Abstract:
The purpose of this study is to systematize the perspectives for work process diagnosis in healthcare based on a quality management approach. Three general perspectives are established to achieve this, related to process structure, process contents, and process management. These three general perspectives are then developed in detailed considering nine healthcare characteristics represented by such statements as "must respond to significant differences among individual patients", "patient's condition changes on a moment-by-moment basis," and so on. A list of 278 specific perspectives for healthcare work process diagnosis is prepared from this. Finally, the list is tested and applied in two hospitals, where we verify its effectiveness by confirming the results of the work process diagnosis before and after its application.

Keywords
Process Management, Quality Improvement, Internal Audit, Quality Management System, Healthcare Work Process Diagnosis

1. Background and research purpose

Many hospitals in Japan have begun to establish their own quality management systems (QMS) to ensure the quality of their healthcare services. Through QMS, hospitals want to ensure they have the necessary work processes to deliver high-quality healthcare services. Since there are characteristics of “healthcare services are difficult to undo”, it is more important in healthcare than in other industries to diagnose a work process, and improve it before providing the healthcare service to patients.

It is possible to identify the problems in the work process at a hospital based on failures that have already occurred. However, if a hospital prefers to identify these problems beforehand, it should have a general model of a high-performance work process, and confirm the existence of a gap between the existing work process and the general model. This study identifies these gaps as “perspectives for work process diagnosis.”

Many useful general work processes models have already been developed and applied in the industrial sector. For example, the IPO (Input-Process-Output) is a simple process model, and a method for visualizing the Input-output relationship among functions in software development. IDEF0 (The National Institute of Standard and Technology of USA, 1993) shows that each activity consists of input, output, control, and mechanism. The Turtle analysis model (International Automotive Task Force, 2009) indicates that a work process of high-performance has six elements such as input, process, human resource, infrastructure, method, monitoring and measurement, and output. The QMS model based on ISO 9001 (International Organization for Standardization, 2008) demonstrates that QMS consists of several unit processes and their process network. Nakatsukasa and Nakajo (2001) evaluate the TQM activity based on the concept of Plan, Do, Check/Act, and Performance. Ishizu and Osada (2005) propose self-assessment items in the management system of an organization, categorized into Driver, Enabler and Performance based on the business management system model proposed in their previous study.

On the other hand, the SHELL model (H. F. Hawkins, 1987), Medical Systematic Approach for Error Reduction (Kawano, 2004) and the VA-RCA (VA National Center, 2015) are mainly used for work process improvement based on failure cases in the healthcare field. The SHELL model and Medical Systematic Approach for Error Reduction focus on the “human factor,” one of factors to consider when building a high-performance work process. The VA-RCA proposes the standard questions regarding rules, safeguards, environment, equipment, information technology, fatigue and scheduling, training and communication in order
Thus, various perspectives are proposed in both the fields of industry and healthcare. However, there are substantial differences among the perspectives used in each model, and the relationships among them lack the clarity required for a medical staff to utilize them for the purpose of process diagnosis. In addition, no studies systematize the model according to the characteristics of healthcare.

Therefore, the purpose of this study is to systematize the perspectives for work process diagnosis in healthcare in order to enable a medical staff to find problems in a work process, and shape these into a list. The proposed list is then tested at two hospitals to confirm its effectiveness.

2. Clarification of perspectives for process diagnosis

2.1 Three basic perspectives for work process diagnosis

Three different types of perspectives are identified in this study through investigation of the conventional QMS studies. The three basic perspectives of process diagnosis used here is shown in Figure 1.

As shown in Figure 1, the work processes that can achieve high performance are to be identified from aspects of “structure”, “content” and “administration”. The “structure of work process” is comprised of a process network and unit processes. The “content of work process” represents engineering technology, management technology, and people’s values and behavioral principles reflected in the work process. Finally, the “administration of work process” means that we need to administer the work process based on a Plan, Do, Check, and Act (PDCA) cycle; in other words, the work process is decided in the Plan stage, and it is implemented in the Do stage, then the performance is confirmed in the Check stage, and the necessary action will be taken in the Act stage.

