

Development of a model of rehabilitation exercise and sports service delivery system for health promotion of people with disabilities

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People with disabilities (PWD) suffer from chronic diseases and other problems due to their low physical activity compared to people without disabilities. Physical activity and exercise can prevent chronic diseases and improve health management. However, PWD do not receive proper rehabilitation exercise and sports services immediately after discharge from hospitals. An effective model of rehabilitation exercise and sports service delivery system has not been established in Korea. This study aimed to present such a model for health promotion, which enables PWD to participate in exercise regularly in local communities. The model is presented by dividing it into sides of consumers and suppliers by

analyzing domestic and foreign rehabilitation and sports service systems and expert meetings. The system presented in this study can help promote returning to normal social life and transition into sports in daily life for PWD. In addition, it is expected to positively affect local communities through training instructors in rehabilitation exercise and sports; it can serve as a bridge between rehabilitation in medical institutes and sports in daily life.

Keywords: Rehabilitation, Sports, Service delivery system, Disabilities, Physical activity

INTRODUCTION

Based on the Act on Welfare of Persons with Disabilities in Korea, individuals with disabilities are registered into 15 types of disabilities (Kim et al., 2014; Kim, 2019). As a result of examining the change in the number of people with disabilities (PWD) in Korea from 2015 to 2021 announced by Statistics Korea, the number of PWD was 2,490,406 in 2015, 2,585,876 in 2018, and 2,644,700 in 2021, respectively, showing a continuous increase every year (Statistics Korea, 2022). PWD has a variety of health problems, and the prevalence of chronic disease is higher than those without disabilities (Bahk et al., 2019). In addition, it is reported that PWD are more likely to suffer from diseases such

as diabetes and cancer than those without disabilities (Centers for Disease Control and Prevention, 2020a). The high prevalence of chronic diseases among PWD worsens their quality of life (QoL) (Shin and Lee, 2021), and they have a higher mortality rate than those without disabilities (Majer et al., 2011). Therefore, managing health and preventing chronic diseases are essential for PWD.

HEALTH MANAGEMENT AND PREVENTION OF CHRONIC DISEASES FOR PWD

Chronic diseases could be prevented through regular physical activities and exercises, positively affecting the maintenance and improvement of physical functions of PWD. In particular, it is

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known that exercise can lower the prevalence of chronic diseases such as obesity, diabetes, and hypertension, commonly experienced by PWD, and is very effective in preventing such diseases (Tsai and Chiu, 2019; Van Schijndel-Speet et al., 2017; Wu et al., 2017). Regular physical activity and participation in exercise are known to positively affect the body composition, including cardiopulmonary and muscle function, of PWD (Bouzas et al., 2019); they also improve motor function and increase the range of motion of the upper and lower extremities (Hosseini et al., 2019). As such, participation in physical activity and exercise not only has universal benefits for health but is also a very important factor in managing and preventing secondary psychological conditions, including anxiety, depression, and sleep disorders (Durstine et al., 2000; Van der Ploeg et al., 2004). In addition, regular exercise is effective in alleviating pain according to the characteristics of disabilities and is known to positively affect health-related QoL (Nightingale et al., 2018; Wilbanks et al., 2016). Therefore, regular physical activity and exercise are essential for PWD for health management and prevention of chronic diseases, and continuous participation is necessary to improve psychological conditions and QoL.

CURRENT STATUS OF PHYSICAL ACTIVITY AND REHABILITATION EXERCISE FOR PWD IN KOREA

According to a survey on sports in daily life for PWD in 2020 in Korea, the participation rate in sports and physical activity of PWD increased every year from 4.4% in 2006 to 24.2% in 2020, but the rate is very low compared to people without disabilities (60.1%), indicating a large gap. The rate of sports and physical activity participation clarifies that PWD are restricted from participating in physical activities due to various issues such as limited programs, inexperienced leaders of basic competencies and training skills, and the lack of leadership and expertise of leaders, sports facilities, convenient facilities and advertisement, and basic knowledge and information for PWD (Oh and So, 2022). In addition, the gap in physical activity participation rate occurred because PWD did not know where, under whose instruction, and what kind of exercise they needed to perform by understanding their physical function in the early stage of disability after getting discharged from hospitals. For this reason, PWD with low participation in physical activity after getting discharged from hospitals lose various improvements from hospital treatment due to the increase in sedentary lifestyle, and their risk of secondary problems increases (Rimmer and Lai, 2017). As such, although health man-

