ひと、くらし、みらいのために
厚生労働省
Ministry of Health , Labour and Welfare

Patient Safety
Global Ministerial Summit 2018

# 改善

# KAIZEN

## Showcase of Engineering Patient Safety and Quality Culture



April 2018

Third Global Ministerial Summit on Patient Safety

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# Introduction and background

Patient safety is an urgent global issue. We need to improve quality and safety in the healthcare setting; this is a fundamental element, not a luxury, to ensure quality service delivery toward Universal Health Coverage (UHC). Our key messages to improve patient safety described in this report are as follows:

- **With limited resources, we can still tackle patient safety issues by learning from the experience and expertise of other industries.**
- **There have already been many great successes in improving patient safety and healthcare quality in not only high-income countries, but also low- and middle-income countries, by applying KAIZEN tools.**
- **Collaboration with other industries is the key to solving difficult challenges in healthcare.**

When the issue of patient safety emerged globally around 2000, Japan too experienced many patient safety incidents, including the followings:

- **January 1999: Yokohama City University Hospital**
  Patients for heart surgery and lung surgery were mixed up, and operations were performed on the wrong patients.

- **February 1999: Tokyo Metropolitan Hiroo Hospital**
  Disinfectant, instead of anticoagulant, was administered intravenously by mistake, resulting in the patient's death.

- **February 2000: Kyoto University Hospital**
  Ethanol was put into the humidifier of the ventilator by mistake instead of distilled water, resulting in the patient's death.

- **April 2000: Tokai University Hospital**
  Oral medication was administered intravenously due to confusion with the enteral nutrition route, resulting in the patient's death.

Some of the incidents could have been prevented by organizing the care setting better, for example, applying "5S", one of the KAIZEN tools developed in Japan industry. KAIZEN is the Japanese word, " 改善 ", consisting of two characters: KAI " 改 " meaning to change, and ZEN" 善 " meaning to be good or well. So KAIZEN " 改善 " means to change to make things better or improve them. Since KAIZEN is now widely used globally to mean continuing quality improvement in industry and business, we define KAIZEN in this report as the broad concept of quality improvement originating in Japanese industry, including its tools such as PDCA (or PDSA), "5S", "KYT", and "QC circles".

KAIZEN and its tools have been applied in healthcare settings to improve healthcare quality and patient safety in not only high-income countries, but also in low- and middle-income countries. This report describes some best practices of KAIZEN from all over the world.

# KAIZEN Experiences in Low- and Middle-Income Countries (LMICs)

# Chapter 1

## KAIZEN Experiences in Low- and Middle-Income Countries (LMICs)

Report from Fujita Planning Co., Ltd. & JICA
Authors: Mr. Takahiko Minase, Mr. Shuichi Suzuki,
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# Chapter 1:
# KAIZEN Experiences in Low- and Middle-Income Countries (LMICs)

## 1.1 Japan Brand KAIZEN and Hospital Management

Many Japanese organizations and groups are involved in providing assistance to LMICs for socioeconomic development as part of the Official Development Assistance (ODA) program. The Japan International Cooperation Agency (JICA) is the main implementing agency for ODA, which provides bilateral aid in the form of technical cooperation, Japanese ODA loans and grant aid (See Column 3) aiming at working on human security and quality growth as its mission.

Unique know-how, methods and techniques originating in Japan are proved to be useful in the field in many LMICs. KAIZEN is one such method that is regarded as "Japan Brand". At the Opening Session of the Sixth Tokyo International Conference on African Development (TICAD VI), Japanese Prime Minister Shinzo Abe mentioned cooperating with the New Partnership for Africa's Development (NEPAD) to disseminate the KAIZEN method throughout Africa[1]. The KAIZEN method can be applied to ensure quality of healthcare services contributing to achievement of UHC which is essential to human security.

### 1.1.1 World recognition of KAIZEN

5S-KAIZEN is a method for improving business management that has developed in the manufacturing sector in Japan, and while TQM has its origins in the manufacturing industry in the United States, it is a method for improving management that has been developed in a unique manner in Japan.

In the health sector in LMIC countries, this method has been introduced as the 5S-KAIZEN-TQM (Total Quality Management) approach through JICA's projects and received world recognition.

In 2012, JICA received the Solution Award from United Nations Office for South-South Cooperation for the "Program of Quality Improvement of Health Services by 5S-KAIZEN-TQM," which has been recognized as a model practice to help resolve organizational issues in hospital management.



Director, Health Quality Assurance Division presents 5S-KAIZEN-TQM experiences in Tanzania at the Expo[2]

1 https://japan.kantei.go.jp/97_abe/statement/201608/1218850_11013.html

2 https://www.jica.go.jp/project/english/tanzania/006/news/general/130117.html

Moreover, the "5S-Kaizen" became one of the finalists awarded with the Development Assistance Committee (DAC) prize[3] in 2015 for its innovative approach and scalability by the following points.

- Innovative application of **simple, low-cost quality management techniques** developed in Japan's manufacturing industry to hospitals for improving management and services
- The **bottom-up team-based approach** leading to **spontaneous activities for improvement** in the workplace.
- Increased **confidence and motivation** of staff members through **experiencing small successes**, and the realization that **they can be agents for change**, enhancing the sustainability of the approach.



DAC prize in 2015[4]

## 1.1.2 5S-KAIZEN-TQM approach and Hospital Management

As mentioned above, the 5S-KAIZEN-TQM is a simple, yet highly effective approach for improving the quality of healthcare, safety and hospital management in resource-constrained settings.

In JICA's program, **5S** stands for Sort, Set, Shine, Standardize, and Sustain, and the 5S leads to more efficient work environment by eliminating waste. **KAIZEN** is a problem-solving process by eliminating waste and maximum use of existing resources for departmental or sectional optimization. **TQM** is a state in which KAIZEN activities are continuously implemented in all departments and the leaders are able to make evidence-based decisions through such activities, optimizing the organization' management.

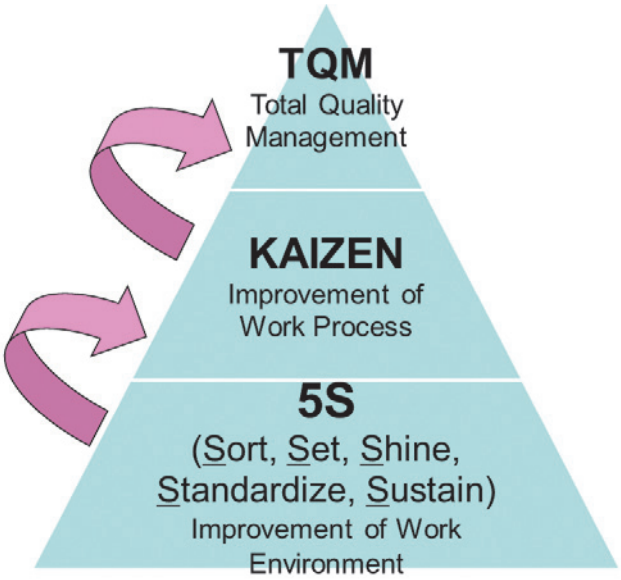


Figure 1: 5S-KAIZEN-TQM Pyramid

3 The DAC Prize was established by the Development Assistance Committee (DAC) of the OECD in 2014 to recognize innovative approaches that can be widely applied in low- and middle-income countries.

4 https://www.jica.go.jp/english/news/press/2015/160322_01.html

Figure 2[5] shows an example of the impact that can be achieved by improving the six major problems at hospitals such as "Medical accidents" and "Hospital associated infection" through the implementation of the 5S-KAIZEN-TQM approach.

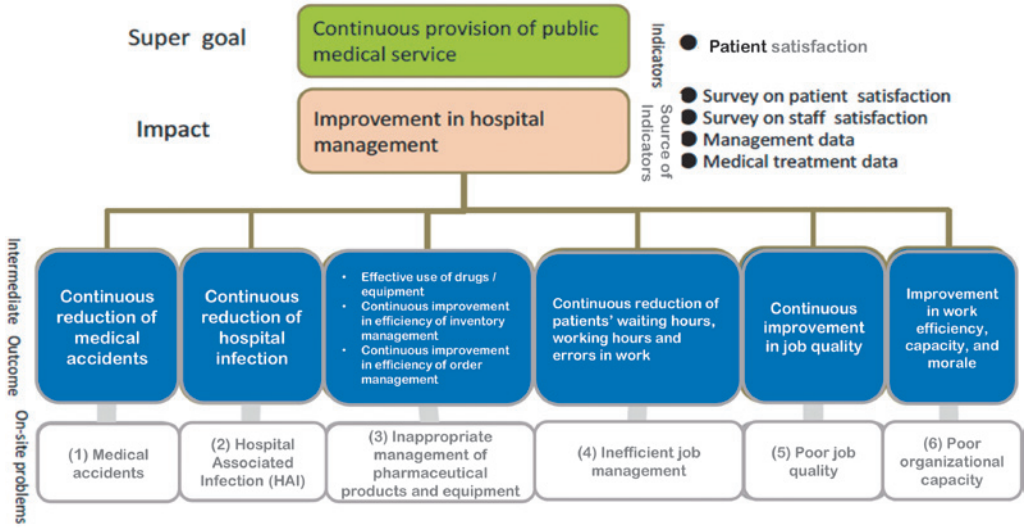



Figure 2: Example of outcomes that can be achieved through 5S-KAIZEN-TQM approach

## 1.1.2 (1) 5S – the first step of the 5S-KAIZEN-TQM approach–

The 5S is a philosophy and a methodology for organizing and managing the workspace and work flow with the intent of maximizing efficiency by eliminating waste, improving the work flow and reducing process unreasonableness. The achievements are visible, and active participation in the 5S nurtures a positive attitude and confidence among staff members through small successes. The explanation of 5S is as follows:

**Sort (S1):**
Eliminating unnecessary items from your workplace

**Set (S2):**
Organize all necessary items according to the current work flow for easy service provision

**Shine (S3):**
Cleaning up your workplace, including equipment

**Standardize (S4):**
Set up an environment where S1 to S3 are implemented in the same manner throughout the organization

**Sustain (S5):**
Maintain S1-S4 through discipline, commitment and empowerment




5S poster in Tanzania[6]

5 https://www.jica.go.jp/english/news/press/2015/160322_01.html
ant/program/thematic/c8h0vm000001rgwp-att/2013_01.pdf (Partially modified)

6 https://www.jica.go.jp/english/our_work/thematic_issues/health/c8h0vm00009u4yt7-att/case_materials_tanzania_03.pdf

### The 5S tools[7]

The tools for practicing the 5S to improve space utilization, productivity/efficiency, safety, communication, mistake proofing etc. are called "5S tool". The examples are as follows: Red tags, Alignment, Labeling, Tapes, Numbering, Alphabetical coding, Safety signs, Signboards, Zoning, X-Y axis, Symbols, Color coding, 5S Corner, etc. The meaning for each tool needs to be fully understood and agreed upon by staff members before introducing the tools.



**Labeling**
Used for the identification of items and their proper storage place



**Numbering**
Used for the identification of items, confirmation of orders



**Symbols**
Used for visual explanation to ensure that everyone can understand



**Zoning**
Used for the identification of the proper place to keep/store items



**Color Coding**
Used for the identification of items

## 1.1.2 (2) KAIZEN – the second step of the 5S-KAIZEN-TQM approach

In the ongoing JICA programs, the KAIZEN method is implemented using the QC story, which is composed of 7 steps[8] as shown below. The QC story is a method for illustrating the quality control process, which is used for systematic and fundamental problem solving.

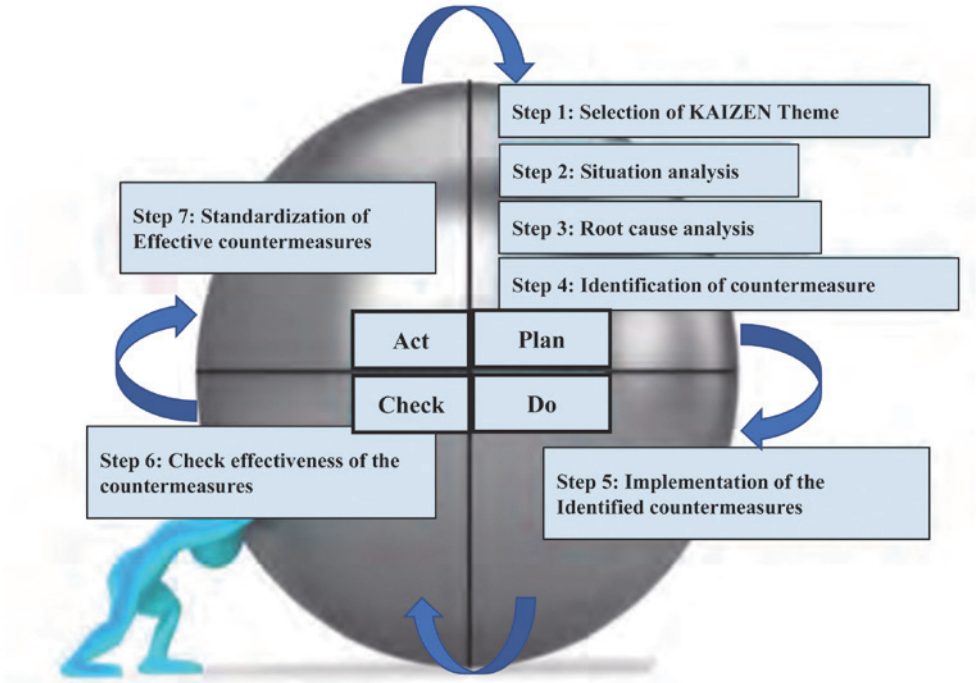



Figure 3: KAIZEN 7 steps (QC story) and PDCA cycle

7 https://www.jica.go.jp/english/our_work/thematic_issues/health/case_materials.html

8 After Step 2, "Target setting" or "Activity planning" may be added, which would be 8 steps in total, but the JICA project uses the above 7 steps.

## The QC tools

In each step, different types of QC tools are used to analyze data and information in a scientific manner and determine the measures to be taken. QC tools are simple and participatory to proceed with the QC story with evidence.

Implemented on 30th October 2014

| Possible KAIZEN theme | Impact | Urgency | Possibility | Resources availability | Feasibility |
|---|---|---|---|---|---|
| Number of giving wrong medication is reduced | 3 | 3 | 3 | 2 | 11 |
| Number of mistakes of specimen collection is reduced | 2 | 2 | 3 | 3 | 10 |
| Medicine wastage volume is reduced | 3 | 2 | 2 | 2 | 8 |

*Score scale*
*3: High priority, Easy to implement*
*2: Middle priority*
*1: Low priority, Difficult to implement*

Figure 4: Matrix Diagram (Step 1, Step 4)

This diagram is used to check the feasibility of a KAIZEN theme. Feasibility can be evaluated based on four factors: **Impact, Urgency, Realization, and Resource Availability.**

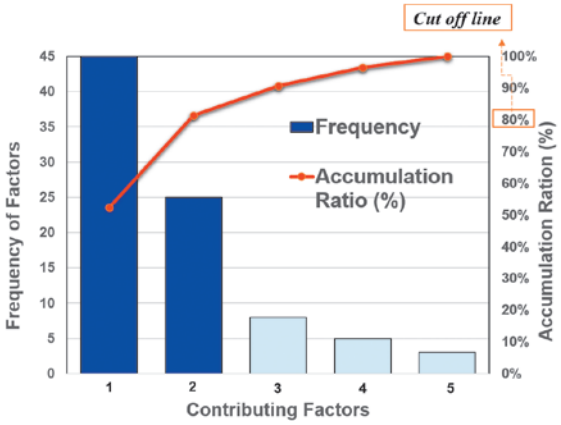



Figure 5: Pareto Chart (Step 2, Step 6)

This chart is used to quantitatively identify the present situation. It uses both bars and a line graph, where individual values are represented in descending order by bars, and the cumulative total is represented by a line. The cutoff line is set at 80% following the **Pareto Principal (80/20 rule)**. Thus, the order of priority of contributing factors to be resolved is identified.

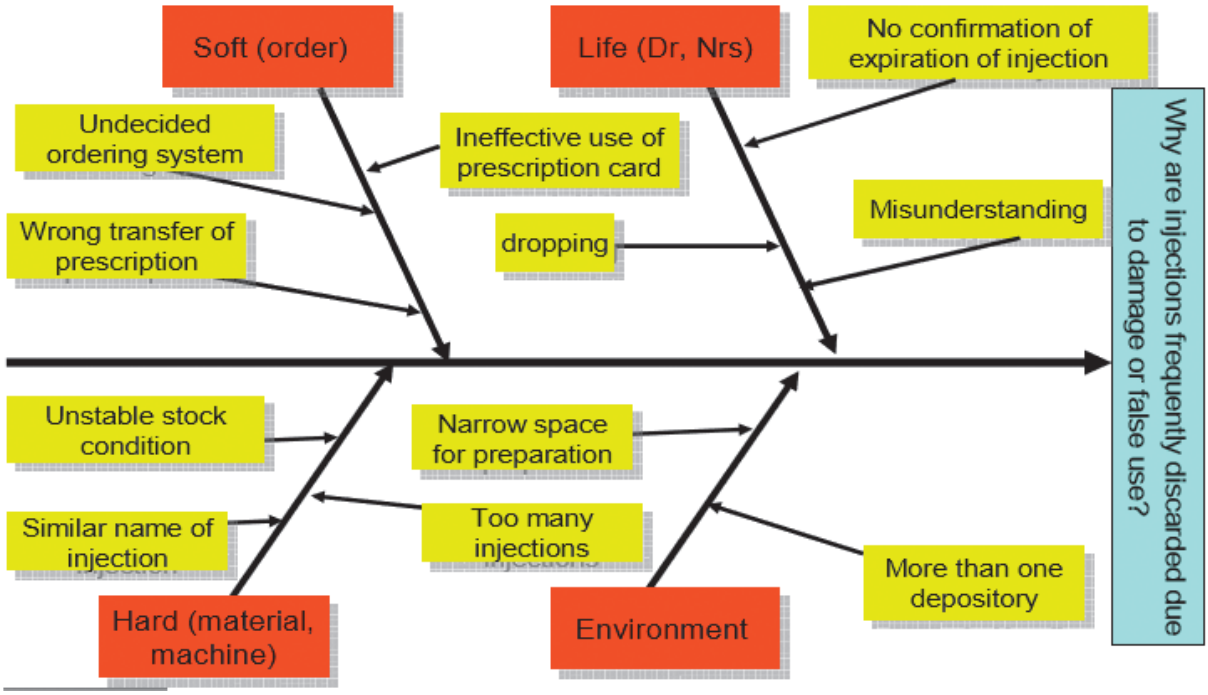



Figure 6: Fishbone Diagram (Step 3)

This diagram is used to analyze cause and effect relationships under the selected problems. To find the root causes, ask, "Why is this happening? Because..." five times for each possible cause and extend branches from each possible cause until it is complete.

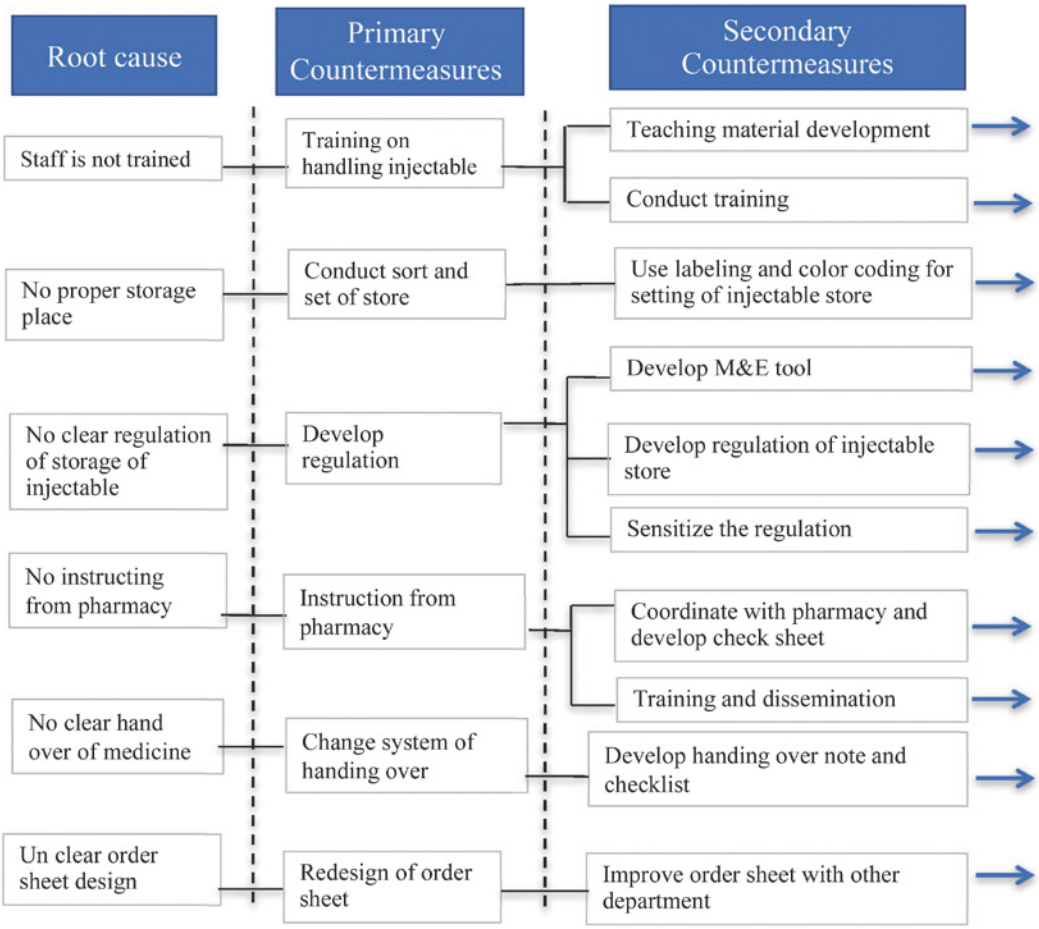



**Figure 7: Tree Diagram (Step 4)**

This diagram is used to identify possible countermeasures.

