Development of a Method for Standardization of Rehabilitation Intervention Processes

-Standard Intervention Processes in Dysphagia Rehabilitation-

Shogo Kato*1, Satoko Tsurur2, Yoshinori Iizuka2, Makoto Ide3, Eiko Nakashima4, Hiromi Kuroki5, Kazumi Maeda6, Akira Shindo7, Kazuki Miyawaki7, and Yasuko Hashimoto8

1. National Center for Child Health and Development: 2-10-1 Okura, Setagaya-ku, Tokyo, Japan, 157-8535
2. The University of Tokyo: 7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan, 113-8656
3. St Mary's Healthcare Center: 448-5 Tsubukuhonmachi, Kurume-city, Fukuoka, Japan, 830-0047
4. St Mary's Hospital: 442 Tsubukuhonmachi, Kurume-city, Fukuoka, Japan, 830-8543
5. University of Miyazaki Hospital: 5200 Kihara, Kiyotake-cho, Miyazaki-city, Miyazaki, Japan, 889-1601
6. Iizuka Hospital: 3-83 Yoshio-cho, Iizuka-city, Fukuoka, Japan, 820-8505
7. Oguno Hospital: 6416 Oguno, Hinode-cho, Nishitama-gun, Tokyo, Japan, 190-0181
8. Senri Rehabilitation Hospital: 4-6-1 Onoharanishi, Minoo-city, Osaka, Japan, 562-0032

*contact author’s e-mail address: kato-sy@ncchd.go.jp

Abstract:
Rehabilitation is a medical intervention implemented mainly by therapists under the prescription orders of medical doctors in hospitals. It is difficult to standardize rehabilitation intervention processes because they largely depend on individual therapists rather than medicines or instruments, and there are few quantitative clinical indicators. In such situations, there are differences in intervention processes and outcomes between therapists and hospitals.

In this study, we aim to develop a method for standardization of rehabilitation intervention processes based on actual clinical data. In our method, we firstly prepare a standard intervention process that could include the differences between therapists and hospitals. Second, we prepare an investigation sheet, which is designed to record information on intervention, outcome, and patient background. Third, we accumulate actual clinical data on the standard intervention process. Fourth, we analyze the accumulated clinical data, based on the evaluation structure designed for the target rehabilitation intervention. Finally, we try to standardize the intervention processes based on the results of analysis among therapists and hospitals.

We applied our method to 87 total cases of dysphagia rehabilitation for cerebral stroke patients at three hospitals as the first cycle of standardization, and 130 cases as the second cycle. We thus designed a standard intervention process to record the clinical processes actually implemented in three hospitals. In addition, we obtained findings both on the effects of patient background and on effective intervention which supported the validity of our proposal.

Keywords
Cerebral stroke, swallowing disorder, speech and language therapist, clinical pathway, clinical guideline

1. Introduction

1.1 Background
Japan is a super-aging society. Individuals aged over 65 years account for over 25% of Japan’s population (Cabinet Office, Government of Japan, 2014); this increases the rate of diseases and injuries among the elderly. As medical treatment technology allows more people to survive and recover from diseases and injuries, an
increasing number of people are suffering the aftereffects of disease and injury. Rehabilitation improving quality of life is increasingly important under these circumstances.

“Rehabilitation” refers to medical interventions prescribed by medical doctors and typically implemented by therapists. The World Health Organization’s definition of rehabilitation states that “it can involve measures intended to compensate for a loss of function or a functional limitation (for example by technical aids) and other measures intended to facilitate social adjustment or readjustment” (WHO, 1982).

In April 2006, the Japanese medical service fee system was amended, and the length of rehabilitation covered by medical care insurance was limited to 180 days from onset. The amendment was intended to concentrate resources on initial-stage rehabilitation requiring intensive care; however, the imposed time constraint has made rehabilitation’s situation more severe than it previously was. The medical care insurance scheme is imposing greater time pressure on rehabilitation; simultaneously, public need for rehabilitation is growing. Rehabilitation must therefore be more effective and efficient.

Generally, rehabilitation processes are not yet fully standardized. Differences in intervention processes and outcomes exist between therapists, rehabilitation colleges, and hospitals. Standardization is difficult, as processes depend largely on individual therapists rather than medicines or instruments, and few quantitative indices are extant. Quality healthcare must be adequately available, as healthcare quality directly affects patients. The quality assurance and standardization of rehabilitation services is therefore important in Japan and many other countries.

