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ESSENTIAL TOOLS AND PRINCIPLES WHEN IMPLEMENTING LEAN IN REGIONAL HOSPITAL AND HEALTH SERVICES: CASE OF CQHHS

Abstract

Introduction: A large number of re-design tools and methods have been introduced to healthcare organisations However, organisational leaders are often out of step with modern organisational transformation and management systems which are fit for purpose. The need to achieve operational excellence, meeting accreditation requirements and organisational growth was the impetus for Central Queensland Health and Hospital Service to adopt Lean management system. The authors therefore, discuss the essential tools when introducing Lean in a regional hospital and health services to improve operational excellence, resource allocation, productivity of staff and improve quality of services. Methods: This work is a result of a literature study of various materials, general staff surveys, logical reasoning as well as practical experience of implementing Lean in a regional hospital services. Results: Active participation of staff in improving their work processes; equip staff with evidence-based problem-solving skills to address work environment issues; clear standard work processes, visual management systems to improve organisational performances and sustain the gains from Lean implementation.

Key words: Lean, kaizen, standard work, Lean management tools, organisational transformation, problem-solving

A KATASZTRÓFAMENEDZSMENT LEGFONTOSABB ESZKÖZEI ÉS ALAPELVEI AZ EGÉSZSÉGÜGYI SZOLGÁLTATÁSOK VÉGREHAJTÁSÁHOZ EGY AUSZTRÁL VALÓS PÉLDA ALAPJÁN

Absztrakt

Bevezetés: Számos új eszköz és módszer került bevezetésre az egészségügyben. A szervezetek vezetői azonban sok esetben nem tartják be a modern szervezeti átalakítási és irányítási rendszereket. Az operatív kiválóság elérésének szükségessége, az akkreditációs követelmények teljesítése és a szervezeti növekedés hozta lendületbe a Central Queensland Egészségügyi és Kórházi Szolgálat számára, azt, hogy elfogadja a Lean irányítási rendszert. A szerzők e cikk keretén belül vizsgálják a Lean egészségügyi szolgáltatásokba történő bevezetését a működési kiválóságát, az erőforrások felosztását, az egészségügyi szolgáltatások minőségének javítása érdekében. Módszertan: A cikk megírásának alapja a releváns nemzetközi szakirodalom tanulmányozása mellett az egészégügyi személyzet véleményének felmérése, azok logikai érvelése valamint gyakorlati tapasztalatai a Lean szolgáltatások tekintetében. Eredmények: A cikk eredményeként lehetővé válik a személyzet munkafolyamatainak javítása és további lehetőség nyílik a különböző munkahelyi problémák kezelésére.

Kulcsszavak: Lean, kaizen, standard munka, Lean menedzsment, szervezeti átalakulás, problémamegoldás

1. INTRODUCTION

Lean thinking has shown great potential for improving quality of care and processes in several departments of the general healthcare system [1] [2] [3] Most success in the healthcare industry has been reported in emergency departments, pharmacy, radiology, pathology, transport, operating theatres, human resources, information

technology and food services to generate a culture of continuous improvement through identification and elimination of waste within the processes [4] Healthcare is so people intensive such that staff costs represent 75% of the healthcare costs. [5] However, it is the operational staff who contribute to the largest part of the workforce and are always frustrated due to lack of clear processes and standardised work in healthcare. As a result, many healthcare organisations have utilised Lean techniques on some projects on a short-term basis to good effect, but the positive outcomes do not last long because the underlying philosophy is missing within the workforce.

