

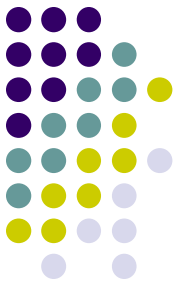
# Writing a Research Grant: The Basics

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Department of Epidemiology  
and Public Health



# All you ever wanted to know about grants...

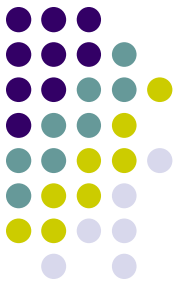


- Why do you want a grant?
- Who will fund your research?
- How do you prepare a grant?
- How are grants reviewed?
- What do you do when you get a grant?



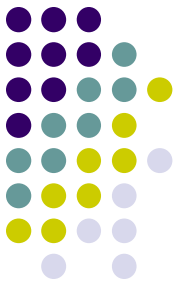
# Why apply for a grant?

- Faculty
  - Coin of the realm
- Fellow
  - Entry into faculty position
- Resident/Student
  - Outstanding credential
- Research Staff
  - Autonomy
- Instant Respect
- \$\$ to do Your Study



# Before you start writing

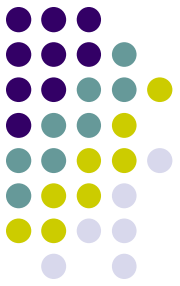
- Define/refine your research question
- Collect preliminary or pilot data
- Identify your support base
  - institutional support
    - protected research time
  - mentors
  - collaborators
  - research team
- Learn the rules for the grant application



# Funding Source Terms

- grant vs. cooperative agreement vs. contract
- investigator initiated
- peer-reviewed
- RFA/RFP
  - request for applications or proposals
- PA
  - program announcements
- LOI
  - letter of intent

# Federal Funding Mechanisms



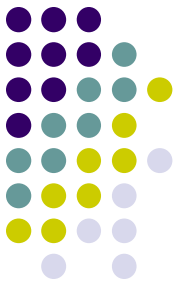
## Research

- RO3: small grants program
- R21: exploratory/development grants
- RO1: investigator initiated research
- PO1: program project grants

## Training

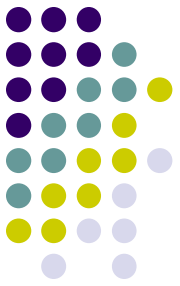
- T/F series: institutional and individual pre- and post-doctoral training grants
- K series: career development grants

# Other Common Funding Sources



- Department of Veterans Affairs
  - Merit review grants
    - Biomedical and Clinical Science Research
    - Health Services Research
    - Rehabilitation Research
    - Cooperative Studies Program
- Other federal agencies
  - CDC, AHRQ, FDA, DoD...
- Foundations