1.2 Related studies

The term of “standard” refers to a thing or method that has come to be considered good and recommendable on the basis of someone’s experience, and "standardization" is an organized activity to develop a standard (Iizuka, 2009). Clinical practice guidelines and clinical pathways are representative standards for clinical interventions.

Clinical practice guidelines are developed to enable healthcare professionals and patients to make decisions about screening, prevention, or treatment of a specific health condition (Institute of Medicine, 1992). These guidelines are based on the best available evidence gained from clinical studies. Gordon et al. (2008) propose the GRADE (Grading of Recommendations Assessment, Development and Evaluation) system, which provides a system for rating quality of evidence and strength of recommendations, as a method for developing clinical practice guidelines. It is in widespread use, however, it is difficult to apply rehabilitation intervention because there is few evidence in the area.

A clinical pathway is a timed sequence of specific interventions and observations in a patient’s plan for health care to achieve desirable outcomes. Clinical pathways are tools used to guide evidence-based healthcare that have been implemented internationally since the 1980s (Kinsman et al, 2010). PCAPS Study Group (2012) proposed the Patient Condition Adaptive Path System (PCAPS) as a new type of clinical pathway. PCAPS describes the flow of medical care as a stream of units that correspond to the disease condition, therefore it allows encyclopedic description of various clinical processes, contrary to the traditional clinical path system described in chronological order. However, rehabilitation intervention processes do not do much to be provided based on disease condition.

Ogata et al. (2010) proposed a method for improving structured clinical information in order to standardize medical intervention. This method applies to structured clinical information, and analyzes medical professionals’ “intervention logic”; this method is therefore effective only in the later stages of standardization, and across a limited range of medical interventions. Matsuoka et al. (2012) proposed a method for improving clinical processes by providing feedback on standard clinical guidelines. This method applies to clinical processes in which some clinical guidelines are provided; it is therefore likewise effective only in the later stages of standardization. Its scope of intervention would suit “operative treatment of breast cancer,” for example, and is hence wider than Ogata et al.’s method, which is better applied to specific parts of a complete intervention.

Kato et al. (2012b) addressed ADL (activities of daily living), and proposed a logical method to determine and implement appropriate rehabilitation training programs for patients to recover from a current condition to a target condition; however, this paper did not establish a method for determining the target condition, or design a patient recovery process. Kato et al. (2012a) proposed a method for establishing standard technical guidelines in order to standardize general techniques. This method aims to be suitable for medical intervention. Its standards development process consists of four phases, in which the level of standardization is gradually increased by extending the range of professionals concerned; however, it does not establish a concrete method for expressing or evaluating standards at each phase.
1.3 Purpose of this study

This study aims to develop a method for standardizing rehabilitation intervention processes using clinical data, by redesigning related studies’ core concepts and considering additional issues. We have partially assessed our method’s validity by applying it to specific rehabilitation intervention processes. This paper’s scope of application is cerebral stroke-related dysphagia rehabilitation, which is an important issue in Japan.

In the following sections, we first discuss the core concept for the method (section 2). Then, we describe the overall view and details of the method (section 3). Finally, we describe the results of application to 87 total cases of dysphagia rehabilitation for cerebral stroke patients at three hospitals in the first cycle, and 130 cases in the second cycle, to discuss the validity of the proposed method (section 4).

2. Core Concept

This study incorporates three core concepts regarding benchmarking rehabilitation intervention processes for standardization.

First one is a method for standardizing medical intervention processes. As medical intervention is provided directly to patients, it is difficult to design experiments similar to those that assess industrial processes. It is therefore important to use retrospectively analyzed clinical data.

Second one is a method for describing the rehabilitation intervention process. It is essential to describe the rehabilitation intervention process, in order to record and compare interventions with patients in multiple hospitals, as well as to describe the general process.

Third one is a method for evaluating the rehabilitation intervention process. After recording each patient’s intervention, interventions must be evaluated for effectiveness, efficiency, safety, etc.

In this section, we describe these three important concepts.