agement is important for PWD, it is hard for them to participate in exercises suitable for their characteristics and functional levels due to the absence of a specialized rehabilitation and sports service system accessed after getting discharged from hospitals. Therefore, it is necessary to establish a systemic and effective service delivery system for PWD to allow them to participate in rehabilitation exercises and sports in local communities. It is also essential to distribute these rehabilitation and sports services so that PWD can participate in exercise regularly in local communities.

NECESSITY OF DEVELOPING A REHABILITATION EXERCISE AND SPORTS SERVICE DELIVERY SYSTEM FOR PWD

Rehabilitation exercise and sports services for PWD are provided in many countries such as Germany, the United States (US), and Japan. Such services are known to be effective in helping PWD to return to normal social life, reduce pain, and improve health (Bethge et al., 2019; Brzoska et al., 2010; van Middelkoop et al., 2011). Because of these positive effects, efforts are being made to establish a rehabilitation exercise and sports system in Korea. According to the report by the National Rehabilitation Center Research Institute (2018), rehabilitation exercises and sports in Korea are defined as follows:

Physical activities to improve the physical, social, and mental abilities of persons with disabilities or those who are likely to be diagnosed with having a disability within a certain period due to difficulties in recovery from damages or diseases with various causes, and to include planned physical activities by considering the level and characteristics of disabilities to realize values such as improvement of health, prevention of secondary problems caused by disabilities, and participation and integration into local communities through improvement of health and motivating regular physical activity (National Rehabilitation Center Research Institute, 2018).

In other words, rehabilitation exercises and sports are physical activities performed in all stages of medical rehabilitation, from providing services based on a doctor's prescription, targeting PWD who need medical management after getting discharged, to sports in daily life. Intervention immediately after getting discharged is very important for these services; in particular, rehabilitation exercise and sports is a necessary step for PWD due to the positive effects including recovery and improvement of physical functions and improving secondary problems caused by disabilities (Rimmer and Lai, 2017). As such, rehabilitation exercises and sports

are essential areas for returning to the normal life, from the stage of medical rehabilitation in hospitals to the stage of sports in daily life. In addition, rehabilitation exercise and sports bridge the gap between rehabilitation treatment in hospitals and sports in everyday life. Establishing a systematic and effective service delivery system is necessary to increase PWD's participation in sports in local communities for rehabilitation treatment and return to normal social life after getting discharged from a medical institution.

However, a systematic and effective rehabilitation exercise and sports service delivery system has not been established in Korea; therefore, this system should be developed to help PWD return to normal social life and promote their health. Therefore, by examining various domestic and foreign cases, we aimed to develop a model of the rehabilitation exercise and sports service delivery system for PWD and suggest concrete ways to implement rehabilitation exercise and sports services.

ANALYSIS OF REHABILITATION EXERCISE AND PHYSICAL EDUCATION SERVICES FOR PWD IN KOREA AND OTHER COUNTRIES

Analysis of rehabilitation exercise and physical education service for PWD in Korea

Currently, there are three types of rehabilitation exercise and sports service delivery systems in Korea: vouchers (Ministry of Health and Welfare, 2022), vouchers and the Ministry of Culture, Sports and Tourism support model (Korea Paralympic Committee, 2014), and payment by the National Health Insurance Corporation (NHIC) (National Health Insurance Service, 2020).