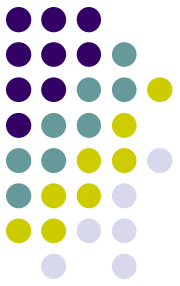
# Access Points for Grant Information



- Talk to your colleagues
- Sign up for e-mail alerts

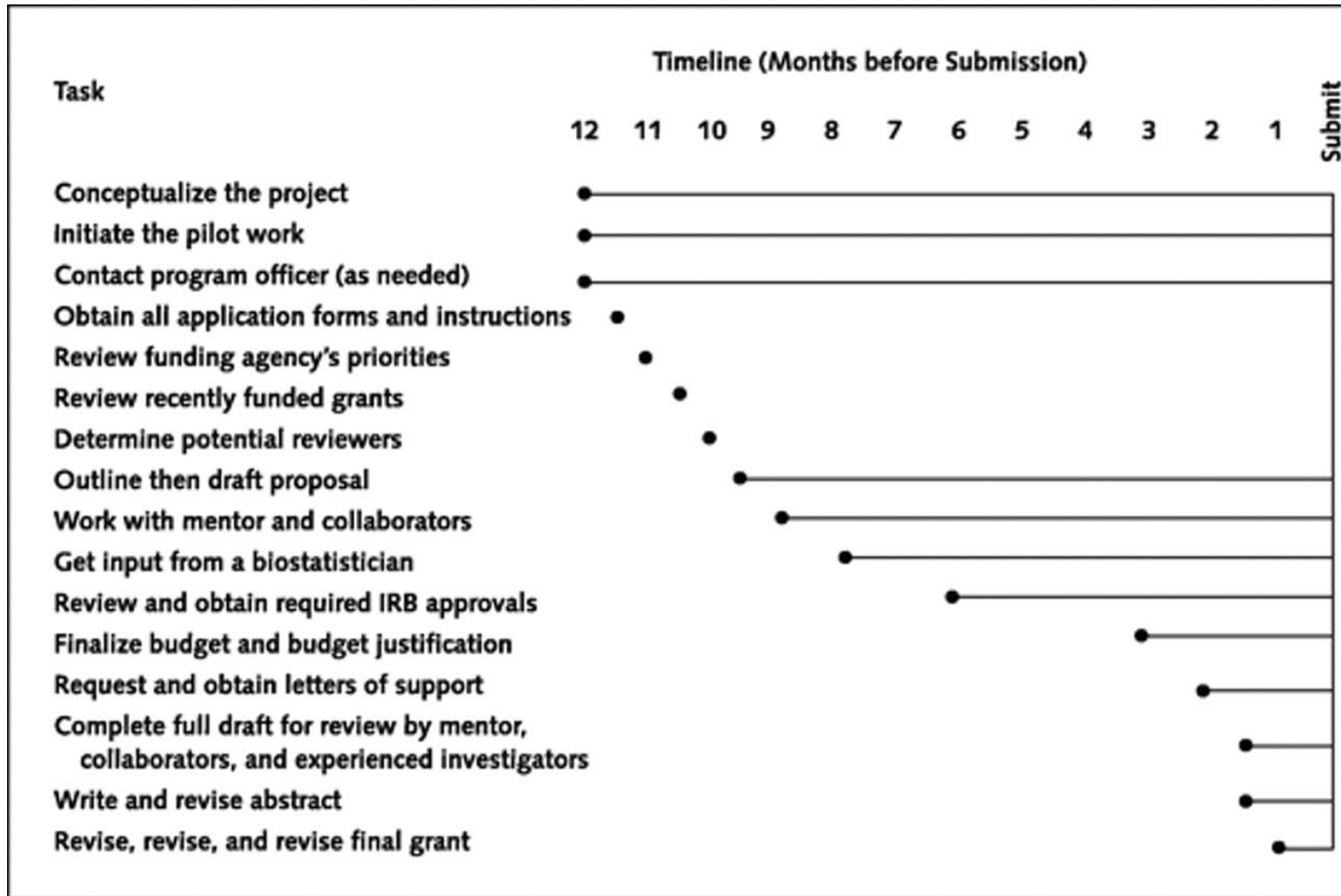
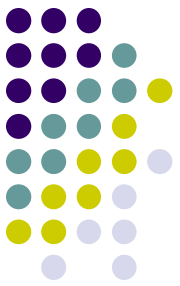


# Preparing the Grant

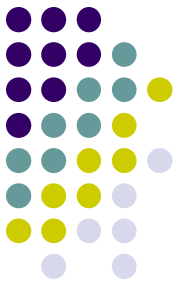


- Fundamental Principle
  - The more time you plan in advance of writing,
  - the less time you will waste on crafting language for the wastebasket and
  - the more clear and focused your final proposal will be;
  - However.....you will never get a grant, you don't submit.

# Grant-writing Timeline



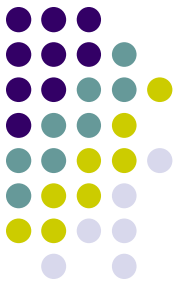
Inouye, S. K. et. al. Ann Intern Med 2005;142:274-282



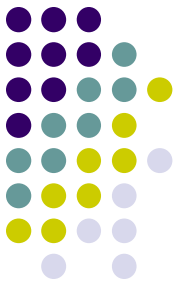
# Don't forget to...

