How To Build Effective Research Programs (and Networks)

Edward A. Panacek, MD, MPH

UC Davis Medical Center

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This subject really has two separate topics:

1. Building effective research programs
2. Performing research effectively in networks

And… building effective research programs has two important, and separate elements:

1. **Becoming an effective researcher**
2. **Growing a research program**

In 20 years: Research lessons learned

1. The impact of one person's research can be profound
2. Good research follows basic principles
3. Research education is life long
4. Asking important questions is paramount
   - Research design can be simple

- Research mentors are important
- Build upon strengths
- Like anything in life, teamwork is paramount

The elements of a successful research career

- Techniques
- Tools
- Target
- Time
- Tricks & Treats
- Teamwork

Research success: Techniques

- Success in any endeavor requires proper preparation
  - Content knowledge
  - Experience/application

In clinical research, that means:

- Research education
- Hands-on research exposure

Research success: Techniques
My perspective

- **Fellowship experiences:**
  - Had some lab research exposure
  - No formal research education
  - Much clinical trials exposure
- **Lessons learned:**
  - Earlier formal research education would have been very helpful
  - RCTs exposure and mentor very helpful

Research success: Techniques
The value of formal research education

What an MPH really taught me:

1. How to ask the right research questions
2. How to design studies that could answer those questions
   - Particularly how to design an RCT
3. How to control for sources of bias in research studies

Good research follows basic principles of study design

- **Your study is your study**
  - Your data is your data
- **Proper study design is key**
  - Minimize the effects of bias
  - Garbage in = garbage out
- **Statistics is only a tool that you use to better understand your data**
  - Statistics cannot fix garbage
  - Statistics cannot harm quality data

In research, asking important questions is paramount

"It is time to stop squabbling over the best design methods"

Sackett D, et al. BMJ.1997

- **Study discussions have focused excessively on the design methods, rather than on asking the right questions**
- **In reality, the question asked often drives the design to be used**
- **Many different study design tools can give us good answers to important questions**

Research education is life long

- Does your clinical medical education stop at a certain point?
- Your research education should not stop either!

My lesson learned:

- I should have obtained formal research education earlier in my career

The elements of a successful research career

- Techniques
- **Tools**
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- Tricks & Treats
- Teamwork

Research success: Tools

- In most activities in life, content knowledge is not enough
  - You also need to know how to use various tools
- This is particularly true in bench research
  - Culture, assay, biochemical, cellular techniques
- It can be true in clinical research
  - Medical equipment, survey tools
- At a minimum, in 2008, it applies to computer skills

Research success: Tools
My perspective

- **Fellowship experiences:**
  - **Learned some lab research techniques**
    - **Difficulty restarting them at new location**
- **Lessons learned:**
  - **Specific bench techniques do not travel well**
  - **I should have learned better computer skills earlier**

The elements of a successful research career

- Techniques
- Tools
- **Target**
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Research success: Targets

- In medicine, as in many things, focusing in a specific area results in particular expertise
- That expertise makes it more efficient to:
  - Perform research studies
  - Get involved in large projects
  - Write up research studies
  - Apply for research funding
- The NIH study grant review process reflects this fact

Research success: Targets
My perspective

- **Personal experiences:**
  - **Started out focused and advanced rapidly**
  - **Later, accepted many opportunities in other areas and got too diffuse**
- **Lessons learned:**
  - **In the short run, specializing can seem limiting and less productive; in the long run, it is usually much more productive**
  - **I should have stayed more focused during my mid-career**

The elements of a successful research career

- Techniques
- Tools
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- **Time**
- Tricks & Treats
- Teamwork

Research success: Time

- Success in any endeavor requires adequate resources
- An often overlooked, but critically important resource is time
- Your time for research
- Your collaborator's time for research
- Truth #1: The most successful researchers are often simply the hardest working
- Truth #2: Even the energetic eventually burn out
- Truth #3: It is very difficult to sustain research success without adequate time

Research success: Time
My perspective

- **Personal experiences:**
  - As a junior faculty member, I routinely put in 60 to 80 hour work weeks to get all my tasks done
  - I did not focus on or jealously guard research time
- **Lessons learned:**
  - Early, when building a research career, you must carve out and protect enough time

The elements of a successful research career

- Techniques
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Research success: Tricks/treats

- One rarely receives protected time and other research resources automatically
  - But to maintain a successful research career, you need both, consistently
- Where do they come from?
  - Earn them via grants (tricks), or
  - negotiate for them (treats)

Research success: Tricks/treats
My perspective

- **Personal experiences:**
  - Never negotiated much for protected time
  - Used industry sponsored clinical trials
    $ for protected time
    - Worked well for a decade, but then the field faded
- **Lessons learned:**
  - Didn't adequately understand the importance of negotiation
  - Should have diversified my funding portfolio

The elements of a successful research career

- Techniques
- Tools
- Target
- Time
- Tricks & Treats
- **Teamwork**

Research success: Teamwork

Teams in research have multiple elements:

