

Shared Learning: Basics of Large-Scale Systems Improvement

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MCIC Presentation Notes

Introduction

The ED environment

In 2024, emergency departments in the U.S. have high demand for care and subsequent challenges to maintain high levels of safe, effective and efficient care. The care environment is characterized by a fast pace and diversity of patient conditions that vary across ED locations. Changes to improve performance in other care settings, like the ICU or surgical suites, may need adapting to yield improvements in the ED.

Paulo Borem has extensive experience with large-scale improvement interventions in Brazil, Portugal and X [the RIE experiment?]. He is launching a project with 11 EDs in Sao Paulo Brazil and will apply his experience in previous projects to the ED environment.

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 doesn't deliver improvement in local tests.

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

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 and current applications.

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. The project achieved more than a 50% reduction in HAI averaged across the ICU units through deployment of specific infection prevention “bundles”.

However, the 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 bundles. The Ministry of Health requested a new initiative with 200 ICUs but anticipated that the good results would fade as the units no longer could see and react to data on the fidelity of bundle use.

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 control quality.



52% reduction CLABSI, CAUTI and VAP in 24 months

Bundle reliability was collected using checklist with check mark

How this story evolved...

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

MoH requested for phase 2 a different way to CONTROL QUALITY

We embarked in a journey to explore different and novel ways to control quality

Prompted by the Ministry of Health's criticism, Paulo next designed an revised intervention to improve maternal mortality and morbidity, focused on interventions in Emergency Departments.

He extended his design by adding more tools and approaches with a new phase of work to reduce infections in ICUs, both in Brazil and Portugal.

The three new projects allowed him to test new ways to improve operations and sustain those improvements. We'll give you a brief look at each of these projects.

Two Mind Shifts are the foundation of Paulo's new approach

Paulo's mind has shifted since 2019 in two major ways as he develops large-scale improvement projects:

- Quality Improvement must integrate with Quality Control
- Problems are good to have

Quality Improvement must integrate with Quality Control

Paulo now firmly believes that Quality Improvement must be integrated with Quality Control to increase the odds that improvements will stick.

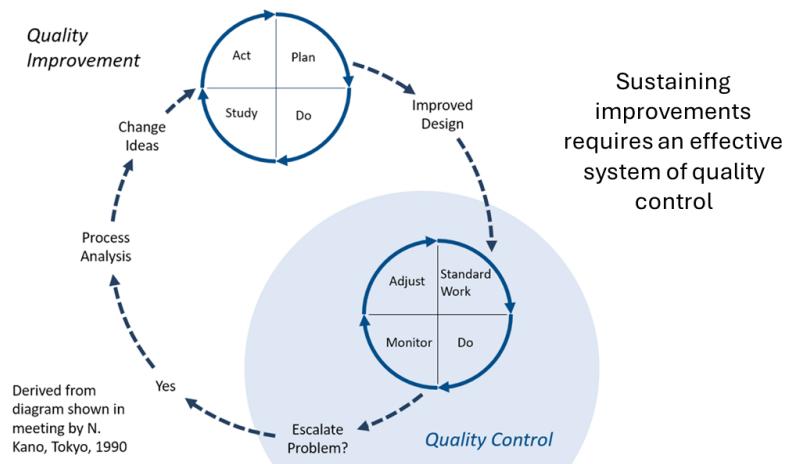
The relationship between Quality Control and Quality Improvement may not be news to you.

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

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 sketched by Dr. Noriaki Kano, an expert in Japanese Total Quality Control in 1991:

Quality Control is the foundation of Quality Improvement



In the Kano 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 step in a care process, what is the job and how should it be done?

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

Quality Controls builds capacity for Quality Improvement

In carrying out Quality Control during operations, people use the Plan-Do-Study-Act cycle explicitly every day. Daily experience builds skills of supervisors and individuals in solving local problems that usually have easier to grasp causes. When your organization needs a special improvement project, you will have a large cadre of skilled people who can contribute—you’re not reliant on staff specialists who often do not have detailed job-specific knowledge and know-how to develop solutions that work well.