- Read the instructions!!!
  - RFA/PA:
    - Deadlines (this is not your deadline)
      - When it might be funded
    - Funding limits
    - Number of pages
    - Review criteria
- Route the grant!
  - Basic concept: grant/contract is awarded to an institution, not investigator

# (NIH) RO1 Grant Structure



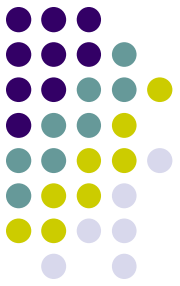
- Title page
  - Title of grant
- Project Summary
  - Narrative
  - Public Health Relevance
- Budget
- Biosketches
- Resources
- Research Plan
  - Introduction
    - Revisions only
  - Specific Aims
  - Research Strategy
    - Significance
    - Innovation
    - Approach
      - Preliminary Data
  - Human Subjects
  - Literature Cited



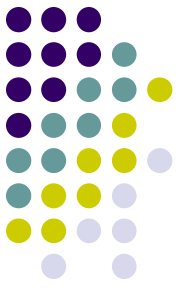
# NIH RO1 Grant Budget

- Total costs = indirect costs + direct costs
- Don't forget:
  - adequate personnel salaries (~80%)
    - statistical assistance
  - supplies
  - other expenses
    - participant compensation
    - study cell phone
    - travel
    - shipping

# NIH RO1 Other Sections

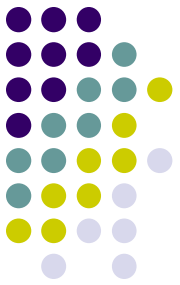


- Biosketches
  - 5 pages
  - Specific format
  - Tailored to grant topic
    - Personal statement
    - Contributions to Science
  - Up-to-date
- Resources/Equipment
  - Facilities
  - Tailored to grant topic
  - Up-to-date



# (NIH) Review Criteria

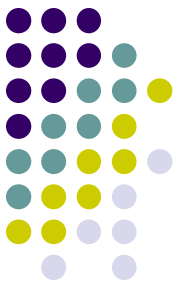
- Significance: importance of problem, new knowledge to be gained, impact on field
- Approach: conceptual framework, design, methods, analytic plan, alternatives
- Innovation: novel concepts, approaches, methods
- Investigator: training, experience, productivity
- Environment: supportive scientific environment, institutional support
  
- Low scores are good; unscored is bad



# Research Plan

- Specific Aims (1 page)
- Research Strategy (12 pages)
  - Significance
    - 1-1.5 pages
  - Innovation
    - 0.5-1 pages
  - Approach
    - Preliminary data

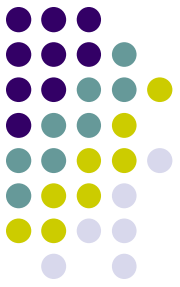




# Specific Aims Section

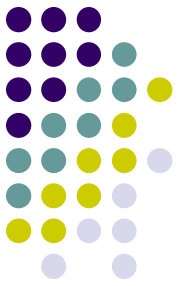
- State the problem and the gap in knowledge which answering your question will fill
- Explain the background from which your scientific hypotheses emerged
  - Previous/preliminary work
- Lists proposed studies (aims) with statistical hypotheses
  - Identify study design and population
  - Predicted outcomes
- Relate specific aims to long term goals of your research program and how it will advance your research area

# Writing the Significance Section



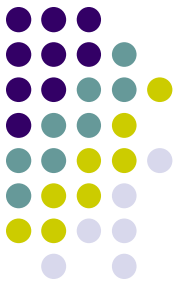
- Begin: Identify research problem you propose to address
  - Critical analysis of salient, most important, relevant primary literature
  - Identify “gaps” in knowledge/need for more research
  - How will your research address this need?
- Explain importance of resolving problem – clear sentence, *italicize*
  - Link to mission of NIH institute, include public health aspects
- If you carry out your research, what will be impact on field (on other research, theories/constructs driving field, etc)

# Significance is in the Eye of the Beholder



- Reviewer specific
  - Target a [specific study section](#)
    - Find the roster
      - M.D. vs. Ph.D.
      - Clinical vs. Laboratory Research
      - Quantitative vs. Qualitative Research
    - What has the Study Section funded before?
      - Matchmaker in NIH Reporter, Assisted Referral Tool
- Institute specific
  - [What's its mission?](#)
  - Talk to the Program Officer

# Innovation starts with a novel question



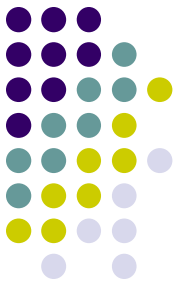
- Provide new findings!
- Confirm or refute previous findings
  - Refute a commonly held belief
  - Confirm a **controversial** finding
- Extend previous findings
  - New populations
  - Insight into the mechanism

# Be Innovative in Multiple Ways



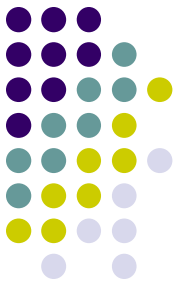
- Does your research approach the question from fresh perspective?
- Does your research approach bring together novel expertise?
- Does your research approach use a novel combination of technologies?