This means that we can only achieve high performance in a work process if the structure of the work process is well arranged, the content is sufficiently developed to meet its purpose, and we can manage the process organizationally. We explain this in detail in the next section.

2.2 First perspectives: Structure of work process

The first perspective is the “structure of work process” that shows the kinds of components the work process should be comprised of (Shimono et al., 2011; Iizuka et al., 2009). Process approach, a quality management principle in the ISO9001 requirements, is incorporated into this; in other words, the work process is composed of process network (1-1), and unit process (1-2), as shown in Figure 2.

The elements of concern in the “process network” are “whether or not the necessary processes are specified to achieve the purpose of the work process,” and “has the relationships among the processes been validated?” On the other hand, the elements of concern in the “unit process” are “the basic components been clarified and
well-prepared such as input-output, tasks, resources (including the specifications of the resources and their management), and control (including functions for monitoring and measuring, and immediate response, if necessary)?”

Therefore, we can arrange the following perspectives in Figure 3.

Figure 2: Structure of work process

- 1-1: Process network
  - 1-1-1: Necessary processes to achieve the purpose of the work process
  - 1-1-2: Relationship among each process
- 1-2: Unit process
  - 1-2-1: Input-output
  - 1-2-2: Tasks
  - 1-2-3: Resources (People/Infrastructure/Work environment/Knowledge/Partner)
    - 1-2-3-1: Specs of the necessary resources
    - 1-2-3-2: Resources management
  - 1-2-4: Control
    - 1-2-4-1: Monitoring and measuring
    - 1-2-4-2: Immediate response

Figure 3. Perspectives on structure of work process

2.3 Second perspectives: Content of work process

The second perspective is the “content of work process.” In general, it is essential for an organization to have two types of technology in order to implement the high-quality work process (TQM Committee, 1998). The first is an engineering technology (2-1 in Figure 4) that is unique and necessary when providing products and services. The second is a management technology (2-2) to utilize the engineering technology and to make it more effective and efficient in implementing work processes. The management technology is deployed as two detailed items. These are “work process that anyone can implement anytime and anywhere (2-2-1)” and “early detection and resolution of abnormality (2-2-2).” Satisfying 2-2-1 involves “simplification of the difficult work process (2-2-1-1),” “consideration of human factors (2-2-1-2),” and “response to unsteady situations (2-2-1-3).” On the other hand, “implementation of inspection in the right step (2-2-2-1),” “inspection that can detect the abnormality without omission (2-2-2-2),” and “immediate and appropriate countermeasures (2-2-2-3)” are necessary for 2-2-2.

Additionally, another perspective is peoples’ values and behavioral principles. This perspective means that
even if the above are absolutely reflected in the work processes, the key factor to achieve high-performance is an individual’s understanding of the purpose of the work process and the necessary behavior based on QM principles such as overall quality, system approach, and standardization. This results from the fact that people may face a work process without a standard operation procedure (SOP) or feel like deviate the SOP for a certain reason. Correct value and behavioral principles can overcome such serious situations.

Therefore, we arrange the following perspectives on “Content of work process.”

| 2-1: Engineering technology |
|-----------------------------|
| 2-1-1: Necessary engineering technologies that an organization has |
| 2-1-2: Work process in which the mechanism of the engineering technologies are reflected |

| 2-2: Management technology |
|-----------------------------|
| 2-2-1: Work process that anyone can implement anytime and anywhere |
| • 2-2-1-1: Simplification of the difficult work process |
| • 2-2-1-2: Consideration of human factors |
| • 2-2-1-3: Response to unsteady situations |
| 2-2-2: Early detection and resolution of abnormality |
| • 2-2-2-1: Implementation of inspection in the right step |
| • 2-2-2-2: Inspection that can detect the abnormality without omission |
| • 2-2-2-3: Immediate and appropriate countermeasures |

| 2-3: People’s values and behavioral principles |
|-----------------------------------------------|
| 2-3-1: Understanding of the purpose of the work process |
| 2-3-2: Understanding of QM principles |

| 2.4 Third perspectives: Administration of work process |

The third perspective is the “administration of work process,” in other words, the PDCA cycle. Iizuka et al. (2009) indicate that the PDCA cycle consists of the following nine activities illustrated in Figure 5.

