

Shared Learning: Lessons from Large-Scale Systems Improvement

Paulo Borem, MD and Kevin Little, Ph.D.

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MCIC Presentation Notes

Introduction

Paulo Borem, MD has extensive experience with large-scale healthcare improvement interventions in Brazil, Portugal and multi-nation projects in Africa. He will apply his experience to a new project with 11 EDs in Sao Paulo Brazil. The ED project will launch before the end of 2024. Paulo and his colleagues have deployed management systems to increase the odds that improvements will be sustained over time. He will share his experience and insights with us today.

The ED environment

The ED care environment is characterized by a fast pace and diversity of patient conditions. In 2024, most emergency departments in the U.S. also face high demands for service. High daily demand increases the challenges for safety, effectiveness and efficiency. How can ED leaders continue to improve performance in this environment?

While the ED environment differs in important ways from other clinical settings, changes that have shown promise in other settings may work in your ED, with appropriate adaptation. The presentation today will invite your questions and perspectives to explore a set of changes to management of clinical operations that we believe are relevant to EDs.

Our common experience with improvement projects

Have you experienced an improvement project that failed? There are many ways a project might fail. Some projects never get off the ground or an initial great idea that worked in someone else's ED doesn't deliver improvement in local tests where you practice.

Let's focus on projects that showed promise initially but could not be sustained over time.



Think about an ED improvement initiative that failed to stick

Figure 1: Presentation Slide 4

What's your story?

We have had many projects just like yours.

Some of our failure modes include:

- The “new way” was too difficult to maintain, with too much burden for staff
- We didn’t address problems that emerged in dynamic clinical settings
- Staff turnover diluted knowledge and skills; training and on-boarding did not provide new staff with the skills and knowledge they needed
- Other initiatives and priorities demanded attention and effort, we lost focus
- We proposed changes that the front-line staff don’t think matters.

How can we prevent these failure modes? We’ll present what Paulo has learned over the past five years.

A look at the ICU Project 2018-2021—A “failure”?

Paulo helped to design and lead a large-scale project to reduce hospital-acquired infections in 118 public hospital ICU units in Brazil. Over two years, the project achieved more than a 50% reduction in HAI averaged across the ICU units. The main intervention deployed specific infection prevention “bundles.”



52% reduction CLABSI, CAUTI and VAP in 24 months

Bundle reliability was collected using checklist with check mark

After 1 year almost no hospital was collecting process data
(no sustainable process)

Figure 2: Presentation Slide 5

However, this project had a fundamental weakness. The method to achieve the lower HAI rates depended on a burdensome feedback cycle. After 12 months, almost all ICU units had stopped collecting data on adherence to the use of the care bundles that formed the foundation of the project.

The Ministry of Health in Brazil wanted to have more ICUs reduce infection rates. However, it seemed likely that initial good results would fade if the ICUs did not have a method to sustain use of the bundles through effective feedback.

The Ministry of Health asked for a change in methods to address this fundamental issue.

Paulo and his project colleagues embarked on a journey to explore different and novel ways to address sustainability of their interventions.

Prompted by the Ministry of Health's criticism, Paulo and his colleagues next designed and deployed a project to improve maternal mortality and morbidity, focused on interventions in Emergency Departments.

He extended the design used in the Maternal Mortality project in new projects that aimed to reduce infections in ICUs in Brazil and in ICUs and wards in Portugal.

The three new projects allowed him to test new ways to improve operations and sustain those improvements. We'll refer to these projects as we tell you about the management system that Paulo now proposes for his clients.

Two Mind Shifts

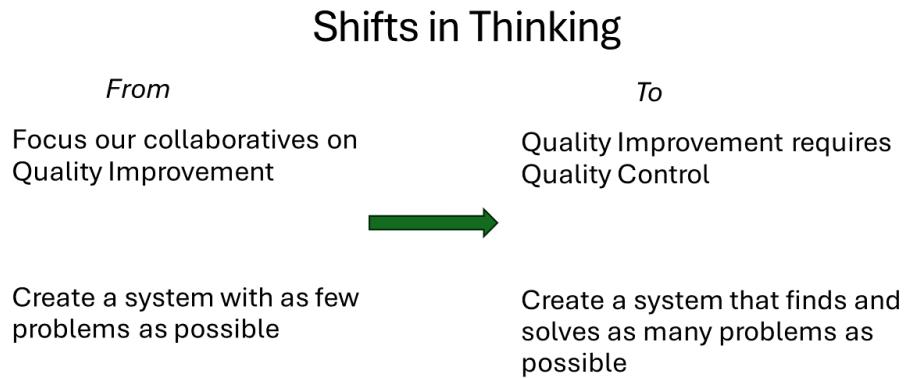


Figure 3: Presentation Slide 6

Paulo has shifted from the way he worked in 2019. He now develops and deploys large-scale improvement projects with two design principles:

- Quality Improvement requires Quality Control
- Problems are good to have

Quality Improvement must integrate with Quality Control

What's your experience in understanding the connection between Quality Improvement and Quality Control?

Paulo now firmly believes that Quality Improvement must be integrated with Quality Control to increase the odds that improvements will stick. If an organization does not have an effective system of Quality Control, you have to build a QC system as part of an improvement project. As Joseph Juran observed, Quality Control is not inspection of results and repair or fixing after the product or service is complete. Quality Control happens during operations

The relationship between Quality Control and Quality Improvement may not be news to you.

Different quality experts have stressed QI and QC integration for decades but we didn't understand the implications as deeply as we do now.

For example, here's a diagram based on a sketch in 1991 by Dr. Noriaki Kano, an expert in Japanese Total Quality Control (the diagram appears in the IHI White Paper, “[Sustaining Improvement](#).”).

Quality Control is the foundation of Quality Improvement

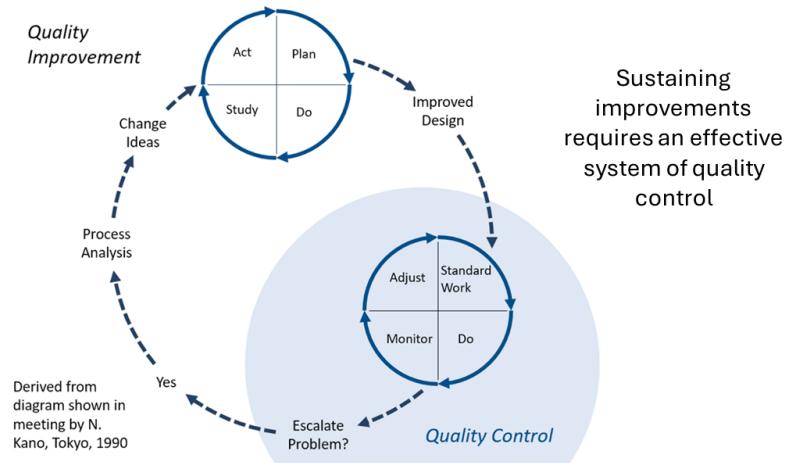


Figure 4: Presentation Slide 7

In the diagram, Quality Control is the beginning and end of Quality Improvement. Quality Control itself is a cycle that starts with Standard Work.

“Standard work is a verb and not a noun....Standard work is meant to be a hypothesis to test the results of everyone doing something in the same way all the time....Standard work, therefore, is not the destination itself but simply a *tool* along the way in our endless quest to find the best, safest, and easiest way to deliver patient care.” (*Getting to Standard Work in Health Care*, 2nd edition, p. 27).

Sustaining Quality Improvement requires a foundation in standard work. The foundation of standard work is the work standard: for each care process, what are the jobs and how should those jobs be done?

Paulo’s experience with the Maternal Mortality Project opened the door to better ways to define and teach jobs through clear work standards.

Problems are good to have

The Kano diagram shows that Quality Control generates problems.

Here's our definition of problem: a problem is simply a gap between what you want and what you've got right now. A solution to a problem closes or eliminates the gap.

We now believe that your challenge and ours is to build management systems that make it easy for people to find and solve problems. That's a radical shift from seeking a management system that has no problems.

The more problems, the better!

Of course, too many problems will overwhelm the best organization. You must catch the problems before the problems are too big and your people need sufficient skills and support to solve the problems they find.