According to Waring and Bishop [6] some healthcare organisations are using specific Lean tools to tackle very specific problems, while others are committed to Lean as a way of working, rather than just a simple toolkit. When Lean tools are used to improve specific problems, its implementation often fails due to lack of long-term commitment, motivation and sustainability [7] According to Radnor, [8] most healthcare organisations, especially in Australia and UK, use few Lean tools, for example value stream mapping or 5S, to address a problem and experience positive outcomes. However, to sustain the gains from utilising the Lean tools in order to create flow in the systems, organisations have to adopt Lean philosophy on a long-term basis. [2] Many tools and techniques are available to support the Lean philosophy and to enable organisations to apply the ideas and implement change. Nevertheless, the people or staff who are involved in the process need to be actively engaged in the quality improvement activities. They need to live and breathe the philosophy. [2] Implementing Lean in CQHHS followed the five Lean principles which have been suggested as a framework to be used by an organisation to implement Lean thinking. [9] These principles are based on the fact that only a small fraction of staff time and efforts to provide a service or produce a product actually adds value for the end customer. As a result, organisations should always clearly define the value for a specific product or service from a customer's perspective. The five principles are:

- Specifying what creates 'value' from the customers' perspective
- Identify all steps across the whole 'value stream'
- Make those actions that create value 'flow'
- Only make what is 'pulle'd by the customer just-in-time

- Strive for ‘perfection’ by continually removing successive layers of waste.

In addition to the above mentioned principles, implementation of Lean at Central Queensland Health and Hospital Services, (The CQWay) focused on re-envisioning and reconfiguring the whole journey from a consumer’s perspective, respecting the ideas and work of others, giving frontline staff the time and tools to tackle problems and taking small gradual improvement steps, as well as big radical changes. CQWay was based on four pillars, which are:

- Those who do the work improve the work - frontline staff empowered to solve problems using simple methods such as 5-Whys, identifying and eliminating waste using Lean tools, for example 5S, value stream mapping to reduce variability and consistently meet the needs of consumers.

- The right process to produce the right results – a structured approach to improvement using proven methods to analyse existing processes and design as well as implementing new processes while continuously measuring impact.

- The right quality first time every time - empowering staff to stop and fix problems in a sustainable way (*poka yoke)* based on the *Jidoka* concept.

- Placing a premium on developing and empowering Central Queensland employees – changes the roles of management and leadership from command and control to support and trust, to facilitate and create the conditions for frontline staff to understand, improve and implement safer and more reliable ways of providing services.

The CQWay is about staff participation, sharing ideas and solutions. The CQWay focuses on engaging staff to improve their daily work processes. Value stream mapping, 5S process, increased visualisation, *kaizen* workshops, and creation of standard work, *kanban* system, problem-solving, mistake proofing and checklists were the main activities in the CQWay.

2. KAIZEN WORKSHOPS

Kaizen workshops engaged all the staff to improve their daily work in a team-based approach that focussed on continuous improvement. These workshops aimed to identify and eliminate waste, in order to focus on adding value to the service provided to the consumers. The key to eliminating waste was understanding that the staff who did the work knew the problems and had the best solutions. Strategies ranged from small-scale ideas that were tested and implemented immediately (Brownfield) to long-range re-design of new spaces and process (Greenfield), within the healthcare system.

3. VALUE STREAM MAPPING

Value stream mapping was one of the most utilised diagnostic tools in Central Queensland health service transformation journey. It was adapted by Rother and Shook [10] from Toyota's material and information flows of a given product family with the aim of identifying waste in the system. It evolved from a tool which Toyota calls "materials and information flow" diagram. Value stream mapping can be described as creating a diagrammatic or pictorial representation of all steps or activities required to provide a service to the customer [11]. Week-long workshops were held for staff to map out their current service, with a particular focus on identifying waste and variability in different departments or service families. The staff involved then identified ways to optimise their service and developed a model for the CQWay of service delivery. The CQ Way team trained key staff members how to map processes, recognise waste, gather and interpret key data and present it in pictorial format. A sense of 'ownership' from operational staff was a vital ingredient for creating processes which are sustainable. [12] One of the great strengths of Lean thinking, specifically, value stream mapping, is that it encourages involvement of those working on the shop floor to speak out, create future desired processes and eliminating waste. [5]

4. INCREASED VISUALISATION

The manufacturing industry has focused on visual management for a long time, and healthcare has recently introduced the concept to good effect. Visual management is a set of tools and techniques that make operation standards visible so that employees can follow more easily. [13] These tools and techniques expose *muda* (waste) so that it can be eliminated and prevented in the future. Various scoreboards, control charts, team communication boards, and other types of visuals are used to keep vital information flowing within departments. Several healthcare organisations have utilised visual management to great effect. One good example is Thedare healthcare in the USA where this concept was used to great effect. Most of the key performance indicators for the Central Queensland Hospital and Health Services are developed by the Queensland state-wide improvement unit following the national set targets. As services are progressing towards activity based funding rather than block funding, it is now essential for services to meet the national and state targets. Enacting visual management systems in Central Queensland Hospital and Health Services allow tracking of these departmental progress or current performance visible against consumers' requirements. In addition, visual management is one of the most fundamental and necessary elements to success and to sustain the improvements that will be happening within the *gemba* (shopfloor).