**Table 1: Action plan format (Standardized procedure table) and Checklist (Step 5, Step 7)**

| Countermeasures | Who | What | Where | When | Why | How | Monitoring of progress | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| IPC Training materials are developed | Ward In-charge | Develop IPC training martials | Ward | By the end of May | For conducting IPC training | By establishment of task team | 15/3 | G | 30/3 | C |
| Staff training on IPC is conducted | IPC manager | IPC Training | Ward | 2nd week of June | for improve knowledge on IPC among staff | By using weekly Continuous education session | 15/4 | C | | |
| Develop SOP on IPC | IPC manager | SOP on IPC | Ward | By the end of June | for standardizing IPC practices among staff | By establishment of task team | 15/4 | D | 30/4 | C |

Monitoring scale: D= Delay, G=Good progress, C= Completed

The key to developing an effective implementation plan is to clarify 5W 1H (Why, Where, Who, When, What, How) that help all team members understand the roles and responsibilities of everyone involved in the KAIZEN, and how to implement countermeasures.

## 1.1.2 (3) 5S-KAIZEN-TQM approach and patient safety

With 5S-KAIZEN-TQM approach, some of the major issues at hospitals such as medical accident and hospital associated infection can be tackled. Figure 8[9] is an example of the logic model used for "eliminating medical accidents", one of the six major on-site problems at hospitals.

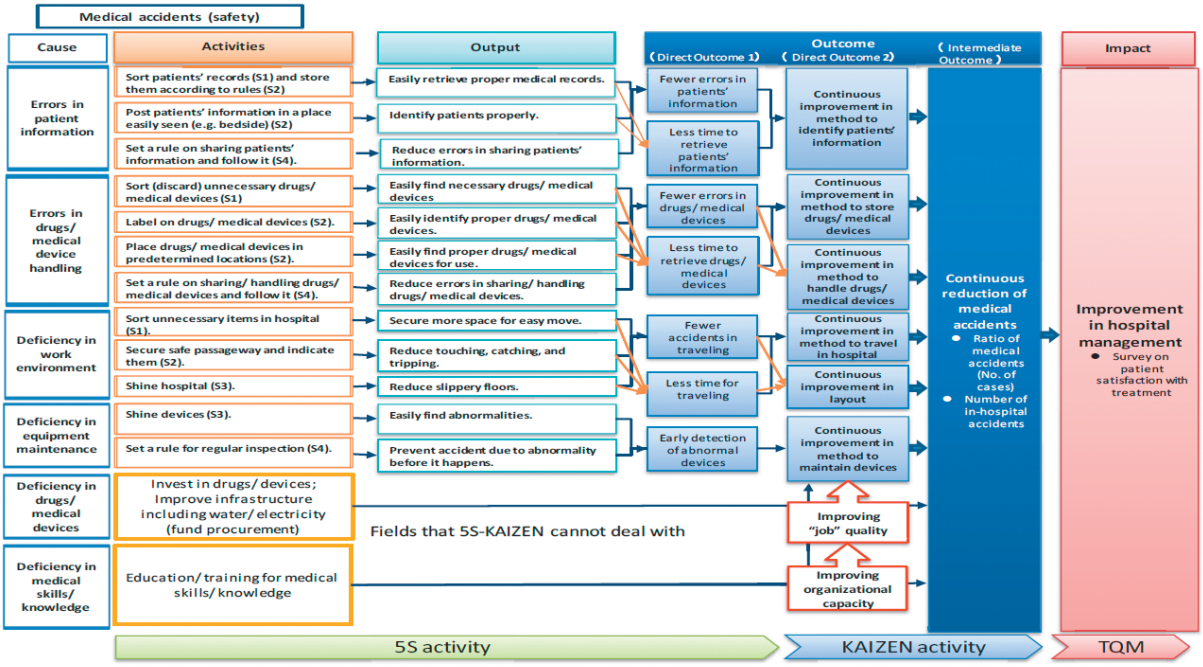



Figure 8: Example of the logic model for eliminating medical accidents using the 5S-KAIZEN-TQM approach

In the figure, the causes of medical accidents are broken down into six categories: "errors in patient information", "errors in drugs or medical device handling", "deficiencies in work environment", "deficiencies in equipment maintenance", "deficiencies in drugs or medical device" and "deficiencies in medical skills or knowledge". Among these, the categories that may be dealt with by using "5S-KAIZEN-TQM approach" are the following four: "errors in patient information", "errors in drugs or medical device handling", "deficiencies in work environment", and "deficiencies in equipment maintenance". While the remaining two categories, "deficiencies in drugs or medical devices" and "deficiencies in medical skills or knowledge" are not covered, these are necessary condition to be fulfilled for the intermediate outcome, which is the continuous reduction of medical accidents.

9 https://www.jica.go.jp/english/our_work/evaluation/tech_and_grant/program/thematic/c8h0vm000001rgwp-att/2013_01.pdf

It should be noted that setting the adequate objective level is very important when introducing 5S-KAIZEN-TQM approach. If the people concerned at the hospital have only set the 5S-level target, once their 5S activities have been completed and outputs have been achieved in a visible manner, the activity will end at the point. On the contrary, if they set the intermediate outcome-level goal such as "continuous reduction of medical accidents", conduct training on KAIZEN activities ("improving organizational capacity") from the beginning and once methods for reviewing tasks are mastered by staff ("improving job quality"), the hospital staffs will continuously review their task, find new issues and solve them using 5S and QC tools to achieve the goal.

### 1.1.3 History of the 5S-KAIZEN-TQM approach

The 5S-KAIZEN-TQM approach, introduced in a Sri Lankan hospital in 2000, has since spread to hospitals in many African countries with JICA's continuous support over 10 years. Currently, the approach is implemented in over 2,000 health facilities in 29 countries.

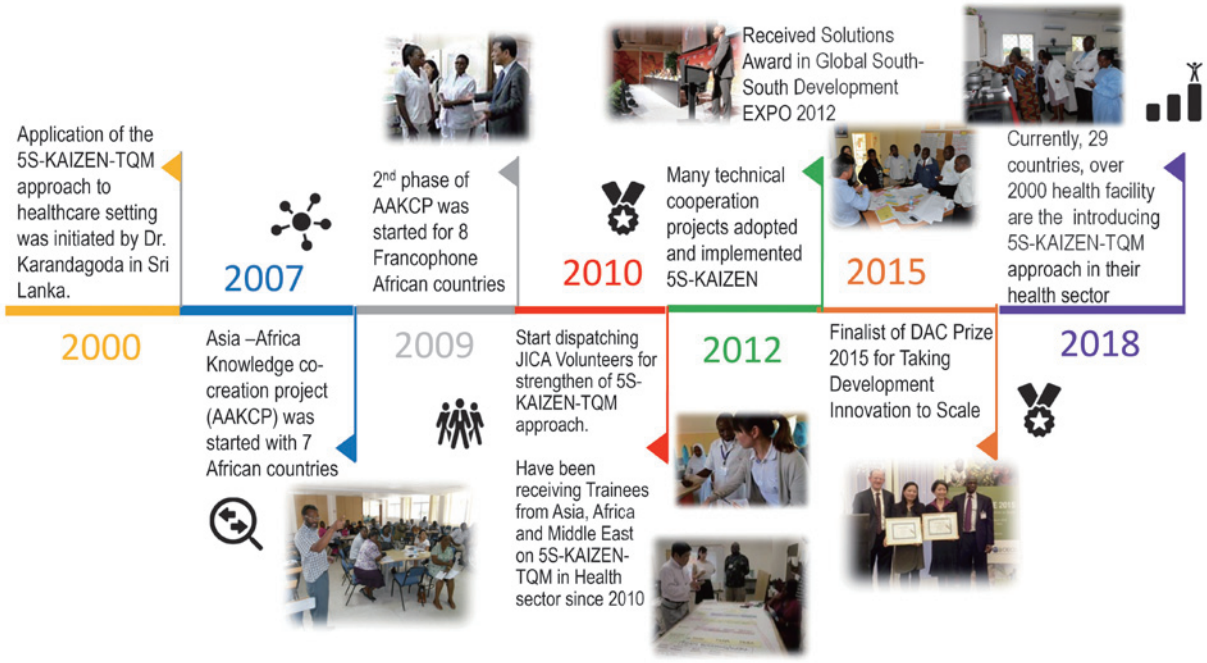



Figure 9: The history of the 5S-KAIZEN-TQM approach

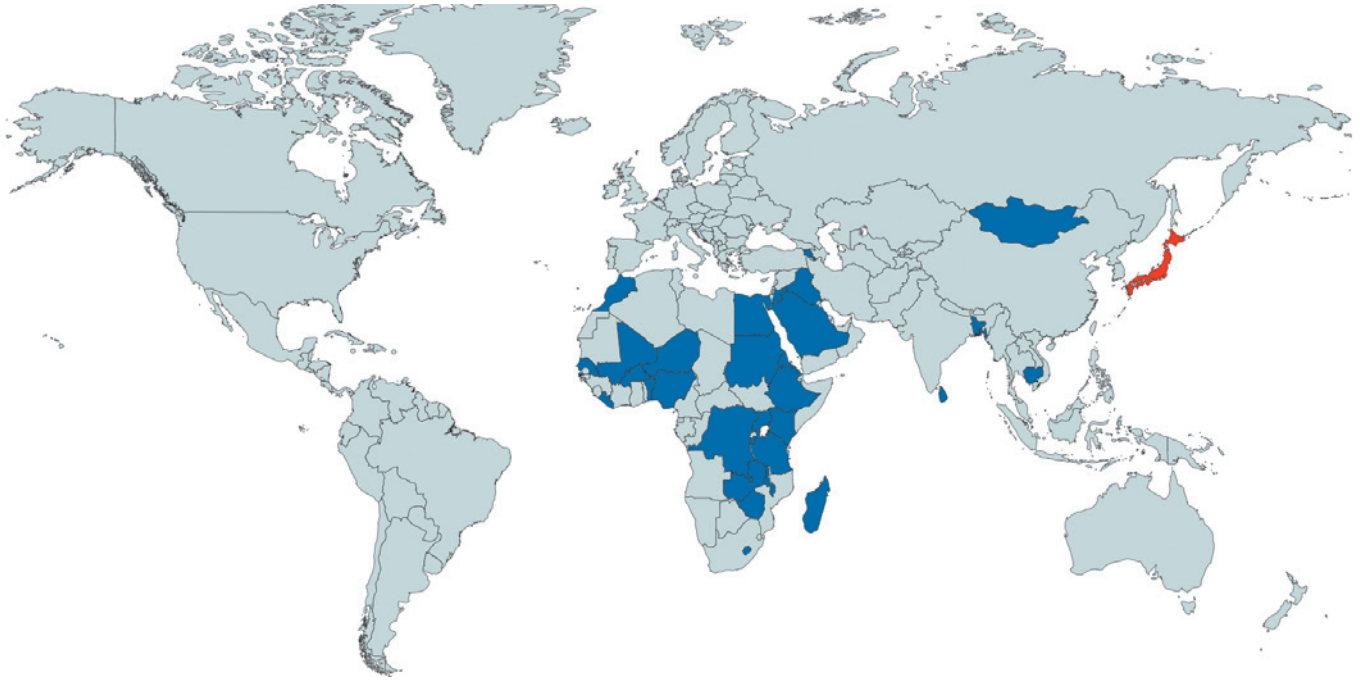


Figure 10: The countries that has introduced the 5S-KAIZEN-TQM approach (blue shaded)

## Column 1: 5S in each language

The 5S is derived from the Japanese words Seiri, Seiton, Seiketsu, Seiso, and Shitsuke. These words are translated into many languages, not only major languages such as English, French, Arabic, and Spanish, but also local languages such as Swahili, Chewa from Malawi, and others.

| | S1 | S2 | S3 | S4 | S5 |
|---|---|---|---|---|---|
| **English** | Sort | Set | Shine | Standardize | Sustain |
| **Japanese** | Seiri (整理) | Seiton (整頓) | Seiketsu (清潔) | Seiso (清掃) | Shitsuke (躾) |
| **French** | Séparer | Systématiser | Salubrité | Standardiser | Se discipliner |
| **Spanish** | Clasificar | Organizar | Limpiar | Estandarizar | Mantener |
| **Arabic** | تصنيف | ترتيب | تنظيف | توثيق | تاكيد |
| **Swahili** | Sasambua | Seti | Safisha | Sanifisha | Shikilia |
| **Chewa** | Sankhulani | Sanjani | Salalotsani | Samalitsani | Sungitsani |

## 1.2 Beginning of the approach in Sri Lanka

The application of the 5S-KAIZEN-TQM approach to healthcare settings was initiated by Dr. Wimal Karandagoda, who was the director of the Castle Street Hospital for Women in Sri Lanka.



Dr. Wimal Karandagoda[10], director of CSHW, who first introduced the 5S-KAIZEN-TQM approach in the Sri Lankan health sector.

When Dr. Karandagoda became the hospital director of the Castle Street Hospital for Women (CSHW) in 2000, he faced a serious prevalence of post-operative infectious cases caused by improper infection control for operations and post-operative care by the hospital staff. The hospital's chronic budget shortage resulted in limitations of resources for tackling those cases and furthermore, staff members were pessimistic about the situation. However, Dr. Karandagoda believed the situation could be solved by proper management.

To improve the situation, he learned about the 5S KAIZEN method (at this point, KAIZEN was simply referred to as continuous quality improvement (CQI) and consisted of general improvement activities) and Total Quality Management (TQM) on his own. He introduced these methods to his hospital in a stepwise manner, from 5S to KAIZEN, finally aiming for TQM.

In the initial stage, there was some resistance from the hospital staff of health profession, who did not support making changes of the work environment and work formula. Dr. Karandagoda then decided to first introduce 5S to staff members in charge of cleaning and sweeping in the hospital, who suffered from the most serious lack of work efficiency. Once these staff members achieved improvements in their working environment, those of health profession realized the value of the 5S with the initial resistance faded. The attention of management members to the most vulnerable group of the workforce, the "minor" staff members, was necessary to generate bottom-up movement and encourage other professions to change their negative attitude. In this way, the 5S activities that were initially implemented among cleaning staff gradually spread to all staff members.

Moreover, Dr. Karandagoga worked on the following matters, which greatly contributed to maintaining and improving staff motivation as well as quality and safety.

- Senior and middle management focusing on staff
- Responding to employees' needs and providing neat and clean areas for resting and dining
- Developing middle management leadership through an increasing transfer of authority and responsibility to them regarding management of their respective units and processes
- Taking corrective and improvement measures through monthly analysis of results
- Instilling team spirit and focusing on performance
- Developing an organizational learning culture
- Incorporating patients' suggestions into the decision-making process

10 https://www.jica.go.jp/english/our_work/thematic_issues/health/c8h0vm00009u4yt7-att/text_en_01.pdf

These series of activities were implemented within a short period of two years.
Many good results were reported, as shown below[11].

- Rate of infection during Caesarean section decreased by 52% in two years.
- Rate of infection in newborns decreased by 58% in two years.
- Stillbirth rate per 1000 persons dropped from 10.3 to 6.9 in two years.
- Mortality rate during delivery per 1000 persons dropped from 1.09 to 0.24 in two years.
- Close relationship was made between administrative staff and medical professions.
- The improved work environment nurtured a positive way of thinking among staff and confidence in team work.

The changes at CSHW had a huge impact on the management of public hospitals. However, the health authorities did not initially take a positive attitude on the improvements. Dr. Karandagoda decided to apply for the prestigious "Taiki Akimoto 5S award", the annual competition to recognize and reward the overall performance of the organization and application of 5S standards[12]. After CSHW successfully won the prize, the health authorities started to appreciate the hospital's achievements.

On the back of these achievements, the Ministry of Health established the Quality Secretariat at CSHW to enable Dr. Karandagoda to expand his activities across the country.

With the support of WHO and JICA until 2007, the Ministry of Health started disseminating the 5S-KAIZEN-TQM approach nationwide. Dr. Karandagoda gave 5S leader's seminars to staff from each hospital so that they could implement the 5S at their hospital.

The achievements at CSHW and other hospitals in Sri Lanka made JICA decide to support the introduction of the 5S-KAIZEN-TQM approach to public hospitals in other countries.

## Column 2: Another success story in Sri Lanka[13]

At the Mahiyangana Hospital, a government hospital in a rural area of Sri Lanka, the 5S-KAIZEN-TQM approach was introduced by the medical superintendent, Dr. Sridharan Sathasivam. He had much knowledge about the approach since he had worked in the quality management unit in CSHW.

The Mahiyangana Hospital systematically introduced the 5S-KAIZEN-TQM approach as CSHW had done, and they succeeded in increasing the number of outpatients, reducing hospital-associated infections and maternal deaths, and reducing costs.

Mahiyangana Hospital was known as a station for punishment transfer in the past. Today, a number of government and private organizations select Mahiyangana Hospital for their study tours. Furthermore, many international health managers have visited this hospital to witness the marked improvements. Some visitors say, "How were the changes achieved at a low cost?" and others say, "The implementation of 5S, Productivity and Quality concepts does not need lots of money; what is needed is just determination and a positive attitude."



Internal monitoring and On-the-Job Training

11 https://www.jica.go.jp/english/our_work/evaluation/tech_and_grant/program/thematic/c8h0vm000001rgwp-att/2013_01.pdf

12 This award commemorates Dr. Taiki Akimoto who has introduced 5S concept to Sri Lanka in the mid-1990s and organized by the Japan Sri Lanka Cultural Association from 1996.

13 Based on https://www.jica.go.jp/english/our_work/thematic_issues/health/c8h0vm00009u4yt7-att/text_en_05.pdf pp. 186-202

## 1.3 Introducing the approach to Africa

In 2007, JICA launched the program "Total Quality Management (TQM) for better hospital services" as a subprogram of the Asia-Africa Knowledge Co-Creation Program (AAKCP)[14] in response to the challenges in the African region. At that time, public hospitals in the African region were facing with the challenges such as disorganized facilities under a chronic shortage of budget, logistics and human resources. Such environment had given little motivation to the staff members and made them difficult to provide safe and quality medical services to patients.



Scattered documents



Mixed unnecessary items



Unsegregated waste



Mixed infectious waste



Disorganized arrangement of medicine in pharmacy



Poor maintenance of equipment

**The image of situations before adopting the 5S-KAIZEN-TQM approach**

14 In 2004, JICA proposed a initiative called the Asia-Africa Knowledge Co-Creation Program (AAKCP), after the Japanese government reaffirmed the importance of promoting South-South Cooperation at the Third Tokyo International Conference on African Development (TICADIII) in 2003. The program's aim was to provide a forum for in-depth sharing and exchange of knowledge and experiences with the goal of generating new knowledge, ideas, perspectives or approaches that would be appropriate and valuable to the development efforts in Africa.

This program introduced Sri Lankan and Japanese experiences in hospital management using the 5S-KAIZEN-TQM approach. One pilot hospital was selected from each country participating in the program, and training in Japan and Sri Lanka for the hospital directors was provided. The training was followed by on-site consultation visits by Japanese specialists.

Officers of the Ministry of Health were also invited for the training, as they were indispensable when introducing the approach nationwide as a national health policy.

Through this program, Dr. Karandagoda and JICA specialists organized quality improvement (QI) activities into participatory and stepwise concepts, and the 5S-KAIZEN-TQM approach took its present form.



African participants meeting with a Sri Lanka counterpart (Sri Lanka)[15]

Several African countries have already benefited from the program. As shown in the photos below, 5S enables the organized placement of objects, which lead to easy and quick identification of the objects needed, resulting in time saving, prevention of incorrect choice and improvement of the stock management.

## BEFORE



Scattered documents



Mixed medicine and sundries

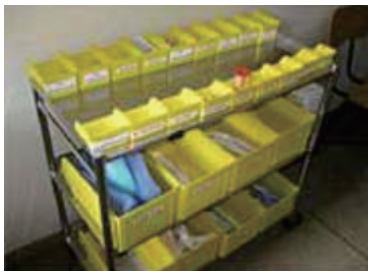


Disorganized storage

## AFTER



Proper document management.[16]



Proper arrangement of medicine and sundries



Proper stock management due to organized storage

15 https://www.jica.go.jp/english/our_work/thematic_issues/south/project06.html

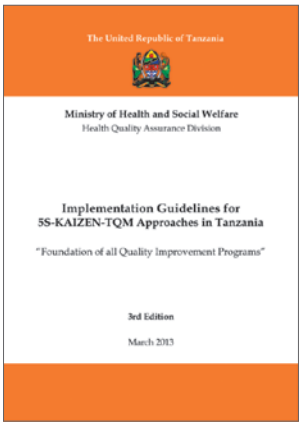
16 https://www.jica.go.jp/activities/issues/health/5S-KAIZEN-TQM/outline01.html#a04

Although the program itself ended in 2012, various countries are interested in the 5S-KAIZEN-TQM approach. The approach is incorporated in technical cooperation projects and other modalities that is going on.

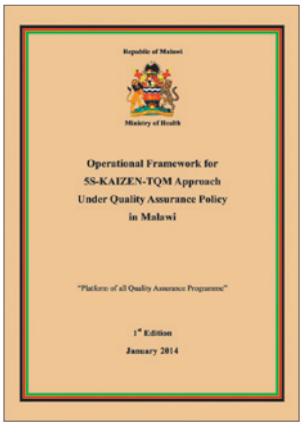
In addition, national guidelines[17] on the 5S-KAIZEN-TQM approach have been developed in many countries through the program or subsequent projects.



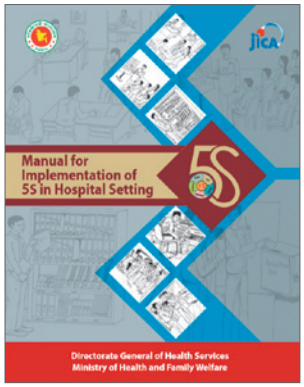

(Sri Lanka)



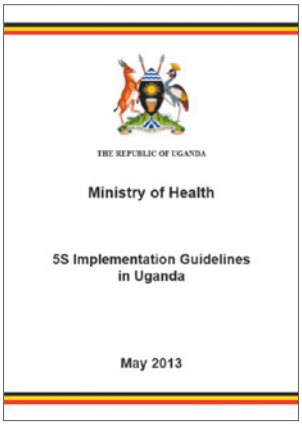

(Tanzania)



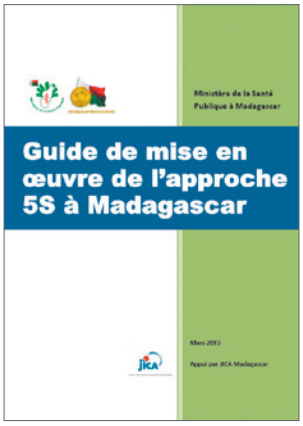

(Malawi)




(Bangladesh)




(Uganda)




(Madagascar)

**Figure 11: Guidelines on the 5S-KAIZEN-TQM approach in different countries**

17 https://www.jica.go.jp/english/our_work/thematic_issues/health/case_materials.html

# 1.4 Implementation of the approach in Tanzania

## 1.4.1 Introduction to the pilot hospital "Mbeya Zonal Referral Hospital"

The Mbeya Zonal Referral Hospital (MZRH), one of the four national hospitals in Tanzania, faced numerous issues such as a lack of mutually agreed concept on the "quality of health care" among staff, inadequate treatment for patients due to the lack of supplies and personnel, and the lack of a sense of commitment for inventory control.



