Lean & learn: Efficiency in the laboratory

Many years ago, a Japanese automotive engineer by the name of Taiichi Ohno helped create an efficient production system whilst working for Toyota. Based on the idea of increasing value for less work, any malfunctions in the system would be regarded as waste and all attempts to eliminate them would be made. This framework become known as Lean manufacturing and evolved from the Toyota production system with the help of other progressive development concepts such as Six Sigma, Kaizen and Kanban. Together, these manufacturing and production methodologies are globally accepted as the leading tools for efficiency and continuous improvement and can equally be applied to the clinical laboratory. Lean is a structured and methodical approach for solving problems by reducing the eight recognized categories of waste easily memorized by using the aptly named acronym DOWNTIME (Figure 1).

Figure 1. DOWNTIME - the eight wastes of Lean

In the clinical setting, provision of a reliable and efficient service for the analysis and diagnosis of tissue samples is the primary function of the cellular pathology laboratory. Modern technology is

often combined with ageing practices and procedures so minor workflow improvements do not always benefit under those constraints. With sections of the laboratory often in different rooms or areas, layout is a major contributing factor to poor efficiency. Relocating equipment and reconfiguring these areas can help remove bottlenecks and provide a smooth transition between processes. Ending one process at the same place where the next one begins is the ideal scenario but cost, space constraints and safety of staff are often critical factors in reorganisation.

The application and maintenance of Lean principles help to improve workflow without compromising quality by recognizing areas of waste that impact on the overall efficiency of the histology laboratory. Probably the simplest way of identifying these areas is in the production of a workflow diagram or process map (value stream mapping). These are prepared by representing a visual journey of a sample by walking the flow through each process in the laboratory (Figure 2). Examining each step in turn and identifying areas of waste such as unnecessary waiting times and bottlenecks will help to assess the overall value and efficiency of the laboratory. Progress of samples or staff can also be visualized by creating a continuous flow spaghetti diagram on a plan of

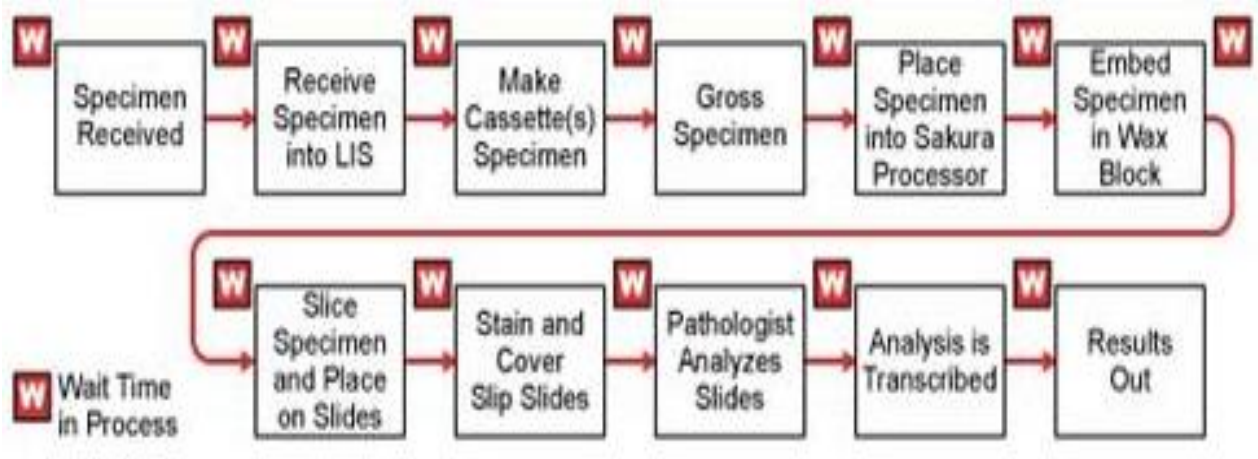

Figure 2. Production of a simple process map

the laboratory before, during and after a Lean event (Figure 3). Recognizing redundancies and malfunctions such as excessive, repetitive or unnecessary movements in the system can be readily identified on spaghetti diagrams for particular laboratory processes or specific time spans. The organization and maintenance of orderly workspaces is also achievable using additional Lean practices known as 5S (Figure 4). Once completed, these areas help to reduce excess movement or