2.1 Method for Standardization

Collecting clinical data presents a major difficulty in standardizing medical intervention processes. As medical intervention is provided directly to patients, it is difficult to design experiments similar to those that assess industrial processes. Prospective clinical investigations must follow strict rules and systems regarding examinees and investigators, such as are applied by medical ethics boards. These systems make experimentation costly, require additional investigatory effort, and do not remove all risk to participants. Therefore, it would be safety and efficient if we could appropriately utilize recorded clinical data in typical clinical intervention retrospectively to standardize the intervention processes.

Kato et al (2012a) proposed a method for establishing standardized technical guidelines (as shown in Figure 1).

Their method allows standards to be effectively established by combining the “development process,” which uses a small-group approach, with the “sharing process,” which aims to generate ongoing endorsement. Their method addressed technologies regarding which experimentation under controlled conditions was impractical, and relevant information was available only from operational data and professionals’ experience. We suggest that Kato et al.’s method may apply to medical intervention.

When we consider to apply this method into rehabilitation intervention processes, we focus on the “development process” in the model, because the situation is too early to share with wider member. It is expected that it would difficult to follow the functional phase, and that multiple reputation of improvement would be needed. Therefore, it would be better to express the development process as just a cycle later than gradual phases.

2.2 Describing rehabilitation intervention processes

Therapists implement rehabilitation interventions based on rehabilitation programs, which specify training type, frequency, lead professional, etc. Therapists design rehabilitation programs according to patients’ present and target conditions, setting appropriate targets and reviewing patients’ recovery, as shown in Figure 2 (Kato et al., 2012b). More appropriate targets facilitate more appropriate rehabilitation. Skill in setting targets, which reflects therapists’ individual ability, will therefore also affect rehabilitation outcomes.

In order to describe components of rehabilitation intervention, we used the PCAPS (PCAPS Study Group, 2012). Traditional clinical path systems describe clinical processes in chronological order; however, this is not suited to a wide range of patient conditions, and “variances,” in which cases do not follow the path, are
consequently common. Patients’ condition should guide determination of medical intervention. PCAPS describes the flow of medical care as a stream of units that correspond to the patient’s condition. Units are not time-delimited, and original units may be attached as appropriate. PCAPS therefore allows encyclopedic description of various clinical processes, contrary to the traditional clinical path system.

Figure 1. Method for Establishing Standard Guidelines (Kato et al., 2012a)

Figure 2. Implementation of Rehabilitation based on a Rehabilitation Program (Kato et al., 2012b)
As shown in Figure 3, PCAPS consists of two main tools: the Clinical Process Chart (CPC) and the Unit Sheet (US). The CPC describes the flow of medical care, and represents the overall flow of clinical judgments and treatments as a stream of units that correspond to patient condition. The US describes clinical practices to be provided in each unit. Health care providers decide appropriate clinical practices according to the hospital’s situation and the patient’s condition.

Generally, the CPC is described as a stream of units that correspond mainly to disease condition. However, rehabilitation intervention does not follow only the disease condition, but also follow the progress of rehabilitation training. Therefore, when we consider to apply this model into rehabilitation intervention processes, it would be required to take such circumstances into consideration.

2.3 Evaluating the rehabilitation intervention processes

In the first step of clinical studies, P.I.C.O. ("Patient / Population / Problem", "Intervention / Exposure", "Comparison", "Outcome") Model (Sackett DL et al., 1997) is generally used for defining clinical questions. In evaluating the rehabilitation intervention processes, “Intervention” and “Outcome” are no less essential, however, “Patient” and “Comparison” are difficult to define in advance, because there are few evidence.

In such situation, it would be effective to utilize accumulated clinical data without defined P.I.C.O. Model for exploratory research, in such situation. We designed the relationships between intervention, outcome, and patient background (Figure 4), by integrating Patient and Comparison into one element. The rehabilitation intervention period was roughly expressed as CPC route, as described in the previous section. Rehabilitation intervention outcomes were roughly expressed as degree and speed of recovery. Additionally, patient background, which was roughly expressed as comorbidity and inhibitory agents, mediated the intervention effect. Concrete factors of outcome and patient background depended on types of rehabilitation, and we gradually define P.I.C.O. Model through exploratory analysis.

