A Resident's Perspective on Investigative Medicine

Nathaniel S. Rial

University of Arizona, Department of Internal Medicine, Campbell Ave, Tucson.

Email: nsrial@email.arizona.edu

Introduction

In 1964, Congress was lobbied for the creation and funding of the Medical Scientist Research Program (MSRP) (Rosenberg 2008). The intention was to increase the numbers of physician-scientists with greater involvement in clinical research. Since that time, there has been an expansion in MRSPs with both federal and non-federal financial support. There are more than 40 programs funded by the federal government with nearly twice that number self-funded through a variety of sources (Rosenberg 2008). Among other characteristics, physician-scientists “have a greater planned career involvement in research” (Andriole et al. 2008). Yet, despite the investment in both time and money, the current problem is a paucity of physician-scientists. In reality fewer medical graduates have planned careers in research (Rosenberg 1999). The importance of primary care in underserved areas cannot be understated. Yet equally as important is the necessity for basic medical and clinical research to advance knowledge for tomorrow’s solutions. Clearly, a single approach to the solution is unlikely to produce a successful result. Instead, a multifaceted approach is needed to help fill the void of investigative medicine. The paucity of physician-scientists may be augmented by both formal degree-granting pathways as well as no degree-granting pathways that are underscored by active mentorship.

Methodology

A systematic review of the literature was done. The PubMed database was utilized with key words including; physician scientist training, MD/PhD programs and career choice in academic medicine. The articles’ abstracts were reviewed and manuscripts were downloaded based on the applicability to the current research question, “How to encourage careers in academic medicine?” The articles were read, then compared and contrasted to the University of Arizona Model of Investigative Medicine.

The University of Arizona was chosen as a Model of Investigative Medicine for several reasons. First, it has formal degree-granting programs that foster investigation, namely the MD/MPH and MD/PhD Programs. Second, the UA also has nondegree-granting programs such as the Medical Student Research Program that encourage Medical Students to complete summer research programs and present their findings. Third, there are advocates of a degree-granting program for physicians who spend additional years during residency involved in research. The results of the literature search and the UA MD/PhD Program are discussed below.

Review of Literature

One such solution to the lack of physician-scientists is early guidance and monetary support. This comes in the form of mentoring and financial incentives/loan repayment to help stabilize the paucity of academic physicians (Zemlo et al. 2000). Another solution to increasing physician-scientists is through nondegree-granting pathways. In a previously published review, Vaarki et al, suggests broadening the focus to include medical school-, residency- or fellowship-based research projects that may not lead to a separate degree (Vaarki et al. 2002). It is clear that the rapid rate of research is dividing basic science from clinical practice (Schafer 2010). The stakeholder in this debate is health of the US population through implementation of novel scientific discoveries in medicine. Prior attempts at resolving this issue included enrolling persons with a Doctorate of Philosophy (PhD) into medical school with an accelerated pathway to graduation (Koniaris et al 2010). Clearly, multiple incentives have the greatest opportunity to increase both the quantity and quality of physician-scientists (Ley et al 2005). While most medical schools have equalized male and female matriculates, one problem remains with the physician-scientist pathway-gender inequality
The barriers that women face are even more daunting than their male counterparts, including lack of role models, encouragement and support (Andrews 2002).

University of Arizona Model of Investigative Medicine

The University of Arizona MD/PhD Program falls within the latter of the two previously mentioned groups with funding by the State government as well as grants and scholarships. The Dean of the University of Arizona, College of Medicine, guaranteed funding for the MD/PhD program in 1990. The mission of the program was defined, “to train physician-scientists who will make an impact advancing clinical and investigative medicine” (UA MD/PhD Program 2010). Since its inception, 20 physician-scientists have graduated. Of the 20 graduates, half are still training in residency or fellowship. Of the remaining half in practice, 70% are in academic positions with over 200 publications, awardees of numerous R01, K08, F32, K99/R00 grants and holders of multiple patents. In total 25% of the MD/PhD Program at the University of Arizona, including current and graduates is comprised of women.

The University of Arizona also supports an MD/MPH Program. Graduates of the MD/MPH Program are leaders in a variety of clinical and public health systems, agencies and organizations. To date, 42 medical students have been admitted to the program, 34 of whom have graduated and are working as healthcare leaders (UA MD/MPH Program 2010).