| 3-1: Plan |
|----------|
| 3-1-1: Clarify the purpose of the work process (P1) |
| 3-1-2: Decide the procedure to achieve the purpose (P2) |

| 3-2: Do |
|---------|
| 3-2-1: Arrange the work environment (D1) |
| 3-2-2: Implement the work process along with P2 (D2) |

| 3-3: Check |
|-----------|
| 3-3-1: Confirm the status on the individual cases (C1) |
| 3-3-2: Confirm the status on the work process (C2) |

| 3-4: Act |
|----------|
| 3-4-1: Conduct immediate response (A1) |
| 3-4-2: Eliminate the causes of abnormality (A2) |
| 3-4-3: Take preventive action (A3) |

Figure 4. Perspectives on content of work process

Figure 5. Nine activities for PDCA cycle

Planning includes two activities: “P1” clarifies the purpose of the target work process with the results utilized as management indicators in the Check process; “P2” decides how the work process will achieve its purpose. Normally, this means that a hospital visualizes its own current work processes as a first step in process improvement. The results of “P2” are utilized in “D1” of the Do process and “A2” of Actions. The Do process has two activities as well. “D1” prepares the work environment, such as education and training of the medical staff, medical materials and devices, and so on, based on “P2” output. “D2” implements the work process determined in “P2.”

The Check process includes the “C1” and “C2” steps to confirm the implementation status, performance, and side effects by the management indicators clarified in “P1.” If discrepancies between the target levels for the management indicators and the present status are found, “A1,” “A2,” and “A3” of Act process are initiated. “A1” conducts the emergency measures for a certain case based on the results of “C1.” As this activity cannot contribute to the improvement of other cases, recurrence prevention in “A2” is necessary to avoid the “A1”
activity. Through the “A2” activity utilizing the results from “C2”, the work process of “P2” is improved. In addition, taking a preventive action of “A3” based “P2,” is very important for a hospital.

3. Development of a list for work process diagnosis considering healthcare characteristics

In this chapter 3, a list for work process diagnosis is established considering how characteristics in healthcare should be reflected in the list.

3.1 Clarification of the relationship among the three perspectives

When conducting the process diagnosis, the targeted work process has already been implemented in the organization. This means that to some extent, the organization is already starting to direct the work processes after arranging their structure and establishing the content of each work process. Therefore, the list for work process diagnosis should be developed with the “Administration of work process” as a primary axis. It is necessary from this point to examine where the perspectives on “Structure of work process” and “Content of work process” should be reflected in the PDCA cycle. The results are identified in Table 1. The vertical column of the Table details the nine activities of the PDCA cycle shown in Figure 5. The other two perspectives are detailed in the horizontal column. A black circle (●) indicates that a relationship exists between the elements in the vertical and horizontal columns.

Table 1. Relationship among the perspectives

| 3. Administration of work process | 1. Structure of work process | 2. Content of work process | 2-3: People’s value and behavioral principle |
|----------------------------------|-----------------------------|---------------------------|-------------------------------------------|
| 3-1-1: Clarify the purpose of the work process | 1-1-1: Necessary processes to achieve the purpose | 2-1-1: Necessary engineering technologies that an organization has | 3-3-1: Understanding of the purpose of the work process |
| 3-1-2: Decide the procedure to achieve the purpose | 1-1-2: Relationship among each process | 2-1-2: Work process in which the mechanism of the engineering technologies are reflected | 3-3-2: Early detection and resolution of abnormality |
| 3-2-1: Arrange the work environment | 1-2: Input-Output | 2-2-1: Work process that anyone can implement anytime and anywhere | 2-3-1: Understanding of QM principles |
| 3-2-2: Implement the work process along with P2 | 1-2-1: Task | 2-2-2: Early detection and resolution of abnormality | 2-3-2: People’s value and behavioral principle |
| 3-3-1: Confirm the status on the individual cases | 1-2-2: Resources | 2-2-3: Early detection and resolution of abnormality | 2-3-3: Understanding of the purpose of the work process |
| 3-3-2: Confirm the status on the work process | 1-2-3: Process network | 2-2-4: Early detection and resolution of abnormality | 2-3-4: Understanding of the purpose of the work process |
| 3-4-1: Conduct immediate response | 1-2-4: Control | 2-2-5: Early detection and resolution of abnormality | 2-3-5: Understanding of the purpose of the work process |
| 3-4-2: Eliminate the causes of abnormality | |
| 3-4-3: Take preventive action | | | |

