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# Primary Care Research Funding Sources

Mack T. Ruffin IV, MD, MPH, and Kent J. Sheets, PhD

Ann Arbor, Michigan

**Background.** Numerous studies and anecdotal reports have identified lack of funding as a major obstacle to recruiting young physicians to academic medicine and to developing research in primary care. The focus of this study is the comparison of funding sources reported for published research in the primary care disciplines of family medicine, general internal medicine, pediatrics, and obstetrics and gynecology.

**Methods.** Articles from a representative sample of the journals of each discipline were eligible for review and inclusion in the study if the work was an original research article. The eligible articles were reviewed and classified by specialty and by funding source. The reported funding sources were categorized into federal, private foundation, local, discipline specific, corporate, and none. After all of the articles had been categorized, 40 articles from each discipline that had not reported any funding source were randomly selected. The primary author of each study was then contacted by telephone for a structured interview to verify the absence of reported funding in the published study.

**Results.** Eligible published articles used in this study numbered 319 in family medicine, 208 in general internal medicine, 522 in obstetrics and gynecology, and 888 in pediatrics. There was a statistical difference between the disciplines regarding the source of funding ( $\chi^2 = 223.0, P < .0001$ ). Family medicine research was funded primarily by federal and discipline sources. Obstetrics and gynecology research was funded primarily by federal, private foundation, and corporate sources. General internal medicine research and pediatric research were funded primarily by federal and private foundation sources. The majority of the research articles in all four disciplines did not report any funding source.

**Conclusions.** All four disciplines had diverse sources of funding with many similarities and relatively few differences. An important finding of the study was the amount of unfunded research conducted and published in these primary care disciplines.

**Key words.** Research; research support; literature, medical. *J Fam Pract* 1992; 35:281-287.

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The annual US government research budget increased from just over \$6 billion in 1977 to almost \$21 billion in 1989.<sup>1</sup> Between 1970 and 1989, the size of the average federal research project grant (R01) has grown at an annual rate of 1.3% (discounted for inflation).<sup>2</sup> The majority of funding for medical research at medical centers comes from the National Institutes of Health (NIH), which received 40% of the research budget in 1979 but only 30% in 1989.<sup>3</sup> A dramatic increase has been noted in the number of R01 grants submitted from 1970 to the mid-1980s, but the number during the last 10 years has remained relatively stable.<sup>1</sup> The increases in grants submitted originated primarily from PhD submissions. The success rate is essentially the same for applicants regard-

less of their degree, and it reached an all-time low steady state of 20% to 25%. Given this environment for medical researchers, the numerous articles from all disciplines regarding the difficulty in acquiring research funding are not unexpected.<sup>4-10</sup> Several authors<sup>11-14</sup> believe that this issue hinders the recruitment of talented young physicians to academic medicine.

The literature on research in primary care medicine contains many editorials, opinion papers, research reports, and letters written by authors who have attempted to define the issues confronting researchers.<sup>15-25</sup> In various articles the content of published articles and potential sources of research funds for family medicine have been examined.<sup>26-33</sup> These works can best be summarized as hypothesizing that the lack of a national funding source committed to primary care research significantly hinders the research effort in primary care medicine, especially in family medicine. The same lack of adequate research funding has been raised by other medical disciplines. In 1984, the emergency medicine literature was

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Submitted, revised, March 25, 1992.

From the Department of Family Practice, University of Michigan Medical School, Ann Arbor. Requests for reprints should be addressed to Mack T. Ruffin IV, MD, Department of Family Practice, University of Michigan Medical School, 1018 Fuller, Box 0708, Ann Arbor, MI 48109-0708.

assessed for research funding sources, and the authors concluded that emergency medicine research is not supported by traditional funding sources.<sup>34</sup> Thus, the two youngest disciplines, family medicine and emergency medicine, have apparently not matured to the point where they are able to access the traditional funding sources over which the more established disciplines are already arguing, thereby indicating the inadequacy of available funds.