First, in the rehabilitation exercise and sports service in the form of a voucher, the users receive a request from their hospital doctors on whether to use the rehabilitation exercise and sports voucher service, and applies for a rehabilitation exercise and sports voucher to the local community center and gets approval if they are eligible for the service. They can use the voucher when using programs at service providers certified by the Korea Disabled People's Development Institute. However, this voucher-type rehabilitation exercise and sports service have a disadvantage in that it has a lengthy preparation process since it takes a lot of manpower and physical time for the user to obtain a referral from a hospital. Second, through vouchers and the Ministry of Culture, Sports and Tourism support model, users of rehabilitation exercises and sports services can use the services through institutions certified by the Korea Disabled People's Development Institute. This system dis-

patches and educates leaders belonging to the city, county, and gu sports associations for PWD. This service is advantageous because of the collaboration between the Ministry of Health and Welfare (MHW) and the Ministry of Culture, Sports and Tourism; however, it also has a high probability of failure if collaboration is not smooth or the budget from both is not well supported. In addition, sports instructors for PWD who belong to the city, county, and *gu* sports associations for PWD may lack experience with people with moderate disabilities who would be the main users of the services. Third, rehabilitation exercise and sports service users receive a referral from a hospital doctor, and the hospital receives the prescription fee from the NHIC. The users receive the service from a rehabilitation and sports provider with the issued referral letter, and the NHIC pays the cost. The disadvantage of this model is that even if a service user receives a request from a hospital and the NHIC pays for the request, asking the Korean Medical Association training to educate doctors how to write prescription for the rehabilitation exercise and sports service might be a barrier for this service system if there is a gap of the direction in business between Korean Medical Association and MHW in the future, which is a risk of increased dependence on hospitals. Moreover, there is a risk of increased dependence on hospitals. In addition, in the current absence of evidence that the Korea Disabled People's Development Institute can run the rehabilitation exercise and sports services, it is necessary to establish an institution dedicated to rehabilitation exercise and sports, which can take the place of the institute.

Analysis of rehabilitation exercises and sports services for PWD in Germany

In Germany, rehabilitation exercise has been legally authorized as a medical treatment for PWD since 1956. A distinctive feature of the German rehabilitation sports program is that it must be done in a group form, not individually. In addition, the rehabilitation sports programs focus on what the person can do rather than a directive treatment. Rehabilitation sports are implemented not only for PWD but also for those at risk of disability, as well as those who are predicted to have a disability according to the doctor's diagnosis based on the International Classification of Functioning, Disability, and Health (Geidl et al., 2014).

There are various service-providing institutes because the rehabilitation exercises implemented in Germany are applied to PWD and people at risk or who are predicted to have disabilities. Subsequently, official national approval is required to provide rehabilitation sports in Germany. The National Paralympic Committee

Germany can give approvals under the standards of the Framework Agreement on Rehabilitation and Sports (National Paralympic Committee Germany, 2022a). The Deutscher Behindertensportverband (DBS) oversees rehabilitation sports of state governments in Germany and provides only guidelines. In addition, related institutions in each state are entrusted, and each state selects clubs with facilities and professional leaders under the law to approve the rehabilitation sports club. The rehabilitation sports clubs have established a program by professional leaders and provide rehabilitation sports to people with prescriptions. In addition, states play major roles in training professional leaders, issuing certificates, and accrediting institutions. Rehabilitation sports are conducted at a rehabilitation sports club near the residence, in an easily accessible place, where programs suitable for the type of disability are provided based on a prescription. Rehabilitation sports instructors are trained according to the DBS curriculum or the general guidelines for training by the German Olympic Sports Confederation (DOSB). Training courses for the rehabilitation sports leader of the DBS are as follows (National Paralympic Committee Germany, 2022b). Rehabilitation and sports instructors work with six areas of disabilities, including orthopedic internal, sensory, neurological, developmental, and mental disorders, and must complete 180 hr of training, including basic courses. The certificate is valid for 4 years and must be renewed with 15 hr of continuing education before it expires. In addition, those with master's degrees in rehabilitation sports from departments of special physical education only need to complete the basic course "BLOCK 10" and do not need to complete any other courses. In addition, those who have obtained a special education qualification only need to complete "BLOCK 10" and "BLOCK 40" and do not need to complete any other courses. Those with master's in physical education and physical therapy must complete all courses, including a course on training rehabilitation sports instructors. In other words, leaders with similar qualifications related to rehabilitation sports can take the exam based on the approval standard for the curriculum of rehabilitation sports. Such standards are different depending on the qualifications acquired, and unlike special physical education and rehabilitation sports, physical education departments and physical therapists must complete all courses assuming that they need a basic understanding of disabilities.

