

2008 UIC Emergency Medicine Residency Research Course
Basic Statistics: Power Calculations
Edward P. Sloan, MD, MPH, FACEP

**Basic Statistics for
EM Research:
Power Calculations**

Edward P. Sloan, MD, MPH, FACEP



2008 UIC Research Course

*UIC EM Residency Program
Chicago, IL
September 25, 2008*

Edward P. Sloan, MD, MPH, FACEP



Edward P. Sloan, MD, MPH FACEP

Professor

*Department of Emergency Medicine
University of Illinois College of Medicine
Chicago, IL*

Edward P. Sloan, MD, MPH, FACEP



**Attending Physician
Emergency Medicine**

University of Illinois Hospital

Chicago, IL

Edward P. Sloan, MD, MPH, FACEP



Disclosures

- FERNE Chairman and President
- ACEP Clinical Policy Committee
- ACEP Scientific Review Committee

- No individual financial disclosures

Edward P. Sloan, MD, MPH, FACEP



Power Calculations Made Easy

Edward P. Sloan, MD, MPH

**Associate Professor
Department of Emergency Medicine
University of Illinois Chicago**

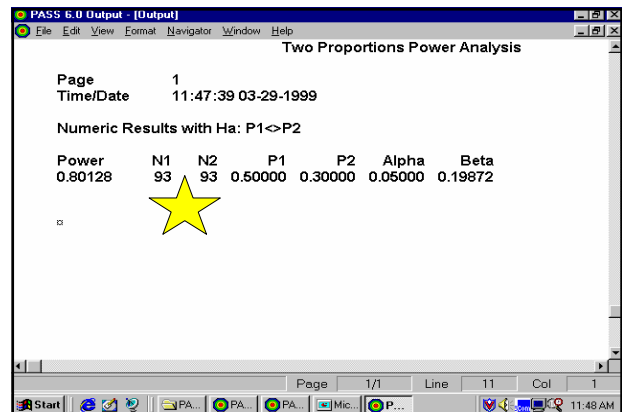
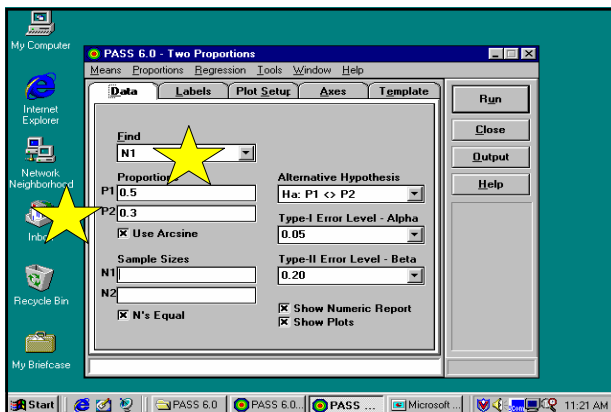
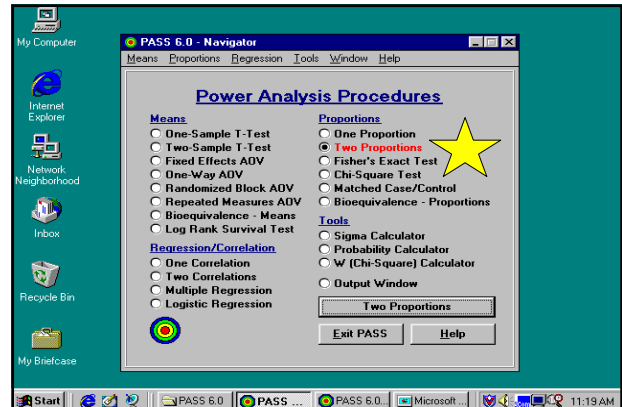
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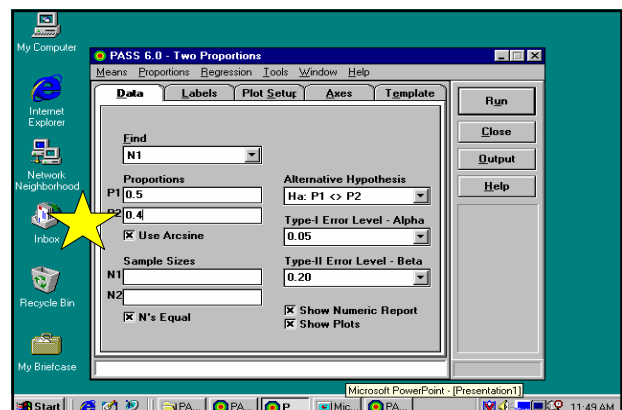
A Question