There are five step processes identified in the literature for establishing good visual management. Organisations should clearly define what they are trying to communicate, clearly identify the information recipients who collects and disseminates the information, determine the actual control method and train all employees about the new visual control method. [14] According to Tovin at Flinders Medical Centre in Adelaide, the visual tools should be simple, clear, real time, based at a point of use, available to all, and show progress towards the identified goal. [15] Visual management should focus on the process and desired targets so that employees at all levels will feel safe to present concerns and participate effectively in continuous improvement work without fear.

5. HUDDLES

Huddles are short, daily meetings in which a team reviews daily activities, alert every one of any immediate issues, upcoming events, and important policy updates. The huddles usually last no more than 10 minutes. The idea of using quick huddles, as opposed to the standard one-hour meeting, arose from a need to speed up the work of improvement teams. Huddles enable teams to have frequent but short briefings so that they can stay informed, review work, make plans, and move ahead rapidly. In healthcare, Huddles enable a team to anticipate care needs and special situations, so that members of the care team can support each other through the day. [16] There is not one right way to conduct a healthy huddle. Huddles in CQHHS can range from a few minutes to twenty minutes. They are held daily or at the beginning of a clinic session, and the agenda varies depending on the team needs. The goal is for a huddle to be an effective and efficient tool for communicating about consumers and the flow of the clinic session. However, the most effective huddles requires some preparation in advance. Conducting huddles in CQHHS have several other benefits which include, but not limited to, allowing maximum participation of clinicians who often find it impossible to attend the conventional hour-long improvement team meetings. According to Provost clinical staff are more likely to show up on time for huddles which in turn improves communication within teams. [16] Huddles also keep momentum going; as teams are able to meet more frequently ensuring that teams know the plan, expectation for the day, and the support available for critical decisions needed during the day. Huddles also often result in great improvements for relatively small time investment.

6. MISTAKE PROOFING

In healthcare the *poka-yoke* concept, which was developed by Shingo, relates to stopping the line to get quality right the first time and subsequently improve consumer safety. [17] In healthcare, checklists are regarded as the gold standard for mistake proofing. [18] Checklists allow healthcare staff to check their own work to prevent

defects from occurring. Literature reveals that several healthcare organisations have successfully implemented the *Jidoka* concept and these include Virginia Mason Medical Centre, Park Niccollett, and Thedacare in Appleton, Wisconsin. The Virginia Mason Centre implemented the consumer alert system. All staff were asked to be safety inspectors, empowered to stop the line when potential sources of mistakes are discovered, without fear of blame. [19] The establishment of various process tollgates in the consumer care-plan at Thedacare is a good example of mistake proofing in healthcare. [20] Mistake proofing in this process is based on procedural tollgates intended to prevent defects during the care process. The overall process owner can be informed by other healthcare professionals if certain tollgates have not been met. When the first defects occur, the first step is to provide containment or stopping the line in order to determine whether the process should continue or be stop. Other healthcare organisations use clinicians' self-checklists as well as successive checklists to identify anomalies and subsequently stopping the line. *Jidoka* and *poka yoke* both involve stopping the process. *Jidoka* involves stopping the line in-order to solve problems. *Poka yoke* stops the process in order to restore the process to its proper running parameters, or to remove the causes of defects. *Poka yoke* is one of the actions taken in response to problems surfaced by *Jidoka*. In fact, the line between *poka yoke* and *jidoka* is broad and grey, as a result, some authors argue that *poka yoke* is a subset of *Jidoka* and others vice versa [17] [20] [21] In healthcare there are five levels or stages of mistake proofing. [11] The first level is when the consumer reports the defect or error. This is very costly and can result in litigations to the organisation as it means the consumer is dissatisfied with the service provided.