In Germany, the time of program is flexible depending on the disease. In Korea, the service should be divided into the case of disabled people who need to provide long-term services by identifying the characteristics of the disease and the case of disabled people who need to provide short-term services. In Korea, it is neces-

sary to provide services in connection with special education, physical therapy, and rehabilitation therapy, and to find ways to provide rehabilitation sports specialist education and put into the field for those who have already acquired related qualifications.

Analysis of rehabilitation exercises and sports services for PWD in the United States

The Center for Disease Control and Prevention provides guidelines for physical activity and activities to maintain health for PWD (Centers for Disease Control and Prevention, 2020b). Rehabilitation sports in the US is provided not by the government but by communities; for example, hospitals, community welfare facilities, nonprofit organizations (Young Men's Christian Association [YMCA], Young Women's Christian Association [YWCA]), commercial health clubs, and universities or hospitals in each region develop and implement their exercise programs, which is because the US health care system highly depends on the private sector.

The Rehabilitation Services Administration in the US provides rehabilitation and other services for PWD to support independence and community integration. In particular, long-term and short-term rehabilitation training is supported as an educational program for PWD. Accordingly, rehabilitation and sports providers are health promotion clubs and university sports centers in communities or public institutions—the stage before going to community sports centers from institutions such as hospitals and rehabilitation centers. In the US, the American College of Sports Medicine and the National Center on Health, Physical Activity and Disability produce certified inclusive fitness trainers. In addition, special physical education teachers are produced by special physical education departments at various universities. To become certified inclusive fitness trainers, they must pass the exam conducted by Pearson Virtual University Education with the health and fitness certification provided by National Commission for Certifying Agencies and the cardiopulmonary resuscitation and automated external defibrillator certifications. The certified special population specialist, whose degree is awarded by the National Strength and Conditioning Association, can acquire other National Strength and Conditioning Association certifications; this process is only for those with a bachelor's degree or higher or senior students from accredited universities. Achieving certified special population specialist requires having these certifications or at least a bachelor's degree in relevant majors such as exercise science, physical therapy, chiropractic medicine, and cardiopulmonary resuscitation and automated external defibrillator certificates. The curriculum requires a minimum of 250 hours of experience, and an exam by

Pearson Virtual University Education must be passed.

In the case of the US, rehabilitation and sports programs are conducted by state. Because the policy and financial status are different for each state, in Korea, it is more appropriate to open a government-led service and manage each local government's institutions rather than proceeding by local government. By sharing information on rehabilitation sports programs in other countries and receiving education using institutions such as YMCA or YWCA, it is believed that it can help develop programs suitable for the situation in Korea by studying and researching the US system that already provides rehabilitation sports services. Special physical education departments at various graduate schools should train special physical education teachers and apply a system that utilizes them to Korea to find ways to utilize experts who are already in place. A system that passes basic qualifications like the US is needed to understand and prepare for the special situation of rehabilitation sports.

Analysis of rehabilitation exercises and sports Services for PWD in Japan

Rehabilitation exercises in Japan are provided not only for PWD but also for the elderly, people with low physical strength and problems in physical functions. The rehabilitation sports program in Japan are based on the Sports Promotion Act, and depending on the location where physical activity is conducted, it is divided into four areas: competitive sports, lifelong sports, school sports, and rehabilitation sports for people with reduced physical functions such as PWD and the elderly. Rehabilitation exercises in Japan started at the National Rehabilitation Hospital; thus, it seems that a lot of medical parts have been added, and the main focus is on lifelong sports, making the definition broad. However, it is clearly stated that rehabilitation sports are different from physical therapy and lifelong sports. Rehabilitation exercise providers in Japan are mainly sports centers for PWD. Rehabilitation exercises are provided at the National Rehabilitation Center for PWD, which the state and local governments fund, and sports facilities with professional instructors that are commissioned by local governments; they receive operating expenses or are operated with a small amount of payment from users. In addition, rehabilitation sports are conducted in various institutions such as facilities for the elderly, health promotion-related facilities, sports associations for PWD, and public health centers. As such, the institution, which provides rehabilitation sports, is present in all organizations that provide sports and exercise, but the provider's standards are determined according to the placement of rehabilitation sports experts. In Japan, there is