- Personal teams
  - Mentors
  - Family
- Research program teams
- Research collaborations
  - Intra-institutional
  - Clinical networks
  - Research networks

Research success: Teamwork

It is very difficult to achieve greatness entirely on your own

- Coaching (mentors) is important
- Support systems are important
- A research program team is necessary
- Collaborations are needed
- Networks have become paramount
  - Within specialty, within focused field
  - Within healthcare delivery systems

Research success: Teamwork
My perspective

- **Personal experiences:**
  - During fellowship benefited from a mentor and an established lab research team
  - As junior faculty joined a great clinical research team
  - In mid-career, moved; no team, tried to carry it myself
- **Lessons learned:**
  - Mentors are very important early on
  - Focus more on collaborations and teams

The elements of a successful research career

- Techniques
- Tools
- Target
- Time
- Tricks & Treats
- **Teamwork**
  - **Mentors**
  - Collaborators
  - Research teams
  - Networks

"If I have seen further than others, it is because I have stood on the shoulders of giants"

Sir Isaac Newton (1642 - 1727)

Mentors are important

Mentoring in academic medicine: A systematic review

Sambunjak D. JAMA. 2006;296(9):1103-1115

Single strongest predictor of research success for Internal Medicine faculty:

- **Early in their career: The amount of time spent working with a highly successful, consistently funded, researcher-mentor**
  - **Especially more than 2 years in a lab of PhD researcher**

The elements of a successful research career

- Techniques
- Tools
- Target
- Time
- Tricks & Treats

- **Teamwork**
  - Mentors
  - **Research teams**
  - Collaborators
  - Networks

Research success: Teams

- It is difficult to achieve major success alone
- It usually is the result of coordinated team effort
- A group can be lesser or greater than the sum of its individual parts
- Efficient, complementary, collaborative teams usually amplify the efforts of any one investigator

Research success: Teams
My perspective

- **Junior faculty:**
  - Worked within a high functioning team
  - Research productivity accelerated

- **Mid-level faculty:**
  - Moved; no team or critical mass existed
  - Developed, paid for, supported my own group
  - Functioned more like a “lone wolf”
  - Research productivity decelerated

Research team in my department

- Critical mass of research faculty
  - 12 total, 5 have MPH degrees
- Department “Research Manager”
  - Is an RN, MPH
  - Has oversight of research staff
  - Assists identifying, organizing, managing grants
  - Reviews, polishes IRB submissions
- 3 full-time Research Coordinators
- 40 part-time, unpaid Research Assistants

Our department team structure

- **Collaboration by faculty encouraged**
  - 4 sub-focus research groups
  - Monthly research-in-progress meetings
- **Shared department research resources**
  - The RM, RCs and RAs work on all active projects
  - More expertise brought to each project
  - Much more efficient
  - Less demand on each researcher
  - Allows researchers to start small and try to build

The elements of a successful research career

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- **Teamwork**
  - Mentors
  - Research teams
  - **Collaborators**
  - **Networks**

Research success: Collaboration

Historical patterns:

- Vertical "silo" approach to research
  - Encouraged by NIH grant structure
- Little collaboration
  - None outside of individual labs or offices
- Recognized as inefficient, conflictual

Current patterns:

- Collaboration encouraged, often required
- NIH supports Centers, Programs, Networks
  - Many grants targeted only to networks

Research success: Collaboration
My perspective

- **Junior faculty:**
  - **Collaborated with PharmD Research program**
  - **Hostility from faculty outside my office**
    - **Some may have been institution specific**
- **Mid-level faculty:**
  - **Moved; much more collaborative environment**
  - **No formal collaborative systems in place**
- **Currently:**
  - **Collaboration highly prized in department, in School of Medicine, in regional, national grants**

Multiple reasons for the increased importance of collaboration

- Larger study sizes
  - Greater “power” of the studies
  - Less chance of making a type II error
- Studies get done faster, more efficiently
- Broader, more diverse study population
  - More representative samples
  - Greater “external validity” of the results

Different types of research collaborations have their own unique challenges

- **Within a department**
  - Requires a critical mass of researchers in the area
- **Within an institution**
  - Requires communication, coordination of efforts
    - Have to break down some traditional barriers
- **Within a subspecialty area**
  - Requires contacts, coordination, structure
    - Have to handle distance communications, coordination
- **Within a clinical network**
  - Requires change in orientation in clinical settings

Examples of different types of research collaborative networks

- Intra-departmental
  - UCDMC-EM Meth-tox research group
- Inter-departmental
  - UCDMC Low-risk CP study group
- Subspecialty specific group
  - PECARN (EMSCC federally funded)
- Disease specific group
  - ARDSNet (NIH funded multi-center group)
- Clinical network specific group
  - Kaiser foundation Hospitals-Northern Calif.

Summary: Building successful research programs

- Starts with being a successful researcher
  - Techniques
  - Tools
  - Target
  - Time
  - Tricks & Treats

Summary: Building successful research programs

- To be highly successful requires an effective team
- That team may have many different structures
- All the structures involve collaborations and networking outside of your immediate group

The end !

Best of luck with your research careers!