# Writing the Innovation Section



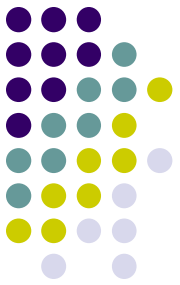
- Brief recap of what is known and not known
- Highlight the ways that your project is innovative
  - Novel concept
  - Novel approach
  - Novel methodology
    - Tools, expertise
- Translate innovation into impact

# Significance vs. Innovation



- impact on the field
- important, public-health problem
- a fundamentally new way of conceptualizing or carrying out the research

Significance is more important than Innovation



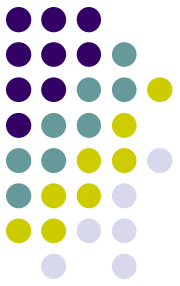
# Research Plan

- Specific Aims
- Research Strategy
  - Significance
    - 1-1.5 pages
  - Innovation
    - 0.5-1 pages
  - **Approach**
    - **Preliminary data**

13 pages

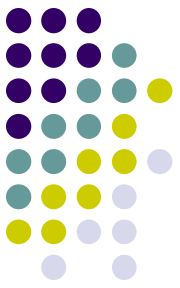


# Approach Review Criteria



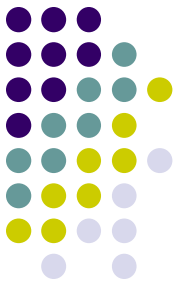
- Are the conceptual or clinical framework, design, methods, and analyses adequately developed, well integrated, well reasoned, and appropriate to the aims of the project?
- Does the applicant acknowledge potential problem areas and consider alternative tactics?

# Outline of Design and then Methods



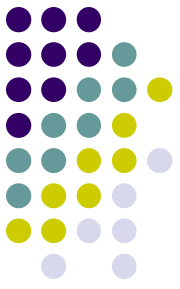
- Protocol/experiments
    - Conceptual framework
  - Rationale
    - Advantages of methodology chosen
    - Novel concepts, approaches, tools, or technologies
  - Data collection, analysis, interpretation
  - Anticipated Outcomes
  - Potential Problems, Alternative Approaches
- Details of all procedures/methods
  - Describe and reference all new procedures
  - Describe and reference all procedures reviewers may not know
  - Reference standard procedure
- Consider combining Design and Methods so that it reads in the order in which the study will be done.**

# Potential Problems, Alternative Approaches



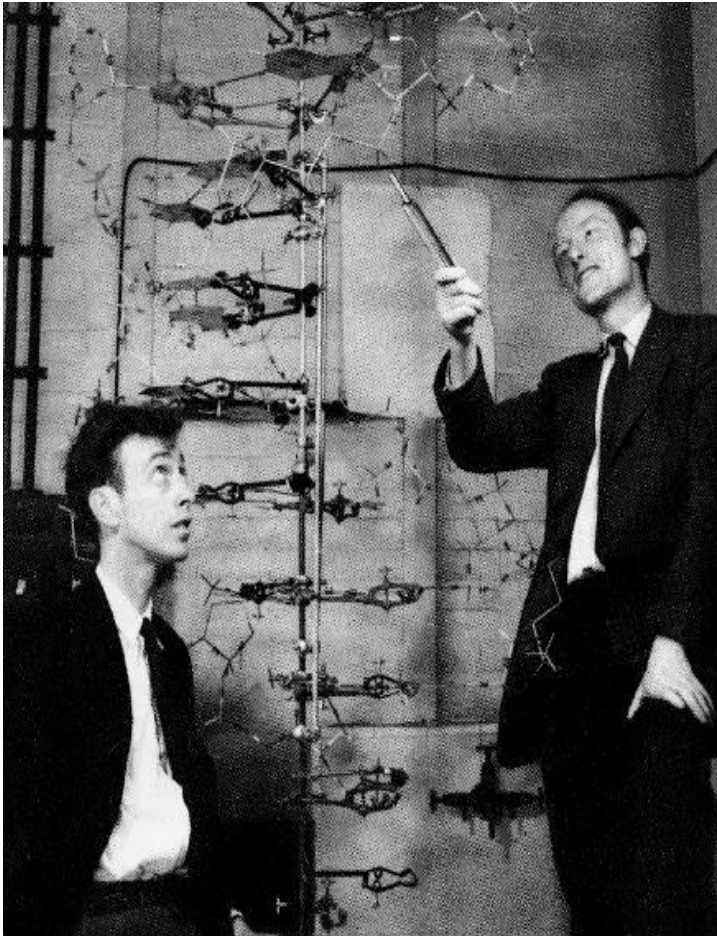
- What could go wrong?
  - Enrollment
  - Study measurements
  - Confounding
  - Generalizability
- Have a plan to deal with it
  - Do not raise unsolvable problems
- Do not cut from this section!