no national qualification system for rehabilitation sports experts. However, a 2-year training program at the National Center for Rehabilitation for the Disabled, a public institution, and is a state-recognized rehabilitation sports expert such as physical therapists and nurses. At the National Rehabilitation Center for PWD, 20 people each year complete 780 hr of the basic course and 1,605 hr of specialized course for 2 years; then, they become experts in rehabilitation sports.

In Japan, rehabilitation and sports leaders are the main players, planning life and nutrition guidance along with training of PWD, and conducting exercise programs suitable for each person, so the service is carried out with expertise and overall management. In the case of Korea, as well as rehabilitation exercises, if nutrition and life guidance are provided together, not only will the satisfaction of the disabled be high, but it will also be of great help to the health of the disabled. In Japan, rehabilitation for the disabled is conducted under the leadership of the central administration, and there is a National Rehabilitation Center for PWD that is operated by the state, so more efficient rehabilitation and sports for PWD can be achieved. It is raised that Korea needs a national rehabilitation and sports center for PWD as in Japan. Japan has a systematic training course for rehabilitation sports professionals, although there is no national qualification, it has a rehabilitation sports instructor certificate issued by the Japan Sports Association for PWD, which is very difficult to qualify. The qualification of rehabilitation sports instructor can be obtained through two routes: in the case of seniors, the field work experience is at least 5 years, or in the National Rehabilitation Center, the graduate school course of 2 years must be completed, and the course of the National Rehabilitation Center (2 years) must be completed for 2,385 hr. Compared to Korean exercises instructors for PWD, Japan has a very long education time, and the contents of education are very systematic and professional. Japan can provide more accurate and in-depth education by conducting deep learning by disability. In Korea, it is necessary to establish a professional curriculum to effectively perform rehabilitation physical education activities for the disabled. If the rehabilitation physical education support center for PWD is established and professional education and rehabilitation physical education for PWD can be done here, more professional rehabilitation physical education activities for PWD will be possible. In Japan, PWD who want to participate in exercise for all can receive rehabilitation exercise almost free of charge when they go to exercise facilities for PWD with rehabilitation exercise experts. In Korea, it is necessary to establish a rehabilitation exercise support center for PWD, which is an inte-

grated institution that can receive rehabilitation exercises at any time if the disabled want and receive guidance on rehabilitation exercise.

DEVELOPMENT OF A MODEL OF REHABILITATION EXERCISE AND SPORTS SERVICE DELIVERY SYSTEM FOR HEALTH PROMOTION OF PWD

This study analyzed the system and status of rehabilitation exercise and sports services based on previous studies, research reports, and online data related to physical activity and rehabilitation for PWD in Korea and other countries. Moreover, based on these data and through weekly meetings among researchers, expert focus group interviews, and conferences, opinions on rehabilitation exercises and sports service systems from experts in sports related to PWD were collected. Based on the final opinions, a Korean rehabilitation exercise and sports service system was devel-

oped, modified, and supplemented by the members of a consultative group on rehabilitation exercise and sports. The rehabilitation exercise and sports service delivery system model for the health promotion of PWD developed through these processes is presented and divided into the sides of the consumers and the providers.

