“Indiana Genomics Implementation Opportunity for the Underserved”

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Indiana Genomics Implementation Opportunity for the UnderServed

Acronym: InGenIOUS funded by NHGRI-IGNITE

Testing the effect of pharmacogenetics genotyping on health care costs and adverse events.

Endpoints:
- Total health care costs
- Adverse events

Eskenazi & IU Health patients randomized to
- >1,312 genotype guided therapy
- >3,145 standard of care
Why target genomic medicine to underserved populations?

Routine monitoring of drug response can be more difficult for underserved patients:
- Access to monitoring may be further away for MUA’s
- Days off work may mean less pay
- Transportation costs may be more significant

Thus, patients may not return for routine monitoring of efficacy & toxicity

Genomic testing that helps get the right drug at the right dose the first time may help
INGENIOUS Enrollment

Recruiting from 192+ clinical sites utilizing in-person and on-line methods collecting blood or saliva for genotyping

Enrollment 4/1/2015 to 4/10/2018

- 18,603 Alerts Received
  - 1,312 Genotyped Arm
  - 3,145 Control Arm
  - 14,262 Randomized, pending, unable to reach or declined

Eskenazi Health System
(4/1/2015 to present)
- 1 Hospital location
- 70+ in and outpatient sites
- Phone recruitment
- In-person enrollment

Indiana University Health System
(2/1/2017 to Present)
- 14 of 16 Hospital locations
- 122 outpatient clinics
- Phone recruitment
- On-line enrollment
Potential subjects identified by informatic screening daily medication scripts and randomized to control or genotyped arm

Genotype arm subjects phoned by research assistants

**Eskenazi:** RA consents and collects blood in person.

**IU Health:** Consent done online, and blood collected at the nearest IUH hospital draw station. Blood sent by currier to PGx testing lab.

Genotyping and medication data evaluated by adjudication committee and any actionable results returned to provider

Adverse event and economic data extracted from medical record
INGENIOUS Enrollment Analysis

- 1,313 subjects genotyped
- 33.1% of subjects genotyped had an actionable result
- Actionable genotype frequency varied significantly by medication
- All actionable genotypes reviewed by adjudication committee

<table>
<thead>
<tr>
<th>Drug</th>
<th># subjects</th>
<th>Actionable</th>
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</thead>
<tbody>
<tr>
<td>tramadol</td>
<td>233</td>
<td>99</td>
</tr>
<tr>
<td>Escitalopram</td>
<td>133</td>
<td>42</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>125</td>
<td>68</td>
</tr>
<tr>
<td>Codeine</td>
<td>107</td>
<td>15</td>
</tr>
<tr>
<td>Nortriptyline</td>
<td>88</td>
<td>8</td>
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<tr>
<td>Omeprazole</td>
<td>87</td>
<td>31</td>
</tr>
<tr>
<td>Pantoprazole</td>
<td>81</td>
<td>20</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>78</td>
<td>29</td>
</tr>
<tr>
<td>Citalopram</td>
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<td>28</td>
</tr>
<tr>
<td>Venlafaxine</td>
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<td>34</td>
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<tr>
<td>Aripiprazole</td>
<td>66</td>
<td>10</td>
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<tr>
<td>Warfarin</td>
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<td>14</td>
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<tr>
<td>Esomeprazole</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Doxepin</td>
<td>14</td>
<td>7</td>
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<tr>
<td>Capecitabine</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>Atomoxetine</td>
<td>11</td>
<td>3</td>
</tr>
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</table>
## INGENIOUS Race Distribution

<table>
<thead>
<tr>
<th>Race</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>White</td>
<td>2743</td>
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<tr>
<td>Black or African American</td>
<td>1300</td>
</tr>
<tr>
<td>Unknown or not reported</td>
<td>341</td>
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<tr>
<td>More than one race</td>
<td>57</td>
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<tr>
<td>Asian</td>
<td>35</td>
</tr>
<tr>
<td>American Indian/Alaska native</td>
<td>10</td>
</tr>
<tr>
<td>Native Hawaii/Pacific Islander</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4495</strong></td>
</tr>
</tbody>
</table>
Geographic distribution of Indiana MUA/P’s

- 90-98% of patients in IU’s EHR systems are ethnically/racially identified.
- > 83% are Geo-Coded so those in Medically underserved areas and populations (MUA/P’s) can be identified.
- ~ 42% of IUH/Eskenazi patients reside in MUA/P’s that are served by inpatient and outpatient facilities.
INGENIOUS patients in MUA/P’s

- Of the genotyped arm,
  - 37% are from MUA/P
  - 53% not from MUA/P
  - 10% unknown status
INGENIOUS Study
Control and Intervention Arms (through 8/2017)

Eskenazi vs. IUH Percent by Insurance Type

- Medicaid
- Medicare
- Low income
- Pvt Pay
- Self Pay
- Other

Eskanazi % vs. IUH %

0% - 60%
On average the enrollment success rate of enrollment at IUH is 3 times greater than at Eskenazi Health.
For each subject enrolled in the study, RAs needed to contact ~ 5 times the number of potential candidates when recruiting from Eskenazi vs IUH.
It's a good idea to get genetic testing to find out whether you will respond to a certain medication.
Do you plan to share your PGx results?

- MUA/P: Yes 80%, No 20%
- Not MUA/P: Yes 90%, No 10%
- Unknown: Yes 85%, No 15%
If Yes for you plan to share, who will you share with?
Remote recruitment for genomic medicine studies can successfully enroll patients and collect samples from medically underserved areas and populations.

Direct to patient recruitment can reach patients in underserved areas without needing to engage large numbers of providers.

Tools exist to identify patients in underserved areas and assure that those patients are represented in the studies.

More resources may be needed to recruit patients from safety-net hospitals.

The subjects want their genetic data and want their providers to have access to it.
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