# Preliminary Data as the “Hook”



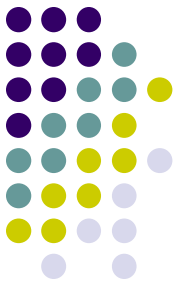
- One piece of preliminary data that sets the direction of the grant
  - Compelling
  - Believable
- Part of your long term research goals
  - Ideally this grant should be the next logical step from your last grant
  - Preliminary data should be from your K grant

# Research Problem Should Lead to Future Studies

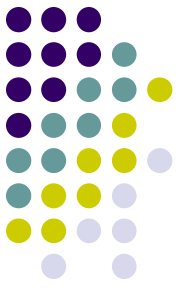


- Will project be complete at end of study or lead to related studies? (Continuity – especially important for early stage investigator)
- Will research findings be important one year after study is complete? Ten years after?

# Other Purposes of Preliminary Data



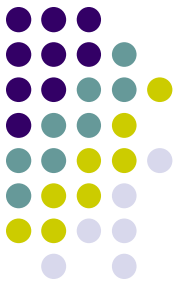
- The proposed studies are feasible in the hands of the PI
  - Should always be supportive
- Expertise in all the procedures in which there is direct responsibility
  - Write after the methods is done
- Proposed collaborations actually function to produce usable data
  - Not just a letter of support



# Human Subjects

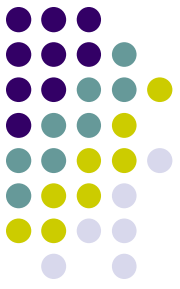
- Protection of Human Subjects
  - If exempt, explain why exempt
  - If non-exempt, go to next slide
- Inclusion of Women and Minorities
  - Targeted Enrollment Form
- Inclusion of Children
  
- *Contributes to score; can administratively hold up application*

# Grantsmanship



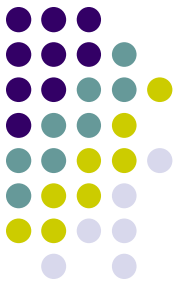
- Get internal reviews from your peers/mentors
  - if possible, get comments from someone with study section experience
  - timing
- FOCUS on your question
- Don't push the due date
  - as with fine wine, grants improve with age
  - but... you will never get a grant you don't submit
- Make the grant easy to follow





# Organize your work

- Use subheadings
  - general to specific
  - serve as a guide to the reviewer
- Figures and Tables
  - present conceptual models of your research question
  - preliminary data
  - approach
  - time line



