This probability & statistical association

Time: Models for Means

Next

Time: Models for Percentages

Read: FOB ch. 20, 21

Case Study 9 (Hypokalemia) Continued

Population

All possible potassium readings on my blood

Sample

The observed measurements

Imaginary data set

Possible values of $\bar{y}$

$\bar{y} = \begin{bmatrix} 3.7 \\ 3.85 \\ \vdots \end{bmatrix}$

Long run mean $\mu = 3.8$

Long SE of $\bar{y} = \frac{\sigma}{\sqrt{n}} = 0.1$

$\bar{y} = \frac{3.7}{4} = 0.925$

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I have to quadruple the sample size to cut the $SE$ of $(\bar{y})$ in half. (This is the square root of $\text{var}$.)

As $t$, $SE(t)$ increases.

Contrast with $\bar{y}$, as $t$ increases.

$SE(\bar{y}) = \frac{1}{\sqrt{n}}$.

$p(3.5 < \bar{y} < 2.5)$ = $p(\text{misdiagnose with } n = 1) = 6.5%$

$p(\text{misdiagnose with } n = 4) = .015$

$\frac{\bar{y}}{\sqrt{\text{var} \text{of } \bar{y}}} = \frac{\bar{y}}{\text{SE} \text{of } \bar{y}}$

$\text{important formula in statistics}$

Just about $\pm 3.8$
CLT? Does it apply here? Yes, by part 2 of CLT

SD 0.2

SE 0.1

3.5 3.8

Hist of Y with n = 1

Hist of Y with n = 4

<table>
<thead>
<tr>
<th>n</th>
<th>Misdiagnosis Prob</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.5% = \frac{1}{15}</td>
<td>825</td>
</tr>
<tr>
<td>4</td>
<td>0.15% = \frac{1}{62}</td>
<td>8100</td>
</tr>
</tbody>
</table>

Cost-Benefit Analysis: n = 1

Cost = \$100, Benefit = This Prob drops to only 0.15%. Nothing in the math gives a unique "right" answer here. But if diagnosed Hypokalemic when not true,
DOWNSIDE = EAT SOME BANANAS (NOT SO BAD).