broadlawns
MEDICAL CENTER

HOW BROADLAWNS MEDICAL CENTER USED AUTOMATED URINALYSIS TO REDUCE MANUAL MICROSCOPIC REVIEWS BY 63%

ABOUT BROADLAWNS MEDICAL CENTER

Since 1924, Broadlawns Medical Center has enhanced the quality of life for the Des Moines, Iowa community through its healing, teaching and compassionate care. Its approach to healthcare and quality outcomes earned a Level 3 rating from the National Committee for Quality Assurance (NCQA), the highest achievable status for a medical delivery model. Broadlawns takes a leadership position in teaching the next generation of healthcare professionals through its residency and fellowship programs. In 1971, it became one of the first fully accredited Family Medicine Residency programs in the Midwest and has curricula designed to meet all requirements of the residency review committee of the ACGME.

ANALYSIS EVALUATION OF MANUAL MICROSCOPY, THE TRADITIONAL METHOD

Diagnostic screening of urine samples is the third most common analysis performed by clinical laboratories.[1] Urine sediment analysis, or urine microscopy, focuses on the measurement and description of the formed elements of urine. In the traditional method (manual microscopy), urine is spun and the sediment is observed manually through a microscope.[2] This approach, while effective, is labor intensive and prone to subjectivity. Not surprisingly, laboratories not employing automated alternatives, have developed rules from clinical parameters or urinalysis results to limit the number of these examinations.[2]

TOP NEEDS › Improve TAT › Reduce Cost › Standardization

OVERVIEW

Broadlawns Medical Center,
Des Moines, Iowa

200-bed, nonprofit healthcare organization

Core laboratory operates **24/7**

30 full-time employees in the main laboratory;

6 employees in clinic satellite laboratories

29,000 chemistry tests/month

8,900 hematology tests/month

1,690 urinalysis tests/month

Current Urinalysis Solutions:
iQ Workcell; Arkray is AUTION MAX™ AX4030 fully automated urine chemistry analyzer and iQ 200 ELITE automated microscopy system

Other Beckman Coulter Solutions:
Two DxH 900 hematology analyzers, three DxH 520 hematology analyzers (satellite clinics), and Microscan WalkAway 40 MIC microbiology instrument.

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THE NEED FOR LABORATORY AUTOMATION

Broadlawns Medical Center laboratory used the Siemens Clinitek Advantus with Siemens 10SG Multistix, the KOVA® system, and bright field microscopy. This methodology proved costly, not only because of the excessive use of the technologist's time, but also in terms of the supplies needed.

With the combined urinalysis, hematology and coagulation departments, priority runs were generally given to STAT hematology testing. This occasionally caused a decreased turnaround time in the manual urinalysis review. To further delay matters, the reflex protocol resulted in a recorded average of 66.5% of routine urine samples being reflexed for microscopy exam.

AUTOMATION DRIVES RESULTS FOR BROADLAWNS MEDICAL CENTER

In the fall of 2018, Broadlawns Medical Center implemented the use of the iQ Workcell urinalysis solution pairing iQ200 urine microscopy and Arkray AUTION MAX™ AX-4030 fully automated urine chemistry analyzer in their laboratory.

Prior to the implementation of this automated solution, each manual microscopy took approximately 14 minutes—including spinning, reading, manual review and entering results. Post-implementation turnaround time was reduced to 5 minutes, allowing technologists to utilize the 9-minute difference on critical areas of the laboratory.

