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An Analysis of the American Radiology Accreditation Process and Curriculum for the Revision of the Korean Radiology Curriculum

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Abstract

The accreditation process is the basis for opening higher education institutions in the United States and other countries. Higher education institutions must be accredited to support student learning through a high-quality curriculum. In this paper, the Western Association of Schools and Colleges, a regional accreditor, and the Joint Review Committee on Education in Radiologic Technology, a specialized accreditor, were compared to explore the accreditation process of the United States. Following this is an analysis of the radiology program curriculaof the United States and the Republic of Korea. Finally, a reform of Korea's radiology curriculum was proposed.

Keywords: accreditation process, radiology program, education curriculum, United States of America, Republic of Korea

Introduction

The use of X-rays in the Republic of Korea began 18 years after Wilhelm Conard Roentgen's discovery of them in 1895[1-2]. Yonsei University Severance Hospital, which is located in Seoul, installed South Korea'sfirst X-ray producer for diagnostic purposes in 1913.In 1945, radiologic technologists and physicians collaborated and established the Korean Radiological Technologists Association [2]. In 1956, this association published the first radiology journal in South Korea. The country's first medical radiography school was established almost a decade later in 1963 by the Seoul Medical School & Medical Technology College [3]. Two years after that, the Korean Radiological Technologists Association implemented the country'sfirst radiology board certification. A total of 422 students passed the board certification exam in the first year and became radiologic technologists[4]. The fortieth board certification exam was administered in 2014.

Korea's history is highly influenced by Japan. Japan ruled South and North Korea from 1876 to 1945. During this time, new technology was imported into Korea through Japan and contributed to the advancement of science and technology in Korea [5]. Following South Korea's first X-ray installation in 1913, Japanese physicians, Korean physicians, and Korean radiologic technologists established the Cho-Sun Roentgen Association in 1932 [2]. Academic and technological exchange between Japan and Korea continued until Korea's liberation.

Korea was liberated from Japan following the end of World War II. However, its radiology curriculum and related laws were still heavily influenced by Japan.Through these changes in education, a foothold to advance internationally should be prepared in the radiology field. Therefore, in this paper, a revision of the Korean radiology curriculum was proposed by examining the radiology accreditation process and radiology curriculum of the United States.

Materials and Methods

Accreditation of Radiology Programs in the United States

Ⅰ. Basis for Accreditation of Higher Education

The United States Department of Education and the Council for Higher Education Accreditation (CHEA) provide guidelines for accreditation organizations dedicated to higher education in the United States. American accreditation organizations can be categorized into four types: regional accreditors, national faith-related accreditors, national career-related accreditors, and programmatic accreditors [6]. The two most common types are regional and national.

II. National Versus Regional Accreditation

Both regional and national accreditation organizations accredit institutions to ensure program quality. Regional accreditation organizations are divided into six regions, and each has its own procedures for performing accreditations [7]. This type of organization accredits non-governmental agencies, and regional accreditors work voluntarily. On the other hand, national accreditation organizations accredit specialized institutions, vocational education institutions, non-traditional institutions, non-profit educational institutions, and proprietary institutions [7].

The main difference between nationallyand regionally accredited institutions is that those that are nationally accredited accept academic credits from both types of institutions, whereas some regionally accredited institutions do not [8]. In addition, regionally accredited institutions usually have the more expensive tuition of the two, but they also tend to have a better academic reputation.

III. Benefits of Accreditation

The purpose of accreditation is to demonstrate the academic quality of a program. A CHEA report lists three benefits of accreditation: First, students and the public are made aware of the quality of the education program and that it has met the standards for accreditation, such as having a good curriculum, student services, and libraries [6]. Second, institutions can access federal and state funds when they get accredited [9-10]. Third, students attending accredited institutions can also receive financial aid from the state government for their tuition. Thus far, the federal government has distributed an estimated $169 million in financial aid to students attending accredited institutions.

IV. Accreditation in the United States Versus Other Countries

The main difference between the accreditation process of the United States and that of other countries is that the United States does not have a centralized system [11].Only in the United States and Australia is education the responsibility of the state [11]. Each state has its own rules and is responsible for the credentialing and accreditation of both the instructor and the program, respectively. In contrast, other countries such as Japan, Hong Kong, Korea, and Singapore have centralized systems, meaning most of their education, certification, and accreditation processes are the responsibility of one government agency.

V. Standards of the Western Association of Schools and Colleges

The United States has six active regional accreditation organizations, and one of them is the Western Association of Schools and Colleges (WASC). WASC accreditation demonstrates a school's ability, dedication, and competence to support student learning through a continuous improvement of its education [12]. WASC accreditors discussed their accreditation process during anopen forum at the California State University of Fresno. There are four WASC standards for accreditation:

1. Defining institutional purposes and ensuring educational objectives
2. Achieving educational objectives through core functions
3. Developing and applying resources and organizational structures to ensure sustainability
4. Creating an organization committed to learning and improvement

(UCLA WASC Standards for Accreditation)

These standards for accreditation reveal the primary criteria of the accreditation process. A school or program must have certain educational objectives and institutional purposes to improve and maintain its organizational structure and must follow these standards during the accreditation process.