Dr. Eleuter Samky, director of MZRH, who introduced the 5S-KAIZEN-TQM approach in the Tanzanian health sector.

In 2007, MZRH was selected as a pilot hospital for the "Program of TQM for Better Hospital Services" in Tanzania because Dr. Samky, director of the hospital, thought that the program might give him the necessary instruction on how to improve the hospital situation.

In March 2007, before the introduction of 5S-KAIZEN-TQM to MZRH, the director and the Ministry of Health administrators attended the 5S introduction training seminar, and in July 2007, several middle management personnel from the hospital attended the 5S intermediate training seminar held by JICA.

Through participating in the training program in Japan and visiting a hospital in Sri Lanka, Dr. Samky was fascinated with the idea that despite the severe shortage of resources, 5S may bring dramatic improvement in service quality to MZRH as it happened in CSHW in Sri Lanka. Dr. Samky announced his intention to make Mbeya Referral a regional hub of the 5S in Africa to hospital staff and initiated activities in his hospital.

### POINT 1: Strong leadership

The director's strong leadership is a common feature of hospitals that make good progress of the implementation of 5S-KAIZEN-TQM approach[18]. Additionally, in order to introduce 5S-KAIZEN-TQM, it is prerequisites for the hospital director to recognize the problems of the hospital, carefully consider the work involved, and be firmly committed to solve the problems[19].

To introduce the 5S-KAIZEN-TQM approach, Dr. Samky formed a Quality Improvement Team (QIT) with staff members who were as motivated as he was, because he knew through the training that hospital-wide activities are necessary for solving the problems through the 5S-KAIZEN-TQM approach. The QIT consisted of 11 persons including 3 physicians and 5 nurses (many multi-profession members were subsequently added).

18 http://libopac.jica.go.jp/images/report/12114781.pdf

19 https://www.jica.go.jp/english/our_work/evaluation/tech_and_grant/program/thematic/c8h0vm000001rgwp-att/2013_01.pdf

## POINT 2: Active QIT with clear roles and responsibilities

Another common feature of hospitals making good progress on the program is that the roles and responsibilities of each QIT member are clear and hospital-wide activities are implemented as a team.
An excellent understanding of the approach among QIT members is also a common feature.

### What is the QIT?

- The QIT is the team that takes the lead in implementing quality improvement activities in the healthcare facility.
- The members are multidisciplinary employees charged with the responsibility of improving processes and/or services.
- The team includes top and middle management members who coordinate the initial plan and implementation.

### Major QIT roles and responsibilities are as follows:

1. Coordinate all QI activities.
2. Train hospital staff on QI activities.
3. Conduct situation analysis before implementing any QI activities.
4. Implement QI activities for solving common problems of the hospital.
5. Conduct periodical monitoring and evaluation, and provide technical advice to WITs (Work Improvement Teams) for further improvement.
6. Be responsible for record keeping and archives of all QI activities conducted in the hospital.
7. Review situation analysis and action plan.
8. Allocate resources in an effective and efficient manner for QI activities.

The 5S began in 2007 with six pilot departments of different backgrounds; some were positive to the introduction and others were not, some were clinical and others were non-clinical .

It was not easy to get the 5S to take root. The 5S aims are to form the habit of staff to keep their own work environment always in order, and build the foundation for identifying and resolving problems through 5S. However, there was resistance at the outset. A number of staff members refused to cooperate, questioning why specialists had to take part in the cleaning campaign. QIT patiently persisted with their efforts.

In time, the results of maintaining order and eliminating waste became obvious: stock management was improved and costs were reduced. This gained the understanding and support of all staff members.

In 2009, the number of departments implementing the 5S doubled to 12, and it was adopted by all departments of the hospital in 2012.

## POINT 3: Start with a few departments

In survey interviews[20] conducted with experts involved in the implementation of the 5S-KAIZEN-TQM approach, the expert recommended that “it is favorable to start with the limited number of departments that can well be monitored by the director and QIT.”

20 http://libopac.jica.go.jp/images/report/12123667.pdf

At MZRH, the QIT had weekly meetings for sharing information on the progress and challenge of activities related to the 5S-KAIZEN-TQM approach. The team also periodically provided technical advice and follow-up support to the pilot departments. In-hospital training was conducted by the hospital director and QIT as a core activity.

The 5S, the common language for all the staff, made it possible to have discussions on improvement of the workplace environment regardless of different occupational roles.

## POINT 4: Feedback and information sharing

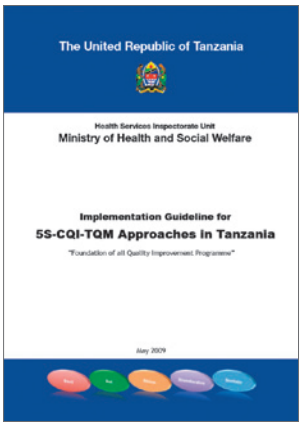
It is crucial for the QIT to make regular visits to each department for introducing the 5S and supporting the department's activities through on-site guidance and On-the-Job Training from the introduction of the 5S to the stage of reaching the 3S (Sort, Set, Shine) level. No on-site visits from the QIT would make it difficult for the department staff to maintain their motivation for the 5S and might lead to stagnant progress in the field[21].

In 2009, the Ministry of Health and Social Welfare in Tanzania decided to disseminate the 5S-KAIZEN-TQM approach nationwide based on the success at MZRH and formulated the "Implementation Guideline for 5S-CQI-TQM Approaches[22] in Tanzania"[23] (currently the third edition).

Through JICA's support, the 5S was implemented in 46 hospitals all over Tanzania in 2011. This has led to many reported cases regarding the improved quality services and patient safety through KAIZEN as well as 5S.

This process resulted in model development of dissemination and follow-up and the subsequent improvement standardization. This is applied to all over Tanzania and is spreading to other countries such as Uganda, Egypt, and Malawi.

As a model hospital, MZRH currently accepts visitors not only from domestic areas but also from neighboring countries. In July 2017, JICA awarded Dr. Samky to appreciate his series of contributions.




National guideline for the 5S-KAIZEN-TQM approach in Tanzania




Dr. Samky receiving an award from JICA

21 http://libopac.jica.go.jp/images/report/12123667.pdf

22 CQI (continuous quality improvement) means improvement activity in general, a synonym of Kaizen

23 http://ihi.eprints.org/1471/1/Guidelines_for_implementation_of_5S.pdf

### 1.4.2 National rollout by Ministry of Health in Tanzania

The dissemination and follow-up model developed based on the experience in Tanzania is shown below.

First, national facilitators are trained, and a center of excellence is established as a pilot hospital such as MZRH. Also, guidelines, training materials and monitoring and evaluation (M&E) tools are developed. Then, training of trainers (ToT) is conducted for hospital managers or equivalent level staff at the initial stage of introduction. The participants of ToT must train their own hospital staff members as trainers of the approach. After six months of ToT, a consultation visit (CV) is conducted as an external M&E twice a year. Each hospital also has an opportunity to share their progress with other hospitals through Progress Report Meetings (PRMs). Findings from such follow-up activities are utilized for improving the training materials and methods.

These series of cycles are not conducted at hospitals nationwide at the same time, but carried out region by region, or even hospital by hospital.

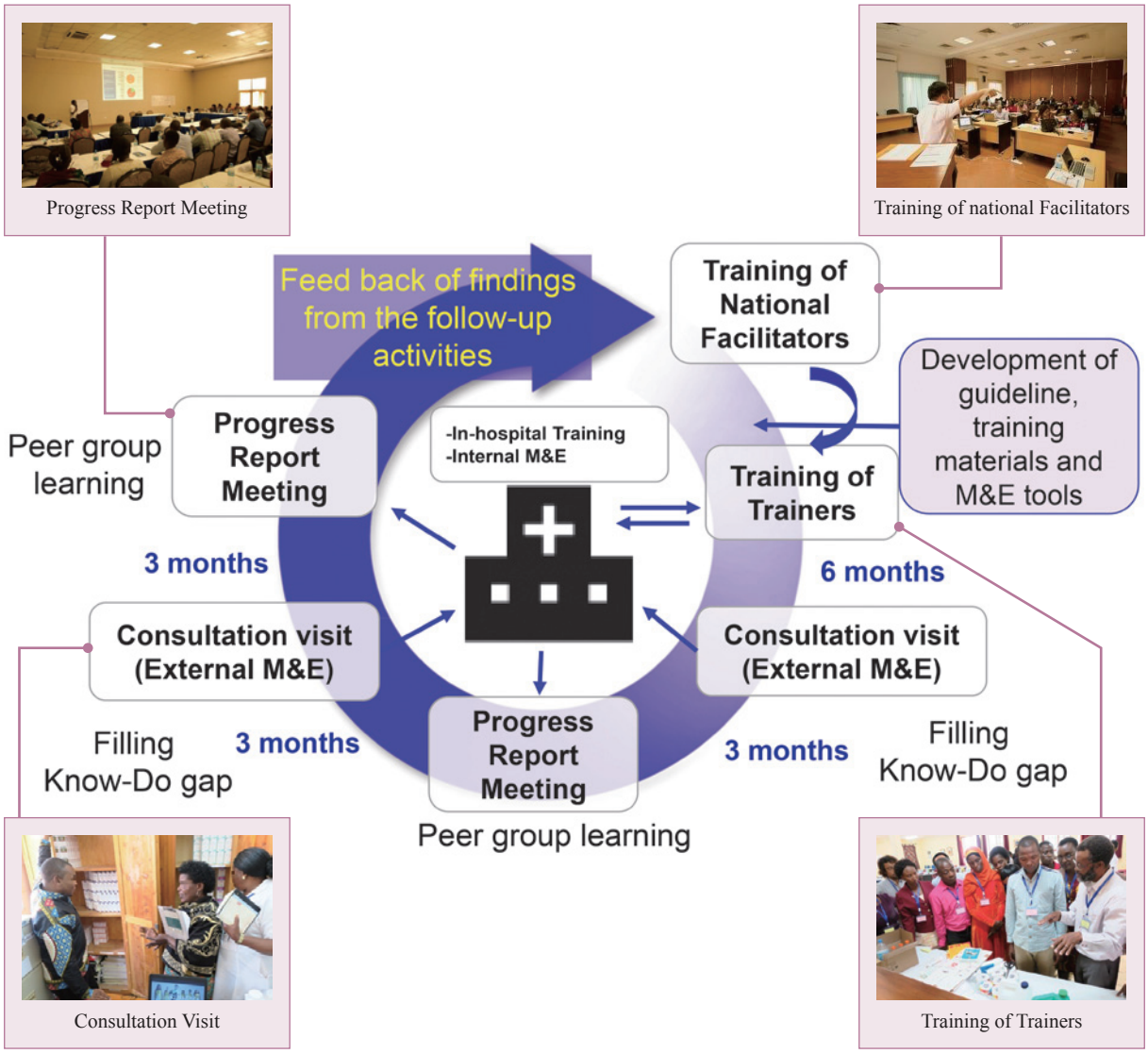



Figure 12: Dissemination and follow-up model in Tanzania

According to the study[24] which has collected data from 46 public hospitals in Tanzania, the following factors for smooth introduction of the 5S were identified:

- *Establishment of a hospital-based Quality Improvement Team (QIT) at an early stage with clear roles and responsibilities*
- *Feedback and sharing of information of all staff members in hospital management and service delivery*
- *Good understanding of the 5S approach among sections in charge*
- *Commitment and involvement of sections in charge*
- *Availability and use of implementation guidelines*

The study also suggests that the followings are indispensable when introducing 5S:

- Ministry of Health should conduct follow-up activities such as coaching and monitoring through Consultation Visits as an external monitoring and evaluation.
- Hospitals should establish the function of feedback and information sharing on QI activities among hospital staff members with clear roles and responsibilities.
- Hospitals should equip the sections in charge (middle management) with proper knowledge and technique for quality improvement.



Quality Improvement Team (QIT)



Consultation Visit



Involvement of section in charge

24 H. Ishijima et al. (2014) "Factors influencing national rollout of quality improvement approaches to public hospitals in Tanzania," *Clinical Governance: An International Journal,* Vol. 19, No. 2, 2014, pp. 137-152

# 1.5 How 5S-KAIZEN activities contributes to patient safety

## 1.5.1 The 5S on patient safety

As it is indicated in Figure 8, improvement of the workplace environment by the 5S leads to patient safety. These are the samples how the 5S tools can contribute to patient safety. With 5S, it is easy to identify the deficiency, keep hygienic conditions and utilize the limited resources safely with minimum lead time.

### Error-Proofing (Easy to identify deficiencies)



"Alignment and Labeling"
(Tanzania)



"Color Coding"
Full (blue) and empty (red) (Sri Lanka)[25]



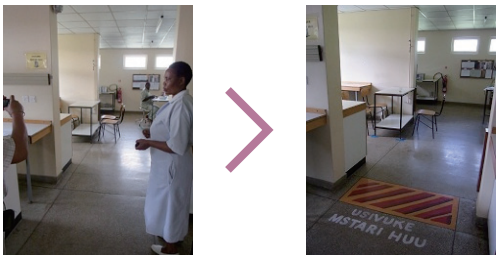
"Zoning"
(Egypt)

### Keep hygienic conditions (Prevent contamination)



"Color Coding"
Contaminated (red), dirty (yellow) and noninfectious (green)
(Tanzania)

BEFORE AFTER



"Symbols and Signs"
Clean area separated from contaminated area (Tanzania)

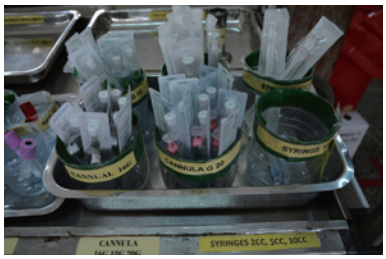
### Appropriate resource management (Prompt response to treatment)




"Zoning"
(Tanzania)



Instrument sets are prepared in advance according to lists and photos (Tanzania)



"Labeling"
(Tanzania)

25 https://www.jica.go.jp/english/our_work/thematic_issues/health/c8h0vm00009u4yt7-att/text_en_05.pdf p. 189

## 1.5.2 The KAIZEN cases on patient safety

The followings are KAIZEN cases using KAIZEN 7 steps (QC stories) from Tanzania.

**STEP 1 KAIZEN theme selection**

### Case1: Reduction of improper waste segregation cases

Place: Labor Ward, Singida Regional Referral hospital

**STEP 3 Root cause analysis**

| | |
|---|---|
| **Data collection method** | ● Counting the number of occurrences of improper waste management every day |
| **Major root causes** | ● No coaching on waste segregation at the sectional level<br>● No rules for maintaining proper waste segregation |

**Major countermeasures** ← **STEP 4 Countermeasure identification**

- Conduct coaching continuously
- Define rules for maintaining proper waste segregation
- Develop and display clear instructions on waste segregation

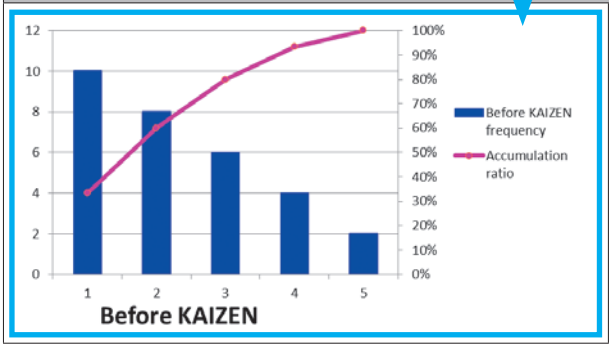
**(STEP 5) Countermeasure implementation**

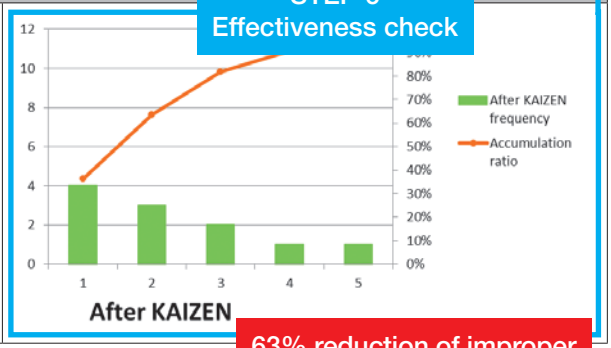
| # | Contributing factors | Frequency | | Reduction rate (%) |
|---|---|---|---|---|
| | | Before | After | |
| 1 | Wrong items in red dust bin | 10 | 4 | 60 |
| 2 | Wrong items in yellow dust bin | 8 | 3 | 63 |
| 3 | Wrong items in blue/black dust bin | 6 | 2 | 67 |
| 4 | Wrong items in safety box | 4 | 1 | 75 |
| 5 | Wrong use of bin liners | 2 | 1 | 50 |
| | TOTAL | 30 | 11 | 63 |

**STEP 2 Situation analysis**

**STEP 6 Effectiveness check**

**Effectiveness of the KAIZEN**




63% reduction of improper waste segregation

**Standardized activities to prevent reoccurrence**

| Effective countermeasures | Who | What | Where | When | Why | How |
|---|---|---|---|---|---|---|
| Coach staff members about waste segregation | Ward in charge, WIT | Coaching on waste segregation | Labor Ward | Daily | To strengthen knowledge on waste segregation | Conduct |

**STEP 7 Standardization**

## Case 2: Reduction of incidence of phlebitis

Place: Male Surgical Ward, Muhimbili National Hospital

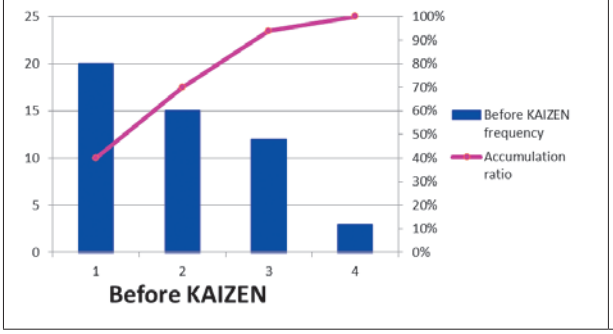
| | |
|---|---|
| **Data collection method** | ● Counting the number of patients who develop phlebitis |
| **Major root causes** | ● No training on cannulation management<br>● No supervision of cannulation management<br>● No protocol for handing over reports on I.V. lines<br>● No SOPs for I.V. cannulation on the ward |

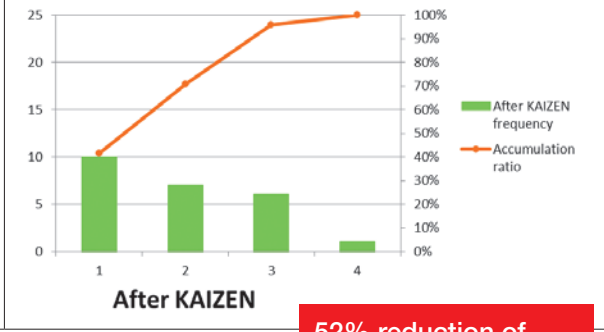
**Major countermeasures**

- Conduct On-the-Job Training on proper I.V. cannulation
- Identify and assign specific person to affix labels and check I.V. cannulation on every shift
- Develop SOPs for proper I.V. cannulation
- Develop report protocol for I.V. cannulation

| # | Contributing factors | Frequency | | Reduction rate (%) |
|---|---|---|---|---|
| | | Before | After | |
| 1 | Number of cases of I.V. line not labeled | 20 | 10 | 50 |
| 2 | Number of cases of I.V. cannula remaining for a long time (more than 72 hours) | 15 | 7 | 53 |
| 3 | Number of cases in which the site around the cannula is dirty | 12 | 6 | 50 |
| 4 | Number of cases in which the set is reused | 3 | 1 | 67 |
| TOTAL | | 50 | 24 | 52 |

**Effectiveness of the KAIZEN**




52% reduction of incidence of phlebitis

**Standardized activities to prevent reoccurrence**

| Effective countermeasures | Who | What | Where | When | Why | How |
|---|---|---|---|---|---|---|
| Assign person to check labeling on cannulas | KAIZEN team, Ward in charge | Specific person | Male Surgical Ward | Daily | To strengthen checking | Assign (put star (*) on the roster) |
| Use SOPs for I.V. cannulation | KAIZEN team | SOPs | Male Surgical Ward | Daily | To reduce misunderstanding of proper cannulation among staff | Use |
| Check progress of checking I.V. cannulas | Ward in charge | Progress of checking I.V. cannulas | Male Surgical Ward | Daily, Before next shift starts | To strengthen checking | Check |

## Case 3: Reduction of cases of improper management of patient's own medication

Place: Psychiatric Unit, Mbeya Zonal Referral Hospital

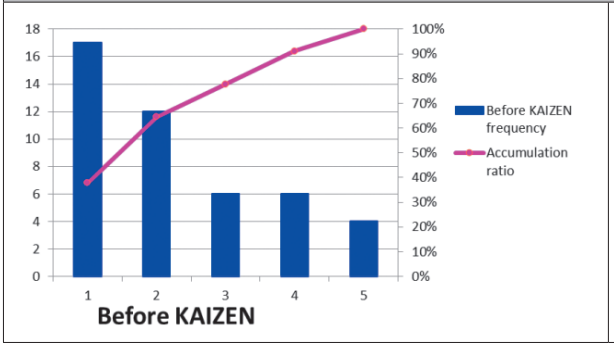
| | |
|---|---|
| **Data collection method** | ● Counting the number of occurrences of improper medication other than psychiatric medication |
| **Major root causes** | ● No clear rules for history taking<br>● No checklists for supervision of medication routines<br>● No medicine handling rules and documentation<br>● No medicine trolley for containing patients' medicines |

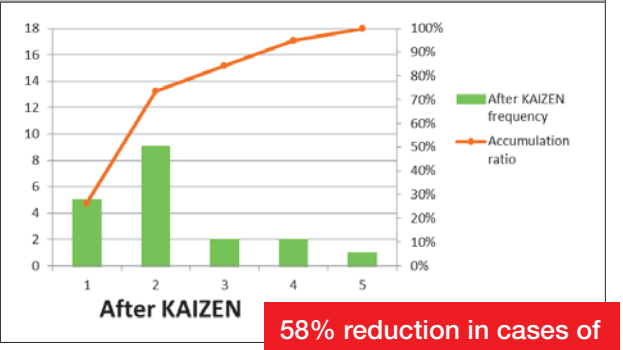
**Major countermeasures**

- Develop checklist for patient history taking
- Develop checklist for supervision of medication routines
- Develop SOPs for medicine storage, medication and documentation
- Order trolley to contain all patients' medicines from the Store

| # | Contributing factors | Frequency | | Reduction rate (%) |
|---|---|---|---|---|
| | | Before | After | |
| 1 | Patient/Relatives forgetting other medicines at home | 17 | 5 | 71 |
| 2 | Relatives not bringing other medicine | 12 | 9 | 25 |
| 3 | Lack of information on other medical conditions from relatives | 6 | 2 | 67 |
| 4 | Lack of health education for relatives/patient on drug adherence | 6 | 2 | 67 |
| 5 | Improper storage of patients' medicines | 4 | 1 | 75 |
| TOTAL | | 45 | 19 | 58 |

**Effectiveness of the KAIZEN**




58% reduction in cases of improper management of patient's own medication

**Standardized activities to prevent reoccurrence**

| Effective countermeasures | Who | What | Where | When | Why | How |
|---|---|---|---|---|---|---|
| Use checklist for patient history taking | Admitting doctor/nurse | Checklist | Ward 4 | Daily | To reduce improper history taking | Use |
| Use SOPs and checklist on medication | KAIZEN team | SOPs and checklist | Ward 4 | Daily | To strengthen management of medication | Use |
| Sensitize staff members on checklist utilization | Ward in charge, KAIZEN team | Handing over notes and checklists | Ward 4 | Daily | To reduce improper history taking and medication | Check the handed over notes/checklists before shift |

### 1.5.3 The KAIZEN cases indirectly lead to patient safety

There are various types of KAIZEN themes such as improvement of work efficiency, quality of work and management of equipment as well as patient safety. The following list shows some KAIZEN cases from Malawi and Tanzania.