Rehabilitation exercise and sports service delivery system from the consumers' side

The rehabilitation exercise and the sports service delivery system from the consumers' side in Korea consist of nine stages and are shown in Fig. 1. Stage 1 indicates the initial visit to the hospital due to injury or disease. A doctor in the hospital diagnoses them with having a disability according to the degree of damage and disease and suggests rehabilitation exercise and sports services. Stage 2 is for disability registration and approval. When people have a disability due to injury or disease, they apply for disability registration at the National Pension Service with a disability diagnosis, test results, and medical records for the last six months. The

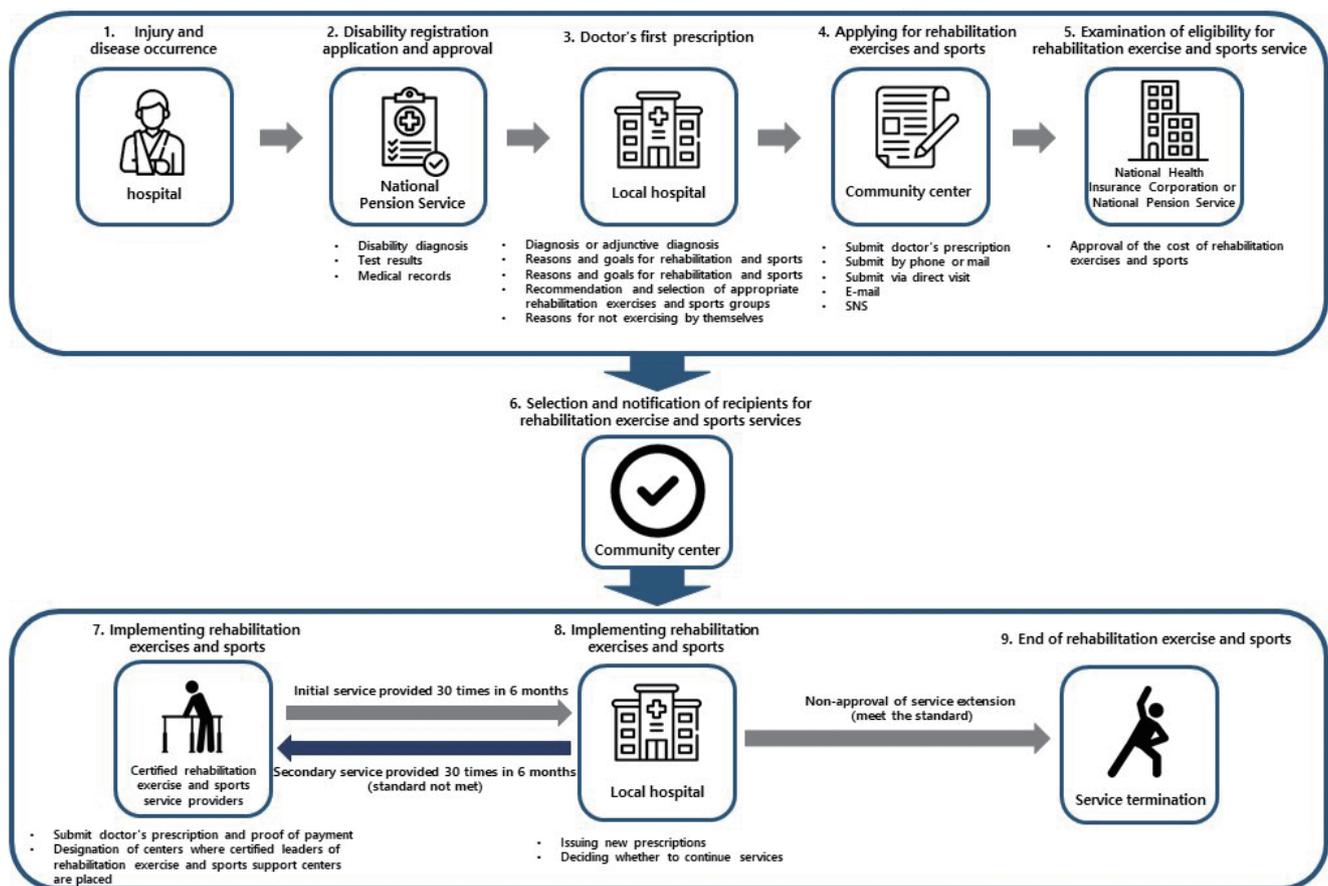


Fig. 1. Rehabilitation exercise and sports service delivery system (consumers' side).

