Case Study 9 (Hypokalemia) cont'd. (Pg. 88)

Population

- All possible potassium readings on my blood
- Mean $M = 3.6$
- SD $\sigma = 0.2$
- SD 0.2 pop. hist.

Sample

- Thu observed measurements
- Mean $\bar{Y} = ?$
- Possible values of $\bar{Y}$
- $\begin{bmatrix} y_1 \\ \vdots \\ y_n \end{bmatrix}$
- n = 4
- $\bar{y} = ?$
- (Ex. 3.7)
- $\begin{bmatrix} 3.7 \\ 3.85 \\ \vdots \end{bmatrix}$

Q1: $P(\text{misdiagnosis w/ } n=1) = ?$

- $P(\bar{Y} \leq 3.5) = 0.5\%$

Q2: $P(\text{misdiagnosis w/ } n=4) = P(\bar{Y} < 3.5) = ? = 0.15\%$

Long run mean of $\bar{Y}$ (Imaginary data set)

Q: $\text{EV of } \bar{Y} = E(\bar{Y}) = E_{\text{IID}}(Y) = ?$

A: $E_{\text{IID}}(Y) = \mu = \text{Pop. Mean} = 3.8 \leftrightarrow \text{Long run mean for C.S.}$
Long run SE of $\overline{y}$

$SE_{of} \overline{y} = SE(\overline{y}) = SE_{iid}(\overline{y}) = \frac{\sigma}{\sqrt{n}}$

**Note:** By contrast $SE_{iid}(\hat{\theta}) = \sigma \sqrt{V}$ with $\hat{\theta}$, as $n \uparrow$, $SE(\hat{\theta}) \uparrow$

**Note:** for $\overline{y}$, as $\sigma \uparrow$, $SE(\overline{y}) \uparrow$

**Note:** As $n \uparrow$, $SE(\overline{y}) \downarrow$

$A: SE(\overline{y}) = \frac{\sigma}{\sqrt{n}} = \frac{0.2}{\sqrt{4}} = 0.2 \frac{0.2}{2} = 0.1$

Long run Hist. of $\overline{y}$ w/ $n=4$

CLT? does it apply here?

Yes by Part 2 of CLT.
8/5 AMS 5 Monday

N=4, Cost = $100, Benefit = this prob. drops to only 0.15%. Nothing in the math gives a unique "right" answer here. But if diagnosed as hypokalemic when this isn't true.

Downside: Eat some bananas (not so bad)

C.S. #10 (Pg. 92)

Next time!