It may not be easy to address patient safety issues from the very beginning of the activities. Starting from an easy entry point will keep the staff members' motivation and foster the KAIZEN (continuous improvement) culture that eventually leads to patient safety.

#### Malawi

| KAIZEN Theme | Indicator | Result |
|---|---|---|
| Reduction of long waiting time of patients at the dispensary | Number of delays in starting days | 75% reduction |
| Starting work on time at the operation theatre | Number of delays in starting operations | 75% reduction |
| Efficient tracking system of samples at the laboratory | Number of improper samples and forms | 90% reduction |
| Practice of infection prevention guidelines | Number of improper procedures | 20% reduction |

#### Tanzania

| KAIZEN Theme | Indicator | Result |
|---|---|---|
| Revenue collection of National Health Insurance Fund | Percentage of approved revenue amounts | 81.9% → 94.6% |
| Number of rejected laboratory samples | Number of rejected samples per day | 63.3% reduction |
| Decontamination process errors on ward | Number of errors in decontamination process | 72.2% reduction |
| Misplacement of files at Dermatology Clinic | Number of misplaced files at the clinic | 47.1% reduction |
| Improper endoscopy request form | Number of improperly completed endoscopy request forms | 50% reduction |
| Overstocking and redundancy of equipment and instruments in the store | Number of redundant items in the store | 37.1% reduction |
| Waste segregation at the point of collection in the hospital | Number of improper occurrences of waste management | 85.8% reduction |
| Re-sterilization of unused trays and packs at CSSD | Number of occurrences of re-sterilization of unused trays and packs | 89.5% reduction |
| Delay in obtaining patient files on time | Number of occurrences of improper file management | 65% reduction |
| Recurrent toilet blocking | Number of incidents related to toilet blocking | 44% reduction |

## Column 3: JICA's modalities of support related to the 5S-KAIZEN-TQM approach

### (1) Technical Cooperation Projects

The Technical Cooperation Project is a modality that consists of various operational menus such as dispatching experts, knowledge co-creation program in Japan (described below) joined by counterparts and providing equipment to attain specific agreed outcomes within a certain period.

In 2017, Technical Cooperation Projects including capacity development on the 5S-KAIZEN-TQM approach were implemented in countries such as Tanzania, Uganda, Zambia, Senegal, Sudan and Bangladesh.



JICA expert conducted the lesson on 5S-KAIZEN.

### (2) Third-Country Training Program in Egypt and Sri Lanka



JICA expert conducting a lesson in Egypt

The Third-Country Training Program (TCTP) is one of the South-South Cooperation modalities. JICA provides a technical training program for participants from developing countries in collaboration with a partner third country for the purpose of transferring or sharing development experiences, knowledge and technology.

JICA has been implementing TCTP related to the 5S-KAIZEN-TQM approach in Sri Lanka (Title: "5S-CQI-TQM Implementation") and in Egypt (Title: "Management of Health Care Facilities") and has accepted over 200 participants together with these countries so far.

### (3) JICA Knowledge Co-Creation Program

Knowledge Co-Creation Programs are training programs that JICA carries out in Japan. Some of the knowledge that Japanese society has accumulated, including its background in areas such as organizational know-how and social systems, can only be understood through first-hand experience.

The JICA Tokyo International Center (TIC) conducts courses related to the 5S-KAIZEN-TQM approach such as "Quality Improvement of Health Services through KAIZEN" and this course has accepted over 200 trainees from 23 countries so far. Other JICA International Centers also conduct various courses related to the 5S-KAIZEN-TQM approach.



Participants practicing each KAIZEN Step using effective QC tools

### (4) Volunteer Programs



A Japanese volunteer conducting a lesson with a hospital staff member in Uganda

JICA's volunteer programs support activities by citizens who wish to contribute to economic and social development. Many volunteers related to the 5S-KAIZEN-TQM approach have worked at health facilities in developing countries and cooperated with local staff members to solve a variety of challenges in health facilities through the 5S-KAIZEN-TQM approach. Their activities include helping to conduct the training related to the approach, implementing M&E, making 5S tools such as labels, color-coded boxes and more.

### (5) Other Programs (ODA Grants, Loans, etc.)

ODA Grants are a type of financial assistance in which funds are granted to a developing country to support construction projects or services such as procuring equipment and materials that are necessary for economic and social development. Since ODA Grants are financial assistance with no obligation for repayment, they are targeted mainly for developing countries with low income levels. ODA Loans are financial assistance but with a low interest rate, focusing mainly on middle developing countries. These are provided for not only hard components but also soft components. Some portion of projects under both ODA Grants and Loans are aimed at construction of hospitals and health facilities, under which the 5S-KAIZEN-TQM approach is also provided as part of the soft components for sustainable management of the facilities and other systems.

For more information, please refer to the following page in JICA's homepage.

**Materials of "Quality Improvement of Health Services through the 5S-KAIZEN-TQM approach"**

▶ https://www.jica.go.jp/english/our_work/thematic_issues/health/case_materials.html

# KAIZEN Experiences in High- Income Countries

# Chapter 2

# ASUISHI

## ~ physician training program ~

Report from ASUISHI Project
Author: Dr. Ayuko Yasuda






# Chapter 2:
# ASUISHI
# ~ physician training program ~

**ASUISHI*** physician training program: Developing physicians' leadership skills to ensure patient safety and quality improvement in tomorrow's healthcare using the **TOYOTA Total Quality Management (TQM)** method.

* The name "ASUISHI" comes from the Japanese words "ASU" meaning tomorrow, and "ISHI" meaning physician.

## 2.1 Introduction




Figure 1 : TOYOTA plant tour class in session

Since its founding in 1937, TOYOTA Motor Corporation has followed the principles of "Customer First" and "Quality First". Dr. Deming visited Japan in the 1950s when there was an urgent need to recover from the devastation after the war, and he introduced quality control to the country. Soon after, in 1961, TOYOTA introduced Total Quality Control (now TQM). Since winning the Deming Application Prize (now the Deming Prize) in 1965 and the Japan Quality Control Award (now the Deming Grand Prize) in 1970, TOYOTA has conducted Japanese-style Total Quality Management (TQM) based on the unchanging principles of "customer first," "kaizen (continuous improvement)," and "total participation." An activity system for realizing TQM was also developed. TOYOTA set the goals of improving the vitality of people and the organization and raising the quality of work.

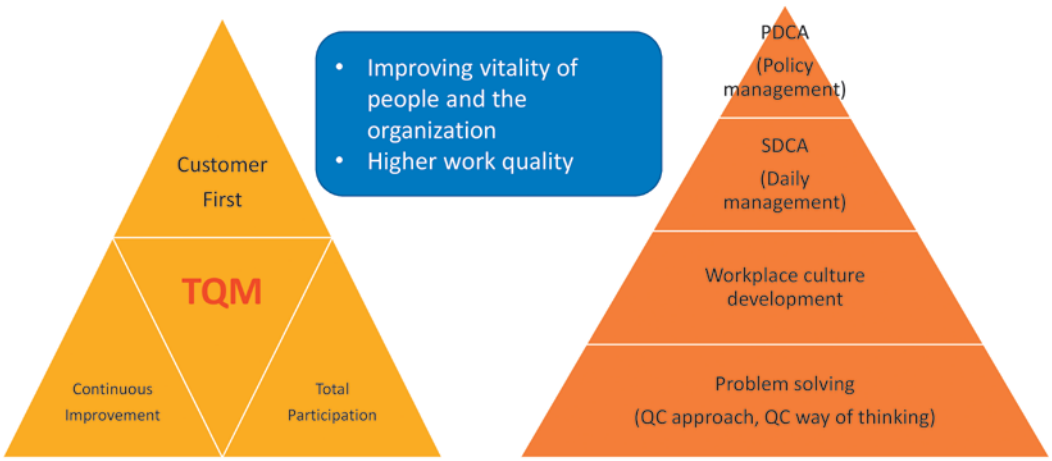



Figure 2 : Three basic concepts of TQM and the activity system to achieve TQM at TOYOTA

On the other hand, the TOYOTA Production System (TPS) is a management philosophy (value) based on the Just-in-Time system and *jidoka*, which can be loosely translated as "automation with human wisdom." Various ideas have been introduced, aiming to attain the highest quality, the lowest cost, and the shortest lead time. Basic methods such as 5 S and 7 wastes have also been established.

TOYOTA Motor Corporation has been pursuing ways to implement "customer first" and "quality first" as organizational policies. Based on scientific theories, it has applied these policies in a way that makes each employee enjoy their work more. One reason why TOYOTA continues to drive the world market through "TOYOTA Quality" is that TPS and TQM have demonstrated synergy effects under the concept of human resource development.




Figure 3 : Synergy between TQM and TPS

## 2.2 Background

In Japan, patient safety has been promoted at all levels since the 1999 landmark medical accident concerning patient misidentification at Yokohama City University Hospital. Triggered by this accident, improvements have been made to procedures and environments to ensure safe medical practice advanced. Though various measures to reduce the influence of human factors and ensure that standard procedures have been conducted, the workload of medical staff in the clinical field has increased due to lack of proper management.

Under the regulated medical fee schedule of the Japanese health care system, hospitals have minimal incentive to let physicians manage patient safety, generally resulting in nurses being in charge of patient safety. Since it became common for nurses to manage patient safety, physicians have less opportunity to undergo training on patient safety, from the time of being a medical student to becoming a consultant. As a result, adverse events in the most important parts of medical care such as diagnosis and treatment seem to be increasing because physicians are not participating actively in implementing patient safety.

Our facility, Nagoya University Hospital, is in the same city as the headquarters of TOYOTA Motor Corporation. To ensure patient safety and promote patient-centered medical care, we considered that it was necessary to introduce management techniques into medical systems, including active participation by physicians. Therefore, we introduced the TOYOTA Total Quality Management (TQM) method to physicians who will serve as leaders in the hospital, with the aim of enhancing patient safety by enabling physicians to master TQM.

We took over a year to establish the program for physicians. The project team consisted of safety and quality manager-physicians, infection control physicians, information system personnel, an epidemiologist, and medical education experts, as well as TQM experts from the TOYOTA group.

## 2.3 ASUISHI program to turn consultant physicians into leaders with TOYOTA

Table 1 : Summary of ASUISHI program

PS: Patient Safety, IC: Infection Control, QM: Quality Management

| Course | | Main (PS, IC, & QM) | PS intensive | IC intensive |
|---|---|---|---|---|
| Contents | Feature | TOYOTA's problem solving method | Management of Adverse event | Implementation of IC |
| | Participatory training (hours) | 100-120 | 30-40 | 36-50 |
| | E-learning (hours) | 20-40 | 12-20 | 12-18 |
| | Total study time (hours) | 120-140 | 40-50 | 40-60 |

The aim of our syllabus is for the participants to learn about the global standard for patient safety, infection control and quality management in healthcare, and to become able to identify problems in medical practice by themselves, manage the problem-solving procedures, and improve each process as a leader. We have built a curriculum that lasts about 140 hours consisting of E-learning and participatory training just for consultant physicians (Table 1). With E-learning, we focus on acquiring deep knowledge on patient safety, infection control, and quality management. The purpose of participatory training is to acquire skills and attitudes through discussions using actual examples, and to improve practical management skills. The participants gather for a few days every month and enjoy exchanging opinions with colleagues with the same purpose. In addition to the main course to learn about quality improvement, we have created an intensive course on patient safety or infection control.

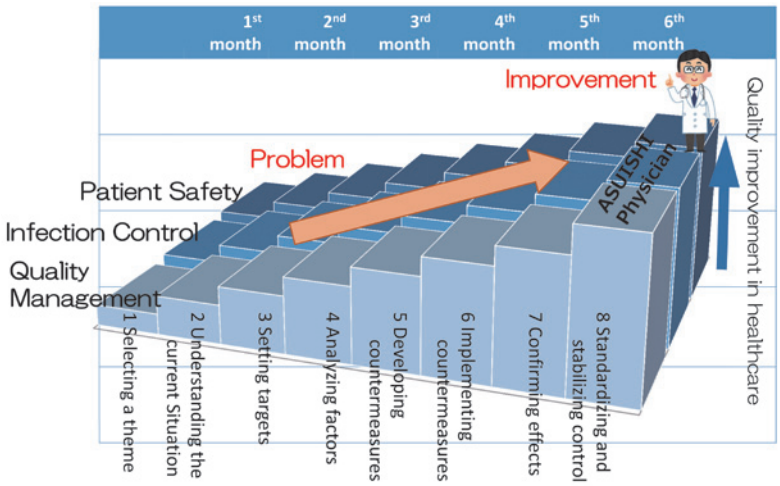



Figure 4 : Conceptual diagram of ASUISHI training program




Figure 5 : Problem-solving course in session

The program is centered on TOYOTA's problem-solving practice training (Fig. 4). Participants receive advice on their hospital's own problems directly from TOYOTA TQM experts based on their experience of improving quality in industry. Advice is given in the form of a group discussion (Fig. 5). Through seminars once a month, they implement countermeasures over six months and report the processes and outcomes at a presentation on the final day.

We prepared a rubric evaluation table to define our goals. We have set 88 specific behavioral objectives (SBOs), provide a curriculum to achieve the objectives, and our coaches give support.

## 2.4 Facts about the ASUISHI program

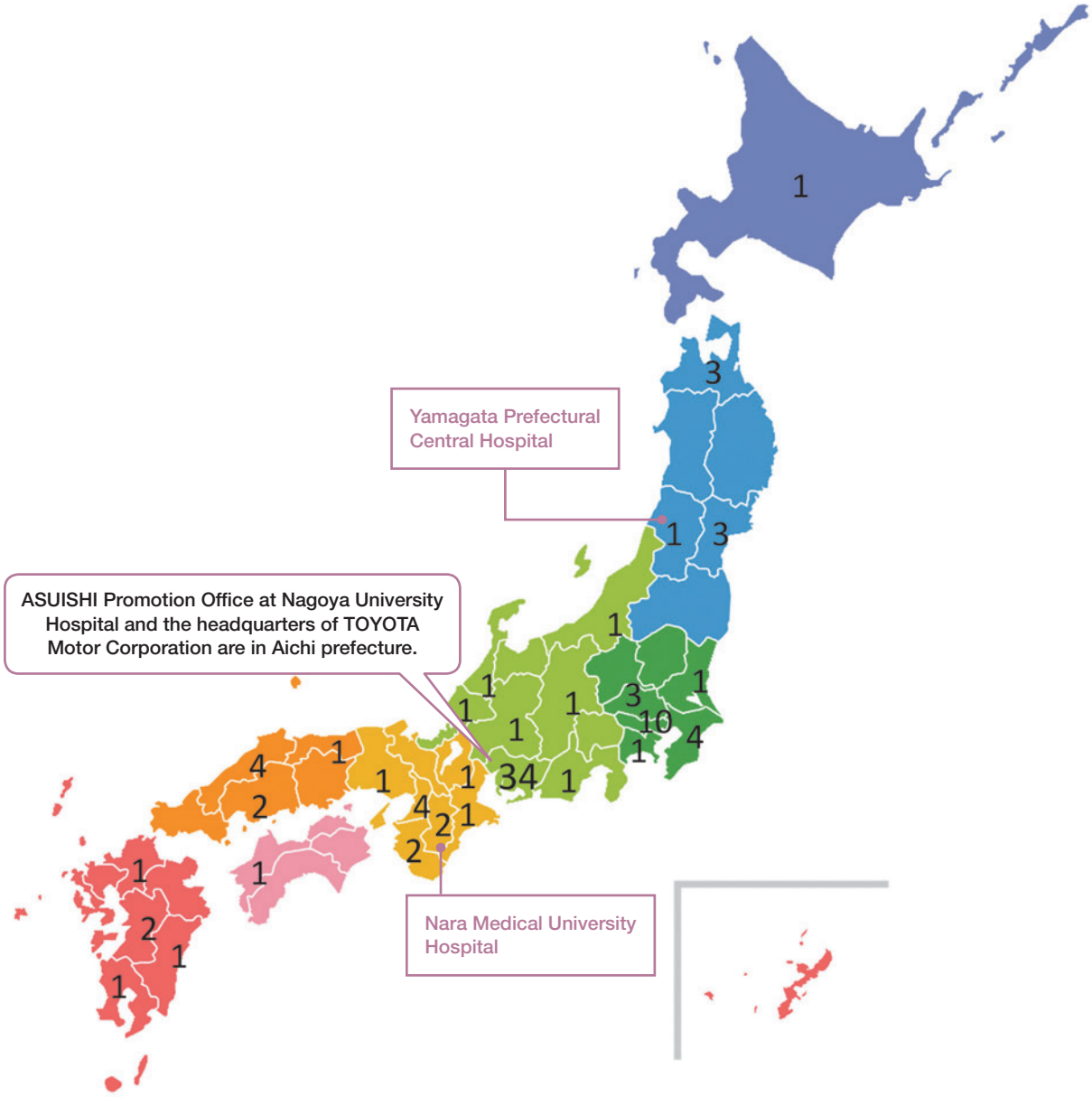



Figure 6 : Geographical distribution of ASUISHI physicians (n = 89)

The ASUISHI program opened to physicians in **2015**. A total of **91** participants joined the course in four terms. Consultant doctors who were considered to be candidate leaders gathered from regional core hospitals and university hospitals throughout Japan, covering 30 of the 47 prefectures (Fig. 6). The total number of beds in hospitals to which ASUISHI physicians belong is 43,450, which covers **2.79%** of all beds in Japanese hospitals. The median age was **47 years** (Table 2). The participatory training module includes the following: 5-whys analysis and cause and effect diagram, case method training on medical adverse event, teamwork training method (using TeamSTEPPS™), surveillance for infection control practice, how to respond to outbreaks, TQM policy and daily management, TOYOTA automobile plant tour, statistical quality control method, diversity management, and other key items for establishing a “patient safety first” medical system (Fig. 7).

Table 2 : Outline of participants

| Course | | Main | PS intensive | IC intensive | Total |
|---|---|---|---|---|---|
| Number of participants | 1st term | 12 | 3 | 1 | 16 |
| | 2nd term | 20 | 2 | 1 | 23 |
| | 3rd term | 19 | 5 | 2 | 26 |
| | 4th term (being held) | 20 | 4 | 2 | 26 |
| total | | 71 | 14 | 6 | 91 |

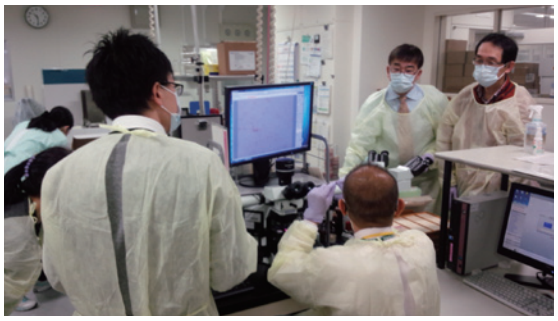
| N = 65 | Median | Minimum | Maximum |
|---|---|---|---|
| Age of participants | 47 | 31 | 61 |
| Number of beds at hospital | 606 | 115 | 1,435 |
| Number of physicians at hospital | 165 | 7 | 633 |



Case method training on medical adverse events



TQM policy and daily management



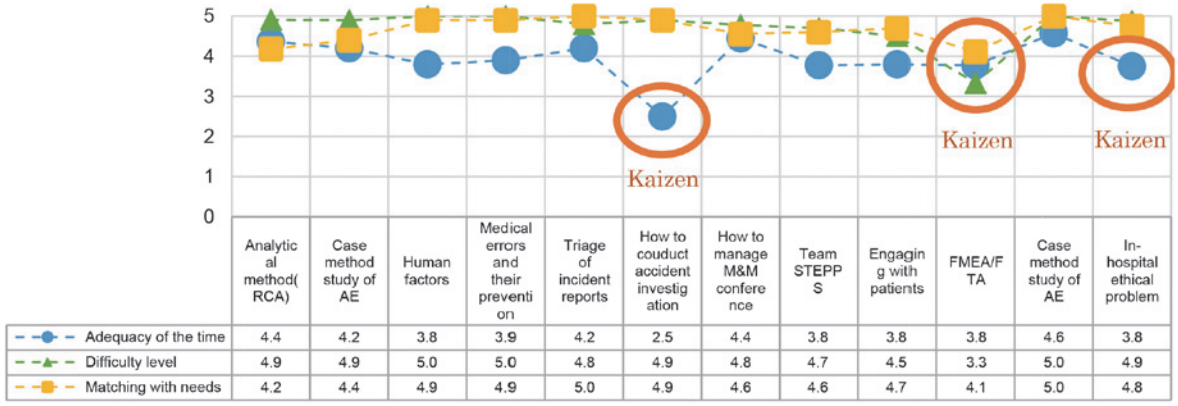
Surveillance for infection control practice

Figure 7 : Classes in session

The effects of the ASUISHI program have been analyzed based on Kirkpatrick's training evaluation model and evaluated in four stages.