"'No problems' is the biggest problem of all."

We've looked for a citation to this observation attributed to Taiichi Ohno, developer of the Toyota Production System. We haven't found a precise reference to this advice but we like the provocation.

How can you modify your existing management system to make problems more visible and ready for your people to solve?

The second phase of Paulo's ICU Improvement Project used several methods to make problems more visible, including a way to contrast the plan for core work with what people actually do, in real-time.

Quality Control builds your capacity for Quality Improvement

In carrying out Quality Control during operations, people use the Plan-Do-Study-Act (PDSA) cycle explicitly every day. Daily experience with PDSA builds skills of supervisors and individuals as they solve problems connected with daily work. Daily work problems often have simpler causal relationships than typical organization or department improvement projects, which makes the daily problems easier to solve.

When your organization needs a special improvement project and your people use PDSA problem-solving as part of Quality Control, you will have a large cadre of skilled people who can contribute to the special project. Your special improvement project will not rely solely on staff specialists who often do not have detailed job-specific knowledge and know-how to develop solutions that will work well.

Improving performance of 11 EDs in Sao Paulo, Brazil: 4th Quarter 2024

Paulo and his colleagues are designing a learning community that aims to improve care in 11 EDs. Leaders in the 11 EDs will clarify several elements of care as they define standard work. The leaders in the EDs will also make it much easier to see and solve operational problems.

Our challenge in 11 EDs--New Project 2024

-  > 1,000 patients/day (80% shouldn't be there)
-  Protocols, when in place, are complex, impossible to apply
-  No Early Warning Score (NEWS) to detect patients deteriorating (to prioritize)
-  MDs (young) and RNs don't follow protocols causing harm, mortality and morbidity.
-  Focus in 7 conditions: respiratory distress, stroke, cardiac infarcts, sepsis, trauma, abdominal pain and heart congestion failure.

Figure 5: Presentation Slide 8

ED project aims: 12 months from start....

- Increase rate of bundle use for the seven conditions > 80% of patients
- Increase rate of high-risk patients with Early Warning Scores > 95%
- Increase patient perception of quality and safety (Net Promoter Score)
- Reduce waiting time for care for patients with EWS ≥ 5 and identification of potential infection
- Implement a system to detect and manage domestic violence

Figure 6: Presentation Slide 9

Here's a summary of the management system being designed for the ED project to solve the problems and achieve the aims. This management system has emerged from experience in three large-scale improvement projects starting in 2019.

Proposed Quality Control + Quality Improvement System for the ED project

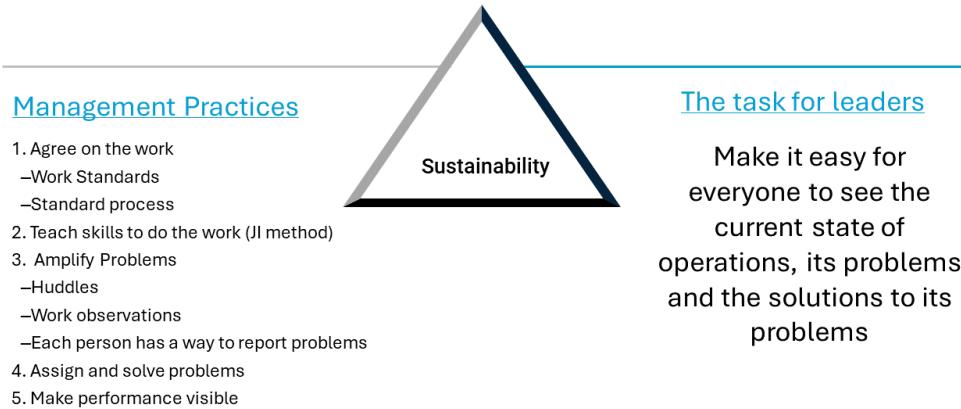


Figure 7: Presentation Slide 10

You are likely to be familiar with and may be using one or more of the management practices in your EDs right now.

We borrowed the term "Amplify problems" from Kim and Spear (2023), *Wiring the Winning Organization*. Kim and Spear describe a management system that makes it easy for staff and leaders to find and perceive problems. One pillar of their system is amplification.

"*Amplification* is the act of calling out problems loudly and consistently enough so help is triggered to swarm them. Once the problems are swarmed, they are contained so they neither endure locally nor spread systemically. Then, they are investigated to determine their causes and create corrective actions that prevent recurrence. This requires that the signal of a problem is successfully generated, transmitted, received, and then reacted to." (Kim and Spear, p. 233).

Lessons from the Maternal Mortality Project 2019-2021, changing care in the ED



Lessons from Maternal Mortality Collaborative 2019-2021, changing care in the ED

Agree on the work
--Work Standards
--Standard process
Teach skills to do the work (JI method)

Figure 8: Presentation Slide 12

The Maternal Mortality Project focused on reducing birth-associated mortality in hospitals (mostly ED sites of care). The project was the first project Paulo and his colleagues led that integrated the technique of Job Instruction with a core clinical process.

Defining the problem

64 deaths/100,000 live births between 2012 to 2021.

Using same tactics not likely to reach the aim, 30 deaths/100,000 live births.