# Examples - Subheadings

## 6. Research Strategy

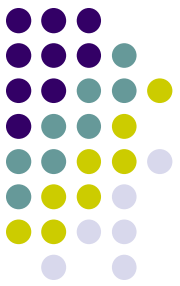
### b. Significance

*Types of Costs and Different Perspectives in  
Costs of Healthcare*

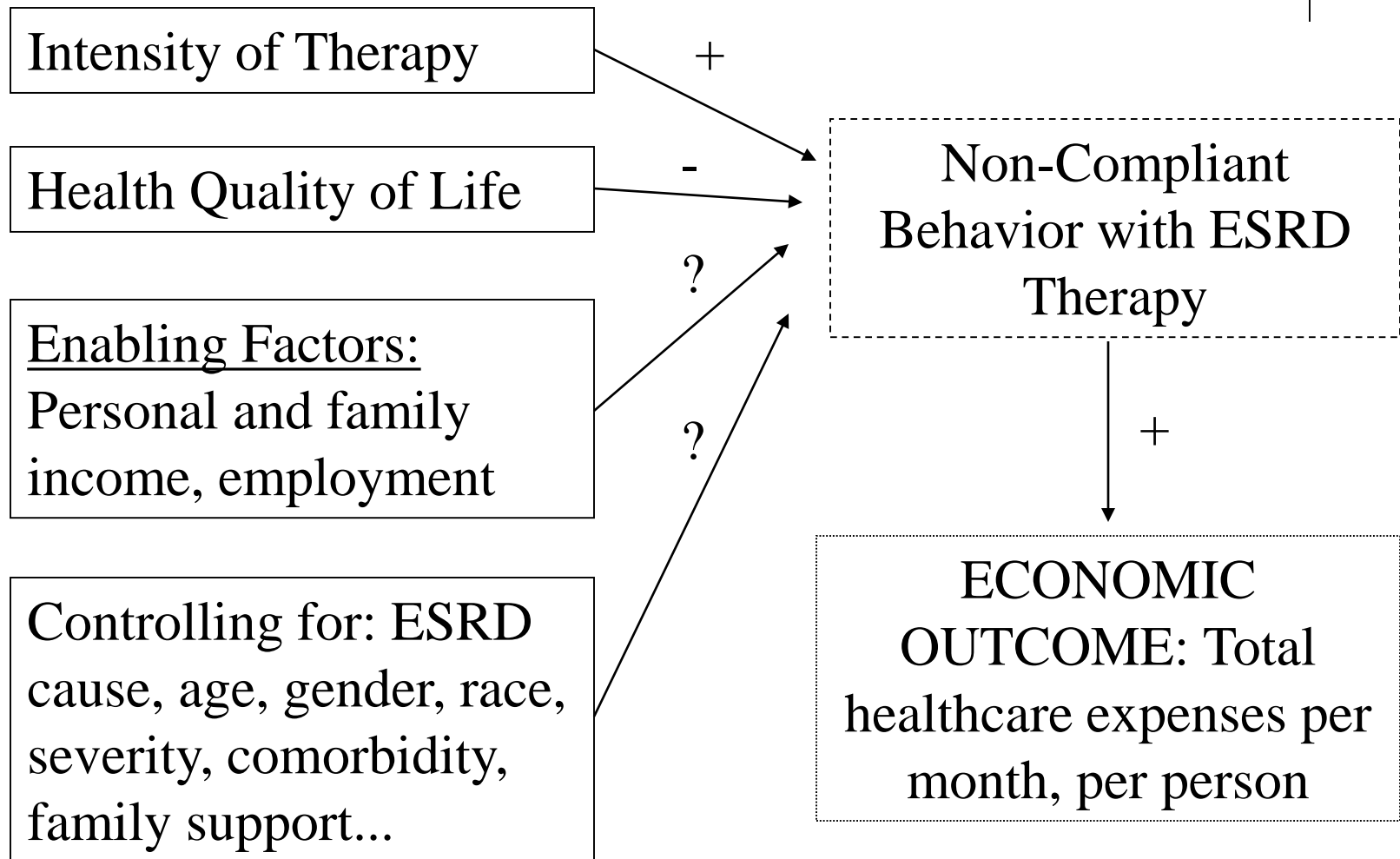
*Methods for Estimating Costs of Nosocomial  
Infections [McGowan, 1981 #23]*