## a. Reaction

The participants' feedback evaluations were gathered and used to improve the curriculum (Fig. 8).




| | Analytical method( RCA) | Case method study of AE | Human factors | Medical errors and their prevention | Triage of incident reports | How to couduct accident investigation | How to manage M&M conference | Team STEPPS | Engaging with patients | FMEA/FTA | Case method study of AE | In-hospital ethical problem |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adequacy of the time | 4.4 | 4.2 | 3.8 | 3.9 | 4.2 | 2.5 | 4.4 | 3.8 | 3.8 | 3.8 | 4.6 | 3.8 |
| Difficulty level | 4.9 | 4.9 | 5.0 | 5.0 | 4.8 | 4.9 | 4.8 | 4.7 | 4.5 | 3.3 | 5.0 | 4.9 |
| Matching with needs | 4.2 | 4.4 | 4.9 | 4.9 | 5.0 | 4.9 | 4.6 | 4.6 | 4.7 | 4.1 | 5.0 | 4.8 |

Figure 8 : Evaluation of participation training on patient safety (Rating scale)

## b. Learning

Participants wrote down their observations on each curriculum and conceptualized their experience, to increase the depth of learning. The rubric evaluation and SBO achievement evaluation were conducted before and after attendance, both of which improvement (Fig. 9). Especially, the quality management score was significantly lower than those of patient safety or infection control before attending, but improved after attending (Fig. 10). The ASUISHI program proved that doctors can **acquire quality management skills** by learning from industry lecturers.

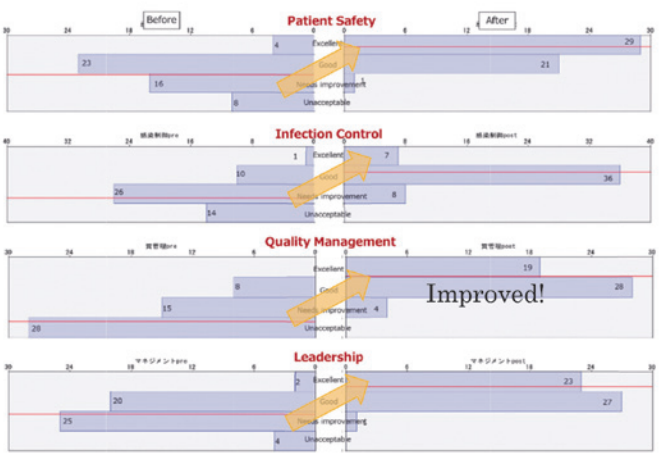



Figure 9 : Summary of rubric evaluation (n = 51)

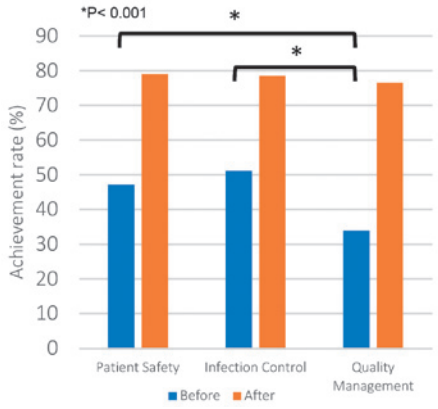



Figure 10 : Achievement of specific behavioral objectives (SBOs) (n = 20)

## c. Behavior

All participants completed the problem-solving procedures, and a large number of graduates have presented their achievements at domestic and international academic conferences on patient safety and quality in healthcare.

### d. Results

Currently, we visit hospitals where ASUISHI graduates work and are promoting qualitative evaluation by interviewing their managers and colleagues. The graduates' reputation at their hospital was generally good, and ongoing Kaizen activities are being developed. The graduates' attitudes have always been forward-looking as **leaders of the organization**, which suggests that they have a positive influence on others at their hospital.

## 2.5 Examples of improvement activities of participants

(These products were presented in **TOYOTA's A3 report format** in the class.)

### 2.5.1 "Elimination of Right-Left Errors in Surgeries"

**Dr. Naoki Sakurai, Yamagata Prefectural Central Hospital** **http://www.ypch.gr.jp/**

Dr. Sakurai is a consultant surgeon, and also a director of the patient safety management department in his hospital. He and his colleagues had experienced some near-misses involving left/right misidentification of surgical cases. A survey of the staff showed that many of them thought there was a risk of left/right misidentification. They formed a project team in the operating theater for Kaizen, set the goal of zero wrong-side operations, and analyzed which processes have many hazards and causes.

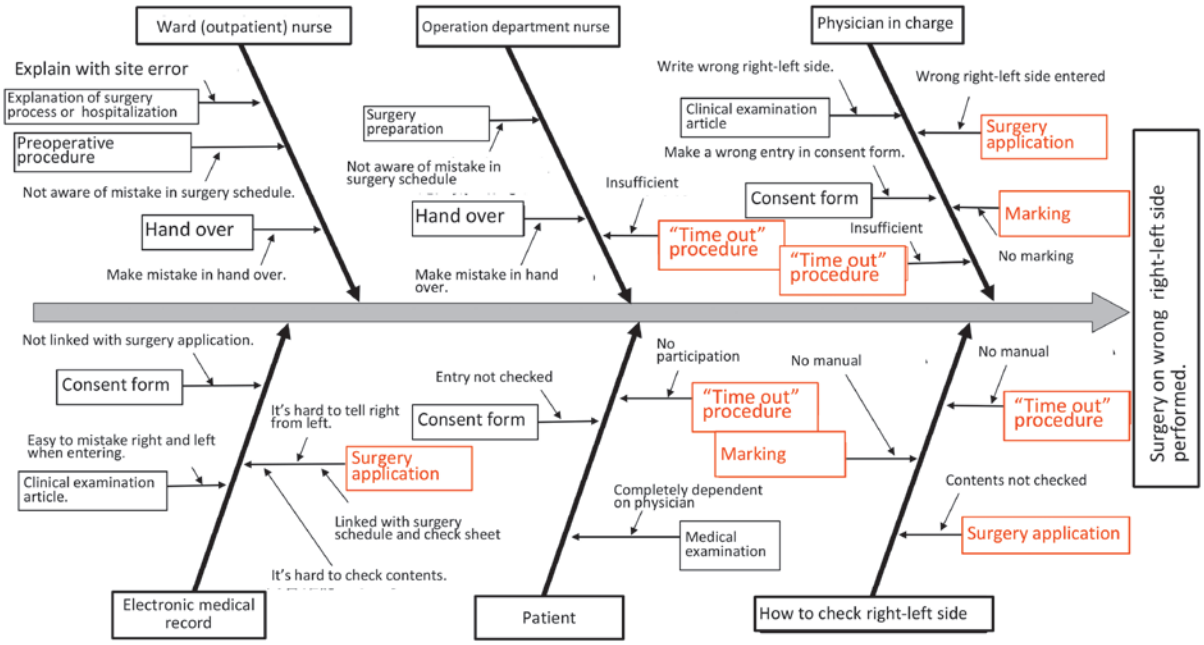



Figure 11 : Characteristic factor diagram

As countermeasures, confirmation of surgical application, standardization of marking of the surgical site and a time-out process were conducted. During implementation of these, Dr. Sakurai realized the importance of multi-disciplinary communication and negotiation as a leader (Fig. 12). The rate of compliance with the checklist that includes site marking and time-out has remained at 100% (Fig. 13).

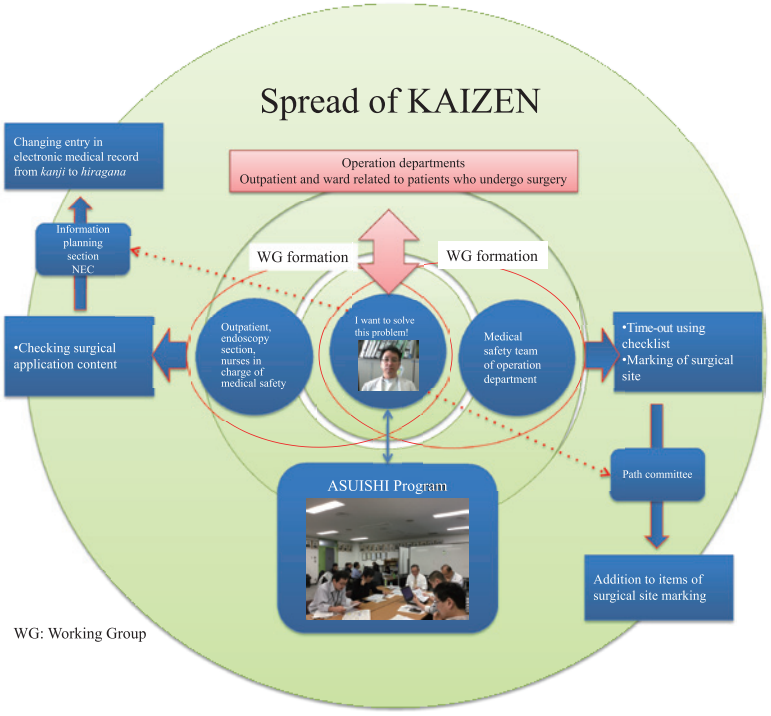



Figure 12 : The thoughts of one physician influence the entire hospital

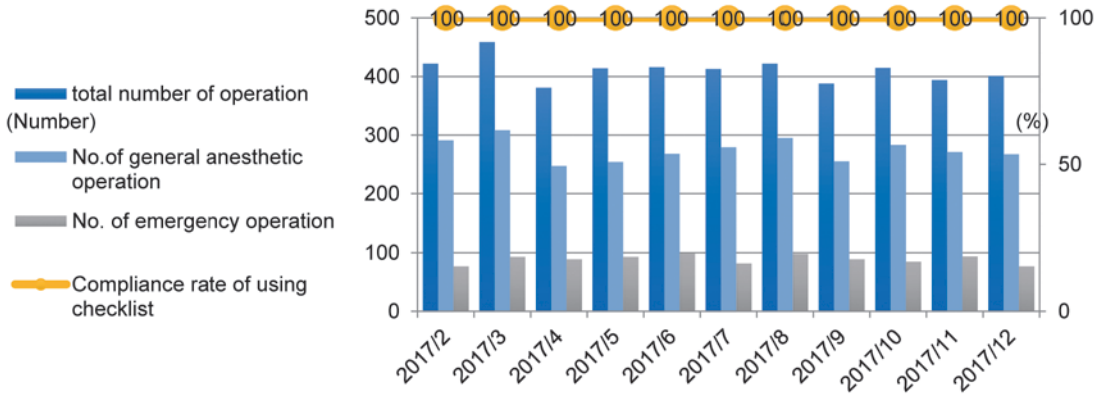



Figure 13 : Compliance rate using safe surgery checklist

## 2.5.2 "No More Endoscopy Patient Mix-Ups"

**Dr. Koichi Tomoda, Nara Medical University Hospital** **http://www.naramed-u.ac.jp/hospital/**

Dr. Tomoda is the chief medical safety manager of his university hospital. One day he realized through the incident reporting system that a few patient misidentifications were occurring in the endoscopic department. When he and his colleagues created a process flowchart of endoscopic examination, he found that standards

such as the timing and method of patient confirmation were not fixed and the responsibility for specimens was unclear. Therefore, he gathered a team consisting of a nurse, a medical engineer, a physician of the endoscopic department, and members of the medical safety office. They drew up rules and incorporated a time-out procedure before the examination into the process.

Unfortunately, mix-up incidents continued because the team could not get the cooperation of the department chief. Dr. Tomoda and his team patiently waited until the chief noticed himself that the situation needed to be improved. The climate of the whole department changed gradually and the kaizen cycle started to function properly (Fig. 14). Since the last patient misidentification occurred in October 2016, the time-out compliance rate has remained at 100% and there have been no mix-ups. During that period, the endoscopic team, including the chief, repeatedly conducted various Kaizen activities on their own (Fig. 15).

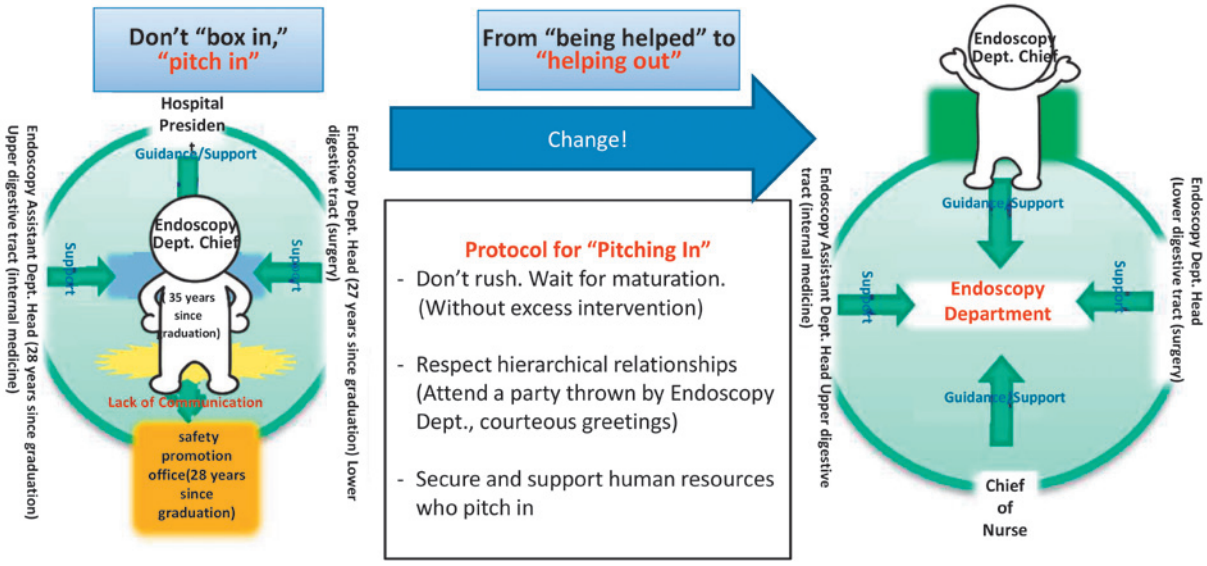



Figure 14 : Human relationship surrounding chief of endoscopy dept.

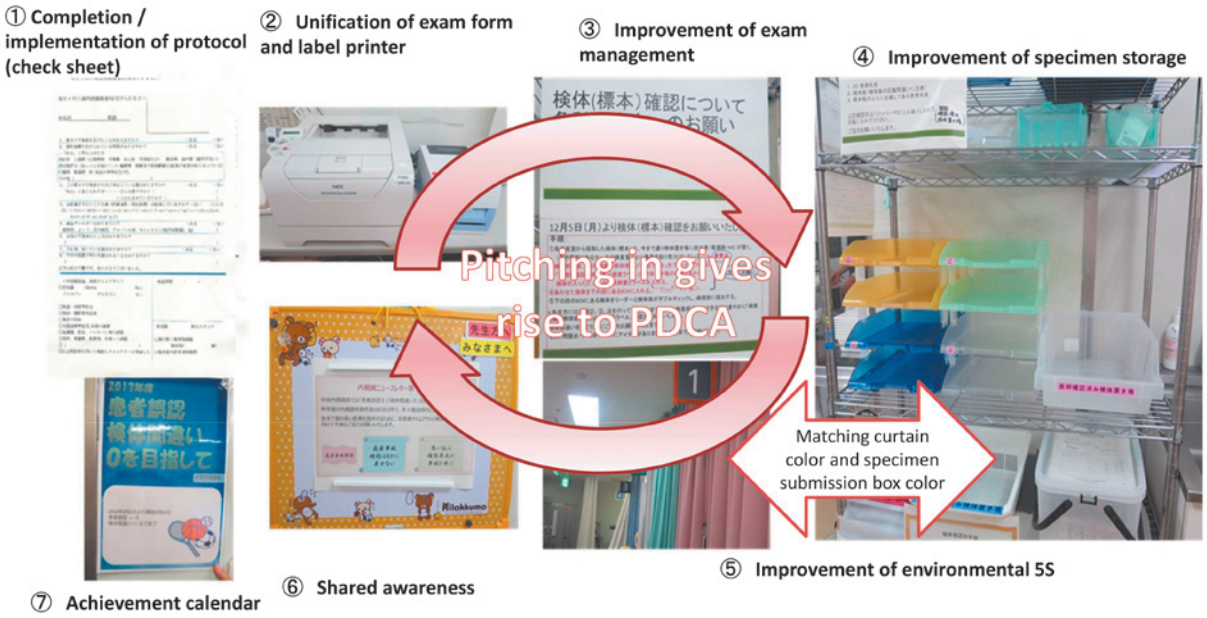



Figure 15 : Effect of Pitching In: PDCA in the Endoscopy Department

## 2.6 Effects of ASUISHI program and challenges

The program satisfied almost all participants (Fig. 16). They seemed to be satisfied with discovering that management in medical care is learnable, and with learning the skills and attitudes as a leader. Their satisfaction is also due to finding colleagues who together construct the patient first medical system. The number of applicants from busy core hospital is increasing, suggesting that medical doctors who understand the necessity of management are increasing gradually.

The program is attracting the attention of not only the medical community, but also social media, and the mass media are also showing interest in this cooperation between TOYOTA and the medical community. Its influence is even extending overseas, and we have received inquiries from various professionals in regions such as Taiwan, Mexico, the United States of America, Switzerland, Germany, Asia, and Africa.

In order to raise patient safety in Japan to the next stage, reduce incidents and improve the quality of medical treatment, it is essential to introduce TQM to hospitals. Although the ASUISHI program has only just begun, **it is fostering many leaders who can improve the hospital system**. The common aim of improving the medical system is also shared with the TOYOTA group lecturers and supports the program management.

The objective of training physicians to be leaders and promote TQM is being fulfilled. To enable them to continue TQM in their hospital, it is necessary to form a core team. Many graduates are faced with the challenge of selecting and educating their members, and it is necessary to consider how to support them. Since there are not enough experts to support each hospital continuously from the outside, a mutual support system is necessary. Because the project was launched for a limited time, it is urgently necessary to consider establishing a sustainable system in the future.

We have recognized the necessity of giving all medical professionals the knowledge, skills and attitude on implementing TQM in medical care. In order to do this, cooperation with medical organizations and other medical professions is required. We will expand our activities with the aim of "**changing medical professionals, changing hospitals, and changing our society for tomorrow's medicine.**"

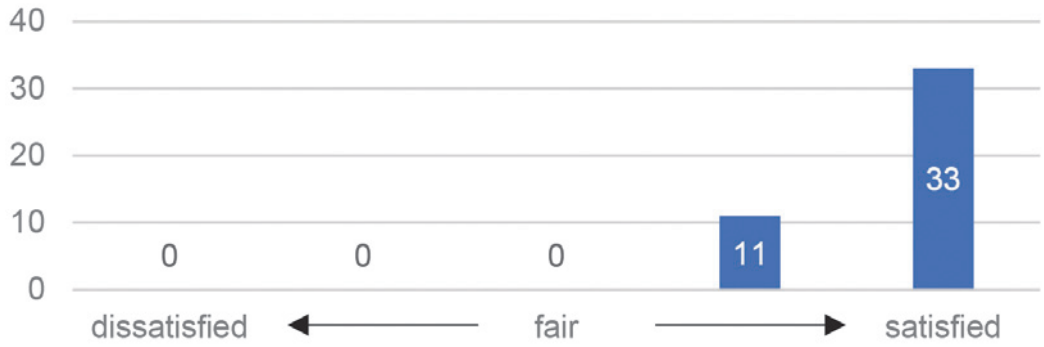



Figure 16 : Satisfaction survey for the whole program (n = 44)

## 2.7 Reference web sites


### 1. *TOYOTA MOTOR CORPORATION GLOBAL WEBSITE | 75 Years of TOYOTA | Total Quality Management (TQM) | Changes and Innovations.*

**http://www.toyota-global.com/company/history_of_toyota/75years/data/company_information/management_and_finances/management/tqm/change.html**

### 2. *ASUISHI physician training program.*

**http://www.iryoanzen.med.nagoya-u.ac.jp/asuishi/en_asuishi/**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# Chapter 3

# Kaizen Activities from a Factory to a Hospital

Report from Aso Iizuka Hospital
Authors: Dr. Hiromi Ando, Dr. Fumio Fukumura,
Ms. Nana Tateishi




## Overview of Aso Iizuka Hospital

Number of Hospital Beds: 1,048 beds (General 978 beds, Psychiatric 70 beds)
Number of Staff: 2,411 (303 Doctors, 1,080 Nurses, 520 Co-Medical Technologists, 508 Clerks and Others) ※ As of December 1 2017
Number of Inpatients: 894 / day
Number of Outpatients: 1,896 / day ※ Medical statistics 2016

Iizuka Hospital has been working to expand the clinical training system from early on, and now it has become a clinical resident training hospital where residents come from all parts of the country. In addition, the hospital focuses on critical care, and handles over 7,000 emergency transports per year. At the same time, there is a cancer center, disaster center and perinatal medical center, and also supports community healthcare as a regional medical care support hospital. Iizuka Hospital is located in the central part of Fukuoka prefecture, and is a core hospital for acute phase with 430,000 people in the Chikuho region as the second medical area. Our hospital was built by Takichi Aso in 1918, with the spirit to “bring skilled physicians, and provide the best in medical treatment for the people of the region”. We are continuing the effort to deliver the best medical care with sincerity to everyone, while still inheriting that spirit and aiming to become “the most sincere hospital in Japan”.

# Chapter 3: Kaizen Activities from a Factory to a Hospital Report from Aso Iizuka Hospital

## 3.1 Being a pioneer hospital in applying Japanese manufacturing methods to hospitals

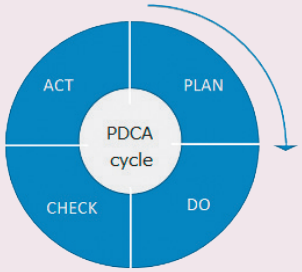
Until the mid-20th century, "made-in Japan" was synonymous with low-quality products. Inspired by a series of lectures about quality control in the 1950s by Edward Deming, many industry leaders in Japan came to realize the importance of quality management to enhance their international competitiveness. More importantly, proactive efforts to improve the workflow quality by company employees, called QC circle activities, spread rapidly throughout the country. These company-wide quality control systems developed into today's Total Quality Management (TQM), which was a main driving force behind raising the quality and productivity of Japanese manufacturing.