- Current Rx: 50% admit rate
- New therapy: 30% admit rate?
- How many pts req'd to prove?
- Assume: $p < .05$, power 80%



A Change in Outcome

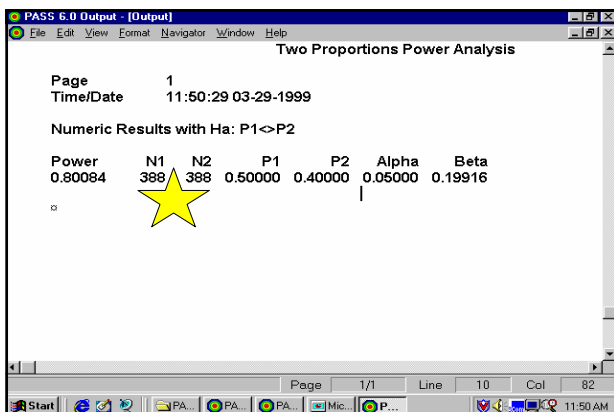
- Current Rx: 50% admit rate
- New therapy: 40% admit rate?
- How many pts req'd to prove?
- Did N change?



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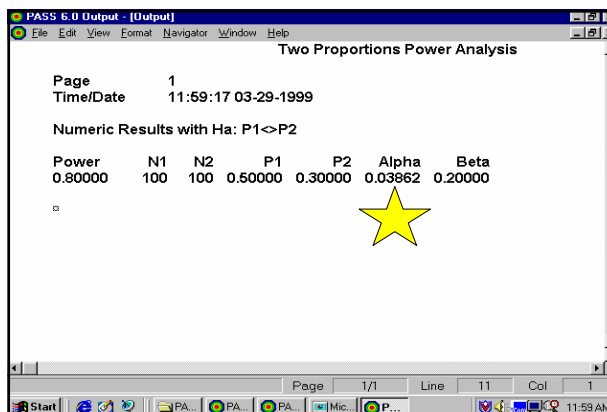
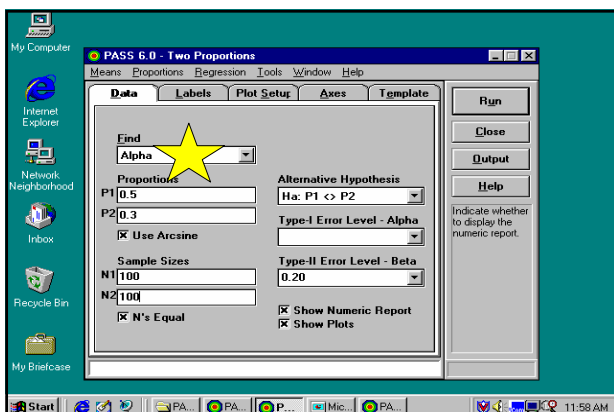
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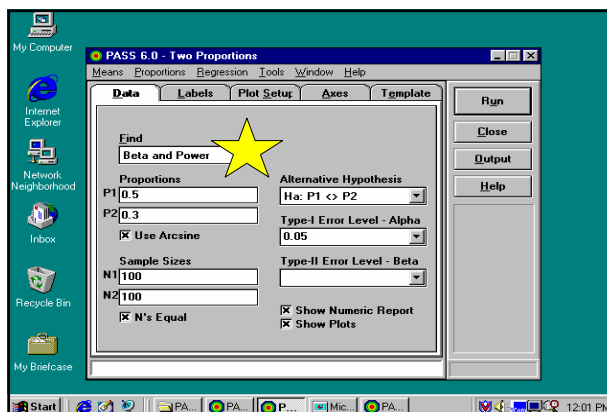
A Fixed Sample Size

- Current Rx: 50% admit rate
- New therapy: 30% admit rate?
- Can only include 200 patients
- What kind of p value to expect?



What is the Power?

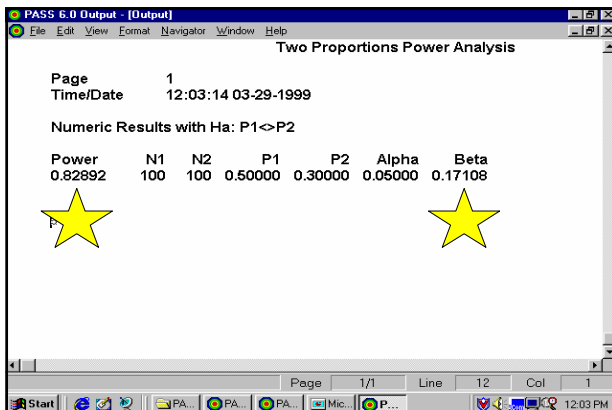
- Current Rx: 50% admit rate
- New therapy: 30% admit rate?
- Can only include 200 patients
- What is the power?



