Agilent Case Study

Patient Case Management Brings Improved Workflow to Canadian Pathology Laboratory

Agilent Dako

An easy transition

The Pathology and Laboratory Medicine (PaLm), Surgical Pathology University Hospital in London, Canada, decided to switch to patient case management with Dako Omnis to further optimize their workflow.

To ensure a smooth transition, the Agilent Team assisted the laboratory with installation, protocol setup, and guidance on how to organize the workload.

"The Agilent team prepared us very well in advance of the installation of the new Dako Omnis platform. A thorough plan including timelines had been provided well ahead of time outlining the expectations for all involved to complete the process as quickly as possible and with minimal disruption to the lab's ongoing work," said Dr. Bret Wehrli, Director of Immunohistochemistry at the hospital.

The optimization of workflow processes was implemented in two phases. In January 2018, the Agilent Workflow Team did initial workflow observations and recommended some changes from historical batch loading practice to continuous loading. In April 2019 the lab identified opportunities to improve even further through consultation with the Agilent Workflow Team and Field Technical Support.

To evaluate the effect of having full focus on optimizing patient case management workflow, we extracted data from the Dako Omnis software for an entire year from August 1st, 2018 to July 31st, 2019.

Table 1. Data for a whole year (August 1, 2018 to July 31, 2019).

Dako Omnis instruments	4
Workdays	248
Total IHC slides	59,630*
Average slides per day	248
Protocols used	233

*Including 1,202 non-diagnostic slides

Pathology and Laboratory Medicine (PaLM), Surgical Pathology, University Hospital, London, Canada

Background

Teaching and research hospital

Cytology, surgical, and autopsy specimens

60,000 IHC slides per year

Test menu > 200 antibodies

Opening hours: 6 a.m. to 4 p.m. (Monday to Friday)

First two Dako Omnis in 2017

Third and fourth Dako Omnis instruments were installed in 2018

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The extracted data contained each slide's run data including request times, load times, completion times, patient case ID*, instrument ID and rack ID. From these data, an analysis of the labs loading patterns on instruments and racks per patient case was conducted.

Capacity utilization

An important factor when optimizing a lab's workflow is to utilize the available capacity by distributing cases equally on the instruments. This will ensure a smoother staining process and reduce risk of bottlenecks. As can be seen in figure 1, the lab succeeded in using all their four Dako Omnis instruments, almost to perfection.

Slides per case

To analyze the effects of the protocol optimizations that were implemented in June 2019, we isolated the slides and cases in the 'Before' situation (April 2019) and compared those data with the situation after workflow optimization (July 2019). As seen in figure 2, the number of slides per case did not change from April to July 2019, thus any improvement to the workflow is not due to differences in slides per case distribution. If the lab was able to reduce splitting of cases with five or fewer slides, it would have a big impact on the overall efficiency in the lab, as this group contained 65% of all cases. The protocol optimizations were intended for this purpose and the impact was analyzed next.

Reduction in case splitting after optimization

Data extracted from Dako Omnis software for the months April 2019 and July 2019 was broken down into number of cases using two to five slides. This range is important as one slide rack for Dako Omnis holds five slides, and cases containing only one slide cannot be split. We analyzed how slides for each of the cases were loaded in either the same rack or split in more racks as well as identifying which of the four Dako Omnis instruments that the rack was loaded onto.

An overview of reduction in case splitting on instruments is presented in Figure 3. The reduction in splitting on different instruments varied from 41-68%, i.e., for the majority of all cases (cases with two to five slides) run in the lab, they drastically increased the number of cases that were kept together on the same instrument.

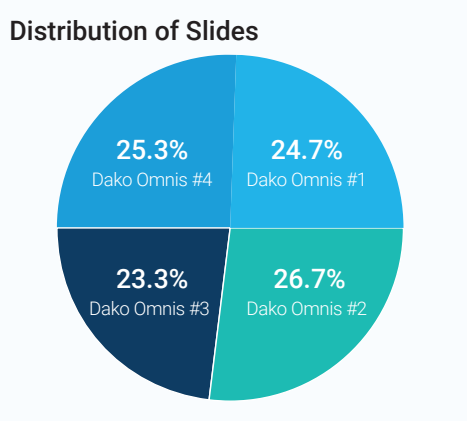


Figure 1. Distribution of slides on the four Dako Omnis instruments. The difference varied +/- 1.7%.