TQM is not just about the "PDCA" process, but has the core principles of "respect for people" and "customer oriented". Through continuous QC circle activities, which are the core of the TQM system, employees are expected to gain the opportunity to fully utilize their intelligence and creativity, enabling both companies and employees to grow.

In the early 1990s, Mr. Aso, the president of Aso Iizuka Hospital (AIH), felt that the productivity and quality of hospital management needed to be improved. At that time, AIH was already facing the effects of population ageing and medical progress, namely that diseases were becoming more complex and requiring more sophisticated medical treatments. In addition, diversification of patients' needs required higher quality healthcare. To overcome this challenging situation, Mr. Aso decided to apply Japanese management methods in manufacturing – Total Quality Management (TQM) – to AIH. This decision was a natural step for AIH, which is owned by a company, Aso Cement Co. Ltd. Since then, AIH has been developing its own style of TQM by adopting QC circle activities, ISO9001 and lean management.

### PDCA cycle

① Plan: Define the problem to be addressed, collect relevant data, and ascertain the problem's root cause.
② Do: Develop and implement a solution; decide upon a measurement to gauge its effectiveness.
③ Check: Confirm the results through before-and-after data comparison.
④ Act: Document the results, inform others about process changes, and make recommendations for the problem to be addressed in the next PDCA cycle.



## 3.2 Limitation of Quality Circle Activities

The TQM activities in AIH were similar to QC circle activities, which are the most symbolic and traditional part of AIH's quality management system. We extended the QC activities to the whole hospital, to create a hospital with the best hospitality in Japan. Throughout the TQM activities, all the staff in the hospital proactively worked on improving the quality of medical treatment with a bottom-up approach. The hospital staff became able to report issues with quantitative data, and come up with concrete solutions by collaborating with other staff. There was a positive cycle, where one success inspired people to work on another improvement. The theme of the initial QC circle activities was cutting costs and streamlining operations, but recently it also includes patient services, medical safety, and medical quality. This reflects the higher awareness of the hospital staff through the bottom-up approach.

The principles of the QC approach include: "focus on crucial issues" and "the next processes are our customers (do not drain the defective product in the rear process)". All the staff should be aware of these principles in order to improve the performance of the whole hospital. However, the environment surrounding medical care has changed, and hospital staff must now provide more advanced and higher quality medical care. As hospital staff are required to work on QC activities in addition to their daily medical care work, the staff began to feel under pressure by QC activities, and sometimes engaged in the activities just to satisfy the management rather than to make real improvements. As a result, QC activities did not function effectively and solve problems.

Therefore, in 2010, the Kaizen Promotion Office (KPO) was set up as a dedicated section for QC activities, aiming to make improvement activities more simple and user-friendly to hospital staff, and to increase the number of people who can implement improvements. The mission of KPO is to expand the QC mindset throughout the organization and ensure the sustainability of QC activities. We have provided three approaches by which hospital staff can work on improvement activities according to the purpose and timeline: the existing QC Circle Activities, the Kaizen Workshop, and the Everyday Kaizen.

KPO supports and provides guidance for these three approaches, and is also in charge of developing improvement tools and managing improvement activities.

## 3.3 QC Circle Activities

The QC circle activities that have been implemented since 1992 are the most iconic activities of AIH-TQM. Hospital staff work in teams of five to ten people, learn the QC story, and provide Kaizen solutions to their issues in six months. The QC story is a methodology of systematic problem-solving and consists of eight steps – identifying issues, recognizing the current status, setting goals, analyzing factors, planning and implementing solutions, assessing the results, and standardizing the methodologies. As shown in the following chart, it is important to carefully follow the flow of these steps.

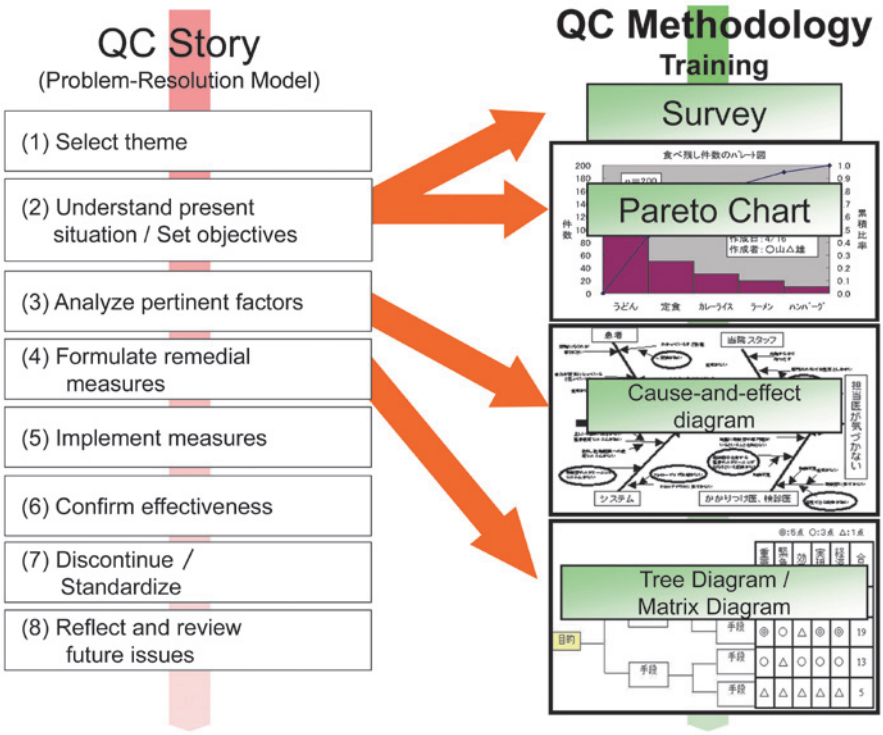



Figure 1 : QC story and QC tools

AIH has its own support system to enable each team to accomplish its activities. Firstly, we have several TQM experts who provide proper advice and support to each team until their final presentation. Secondly, we have a special TQM educational team to teach tools and techniques at each step of the QC story. Finally and most importantly, we have a clear commitment from top management, where the Chief Executive is always present at the kick-off meetings and presentations to appreciate and encourage the teams.

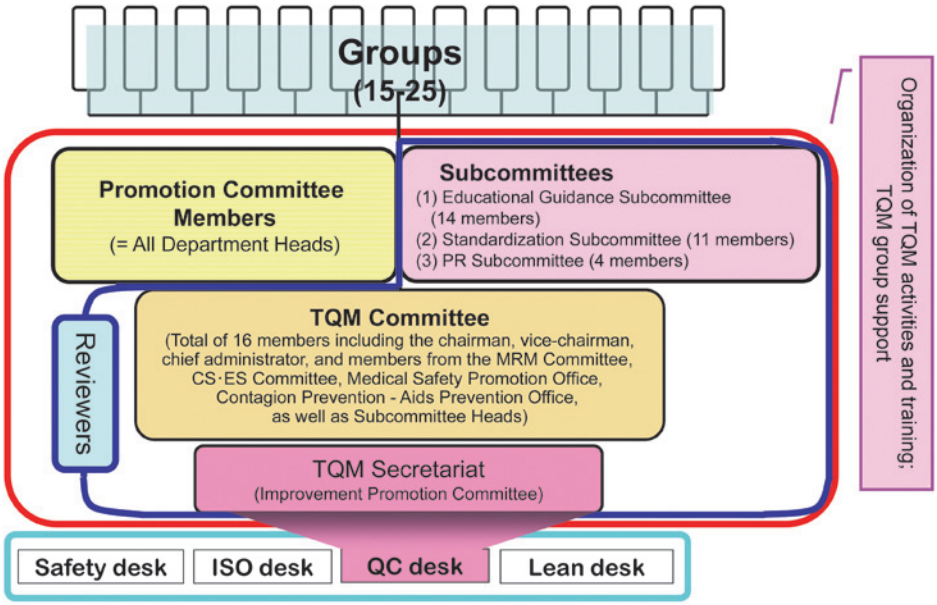



Figure 2 : TQM support system in AIH

Themes for TQM activities are wide ranging, from top-down to bottom-up, and also cover various areas such as patient safety, cost reduction, work productivity, and patient service.

Table 1 : Representative themes of TQM activity

| Department | Team Leader | Theme |
|---|---|---|
| Account Dept. | administrator | Reduction of waiting time for payment |
| Central Laboratory | lab technician | Shortening of turnaround time for lab-test |
| Med. Engineering Dept. | medical engineer | Effective use of medical instruments |
| Nephrology Ward | nurse | Reduction of bed sore occurrence on nephrology ward |
| Orthopedic Ward | nurse | Reduction of delirium after hip-joint surgery |
| Psychiatric Ward | nurse | Reduction of fall event |
| Surgery Ward | nurse | Sufficient wound care guidance at discharge |
| Nutrition Dept. | nutritionist | Tasty meals for patients treated with chemotherapy |
| Pharmaceutical Dept. | pharmacist | Proper renal dysfunction alerts when using renal toxic drugs |
| Anesthesiology, OR | physician | Pain control after surgery |
| Facilities Division | technician | Reduction of $CO_2$ emissions of AIH |

The following chart shows the annual schedule of the QC Circle activities, the Circle review and the QC methodology study meeting tailored to it. The hospital staff can continue their proactive activities with the benefit of such systematic support and guidance.

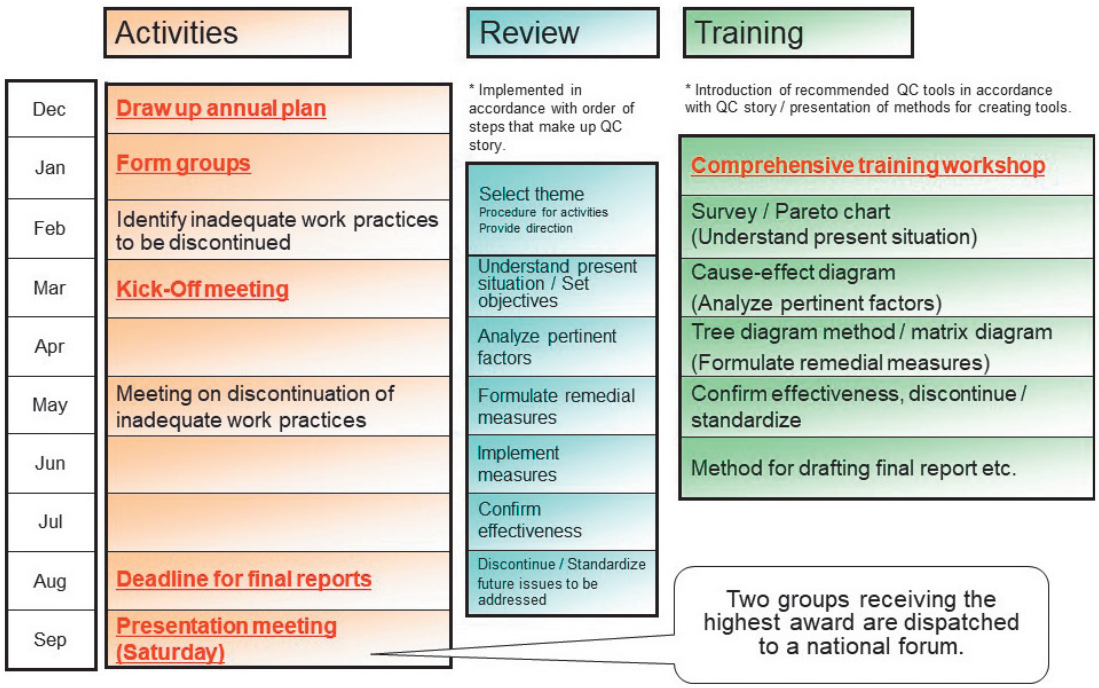



Figure 3 : Time schedule for review and training in TQM activity

The following are examples of QC circle activities

| Department | Northern Ward 5th floor (Pediatrics ward) | Story Type | Problem Solving | Category | Healthcare Service | No.1 |
|---|---|---|---|---|---|---|
| Theme | Incorporating preparation: I won't be crying after preparation! | | | | | |
| Reason for Theme Selection | What is preparation? Are we properly explaining to the children what examination they will be having? Are we giving an injection and take blood after the child is convinced? Children are young but they have the same rights as adults. We at our pediatrics ward not only collect blood of inpatients, but also accept one-day hospitalizations, resulting in more frequent blood tests and securement of vascular access. We chose this theme in the hope that we could thoroughly understand the value of preparation and incorporate it into our workflow so that the children can feel at ease when receiving medical treatment. | | | | | |

**1. Select theme**

**PDCA Cycle**




**2①. Understand present situation**
- ✓ Conducted survey of ward nurses to measure awareness of preparation.
- ✓ Investigated the time spent for blood testing and securing vascular access as well as the children's responses (3 to 8 year olds) .

**2②. Set objectives**

"Increase the ratio of blood testing and securing vascular access that take less than 10 min for 3 to 8 year olds from 51% to 75%."

**3. Analyze pertinent factors**
- ✓ Analyzed why blood testing and securing of vascular access of 3 to 8 year olds took so long and focused on and verified 2 important factors.

1) No rules in place for preparation
2) No items for distracting the child's attention from treatment in the rooms.

**4. Formulate remedial measures**
- ✓ The following countermeasures are deemed necessary for the important factors:

1) Unify the method, procedure, and awareness of preparation.
2) Secure time for preparation.
3) Provide specific explanation on the method of taking blood and securing vascular access.
4) Brighten the atmosphere of the treatment room.
5) Put in place items that attract a child's attention.

**5. Implemented measures**
- ✓ Held study sessions to learn the purpose and method of preparation.
- ✓ Created a manual for preparation.
- ✓ Adjusted the task schedule.
- ✓ Created picture-story shows to use in preparation.
- ✓ Created and placed character decorations in treatment room.
- ✓ Started to play music and DVD's in treatment room.
- ✓ Created stickers and boards given as rewards to the children after finishing treatment.

**6. Confirm effectiveness**
- ✓ The ratio of procedures with 3 to 8 year olds taking less than 10 min went up from 51% to 86%. **Objective Achieved.**
- ✓ Patients: Increased in volition and interest.
- ✓ Families: Increased in satisfaction.
- ✓ Staff: Increased in awareness and changed their working style.

**7. Discontinue and Standardize**
- ✓ Clarified roles and terms in order to maintain effective countermeasures.

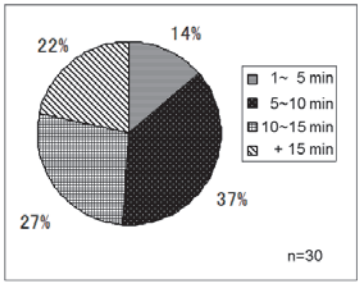
**8. Reflect and review future Issues**

2 year olds are also subject to preparation, but due to the difference in growth were not covered. Given the successful introduction of preparation, we plan to include 2 year olds as well so that more children can stay in the hospital at ease.

**[Tangible effects]**

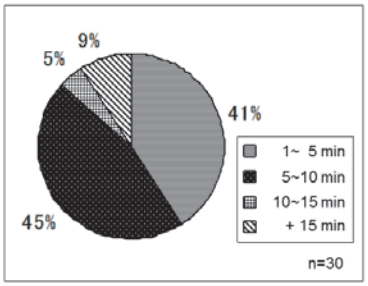
Pre-implementation | Actual: Under 10 min was 51%
Goal: Increase it to **75%**!

Time spent to collect blood or secure vascular access (3 to 8 year olds)




Post -implementation | Under 10 min reached **86%**!

Time spent to collect blood or secure vascular access (3 to 8 year olds)




**[Intangible effects]**

Patients
- ○More children felt ready for treatment after understanding the process with the picture show.
- ○Children were less afraid to enter the treatment room.
- ○Even crying children were distracted by the decorations, music and the DVDs.
- ○More children stayed still and calm as they expected to receive the reward stickers.

Families
- ○Some parents expressed they could safely hand their kids in for care.
- ○Delighted to see their kids being treated without crying for the first time.

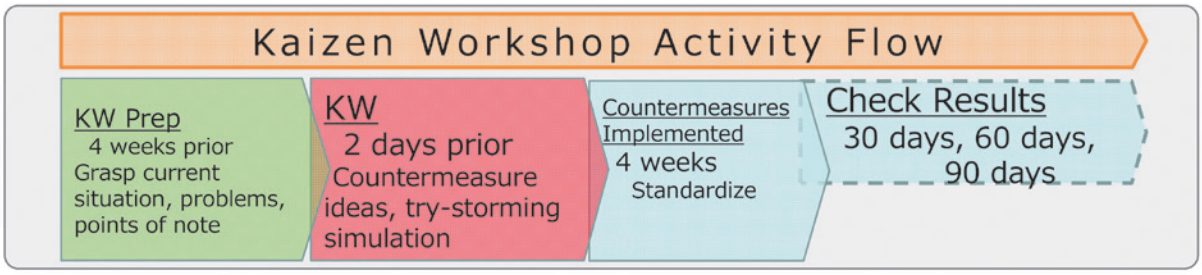
Staff
- ○Staff and time involved in the treatment decreased, enabling smooth operation.
- ○Awareness of preparation increased, with staff being able to giving appropriate explanation according to the age of children.
- ○Increased awareness of preparing a well-organized treatment room with the more relaxed atmosphere.

## 3.4 Kaizen Workshop (KW)

We met Dr. Kaplan, the CEO of Virginia Mason (VMMC), in 2008 when TQM activities had been in operation for 20 years and we were considering further development of those activities. VMMC had established the Virginia Mason Production System (VMPS) which was based on the TOYOTA Production System, and was running the hospital management and improvement activities targeting value for patients.

The TQM activities in AIH were mainly intended to help young staff to learn Kaizen techniques, and therefore the speed of improvement became slower and we have not been able to provide tools that could be used immediately in the work place. Therefore, we established the Kaizen Workshop (KW) based on the improvement activities developed in VMMC.

KW is "improvement activity targeting value for the patient (customer)", and its major characteristic is that the members have opportunities to stay away from their daily work for two days to engage in improvement activities. The flow of activities is shown below. It takes 4 weeks to select the theme, understand the current situation and identify the problems, and takes 2 days to run simulations on the ideas. Using the results of the simulations, we identify the effective actions to take, execute the actions within one month, and also conduct performance reviews at 30, 60, and 90 days after the execution. Also, the roles of each member are clearly identified, as shown below.




| Name | Target | Responsibility | Role |
|---|---|---|---|
| Sponsor | Service Line Leader (for the scope of the Kaizen activity impact) | Get Kaizen Results | Grasp results<br>Consult, Coordinate<br>Decide content which cannot be judged by the WM |
| Workshop Manager (WM) | Class 5 and above (next term candidate) | Realize KW Activities | Further KW Activities<br>Results management |
| Workshop Team Leader (WTL) | Class 4 and above (next term candidate)<br>*TQM experience, if possible | Implement KW | KW Prep/Promotion<br>Data collection<br>Generate opinions/ideas<br>WM support |
| Team Members | Work on Target Processes Staff, Fresh Eyes (Other Departments, Customers, Before and After) | Participate in 2-Day KW<br>*Can participate in more than 60% | Data collection<br>Generate opinions/ideas |
| KPO | Kaizen Promotion Office Staff | | Progress management<br>Support<br>Coach<br>KW implementation Prep |

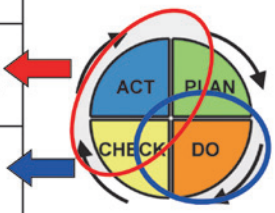
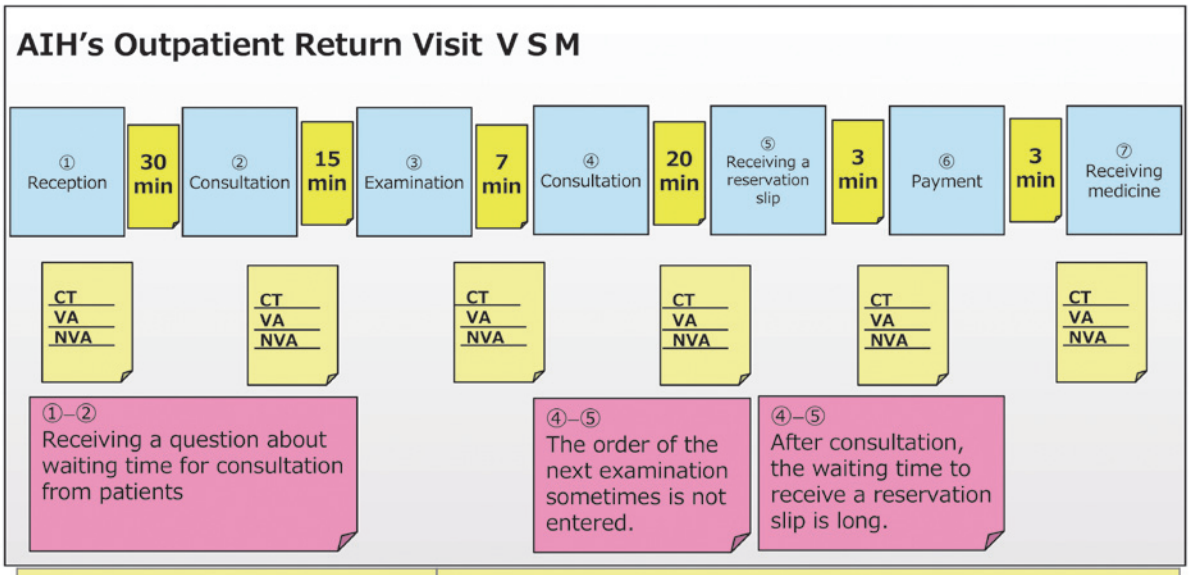


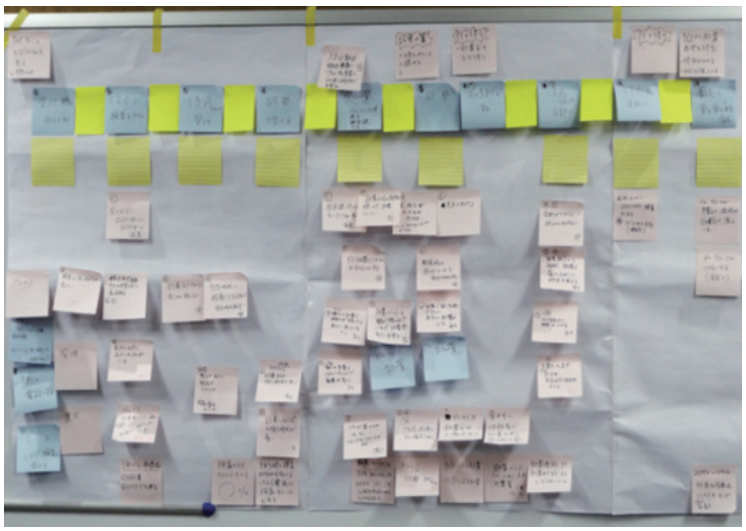

Figure 4 : Kaizen workshop activity flow and the roles of each member

A unique tool used in KW is the Value Stream Map (VSM). This is an improved version of the TOYOTA Production System "Material and information flowchart," which is also recommended by VMMC. Its unique feature is that it visualizes the patients' value by focusing on "patients' experiences". A patient's value is expressed in time. The major difference from a business flow is that all the time when patients do not experience value (i.e. waiting time) is regarded as "worthless time". The advantage of this process is that all the stakeholders involved in the process can share the patients' value and problems with a visual chart.




| Term | Meaning |
|---|---|
| CT (cycle time) | Time taken for one process (cycle) |
| VA (value added) | Valuable time for a patient (customer of the process) [Example] Actual blood sampling time, One-on-one consultation |
| NVA (non-value added) | Wasted time for a patient (customer of the process) [Example] Preparation of inspection equipment, Time searching for papers |

Figure 5 : Value Stream Map (VSM)



Value Stream Map (VSM)

Case of KW: KW in the Urology Department

In 2015, the AIH Urology Department tried to shorten the waiting time for outpatients (return visit reservation). The members of the team were urologists, nurses, medical secretary, clerks and staff members of the Kaizen Promotion Office. At first, they produced a VSM in order to formulate the annual plan and identify the problems (with pink sticky notes), and focused on the waste (inefficiencies) in four areas, 1) process from end of consultation to payment, 2) process from reception to consultation, 3) work interruption, 4) process for hospitalization orientations). The average waiting time was 21 minutes before consultation, and 16 minutes after consultation. Countermeasures to improve such waste were formulated and implemented as shown below.