This study was conducted in response to the complex environment of research funding in family medicine and a study that reviewed the literature on primary care research on adult medical and psychosocial problems in an attempt to determine the major sources of funding for primary care research.<sup>35</sup> The authors' final conclusion was that a national institute for primary care research deserves consideration as a means of improving the quality of primary care research. This conclusion, however, was based on the observation that reported funding sources of published research in primary care medicine were "diverse and ill-defined."<sup>35</sup> Without a comparison to other disciplines that may have well-defined national funding sources, such a conclusion cannot be made. Therefore, the focus of this study is the comparison of funding sources reported for published research in the primary care disciplines of family medicine, general internal medicine, pediatrics, and obstetrics and gynecology. The latter two disciplines were chosen as primary care areas that have national funding sources directly related to their respective fields, such as the National Institute of Child Health and Human Development (NICHD). The *a priori* hypotheses were (1) that no difference would exist among the four disciplines in terms of the diversity of funding sources and (2) that no one funding source would predominate among the four disciplines or for any one of the four.

## Methods

Six journals, *The Journal of Family Practice*, *Family Medicine*, *The Journal of General Internal Medicine*, *Obstetrics and Gynecology*, *Pediatrics*, and *American Journal of Diseases of Children*, were chosen and reviewed for eligible original research publications. These journals were chosen to maximize the yield of limited resources in searching for original research in these four areas and to represent the core of published works for four disciplines. The years reviewed were 1989 to 1991.

Articles were eligible for review and inclusion in the study if the work was an original research publication (not including case reports, letters, reviews, or policy statements). Articles were excluded from the study if (1)

the authors were military-based, (2) the substance of the study was not germane to primary care medicine (eg, surgical techniques, basic science or bench research, animal-based research, treatment of cancers, intensive care procedures such as extracorporeal membrane oxygenation, or management of premature infants), (3) the primary author was based outside of the United States, or (4) the primary author was not affiliated with the discipline of family medicine, general internal medicine, obstetrics and gynecology, or pediatrics. The articles identified were then reviewed and classified by discipline (based on the affiliation of the first author) and by funding source.

The reported funding sources were categorized into federal, private foundation, local, discipline specific, corporate, and none. Federal sources were defined as any federal agency such as the NIH, the Centers for Disease Control, the Food and Drug Administration, or the Environmental Protection Agency. Private foundation sources were defined as any nonprofit organization such as the American Heart Association, the American Cancer Society, Fulbright, Kaiser, or Kellogg. Local sources were defined as groups or organizations restricting their funding to local areas or communities such as university or hospital sources, local government sources, or local civic organizations. Discipline-specific sources were defined as organizations or groups with specific affiliations with the discipline, such as the American Academy of Family Physicians or the American College of Obstetrics and Gynecology. Corporate sources were defined as for-profit organizations, such as drug companies, insurance companies, or companies with an interest in the technology under study. These categories were developed because sources within each category have common characteristics and are generally available to similar groups of researchers. No funding support was defined as absence in the published article of a report of financial support.

After all of the articles had been classified according to source of funding, 40 articles from each discipline that had reported no funding source were randomly selected. The primary author of each study was then contacted by telephone for a structured interview to verify the absence of funding for the study.

## Statistical Analysis

The comparison of funding source by discipline was done using the chi-square test. Subsequent comparisons were made for the individual funding and discipline by chi-square. These comparisons were accepted as statistically significant if the *P* value was equal to or less than .05 divided by the number of comparisons made in order to

Table 1. Funding Sources of Published Original Research in Family Medicine, General Internal Medicine, Obstetrics and Gynecology, and Pediatrics

Reported Funding Source	Family Medicine (n = 319) No. (%)	General Internal Medicine (n = 208) No. (%)	Obstetrics and Gynecology (n = 522) No. (%)	Pediatrics (n = 888) No. (%)
No funding	164 (51.4)	63 (30.3)	305 (58.4)	452 (50.9)
Federal	53 (16.7)	54 (26.0)	115 (22.0)	220 (24.7)
Private foundation	21 (6.5)	53 (25.5)	40 (7.7)	137 (15.4)
Local				
University	19	15	5	21
Hospital	2	4	12	7
Government	1	6	8	18
Total	22 (6.9)	25 (12.0)	25 (4.7)	46 (5.3)
Discipline				
National	20	4	4	7
Local	17	0	0	0
Total	37 (11.6)	4 (1.9)	4 (0.8)	7 (0.8)
Corporate				
Drug	20	8	20	26
Insurance	1	0	0	0
Other	2	1	13	0
Total	22 (6.9)	9 (4.3)	33 (6.4)	26 (2.9)

avoid a type I error (eight comparisons were made, the statistically significant difference set at  $P = .006$ ).