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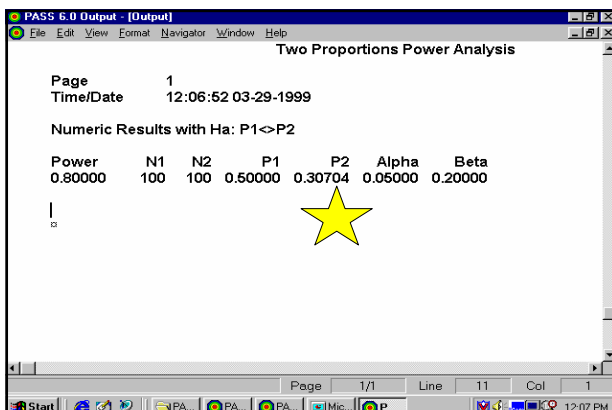
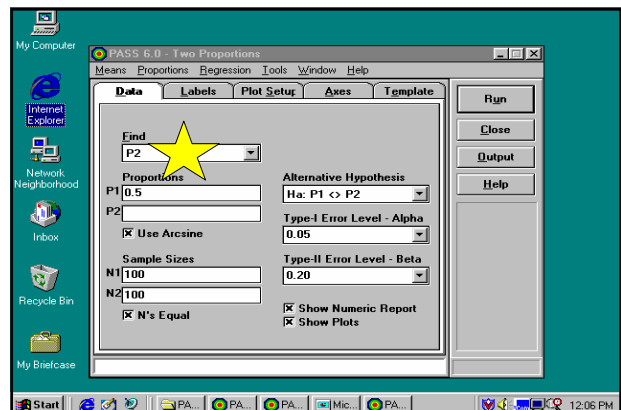


What Does an 83% Power Mean?

- There is an 83% chance that a difference of 20% (between groups) will be detected with this sample size.
- A difference of less than 20% could occur, and we won't know it!

What New Rx Proportion?

- Current Rx: 50% admit rate
- Can only include 200 patients
- New therapy: what admit rate?



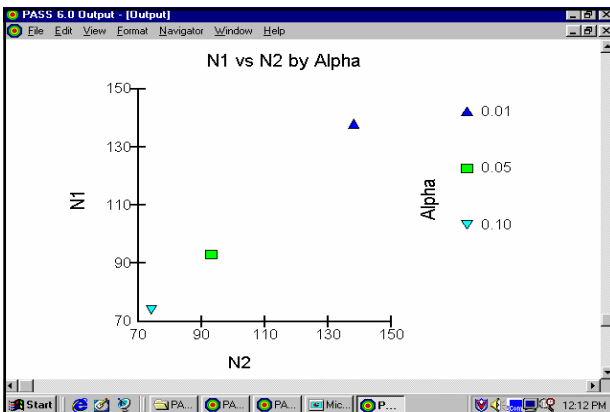
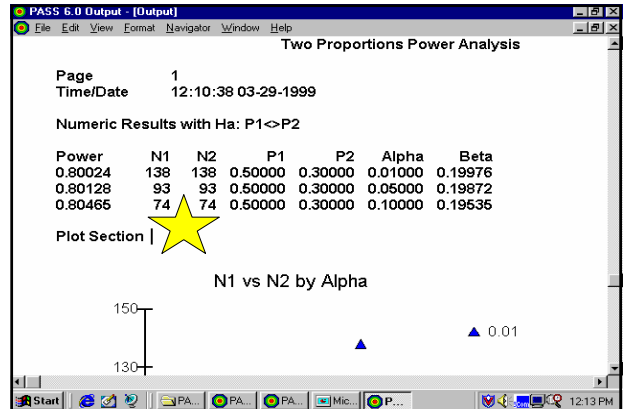
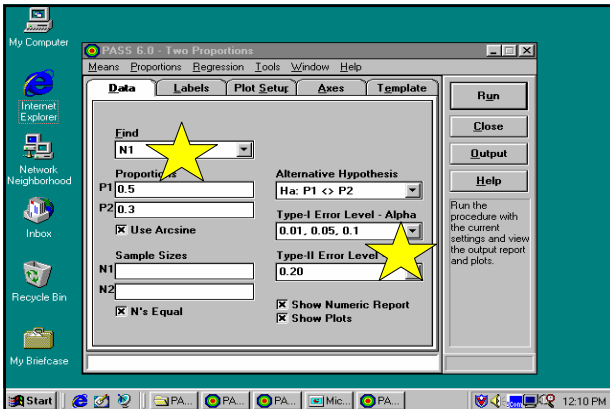
Multiple Levels of Confidence

- Current Rx: 50% admit rate
- New therapy: 30% admit rate
- How much confidence that the result is "real"?

