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### Radiology in South Korea

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#### Healthcare in South Korea

The Ministry for Health, Welfare and Family Affairs (MIHWFA) is responsible for the health of the population, and has a supervisory role in health insurance policy. Universal medical coverage is achieved through a mandated National Health Insurance programme introduced in 1977 and extended to the entire population by 1989. The National Health Insurance Corporation (NHIC), a public non-profit organization, is the single insurer. The NHIC is responsible for providing healthcare benefits to the population, collecting contributions and reimbursing providers on a fee-for-service basis.

The Health Insurance Review and Assessment Service (HIRA) reviews the cost of healthcare benefits and evaluates the reasonableness of healthcare services provided by medical institutions.

Only authorised healthcare professionals can provide health services. The majority of the financing is covered by the social insurance payments, government sources. About 21% are non-covered services, for which patients pay in full, mostly medical imaging fees, including ultrasound and partially for MRI. Most medical examinations and diagnostic procedures have predetermined fees, which consist of the patient share and the national share, with the patient share usually less than the national share. Most medical fees and surgical costs are affordable and, in some circumstances, the fees are limited according to the disease category. Most radiology examinations and procedures are covered by the National Health Insurance Program.

South Korea relies heavily on private sector providers, with approximately 90% of hospital beds being private. Most private medical facilities are located in urban areas, where 90% of physicians are and 80% of the population lives. Severe regional disparities exist in medical services.

Primary care services are provided through clinics, hospitals and general hospitals. Patients can choose their medical provider and visit primary and secondary hospitals without a referral. Patients must have referrals from primary and secondary hospitals or a primary care physician to be treated at tertiary hospitals. When patients are referred to tertiary medical institutions, hospital selection is unlimited, and there is practically no delay in scheduling a medical examination when a patient transfers from the primary or secondary healthcare institution to the tertiary healthcare institution.

Oriental medicine is another main component of healthcare in Korea. Some oriental medicine doctors use imaging tools including US, CT and MRI, which is becoming a problem for radiologists in Korea.

#### Medical Imaging

When patients visit the doctor, the orders for imaging examination are given out by the physicians. The performance of and billing for the imaging examination is traditionally carried out within the radiology department. Although performance and interpretation of imaging can be done by any registered physician, if the formal report is signed by a radiologist, an extra 10% fee is reimbursed. Therefore most of the CT and MRI interpretations are done by radiologists. However, for plain radiographs and ultrasound, non-radiologists are involved to a large extent. The fee for ultrasound is not covered by the mandatory National Health Insurance system, therefore the fee is not regulated by the government, and the fee is relatively expensive compared with other imaging modalities. A very competitive turf battle is going on for ultrasound in Korea between radiologists and non-radiologists, and even with technologists.

Approximately 70% of radiologists work at training hospitals such as university or general hospitals, and the proportion of private radiology practitioners is low, approximately 13% in 2007.

There are several public hospitals, consisting of less than 10% of all hospitals in Korea, governed by different ministries including the Ministry of Health & Welfare, Ministry of Education and Human Resources, Ministry of Government Administration and Home Affairs and local governments with attending radiologists.

Due to the shortage of radiologists in Korea, teleradiology has become widespread and commercially available since 2008. Unlike other countries where teleradiology mainly covers after-hours work, teleradiology in Korea is mainly used in general hospitals with a small number of radiologists in order to get reimbursement for the imaging studies already done. It is also used in instances when special studies are performed but subspecialty radiologists are not available in certain university hospitals. It is not widely used in the emergency radiology setting yet. Some teleradiology services also provide radiologists to do ultrasound. There is growing concern over the spread of teleradiologists within the radiology profession in Korea, because some of the hospitals prefer to save money by outsourcing radiology departments and not hiring radiologists.

## The Korean Society of Radiology

The Korean Society of Radiology (KSR) was founded in 1945, and the first meeting was held in Seoul in the same year. The KSR has been awarded as the 'best medical society in Korea' for three years in a row by the Korean Academy of Medical Sciences. Approximately 3700 members are registered, including over 3000 specialists and around 600 residents.

The KSR is headed by a President (Tae-Hwan Lim), Board of Councillors and Board of Directors. The KSR committees are for planning, scientific, Board examination, training, information & communication, international liaison, clinical practice guidelines, ethics, health policy and practice, health insurance, medicolegal affairs, public communication, accreditation, radiation safety and editor-in-chief.

