Scientific article

"Lean" the New Hire Onboarding Process for Healthcare Workers: Evaluating the QuantiFERON®-TB Gold Test

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Abstract: In the past decade, lean, a management system and improvement methodology based on the Toyota® Production System, has been adopted by healthcare organizations across North America and throughout the world. While hospitals and health systems are indeed quite different than factories, lean principles are consistent and useful across industries. This white paper focuses on a case study on baseline tuberculosis (TB) screening in a large healthcare organization, and evaluates both the current and potential future state of the TB screening process. It concludes that the QuantiFERON-TB Gold (QFT®) test for new hire baseline TB screening, in line with lean principles, is less expensive and more efficient than the current alternative.

Introduction

Healthcare organizations face many challenges, including the need to reduce costs while simultaneously improving quality and patient safety. Many organizations face shortages in key healthcare professions and high turnover rates, both of which can impose significant (and avoidable) costs in overtime, recruiting, hiring, and the use of temporary agencies to fill staffing gaps.

In the past decade, lean, a management system and improvement methodology based on the Toyota Production System (1), has been adopted by healthcare organizations across North America and throughout the world. While hospitals and health systems are indeed quite different than factories, lean principles are consistent and useful across industries.

Traditionally, healthcare organizations have focused on cost reduction as a primary goal, whether or not process improvement methodologies were involved. A cost-cutting focus in healthcare often leads to staffing reductions through layoffs or hiring freezes. Being understaffed due to budget constraints or problems with the hiring process can lead to increased stress for healthcare providers. This can negatively impact both quality and patient satisfaction, leading to increased turnover and unexpected higher costs.

Lean focuses on improving the flow through end-to-end processes or "value streams" as they are commonly referred to in the methodology (2). Improving flow means reducing the elapsed time from the request of work or care (such as a patient requesting an appointment or an employer ordering a TB test) to its completion (such as the employee being fully cleared to start work). In any setting, flow is improved not by working faster, but by reducing delays, rework, and other barriers.

In addition to improving flow, lean also focuses heavily on reducing waste or any activity that does not "add value" to the customer. A healthcare organization typically adds value by either improving the health outcome and quality of life of the patient or by delivering the needed service correctly and in a timely manner. Lean defines eight types of waste, as shown

Table 1: Types of waste addressed in lean healthcare (3)

Type of Waste	Definition
Defects	Time spent looking for, dealing with, or fixing errors, mistakes, or process issues
Overproduction	Producing something in excess or earlier than needed
Transportation	Moving something (a patient, specimen, medication, etc.) more than necessary
Waiting	Time patients or staff spend waiting for a service or the next process step to be done
Inventory	Having excess supply, leading to unnecessary stocking cost and possible supply expiration
Motion	Time spent by patient or staff moving (such as walking or typing) that does not add value to the patient's care
Over-processing	Doing extra work (or unnecessary testing) not required to add value
Talent	Not fully utilizing skills and qualifications of staff

in Table 1. In the lean philosophy, cost reduction is an end result of improving flow and improving quality. Reducing waste improves both flow and quality, thereby achieving desired cost reductions.

As defined by the dual pillars of the Toyota Way management system, lean focuses on continuous improvement, as well as what Toyota calls the "respect for people" principle (1). These pillars are considered to be equally important (1). Practicing respect for people, for example, means ensuring that a hospital has the proper staffing levels, for the benefit of patients and staff. Respect also means that one avoids wasting people's time, treats them fairly and challenges them to improve (while supporting them in those efforts).

Lean management practices have directly led to improved patient care, increased workplace satisfaction, reduced waiting times, and reduced costs in many health systems throughout the world.