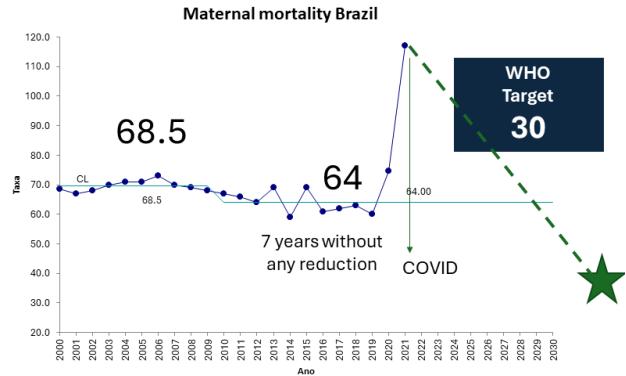


Figure 9: Presentation Slide 13

Project Design

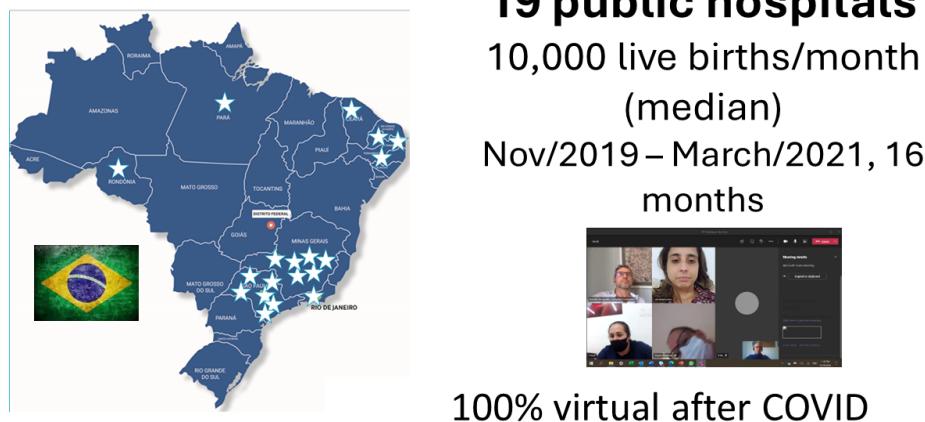


Figure 10: Presentation Slide 14

Analysis of Baseline Conditions

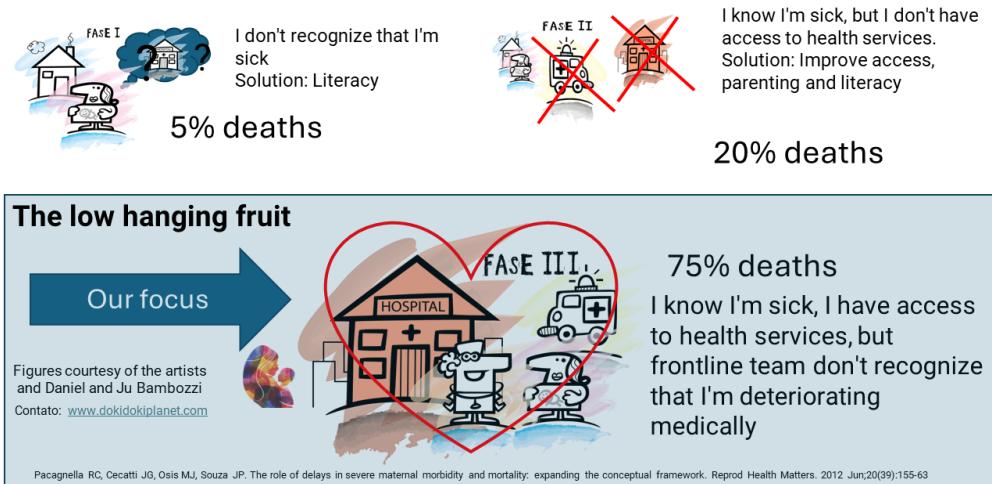


Figure 11: Supplemental Slide Maternal Mortality Project

Quick look at results of the project through 2021

Hospital Maternal Mortality Results 19 public hospitals 2018 – Oct 2021

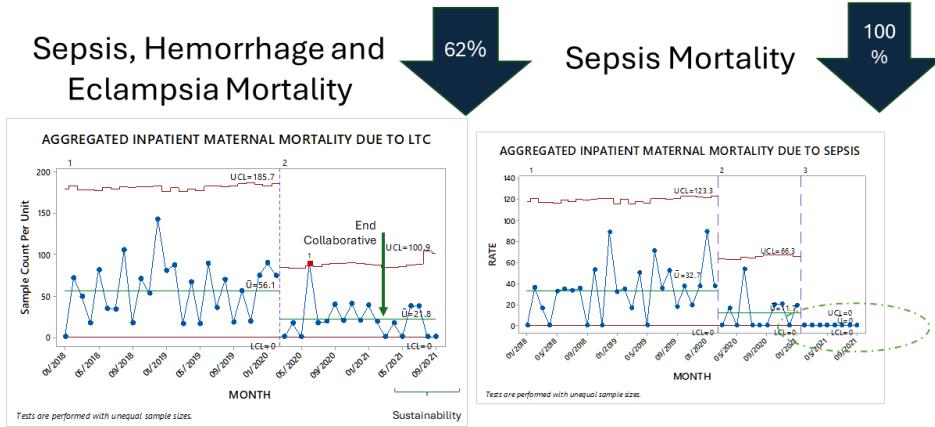


Figure 12: Presentation Slide 15

The MMP project team identified a high-leverage process, “4Rs to Rescue.” High leverage means that a small amount of change effort appeared likely to cause a large change in maternal mortality.

A High Leverage Process: "4Rs to Rescue"

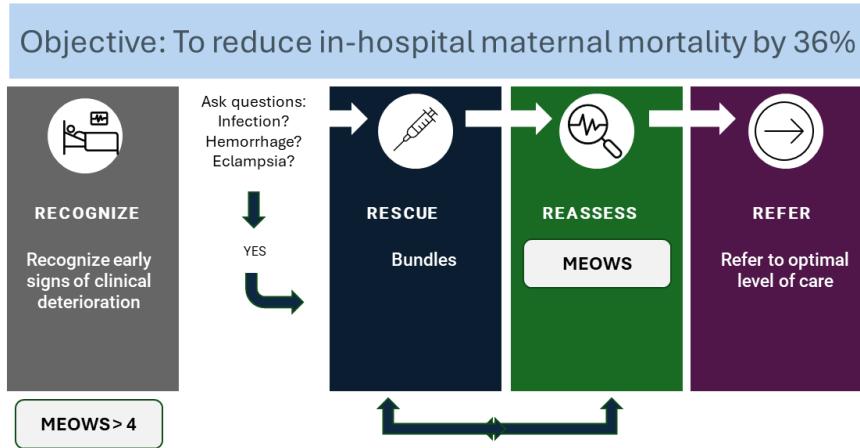


Figure 13: Presentation Slide 16

To achieve the clear aim (work standard) for care of pregnant women, the project team developed specific bundles of care used to rescue.

To reduce variation in the way staff carried out the bundles, the project team applied a new way, “Job Instruction” to train staff in the key steps within each of the 4R process blocks. Here’s the rescue bundle for suspicion of sepsis.

What was new in this project?

- Declare work standard: a clear aim or “normal”
- No pregnant woman/parturient should die due to “failure to rescue” in the public hospitals
 - At least 95% of pregnant women should have MEOWS calculated first contact and transition of care
 - At least 95% of pregnant women/parturient should have a bundle applied if MEOWS>4 and yes to questions

Create and train people on standard work and process to achieve the aim

We defined "4Rs to Rescue" and used Job Instruction

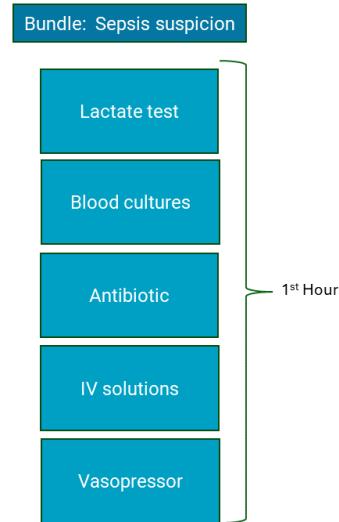


Figure 14: Presentation Slide 17

Job Instruction

Job Instruction (JI) is one of the core methods in the Training Within Industry (TWI). We give a bit more information about TWI in the section Teach skills to do the work (JI Method)).

JI requires one-to-one teaching. This is a striking difference from methods that lecture or demonstrate to groups.

Job Instruction Method: Skills to Carry out the Bundles

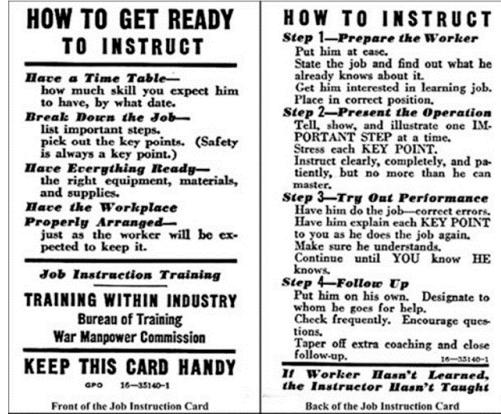


Image of JI card, 1944-5

Figure 15: Presentation Slide 18

The instructor uses a Job Breakdown Sheet to guide the 1-1 training demonstration and explanation. The instructor uses the same teaching approach outlined 80 years ago.

Job Breakdown Sheet: What, How and Why

Important steps	Key points	Reasons
1) Identify patient	<ul style="list-style-type: none"> Introduce yourself to the patient Ask for ID, check name, DOB, gender, ethnicity Explain what will be done 	<ul style="list-style-type: none"> Guarantees and strengthens the bond with the pregnant woman Makes the patient feel safe Front of job Front of hall
2) Perform amnesia	<ul style="list-style-type: none"> Ask the reason for coming to the ER Ask about bleeding, fever and high blood pressure 	<ul style="list-style-type: none"> Observe alert status If vital signs may be normal now, but the pregnant/postpartum woman may have been having symptoms recently
3) Check	<ul style="list-style-type: none"> Start with temperature Place the axillary thermometer on the patient's armpit Observe the RR/taking to the respirations Do not use oral phone Observe the pulse 	<ul style="list-style-type: none"> It takes longer to measure temperature w/ an oral thermometer Armpit is more accurate Prevent the patient from noticing and becoming suspicious Impression of distractiveness Facilitates the counting of RR
4) Calculate MEOWS	<ul style="list-style-type: none"> Use mnemonic: MEOWS = 3 x per minute or x 6 in the sum, ask the 3 questions Ask about pain, bleeding, infections, ecchymosis, or bleeding? 	<ul style="list-style-type: none"> Avoid mistakes and improve accuracy The answer yes is essential to decide on opening the bundles in the first hour
5) Open Bundle	<ul style="list-style-type: none"> Name, Sepsis, Hemorrhage or Ecchymosis 	<ul style="list-style-type: none"> If we want to save the life of a pregnant woman, the resusc must be done in the first hour Front of job Avoid deterioration of the pregnant woman

Important steps	Key points	Reasons
2) Perform amnesia	<ul style="list-style-type: none"> Ask the reason for coming to the ER Ask about bleeding, fever, and high blood pressure 	<ul style="list-style-type: none"> Observe alert status Vital data may be normal now, but the pregnant/ postpartum woman may have been having these symptoms recently

This JBS corresponds to the Recognize step of "4Rs to Rescue" Process

Figure 16: Presentation Slide 19

The instructor shows the important steps, then repeats the demonstration stating the key points and reasons for the key points. Next, the instructor observes the person do the job,

with corrections as necessary. The person learning the job next demonstrates the important steps while repeating back the key points and reasons. When the instructor is satisfied that the person knows the important steps, key points and reasons, the person is ready to go to work.