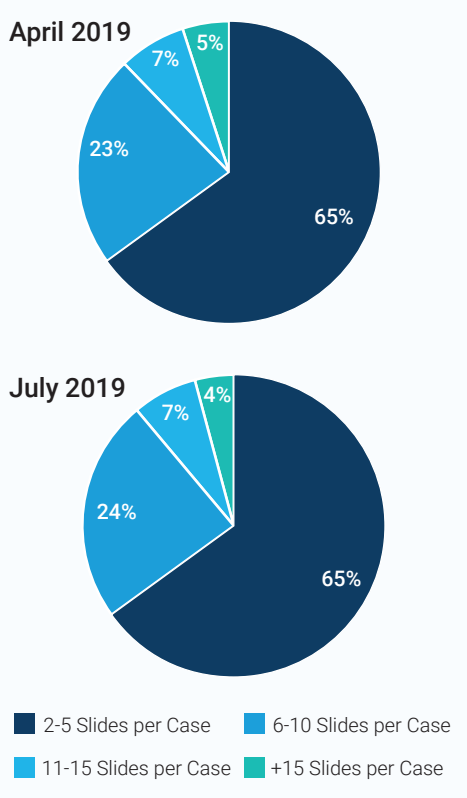


Figure 2. Distribution of slides per case in April 2019 and July 2019. Most cases (65%) consisted of five slides or less (excl. one-slide cases). Only 4% of cases had more than 15 slides.

**No patient names could be identified from the extracted Dako Omnis data. There was no link to LIS data, thus all patient names where 100% anonymous.*

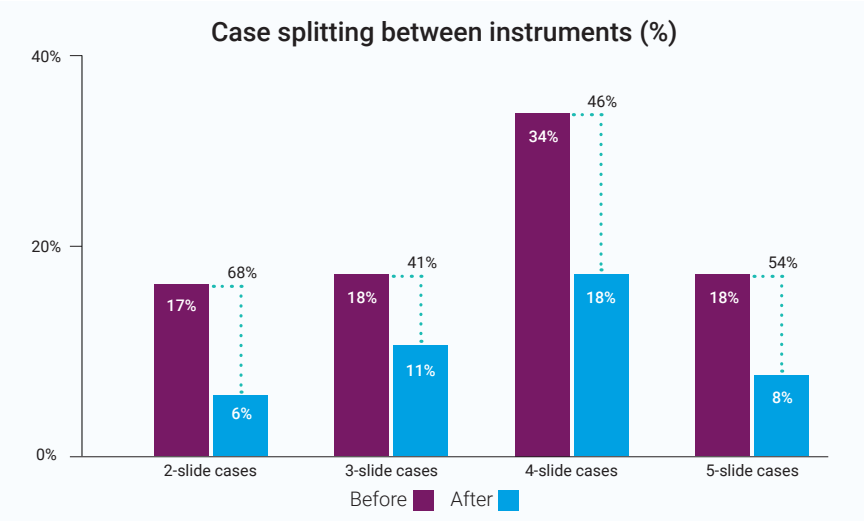


Figure 3. The reduction in case splitting between instruments in percentage for cases having 2-5 slides. A case is considered split if at least one of the slides in a case is stained on another instrument.

The same improvement pattern was found for cases that had to be split in different racks. After the optimization efforts, a 34-51% reduction of cases split between different racks was obtained (Fig. 4).

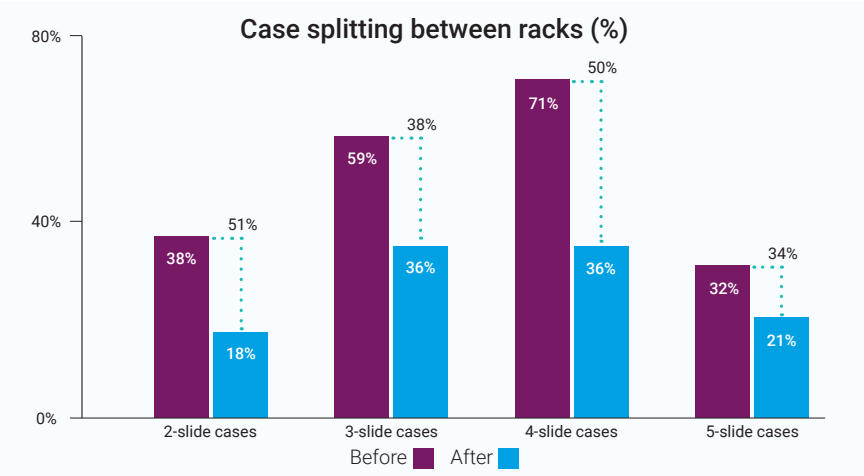


Figure 4. The reduction in case splitting between racks in percentage for cases having 2-5 slides. A case is considered split if at least one of the slides in a case is loaded in another rack.

Turnaround time from request to delivery

Turnaround time for IHC slides should consider the entire time it takes from when the test is ordered to when the results are assessed and reported back. This is the anxious waiting time that the patient's experience and should be reduced as much as possible. A patient case cannot be assessed by the pathologist (readout) before all slides are assembled into a case. Thus, the true turnaround time should be measured when the **last** slide of a case is completed, not as an average of all the slides in a case. Improved workflow using patient case management can greatly shorten this time, which they also experienced in University Hospital London.