A case study: baseline TB screenings in healthcare organizations

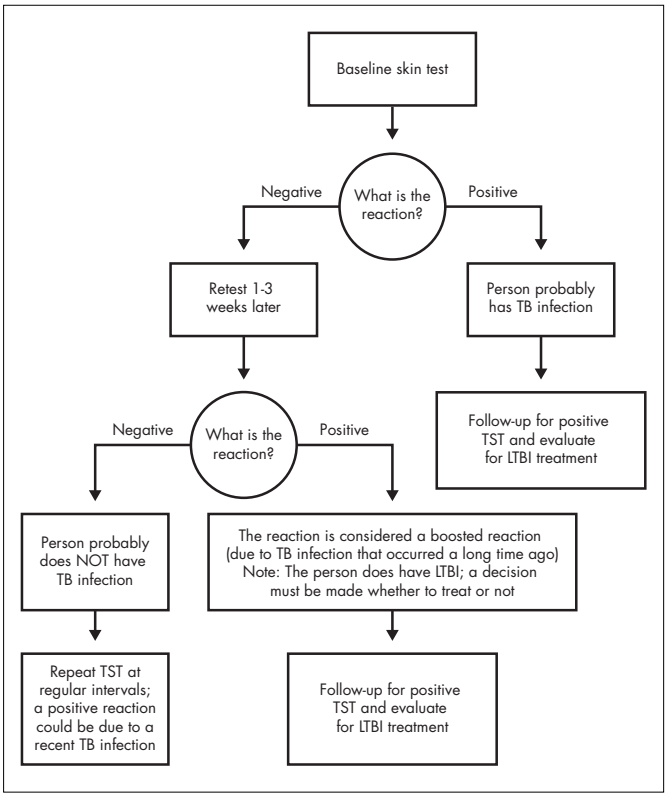
This case study looks at a health system comprised of 11 sites – 3 hospitals and 8 clinics. With approximately 5,000 employees and a 15 to 20 percent turnover rate, the system hires about 1,000 new employees each year. CDC Guidelines recommend that each new hire receive baseline TB screening using the two-step tuberculin skin test (TST), or an Interferon-Gamma Release Assay (IGRA), such as QFT (4).

For this health system, the expectation is that new hires will complete the onboarding process within 30 days of job offer. Historically, onboarding within this 30-day goal was rare. Included in the 30-day window are various background checks, form filings and enrollments through the human resources department, which typically take up to 20 days and require completion prior to initiating the medical clearance process. One aspect of the medical clearance for the healthcare system was the two-step TST TB screening process for all new hires.

Current state

The two-step TST baseline screening process involves multiple steps as shown in Figure 1. First, the initial TST is placed, followed by result interpretation 2–3 days later. If the result is negative, the second TST is placed 1–3 weeks after initial TST placement, again followed by result interpretation 2–3 days later. If this second result is negative, the new hire has passed

Figure 1: Two-step TST. Source: CDC (5).



the TB screening portion of the medical clearance process after a minimum period of 10 days. However, if there is a positive result requiring the employee to go for a chest x-ray or the employee does not return for TST reading within the correct timeframe, the onboarding process flow is delayed further. The false-positive rate with the two-step TST process is roughly 14% (6), a frequency that would be viewed as a "defect" in the lean approach.

The two-step TST process, requiring four separate trips to the clinic, creates inconveniences and frustrations for the health system's candidates, sometimes resulting in loss of preferred candidates. Additional hiring delays and rework in the hiring process further exacerbates the costs of temporary staffing, recruiting and related costs.

The required baseline TB screening process, in addition to the other onboarding requirements, allows very little room for error given the health system's 30-day onboarding goal. If one applies lean principles, the healthcare organization could recognize this process gap.

This analysis of the current state, helped identify the systemic root causes of delays so that they could be addressed, thereby making expectations attainable and reducing performance pressures on current employees. If the organization followed lean principles, they would ask why the baseline TB screening process has to take 10 days and whether the human resources department can complete its requirements more quickly. Separate projects and teams could be assigned to develop a new future state vision and processes that better meet the needs of the hiring organization and its candidates.