What did Paulo's teams learn from their use of the JI method? What are the benefits?

Reflections on Job Instruction

- Everyone has clarity about the core jobs in the bundles.
- New people learn how and why, along with what to do.
- 1-1 training takes time but delivers exceptional consistency in work
- Job Instruction drives a Training Plan/Schedule for each team

Figure 17: Presentation Slide 20

Everyone has clarity about the core jobs. Common agreement on core jobs provides the basis for future adjustments and upgrades to work.

New people can learn the important steps along with key points. The key points give how-to tips so new people carry out the work in the same way as current staff, reducing variation. People know why they are doing specific tasks a certain way. Knowing why helps to cement the sequence of steps and key points.

While 1-1 training may seem inefficient, ultimately there is no other way we've seen that delivers the consistency of job performance produced by JI method.

JI supports a Training Plan: who will know what and by when. We do not expect every person to master every job skill all at once. Supervisors and managers can organize a sequence for training. The training achievement of team members allows more effective schedules to assure sufficient people with skills are present on each shift across shifts, accounting for vacations and leaves of absence. The training status naturally appears as a chart on the local visual management board.

Paulo's experience: People resist the systematic way of training at the beginning. When they understand the impact, they will adopt it.

Lessons from HAI reduction projects, 2021-present: make problems easy to see (and solve)

Paulo and his colleagues continued to apply the Job Instruction methods in two more projects that aimed to reduce hospital acquired infections. The project designers adapted bundles of care for HAIs first developed in the ICU Phase 1 Project. One project involved 200 ICUs in Brazil; the other project involved 20 public hospitals in Portugal ICUs and wards.

Lessons from collaboratives to reduce hospital acquired infections

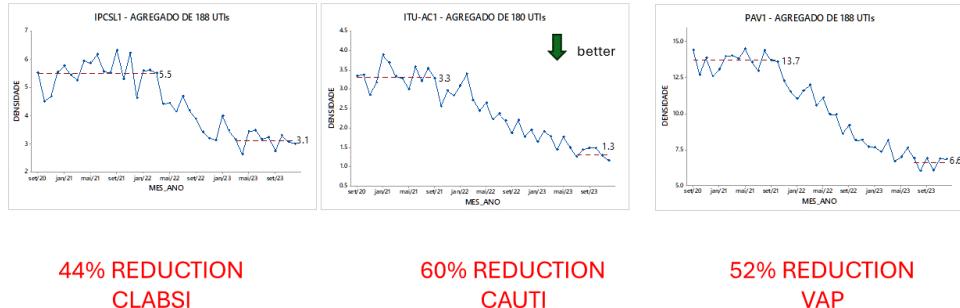


- Amplify Problems**
 - Huddles
 - Work observation
 - Each person has a way to report problems
- Assign and solve problems**
- Make performance visible**

Figure 18: Presentation Slide 21

The projects achieved their aims. Here is a summary slide for the Brazil HAI 2021-2023 project:

Infection Reductions HAI Project Brazil, Sept 2020 - Sept 2023



Note: UTI in the graph headings is the Portuguese acronym for ICU, not urinary tract infection

Figure 19: Presentation Slide 22

What was new in the HAI projects

Amplify Problems

- Huddles used to surface problems
- Work observations
- Problem-reporting method

Assign and Solve Problems

- Weekly review cycle, posted status

Make Performance Visible

- Management boards



Figure 20: Presentation Slide 23

The HAI projects involved several elements of the management system that will be used in the ED Project.

- Huddles: ICUs and wards adapted shift huddles to include reflection on problems related to the HAI project the previous day and asked for any additional problems. The stand-

up huddles were coached not to solve the problems but only to capture the problem statements.

- Problem Identification: The ICUs and wards introduced a way to invite and gather problems from the entire team. Anyone who identified a problem would describe it briefly and deposit the description into an envelope hanging on the management board. These problems as well as problems identified in huddles were reviewed once a week and assigned for solution by local project leaders.
- Management Boards: Each site of care built a daily management display board that contained graphs of key metrics, problem-solving status, and audit records of work. Huddles took place in front of the board to make it easy for people to discuss and identify issues.

We'll say more about work observations because we think is the most novel aspect of Paulo's recent projects.

Work Observations: the Kamishibai method

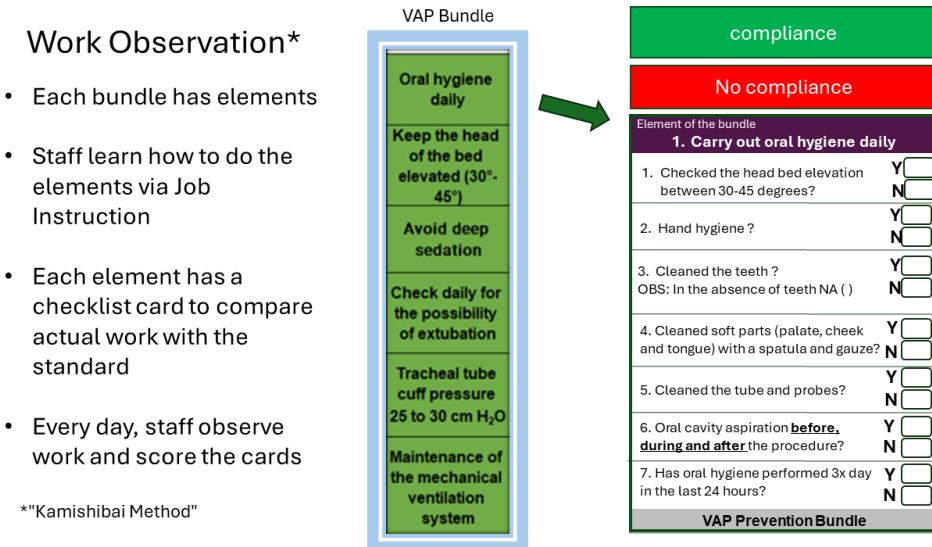


Figure 21: Presentation Slide 24

After people are trained in basic job skills using Job Instruction, how well are they able to carry out the jobs according to the standard?

The Kamishibai method is a way to link the job skills defined by Job Breakdown Sheets with a regular audit of work. Observers must be trained to compare the work with the work standard. If there is a safety issue, the observer must stop their colleague and fix the problem. If there are

other deviations from the standard that are not safety issues, the observer notes the problem and debriefs with their colleague at the end of the observation.

The team takes the results from regular audits to build a picture of performance. A display board enables everyone to see the state of compliance with the core work skills in the clinical unit, week by week. Adherence to the standard is rated as pass (Green) or fail (Red).

Two-sided cards

Perfect Compliance	At least one failure
Element of the bundle 1. Carry out oral hygiene daily	
1. Checked the head bed elevation between 30-45 degrees? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N	1. Checked the head bed elevation between 30-45 degrees? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N
2. Hand hygiene ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N	2. Hand hygiene ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N
3. Cleaned the teeth ? OBS: In the absence of teeth NA () <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N	3. Cleaned the teeth ? OBS: In the absence of teeth NA () <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N
4. Cleaned soft parts (palate, cheek and tongue) with a spatula and gauze? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N	4. Cleaned soft parts (palate, cheek and tongue) with a spatula and gauze? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N
5. Cleaned the tube and probes? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N	5. Cleaned the tube and probes? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N
6. Oral cavity aspiration <u>before</u> , <u>during and after</u> the procedure? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N	6. Oral cavity aspiration <u>before</u> , <u>during and after</u> the procedure? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N
7. Has oral hygiene performed 3x day in the last 24 hours? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N	7. Has oral hygiene performed 3x day in the last 24 hours? <input checked="" type="checkbox"/> Y <input type="checkbox"/> X <input type="checkbox"/> N
VAP Prevention Bundle	

Figure 22: Presentation Slide 25

The person who observed the work places the completed card on a summary display. The summary display has a column for each day of the week and a row for each bundle element. The card is placed in the relevant cell of the display.