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For example, Table 1 illustrates that the “P2” activity has a relationship with the process network (1-1), unit process (1-2), engineering technology (2-1), and management technology (2-2). This indicates that all related perspectives should be included in the “P2” activity. Further, no black circle is noted in 3-1-1, 3-2-2, and 3-4-3. This does not mean that these three items do not need to be covered in a list for work process diagnosis, but that there is no perspective of “Structure of work process” and “Content of work process” that should be reflected in these three items when creating the list.

3.2 Steps to create a list for work process diagnosis

The steps to create a list for work process diagnosis in this study are as follows, and an overall figure of the steps is shown in Figure 6.

- Step1: Establish the vertical column based on PDCA cycle as the primary items.
- Step2: Deploy each primary item into secondary items with considering the relationship among the perspectives shown in Table 1.
- Step3: Deploy each secondary item into tertiary items by examining the kinds of items that should be added when considering the characteristics of healthcare.
- Step4: Deploy each tertiary item into quaternary items for medical staffs to easily understand how to ask questions and conduct necessary investigations.

At first, the primary items are decided upon based on the PDCA cycle shown in Figure 5. As a result, the five items, P1, P2, D1, C1&A1, and C2&A2&A3, are set because A1 activity needs to occur after C1 activity, and A2 and A3 should be done after C2 activity, as mentioned in Section 2.4.

Next, the secondary items are deployed considering the relationship among the three perspectives in Table 1. For example, since the P2 activity has a relationship with “necessary processes (1-1-1),” the perspective of “are all necessary processes listed to achieve the purpose of the work process?” is incorporated. Additionally, since the P2 activity has a relationship with “input-output (1-2-1),” the perspectives of “is the input and output of each process clarified?” is incorporated as well.

Tertiary items are determined considering the nine characteristics of healthcare summarized by Kaneko and Munechika (2013) as shown in Table 2. Then, where the new added items must be reflected in the five primary items is examined. For example, considering the characteristics of “a,” the three perspectives are added to the P1 activity, including “is the applied condition of the work process such as the patient’s condition and other work environment situation specified?” and the four perspectives are added in the P2 activity, including “can
the process flow correspond to the individual difference among each patient?”. As a result, the number of added items to consider the nine characteristics is thirty-five, as shown in Table 2.

Finally, the tertiary items are deployed in detail as quaternary items in order for medical staffs to easily understand how to ask questions and conduct necessary investigations when performing a process diagnosis.

Table 2. Nine characteristics of healthcare

| Category | No. | Arranged characteristic of healthcare service | P1 | P2 | D1 | C1&A1 | C2&A2 &A3 | Total |
|----------|-----|---------------------------------------------|----|----|----|-------|----------|-------|
| Characteristics of "Patient" |    |                                             |    |    |    |       |          |       |
| a        |    | Must respond to significant differences among individual patients. | 4  | 4  | 2  | 1     | 11      |       |
| b        |    | Patient’s condition changes on a moment-by-moment basis. |    |    | 2  |       | 2       |       |
| Characteristics of "Healthcare service" |    |                                            |    |    |    |       |          |       |
| c        |    | Healthcare service provides invasive patient interventions. |    | 1  |    |       | 1       |       |
| d        |    | Healthcare services are difficult to undo. |    | 1  |    |       | 1       |       |
| e        |    | Emergency response is required to restore patient’s condition. |    | 1  | 1  |       | 2       |       |
| Characteristics of "Organization to provide healthcare" |    |                                            |    |    |    |       |          |       |
| f        |    | Skilled expertise is required to provide healthcare services. |    | 2  | 1  |       | 3       |       |
| g        |    | Provision of healthcare services is based on cooperation among several disparate professions. |    | 1  | 2  |       | 3       |       |
| h        |    | Patients and medical staff operate in the same environment. |    | 3  | 5  |     | 8       |       |
| i        |    | Each hospital is categorized by its own primary functions. |    | 1  | 2  |       | 4       |       |
| Total    |    |                                            | 6  | 17 | 7  | 3     | 2       | 35    |

