Laboratory Methodology Testing Change Due to Increase in HIV Screening in Emergency Department

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\section*{BACKGROUND}

Human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS) remain leading causes of illness and death in the United States. As of December 2004, an estimated 944,306 people had received a diagnosis of AIDS, and of these, 529,113 (66\%) had died. Screening for the disease is one of the most basic tools of modern public health and preventive medicine. Screening programs control epidemics of infectious diseases by detection in a population group and targeting early treatment.

Based on CDC recommendations in 2006; HIV screening is recommended for patients in all health-care settings after the patient is notified that testing will be performed unless the patient declines (opt-out screening). Implementation of opt-out screening in the emergency department affected the routine workflow of the chemical laboratory in our center. It was a challenge to incorporate the increased testing in the laboratory workflow utilizing the existing resources to detect HIV-positive patients and link them for long-term care while in the emergency department. In addition a grant was received to perform HIV screening on all patients who had no insurance. We switched from manual testing by Alere Determine\textsuperscript{™} HIV-1/2 Ag/Ab Combo to automated testing on Abbott platform, ARCHITECT 2000SR immunoassay analyzer HIV Ag/Ab Combo. An automated line was also added which significantly reduced the workload and improved the turn around time leading to proper and timely management of positive cases in the emergency department and labor and delivery.

\section*{PROJECT AIM}

To incorporate HIV screening test as a routine opt-out blood test to the patients in the emergency department in order to provide better care to the patients without affecting the routine workflow of the laboratory.

\section*{PROJECT DESIGN/STRATEGY}

Opt-out HIV testing was implemented for patients between 18-65 years of age requiring blood work with no previous documented HIV testing in their electronic medical record. Testing was performed as per CDC algorithm. The screening was initially done by manual HIV 4th generation Ag/Ab assay but with the increasing workload and with the installation of new automated line and change over to ARCHITECT 2000SR from Abbott i1000 the average time per manual test was compared with the time taken to perform the same test by the automated line.

\section*{CHANGES MADE}

To improve the workflow, the laboratory switched from manual testing by Alere Determine\textsuperscript{™} HIV-1/2 Ag/Ab Combo to automated testing on Abbott platform, Abbott i-1000 AG/AB Combo. Between March 2017 and July 2018, over 7000 HIV tests were performed which is an average of 591 tests/month compared to a previous average of 10 tests/month. Testing has increased over 58 times compared to tests done in the previous two years. Nineteen HIV-positive specimens were identified by antigen/antibody combination immunoassay and confirmed as HIV-1 by antibody immunoassay. Among the 14 newly diagnosed, 12 were linked into HIV care; 2 known positives were re-linked to care from emergency department due to improved turnaround time.

Our study demonstrates the feasibility of incorporating routine HIV testing within existing laboratory infrastructure by just changing the testing methodology. Although laboratory workload increased it helped in early HIV-detection and appropriate and timely long-term care services.

\section*{RESULTS/OUTCOMES}

Every single manual test performed by the technologist took 25 minutes/test. After the automated line was installed and the Abbott i1000 was switched to Abbott2000 that time was reduced to 1 minute/test so a total of 24 minutes were saved per technologist per test.

The cost per test also decreased substantially. Manual testing by Alere Determine\textsuperscript{™} HIV-1/2 Ag/Ab Combo cost 16.48 per test as compared to automated testing on Abbott platform, ARCHITECT 2000SR immunoassay which costs 5.99 per test.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
Year & ED & L & D & Others
\hline
2015 & 19,309 & 14,998 & 1,184 & 11,112
\hline
2016 & 19,402 & 15,000 & 1,184 & 11,112
\hline
2017 & 19,506 & 15,000 & 1,184 & 11,112
\hline
2018 & 19,602 & 15,000 & 1,184 & 11,112
\hline
\end{tabular}
\caption{Employed employees}
\end{table}

\section*{LESSONS LEARNED}

Even though the number of tests doubled during this time the time taken to perform a test was significantly reduced without any additional burden to the technologist; which improved their morale as well. The results were encouraging, this not only saved the technologist’s time and labor but also made them available to perform other tasks in the meantime. This change in our laboratory protocol improved the turnaround time for HIV screening reports thus providing better patient care. Some patients were linked in to HIV care from the emergency department itself.

Our study demonstrates the feasibility of incorporating routine HIV screening test within existing laboratory infrastructure by just changing the testing methodology. Although laboratory workload increased it helped in early HIV-detection and appropriate and timely long-term care services. Future plans include expanding testing among adolescents and utilizing similar methods to integrate Hepatitis C testing.

\section*{NEXT STEPS}

- To determine the false positive rate of the automated line ARCHITECT 2000SR and compare it to the manual Abbott i1000.
- To expand testing among adolescents (started)
- To utilize similar methods to integrate Hepatitis C testing (started)