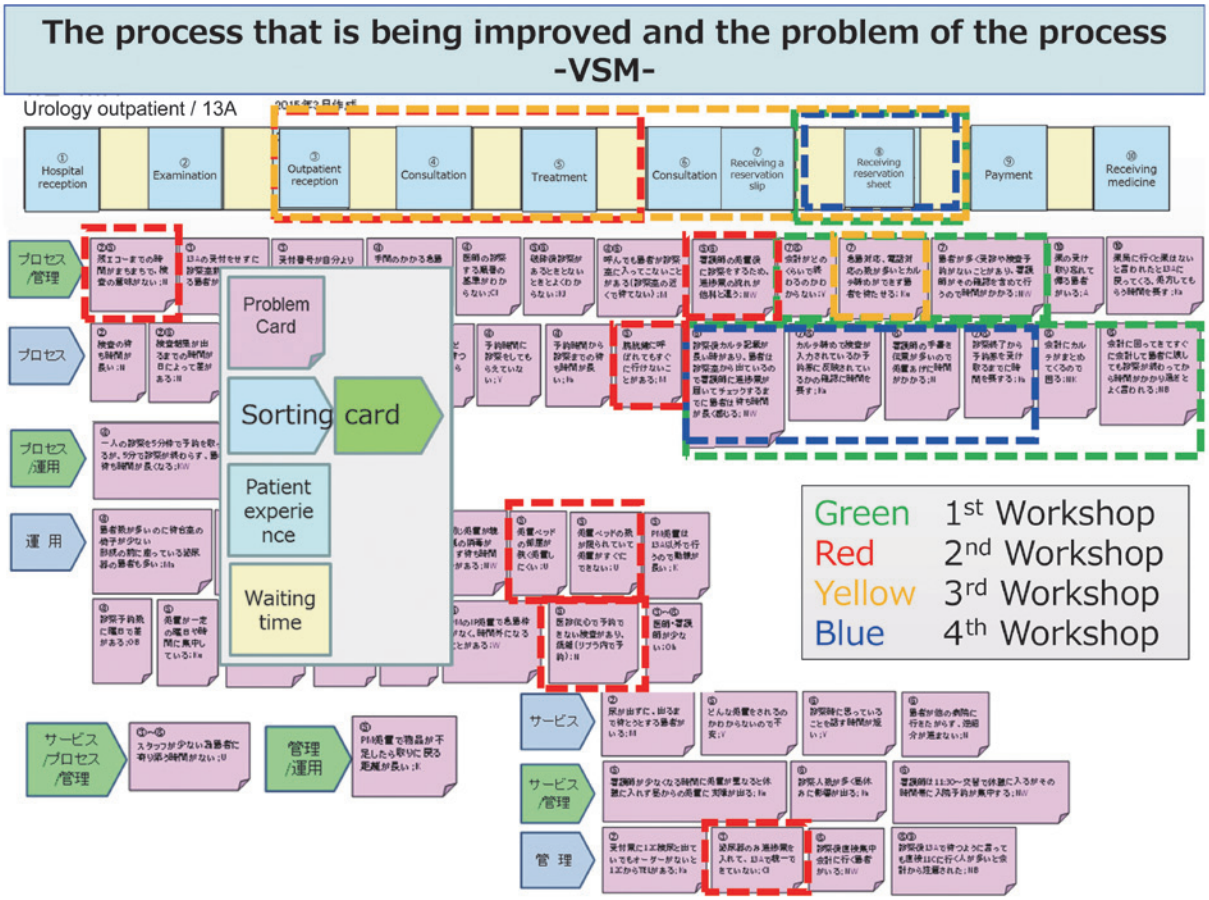



Figure 6 : Value Stream Map for urology outpatients (return visit reservation)

Table 2 : Focus points and countermeasures

| Waste | Countermeasure |
|---|---|
| 1) Waste of process from consultation end to payment | ● Making a check list after consultation<br>● Systematization of examination reservation<br>● Effective use of messengers<br>● Dividing document boxes before and after consultation and contriving the arrangement such as placing boxes beside the staff who need them |
| 2) Waste of process from reception to consultation start | ● Arrangement of documents divided for patients with prior examination and patients with prior consultation<br>● Placing waiting area for echographic examination near entrance<br>● Changing echographic examination of wheelchair patients from supine position to sitting position based on evidence |
| 3) Eliminating the waste of work interruption by telephone | ● Review of reservation change procedure and reduction of phone call transfer<br>● Patterning correspondence to unwell patients<br>● Revising explanation sheet of cystoscopy to reduce inquiries by phone |
| 4) Waste of process for hospitalization explanation | ● Changing document preparations and timing for hospitalization explanation<br>● Standardization of contents and description fields by doctors about hospitalization reservation<br>● Revising hospitalization manual with patients' point of view<br>● Removing duplication of checklist for hospitalization preparation and clarifying description field among staff in charge |

1) Improvement of arrangement of document boxes before and after consultation

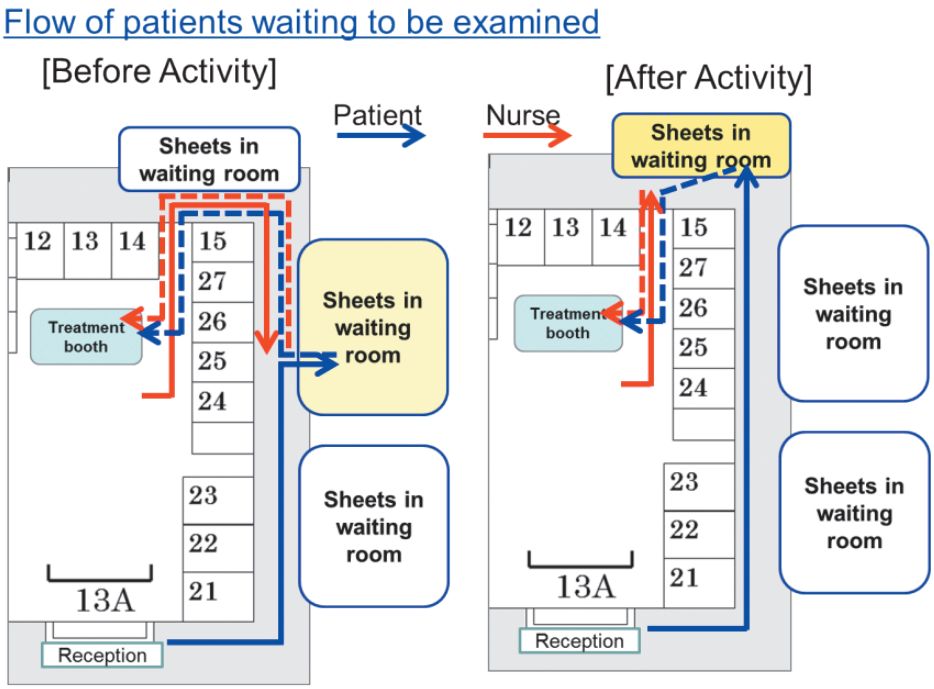




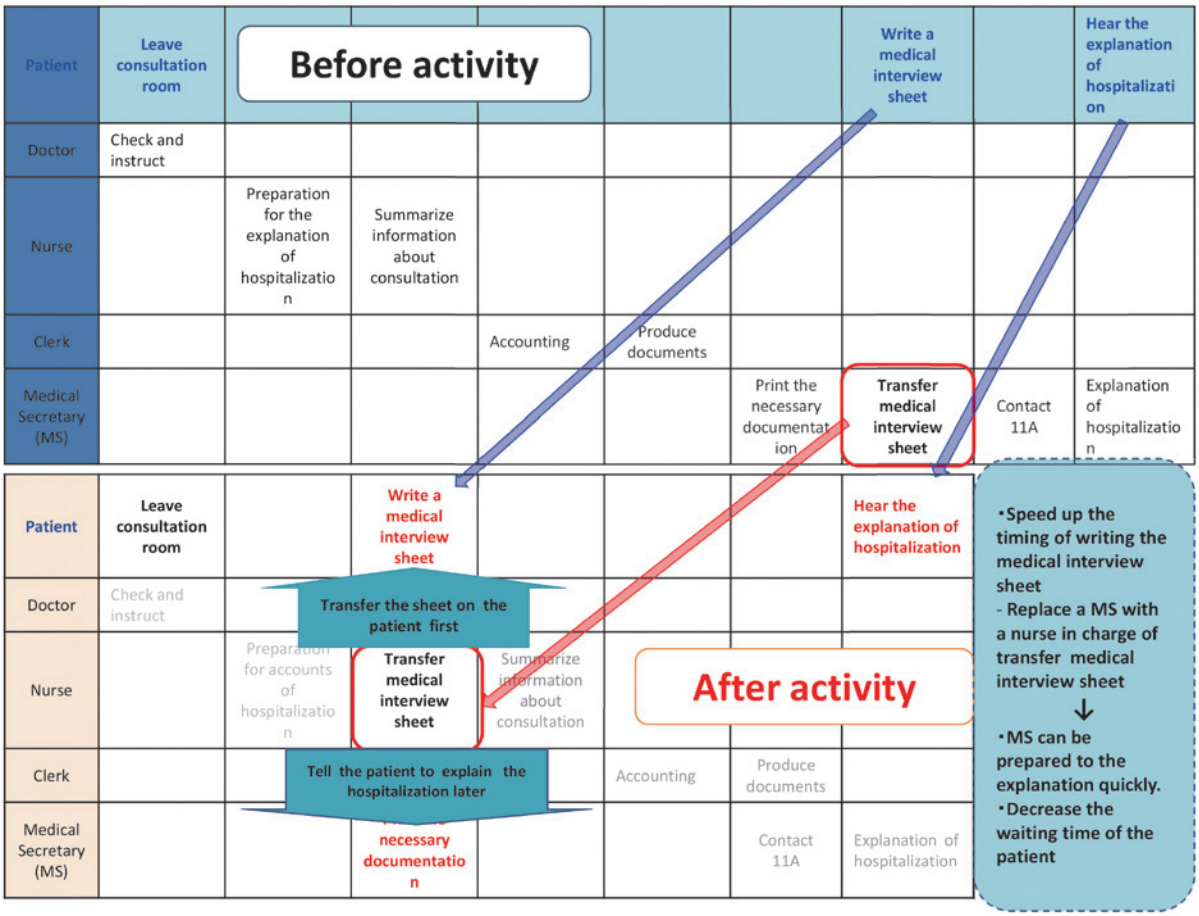
2) Improvement of document submission of patients with prior consultation




Process Sheet of patients in consultation room



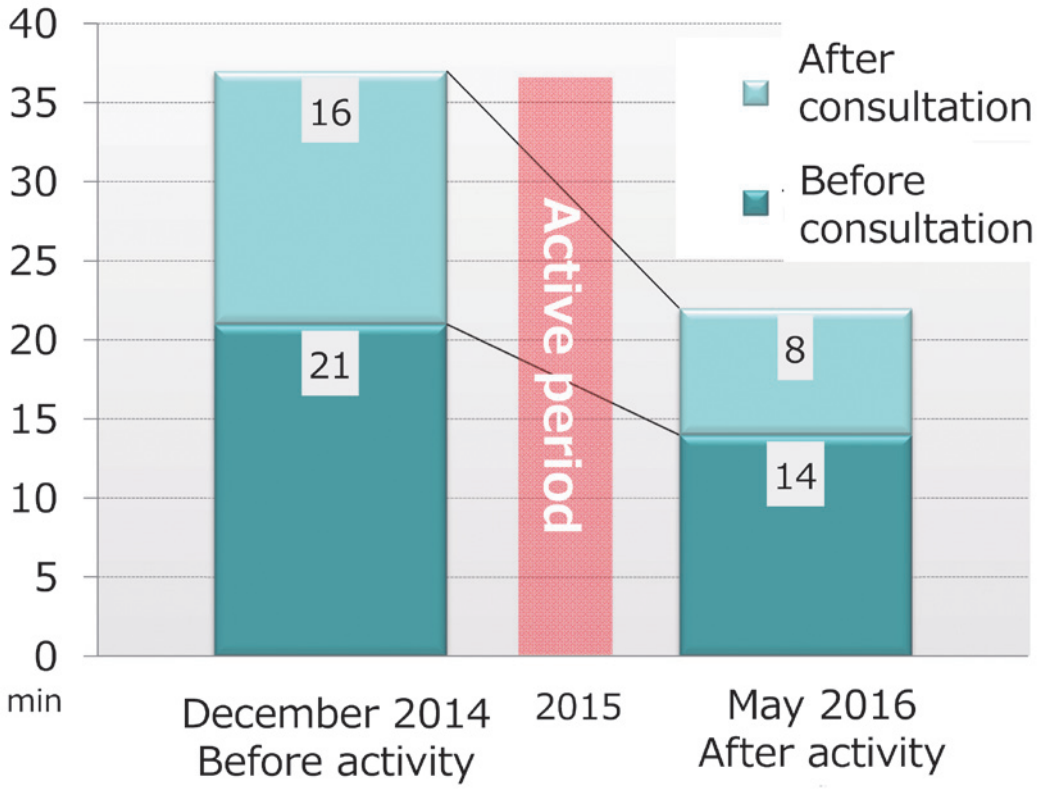

3) Improvement of waiting area for echography examination




4) Improvement of preparation and timing for hospitalization explanation

They investigated the improvement in waiting time every month after the activity, which showed the effect of such countermeasures: waiting time in May 2016 improved to 14 minutes before consultation and 8 minutes after consultation.

Figure 7 : Waiting time for Urology Department outpatients (return visit reservation) in 2015





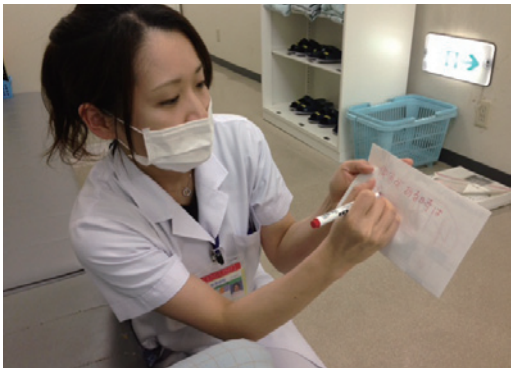
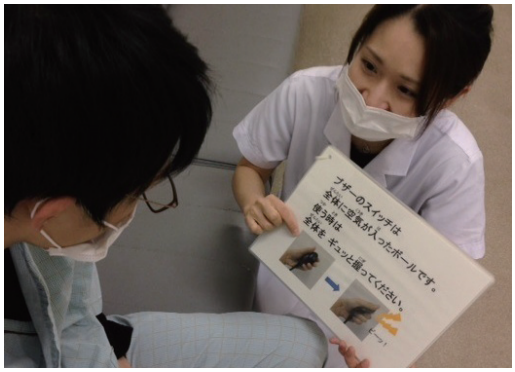



## 3.5 Everyday Kaizen

Everyday Kaizen (EK) is one of the AIH Kaizen activities. Through EK, hospital staff can realize their own ideas to solve daily problems supported by their managers. A unique aspect of EK is its straightforwardness, which enables anyone to perform it at any time and anywhere. Since EK focuses on fundamental issues, hospital staff can learn the basic PDCA concepts such as identifying problems, making plans and checking effects, and experience self-realization. The completed EK is disclosed to all the staff, which can provide good ideas to other staff. Since 2014 over 700 EK have been reported and displayed on the AIH intranet.

The below is an example of EK performed by a radiation technologist.

**Standardization (Example: Radiation technologist Yui's idea)**
**Title: Creating Examination Explanation Sheet**

| Before improvement | After improvement |
|---|---|
| Problem:<br>The explanation for MRI scanning to patients with hearing difficulty is done by writing, but the explanation is lacking and unreliable. | Result:<br>There is nothing missing or unreliable in the explanation.<br>**Point:**<br>**Every radiologist can give the same explanation and always provide the same quality to each patient. Reduction of time for writing!** |
|  |  |

1) EK in X-ray room: Creating an inspection description sheet (standardization)

| | | |
|---|---|---|
| P | ① Theme | Explanation of examination for patients with hearing difficulties at X-ray room |
| | ② Preset Issues & Idea | For these patients we write down all issues for the pre-exam explanation every time.<br>It takes much time and we sometimes forget some issues. |
| D | ③ Counter -measures | Decide the standard explanation issues.<br>Make a standard explanation template to use every time. |
| | ④ Coach | 7 Mudas (Waste)<br>☐ Transport ☐ Waiting ☑ Defects ☐ Overprocessing<br>☐ Inventory ☑ Motion ☐ Overproduction |
| C | ⑤ Effects | We could shorten the explanation time for patients with hearing difficulties.<br>Nothing to be explained is forgotten. |
| A | ⑥ Unsolved Issues | The same countermeasures should be done for other X-ray examinations. |
| | ⑦ Coach Comments | The explanatory sheets are easy to use by bundling in a ring and are able to proceed an examination smoothly. |

2) Example of EK reporting form

## 3.6 Developing in human resources in TQM

By providing the three approaches to improvements, the hospital staff can experience and conduct various improvement activities depending on the issues they are facing. In order to keep making continual improvement activities, it is necessary to have a culture in which the hospital staff proactively challenge their issues. We have established our human resources development system by matching the staff's skills and experience to AIH's personnel system. By incorporating such requirements into the human resources development system, experience and skills in improvement activities have been made a requirement for being promoted to management, which helps expand the culture of improvement activities within the hospital.

### 3 Types of Kaizen Activities at Aso Iizuka Hospital

| Kaizen Activities | | ① EK | ② TQM (QC) | ③ KW (Request-Type, Service Line-Type) |
|---|---|---|---|---|
| Aim | | Participation in Kaizen Activities | Kaizen Ability Power-Up | Obtain Results |
| Activity Period | | 4-8 Weeks | 4-6 Months | 6 Weeks Prep, 2 Days Implementation, 4 Weeks Follow-up |
| Kaizen Target | | Free in Each Person's Realm of Activity | Themes in Line with Business Plan | Themes in Line with Business Plan |
| Activity Target Group | Leaders | All Staff | Mid-Career and Up | Persons in Charge and Up |
| | Members | | Young Staff and Up | Novices and Up |
| Target Group and Role | Affiliated Manager | Implementors / Admini-stration/ Support | Admini-stration/ Support | Admini-stration/ Support |
| | Person in Charge | | Circle Leaders | Workshop Managers / Team Leaders |
| | Mid-Career (10+ years of experience) | | Members | Members |
| | Young (3 or fewer years of experience) | | | |
| | Novice (2 or fewer years of experience) | | | |

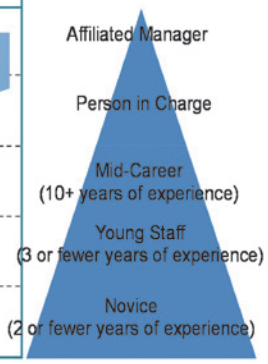



Figure 8 : Three approaches to improvement activities at AIH

## 3.7 Summary

AIH has been developing TQM through continuous improvements by work-site staffs. In recent healthcare services, which involve complex connections among processes involving various medical specialists, we think that TQM could be an effective tool for every hospital to improve the quality and safety of the healthcare system.