## Results

The number of original published works in each discipline was 391 in family medicine, 234 in general internal medicine, 859 in obstetrics and gynecology, and 1014 in pediatrics. Of those, 72 studies (18.4%) were excluded from the family medicine articles for the following reasons: authors were military-based (7), authors were based outside the United States (36), and authors were not affiliated with one of the four disciplines being reviewed (29). A total of 26 articles (11.1%) were excluded from the general internal medicine articles for the following reasons: authors were military-based (15), authors were based outside the United States (7), and authors were not affiliated with one of the four specified disciplines (3). The number of obstetrics and gynecology articles excluded was 337 (39%) for the following reasons: topic was not germane to primary care (188), authors were based outside of the United States (114), authors were not affiliated with the four specified disciplines (21), and authors were military-based (14). Among the pediatric articles, 126 (12%) were excluded for the following reasons: topic was not germane to primary care (66), authors were based outside the United States (40), authors were not affiliated with one of the

four specified disciplines (12), and authors were military-based (8). Therefore, the number of eligible published articles used in this study were 319 in family medicine, 208 in general internal medicine, 522 in obstetrics and gynecology, and 888 in pediatrics.

The distribution of funding sources for each discipline is presented in Table 1. There is a significant statistical difference between the disciplines regarding the source of funding ( $\chi^2 = 223.0$ ,  $P < .0001$ ). This difference appears to be secondary to the difference between the reporting of no funding, federal funding, local funding, and discipline sources. Therefore, subsequent chi-square comparisons were limited to these areas.

Among the four disciplines, there were no significant differences between family medicine, obstetrics and gynecology, and pediatrics in the percentage of articles with no reported funding ( $\chi^2 = 8.026$ ,  $P = .02$ ). Aggregating these three disciplines together and comparing them with general internal medicine on no reported funding source demonstrates that general internal medicine had significantly fewer articles reporting no funding than the other three disciplines ( $\chi^2 = 39.226$ ,  $P < .0001$ ). There was no significant difference between general internal medicine, obstetrics and gynecology, and pediatrics in funding reported from federal sources ( $\chi^2 = 1.837$ ,  $P = .60$ ). In comparison, family medicine had significantly fewer reports of federal funding than the three other disciplines ( $\chi^2 = 8.49$ ,  $P = .002$ ). There was

Table 2. Federal Funding Sources of Published Original Research in Family Medicine, General Internal Medicine, Obstetrics and Gynecology, and Pediatrics