The University of Arizona, College of Medicine also fosters Medical Student Research. The Medical Student Research Program was started in 1981 with nearly 60 000 students have participated in NIH funded research. “The vast majority indicate that the research experience was one of the most enjoyable and productive activities during their medical training and one which often influenced the ultimate choice of career or specialty” (UA Medical Student Research Program 2010).

Potential Solution

While it is clear that there are few physician-scientists, the potential solution is less clear and likely requires a multifaceted approach. Often, universities have focused on a single solution and may be disappointed at the outcomes. Individual solutions alone may be too focused and may require integration with other strategies. There are traditional degree-granting pathways. They are expensive and without certainty-yet an essential component of medical schools. Combined degree programs include formal degree programs such as the MD/PhD and MD/MPH programs. They foster investigative medicine. Another pathway is through a non-degree pathway. Medical Student Research is another component of Investigative Medicine through a non-degree pathway. Others have described, “a new burst of activity in the "late bloomer” pool of MDs (individuals who choose research careers in medical school or in residency training), fueled by loan repayment programs that were created by the NIH in 2002” (Ley et al 2005). These programs are often funded by National Institutes of Health (NIH) monies. So called “Late bloomers” are also supported in Residency and Fellowship. Any such pathway would require active mentorship, and likely increases the chances of success in contributing to careers in academic medicine (Reynolds 2008). Active mentorship has been identified as a modifiable factor that increases decisions to pursue a career choice in academic medicine (Straus et al 2006) both in the US and internationally (Barton 2008).

The proposed intervention strategy combines the previously described degree and non-degree pathways. Specifically, it employs active mentorship of medical student, residents and graduate students to fill the void of investigative medicine. The proposed model of investigative medicine is shown in Fig 1. The intervention would aim to identify both male and female medical students, residents and fellows who appear to be on the academic pathway and interact with them as Junior Faculty. Providing them with career advice, grantsmanship, research and funding opportunities as well as the mundane office space and dedicated computer access may prove to be a low cost and high yield intervention strategy.
Discussion and Conclusion

Physicians are at a unique crossroads to clinically manage a patient while observing first hand progression of the disease. Questions raised at the bedside then taken to the lab bench for further investigation likely have significant clinical outcomes. This process forms the basis of translational medicine. Yet physician-scientist programs are the subject of much debate. Since their inception in the 1960’s, physician-scientist programs have engendered a love-hate relationship. Previous studies have alluded to the enormous cost and uncertainty of outcomes that leave many more questions than answers (Rosenberg 2008, Zemlo et al 2000, Straus et al 2006). This has led many to question the usefulness of such programs.

Why pursue such a costly endeavor? One answer is that in the absence of physician-scientist pathways clinical questions may go unasked and on-target basic science may be lost to clinicians. The increasingly important role of effective translation from basic science to clinical medicine would be lost. In today’s era of fast-paced information we are in our greatest need for effective communication but seem furthest from it, with the decline of physician-scientists. Both women and men are needed to fill the role of essential communicators, capable of integrating basic science to the clinical setting and then applying this to populations. Communication, whether in the physician-patient, or scientist-physician dyad, is increasingly complex. The role of the physician-scientist is ever clearer as an essential communicator between broadening fields.

Future perspectives regarding the physician-scientist training program would likely benefit from a balanced approach. Clearly a unilateral solution is unlikely. A balanced approach to solving the paucity of physician-scientists can help to grow investigative medicine. This can be achieved, whether through formal degree programs, or informally through non-degree programs, as proposed in Fig.1. Investigative medicine sits at the hub of both formal, degree-granting programs as well as non-degree granting programs. If the goal is to increase Investigative Medicine, then multiple programs that strengthen physician-scientists are essential. These trainees would likely benefit from active mentorship and career development. As it is clear that the definition of physician-scientist may be broadened, so too is there an urgent need to increase the number of women who are mentored from an early stage in their education and career.

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Abbreviations

Medical degree and Doctorate of philosophy (MD/PhD),
Masters of Public Health (MPH),
Medical Scientist Research Program (MSRP)

References

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