Subspecialty groups in the KRS started as small group meetings during the 1980s, and expanded to include 10 subspecialty societies:

- Korean Society of Neuro radiology and Head and Neck Radiology ([www.ksnhnr.org](http://www.ksnhnr.org))
- Korean Society of Thoracic Radiology ([kstr.radiology.or.kr](http://kstr.radiology.or.kr))
- Korean Society of Abdominal Radiology ([ksar.radiology.or.kr](http://ksar.radiology.or.kr))
- Korean Society of Pediatric Radiology ([kspr.radiology.or.kr](http://kspr.radiology.or.kr))
- Korean Society of Urogenital Radiology ([ksur.radiology.or.kr](http://ksur.radiology.or.kr))
- Korean Society of Interventional Radiology ([intervention.or.kr](http://intervention.or.kr))
- Korean Society of Breast Imaging ([ksbi.radiology.or.kr](http://ksbi.radiology.or.kr))
- Korean Society of Cardiovascular Imaging ([kosci.co.kr](http://kosci.co.kr))
- Korean Society of Musculoskeletal Radiology ([ksms.co.kr](http://ksms.co.kr))
- Korean Society of Interventional Neuroradiology ([www.ksin.or.kr](http://www.ksin.or.kr)).

Each society holds monthly meetings to discuss interesting cases, twice-yearly imaging conferences for residents, and an annual academic convention and symposium. The Korean Society of Thoracic Radiology operates a weekly quiz site ([kstr.radiology.or.kr/weekly/index2.php](http://kstr.radiology.or.kr/weekly/index2.php)) open to radiologists and other physicians in Korea and internationally. There are currently approximately 30 participating countries, making this one of the world's more frequently accessed thoracic radiology sites.

The KSR holds an annual Congress of Radiology (KCR) in Seoul each October ([www.kcr4u.org](http://www.kcr4u.org)). KCR is the one of the biggest congresses in Asia, with more than 3,500 participants from around the world, invited guests of world renown and a large technical exhibition.

□  
KCR, image credit: Korean Society of Radiology

The Korean Spring Symposium of Radiology is held annually, and focuses on more practical matters concerning quality and safety in radiology, including guidelines, radiologic safety, legal aspects, clinical research methodology course, hybrid imaging, and policy making.

The KSR publishes two official journals. The Journal of the Korean Society of Radiology is a peer-reviewed monthly journal in Korean, with English abstracts (1964- <http://koreamed.org/JournalVolume.php?id=16>). The Korean Journal of Radiology (KJR) (2000-, <http://www.kjronline.org>) is a peer-reviewed bimonthly journal in English, which aims to produce and provide knowledge on radiologic imaging and related sciences. Both journals are equipped with online submission and peer review systems. A unique feature of the articles in the journal is their reflection of global trends in radiology combined with an East-Asian perspective. World-outstanding radiologists from many countries serve on the editorial board. The KJR is indexed/tracked/covered by MEDLINE, PubMed, PubMed Central, Science Citation Index Expanded (Impact Factor in 2012: 1.555), KoreaMed, Synapse, KoMCI, SCOPUS, Embase and Google Scholar.

Online learning materials for continuing education are available on the KSR website, including 1000 online lectures, 303 educative cases and self-assessment modules.

## International Outreach

KSR has a Speakers Exchange programme for KCR to fortify its status as an international congress. Awarded posters selected during the KCR are exchanged with other society's awarded posters at the annual congress.

Recently the KSR has devoted time and efforts to increase communication with other Asian Radiological Societies. With help from subspecialty and hosting societies, KSR has held Friendship symposia with many Asian radiologic societies with speakers from both societies, including Indonesia in 2012 and Thailand, India and Taiwan in 2013.

KSR actively collaborates with other societies to synergistically enhance the journals of the two societies. Activities range from advertising journals to counterpart society members, mutual exchange of advertisements about counterpart scientific programmes, exchange of reviewers and introducing excellent papers from the counterpart.

KSR provides an international membership programme with free membership dues. International members have free access to the Korean Journal of Radiology (KJR) KSR website and the KSR E-learning system. International members get a discount on the KCR registration fee and prior consideration in KSR fellowship.