Funding Source	Family Medicine (n = 53) No. (%)	General Internal Medicine (n = 54) No. (%)	Obstetrics and Gynecology (n = 115) No. (%)	Pediatrics (n = 220) No. (%)
National Institutes of Health (not specific)	7 (13.2)	4 (7.4)	53 (46.1)	26 (11.8)
National Cancer Institute	6 (11.3)	5 (9.3)	3 (2.6)	9 (4.1)
National Heart, Lung and Blood Institute	2 (3.8)	2 (3.7)	1 (0.9)	18 (8.2)
National Institute on Aging	4 (7.5)	7 (13.0)	3 (2.6)	0
National Institute of Allergy and Infectious Diseases	0	2 (3.7)	2 (1.7)	14 (6.4)
National Institute of Child Health and Human Development	4 (7.5)	0	22 (19.1)	56 (25.5)
National Institute of Drug Abuse	0	0	3 (2.6)	13 (5.9)
National Institute of Diabetes and Digestive and Kidney Diseases	1 (1.9)	0	1 (0.9)	9 (4.1)
National Institute of Environmental Health Sciences	0	0	1 (0.9)	5 (2.3)
National Institute of Mental Health	1 (1.9)	7 (13.0)	2 (1.7)	20 (9.1)
National Institute of Neurological and Communicative Disorders and Stroke	0	0	0	5 (2.3)
Agency for Health Care Policy and Research	6 (11.3)	9 (16.7)	1 (0.9)	2 (0.9)
Public Health Service	10 (18.9)	5 (9.3)	3 (2.6)	10 (4.5)
Department of Health and Human Services	10 (18.9)	4 (7.4)	2 (1.7)	6 (2.7)
Centers for Disease Control	1 (1.9)	4 (7.4)	7 (6.1)	18 (8.2)
Food and Drug Administration	0	0	2 (1.7)	3 (1.4)
National Endowment for the Humanities	0	1 (1.9)	0	0
National Library of Medicine	0	2 (3.7)	0	0
National Science Foundation	0	1 (1.9)	0	0
US Agency for International Development	0	0	7 (6.1)	0
Indian Health Services	1 (1.9)	0	0	0
US Department of Agriculture	0	1 (1.9)	2 (1.7)	4 (1.8)
Environmental Protection Agency	0	0	0	2 (0.9)

no significant difference among family medicine, obstetrics and gynecology, and pediatrics ( $\chi^2 = 1.869$ ,  $P = .60$ ) for reports of local funding. General internal medicine had significantly more reports of local funding than the other three disciplines ( $\chi^2 = 14.311$ ,  $P < .0001$ ). There was no significant difference among general internal medicine, obstetrics and gynecology, and pediatrics for reports of discipline-sponsored funding ( $\chi^2 = 2.58$ ,  $P = .50$ ). Family medicine had significantly more reports of discipline-sponsored funding than the other three disciplines ( $\chi^2 = 116.158$ ,  $P < .0001$ ).

The distribution of funding sources in the federal category was expanded in Table 2 to highlight agencies that may have contributed to the difference observed above. The most common federal funding sources among the published family medicine studies were the Public Health Service (18.9%) and the Department of Health and Human Services (18.9%); for general internal medicine research, the Agency for Health Care Policy and Research or its forerunner, the National Center for Health Services Research and Health Care Technology Assessment (16.7%); in obstetrics and gynecology, the National Institutes of Health (46.1%); and in pediatrics, the National Institute of Child Health and Human Development (NICHD) (25.5%). The private founda-

tion sources of funding included 16 organizations for family medicine, 14 organizations for general internal medicine, 13 organizations for obstetrics and gynecology, and 30 organizations for pediatrics. For each discipline, the number of private funding sources reported was equally distributed across the total number of organizations except for family medicine and general internal medicine, for which the Robert Wood Johnson Foundation provided funding for 12 of 21 studies, and 20 of 53 studies, respectively. Across the disciplines, several private funding sources were common to all four, including the Robert Wood Johnson Foundation, the Kellogg Foundation, the March of Dimes, and the Kaiser Foundation.

From the 40 randomly selected studies from each discipline for which a funding source was not reported, the structured telephone survey of the primary authors found that none of these studies had external funding. All of the primary authors reported that their studies were completed and supported as part of usual clinical or educational practice. The salaries of personnel were supported by the department or division, and all other expenses were supported by discretionary funds or included in the operational expenses of the institution, department, or division.

## Discussion

The first hypothesis of this study was that no differences would exist in the diversity of funding sources among published works in the fields of family medicine, general internal medicine, obstetrics and gynecology, and pediatrics. Clearly all four disciplines have diverse sources of funding that could be designated as "ill-defined," as done in a previous study.<sup>35</sup> There are significant differences, however, among the four disciplines. The named sources of funds for published family medicine research were primarily federal and discipline sources, with the remainder equally divided among private foundation, local, and corporate sources. Obstetrics and gynecology research was funded primarily by federal, private foundation, and corporate sources. Pediatrics research and general internal medicine research were funded primarily by federal and private foundation sources.