**Elements of the bundle are audited daily
and shown on a weekly calendar chart**

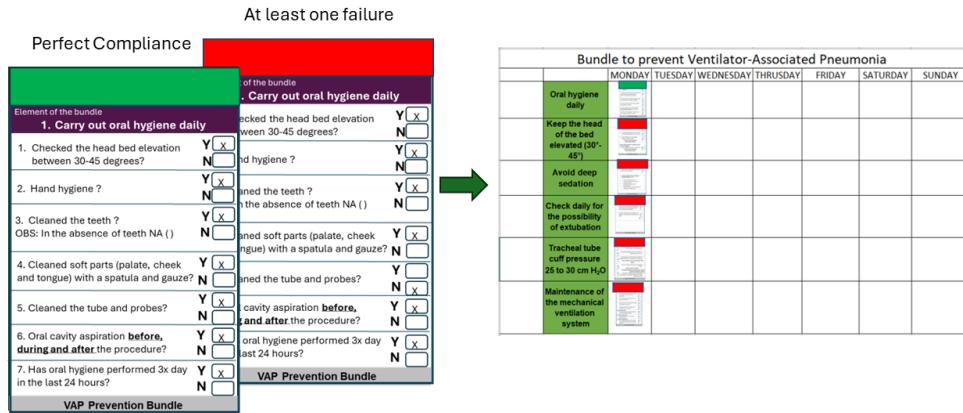


Figure 23: Presentation Slide 26

Each clinical unit usually summarizes weekly performance in a time series chart, one graph per bundle so that the history of previous weeks is not lost.

Here's a view of the improvement in compliance for the VAP prevention bundle (HAI project in Brazil). Results for the other infection bundles were similar.

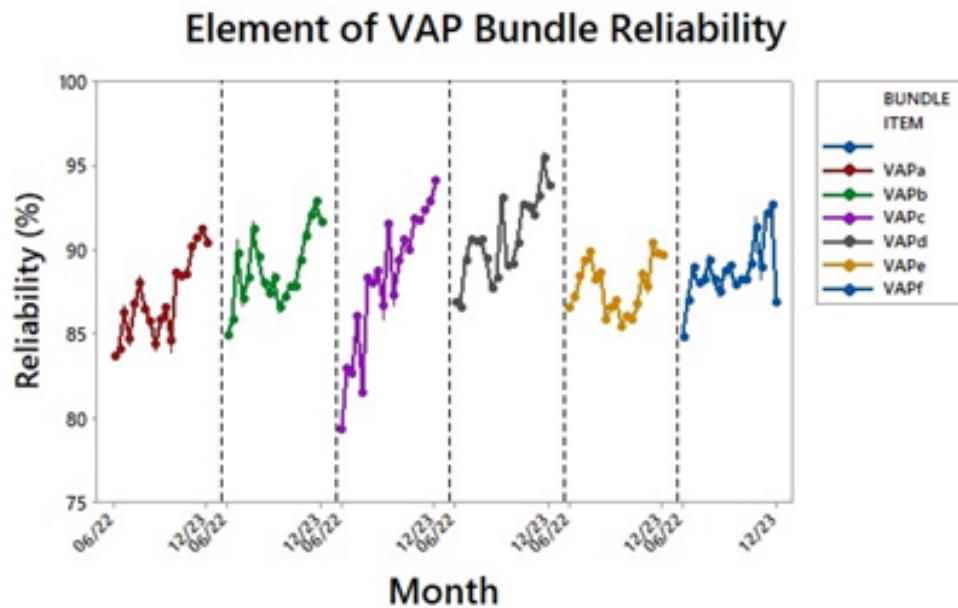


Figure 24: Supplemental Slide: HAI Project Brazil, bundle reliability

Automation innovation An innovation is now planned for a first test in a multi-country project in Africa that started earlier this month: use AI tools to reduce manual effort to translate weekly Kamishibai records into a run chart or control chart. A photo of the Kamishibai board will be taken at the end of each week and then run through an application to count the red and green cards in the photo, The app then converts the counts to a control chart. The team will post the chart on the management board. The project in Africa is also testing ways to use AI tools to process language data into summaries.

What did Paulo's teams learn from their use of the Kamishibai method? What are the benefits?

Reflections on Kamishibai Method

- Set-up/learning take initial effort
- Saves time and improves care in the long run
 - Job problems are caught daily
 - Peers learn to observe bundle elements, reinforcing their own practice
- Problems became annoyingly visible to leaders (red for not compliant)
- No variation among hospitals to check if there was compliance or not to the element of each bundle
- Actual display is very cheap (< US\$10), feasible in our projects

Figure 25: Presentation Slide 27

The Kamishibai method takes effort to establish. The main challenge is getting the clinical unit members comfortable and persistent in daily work observation and the red-green scoring.

Remember that in the ICU Phase 1 project, ICU teams used bundle-compliance checklists that were summarized and reviewed monthly. This was the feedback system that collapsed after the first year.

Kamishibai increases the velocity of the action/response cycle to deviations from the desired bundle practice. A monthly cycle in the ICU Phase 1 project has now shifted to a daily cycle. This 30-fold increase in review cycle frequency means that problems in jobs are caught much earlier and have less chance to result in an infection. Every day, at least some staff members explicitly compare job performance with the desired state and catch deviations. In many other applications of the Kamishibai method, a supervisor or other formal leader audits the work. In the HAI projects, most of the audits are done by peers, which increases job awareness throughout the team.

The Kamishibai board shows everyone the state of job performance on key elements of care. Problems with the elements of the bundles became annoyingly visible to the unit supervisor. The red cards on the wall are out in the open for anyone to see. In Paulo's experience, local leaders work hard to reduce red cards.

As indicated by the slide, the project designers and teams found the method suited their collaborative projects. They found very little variation among hospitals about the definition

of compliance to each element of the bundle. Low variation makes it simpler to aggregate numbers across settings to assess overall impact. Also, the cost of construction of the display board and cards was modest.

Question for the audience: how can the Kamishibai method work an ED environment?

Here's the schematic of a Kamishibai board for the new ED project.

Schematic of Kamishibai Board for the ED project

Process	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday	
Recognize deterioration (NEWS)	M	A	M	A	M	A	M	A	M	A	M	A	M	A
Question to orient Rescue	■	■												
Rescue (immediate)	■	■												
Rescue (bundle)	■	■												
Reassess	■	■												

Figure 26: Presentation Slide 29

The ED project in Brazil will focus on patients who present with seven conditions: respiratory distress, stroke, cardiac infarcts, sepsis, trauma, abdominal pain and heart congestion failure.

The project team plans to develop Job Breakdown Sheets to cover the steps of the generic rescue process, including the specific rescue bundles for each condition.

What challenges and countermeasures do you see in application of the Kamishibai method in the ED environment?

Additional notes on elements of the management system

Agree on the work

How do you characterize the desired outcomes embodied by your products or services?

The definition of product or service quality gets translated into sets of instructions your organization will use to produce the outcomes:

- the characteristics of the product or service you intend to produce;
- the conditions of equipment and the environment that support production;
- the step by step operations by people to make everything happen.

The instructions are referred to as work standards, which are the foundation of standard work as defined by Graupp and Purrier (2023)..