3.3 Results

The created list is shown in Table 3 below, and consists of primary, secondary, tertiary and quaternary items. Each level contains 5, 18, 56, and 278 items, respectively. Each hospital can understand what kinds of questions they need to ask for work process diagnosis based on the quaternary items that are deployed in detail.

Table 3. List of perspectives for process diagnosis

| First item | Second item | Third item | Fourth item | No. |
|------------|-------------|------------|-------------|-----|
| 1. Is the purpose of the work process clarified ? | 1-1) Is the purpose of the work process already set up ? | 1-1-1) Is the application scope clarified ? | Are some unit processes of different purposes combined in the targeted work process ? | 1 |
| 1-1-1-1) Is the application scope too limited in your department ? | 1-1-1-1-1) Is the objective of the targeted work process specified ? | Is the scope overlapping the previous work process or the post work process ? | Is the applied condition of the work process clarified ? | 3 |
| 1-1-1-1-1-1) Is the application scope too limited in your department ? | 1-1-1-1-1-1) Is the application scope too limited in your department ? | Is the applied condition of the work process clarified ? | Is the application scope too limited in your department ? | 2 |
| 1-1-1-1-1-1-1) Is the application scope too limited in your department ? | 1-1-1-1-1-1-1) Is the application scope too limited in your department ? | Is the relationship with the previous work process and the post-work process clarified ? | Is the relationship with the previous work process and the post-work process clarified ? | 6 |
| 1-1-1-1-1-1-1-1) Is the application scope too limited in your department ? | 1-1-1-1-1-1-1-1) Is the application scope too limited in your department ? | Is the start point and end point appropriate ? | Is the start point and end point appropriate ? | 7 |
| 1-1-1-1-1-1-1-1-1) Is the application scope too limited in your department ? | 1-1-1-1-1-1-1-1-1) Is the application scope too limited in your department ? | Are all the concerned professions listed ? | Are all the concerned professions listed ? | 8 |
| 1-1-1-1-1-1-1-1-1-1) Is the application scope too limited in your department ? | 1-1-1-1-1-1-1-1-1-1) Is the application scope too limited in your department ? | Is the process network described based on “patient journey” | Is the process network described based on “patient journey” | 9 |
| 1-1-1-1-2) Is the purpose validated ? | 1-1-2) Is the purpose of the targeted work process specified ? | Is the output of the work process clarified ? | Do you recognize who your customers are ? | 10 |
| 1-1-2-1) Is the objective of the targeted work process consistent with the one in the upper layer level ? | 1-1-2-1-1) Is the objective of the targeted work process consistent with the one in the upper layer level ? | Is the objective consistent with the organizational policy | Do you recognize who your customers are ? | 11 |
| 1-1-2-1-1-1) Is the objective of the targeted work process consistent with the one in the upper layer level ? | 1-1-2-1-1-1-1) Is the objective of the targeted work process consistent with the one in the upper layer level ? | Is the objective consistent with the department policy | Do you understand the needs and wants from the customers ? | 12 |
| 1-1-2-1-1-1-1-1) Is the objective of the targeted work process consistent with the one in the upper layer level ? | 1-1-2-1-1-1-1-1-1) Is the objective of the targeted work process consistent with the one in the upper layer level ? | Do you decide the criteria to judge whether or not an organization satisfies their needs and wants ? | Do you decide the criteria to judge whether or not an organization satisfies their needs and wants ? | 13 |
| 1-1-2-1-2) Is the purpose validated ? | 1-2) Is the purpose validated ? | If the control level of the criteria already set up ? | If the control level of the criteria already set up ? | 14 |
| 1-2-1) Is the objective of the targeted work process specified ? | 1-2-1-1) Is the objective of the targeted work process specified ? | Is the objective consistent with the organizational policy | Does the objective correspond to the needs of the customer and the region ? | 15 |
| 1-2-1-1-1) Is the objective of the targeted work process specified ? | 1-2-1-1-1-1) Is the objective of the targeted work process specified ? | Is the objective consistent with the department policy | Does the objective correspond to the needs of the customer and the region ? | 16 |
| 1-2-1-1-1-1-1) Is the objective of the targeted work process specified ? | 1-2-1-1-1-1-1-1) Is the objective of the targeted work process specified ? | Does the objective correspond to the needs of the customer and the region ? | Does the objective correspond to the needs of the customer and the region ? | 17 |
| 5. Is the improvement activity toward the work process (P2) | 5-3) Do you take preventive action (A3) ? | 5-3-1) Do you establish the useful faults database system ? | Do you categorize each fault by error mode ? | 267 |
| 5-3-1-1) Do you establish the useful faults database system ? | 5-3-1-1-1) Do you establish the useful faults database system ? | Do you recognize the mechanism, such as the process flow or the process condition, which causes the error mode ? | Do you recognize the mechanism, such as the process flow or the process condition, which causes the error mode ? | 268 |
| 5-3-1-1-1-1) Do you establish the useful faults database system ? | 5-3-1-1-1-1-1) Do you establish the useful faults database system ? | Is necessary information prepared for process diagnosis ? | Is necessary information prepared for process diagnosis ? | 269 |
| 5-3-2) Do you diagnose the work process appropriately ? | 5-3-2-1) Do you diagnose the work process appropriately ? | Do you prioritize on the extracted problems ? | Do you prioritize on the extracted problems ? | 270 |
| 5-3-2-1-1) Do you diagnose the work process appropriately ? | 5-3-2-1-1-1) Do you diagnose the work process appropriately ? | Do you follow up on the implementation status of the preventive action plan ? | Do you follow up on the implementation status of the preventive action plan ? | 271 |
4. Verification