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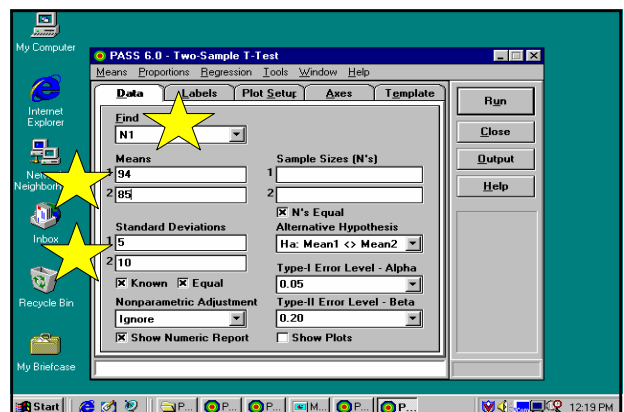
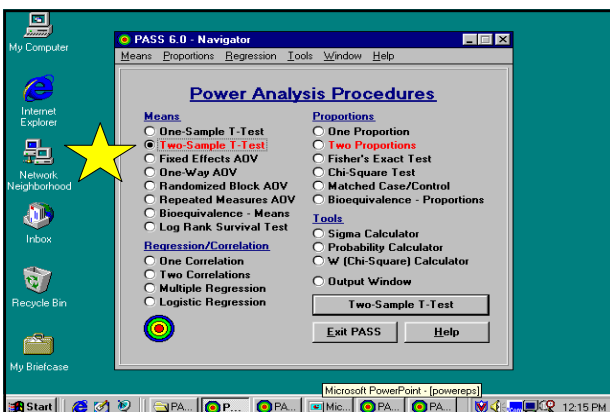
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A Question

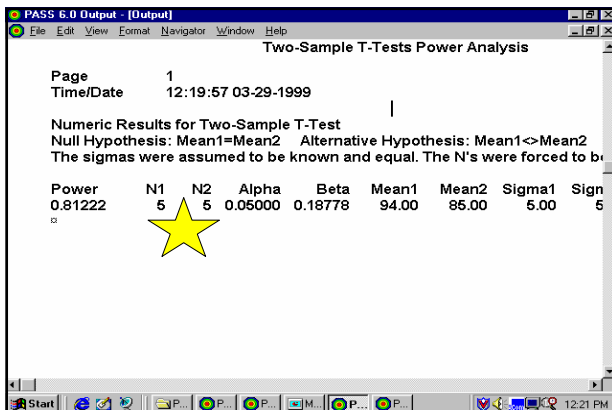
- URI: $pO_2 = 94 \pm 5$
- PE : $pO_2 = 85 \pm 10$
- How many pts req'd to prove?
- Assume: $p < .05$, power 80%



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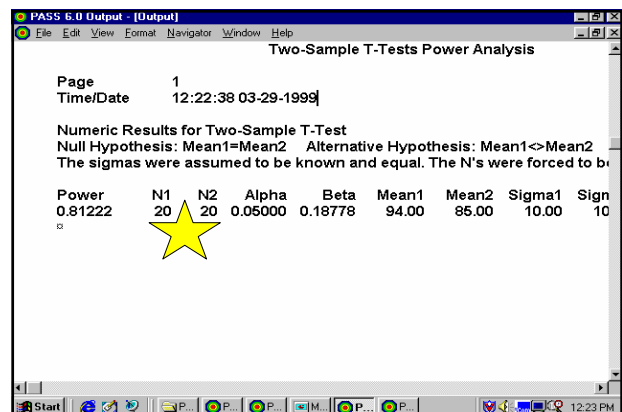
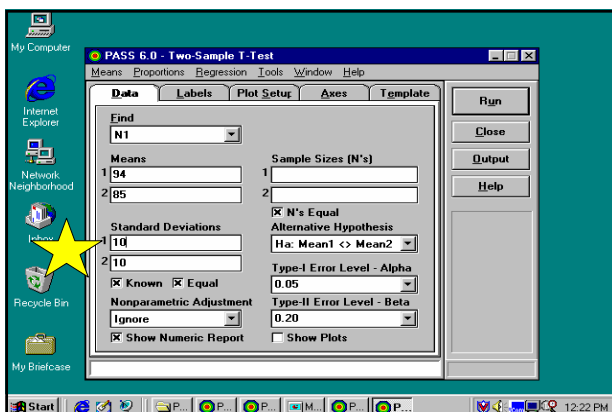
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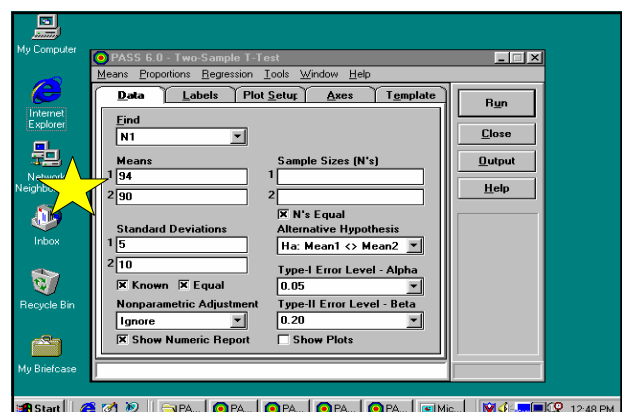
A Bigger Standard Deviation