In this context, we designed a structure for evaluating rehabilitation intervention processes, as shown in Figure 5. In order to implement this evaluation structure, records of the intervention, its outcome, and pre- and post-intervention patient status must be available; mid-intervention patient status records may also be required. We evaluated both degree of recovery and recovery speed as direct indicators, and target attainment level as a sub-indicator. Degree of recovery was calculated as the difference in patient condition pre- and post-intervention. Recovery speed was calculated as the gradient of patient condition improvement. Attainment level was calculated as the difference between the patient’s target and actual state (mark) at the end of intervention. Patient background was considered a stratifying factor in patient evaluations.
3. Method for standardizing the rehabilitation intervention process

In this section, we describe a method for standardization of rehabilitation intervention process, based on the core concept organized in the previous chapter. Total structure is described in Section 3.1, and Details is described in Section 3.2.

3.1 Overall method structure

Figure 6 presents the structure of the method for standardizing rehabilitation interventions. This method was designed following the models of Ogata et al. (2010), and Matsuoka et al. (2012), and based on Kato et al. (2012a). The method consists of five phases: (1) designing the standard CPC, (2) designing the investigation sheet, (3) data collection, (4) analysis, and (5) feedback.

In the preparation phase, we design a standard CPC for rehabilitation intervention, and a detailed investigation sheet. After preparation, we collect data from multiple hospitals by recording patient condition and intervention using the prepared investigation sheet. We then evaluate each hospital’s rehabilitation intervention processes using the collected case data. Finally, we provide feedback regarding each hospital and standard CPC, based on the results of comparative analysis.
3.2 Method details

3.2.1 (1) Designing the standard CPC

In this phase, we design a preliminary standard CPC, based on existing processes in multiple hospitals. Initially, we need to select the target scope of rehabilitation. Hospitals and medical professionals with high motivation and high technical skills should then be chosen to comprise the “focus group” (Kato et al., 2012a) for standardization.

The focus group first develops multiple CPCs by visualizing and structuring each hospital’s clinical process. We then choose a standard CPC through discussion with these hospitals, and organize multiple CPCs for each hospital.

3.2.2 (2) Designing the investigation sheet

In this phase, we design an investigation sheet addressing the target scope of rehabilitation. This sheet will be used for data collection in the subsequent phase, based on the prepared standard CPC and the structure for evaluating the target scope of rehabilitation. The investigation sheet should permit collection of as much information as analysis (phase four) will require, through data collection (phase three).

Investigation sheets consist of three main parts: patient background, intervention recording, and outcome. Intervention is recorded as “unit” and “unit date,” based on the standard CPC process. Additionally, information regarding the lead therapist is sometimes required. Outcome and patient background should be divided appropriately, as required by each rehabilitation target.

3.2.3 (3) Data collection

In this phase, we use the investigation sheets to collect case data regarding rehabilitation targets from lead therapists at multiple hospitals. In case selection, securing sufficient numbers of cases and implementing random sampling are important. If cases are assumed to be divided into sub-groups, stratification sampling will be required.

Both prospective and retrospective studies possess merits and demerits. Prospective studies may gather rich information; however, they require considerable effort from therapists. Retrospective studies may reduce...
therapists’ workload; however, they may not yield sufficient information.

3.2.4 (4) Analysis
In this phase, we evaluate each hospital’s rehabilitation intervention process using clinical case data collected in the previous phases. First, we calculate values for concrete outcome indicators (as developed in the previous phase) for each therapist and hospital. These values are then analyzed, and the results compared between therapists and hospitals, stratifying analysis by patient background.

If a specific therapist or hospital is found to surpass others, we will attempt to identify reasons by discussing the results of analysis with these therapists and hospitals, in order to summarize modification points for each therapist and hospital, and the standard CPC.

3.2.5 (5) Feedback
In this phase, we provide feedback to therapists and hospitals, and reform the standard CPC, based on the results of analysis. Therapists and hospitals may utilize feedback to support or reform their rehabilitation intervention process. Additionally, identified best practices for components of the target scope of rehabilitation may be standardized by modifying the standard CPC.

4. Method evaluation through a case study
This section describes the results of an application of the proposed method to dysphagia rehabilitation in cerebral stroke patients. This case study will inform discussion of the proposed method’s validity. Cerebral stroke is a kind of stroke induced by clogging of cerebrovascular blood vessels, and is the third or fourth leading cause of death in Japan (Japanese Ministry of Health, Labour and Welfare, 2014). As cerebral stroke kills brain cells, it results in impairments such as paralysis following the acute event.