The Society officially invites candidates from Asian countries to apply for the KSR Fellowship programme to promote research by specialists in radiology, to train them in Korean academic institutions and to contribute to the distribution and improvement of radiology, encouraging mutual understanding as well as scientific cooperation.

Presentations given internationally by members of the KRS have increased (192 scientific presentations at the 2007 annual meeting of the Radiological Society of North America (RSNA), the fourth largest number among all presenting countries), and Korean publications in the major international academic journals also continue to grow. For example, in the AJR, Korea is ranked as the third country in the number of articles submitted. In addition, there are increased efforts by Korea to host international academic meetings. Through these activities, efforts to improve the international awareness of KRS members and to promote international collaboration are continually being made.

## Quality Management

Image quality control has become an important issue, due to the increase in the various types of imaging instruments during the past several years. For that reason the Korean Institute for Accreditation of Medical Imaging (KIAMI) was established in 2004 under the Ministry of Health and Welfare to assure image quality management for mammography, CT, and MRI. In addition, practice guidelines and technical standards have been announced by each subspecialty to acquire images that meet established levels of quality. The image quality management has expanded to other modalities including ultrasound, PET CT, fluoroscopy, C-arm etc. this year.

## Women Radiologists

The increase in the number of women radiologists corresponds to the continuing social changes in Korean society and to the overall changes in the medical community. Although women physicians formerly composed 20% of the general medical population, the current proportion of women undergraduate students in Korean medical colleges is as high as one third. In the case of radiologists, the proportion of women doctors is higher compared with other subspecialties, and since 2005 newly certified women radiologists in Korea outnumbered newly certified male radiologists. Therefore, the future role of women physicians is expected to increase in importance.

## Education and Training

Medical school consists of the traditional six year undergraduate system or the recently introduced four-year graduate-level professional school system. After medical school one must pass the national examination for physicians, complete one year of internship and four years of radiology resident training. Currently around 81 hospitals train radiology residents. A physics educational course held for residents annually is a requisite for taking the board examination at the end of the resident training. All residents have to take the 'Resident evaluating examination', a written examination similar to the format of the board examination every spring. After training, residents are qualified to apply for the specialty board examination. After becoming board-certified, a radiologist may pursue one or more years of subspecialty fellowship training. Although fellowship training is optional, the number of general radiologists who pursue subspecialty fellowship training is gradually increasing. However, there is no radiology subspecialist board examination system in Korea. Those who wish to follow an academic career mostly go through fellowship. For general radiologists, fellowship training is not necessary. One exception is the Korean Society of Interventional Neuroradiology, which has an open policy to other board members including neurosurgeons.

## Job Market

There is a shortage of all physicians in Korea including radiologists and interventional radiologists. As of 2012, Korea had 2.1 doctors per population of 1,000, which is below the OECD average of 3.2.

Most Korean radiologists stay and work in the country, while a few emigrate overseas. From 1950 to 1970, many Korean physicians emigrated. As the number of Korean physicians studying radiology in the United States increased, the Korean Radiological Society of North America (KRSNA) was formed to inspire friendship and collaboration among Korean radiologists and to help transfer advanced medical practices to Korea. However, opportunities for Koreans to receive resident training in the United States decreased after 1970, and as the Korean political and economic situations began to significantly improve, the number of emigrating Korean physicians also decreased. Currently, there are few radiology residents or fellows who choose to train in the United States, although many Korean radiologists working at Korean university hospitals still visit overseas radiology institutes.

Most radiologists in Korea serve in academic radiology departments, which are well structured, but suffer from a shortage of radiologists due to wide discrepancy of the salary between academic radiologists and private hospitals. Academic radiology is not well funded in Korea at this moment.

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## Statistics

Total population 49,003,000  
Gross national income per capita (PPP international \$)30,370  
Life expectancy at birth m/f (years) 77/84  
Total expenditure on health per capita (Intl \$, 2011)2,181  
Total expenditure on health as % of GDP (2011) 7.2

Figures are for 2009 unless indicated

Source: [World Health Organization Global Health Observatory](#)

MRI units per million population 23.5  
CT scanners per million population 37.1  
MRI exams per thousand population 19.6  
CT exams per thousand population 129.3

Figures are for 2012.

Source: [OECD Health Data 2013](#)

