3.6)	75,213	(4.8)
90+	30,444	(2.0)	14,840	(1.2)	27,501	(1.8)
Missing	476	(0.0)	42	(0.0)	13	(0.0)
Who ever been to other hospitals						
T	-		191,275	(15.3)	351,847	(22.6)
S	191,275	(12.3)	-		215,804	(13.9)
W	351,847	(22.6)	215,804	(17.3)	-	
Outpatient visits	13,295,899		14,764,136		21,606,623	
Number of inpatient	258,720		410,152		323,451	
Emergency visits	426,876		931,182		734,017	

1.CHR_BASIC duration: 2004/01/01-2020/07/17; delete blank ID_NO (N= 363)
2.Age = (2020 – birth year) or (death year – birth year)
3.Total 3,659,572 people in 3 hospitals- one is 3,023,408(82.6%) people, another is 574,786(15.7%) people, and the other is 61,380(1.7%) people.
4.OPD_BASIC, IPD_BASIC, EPD_BASIC duration: 2008/01/01-2020/07/17

Taipei Medical University Clinical Research Database (TMUCRD):

Since 2015, TMU has begun to integrate the electronic medical record databases of the three affiliated hospitals to form the Taipei Medical University Clinical Research Database (TMUCRD). It combines various electronic medical records of the three hospitals, including structured data (such as basic patient information, visits, tests, diagnosis results, treatment, surgery and medication, etc.) and unstructured data (such as physician records, Pathology reports, radiological reports, discharge records, etc.) are compiled into analyzable data. The overall time interval of the data covered by TMUCRD is 1998-2020, and since 2008, the database also covers the complete data of the three hospitals. The data content covered includes 10 categories, 60 data tables, and 2,355 fields. The various data tables were linked to each other (see Figure 1).

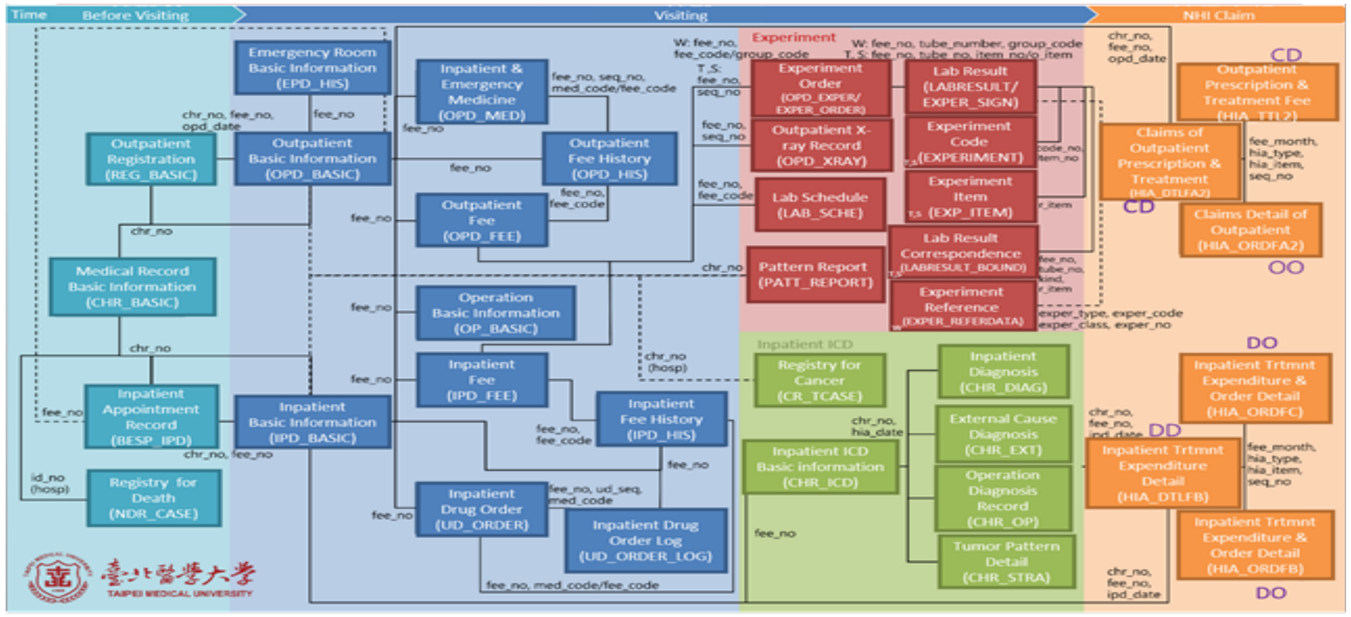

Figure 1. Connection diagram of each table in TMUCRD

Features and advantages of TMUCRD:

Compared with Taiwan's National Health Insurance Research Database (claims data), TMUCRD has 6 advantages, including: (1) It has various test results, such as: CKD severity staging; (2) It has a complete pathology report, such as cancer staging information; (3) It has hospitalization details, including: surgery during hospitalization, drug use Information such as the time and details of various medical treatments; (4) It includes patient self-payment items, such as health examinations, new drugs that have not been paid for by national health insurance, etc.; (5) TMUCRD has been connected with the death registration file of the Ministry of Health and Welfare in Taiwan. Therefore, it has accurate death date and cause of death information for each death case, which is helpful for the survival analysis of diseases and medications; (6) The TMUCRD based on the electronic medical records of the three hospitals has been connected with the cancer registration data coordinated by the Health Promotion Administration, so that TMUCRD has more information about cancer treatment and is helpful for cancer-related research.

Conclusions

TMUCRD is a complete and high-quality clinical database. At present, TMU is leading all universities and hospitals in Taiwan, and is linking TMUCRD and OHDSI's OMOP CDM through the establishment of ETL (Extract-Transform-Load) and serial connection methods. We look forward to participating in more large-scale international cooperation research projects in the future, and developing more topics suitable for international cooperation, to answer clinical, industrial, and policy related critical issues, and to meet the unmet needs of various biotechnology and medicine fields.

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