- URI: $pO_2 = 94 \pm 10$
- PE : $pO_2 = 85 \pm 10$
- How many pts req'd to prove?
- Assume: $p < .05$, power 80%



Closer Mean Values

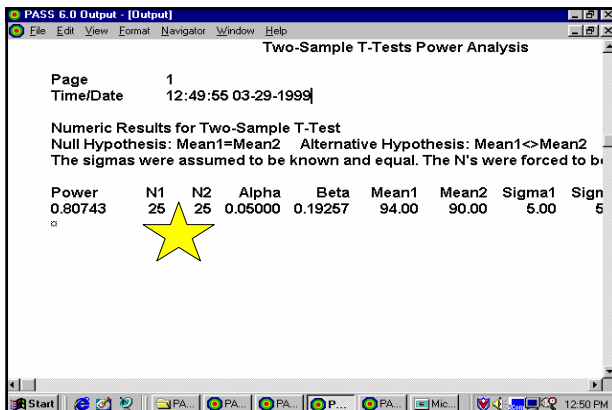
- URI: $pO_2 = 94 \pm 5$
- PE : $pO_2 = 90 \pm 10$
- How many pts req'd to prove?
- Assume: $p < .05$, power 80%



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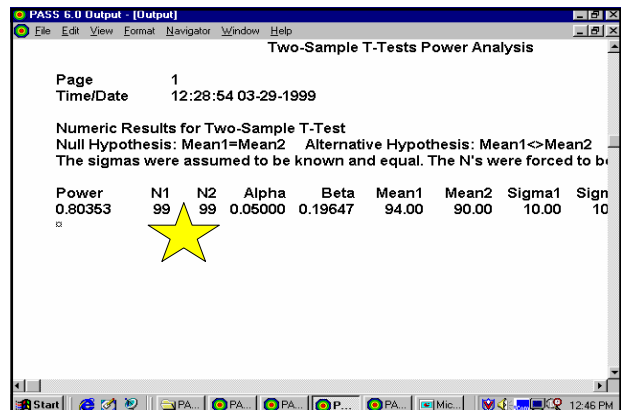
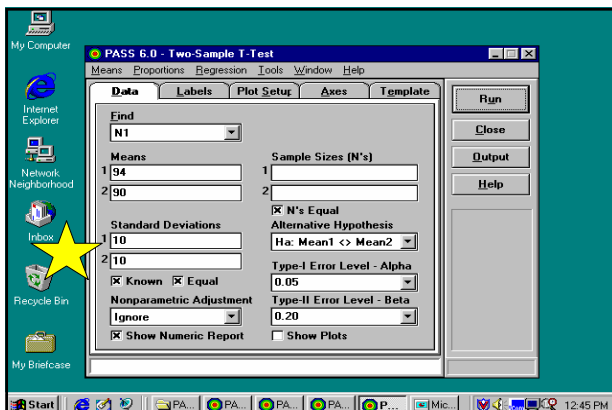
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Closer Means, Bigger SD

- URI: $p_{O_2} = 94 \pm 10$
- PE: $p_{O_2} = 90 \pm 10$
- How many pts req'd to prove?
- Assume: $p < .05$, power 80%



Conclusions

- Know your assumptions up front
- Base them on the med literature
- Know your design constraints
- The power calculations are easy!
- Include the stats in the methods
- Discuss the clinical relevance!!!

Thank you.

www.ferne.org
ferne@ferne.org
edsloan@uic.edu
312 413 7490

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Edward P. Sloan, MD, MPH, FACEP