AFTER AN EVALUATION OF MONTHLY TEST VOLUME COMPARED TO ASSOCIATED COSTS AND HOURS, IT WAS DETERMINED THAT AUTOMATING URINALYSIS AT BROADLAWNS WOULD RESULT IN AN **ANNUAL LABOR SAVINGS OF 1,996 HOURS, AMOUNTING TO $47,504.**

This new methodology also resulted in quantifiable established thresholds. First, the manual microscopy rate decreased from an average of 66.5% to 4%, due to the iQ Workcell gated urine chemistry results:

If the following chemistries are positive: blood, protein, nitrite, leukocyte esterase, and glucose >300, a microscopic analysis is done

If the chemistry results are negative, no microscopic analysis is performed

In these scenarios, the technologist utilized the on-screen review.

	tal UA/month	On-screen microscopic verification	Manual microcopy analysis/month	Required manual microscopy
Before implementation, August 2018	1,113	N/A	750	66.5%
After implementation, June 2019	998	732	101	13.4%*
Post check-in, December 2019	1,065	604	24	4%*

Figure 1: August 2018 (Pre-implementation) compared to June 2019 and December 2019 (Post-implementation).

*Manual microscopy divided by on-screen microscopic verification

After implementation of the iQ Workcell, manual urine microscopy was performed to verify the presence of trichomonas, or in urines positive for sperm in females under the age of 18, or at the technologist's discretion. In the case of the month of June 2019, this amounted to 101 out of 732 for a 13.4% manual review rate. Post check-in after 6 months, in December 2019, their required manual microscopic analysis dropped down further to 4%*.

> "THE LABORATORY TECHNICIANS I TALK TO ALMOST NEVER GO TO THE SCOPE UNLESS IT IS TRULY REQUIRED. THIS WOULD BE THE CASE WITH VERY SHORT SAMPLES OR CONFIRMING RESULTS LIKE TRICHOMONAS."

CASEY HENRY, MEDICAL LABORATORY SCIENTIST AT BROADLAWNS MEDICAL CENTER.

IMPROVING PRODUCTIVITY AND REDUCING TAT BY AUTOMATING URINALYSIS

While the significance and details obtained from microscopic analysis far exceed those gained from the chemistry side, laboratories must be mindful of redundant testing that may result in budget depletion.

A proper balance between diagnostic precision and cost efficiency is key. Automated urinalysis allows for standardization of results as well as, reduced subjectivity and variability, resulting in quantifiable savings to the laboratory.

The iQ Workcell automatically identifies 12 particle classifications and 27 sub-classifications with >90% confidence and has the proprietary Digital Flow Morphology and Auto-particle Recognition (APR).

The results are then shown on the computer screen and auto-released using the Edit-free Release software for auto-verification. Immediately after the implementation, Broadlawns Medical Center was able to reduce manual microscopic review rates from an average 66.5% to 4%*. "At first the techs were hesitant of making the dilutions for turbid urines as they thought it would be more time-consuming. However, they soon realized that dilutions are very simple and far easier than using the scope," shared Casey. As expected with time and as the technologists grew more comfortable with the iQ200 technology, the manual microscopic review rate continued to drop to an average of 4%*.

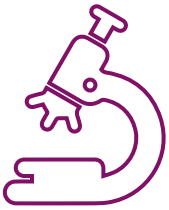
Highlights of Broadlawns Medical Center workflow enhancements with Workcell implementation

Improve productivity

Reduce manual microscopic reviews from on average 66.5% to 4%*

Reduce turnaround

Average time spent on manual microscopy review decreased from 14 minutes to 5 minutes. Auto-validation of results will further reduce TAT



Decrease subjectivity

Microscopy images shared on a screen helped improve review consistency and staff training

Laboratory savings

The iQ Workcell helped the laboratory automate urinalysis, resulting in an annual labor savings of 1,996 hours amounting to $47,504

Learn more about the time- and cost-saving features of iQ Workcell at www.beckmancoulter.com/urinalysis

*Manual microscopy divided by on-screen microscopic verification.

References

1. American Association of Clinical Chemistry. (n.d.). Retrieved June 19, 2020, from https://labtestsonline.org/.
2. Tworek, J. A., Wilkinson, D. S., & Walsh, M. K. (2008). The Rate of Manual Microscopic Examination of Urine Sediment. Arch Pathol Lab Med, 132, 1868-1873.

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