Three hospitals in Japan participated in this application. Hospital X is an acute- and recovery-stage hospital with approximately 1,000 beds. Hospital Y is an acute-stage hospital with approximately 1,000 beds. Hospital Z is a recovery-stage hospital with approximately 150 beds. Each of these hospitals provides rehabilitation services, and is highly motivated to improve its practices.

Section 4.1 outlines the target scope of rehabilitation. Section 4.2 describes the results of the first cycle of application, in which the method was applied to 87 cases. Section 4.3 describes key results of the methods’ application to 130 cases in the second cycle of application, which is ongoing.

4.1 Target scope of application: dysphagia rehabilitation
Dysphagia rehabilitation is provided to allow patients to improve lost swallowing function, and to improve the “food level” patients are able to eat without risk of aspiration. Dysphagia rehabilitation is generally administered by speech and language therapists, though nurses provide this rehabilitation in some hospitals.

Dysphagia rehabilitation generally uses two main methods of intervention: “direct method” and “indirect method” (JSDR medical treatment exploratory committee, 2014). “Direct method” trains swallowing using actual food. “Indirect method” trains more minute swallowing functions using exercises, etc., and without using actual food. In this study, we call trainings in direct method as “eating training,” and call trainings in indirect method as “basic deglutition training.”

There are some studies focusing on specific training method to improve dysphagia, such as Shaker et al. (1997), Okada et al. (2007), Eiichi Saitoh (2008), Jung-Ho Kang et al. (2012), Nakamura and Fujishima (2012), and so on. However, to our knowledge, there is little study and report focusing on standard intervention process in dysphagia rehabilitation.

4.2 Details of the first cycle of application
4.2.1 (1) Preparing the preliminary standard CPC
We prepared three CPCs for dysphagia rehabilitation by visualizing and structuring intervention processes through discussion with lead speech therapists at each of the three participating hospitals. Although we attempted to prepare these CPCs in a common format, some differences were found between intervention processes at the three hospitals.

We subsequently designed a standard CPC for dysphagia rehabilitation by integrating the three hospitals’ CPCs through discussion of the differences between the hospitals; differences were mainly regarding evaluation,
and regarding scope of training of swallowing ability. Finally, we designed a standard CPC, which was expected to include the differences between therapists and hospitals, as shown in Figure 7 (termed the “preliminary standard CPC”).

The left side of Figure 7 expresses medical doctors’ directives; the remainder expresses the therapist’s intervention process. In the therapist’s section, the first intervention evaluated the patient’s swallowing function. Eating training and basic deglutition training was then provided, according to the patient’s condition. Finally, food forms were determined.

4.2.2 (2) Designing the investigation sheet

We designed an investigation sheet for dysphagia rehabilitation, based on the standard CPC, through discussion with doctors and lead therapists at the participating hospitals. Table 1 presents a part of this investigation sheet.

The part for recording “intervention” was divided into “rehabilitation day,” “profession in charge,” and so on. The part for recording “outcome and target setting” was divided into “Food level,” “Fujishima Grade (Fujishima, 1993), a well-known indicator in dysphagia rehabilitation”, and so on. The part for “patient background” was divided into “basic information,” “causative diseases,” and so on. Eventually, it included a total of nine items for intervention, 12 items for outcome and target setting, and 37 items for patient background.

4.2.3 (3) Designing the investigation sheet

From January to June 2012, we used the designed investigation sheet to retrospectively collect data regarding cases of dysphagia rehabilitation of patients at the participating hospitals. Data collection was retrospective, as the standard CPC was preliminary at this stage, and its appropriateness had not been verified by case data.

We collected 30 cases treated by three therapists at Hospital X, 27 cases treated by eight therapists at Hospital Y, and 30 cases treated by six therapists at Hospital Z; we carefully monitored the variety of cases and therapists, in order to ensure random sampling. After collecting data using the investigation sheet, data was made electronically available in Microsoft Excel.

4.2.4 (4) Analysis

We calculated values for concrete indicators of intervention, outcome, and target setting, and tallied results by

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therapist and hospital, stratifying by patient background. We subsequently examined the effect of patient background on intervention effectiveness.

Details of this phase require further discussion; however, some results were obtained.

- Final attainment mark and progression rate varied depending on CPC route (as shown in Table 2).
- Route selection, final attainment mark, and progression rate varied depending on therapists’ level of experience.