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.

More on Improvement Projects

A new project: improving performance of 11 EDs in Sao Paulo, Brazil

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 problems.

ED project: solve the following problems in a pilot of 11 EDs in a city with 21 million people that builds on Maternal Mortality and the ICU infection reduction projects



> 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.

Here's a summary of the management system being designed for the ED project.

Our approach to Sustainable Operations

The task for leaders

Make it easy for everyone to see the current state of operations, its problems and the solutions to its problems

Elements

1. Agree on the work
 - Work Standard
 - Standard process
2. Teach skills to do the work (JI method)
3. Amplify Problems
 - Huddles
 - Work observation: general scan (Gemba walk) and focused (K method)
 - Each person has a way to report
4. Assign and solve problems
5. Make performance visible

You are likely to be familiar with and may be using a version of one or more of the elements in your EDs.

Lesson from the Maternal Mortality Project 2019-2021: Agree on the work, Teach the work

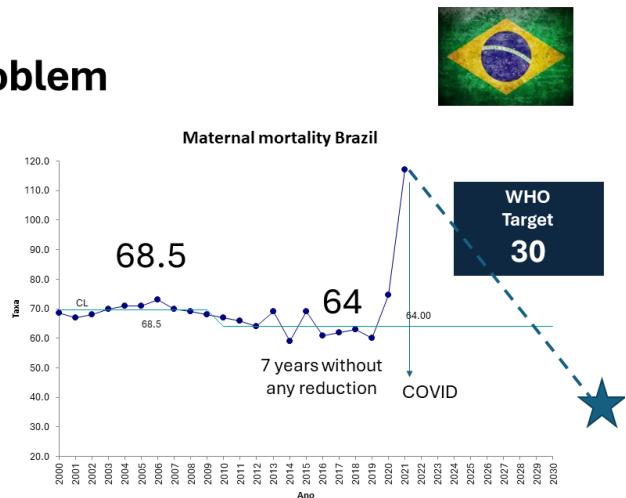
The management system proposed for the ED project emerged from two other sets of interventions.

The MMP focused on reducing birth-associated mortality in the ED. The project was the first time Paulo and his colleagues integrated the technique of Job Instruction with a core clinical process.

[The identification and mapping of the 4R's was good work but not “new”? One of the interventions was to change the work first and then train to the work....this is important sequencing but did you do anything new in defining the 4Rs work??]

Defining the problem

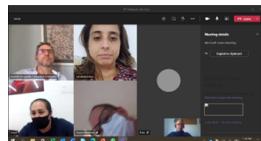
64 deaths/100,000 live births between 2012 to 2021.
Using same tactics not likely to reach the AIM=30