The second level is when organisations hire auditors to check quality compliance. This was very common in the early 1980s. The problem with this method is that the mistake can only be identified at a later stage, after travelling in the system making it difficult to find the root cause. In addition, this method adds cost to the organisation through addition of unnecessary human capital.

Third level of mistake proofing is when downstream processes staff (staff at the end of the process) check on the quality of services provided by upstream process staff (staff at the beginning of the process). This is called successive checking. Third level mistake proofing is better than the second level of error proofing but still the errors can travel a long way within the process before detection and correction. The fourth

level is when staff conduct self-checks of their own work. Self-checks plus successive checks by internal staff constitute the ideal mistake proofing process. The fifth and final level is when the action of a checklist is incorporated in the process.

In CQHHS there have been many instances of *poka yoke* in the form of checklists. Staff review the checklist prior to commencing processes that present risk to the consumer or themselves by ensuring the correct parameters, information, equipment, etc are at hand, set or checked. A good example is the World Health Organisation's (WHO) pre-procedure checklist that is reviewed prior to beginning any procedure in the operating theatre. At CQHHS this has been enhanced by the pre-session huddle at which all concerned - from the surgeon to ward assistant - are present to ensure that everyone is comfortable and everything is ready for the forthcoming operating schedule. At this huddle all consumers are reviewed and any member of staff can ask clarifying questions, ensuring there is no confusion or contention. The final level of mistake proofing occurs in the theatre when any member of staff can call a halt should they notice anything that may affect patient safety.

7. STANDARD WORK (PICTURE)

According to Jackson standard work is an effective tool which reduces variation and helps to guarantee quality outcomes, increases consumer safety and reduction of the cost of providing healthcare. [22] Standardisation is the cornerstone for all the continuous improvement efforts. It helps to establish best practices on how day-to-day tasks should be performed by staff. In the healthcare operations, standard work, guarantees consistency in proving a great service; right products at the right time and that is very crucial. [23] Above all, standard work ensures that the right quality standard can be met consistently. CQWay creation of standard work followed the Toyota way which requires the use of specific tools. Standard work should not be seen as a dictate, it is simply the best agreed way of carrying out any repeatable task. Staff should be given permission to change and retrain the standard if a better agreed way is formulated. In addition, developing standard work requires staff involvement so that they take ownership of the new process.

8. PROBLEM SOLVING

The fishbone diagram, A3 and 5-Whys are the tools that are commonly used in Lean methodology to develop a good understanding of the processes, service provision and to identify real problems. According to Sholtes 5-Whys is closely related to the Cause and Effect (Fishbone) diagram, and can be used to complement the analysis necessary to complete a Cause and Effect framework. [24] The 5-Whys analysis is more than just an iterative process or a simple question asking activity. The purpose behind a 5-Whys analysis is to get the right people in the room discussing all of the possible root causes of a given defect in a process. The technique has been utilised by Taiichi Ohno to develop most of the Toyota car manufacturing methodologies. [2] Many times, teams will stop once a reason for a defect has been identified. However, these conclusions often do not get to the root cause. In healthcare, a disciplined 5-Whys approach will push teams to think outside the box and reach a root cause where the team can actually make a positive difference through identification of the actual problem, instead of treating symptoms. [25] The CQWay uses a prescribed nine-step methodology to solve problems. A template is used to enable teams to follow the nine steps, which takes them on a journey from what is often seen as a vague problem statement to fully understanding the problem using data, to finding the root causes and therefore the right solutions to solve the problem permanently. This template can be used for minor problem-solving through to complex problems that require many detailed actions to bring about resolution.