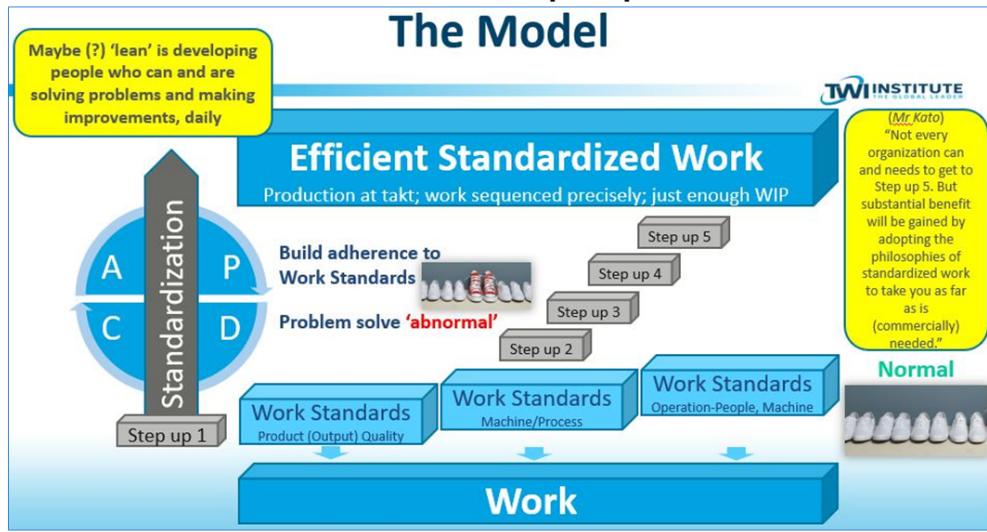
The Quality Control cycle during operations requires that we set up operations in two ways:

- (1) make it easy to see any differences when you contrast the outcomes and process of actual operations with the work standards and
- (2) catch and reduce differences by corrective actions.

Isao Kato, a key associate of Taiichi Ohno at Toyota starting in the 1950's, summarized the essence of Quality Control in his "Step-up" Model.

Isao Kato's Step Up Model

The Model



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Figure 27: Supplemental Slide: Kato's Step Up Model

In Kato's model:

- Step up 1 defines Normal—what you expect, in the sense of a ‘Norm’.
- Step up 2: Make it easy to see the difference between Normal and Abnormal. Step up 2 enables you to see problems!
- Step Up 3: Problem solve (reduce the gap) between Normal and Abnormal.
- Step up 4: Refine the workflow to drive out waste and develop skills of people.
- Step up 5: Assure the continued health of the first four step ups.

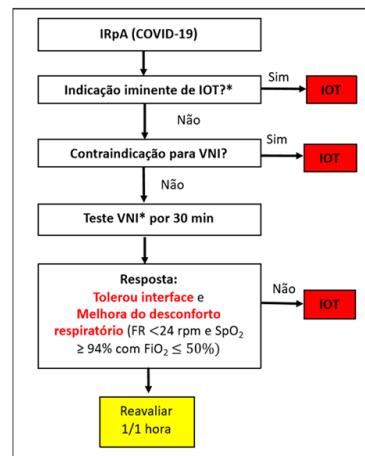
Step ups 1-3 are the core activities of standard work. Step up 4 and Step up 5 merge with the elements of the overall management of operations. See <https://www.iecodesign.com/blog/2021/1/13/work-standard-and-standard-work> for further discussion.

Here's an illustration of the three types of work standards in Kato's Step up 1. We use information from the HAI reduction project in Brazil 2021-2023; VAP = ventilator acquired pneumonia.

Example: Prevention of VAP per Nat'l Guidelines

- Ventilation only when indicated
- For ventilated patients:
 1. Perform routine oral hygiene
 2. Keep the head of the bed elevated (30 ° -45 °)
 3. Reduce sedation
 4. Check extubating daily
 5. Keep the cuff pressure of the tracheal cannula (cuff) between 25 to 30 cmH₂O (or 20-22 mmHg)
 6. Maintain the mechanical ventilation system per local regulatory agency recommendations

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Figure 28: Supplemental Slide: VAP Prevention Process

Work Standard Example: Output Service Quality

Patients leave the ICU without experiencing ventilator associated pneumonia (VAP).



This work standard tells us we need an operational definition of VAP: how to decide if a patient has VAP or not that is clear to all.

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Figure 29: Supplemental Slide: Work Standard Example Service Quality

Work Standard Examples: Environment & Equipment

For ventilated patients:

- Bed elevation between 30° and 45° (except COVID patients with pronated position)



- Cuff pressure of tracheal cannula between 25-30 cm H₂O



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Figure 30: Supplemental Slide: Work Standard Example Environment and Equipment

Work Standard Example: Operations and Staff Roles



0.12% chlorhexidine oral solution is effective against gram-positive and gram-negative bacteria, and against fungi and some viruses; Has prolonged bacteriostatic action of more than 12 hours



Pair of Nurse Technicians will carry out oral hygiene:

Oral Hygiene Protocol	When	Why
Prepare Care		
1.1 get kit		
1.2 assure hand hygiene		
1.3 check patient ID		
Clean using Clorexidine w aspiration		
2.1 clean tube		
2.2 clean bottom of mouth		
2.3 clean tongue		
2.4 clean teeth		
End Care		
3.1 check cuff	2.1 - 2.4 at least 7 minutes	To remove microorganisms that if aspirated can lead to pneumonia
3.2 check head elevation		
3.3 assure hand hygiene		

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Figure 31: Supplemental Slide: Work Standard for People

Teach skills to do the work

Job Instruction is one of part of the Training Within Industry (TWI) curriculum.



Rosie the Riveter
Naomi Parker Fraley was
the real-life inspiration

How can supervisors can promote productivity and safety working with their people?

Training Within Industry* has 3 pillars: JI, JM and JR



Developed by the US government in the 1940s to develop skills of supervisors in war-related factories

Figure 32: Supplemental Slide: TWI-1

TWI was invented and developed through dozens of test cycles 1940-1945 by the United States War Manpower Commission. TWI's development is a great example of iterative refinement, PDSA in action.

The Commission created and refined three 10-hour courses to help supervisors work with their people to increase production and safety:

1. Job Instruction: How to do a job correctly and safely (JI)
2. Job Methods: Basic industrial engineering (JM)
3. Job Relations: The human side of supervision (JR)

The Commission also created a course for trainers, Program Development.

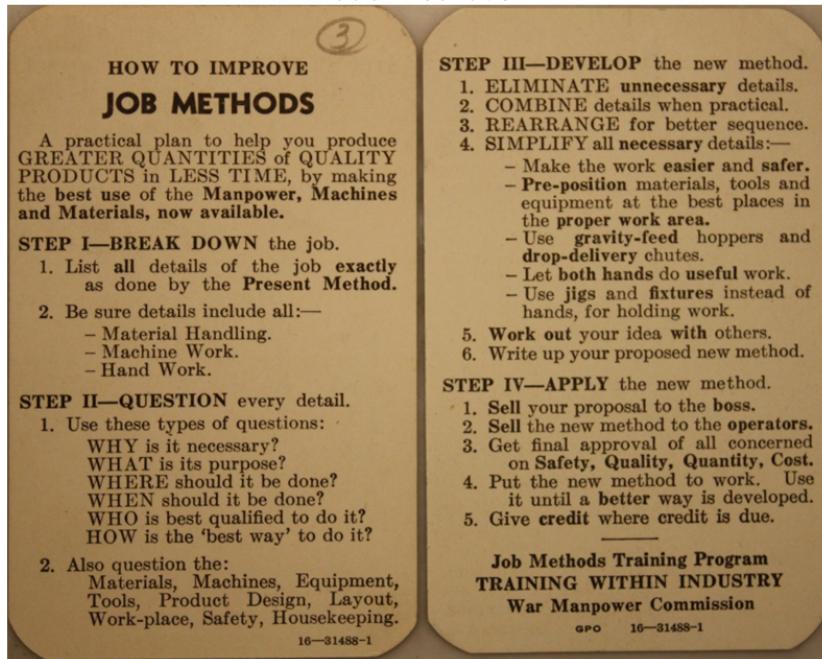
TWI was introduced to Japanese engineers and managers as part of the U.S. occupation of Japan after 1945.

"[The] Japanese Labor Ministry still controls the use of TWI by administering programs and licensing other organizations to conduct the 'J'courses." (Dinero, p. 47)

Toyota leaders incorporated TWI into the nascent Toyota Production System in the 1950's.

Here are images of the World War II era pocket cards for JM and JR, to complement the pocket card for JI we showed earlier.