Project Design

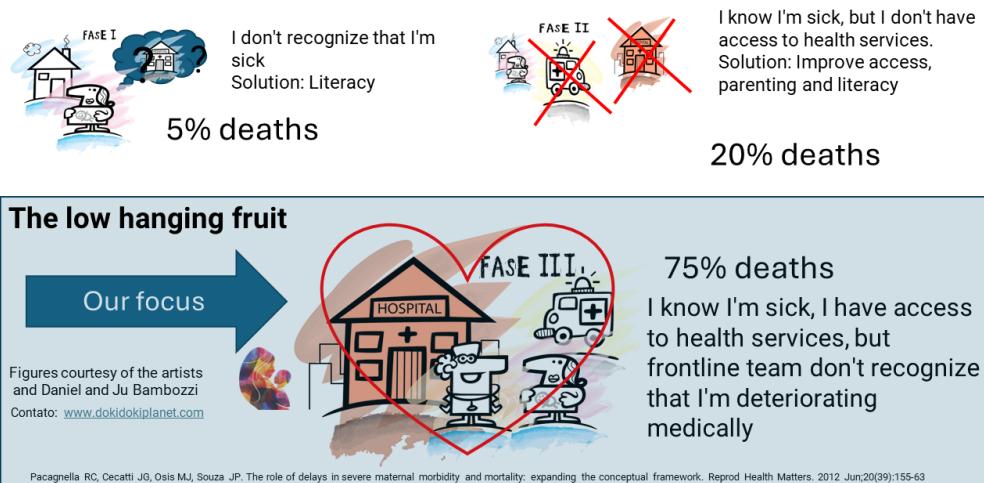


19 public hospitals
10,000 live births/month
(median)
Nov/2019 – March/2021, 16 months



100% virtual after COVID

Analysis of Baseline Conditions



Need different results? Change your approach

Traditional approach

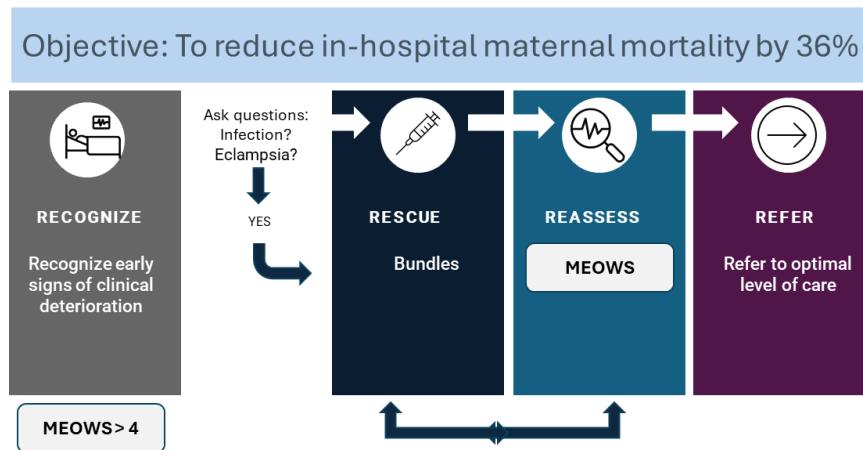
1. Offer training to the healthcare professionals (clinical content)
2. Try to solve all problems of the whole continuum of care at once (prenatal care, hospital care, education, etc.)
3. Lecture, lecture, lecture

New approach

1. Change the process of care first and then offer training to modify the behavior
--use a new way of Training "Job Instruction"
2. Declare your "normal"
3. Develop standard work and processes
4. Focus on where 75% of mortality happens - HOSPITAL, mostly the ED

The MMP project team identified a high leverage process, “4Rs to Rescue.”

Define High Leverage Process: "4Rs to Rescue"



The project team then developed 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.

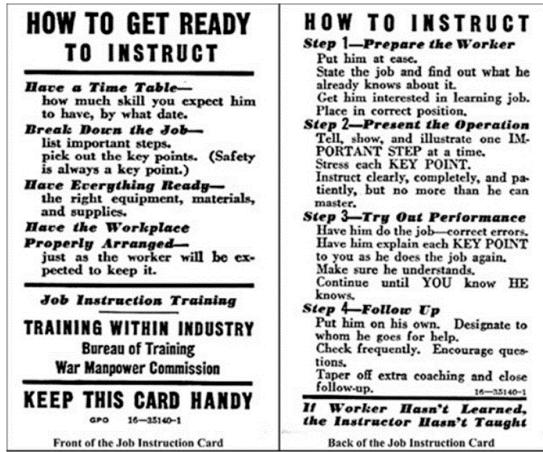
Job Instruction

Job Instruction (JI) is one of the core methods in the Training Within Industry (TWI). We'll say a bit more about TWI later in this session if we have time; go to [2. Teach skills to do the work \(JI Method\)](#) to learn more.

JI requires one-to-one teaching.