Potential future state

The healthcare system from the case above could consider replacing new hire baseline two-step testing with the alternate method permitted under CDC guidelines – a single IGRA. QFT is an IGRA requiring just a single visit to the clinic by the candidate, and the blood draw can coincide with other testing required for medical clearance. If we view the candidate as a customer of this screening process, making one trip instead of four reduces their "waste of transportation" and is more respectful of their time. Further, QFT demonstrates a false-positive rate of less than 1% as compared to 14% with the TST (6) – an opportunity to significantly reduce the "waste of defects."

The results from the QFT blood test can be obtained within 1–3 days, meaning that with a negative result, the candidate can be cleared 7–9 days sooner than with the baseline two-step TST method. Again, a lean organization focuses on reducing the flow time or lead time through a process. Through use of the QFT test, an organization can reduce the flow time through the

Table 2 – Examples of waste reduction through use of QFT instead of the two-step TST

Type of Waste	Example
Defects	Reduction in errors caused by subjective reading of TST tests by staff
Overproduction	Reduction in unnecessary x-rays due to false-positive TST results; n =14% false-positive TST rate (6)
Transportation	Reduction in candidate trips to the clinic to fulfill baseline TB screening requirements
Waiting	Reduction in waiting by nursing staff members who guide candidates through the onboarding medical requirements; reduction in candidate and provider waiting times due to shortage of PPD used in the two-step TST method
Inventory	Reduction in storage and potential risk of expiration of PPD used in the two-step TST method
Motion	Reduction in candidate trips to the clinic for baseline TB screening and in clinician searching for space to process a returning TST patient
Over-processing	Reduction in clinician time spent following up on candidates who don't return
Talent	Reduction in misappropriation of time spent on administrative tasks such as calls to remind patients to return for TST reading

baseline TB screening process. Additional examples of waste reduction through use of the single IGRA method using QFT are shown in Table 2.

Reducing waste such as unnecessary x-rays through the single IGRA method using QFT in employee onboarding demonstrates one way this health system could improve its processes. Further, it's more respectful of the candidate's time and their health to avoid multiple visits to the clinic and radiation exposure whenever possible.

Evaluating the total system cost

A lean healthcare system avoids overly simplistic views of cost reduction. Lean organizations will ensure that departments do not reduce costs in a way that suboptimizes the overall system. Sometimes, one department might spend more to reduce overall costs, i.e. an increase in personnel in the laboratory increases the laboratory's labor cost, but may yield a significant reduction in total cost for the hospital due to reduced patient length of stay in the emergency department.

There is often a difference between a "unit cost" and a total system cost, – lean organizations analyze not only the cost of the test, but also the labor cost related to administering a test. Some higher unit cost tests are selected if labor cost savings can be recognized, thereby reducing the overall cost. But, in the case of new hire baseline TB screening, the hiring organization is looking to reduce hiring costs as well. The cost of unfilled positions can be significant given that temporary staff or overtime must be used in place of the missing full-time candidate.

When the overall cost of a single QFT is compared to the overall cost of two-step TST screening, the healthcare system might find both costs are on par with each other. Therefore, from the lean perspective, it's relatively easy to choose QFT in this case, especially since lean organizations typically do not cling to existing processes and are willing to adapt to meet customer needs. Initially, there may be a perception that the QFT test will add costs to the healthcare system. However, after looking at the total system cost of employee onboarding, administrators might choose to spend more for a test if it reduces the number of lost candidates and reduces the amount spent on temporary staffing or overtime, thereby reducing hiring costs.

Lean organizations tend to take a "balanced scorecard" approach to performance measures and factors impacting decision-making. Cost matters, but ideally it should be balanced by quality, lead time, and employee satisfaction among other factors.

Conclusion

A lean analysis shows that the QFT test for new hire baseline TB screening is less expensive, faster, and reduces the defect rate, making it an effective choice in reducing waste. It also furthers a goal of hiring the right people, reducing delays and avoiding situations where the best candidates are lost.

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