Figure 8. Food Form Structure

| Food Form Level | Mastication Function |
|-----------------|----------------------|
| 1. Jelly for Swallowing Training (1) |
| 2. Jelly for Swallowing Training (2) |
| 3. Puree for Swallowing Training |
| 4. Soft Food for Swallowing Training |
| 5. Mitigation Food for Swallowing Training |
| 6. Cut Food |
| 7. Chopped Food |
| 8. Regular Food |

Table 1. Partial Investigation Sheet

| Investigation Item | Answer |
|--------------------|--------|
| Date of commencing rehabilitation | data ID |
| Date of ending rehabilitation | patient ID |
| Reason for ending rehabilitation | patient name |
| Type of profession in charge | hospital name |
| Name of lead professional | hospital data ID |
| Years of experience of lead professional | age |
| Sex | sex |
| Disease name | disease name |
| Nidus (this situation) | nidus (this situation) |
| Nidus (past situation) | nidus (past situation) |
| Localization: Brain | localization: brain |
| Localization: Cerebellum | localization: cerebellum |
| Localization: Brainstem | localization: brainstem |
4.2.5 (5) Feedback

We explained the analysis’ results to the therapists and hospitals, and discussed their significance. Reasons were provided for each result, which the therapists and hospitals considered useful.

Regarding the preliminary standard CPC, investigation identified some issues and potential solutions, which were discussed as described below. We subsequently designed the modified standard CPC for dysphagia rehabilitation, as shown in Figure 9.

- We deleted the B2 unit, as the difference between B1 and B2 was unclear.
- We integrated E1 and E2, as there is no reason to distinguish them.
- We identified representative food forms for each unit, to facilitate understanding.
- We modified the names and definitions of A2, A3, and A4, to clarify the differences between them.

Table 2. Example of comparative analysis: Route and achievement points, recovery speed

| CPC Route | Attainment Mark | Speed |
|-----------|-----------------|-------|
| Hospital X | Hospital Y | Hospital Z | Hospital X | Hospital Y | Hospital Z |
| ①Beginning with Direct Training (Better Initial State) | 6.6 | 7.3 | 6.6 | 0.41 | 0.40 | 0.15 |
| ②Beginning with Basic Oral Training (Poorer Initial State) | 6 | 5.5 | 5.3 | 0.48 | 0.36 | 0.07 |
| ③With Reply (Some Failures) | 5.4 | 4.4 | 2 | 0.38 | 0.26 | – |

Figure 9. Modified Standard CPC for Dysphagia Rehabilitation
4.3 Summary of the second cycle of application

In phase one of the second cycle, the modified standard CPC (see Figure 9) was prepared as a standard CPC.

In phase two, we modified the investigation sheet in accordance with the new standard CPC, and divided some patient background items into “at time of commencing rehabilitation” and “at time of concluding rehabilitation,” based on the results of discussion held after the first cycle. In phase three, we retrospectively collected data from 130 clinical cases from the three participating hospitals.

Though phases four and five are currently ongoing, we found that the standard CPC should be modified as shown in Figure 10, as we observed many cases in which the patient was eating regular food prior to commencing rehabilitation, based on medical doctors’ direction. To reflect this, the unit “S3: Food Evaluation Form” was added into version two of the modified standard CPC (see Figure 10). Discussion with medical professionals at the participating hospitals indicated that, in these cases, dysphasia rehabilitation was prescribed not to improve the patient’s swallowing ability, but to evaluate which food forms were appropriate for the patient; dysphasia rehabilitation would then typically end a few days after evaluation. We therefore considered it appropriate to distinguish these cases from normal cases, and to either eliminate them from analysis or analyze them separately, to improve analytical precision.

Figure 10. Modified Standard CPC for Dysphagia Rehabilitation, Version Two

5. Discussion

5.1 Results of evaluation

In section four, we designed a preliminary standard CPC. We applied this CPC to dysphagia rehabilitation; this allowed us to record the participating hospitals’ implemented clinical processes. We subsequently improved this CPC, creating the modified standard CPC in the first cycle of standardization. We then proceeded to the second standardization cycle, and improved the modified standard CPC to create version two of the modified
standard CPC. This then permitted us to proceed with standardizing speech therapists’ intervention processes in dysphagia rehabilitation.