rehabilitation exercise and sports is the service designed for people who were diagnosed with having a disability or who are waiting for the application result. Stage 3 is the doctor's first prescription stage. After being diagnosed with a disability and completing registration, a prescription from a doctor is received through a hospital visit in the residence area. The doctor issues a prescription after confirming the additional diagnosis, availability of rehabilitation exercise, and exercise restrictions through various tests and helps recommend and select available rehabilitation exercise and sports services. Stage 4 is the rehabilitation exercise and sports application stage. After receiving a doctor's prescription, rehabilitation exercise and sports services can be required by visiting community centers in the residence area. In addition, those who cannot visit in person can apply through visiting administrative services, phone calls, emails, and social network services. Step 5 is the screening step for eligibility for rehabilitation exercise and sports services. The application received at local community centers is forwarded to the National Health Insurance Corporation (NHIC) to review the validity of the prescription diagnosed by the doctor. The NHIC comprises various experts including doctors, nurses, and social welfare administrators in order to closely review their eligibility as a recipient of the program. After the review, approval is given to the cost of providing rehabilitation exercises and sports services; finally, a "Certificate of Expenses" is issued. Step 6 is the selection

and notification phase for rehabilitation exercise and sports services. If selected as a recipient, the individual is notified through local community centers, and rehabilitation exercise and sports services are provided by the rehabilitation exercise and support center instructors. Step 7 is rehabilitation exercise and sports implementation. The recipients are initially evaluated in various areas such as daily ability, mobility, and depression at the rehabilitation exercise and support center. After the evaluation, rehabilitation exercise and sports services are provided for six months by an institution or a leader certified by the center. Stages 8 and 9 are the doctor's second prescription and the end of the exercise, respectively. When the rehabilitation exercise and sports service period expire, the recipients must revisit the hospital where they received the primary diagnosis. The doctor must issue a new prescription through a variety of tests. If recipients receive a doctor's prescription that they need additional rehabilitation exercise and sports services through the second examination, the service will be extended for six months. After the rehabilitation exercise and sports services are ended, they will be provided with relevant information to switch to the field of sports in daily life. In addition, if it is determined that the physical and psychological states have been greatly improved, and participation in sports in everyday life is possible, the rehabilitation exercise and sports service will be terminated, and various information may be provided.