Within the category of federal funding sources, family medicine had significantly fewer reports of support that the other three disciplines, with no institute or agency clearly predominating. The predominance of federal support reported as Public Health Service and Department of Health and Human Services may reflect training or departmental grants that did not directly support the study published. Similarly, obstetrics and gynecology had no clear predominant institute or agency. Naming the NIH as the source of funding without specifying which institute or agency made drawing conclusions less precise. In contrast, pediatrics and general internal medicine appear to be influenced by several institutes, but no one institute predominates as the federal funding source for the discipline.

Many researchers in family medicine would conclude that the difference observed in federal funding exists because of bias against the discipline. The NICHD primary programs are "reproduction and population studies, perinatal biology and infant mortality, congenital defects, developmental biology and nutrition, human learning and behavior, and mental retardation,"<sup>36(p 60)</sup> and do not therefore favor pediatrics over obstetrics and gynecology or family medicine. In addition, the mission of NIH ". . . is to improve human health through biomedical and behavioral research, research training, and communication. The programs of the NIH are oriented principally toward basic and applied scientific inquiry related to the causes, diagnosis, prevention, treatment, and rehabilitation of human diseases and disabilities. . . ."<sup>36(p 1)</sup> Again, these objectives do not in themselves favor one discipline over another.

The next possible argument concerning the source of the difference in federal funding between disciplines is bias in the evaluation of research proposals. Again, the

NIH is quite clear on the points of evaluation, which are scientific and technical merit as well as the qualifications of the investigators and the adequacy of methods.<sup>36</sup> These points of evaluation are reasonable and objective, yet probably contain the reasons for the funding difference among the four disciplines. First, compared with pediatrics and obstetrics and gynecology, family medicine is a very young discipline with origins primarily in clinical care. Therefore, the discipline does not have the qualifications and experiences, or the resources, to compete equally with more seasoned disciplines in the arena of research. Second, many of the researchers in family medicine do not understand the "game" of competing for a federally supported grant. The rules of this game are not formally published or referenced in any guide, but are passed on through interaction with seasoned research mentors and faculty. Again, as a new, inexperienced discipline, family medicine lacks this source of guidance. Third, the reviewers of federal grants who apply the above objective criteria are generally from other disciplines. Some form of bias or discrimination may enter into the evaluation at this point, either purposefully or unintended. The authors would assume that the most frequent cause is unintended bias or discrimination as a result of family medicine asking new and unique questions, implementing unique or unusual research designs, or proposing methods derived from different disciplines (eg, sociology, anthropology, psychology). All of these approaches most likely push the reviewers beyond their usual field of expertise or level of comfort. The result could easily be a poor score and no funding simply based on lack of understanding of the approach or the question.

The disciplines of general internal medicine and family medicine are very similar in background, emphasis, and recent entry into research and academics. The obvious question raised by this study is why general internal medicine is so similar to obstetrics and gynecology and pediatrics in terms of percentages of federal funding reported. In fact, general internal medicine has the largest percentage of reported federal funding among the four disciplines studied. One could argue that this is a result of ties or collaboration with their colleagues in the subspecialty areas of internal medicine with long-standing experience with specific institutes. If this is true, then one would expect significant differences between general internal medicine and family medicine in the institutes reported for federal funding. However, there was no difference. The institutes identified by family medicine but not by general internal medicine were NICHD, the National Institute of Diabetes and Digestive and Kidney Diseases, and the Indian Health Service. The only institutes identified by general internal medicine but not by family medicine were the National

Institute of Allergy and Infectious Diseases, the National Endowment for the Humanities, the National Library of Medicine, the National Science Foundation, and the US Department of Agriculture. There does not appear to be a reliance of general internal medicine on the expertise of their subspecialty colleagues. General internal medicine units, however, are usually part of a larger department that has a culture, group climate, and expectation of seeking outside funding. The customary source of funding is usually federal. Therefore, general internal medicine researchers may exist in an environment that differs from that of family medicine researchers, and one that encourages and possibly facilitates their seeking federal funding. In addition, they have ready access to colleagues who can supply expertise, experience, and the unwritten rules of how to successfully compete for a federal grant.