Analysis of the data collected in the first cycle has provided some results; however, as we have recently received results from the second cycle, more discussion is required to conclude which intervention processes are most advantageous for each patient background type.

In future, we will reconsider the method of analysis, and further revise the standard CPC with preferable intervention processes. We will then design a unit sheet, in addition to the standard CPC presented above, and will work to standardize practices in the “Unit Sheet”. Additionally, we will work to design standard intervention processes for other types of rehabilitation, through application of our method.

5.2 This study’s significance

PCAPS Study Group (2012) also conducted verification research with multiple hospitals in addition to development of PCAPS contents for particular diseases / injuries, and its concept of “standardization” is similar to our core concept. The PCAPS verification research is mainly conducted to find the shortage of units and the route on CPC, with minimum data number and minimum data item. While, the CPC is correspond to both disease conditions and progress of rehabilitation training, and the standardization is conducted not only to find the shortage of units and the route on CPC, but also to find better intervention process, with larger data number and larger data item in our method.

The concept of the GRADE system (Gordon et al., 2008) is also similar to our core concept. As the GRADE system suppose both that clinical questions are defined by P.I.C.O. Model and that there are sufficient evidence for systematic review, it is difficult to be applied into rehabilitation intervention, because there is few evidence in the area. In such situation, our method is considered to be effective, because it was designed to utilize accumulated clinical data without defined P.I.C.O. Model in advance, through exploratory research.

In the field of rehabilitation, few reports compare interventions in multiple hospitals, as many differences exist in rehabilitation intervention processes between therapists and hospitals. Our method is significant as it suggests the possibility of standardizing the rehabilitation intervention process.

In this study, results were obtained through comparative analysis; however, further discussion is required to develop appropriate indicators for evaluating dysphagia rehabilitation interventions. In future, we will work to establish an evaluation system for dysphagia rehabilitation.

6. Conclusion

We proposed a method for standardizing rehabilitation interventions, to enable the standardization of rehabilitation intervention processes with few evidence in advance. An application of our method to dysphagia rehabilitation confirmed our method’s adequacy and raised new issues.

In future, we will work to design unit sheets for each unit in the standard CPC for dysphagia rehabilitation, in order to proceed with further standardization; we will also work to design a rehabilitation evaluation system. Additionally, we will apply our method to other types of rehabilitation, both to verify our method and to advance the standardization of rehabilitation intervention processes.

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Author’s biographical notes

Shogo Kato is working for Center for Clinical Research and Development, National Center for Child Health and Development. He had worked for the University of Tokyo till September 2015, after he got Ph.D. in Engineering. His research interests are system analysis engineering in both healthcare and industrial fields, as represented by patient safety, trouble prevention, and so on. He was awarded the Nikkei QC Literature Prize in 2009.

Satoko Tsuru is a Professor at School of Engineering, the University of Tokyo. She is leader of research group for clinical knowledge structuring in healthcare. The project is developing integrated Patient Condition Adaptive Path system: PCAPS for clinical quality management. Her research interest is Healthcare Social System Engineering.

Yoshinori Iizuka is a Professor Emeritus, the University of Tokyo, having retired from the position of professor. He has played important roles, including President of JSQC for 2003-2005, Chair of Deming Application Prize Committee for 2008-2011, and Vice President of International Academy for Quality. He was awarded Deming Prize for Individuals in 2006, and ASQ Freund-Marquardt Medal in 2011.

Makoto Ide is a President at St Mary’s Healthcare Center. He is a specialist of rehabilitation medicine.
Eiko Nakashima is a Speech Therapist at Department of Rehabilitation, St. Mary’s Hospital.

Hiromi Kuroki is a specialist in rehabilitation medicine, currently working for Department of Orthopedics Surgery, Faculty of Medicine, University of Miyazaki Hospital. She had been working as a Director at Department of Rehabilitation, Iizuka hospital till May 2015.

Kazumi Maeda is a Speech Therapist at Iizuka Hospital.

Akira Shindo is a President at Oguno Hospital. He is an internal medicine doctor.

Kazuki Miyawaki is a Chief Speech Therapist at Department of Rehabilitation, Oguno Hospital.

Yasuko Hashimoto is a President at Senri Rehabilitation Hospital. She is a medical doctor.

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