Statistical Analysis of Domestic Frequency for Diagnostic Radiography

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1. Introduction

Diagnostic radiography is one of the most advanced fields in modern medicine, widely used for diagnosis of diseases and wounds. Diagnostic radiography is categorized into general radiography, Computed Tomography (CT), dental radiography, mammography, fluoroscopy and angiography according to the radiography method.

Frequency of diagnostic radiography has been increased due to the public interest in health and growth of health industry [1]. Increasing frequency of diagnostic radiography may increase radiation dose to the public. Therefore, it is necessary to manage radiation dose in diagnostic radiography in terms of radiation safety. In addition, systematic frequency analysis should be preceded for radiation dose management for diagnostic radiography. Therefore, it is necessary to establish a methodology for investigating and systematically analyzing the domestic frequency of diagnostic radiography as a radiation dose management.

In this study, we established a methodology for investigating and analyzing the frequency of diagnostic radiography and analyzed the domestic frequency of diagnostic radiography in 2017.

2. Methods and Results

2.1 Investigation and statistical processing of frequency data for diagnostic radiography

We investigated frequency data of diagnostic radiography and statistically processed. We investigated frequency data of diagnostic radiography managed by various institutions, including Health Insurance Review and Assessment Service (HIRA), National Health Insurance Service (NHIS) and Ministry Of Education (MOE). Investigated frequency data is categorized into general radiography, CT, dental radiography, mammography, fluoroscopy and angiography.

HIRA is an institution that conducts evaluations on whether the diagnosis requested by patients with medical insurance is appropriate. NHIS is an institution that provides insurance benefits for the diagnosis and treatment for diseases and injuries of the people. MOE is an institution in charge of student education affairs and conducts radiography for the health of students.

The data investigated from these institutions included variable information such as age of patients and medical institutions. We unified variables of investigated data in order to statistically process frequency data for different institutions. Table 1 shows examples of unification of each institution variables.

Table 1: Examples of unification of each institution variables

Inst.	Age		Medical institution	
	Before	After	Before	After
HIRA	-	-	General hospital or more	General hospital
			Hospital	Hospital
			Dental hospital	
			Care hospital	
			Clinic	Clinic
			Dental clinic	
			Health agency	
NHIS	-	-	The others	General hospital
			Hospital	Hospital
			Clinic	Clinic
			Health agency	
MOE	Elementary school Middle school	10-14 years old	-	Clinic
	High school	15-19 years old		

Among the diagnostic radiography, for general radiography, dental radiography and mammography, multiple filming is performed according to the examination area and the direction of filming. The HIRA categorizes examination names through code in consideration of multiple filming. We statistically processed the frequency data considering the weighting factor of the code. Table 2 shows examples of applying weighting factor.

Table 2: Examples of applying weighting factor

Code	Examination name	Weighting factor
G2101	Chest [direct] 1 shot	1
G2102	Chest [direct] 2 shots	2
G2103	Chest [direct] 3 shots	3
G2704	Breast 4 shots	4
G2705	Breast 5 shots or more	5

2.2 Establishment of classification system for domestic diagnostic radiography

We established classification system suitable for the domestic medical system to systematically analyze processed frequency data. We established classification system according to the examination area and the direction of filming based on the examination names of the HIRA, which uses the most specific and detailed examination name [2]. Table 3 shows examples of classification systems for general radiography and CT.

Table 3: Examples of classification systems for general radiography and CT

Radiography	Large category	Medium category	Subcategory
General radiography	Head	Head	Head AP
			Head LAT
			Head waters
		Maxilla	Maxilla AP
			Maxilla OBL
	Abdomen	Abdomen	Abdomen AP (Lying position)
			Abdomen AP (Standing position)
		KUB	KUB AP
Computed Tomography	Head	Head	
		Face or Skull base	
		PNS	
		Orbit	
	Neck	Neck	

2.3 Statistical analysis of diagnostic radiography frequency in Korea

We analyzed domestic frequency of diagnostic radiography according to the processed frequency data and classification system. In 2017, the total domestic frequency of diagnostic radiography was approximately 280 million. General radiography accounted for the highest percentage, 220 million (about 78%). And it was followed by 31 million (about 11%) of dental radiography, 19 million (about 7%) of mammography, 9 million (about 3%) of CT, 1.8 million (about 1%) of fluoroscopy and 0.38 million (about 0.1%) of angiography. Figure 1 shows domestic frequency of diagnostic radiography in 2017.

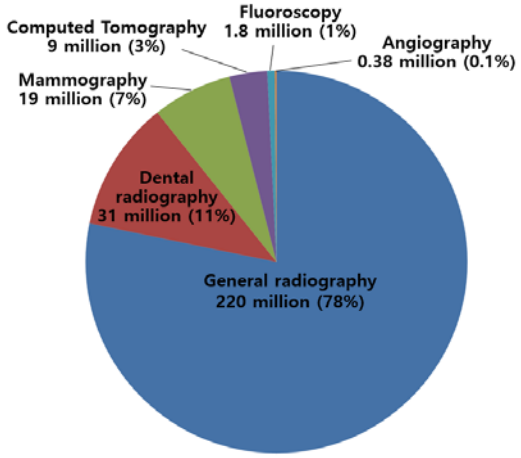

Fig. 1. Domestic frequency of diagnostic radiography

3. Conclusions

In this study, we investigated domestic frequency data of diagnostic radiography and established classification system. Additionally, we analyzed domestic frequency for diagnostic radiography according to the classification system.

In 2017, the total domestic frequency for diagnostic radiography was approximately 280 million. The frequency of diagnostic radiography was highest in the order of 220 million (about 78%) of general radiography, 31 million (about 11%) of dental radiography, 19 million (about 7%) of mammography, 9 million (about 3%) of CT, 1.8 million (about 1%) of fluoroscopy and 0.38 million (about 0.1%) of angiography.

This study results can be used for the analysis of domestic frequency for diagnostic radiography. In addition, if the medical radiation data is constructed by the methodology established in this study, it is expected to contribute to the establishment of regulations and policies for the safety management of domestic diagnostic radiography.

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