The nine steps are:

1. Analysis of the data to clarify the concern
2. Find the first location that the problem occurs
3. Brainstorm possible causes using fishbone diagram
4. Evaluation to identify the direct cause
5. Why to root cause analysis
6. Resolution plan
7. Resolution confirmation
8. Study learning
9. Resolution sharing

9. KANBAN SYSTEM

Another Lean tool which was widely used in CQHHS to manage inventory is *kanban*. *Kanban*, is a Japanese word which means signboard "signboard". Taiichi Ohno, a Vice President of Toyota, developed *kanban* cards (a simple visual tool) to implement just in time (pull) production and minimize work in progress (WIP) during the early days of Toyota production system. The *kanban* creates a "pull" material flow requiring employee participation to control and improve processes between workstations. The idea behind the *kanban* concept is that workstations produce/deliver desired components only when needed, thanks to a visual signal in the form of the reception of a card, box, or empty container. [26] *Kanban* facilitates management of the overall supply chain by strategically and operationally linking production demands and the management of supplies. [27] As a result, organisations eliminate waste and reduce costs, become more responsive to change, facilitate quality control and give importance, trust and support to the employees running the processes. [28]

In hospitals, *kanban* has been used to manage medical supplies, commonly dispense drugs, office supplies, linen and other commodities. [29][30] *Kanban* started to appear in healthcare in the late 1980s through the development of a two-bin system (also called no-count), by Danish and Dutch companies [30] for medical supplies. For many hospitals, *kanban* replenishment systems have provided better inventory management outcomes than traditional requisition-based methods using order on request, exchange carts, par level, or the more expensive automated cabinets [27][30][31] found multiple benefits of the two-bin *(kanban)* system in their study of various replenishment systems in hospitals. The ordering process was faster, as there were built-in decision rules, no counting was required, and only empty compartments were scanned (or retrieved) by material handlers, thereby triggering the replenishment process. Furthermore, the use of *kanban* systems drastically reduced the material management workload of the nursing staff, and even eliminated it when material handlers were employed; thereby permitting nurses to focus on care rather than on material management activities. Several benefits linked to *kanban* usage in healthcare settings have been found. Among these we can highlight: acceleration of the ordering process, improved organization of storage, fewer expired items, and less work for the

nursing personnel [27] [32], [33]; All these benefits exert a positive influence on supply chain performance and should lead to greater work satisfaction for staff. One very simple application of Kanban in CQHHS is in the many racks of forms found within the various hospital departments. There was constant frustration amongst clinical staff due to no one reordering or replenishing forms once the forms rack had been emptied. The CQWay team photocopied an example of each form onto red paper, printed 'please take this card to the admin officer for resupply' onto the example and placed the card at least 15 from the last form. This ensured that the forms were resupplied prior to actually running out.

10. 5S IN HEALTHCARE

5S was another tool which was used in CQWay. 5S originated in manufacturing enterprises in Japan, and introduced to the manufacturing sector in the West in the 1980s [33] 5S stands for five Japanese words, *Seiri, Seiton, Seisou, Seiketsu, and Shitsuke,* which broadly refer to maintaining cleanliness. These five words, often translated in English as sort, set in order, shine, standardize, and sustain, represent a set of practices for improving workplace organization and productivity. [34] 5S has now been applied to the healthcare sector as a systematic method of organizing and standardizing the workplace for Lean healthcare. [35] It has, furthermore, been recognized as the foundation of Lean healthcare approaches, which maximize value-added levels by removing all factors that do not generate values at a low cost and with less technological requirements. [36] The impact of the application of the 5S management method in the healthcare sector has been documented in several countries including the United States, India, Jordan and Sri Lanka. [37] Observed changes, as a result of 5S implementation, included improved working processes and increased physical space, [38] elimination of safety violations and improved compliance with regulations [39] improved clinical indicators of safety [13] increased time with consumers and improved consumer satisfaction. [40]

11. SUMMARY

Anecdotally, implementing Lean tools has resulted in systematic identification of problems with the flow of work, and bottlenecks of operations which has led to the creation of standard work process, and subsequent improvement to consumer safety and outcomes. The general routine staff surveys from the organisations which did not particularly focus on soliciting the impact of lean (CQWay) showed increased staff participation in improving their work practices which substantiates who states that Lean increases staff participation. [2] The key ingredient to the successful implementation of the CQWay was the involvement of the staff not just the tools.

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