The instructor systematically demonstrates the job and offers the and then watches the person being instructed carry out the key steps

Job Instruction (JI) Method: Skills to Carry out the Bundles



Job Instruction is part of
Training within Industry approach

- **What we did:**
Trained 14 supervisors in JI for them to create reliable processes with no variation (each element of each bundle)
- **How we did it:**
10 hours of JI training and weekly sessions to co-design standard process for each element of the bundles.

Image of JI card, 1944-5

The instructor uses a Job Breakdown Sheet to train each person, 1-1.

Important steps	Key points	Reasons
1) Identify patient	1. Introduce yourself to the patient 2. Ask for ID, check name, DOB, mother's name 3. Explain what will be done	1. Guarantee and strengthen the bond with the pregnant woman 2. Make sure the name of the person is in front of you 3. Promote trust
2) Perform anamnesis	Ask the reason for coming to the ER Ask about bleeding, fever, and high blood pressure	Observe alert status Vital data may be normal now, but the pregnant/postpartum woman may have been having these symptoms recently
3) Check -Temperature -RR -BP -Pulse	Start with Temperature Place the axillary thermometer on the arm opposite the clamp Observe the RR talking to the pregnant woman Do not use cell phone Wall or computer clock at your fingertips	It takes longer to measure temperature with an axillary thermometer Avoid dropping the thermometer Prevent the patient from noticing and increasing the course of breathing Impression of distraction Facilitates the counting of RR
4) Calculate MEOWS	Use standard table If MEOWS ≥ 3 in a parameter or > = 4 in the sum, ask the 3 questions: Are there any signs of infection, eclampsia, or bleeding?	Avoid mistakes and improve accuracy The answer yes is essential to decide on opening the bundles in the first hour
5) Open Bundle	None, Sepsis, Hemorrhage or Eclampsia	If we want to save the life of a pregnant woman, the resusc must be done in the first hour since the application of MEOWS. Avoid deterioration of the pregnant woman.

What, How and Why: The Job Breakdown Sheet

The Job Breakdown Sheet guides a supervisor or trainer in teaching a skill to someone.

For each important step, the instructor presents key points about how to do the job and the reasons for key points.

We used the same JBS for each skill across all the EDs.

The instructor uses a well-defined teaching sequence that involves showing the important steps, then adding the key points and reasons for the key points. Next, the instructor observes the person do the job and then the person doing the job 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. This teaching sequence follows the "How To Instruct" advice on the pocket card from 80 years ago.

What did Paulo's teams learn from JI application, what are the benefits?

- Everyone has clarity about the core jobs. New people can learn the important steps and carry out the work in the same way as current staff.
- People know why they are doing specific tasks a certain way. Knowing why helps to cement the lessons and provides the basis for future modification of work standards.
- 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 the JI including the insistence on 1-1 training.
- JI supports a Training Plan—what and by when—for staff skill building. 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.

Lesson from ICU Phase 2 Project, 2021-2024: Make problems easy to see

Paulo and his colleagues next explored a method to link the job skills defined by Job Breakdown Sheets with a regular audit of work.

After people are trained, how well are they able to follow the steps, with the proper technique? Regular audits translate to 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). A card corresponding to the audit is then placed on a summary display board in the unit.

Furthermore, each clinical unit then can summarize weekly performance to a control chart showing the per cent of audit opportunities that are either Red or Green.

One innovation: use AI tools to reduce manual effort in translating the weekly performance into control chart calculation.

Link standard work and job skills to Kamishibai Method

Major benefits of the method:

- regular audit of the fundamental skills—emphasize that could be done by ANYONE. CEO could take a card and go see. There is typically a schedule to go observe. If no safety issue, and a deviation, then debrief afterwards. If safety issue STOP and correct. Operationalizes Quality Control within Operations!!
- regular coaching/intervention to align performance with desired state (normal)

- summarizes the performance on the core skills visible to everyone (display board), motivation to reduce the red
- much faster signaling than the previous monthly reporting cycle on bundle compliance.

