Implementation of Tele-Rehabilitation System Combined with Video Call Center

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Bangkok, Thailand
14-16 November 2016
Low birthrate and rapidly aging population are;
  – causing medical expenses to take up ever more of the national budget.
  – leading to a shortage of young medical professionals.

Medical treatments, including rehabilitation, are being shifted from hospital-care to home-care.

The amount of rehabilitation therapy in a home done by a visiting physiotherapist is limited by law and is insufficient for patients to recover completely.
Background (2)  
- Duration of feeding period -

It is difficult for patients to continue rehabilitation by themselves.

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Our system has following two features to help patients continuously:

- A patient can check data to see the effect of rehabilitation. This time, we use Microsoft KINECT to measure strain of the upper body.

- A call center operator guides patients through the therapy and encourages them with conversation through the Internet.
Purpose (1)

- Tele-rehabilitation system combined with a video call center
  - Behalf of a physiotherapist, call center operators guide patients through the therapy and encourages patients with their voice.

- Medical expense will be suppressed.
  - Personal expenses will decrease
  - Transportation cost will decrease
Basic idea to continue rehabilitation

• Practical data that shows the patients getting better will more effectively encourage them to continue rehabilitation.

• Hearing a person’s voice is likely to cheer patients up.
Concept of the tele-rehabilitation system

Patient

Operator

Supervisor: Physiotherapist

Video Call center

Administration tools

Measuring tools

Supervising tools

Comm. Exchange prg.

RDBMS

Data for patients

Therapy contents

Data

Voice

Video & Voice

Data

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Implementation
- Communication exchange program -

[Diagram of communication exchange program with CCS, Log in, SkyWay, peerID, Voice path, Data path, Matching, ref, and other related elements.]

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Implementation
- Measuring tool -
Training scene for a patient
Screenshots from a patient-PC and an operator-PC

(a) Screen shot of a patient-PC
(b) Screen shot of a patient of an operator-PC
Implementation

- Communication image at a patient-PC -

Login operators list

<table>
<thead>
<tr>
<th>Icon</th>
<th>Property</th>
<th>Name</th>
<th>Status</th>
<th>Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator Icon</td>
<td>Operator</td>
<td>Operator A</td>
<td>Login</td>
<td></td>
</tr>
<tr>
<td>Operator Icon</td>
<td>Operator</td>
<td>Operator B</td>
<td>Login</td>
<td></td>
</tr>
<tr>
<td>Operator Icon</td>
<td>Operator</td>
<td>Operator C</td>
<td>Busy</td>
<td></td>
</tr>
</tbody>
</table>
Implementation
- Searching tool : E-R Diagram-

- [Data management table]
  - Auto_ID
  - Stored date
  - Patient_ID
  - Operator_ID
  - Comment
  - Measured/Archived Directory_path.

- [Patient table]
  - Patient_ID
  - Employment_dateBirth day
  - Address
  - Mail_address
  - Phone_number

- [Operator table]
  - Operator_ID
  - Employment_dateBirth day
  - Address
  - Mail_address
  - Phone_number

- [Bookmark table]
  - Auto_ID
  - Bookmark_ID
  - Start flame number
  - End flame number.
Implementation - Replaying tool -

Remote Rehabilitation Monitor: Review App

Data list

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Measured/ Archived</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator A</td>
<td>2015/07/09/07:34</td>
<td>Measured</td>
</tr>
<tr>
<td>Operator B</td>
<td>2015/07/09/08:48</td>
<td>Archived</td>
</tr>
</tbody>
</table>
Effect for shortage of physiotherapist in TRS

The number of operators that a physiotherapist supervised can deal with in one hour using TRS.

The number of patients that a physiotherapist can deal with in one hour using TRS.
Conclusion

- We developed a tele-rehabilitation system that enables a video call center operator to coach a patient in place of a physiotherapist and a physiotherapist to supervise multiple operators.
- We believe the proposed system will help to suppress the increase of medical expenses and make up for the shortage of young medical professions caused by low birthrates and rapidly aging populations.
Problems to putting TRS on the market

- For healthcare insurance to cover it, TRS has to be approved by the government department in charge of healthcare.
- The national healthcare insurance in Japan covers only face-to-face rehabilitation, not tele-rehabilitation. Thus, TRS will need to be licensed for the national healthcare insurance to cover it.
- If a license cannot be obtained, a new business model will be needed for business operators to continue this business.
- Criteria for evaluation are needed to maintain service quality. At the very least, criteria an operator has to learn are needed.
- Standardization of protocol for training contents or tools to connect TRS.
• Thank you for attentions.

• Questions?