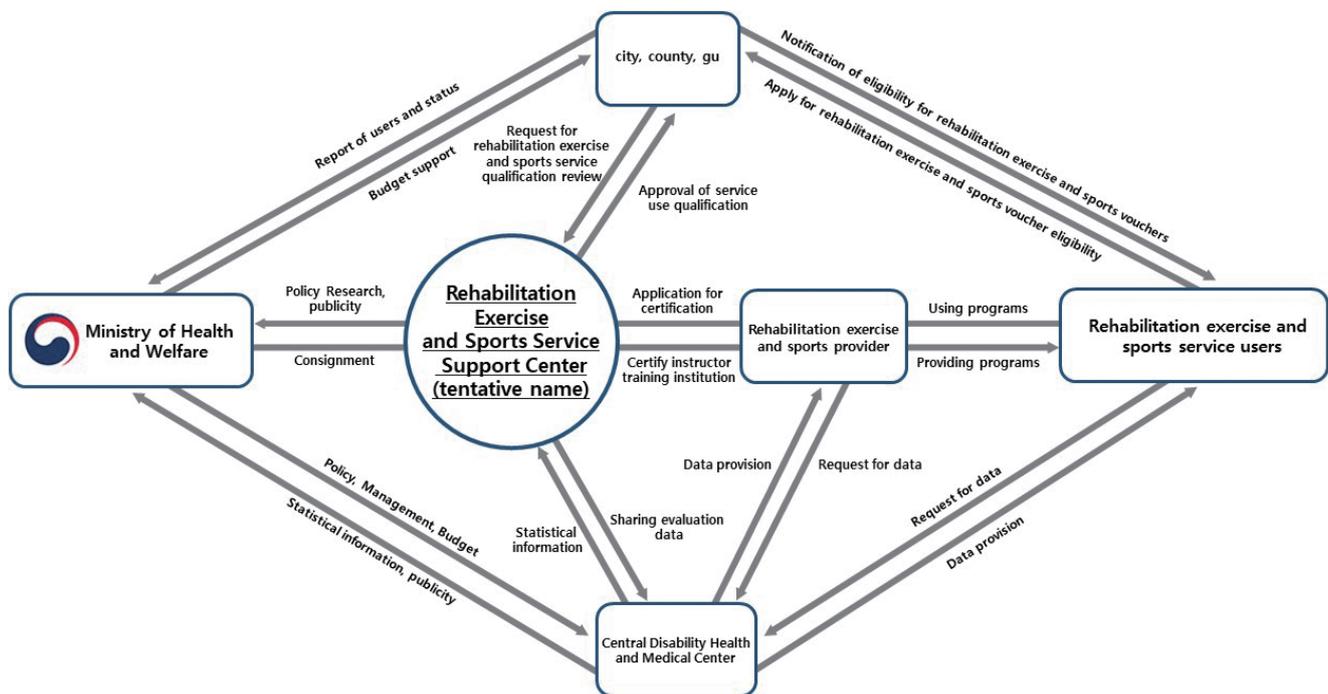


Fig. 2. Rehabilitation exercise and sports service delivery system (providers' side).

Rehabilitation exercise and sports service delivery system from the providers' side

Fig. 2 shows the providers' side of the rehabilitation exercise and sports service delivery system. The MHW will be the top institution for the rehabilitation exercise and sports service delivery system, and it is necessary to establish support centers that manage such services under the ministry. Regarding the Rehabilitation Exercise and Sports Service Support Center (tentative name), "qualifying and certifying leaders and service providers are most important, and it seems desirable to conduct education within the support center" and to set up "rehabilitation exercise and sports provider organizations," "including universities, to conduct rehabilitation exercise and sports instructor training." Above all, the MHW cannot exclusively train rehabilitation exercise and sports leaders; thus, a health exercise manager or a sports instructor for PWD has no choice but to be used. Health exercise managers or disabled sports instructors are qualified and managed by the Ministry of Culture, Sports, and Tourism; thus, giving them another opportunities to be qualified as rehabilitation exercise and sports leaders with additional education would be desirable. For PWD to easily meet the leader, it is a priority to secure maximum accessibility, allowing them to access rehabilitation exercises and sports in settings by not setting a high threshold for qualification acquisition. City, county, and *gu* act as an intermediary that provides rehabilitation exercise and sports vouchers through local community centers, and it is necessary to secure the rehabilitation exercise and sports budget of the MHW for the vouchers. For rehabilitation exercise and sports services to be settled down, the role of the Central Health and Medical Center for PWD, which manages the evaluation results through a professional evaluation group and health-related information of PWD in one place, is important. This center shares evaluation data and statistical information in cooperation with the Rehabilitation Exercise and Sports Service Support Center and provides statistical information with the MHW, which can be used as basic data for setting policies and budgets.

Currently, the MHW has secured the budget. However, moving forward in a market-led form, similar to the US system to maximize accessibility of the service in the long term still seems desirable. Anyone should be able to easily receive rehabilitation exercise and sports services without administrative procedures by burdening the consumer with a certain amount of payment.

CONCLUSION

The rehabilitation exercise and sports service delivery system

model for the health promotion of PWD is considered an efficient and effective differentiated model to promote their health. This system model proposed in this study will facilitate the conversion to sports in daily life and return to normal social life through continuous exercise participation, in addition to improving the health of the PWD. Moreover, developing a rehabilitation exercise and sports service delivery system model will positively impact local communities and vitalization of rehabilitation exercise and sports based on the establishment of new consulting groups, institutions, and training of rehabilitation exercise and sports leaders. Therefore, the rehabilitation exercise and sports service delivery system model for the health promotion of PWD can serve as a bridge between hospital rehabilitation treatment and sports in daily life for PWD through continuous physical activity in local communities after rehabilitation treatment and getting discharged from medical institutions.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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