**BACKGROUND**

- Total yearly healthcare expenditure in the United States is projected to hit $4.4 trillion in 2018.
- Efforts are underway across healthcare settings to reduce costs, with unnecessary diagnostics representing a significant opportunity to reduce overall expenditure.
- The significance of reducing unnecessary testing is realized through more than the actual cost per test; hidden costs include discomfort and anxiety to the patient, laboratory burden, labor costs for members of the healthcare team in obtaining the results, and even additional work that may not be indicated due to misinterpretation.
- HIV patients in routine care typically have existing HIV test results, and linkage to these data may forego unnecessary lab testing in the inpatient setting.
- With specific regard to CD4 counts, a mounting body of evidence in the outpatient setting indicates frequent monitoring of CD4 counts seldom affects treatment decisions, spares patients undue anxiety, and represents millions in potential savings; however, there is limited guidance with regards to the proper use of these tests in patients.

**OBJECTIVES**

- This prospective study, with pre- and post-intervention arms, will evaluate if education and implementation of a pharmacist-driven protocol for ordering CD4 counts, HIV viral loads, and HIV genotypes can improve the ordering of these tests and optimize associated costs.
- **Primary outcome** in this study is the number of unnecessary CD4 count, HIV viral load, and HIV genotype tests intervened on during the post-intervention period compared to the pre-intervention time. Cost savings pre-versus post-intervention and the reduction in inappropriate tests ordered between study arms will also be evaluated.

**METHODS**

- Single-center, pre-post-intervention study
- Retrospective chart review 1 year prior followed by 5-month intervention period
- Pharmacist to discontinue tests deemed unnecessary per pre-specified algorithms based on Centers for Disease Control and Prevention (CDC)/Department of Health and Human Services (DHHS) guidelines and provide education to providers

**Criteria for Appropriateness**

- **HIV PCR RNA**
  - Suspected acute seroconverting illness
  - Confirmatory test for HIV diagnosis (after positive HIV ag/ab test)
- **T-Cell Lymphocyte Panel**
  - New HIV diagnosis made in-house
  - Confirmed or high clinical suspicion of HIV-associated opportunistic infection and no recent outpatient testing available
  - HIV-infected person who is not on antiretrovirals and has no recent CD4 count (> 1 year) available in outpatient records in order to assess need for opportunistic infection prophylaxis
- **HIV Genotype**
  - New diagnosis made in-house and antiretroviral treatment to be initiated
  - Documented antiretroviral treatment failure with intention to modify antiretroviral treatment regimen inpatient

**RESULTS**

- **Pre-intervention** period, 87% (296/341) of tests deemed inappropriate and should not have been performed
- **Post-intervention** period, 63% (32/51) of tests deemed inappropriate and cancelled by the pharmacist

**Table 2: Additional Outcomes - Well-Controlled Patients Tested**

<table>
<thead>
<tr>
<th>Well-Controlled HIV Patients</th>
<th>Pre-Intervention (N=178)</th>
<th>Intervention (N=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD4 &gt; 200 cells/µL</td>
<td>77 (43)</td>
<td>1 (4)</td>
</tr>
<tr>
<td>HIV Viral Load Undetectable</td>
<td>54 (37)</td>
<td>1 (4)</td>
</tr>
<tr>
<td>HIV Viral Load &lt; 100 copies/mL</td>
<td>74 (51)</td>
<td>1 (4)</td>
</tr>
</tbody>
</table>

Well-controlled patients defined as those with stable CD4 > 200 cells/µL who are fully virally suppressed.

**Figure 1: Primary Outcome**

**Figure 2: Additional Outcomes: Cost Savings**

Projected annualized cost savings based on % decrease in tests run post intervention and monthly thereafter

**CONCLUSIONS**

- **Primary Outcome**
  - Pharmacist-driven intervention reduced the number of HIV diagnostic tests performed by 63% compared to pre-intervention arm (P<0.001)
  - Pharmacist-driven intervention projected to reduce cost by $25,900 (88%) annually

- **Additional Outcomes**
  - Pharmacist-driven intervention associated with reduction in stable patients unnecessarily tested

**FUTURE DIRECTIONS**

- Continued education to incoming housestaff and physician groups on appropriate ordering.
- Computerized provider order entry decision support is currently being designed for upcoming implementation when ordering HIV-associated tests.
- Additional pharmacy staff are being trained on intervening when these orders are inappropriately placed.

**REFERENCES**

- Cianflone, M.D., Eva Sullivan, Pharm.D., Harminder Sikand Pharm.D., FCSHP, FASHP, FACCP, Nancy Crum-Canilfone, M.D., MPH, FACP, FIDSA
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