Job Methods

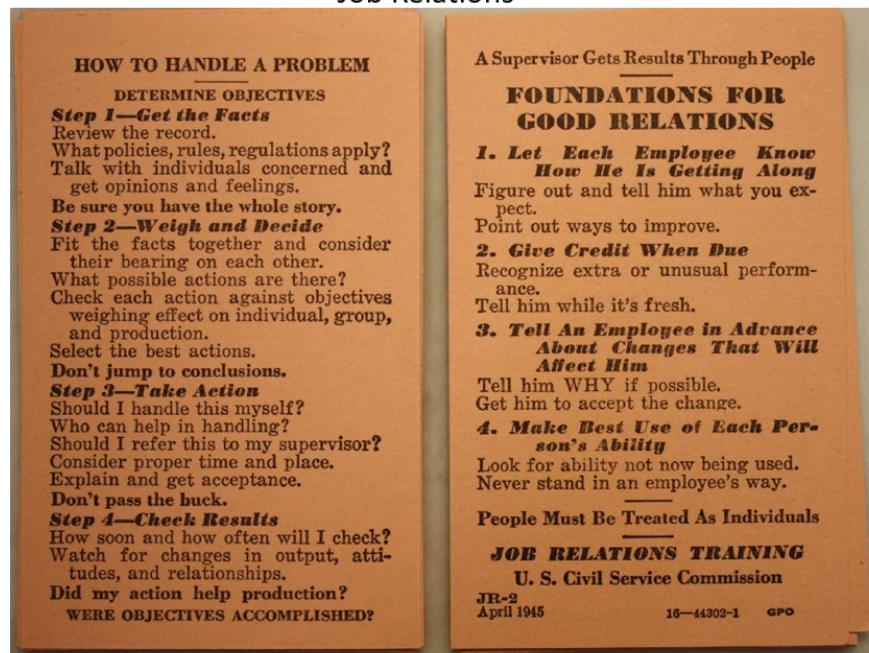


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Figure 33: Supplemental Slide: Job Methods Pocket Card

Job Relations



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Figure 34: Supplemental Slide: Job Relations Pocket Card

Adapting Job Instruction in the Maternal Mortality and HAI reduction projects

The War Manpower Commission developed Job Instruction for war-time factories. A supervisor could build the Job Breakdown Sheet and teach a job skill on the production floor or using a special workstation with production tools and materials. In jobs that involve direct patient care, Paulo's teams adapted how they built and used Job Breakdown sheets. For example, in the 10-hour “learn how to teach the JI way” class, 14 supervisors used mannequins and simulated care settings to learn how to create Job Breakdown Sheets and teach using the Job Instruction outline.

The project team then held weekly sessions with these supervisors to co-design all the Job Breakdown Sheets for each element of the bundles. These Job Breakdown Sheets were again created using simulation care settings and then refined based on direct clinical application to patients.



Figure 35: Supplemental Slide: Job Breakdown Sheet Simulation

Amplify problems

Work Observation: Kamishibai method

Kamishibai is a Japanese term:



Fonte: <https://theconversation.com/kamishibai-how-the-magical-art-of-japanese-storytelling-is-being-revived-and-promoting-bilingualism>

Figure 36: Supplemental Slide: Origin of Japanese term Kamishibai

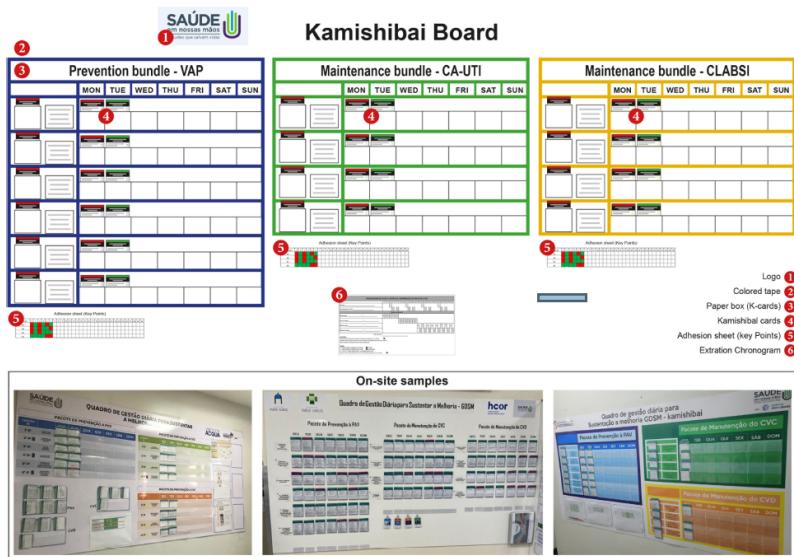


Figure 37: Supplemental Slide: Kamishibai boards from Bravo et al. (2023)

The image above is from Bravo et al. (2023), which describes how the ICU Phase 2 project team developed and deployed Kamishibai boards in almost 200 hospitals.

Individual problem reporting

The ICU projects developed a problem report form that anyone can use. The staff person fills out the form and puts it in a folder on the management display board. Problems are reviewed weekly (see next section.)

Problem report sheet	
Problem observed:	
Is there anything you can do now to resolve the issue?	
<input type="checkbox"/> YES (SEE AND SOLVE)	
<input type="checkbox"/> NO (REQUIRES ANALYSIS)	
IF YES (SEE AND RESOLVE)	
Proposed solution:	
Responsible:	
Expected end:	
Status:	
Help chain:	
IF NOT (NEEDS ANALYSIS)	
Open an A3	

Figure 38: Supplemental Slide: Problem Reporting Template

Assign and solve problems

Problem-solving is not an occasional activity in Quality Control. In Paulo's current design, unit teams use a weekly cycle of problem identification and assignment. Problems are divided into See and Solve problems and Structured Problem Solving problems. Structured Problem Solving requires logic and documentation using an [A3 problem-solving template](#).

Each week the RN and MD leads for the project have a 20 minute meeting. Typically, one front-line representative attends, too. Other people may be invited (e.g. pharmacist). [LINK TO VIDEO?]

Here's the typical agenda for the problem review session:

1. how many new problems have we gotten since last week?
2. Sort the problems in a 2 x 2 Importance x Difficulty matrix.

3. Decide See and Solve or A3 approach for each problem.
4. Update the Daily Management Board, that shows projects and project management notes—date, status, responsible person.

Decision Matrix: Sort the Problems

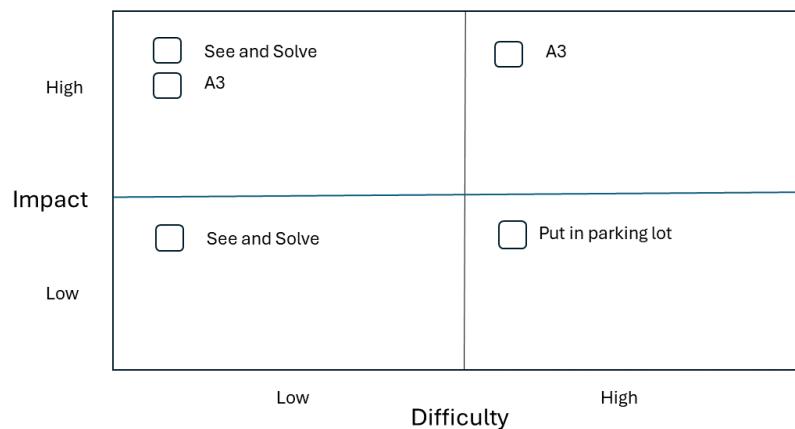


Figure 39: Supplemental Slide: Problem-sorting matrix

Management Board Schematic

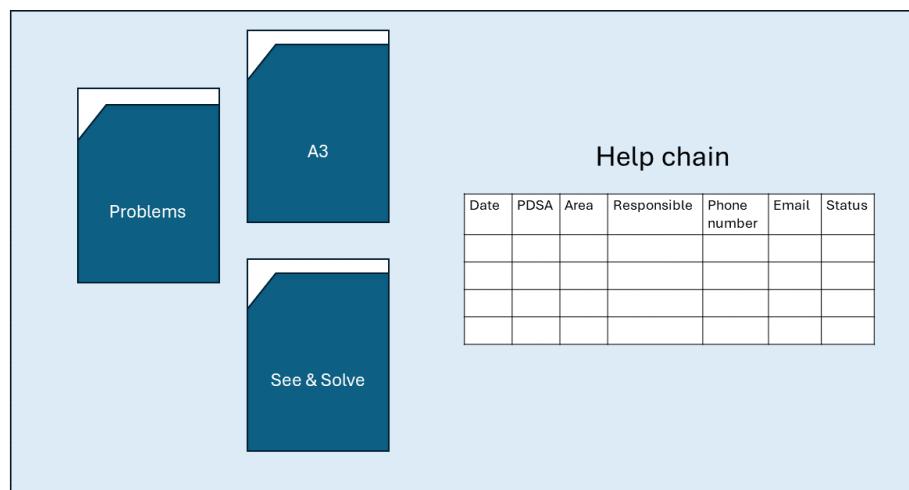


Figure 40: Supplemental Slide: Problem Folders and Problem Table Schematic

The unit leaders decide how many improvement mini-projects can be “open” at any one time.