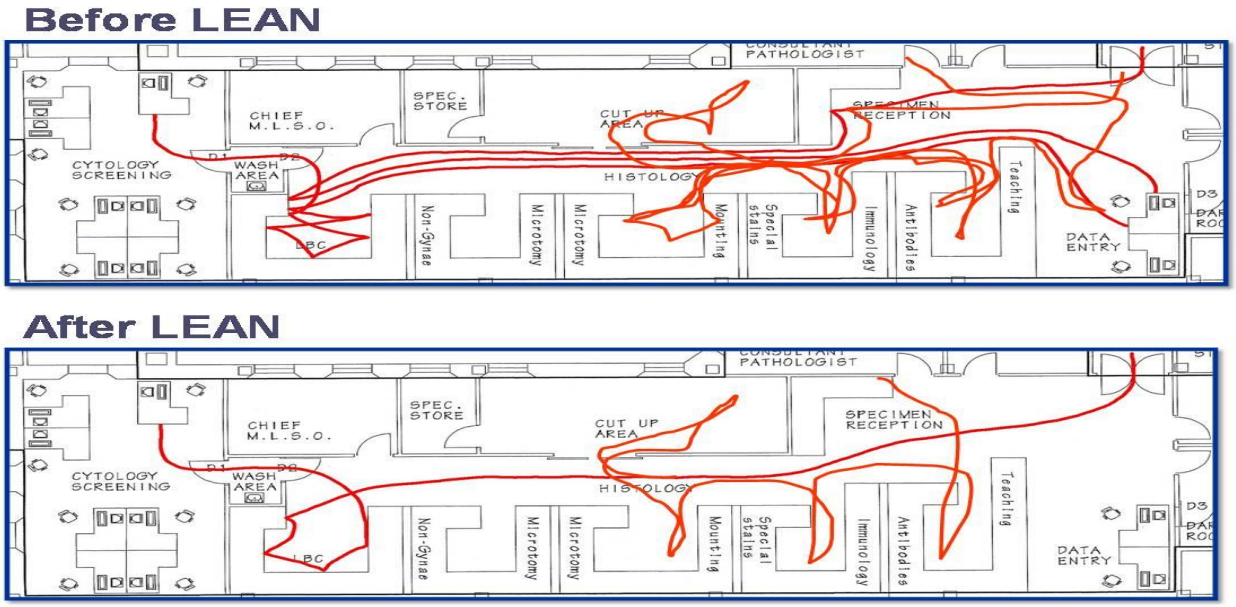

Figure 3. Spaghetti map of a laboratory before and after Lean

motion by ergonomically designing and arranging equipment so that staff can interact with it both efficiently and safely. A sixth S for 'Safety' can also be designed into the mix by risk assessing any new processes prior to implementation. Also, inclusion of a flip chart on which staff can record recommendations and suggestions during an event is a useful adjunct in the laboratory during any Lean process. So, what are the benefits in designing a Lean laboratory? In the changing landscape of the Lean culture, transition of laboratory workloads to the pathologists and improvements in turnaround time has a direct impact on patient care. Elimination of processes that do not add value to the work and the introduction of many, sometimes small changes all contribute to that sustainable culture of continuing improvement. For decades, processing tissue samples overnight was the only alternative in the histology laboratory but now same day results are achievable through the introduction of improvements such as faster biopsy processing and extended working days. Also, in laboratories where poor staffing is frequently an issue, Lean changes to workflow scheduling often help in releasing time for the development of task-specific competencies, training and regular staff meetings which under normal circumstances often prove difficult. Examination of other processes such as sample delivery times from the patient to the laboratory and the time periods taken from distribution of slides to the pathologists to issue of histology reports should also be reviewed. Improving patient care is at the forefront of diagnostic histology and only by maintaining a Lean culture that involves both technical and medical staff alike can efficiency be sustained without sacrificing quality.

Figure 4. The 5S Lean practices

Further reading

1. DOWNTIME - http://www.theproductivitypro.com/FeaturedArticles/article00138.htm

2. Kaizen - https://en.wikipedia.org/wiki/Kaizen

3. Kanban - https://en.wikipedia.org/wiki/Kanban

4. Lean Six Sigma - https://goLEANsixsigma.com/8-wastes/

5. 5S - https://en.wikipedia.org/wiki/5S_(methodology)

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