4.1 Verification Outline

The created list was tested in internal audits by hospital A (350 beds) and hospital B (592 beds). Both of them have already introduced and promoted their own QMS, and each hospital has already conducted the internal audits before the test is 7 and 10 times, respectively. The aim of the internal audit is to find the improvements for the targeted work process.

The members of the administrative staff for QMS in each hospital prepared the checklist based on the proposed list for performing the work process diagnosis, and subsequently the internal audit was done by each hospital.

4.2 Application at hospital A

Figure 7 shows the average number of issues identified in all divisions subject to the internal audit. The new checklist was used in the eighth and ninth internal audit at hospital A, and it took approximately one hour for the audit team to conduct the audit before and after the checklist’s application. Further, the audit team consists of a chief medical doctor, a chief nurse and a co-medical staff above the level of division chief, and they have already implemented the audit at least twice or more before the eighth and ninth audits. A downward trend can be seen up to the seventh audit, however the average number of issues in the eighth and ninth audits increased compared with the three earlier audits (5, 6, and 7).

Figure 7. Trend on average number of issues identified

Further, Hospital A believes a primary problem is that the internal audit is not conducted based on their audit policy, and the quality of the issues identified depends too much on the individual auditor’s skill. Therefore, consistency with the internal audit policy was confirmed before and after its test. The results are shown in Table 4.