The second hypothesis of this study was to establish that no single funding source predominated among the four disciplines or for any one of the four. This was clearly demonstrated. An unexpected discovery was the predominance of absence of reported funding sources for published work. To clarify this issue, the authors interviewed by telephone 40 of the principal authors from each discipline. Each of these interviews confirmed that those authors' published studies had no external support. Our findings indicate that the majority of published research in primary care medicine is unfunded and is accomplished by relying on the discretionary funds of the local institution and on clinical income. In addition, one could hypothesize that the money brought in by funded research is funding a vast array of other work. Another observation that was made was that obstetrics and gynecology, general internal medicine, and pediatrics may be better able to support their unfunded faculty research than family medicine because of better financial reimbursement in their clinical practice and the existence of well-established research units.

Given these findings, how should family medicine researchers, educators, practitioners, and the discipline as a whole respond? First, the unique concept of discipline-based grant support needs to be applauded for the small but significant contributions to the advancement of knowledge. Further availability of these opportunities requires the continued financial support of the practitioners who will directly benefit from educational and research advances. Second, the discipline has a group of well-trained research faculty members who should have some initial experience with the federal system of grant funding. This experience could be passed onto the next generation. In addition, these researchers could seek involvement on the review panels of the various institutes in order to help eliminate the potential for bias toward the discipline and to promote the research agenda of the

discipline. This group of researchers, however, has not made the preliminary steps or had the impact as predicted or expected<sup>18</sup> that would lead to this higher level of function. This lack of grant success could have been predicted, given the environment into which the group was placed. These well-trained research faculty members were placed in an environment that did not provide adequate time, resources, colleagues, money, or leadership.<sup>18,37</sup> These and many other features of the family medicine environment that have been shown to be essential to becoming a productive researcher<sup>38</sup> are lacking in most departments within the discipline. Therefore, the academic leaders of the discipline need to focus on creating environments conducive to research.

The first step would be to develop clear goals that move the department toward establishing a research agenda that is on par with education and patient care.<sup>38</sup> Such a step would require developing resources, recruiting new faculty, developing the appropriate atmosphere for research, and establishing leadership that is compatible with research within the unit. All these suggestions require that the current leaders of departments and divisions make an active commitment to the importance of research as a mission. Third, the collaboration with seasoned researchers outside the discipline needs to be facilitated. When seasoned researchers are not within our departments or divisions, faculty outside the discipline can be recruited as mentors or collaborators. This collaboration facilitates the informal passage of information on the "rules" of federal funding and training in research. Finally, family medicine researchers need to submit grant applications to federal agencies, learn from the reviews, and submit revisions. The "game" of obtaining federal grants is not learned from sitting on the sidelines and complaining about the system.

The limitations of this study are several. First, we compared the funding sources for research based on the discipline affiliation of the first author of the published work. The studies were restricted to those that fell into the realm of primary care research. However, the comparisons were of vastly different studies in terms of content, populations, and methods. Thus, the best method was to categorize by discipline and not by subject matter. Second, the study is limited to published studies over the last several years. This excludes training grants, studies currently underway, and unfunded or unpublished studies. Third, the published works studied represent only a sample of funded studies for which the reference frame is unknown. Therefore, we are unable to conclude how representative our sample is for each discipline. Fourth, authors from the disciplines of pediatrics and obstetrics and gynecology had significantly more published research in the publications reviewed than family medicine

or general internal medicine, which may have also contributed to some of the differences observed; however, the differences probably reflect the larger number of researchers in these disciplines. Fifth, the study only reports funding or no funding and not the amount of funding or the percentage of study expenses covered. Significant differences among the disciplines could exist for the total amount of funding and the percentage of expenses covered.

## Conclusions

This study indicates many similarities and relatively few differences in the funding sources for research in family medicine, general internal medicine, obstetrics and gynecology, and pediatrics. The results do reflect how much unfunded research is published in these primary care disciplines. It remains to be determined whether this is unique to primary care disciplines or has any impact on health care in this country.

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