# Column 1:
# Example: Effect of TQM for a national hospital in rural area

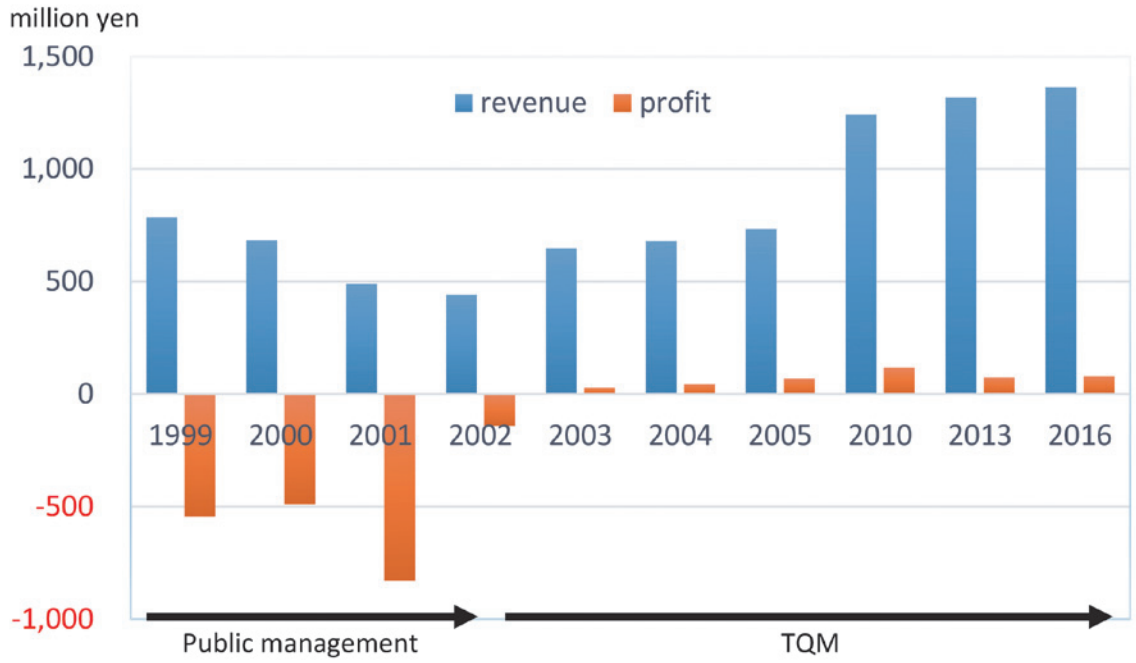
A national hospital with 90 beds was losing 500 million yen every year and was kept going with financial support from the government. However, since its privatization in 2002, it has become financially sustainable and has grown into one of the main medical centers in the region.

A hospital can be changed by its management. Leaders should set their mission and vision, and managers need to analyze existing issues and provide concrete plans to achieve the goal.

Changing the mindset of hospital staff is the most important factor. Since most medical staff generally have strong ambitions, it is possible to improve the productivity of the staff and medical teams, by identifying their roles and motivating them to contribute to improvement.

Through this process, various improvements have been achieved, such as reducing headcounts, optimizing employees' costs, reducing purchasing costs, reducing reimbursement loss, improving the turnover of beds, and as a result improving the financial performance at various levels of medical treatment.

Figure 1 : Changes in ordinary profit and revenue



# Column 2:
# National Network on TQM for Health

## National Network on TQM for Health (NNTH)

I. **Context:** The National Network on TQM for Health was founded in 1998 by Prof. Naruo Uehara, Tohoku University, in cooperation with a small number of hospitals who had been adopting Kaizen activity (QC), to expand Kaizen and TQM activities into all hospitals across the country. Over the early several years, alongside NNTH he also organized the research activity, the National Demonstration Project (NDP) Japan, with the invitation of industrial quality managers to learn the quality management system (QMS) within industries.

There have been 132 healthcare systems including the group of them which appeared in the list. In 2017, the 19th Forum "Kaizen activity in healthcare" was held successfully in Matsuyama, Ehime Prefecture with about 700 attendees.

II. **Architectures:** There are largely five kinds of sessions as follows:

**Session 1:** Educational. There are two courses for staff and leaders.

**Session 2:** Various improvements of Kaizen activities are presented and explained by reviewers. Audiences can learn of new Kaizen trials and also learn the key points in each presentation from the comments made by reviewers. There are about 140 reports being presented.

**Session 3:** Symposium on the four goal-setting approaches as mentioned in III. This is very important for the attendees to understand how to resolve the problems occurring in each process while moving toward the goals. And they can approach each goal in their organization by knowing the would-be problems shared and solved in the Forum.

**Session 4:** Symposium on the five components (requirements) included in ISO 9001; 1) Quality Management System, 2) Management Responsibility, 3) Resource Management, 4) Product Realization, and 5) Monitoring, Measurement, Analysis and Improvement. Each organization has various level of competencies in the five components. This is very useful and effective because all participants can get the competencies for those involved in ISO 9001 when they attend this meeting.

**Keynote Session 1:** Professionals who are famous in each area are invited for the Keynote Session. This session will be a chance for us to connect with other people in society and make our scope and knowledge of management more broad. Dr. Gary S. Kaplan, now board member of IHI, was a good example of this. His presentation caused us to dramatically change our understanding of the meaning of "patient-centered or patient-focused" and made it more influential for us in applying Kaizen into processes. The shorter the process, the more patient- centered it is.

**III. Four Goals:** We have set "Four Goals" to achieve in NNTH to realize TQM not only in the attendees' organizations, but also in integrated regional care. Board members have responsibilities being in charge of achieving the four goals as follows.

#1. Realizing Introduction of the Toyota Way into the organization. (Toyota Memorial Hospital in charge)

#2. Realizing TQM in the Integrated Care. (Saku General Hospital in charge)

#3. Realizing Appropriate Resource Management. (Aijinkai Health Care systems in charge)

#4. Realizing the new curriculum for early introduction of quality management in a university. (Osaka City University Hospital in charge)

**IV. Products.**

**New Assessment Tool: Production Flow Unit Chart (PFUC)**

Along the course of research for Quality Management in NNTH we have been designing and developing a new educational tool - Production Flow Unit Chart (PFUC)[1]. PFUC is modified from the Process Flow Chart (PFC), to which three components are added such as tools (or materials), skills and products and overlapped the improved one (Fig. 1). Using this chart, there are several things relating to Quality Management to be explained or analyzed.

1) Using PFUC we can explain that the function of the prefrontal cortex has the role of C in PDCA cycle. And also "C" is functioning as "β" in the negative feedback system in the electric amplifiers. The prefrontal cortex is well known for functioning as ego ideal or super-ego by Sigmund Freud[2] (Fig. 1).

2) By extension of the overlapped chart in PFUC we can make the same figure as an OODA Loop, which was designed by John Boyd[3] (Fig. 2). From this modified OODA Loop we can understand that the OODA Loop is matched with C-A-P-D Cycle (Fig. 2).

## V. Figures.

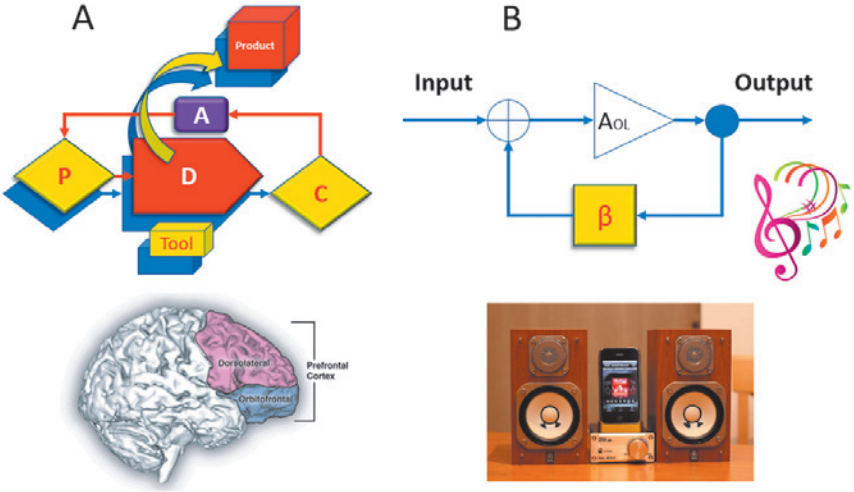



Figure 1 : A: Production Flow Unit Chart (PFUC) is matched to brain function especially with C as the function of the prefrontal cortex. B: Function C is comparable with the function $\beta$ in a negative feedback system within electronic amplifiers.

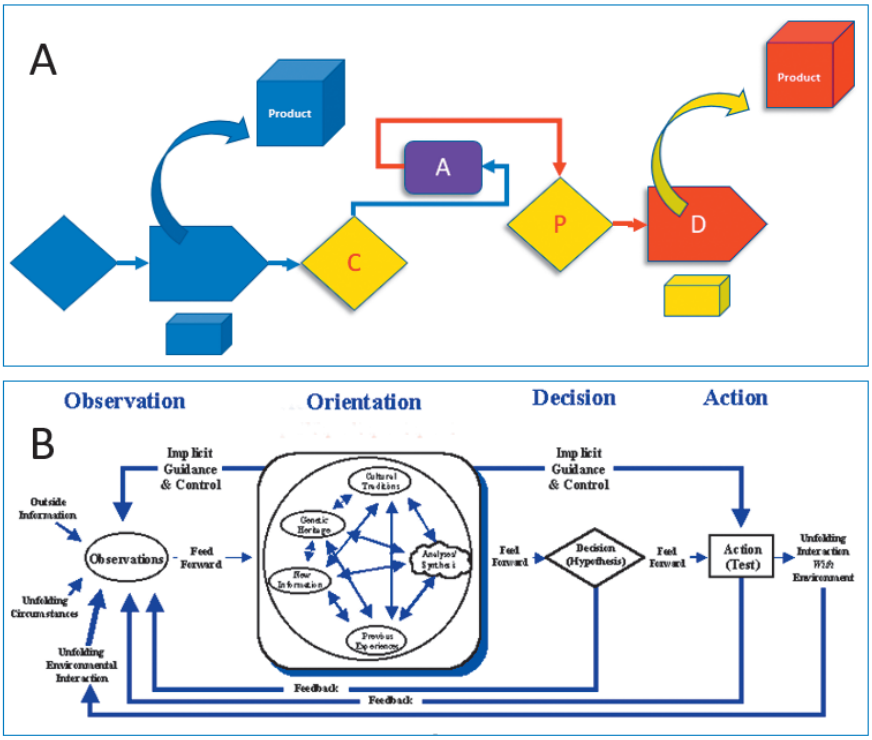



Figure 2 : A: Process Flow Unit Chart (PFUC) is made by extending rightward the overlapped figure transformed into C-A-P-D or a modified OODA Loop while showing spiral-up at the level of A in C-A-P-D. B: Original OODA Loop was drawn by John Boyd.

**VI. References.**

1) Hiromi Ando, Yutaka Aso, Jiro Tanaka. Meta-Management: Management for management using Production Flow Unit Chart (PFUC). Storyboard in 24th Annual Forum on Quality Improvement, 2012.

2) Freud, Sigmund. The Standard Edition of the Complete Psychological Works of Sigmund Freud. Vol. XIX.1999.

3) Boyd, John R. Destruction and Creation. U.S. Army Command and General Staff College, 1976.

# Column 3:
# Conference for Health Care

## Conference for Health Care, CHC

**I. Context**

In the society of Japanese hospitals, quality management (Kaizen) has been being introduced for more than 20 years; however, the rate of hospitals among the country adopting Kaizen in their organization remains small. The most important reason for this scarceness might mainly be derived from the absence of management responsibility or leadership.

In one case of a foreign hospital, Virginia Mason Medical Center has been introducing Kaizen very successfully and has created their own form of quality management system (QMS) known as Virginia Mason Production System (VMPS). How this successful system was created is the key with which we can open a new era for well controlled hospitals with an established QMS, where Kaizen activities can be welcomed by not only the employees and employers but also the customers.

Aso Iizuka Hospital (AIH) and Virginia Mason Institute (VMI) will cooperate for door-opening activities to enable what is the next generation of the hospitals. The first thing we have to do is make a place where we can learn and realize what quality management is and expand its tactics to all health care organizations across the world. For this purpose we have funded the Conference for Health Care since 2012 and the 6$^{th}$ CHC was held in Iizuka successfully in 2017.

**II. Architecture:** CHC is composed of five sessions including 1. Quality Management System, 2. Management Responsibility, 3. Resource Management, 4. Product Realization and 5. Monitoring, Measurement, Analysis and Improvement. These are basic requirements of Quality Management, for you can see them in the PDCA cycle, the QC story and also in ISO 9001.

So, all participants attending CHC can understand all components of QMS and can audit their own organization after their return.

**III. Triple Goal:** The big wave of a Super-Aging Society[1)] has been spreading through Japan resulting in a destructive effect on both rural and urban areas. We have to challenge this danger we are facing with a stronger Quality Management System than before. One of the weak points in the Japanese health care system is the outcome measurement system that the OECD report published in 2014 pointed out. This approach cannot be taken only by a medical team, but we need a new concept of a "multidisciplinary team" that includes everyone who can contribute to this and activate society's competence for health care. So, we have set three goals, known as Triple Goal, as follows.

1. Society-pull Health Care System: to ensure the people living in the society are peaceful and healthy as respected members of the society.
2. Meaningful use of health care IT: to establish multidisciplinary medicine based on an evidence-based health care system.
3. Innovation Promotion System: to enhance problem-solving competencies to move toward a higher level of QMS.

**IV. Eight Targets for Triple Goal in CHC:** We also set eight targets scaling up to the Triple Goal.

1. Society-pull Health Care
   - #1. Transformation of Health Care System (HCS) from batch to flow (shortening Length of stay (LOS) without readmission).
   - #2. Appropriate reallocation of standard processes and human resources, from acute care to living in society (Heijunka).
   - #3. Appropriate reallocation of reimbursement and costing to improve the health care economy (TDABC).
2. Meaningful use of Health Care IT
   - #4. Outcome measurement development to make sure of analysis and improvement.
   - #5. Increase in organization's competency for Quality Management: Accountable Care Organization (ACO).
   - #6. Reduction or elimination of all providers' documentation workload especially for monitoring and measurement.
3. Innovation Promotion System
   - #7. Enforcement of setting measures against problems to support improvement of both productivity and safety.
   - #8. Production of innovative products (devices) to increase benefits for the super-aging society.

**V. Programs:** See table

| Requirements | Presentation Summary |
|---|---|
| Quality Management System | Virginia Mason Production System (VMPS), ISO 9001, Drawing organizations' QMS, Township and the Qualimed TQM Journey, World class Management: Board, Executive and Frontline leader roles |
| Management Responsibility | Leadership, Strategic planning, Marketing, Multidisciplinary Conference (MDC) in Neurosurgery, Balanced Score Card (BSC), Obama Care, |
| Resource Management | QC story, Value Stream Mapping (VSM), Quality Education System in VMMC (RIPW), Education for Nurses, 5S-Kaizen-TQM in Tanzania, Efficient management and role of AIH Clinical Engineers, Graduate Medical Education (GME), Supply Chain Management |
| Product Realization | New building (Design & Development), Operation Theater (OR), Human Resource (HR), Nursing cell (Work around patients), Society-pull Health Care System, Orthopedic Service Line, Integrated Care for National University Health System (NUHS), Integrated Care in Home Visit Care System, Pharmacy, Population Health Care, |
| Measurement, Analysis and Improvement (Innovation) | Safety Alert System, Innovation, Bed with Built-in Fall Prevention Alarm, Current state and future agenda of Aso Iizuka Outcome Measurement System (AIOMS), Home monitoring, Adaptive Servo Ventilation Therapy on Heart Failure, Quality Indicator, SF36, Functional Independence Measure (FIM), Meaningful use of Information Technology at Virginia Mason, |

Table 1. Summary of the contents discussed at CHC for five years.

## VI. Products

### 1. Aso Iizuka Outcome Measurement System[2].

Monitoring, measurement and analysis are indispensable tactics to enable setting measures for improvement. We have been working in cooperation with MDACC installing an outcome measurement system, or Aso Iizuka Outcome Measurement System (AIOMS), to review our production system. Difficulties are that data necessary for measurement are scattered over all computer systems across the organization and many documents, including records, are not digitalized (Fig. 1).

The solution we have adopted is to use Data Spider as an interface which makes it possible to get data from the digitalized documents directly, and the non-digitalized documents once digitalized with FileMaker Pro from the screen where they are recorded. All data are stored in a data base for every patient chronologically. Data arrangement for output is based on the outcome measure hierarchy recommended by the Harvard Business School[3].

### 2. Innovation Promotion Office.

We have incorporation with the Fogarty Institution for Innovation (FII) and have installed an Innovation Promotion Office where all problems occurring in a clinical scene are gathered and analyzed by a "multidisciplinary team", including members from academic disciplines and industries, searching for possible innovation.

The first product from this system is Navel Press's Pack for the treatment of umbilical (navel) hernias in children (Fig. 2). Albeit one small step, this has provided the experience and knowledge necessary to extract problems and to combine multidisciplinary skills for innovation.

## VII. Figures.

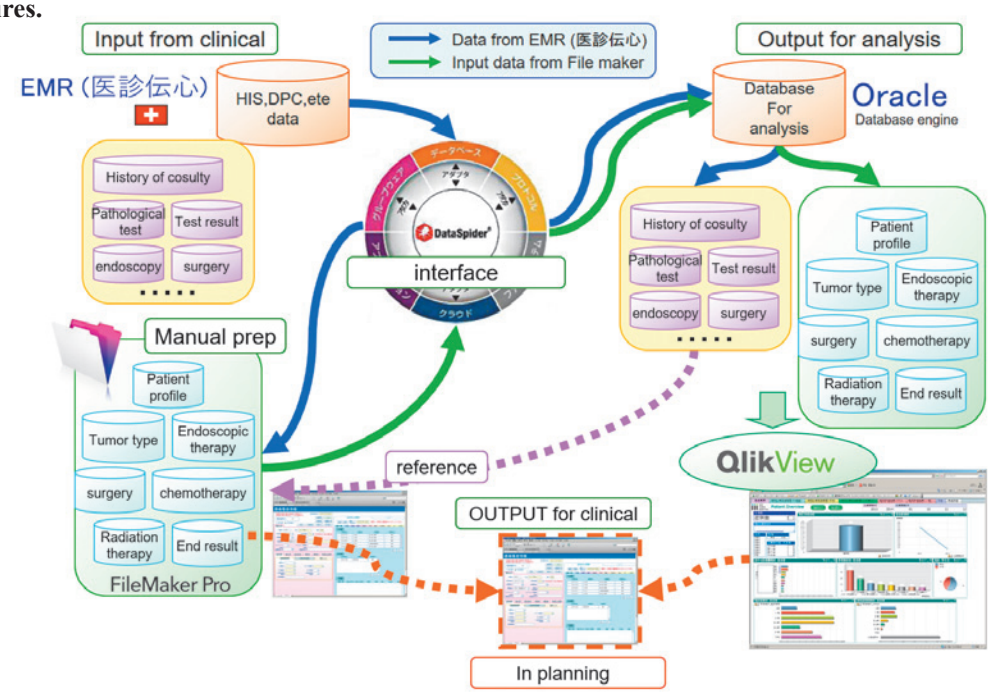



Figure 1 : AIOMS- outline prototype. Digitalized data (Pink) go through interface to Database and to FileMaker Pro. Non- Digitalized data (Blue), once digitalized with FileMaker Pro, go through interface to database. Measured data can be reviewed on QlikView.

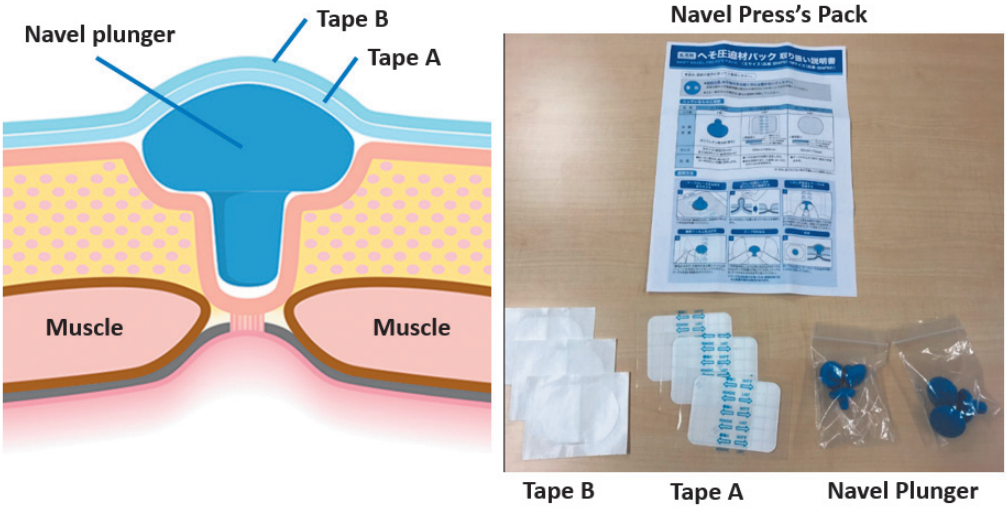



Figure 2 : Navel Press's Pack under experimental use. Pediatrics team has been sharing the idea of Navel Press's Pack for non-surgical treatment of the umbilical hernia in childhood, and designing and developing it with a factory team. Navel Plunger is the tentative name.

**VIII. References.**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# Afterword

UHC is composed of not only financial protection, but also quality health services backed by patient safety. This report describes some of the best practices of applying KAIZEN around the world to contribute to UHC, which is essential to health for all and to human security.

KAIZEN experiences in Japan have been shared with many other countries including low- and middle-income countries, to assist partner countries in improving the quality of healthcare and safety through the application of the 5S-KAIZEN-TQM approach. Through the many successful cases examined in the first chapter, we have learned that we can improve patient safety issues and efficiency, one of the aspects of quality, in other countries with limited resources, by applying KAIZEN methods. We have found "reverse innovations" in some cases, meaning that even high-income countries including Japan could learn from them.

Although physician leadership is important to improve patient safety, it is challenging to build their capacity in the leadership and management of people-centered care for strengthening patient safety systems and creating a culture of patient safety. Chapter 2 describes the "ASUISHI" physician training program, a unique model for developing physicians' leadership skills to ensure patient safety and quality improvement in tomorrow's healthcare using the TOYOTA Total Quality Management (TQM) method, in collaboration with TQM experts from the TOYOTA group. The two cases clearly show that physicians can lead improvements in patient safety in their respective hospitals.

Chapter 3 describes the history and development of KAIZEN at one of the best hospitals in Japan, Aso Iizuka Hospital (AIH). The hospital has been making every effort to meet the diversifying needs of patients for higher quality healthcare by applying Japanese management methods in manufacturing, namely Total Quality Management (TQM). TQM could be an effective tool for every hospital to improve the quality and safety of the healthcare system. Recently, the hospital introduced another KAIZEN method called lean management through the Conference for Healthcare held annually in Japan in collaboration with Virginia Mason Medical Center (VMMC) in the USA. VMMC had already established the Virginia Mason Production System (VMPS) based on the TOYOTA Production System, and is carrying out hospital management and improvement activities targeting value for patients. AIH also presented a couple of cases to demonstrate that TQM could be an effective KAIZEN tool for every hospital to improve the quality and safety of the healthcare system. National Network on TQM for Health is a unique collaboration across various healthcare facilities to share their KAIZEN experiences. We believe that this kind of platform will support many healthcare facilities nationwide.

We hope this report will inspire all countries to provide safe care for patients and safe working environments for all healthcare providers. Japan will continue to share its experiences including those of other industries, and work on patient safety in collaboration with other countries, including low- and middle-income countries, toward UHC.

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