In April 2019, the lab stained 5,133 slides in 962 patient cases and 5,230 slides in 1,013 patient cases in July 2019. The patient case delivery times are presented in Figure 5.

Reduced patient case delivery time

As shown in Figure 5, the average delivery time, i.e., the time from request in LIS to **all** the slides belonging to the same patient case are completed on Dako Omnis, was reduced by almost 8 hours from 38.9 to 31.1 hours (20%).

Most of the time savings is attributed to the reduction in time from test request to the last slide of a patient case has been loaded onto Dako Omnis. This is the expected outcome when more slides can be loaded in the **same** rack on the **same** platform thereby avoiding splitting of cases.

Another benefit is that the practical handling of cases becomes much easier. The requirements for sorting before and after staining is lowered making it possible to have less experienced staff to operate Dako Omnis during off-hours.

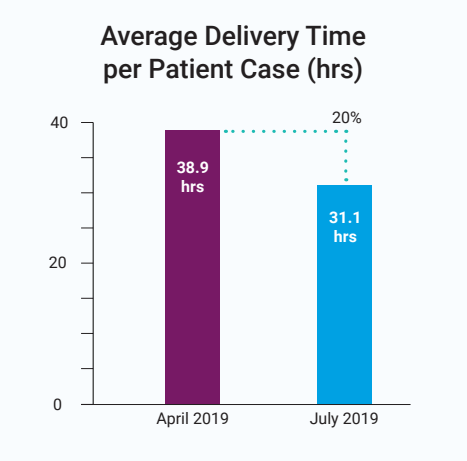


Figure 5. Average patient case completion time from request in LIS to all slides belonging to the same patient case are completed on Dako Omnis.

"A faster time for delivery of completed patient cases allows us to more quickly deliver completed pathology reports, which may result in more rapid delivery of appropriate patient care."

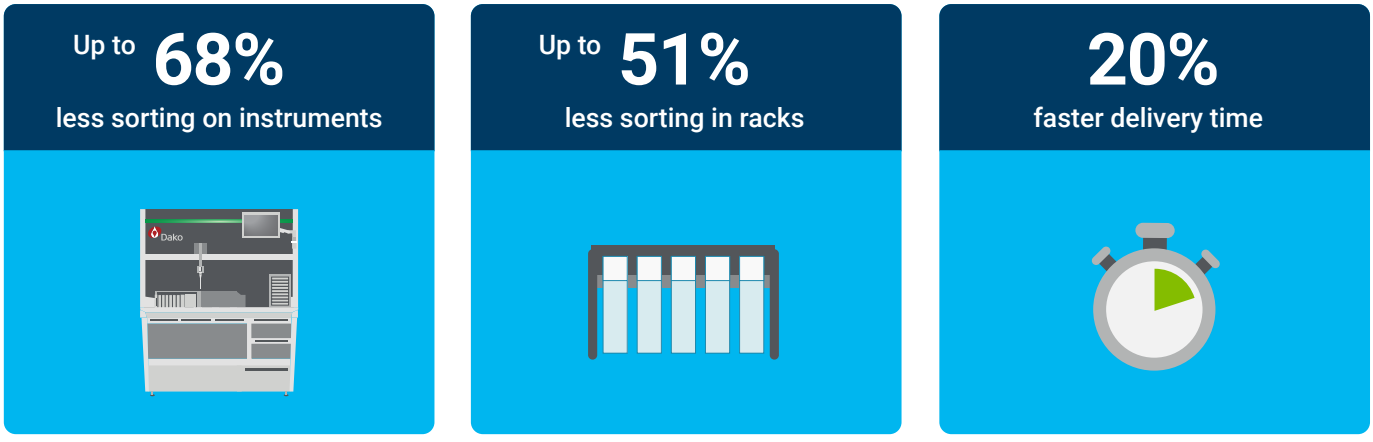
– **Dr. Bret Wehrli**
Director of Immunohistochemistry,
PaLM Surgical Pathology,
University Hospital, London, Canada

Conclusions

A number of protocol optimizations greatly reduced case splitting by up to 68% between different instruments and up to 51% reduction in splitting into different racks.

The reduced need to split cases resulted in a reduced patient case delivery time by 20% attributed to shorter preparation times and unload times.

The PaLM staff has experienced less complexity in slide sorting, smoother loading and unloading processes, thereby creating a less stressful environment in the laboratory. Due to the reduced complexity in slide sorting and simpler loading patterns, the staff now find they have a much leaner workflow and a solution which is easier to use for both new and existing operating staff.



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