A limit on the number of projects reinforces the message that it is important to finish a mini-project before adding a new one to the board. In the recent collaboratives most units are able to address between two and five problems at any one time.

Key points:

- See and Solve reminds you to Go See and catch the problem in action before determining a solution.
- if the same See and Solve problem recurs more than a few times, then this problem is escalated to A3 problem-solving. The recurring problem deserves more analysis and deeper countermeasures.

Make performance visible: use an analog display board

Why not just keep everything about your unit's performance in the computer?

Paulo says: "The system needs to speak to you." A computer is not accessible to everyone on-demand in a clinical unit. You need to log in, find the right place to look among many options...people give up! When the display is on the wall, you can't escape the information. Everyone sees the same thing. The display is the natural location for stand-up huddles.

There are applications of digital displays for bed management that may work well. An analog display does not depend on the IT service team to revise format or update content. No waiting in the IT project queue!

In Paulo's experience, the benefits of the board outweigh the ~10 minutes a day required to keep the display up-to-date.

During the collaborative, the collaborative leader has the job to keep the board updated. After the formal end of the collaborative, the unit leader has the job.

Appendix

Tip for improving a management system

Test on a small scale.

For example, start with one bundle related to one condition in the ED project. Develop the Job Breakdown Sheets, determine how Kamishibai method will work with the initial bundle. Don't ask staff to develop Job Breakdown Sheets and instruct for all conditions and all bundle elements. Testing on a small scale builds confidence and reduces risks of failure.

Small tests get you moving fast(er) to learn by trying out your ideas.

A Note on Quality Planning

If you are familiar with Joseph Juran's Quality Trilogy, Quality Planning complements Quality Improvement and Quality Control. The IHI Whitepaper on Whole System Quality summarizes the three quality components:

Figure 3. Whole System Quality Approach: Quality Planning, Quality Control, and Quality Improvement Activities by Stakeholder Group

Quality Planning	Quality Control	Quality Improvement	
Offer input to inform organizational strategy as primary customer group	Offer feedback on quality experience to inform understanding of performance	Engage as co-producer in relevant QI activities	Patients, Families, and Communities
POINT OF CARE			
Inform plans and requirements to execute on the strategy locally	Identify and solve problems as they arise (gaps with standard), escalate as necessary	Lead and engage in local QI activities and identify potential QI projects	Clinicians
Translate strategy into a plan for unit setting and outline requirements for execution	Monitor performance and direct solutions, escalate problems as necessary	Lead QI projects and capture ideas for potential QI work	Unit-Level Leaders
Facilitate strategic planning process, support research and analysis activities	Support development of QC standard work and infrastructure	Support local QI activities and inform project prioritization efforts	Quality Department Staff
Work with executives and unit leaders to articulate how to execute on strategy	Identify cross-cutting problems and trends close feedback loops	Sponsor QI projects, lead cross-cutting QI efforts	Departmental Leaders
Identify customers, prioritize needs, and develop strategy	Mobilize resources to address emergent and cross-cutting problems	Sponsor and commission prioritized QI projects	Executive Leaders
Ensure organizational strategy is quality-centric	Review quality performance on a regular basis	Review performance of major QI projects on a regular basis	Board of Directors

Figure 41: Responsibility Table organized by three parts of Juran's Quality Trilogy

Quality Planning is the way an organization identifies areas of opportunity and change related to strategy and markets. Quality Planning is not reacting to immediate operational problems.

Quality Planning addresses design of new products and services and the translation of the design into production through initial experiments and pilot-scale operations.

The Kano diagram omits Quality Planning. For example, the diagram does not show a path of improvement projects that emerge from Quality Planning rather projects as responses to operational problems.

While we don't address Quality Planning today, we believe that Quality Planning depends on the health and performance of operations, including an effective Quality Control system.

The rapid pivot in 2020 to COVID protocols in clinical settings is an example of an exogenous change that drove changes to operations. Healthcare organizations with robust QC systems adapted quickly and more safely relative to other organizations. (Baptist Health, Skip Steward, <https://www.lean.org/the-lean-post/articles/building-a-learning-organization-kata-webinar-snippet/>).

Presenters

Paulo Borem, MD has practiced as a vascular surgeon. He is a Senior Director of the Institute for Healthcare Improvement (IHI), an Improvement Advisor, and a Patient Safety Officer (PSO) certified by IHI. Dr. Borem has led more than 15 large-scale initiatives in Portugal, Brazil, and Africa to reduce hospital-acquired infections, maternal deaths, unnecessary cesarean sections, and post-operative deaths and improve Joy in Work. He is also responsible for IHI's Improvement Specialist training courses in Portuguese-speaking countries. Dr. Borem is trained in Job Instruction, Job Relations and Job Methods by the TWI Institute. Contact: pborem@ihi.org

Kevin Litttle, Ph.D. (statistics) has worked as an improvement advisor to health care projects since 2001. As a senior Improvement Advisor with the Institute for Healthcare Improvement, he has recently supported IHI's Pursuing Equity projects and learning communities to decarbonize healthcare operations. He currently serves as the improvement advisor to a project funded by the West Institute that aims to reduce hospital admissions through integration of care by ACOs and Geriatric EDs in the United States. Contact: klittle@iecodesign.com.

Resources

Bravo, M.A.S., Santos, G.C.S.D, Petenate, A.J., Westphal, P.J., de Albuquerque Souza. L.G., Marques, R.G., Morosov, E.D.M., Gushken, A.K.F., Franco, F.F., Silva, W.G., de Moura, R.M., de Lima, A.L., dos Santos, R.G., de Carvalho Andrade, K., Hamada, A.P.S., Cristalda, C.M.R., Ue, L.Y., de Barros, C.G., & Sebastian Vernal on behalf of the Saúde em Nossas Mãos collaborative study group (2023). Adapting lean management to prevent healthcare-associated

infections: a low-cost strategy involving Kamishibai cards to sustain bundles' compliance, *International Journal for Quality in Health Care*, 35(4), 1-6.

Dinero, D. (2005), *Training Within Industry: the Foundation of Lean*, Productivity Press, New York.

Graupp, P. and Purrier, M. (2022), *Getting to Standard Work in Health Care: Using TWI to Create a Foundation for Quality Care*, Routledge, Boca Raton, FL.

Kim, G. and Spear, S.J. (2023), *Wiring the Winning Organization*, IT Revolution, Portland, OR.

Lancaster, J. (2017), *The Work of Management: A Daily Path to Sustainable Improvement*, Lean Enterprise Institute, Cambridge, MA.

Sampath B., Rakover J., Baldoza K., Mate K., Lenoci-Edwards J, Barker P. (2021). *Whole System Quality: A Unified Approach to Building Responsive, Resilient Health Care Systems*. IHI White Paper. Boston: Institute for Healthcare Improvement. (Available at www.ihi.org).

Scoville R., Little K., Rakover J., Luther K., Mate K. (2016). *Sustaining Improvement*. IHI White Paper. Cambridge, Massachusetts: Institute for Healthcare Improvement. (Available at ihi.org)

Video:

What Is the 5 Step Up Model? Focus on Step Up 1 Lean Frontiers video series presented by Oscar Roche, TWI Institute, <https://www.youtube.com/watch?v=LtFqucRqkY4>