Question for the audience: how could Kamishibai method work in your ED?

Deeper Dive on Elements of the Management System

KL idea: highlight how each element either contributes to the QC system OR amplifies problems

Agree on the work

Agreement on the instructions is the foundation of quality control.

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

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

- the characteristics of the product or service,
- the conditions of equipment and the environment that support production, and
- 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 defined above.

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-ups" Model.

Isao Kato's Step Up Model

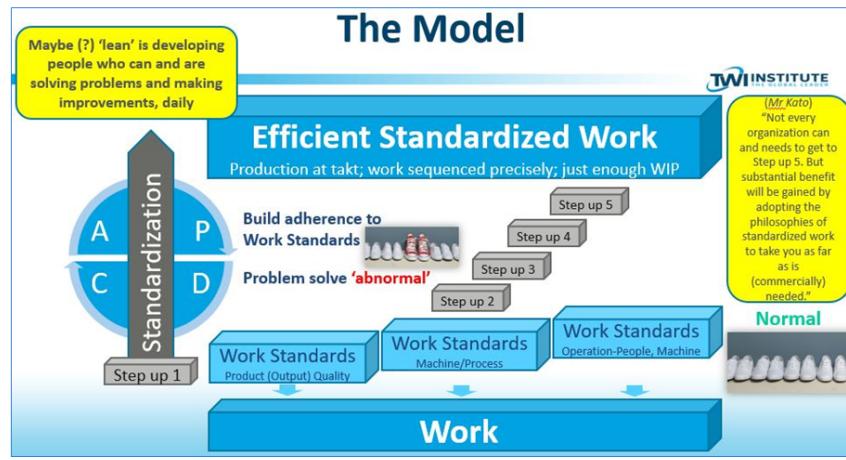


Image used with permission from TWI Institute

Learn more about Mr Kato's model by viewing Oscar Roche's 'What Is...' [video](#) produced for Lean Frontiers

8/28/2024

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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 work standards from the ICU project, Phase 2

Teach skills to do the work (JI Method)

Job Instruction is one of part of the Training Within Industry 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

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 aimed at supervisors:

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

HOW TO IMPROVE JOB METHODS

A practical plan to help you produce GREATER QUANTITIES of QUALITY PRODUCTS in LESS TIME, by making the best use of the Manpower, Machines and Materials, now available.

STEP I—BREAK DOWN the job.

1. List all details of the job exactly as done by the Present Method.
2. Be sure details include all:
 - Material Handling.
 - Machine Work.
 - Hand Work.

STEP II—QUESTION every detail.

1. Use these types of questions:
 - WHY is it necessary?
 - WHAT is its purpose?
 - WHERE should it be done?
 - WHEN should it be done?
 - WHO is best qualified to do it?
 - HOW is the 'best way' to do it?
2. Also question the:
Materials, Machines, Equipment, Tools, Product Design, Layout, Work-place, Safety, Housekeeping.

16-31488-1

STEP III—DEVELOP the new method.

1. ELIMINATE unnecessary details.
2. COMBINE details when practical.
3. REARRANGE for better sequence.
4. SIMPLIFY all necessary details:
 - Make the work easier and safer.
 - Pre-position materials, tools and equipment at the best places in the proper work area.
 - Use gravity-feed hoppers and drop-delivery chutes.
 - Let both hands do useful work.
 - Use jigs and fixtures instead of hands, for holding work.
5. Work out your idea with others.
6. Write up your proposed new method.

STEP IV—APPLY the new method.

1. Sell your proposal to the boss.
2. Sell the new method to the operators.
3. Get final approval of all concerned on Safety, Quality, Quantity, Cost.
4. Put the new method to work. Use it until a better way is developed.
5. Give credit where credit is due.