*Prior Cost Estimates of Surgical Site infections  
(Summary Table in Appendix)*

*A New Method for Estimating Costs of Healthcare-  
Activity Based Costing*

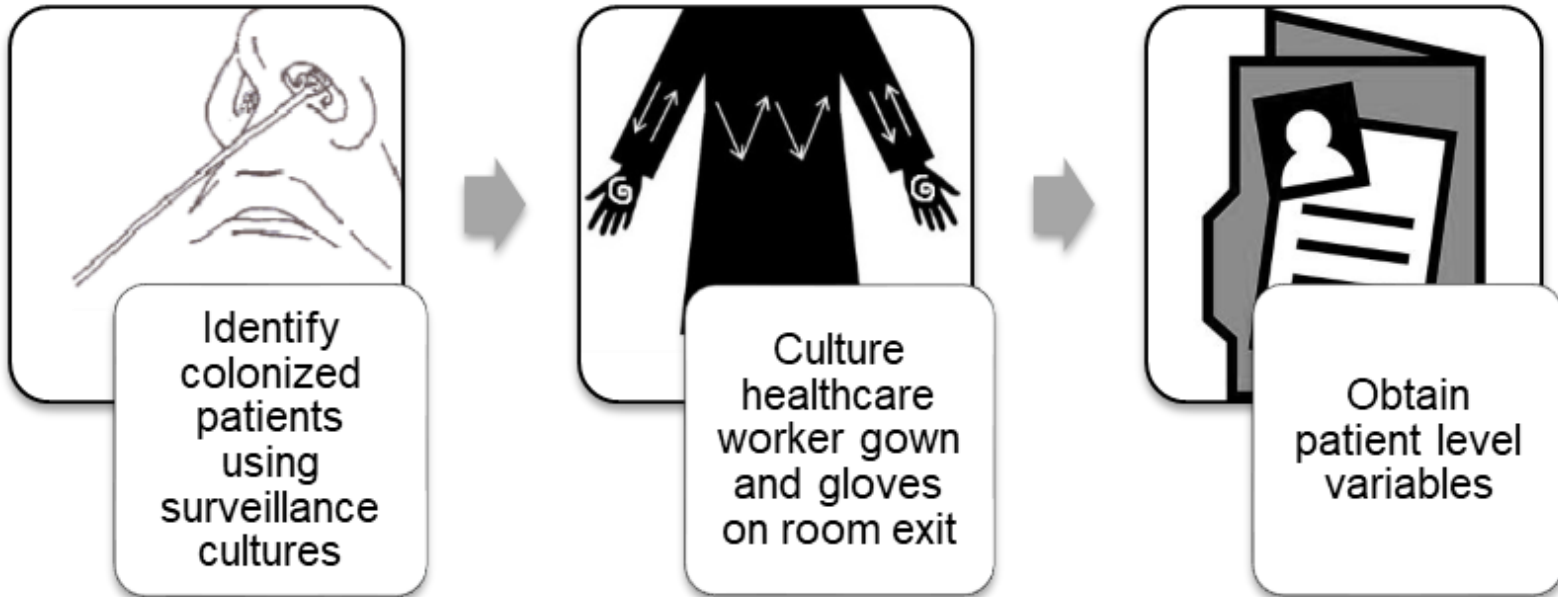
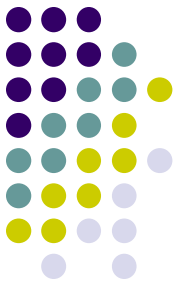


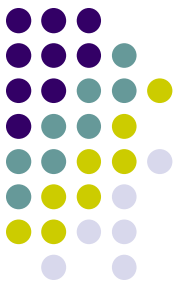
## Example – Figure- “shows the theory”



From D. Bradham

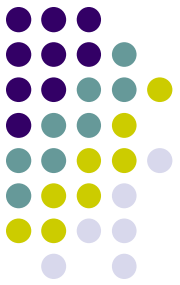
# Aim 1 Approach





# NIH Grant Evaluation

- Submission (new grants): ~October 1, February 1, June 1
- Sent to NIH Center for Scientific Review
  - assigned to an Institute and Initial Review Group (IRG)
  - Track your grant in eCommons
- Reviewed by IRG
  - primary and secondary reviewer, and discussant



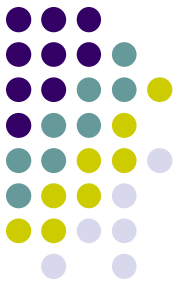
# NIH Grant Outcome

- Institute Council
- **FUNDED!**

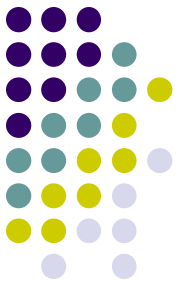
*or*

- not funded
  - “pink sheets”
  - resubmit

# Post-Award Grant Management



- IRB approvals obtained
  - IRB and Grant Titles must match
- Account number assigned
- GET THE WORK DONE!
- Annual non-competitive renewals
- Get ready for resubmission!



*There is no  
substitute for a  
great  
question.*