VI. WASC's Review Cycle

Ongoing accreditation processes evaluate schools for a set period to measure their

improvement. WASC's ongoing review cycle is processed every 6 years to report progress to management agencies and stakeholders, update student/community profiles, and modify school-level action plans as needed[12]. Each year, the school must take action to update its progress and provide its students with a high-quality education (see Figure 1 fortheWASC accreditation status timeline).

After the school completes a self-study, the 6-year accreditation process isinitiated. As illustrated in Figure 1, a probation report and a site visit take place each year to refine the schoolwide action plan [12]. In the third year of the accreditation process, the mid-cycle report begins and the accreditation department visits the school. After a few more visits from the accreditors, the school completesa self-study and ensures the refinement of schoolwide action.

VII. Specialized Accreditation: Joint Review Committee on Education in Radiologic Technology

Ten years after WASC was established to take responsibility for the accreditation of schools in the United States in 1961, the Joint Review Committee on Education in Radiologic Technology (JRCERT) was established to evaluate education programsinthe radiologic sciences [15]. JRCERT accreditation focuses on radiologic science majors and on improving education levels.

JRCERT states,"The United States Department of Education (USDE) and CHEA are the only institutions that have recognized the certification of traditional and remote delivery education programs in the fields of radiography, radiation therapy, magnetic resonance and medical dosimetry" [13].JRCERT is in charge of evaluating and accrediting the programs for all imaging modalities, and it published the "Standards for an Accredited Educational Program in Radiography" to set the guidelines that radiography schoolsmust follow as accredited institutions[14].

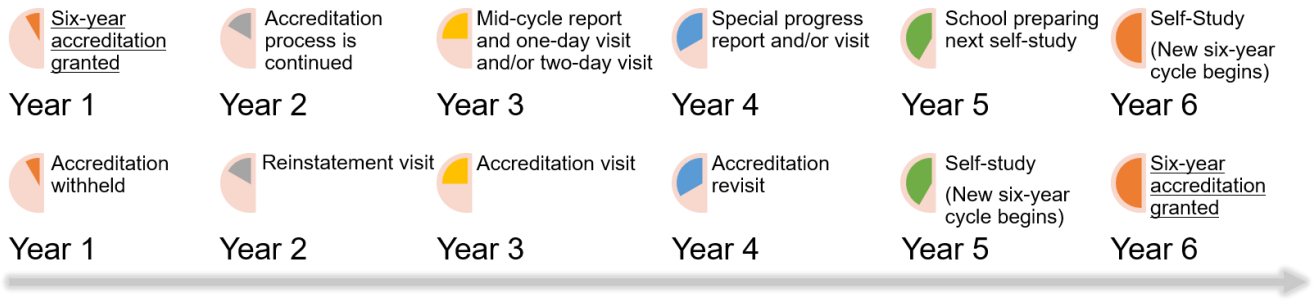

Figure 1. Accrediting Commission for Schools, WASC Accreditation Status Timeline

VIII. Assessing Outcomes in an Institution

WASC made the "Guide to Evaluating Institutions" to measure the quality of education, and it is used in various forms to perform an evaluation [16]. The following are basic questions designed to measure the quality of an institution's education. Honest answers give institutionsthe chance to improve the quality of their education for their students:

1. Do these procedures lead to an assessment of quality and improvement?
2. Are student learning outcomes and assessments established for each course?
3. What improvement to the courses has occurred as a result of evaluation?
4. How are competency levels and measurable student learning outcomes determined?
5. What assessment of student learning styles has the school performed?
6. Do courses include multiple ways of assessing student learning?
7. How does the college evaluate the effectiveness of its courses?
8. What types of data are available for program evaluation?

(Guide to Evaluating Institutions, 2012)

IX. Level of Outcome Assessment

Outcome assessment can be divided into multiple levels. The Excellence in Assessment Association developed the "Campus-Level Assessment of Student Learning Outcomes,"which builds up from the specific faculty assessment of the courselevel to the program, college, and campuslevel[17]. These levels of outcome assessment are designed to serve as indicators for the depth and breadth of student learning occurring on campus, andthey help institutionsassess their outcomes step by step.