Job Methods Training Program
TRAINING WITHIN INDUSTRY
War Manpower Commission

GPO 16-31488-1

Job Relations

HOW TO HANDLE A PROBLEM

DETERMINE OBJECTIVES

Step 1—Get the Facts
Review the record.
What policies, rules, regulations apply?
Talk with individuals concerned and get opinions and feelings.
Be sure you have the whole story.

Step 2—Weigh and Decide
Fit the facts together and consider their bearing on each other.
What possible actions are there?
Check each action against objectives weighing effect on individual, group, and production.
Select the best actions.

Don't jump to conclusions.

Step 3—Take Action
Should I handle this myself?
Who can help in handling?
Should I refer this to my supervisor?
Consider proper time and place.
Explain and get acceptance.
Don't pass the buck.

Step 4—Check Results
How soon and how often will I check?
Watch for changes in output, attitudes, and relationships.

Did my action help production?

WERE OBJECTIVES ACCOMPLISHED?

A Supervisor Gets Results Through People

FOUNDATIONS FOR GOOD RELATIONS

1. Let Each Employee Know How He Is Getting Along
Figure out and tell him what you expect.
Point out ways to improve.

2. Give Credit When Due
Recognize extra or unusual performance.
Tell him while it's fresh.

3. Tell An Employee in Advance About Changes That Will Affect Him
Tell him WHY if possible.
Get him to accept the change.

4. Make Best Use of Each Person's Ability
Look for ability not now being used.
Never stand in an employee's way.

People Must Be Treated As Individuals

JOB RELATIONS TRAINING
U. S. Civil Service Commission

JR-2
April 1945
16-44302-1 GPO

8/27/2024

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Amplify problems

Refer to Kim and Spear use of the term

Huddles

Gemba Walks

Kamishibai Method

Individual Problem Reporting

Assign and solve problems

Problem-solving is not an occasional activity; there is a weekly cycle of identification and assignment. Dividing the set into Just Do It and Structured Problem Solving.

Key point: if the same Just Do It problem recurs more than X times (X = 3?) then it deserves more analysis (don't keep adjusting something that shouldn't keep breaking.)

Make performance visible

Performance measures

What belongs on the board?

An analog board

Why not just keep everything in the computer?

Appendix

Tips for Improving a Management System

1. Take our own advice: Test on a small scale. E.g. take one bundle related to one condition in the ED project. Develop the Job Breakdown Sheets, determine how Kamishibai method could work.
2. Embrace simulations (refer to Kim and Spear, too.) You Tube video McDonald simulation.

What about Quality Planning?

If you are familiar with Joseph Juran's Quality Trilogy, Quality Planning complements Quality Improvement and Quality Control.

Importantly, Juran insisted that Quality Control be done during operations, not after. In other words, Quality Control is not inspection of results and repair or fixing after the product or service is complete.

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

Quality Planning	Quality Control	Quality Improvement	Patients, Families, and Communities
POINT OF CARE			
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	
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

Quality Planning is the way an organization identifies areas of opportunity and change related to strategy and markets, including listening to customers. 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.

While we won't address Quality Planning today, we believe that Quality Planning must rest on understanding the health and performance of operations and on an effective Quality Control system.

You see that the Kano diagram does not show a role for Quality Planning. For example, the Kano diagram does not show a path of improvement projects that emerge from Quality Planning rather than responses to operational problems.

Example: 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

Kevin

Sources of influence

Our thinking and consultation practice has several major influences. You may be familiar with one or more of the following. We think the least familiar to most people is the Training Within Industry (TWI) approach to front-line operations. We'll provide a brief introduction to TWI in our session.

- Deming through API and IHI (Model for Improvement, System of Profound Knowledge);
- Juran (Juran Trilogy, the definition of self-control);
- Lean approach to design and deployment of production systems (various authors list) and advice on specific elements of operations management;
- Training Within Industry skills for supervisors and management.

For Further Study

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

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

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

Direct application of lean manufacturing principles may not yield insights in every clinical application (Lillrank)