Intelligent Rehabilitation Recommendation System

- Big data-based services to enhance customized rehabilitation

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Intelligent Rehabilitation Recommendation Service

Summary

- Workers’ compensation supports the return to work of injured workers, as a social safety net protecting national human resources.
- The Korea Workers’ Compensation & Welfare Service (COMWEL) is an organization operating a “Customized Integrated Services (CIS)” that establishes a rehabilitation plan for individual injured workers since 2011, while implementing systematic rehabilitation services.
- COMWEL has developed the “Intelligent Rehabilitation Recommendation System (IRRS)” in order to efficiently improve the individual effects of rehabilitation services based on experience in operating the CIS over the past 10 years.
- The IRRS is an AI system analyzing big data for work injuries and employment, which selects those who need active support among injured workers, and designs scientifically tailored rehabilitation services for them.
Background

- COMWEL has introduced Vocational Rehabilitation Benefits to the Industrial Accident Insurance Act in 2008 to support injured workers to overcome the results of accident and return to their daily lives.
- In the meantime, efforts have been made to design individual rehabilitation through internal rehabilitation experts.
- As a result, a variety of rehabilitation cases have been managed, with know-hows accumulated, enabling COMWEL to think about how to standardize rehabilitation plans.
- The IRRS is an AI system analyzing big data for work injuries and employment, which selects those who need active support among injured workers, and designs scientifically tailored rehabilitation services for them.
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Framework

- The IRRS is a partnership project with the MOEL and COMWEL under the ‘ICT-based public service promotion project’ organized by the MOSTC.
- The idea was submitted as a collaboration model, and as a result, it was finally selected an excellent one, with the government support of 1.4 billion KRW.
- For the development of this system, COMWEL calculates the vulnerability index based on 19 million administrative data of workers’ compensation and unemployment insurance.
- Algorithm recommending rehabilitation services to injured workers has been developed and related patents are being prepared.
- Workers who are selected based on this AI system will undergo sufficient consultation with the experts at COMWEL.
- Service plans are finalized with the recommendations for each individual in order to improve the rehabilitation effect of injured workers.
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**Targets**

- Total number of services to be (7.7) and categories of services to be (12.3) under the IRRS
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Targets

- The ratio of other various services to be (50%) with traditional services (medical-, return-to-work-, GP-consulting) to be
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COMWEL was able to

• Establish AI rehabilitation plan and continue to increase the number of applied people
• Continuously improve the actual service implementation rate based on the analysis/recommendation, by strengthening related performance
• Provide the data-based scientific rehabilitation plan to workers in a customized manner through the AI system
• Contribute to improving the effects of physical and vocational rehabilitation of injured workers.
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Evaluation

- AI rehabilitation plan provision performance and actual application rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Target population</th>
<th>Recommended services</th>
<th>Finalized services</th>
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<tbody>
<tr>
<td>2020</td>
<td>2,637</td>
<td>13,876</td>
<td>9,172 (66.1%)</td>
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### Evaluation

- **Rapid intervention in rehabilitation services**

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| **Before** | - Rehabilitation plans are established based on the experience and limited information of managers in charge  
Inconsistent services and time-consuming processes |
| **After** | - Optimized rehabilitation plans are recommended based on data-based AI technology  
Consistent services and time reduction in designing rehabilitation plans, timely intervention and consultation |
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Evaluation

- Average duration of rehabilitation services, 2019-2020

<table>
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<tr>
<th>Year</th>
<th>2019</th>
<th>2020</th>
<th>Difference</th>
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<tr>
<td>Duration</td>
<td>32.7</td>
<td>27.9</td>
<td>4.8</td>
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<td>(days on Average)</td>
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Case Study

Work Injury

- (Gender/Age) Male (60)
- (Injury) One hand stuck in the rope
- (Diagnoses) Multiple fingers lost severe contusion

Big Data Analysis

- (Expected period of medical care) 12 months
- (Return-to-work vulnerability index) 69
  → Low possibility of return-to-work / Immediate consulting needed
- (Expected disability) 7 degree or higher

Rehabilitation Designing and AI Recommendations

- (Stage 1) Intensive rehabilitation/medical care and mentor services
- (Stage 2) Psychological rehabilitation programme
- (Stage 3) Registered job-seeking, psychological consulting
- (Stage 4) Rehabilitation sports, functional capacity evaluation

Implementation Outcome

- (Ultimate period of medical care) 10 months
- (Return-to-work) successful reemployment
- (Disability) 10 degree (mild level) out of 14 degrees
  ※ 1 (extremely serious level) ~ 14 (threshold level)

Results Summary

- Medical care period reduced by 16.7%
  - 12 months → 10 months
- Successful return-to-work
  - initially No prospect → back-to-work achieved
- Disability degree lowered to mild level
  - severe level (qualified for annuity) → mild level
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Prerequisites for benchmarking the IRRS

• Immediately after the injury, a rehabilitation plan for overcoming the disaster and returning to the daily life of workers is prepared, and the results of the planned process are managed together. They must be accumulated within each jurisdiction’s data base.

• Differentiated stages of physical recovery for injured workers and various services for each stage/field should be prepared within the system. In addition, administrative support and management are needed so that appropriate rehabilitation services can be provided to injured workers.