Results

America's radiology curriculum differs from South Korea's. In the United States, for example, students take prerequisite coursesand maintain a 3.0 GPA or above to apply to a radiologyprogram. Prerequisite coursesinclude human biology, anatomy, physiology, medical terminology, and general education courses. After being accepted into a program, students must take 25 different core coursesover 2 years and earn grades higher thana C in radiologic science and patient carecourses in order to pass. While in the program, students must fulfill 1,600 clinical hours over 2 years. Students are also tested on their competence in 31 different mandatory procedures and must test their competence in 15 of the 35 elective procedures. According to the "Radiography Didactic and Clinical Competency Requirements" handout from the American Registry of Radiologic Technologists, these competence tests include requisition evaluation, patient assessment, room preparation, patient management, equipment operation, technique selection, positioning skills, radiation safety, image processing, and image evaluation [19].Finally, students take the radiology board certification exam and get their license from the American Registry of Radiologic Technologists. After graduating from a program, students can apply to specialties, which include CT, MRI, radiation therapy, nuclear medicine, interventional radiology, mammography, and medical sonography. Each program has a separate board certification exam, and students can get licenses in different specialties. After students get their license, they can start working immediately as radiologic technologists or in any other modalities.

In comparison, to enter a radiologyprogram in the Republic of Korea, there are no prerequisites coursesto take. After taking the Korean SAT, students can apply to a program of their choice. After entering a radiology program, students take general educationcourses, including science and math courses, for the first 1 to 2 years depending on the school. In their second or third year, students take radiologic science and patient care coursesand, at the same time, coursesinCT, MRI, radiation therapy, nuclear medicine, interventional radiology, mammography, and medical sonography. During summer or winter vacation, students can apply to a hospital to gain clinicalpractice for a month. After 4 years in a program, students can take the board certification exam. In addition, students take a performance test to demonstrate their procedure skills on the same day as the written test. After gettingtheir license from the Korean Radiological Technologists Association, students complete an internship at a hospital until they get hired as radiologic technologists.

Discussion

There is a movement not only in developed countries but also in developing countries to improve healthcare services. The elderly population is increasing, and at the same time, the rate of illness isincreasing globally. Consequently, the demand for quality healthcare and radiology services will continue to rise. Medical imaging could make specialized, individual-focused diagnoses that lead to the effective and rapid treatment of patients in the hospital [20].Diagnostic imaging systemsprovideevidence for healthcare providersand help them choose the best medication and treatment without presumption. Therefore, diagnostic imaging systems and devices are increasingly being createdin developing countries to save patients'lives and provide quality care to patients.

Of the top 10 countries affiliated with the Organization for Economic Co-operation and Development, Japan has 40 MRI units per million population,the United States has 25 per million population, and South Korea has 12 [20]. In addition, Japan has 90 CT scanners per million population,and both the United States and South Korea have 30 [20].Compared to the United States and South Korea,Japan has significantly invested in imaging equipment. Even though South Korea was a little

late in possessing medical imaging equipment, South Korean technologyshould soonadvance at an alarming rate.

Following these global changes, the radiology curriculumin Korea needs change. First, the single license system should be subdivided into specialized radiation medical technology and recognized by law. Second, because Korea's radiology programs lack clinical practice, students must practice for more than 1 year in the field after graduation. In the United States, about 40 times more clinical practice hours are allocated to educating students. This enhances students' understanding of theory courses, but it can also be said that the qualifications of a professional radiologic technologist are met upon graduation and obtaining their license. Third, it is necessary to expand the scope of work of radiologic technologists through the expansion of school accreditation procedures and revision of the curriculum. -

Finally, in American radiological training courses, intravenous theory, intravenous practice, and the injection of contrast medium are taught and conducted during clinical practice. However, in Korea, the curriculum is not prepared, and the practice of injecting contrast medium is restricted by law.

Conclusion

In brief, there are several differences between the radiology accreditation process and radiology curriculum of the United States and those of South Korea. Regarding programs, American radiology programs are only for X-ray licenses and include both prerequisite and general education courses, and students take their performance test during clinical practice. To get other specialty licenses, American students must enter that program and get a separate specialized license. Unlike American radiology programs, Korean radiology programs do not include prerequisite courses, and specialties can be completed in 3 to 4 hours during the program. In addition, students receive a comprehensive radiography license after graduation, meaning if Korean students pass the board certification exam, they are licensed for all imaging modalities. Lastly, American students can work right away after getting their license, whereas Korean students need to perform an internship in a hospital until they get hired.

Regarding the accreditation process, in the United States, radiology schools must be accredited through WASC and JRCERT to prove that they offer a high-quality curriculum. Additionally, in the United States, it is mandatory to revise the curriculum for specialized radiologic technologists. In line with this trend, the Korean radiology curriculum needs to be revised. First, the single license system should be subdivided into specialized radiation medical technology so that students could learn about specialized technology in radiology. Second, Korea's clinical practice hours, which differ by more than 40 times, should be adjusted to increase students' understanding of theory courses.Finally, it is necessary to expand the scope of radiologic technologists'work through curriculum reform. It is believed that through a radiology curriculumreformKorean students willbe able to become specialized radiologic technologists in line with globalization, and the status of radiologic technologists working in Korea will increase.

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