# QI in Amyloid Subtyping: Waste Reduction through Document Streamlining

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## Abstract

*Mayo Clinic is the most reliable source for subtyping amyloid disease from paraffin-embedded tissues and fat aspirates. In stewardship to the environment and in the interest of increased efficiency, the Amyloid Subtyping group employed LEAN practices to reduce document waste and improve the security of client service. By storing electronic copies of all of its controls, standards, and calibration records, the group is saving more than eight reams of paper every six months, $1000s in technologist time and patient record retrieval is more efficient. Our efforts culminated in a universal documentation template that we are showcasing at the divisional level to standardize Mayo's nearly 1000 different maintenance forms.*

## Background

Amyloid disease is characterized by deposition of plaque-forming fibrils in most tissues of the body. Of diagnostic importance is the fact that amyloid plaques stain with Congo Red and fluoresce, making them easy to identify but not necessarily easy to characterize; prognosis and treatment are improved dramatically if the amyloid subtype is known. The immunostains development team, including Julie Vrana, Jeff Gamez and Jason Theis, in collaboration with the Mayo Proteomics Research Core, developed a test that could identify amyloid subtype from a Congo Red positive plaque dissected under magnified fluorescence and analyzed using shotgun proteomics. By its nature, the shotgun proteomics approach is complex and time consuming; we are always looking for ways to increase efficiency.

## Define: Objectives

The primary objective of this project was to identify waste in our documentation processes. Our amyloid subtyping test uses multiple, high precision instruments and we are drowning in paperwork. The goal was to organize our maintenance documentation process and improve record retrieval while decreasing materials waste.

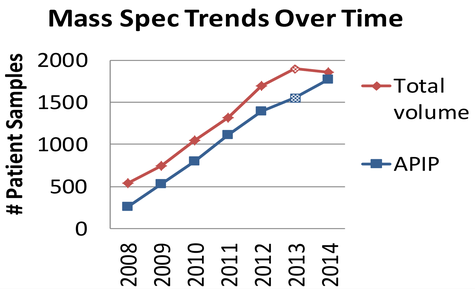
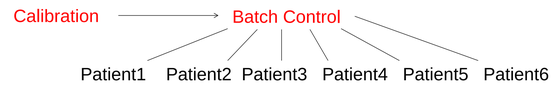



Figure 1: **Amyloid patient trends over time.** As our clinical sample influx increases (APIP), we must take measures to improve efficiency while cutting waste.

## Measure

**The primary defect in our process was inefficient storage and tracking of our maintenance documentation**. This test was not developed with our current capacities in mind and it became clear that our document storage system required updating to meet demand.




We measured document usage by process and found that calibrations and batch controls comprise the bulk of printed materials (2A). **As a counterbalance measure**, we recorded **completeness** before and after implementation (2B).

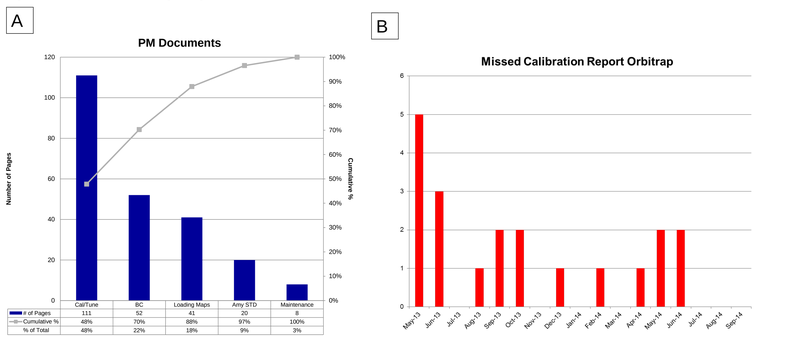



Figure 2: A) **Pereto diagram charting paper usage**. Hard copies of batch controls and calibration contributed to the bulk of paper usage in our lab. B) **Counterbalance measure of missed maintenance recording shows that records are more complete post implementation**. There are 16 possible calibration bins each month, so, for example, there were 5/16 missed calibration bins in May of 2013.

Batch Controls for each patient batch are accessed regularly. Retrieval of control and maintenance records was time consuming and cumbersome, as shown in the spaghetti diagram below.

Process 1 (red line): The technologist must locate the batch control for patient A, and determine which other patients were run in that batch using printed documents. The technologist retrieves the keys to the file cabinet, finds the batch sheet, returns to the hard copy binder and locates the printed batch control. Time = 3 min 15 sec

**Process 2: The technologist uses protini to locate patient A. The technologist does not leave the workstation, and has access to demographic information all in a single location. Time = 15 seconds**

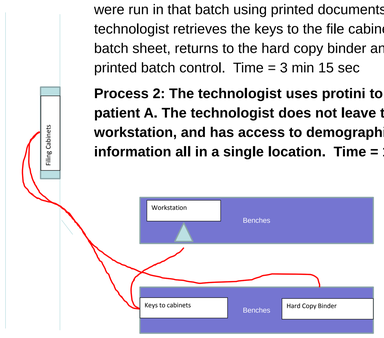



Figure 3: **Spaghetti diagram showing batch control retrieval flow**. With our new database, **Protini,** retrieval of batch controls and patient records is dramatically improved.

## Analyze: Materials Waste Analysis

Analysis of paper usage and document storage revealed that by saving our batch controls in a secured, electronic environment, we could save 200+ sheets of paper/month. **By focusing on electronic storage of these two primary documents and rapid retrieval**, we could reduce waste (Fig 4) and tech time (Fig 3).

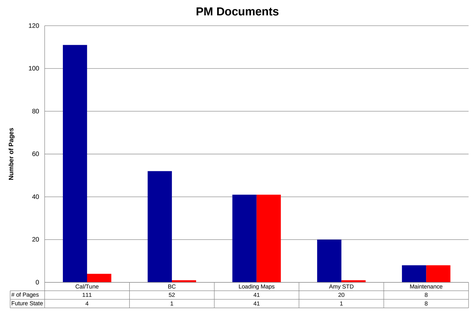



Figure 4: **Future state analysis of document usage results in 200+ sheets of paper saved/month (red bars show FS projections).** Calibrations and batch controls comprise the bulk of our paper usage

## Improve and Control

Improve: After analysis of our data, we focused on developing both a secured, electronic data storage environment and a data retrieval system. All calibrations, batch controls and patient raw data are now stored digitally, though printed pathology reports are still filed. Our paper waste is considerably decresases (figure 4) and all batch controls are instantly retrievable through a database we called "Protini" (figure 3). Now, any patient can be queried in Protini and a copy of the batch control is linked (soft copy), along with all accompanying patients and demographics in the same batch.

Control: As we implement our new electronic storage and database retrieval system, we continue to track missed/lost documents. Preliminary data from our **counterbalance measures** suggest that our new system has improved our record for missed calibrations (Fig 2B). This is likely due to our process for transferring batch control files and electronically documenting calibrations.

Finally, in an effort to safeguard against loss of data, all storage locations are mirrored for instant access to lost data.

## Conclusions

- By switching to electronic storage, we make record retrieval faster with less material waste.
- Standardization of data storage and data retrieval improves tracking and quality of data

## Acknowledgements

Thank you to Mayo Clinic DLMP IT for their efforts in developing and implementing our digital storage and database retrieval system.