Table 4. Consistency with the internal audit policy

|                               | First to Seventh | Eighth and Ninth |
|-------------------------------|------------------|------------------|
|                               | Number of matters| Percentage       | Number of matters | Percentage |
| The matter is consistent      | 122              | 49.0             | 61               | 77.2       |
| The matter is not consistent  | 127              | 51.0             | 18               | 22.8       |
| Total number of matters       | 249              | 100.0            | 79               | 100.0      |
Table 4 demonstrates that there is a marked improvement in the percentages of consistent issues before and after the checklist’s application. This means that the issue found in the audit is consistent with audit policy; if the highlighted issue is outside of the audit policy, it is judged as “Not consistent.” It was found out that all of the eighteen issues identified as “the issue is NOT consistent” in the eighth and ninth audits are beyond the internal audit policy in hospital A.

These facts indicates that the proposed list is useful for medical staffs in hospital A to conduct process diagnosis.

4.3 Application at hospital B

Hospital B also revised the checklist for their internal audits based on our proposed list, then conducted a work process diagnosis. Additionally, a questionnaire survey was performed with 31 people who were concerned with the internal audit, and covered 22 questions, including “is the revised checklist easy to understand?” and “is the revised checklist more useful than the conventional one?” A sample of the results is provided in Figure 8. For example, 92% of the 31 people who answered question 1-7 feel that the revised checklist is very or somewhere clearer compared to the conventional one used in hospital B. Moreover, 85% of those who answered question 1-9 want to use the revised checklist based on the proposed list from the next audit. Furthermore, such comments as “it is important to confirm work processes from the perspective of the Plan-Do-Check-Act cycle, and not only the content of the Plan itself” and “it is useful to systematically check work processes based on input-output, people, and so on, as shown in Figure 2” were obtained from medical staff in hospital A.

These results indicate that the revised checklist, based on the proposed work diagnosis list, is clearer and more useful for medical staff in hospital B than the conventional one.

![Figure 8. Results of the questionnaire survey](image)

5. Discussion

5.1 Importance of this study

The ultimate goal of this study is to ensure the quality of the healthcare service provided to patients. We proposed the perspectives for conducting an effective work process diagnosis to achieve this goal and shaped them into a list. Many conventional studies exist regarding a perspective for process diagnosis, as mentioned in Chapter 1. However, the perspectives in this study were systematized and shaped into a list based on what kind of components a high-performance work process should have, whereas each conventional study encompassed only one or two aspects of the high-performance work process.

In order to develop the list, we first examined a general model of the work processes that can achieve continuous high performance. As a result, three perspectives for process diagnosis were specified: Structure,
Content, and Administration of work process. Then, the perspectives were deployed in detail as primary, secondary, tertiary, and quaternary items, considering the relationships among them. In addition, as the characteristics of healthcare are quite different from other industries, the specified nine characteristics of healthcare were reflected in the perspectives for work process diagnosis. As a result, 35 items are added to the list.

The created list consists of primary, secondary, tertiary and quaternary items, and the total number of the perspectives in terms of the fourth items is 278. Finally, the proposed list was applied at hospitals A and B, and its effectiveness was confirmed by comparing audits before and after its application at hospital A, with a questionnaire survey at hospital B.

Therefore, the proposed perspectives in this study allow medical staff to find existing problems in the targeted work processes more efficiently.

5.2 Future challenges

This study focused on perspectives for process diagnosis and shaped them into a list. As an appropriate diagnosis “process” must be established to conduct an effective diagnosis, if the perspectives shown in the proposed list can be restructured in parallel with the appropriate diagnosis process, we could propose the order in which medical staff should utilize each perspective. Moreover, another important challenge involves proposing a method to design a project plan for diagnosing a certain work process considering the specific characteristics and situations of both the work process and the organization. In addition, as verification in hospitals A and B was not conducted by controlling for such conditions as auditor’s skill and audited work processes, strict verification is necessary in the near future.

6. Conclusion and Future issues

In order to implement effective process diagnosis in healthcare, this study extracted its perspectives and shaped them into a list that consists of 278 items in fourth level. Further, as the effectiveness of the proposed list is confirmed in hospitals A and B to some extent, strict verification of the proposed list is necessary. It is also necessary to further discuss whether the structure of the proposed list is best for a medical staff to effectively conduct a process diagnosis effectively, in other words, whether the deployment steps to create the proposed list shown in Figure 6 offer the best way to proceed.

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