The Future of Pediatric Education II
A Project of the Pediatric Community

Summary of Survey Findings:
Clinical Genetics

Sponsoring Organizations:

American Academy of Pediatrics
American Board of Pediatrics Foundation
American Medical School Pediatric Department Chairmen
Center for the Future of Children of The David and Lucile Packard Foundation
Project #MCJ379381 from the Maternal and Child Health Bureau

Introduction

The FUTURE OF PEDIATRIC EDUCATION II (FOPE II) Project is a 3 year, grant- funded initiative launched by the pediatric community in May 1996. As part of this project, key leaders in the pediatric community are addressing the future supply and training of pediatricians and the provision of pediatric care into the next millennium. They are continuing the work begun with a 1978 report entitled: "The Future of Pediatric Education."

The new report, scheduled for completion in 1999, will contain recommendations that will shape the lifelong learning process of pediatricians. Looking beyond the pediatric workforce and training of pediatricians, the recommendations encompassed in the 1999 report will also address the role and pediatric training of nonpediatricians, the financing of graduate medical education, and primary care and subspecialty issues.

The FOPE II Project consists of a 17-member Task Force that has ultimate responsibility for the development of the final report. Operating under the auspices of the Task Force are five, topic-specific workgroups:

- Pediatric Workforce Workgroup
- Pediatric Generalists of the Future Workgroup
- Pediatric Subspecialists of the Future Workgroup
- Financing GME Workgroup
- Education of the Pediatrician Workgroup

Each workgroup will provide an in-depth analysis of key issues under their purview. The workgroups are charged with generating a report that will, to the extent possible, include data-driven conclusions and recommendations for the optimal provision of pediatric care to all infants, children, adolescents, and young adults.

An important component of the FOPE II Project has been the gathering of insights, information, and data that will inform the deliberations of the workgroups and the Task Force. A number of venues are being used both to provide and solicit information. One opportunity is the Survey of the American Academy of Pediatrics (AAP) Medical and Surgical Subspecialty Sections. Seventeen AAP medical and surgical subspecialty sections have chosen to participate in this survey process. Several additional sections have provided the data and information that they acquired from independent survey initiatives.

The Survey of AAP Medical and Surgical Subspecialty Sections solicits information about career, education, and practice issues, as well as demographic information. The surveys have been sent to members of the AAP Section, as well as members of the appropriate subspecialty organizations, as identified by the Section. This report summarizes the findings from the surveys of physicians in pediatric clinical genetics.

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Methodology

This report is based on responses that were generated from two questionnaires: a standard questionnaire (the Workforce Survey for Child Health Care) and a pediatric clinical genetics questionnaire (the Clinical Genetics Survey). The Workforce Survey for Child Health Care was developed by the FOPE II Task force and was designed to be applicable to most pediatric surgical and medical specialists.

The Clinical Genetics Survey was developed by a volunteer from the Section on Genetics and Birth Defects (the Section), Beth A. Pletcher, MD, along with the Section's chairperson, H. Eugene Hoyme, MD. This questionnaire was mailed to clinical geneticists along with the standard questionnaire. The final questionnaire included questions concerning the number of geneticists in the community, percentage of time spent in different clinics and sites, percentage of patients in different age groups, evaluation of fellowship and residency programs in genetics, and research activities of pediatric clinical geneticists.

The surveys were mailed to a sample consisting of all 243 members of the Section, the 847 US geneticists who are certified in clinical genetics by the American Board of Medical Genetics (ABMG), and an additional 21 geneticists from a research list. Five mailings of the survey went out between November 1997 and March 1998 to a total of 903 physicians (there was some overlap on the mailing lists). Each mailing contained the standard questionnaire and the Clinical Genetics Survey, a cover letter emphasizing the importance of the survey, and a return envelope. One hundred sixty-eight geneticists were excluded from the sample, as it was learned they were not practicing clinical genetics, did not treat children, were retired, deceased, in training or out of the country. The survey, therefore, had an effective sample size of 735 and a response rate of 68.8% (506 out of 735).

Acknowledgments

THE FUTURE OF PEDIATRIC EDUCATION II (FOPE II) Project acknowledges the participation of all who facilitated the development and implementation of the Pediatric Clinical Genetics Workforce Survey for Child Health Care and this report on the survey findings. The FOPE II Project Task Force and Workgroup members provided the overall framework for the surveys of pediatric medical and surgical subspecialists and those non-pediatrician physicians who provide pediatric care. Of particular note are Beth A. Pletcher, MD, a volunteer from the AAP Section on Genetics & Birth Defects, and H. Eugene Hoyme, MD, section chairperson, who wrote the questions for the clinical genetics questionnaire. Sarah E. Brotherton, PhD, and Judy Karacic of the AAP Department of Research worked diligently on construction of the survey instrument, fielding the survey, and analysis of the results. Thomas M. Gorey, JD, of Policy Planning Associates, wrote the final report. Angela Lipinski, AAP Department of Education, handled all aspects of the production and distribution of this report. The FOPE II Project extends grateful thanks to the many individuals who took time from their busy schedules to complete and return the survey. The participation of these respondents has informed the deliberations of THE FUTURE OF PEDIATRIC EDUCATION II Project.

The Future of Pediatric Education II Project is made possible through the support of the following sponsoring organizations: American Academy of Pediatrics, American Board of Pediatrics Foundation, Association of Medical School Pediatric Department Chairmen, Center for the Future of Children of The David and Lucile Packard Foundation, and Project #MCJ379381 from the Maternal and Child Health Bureau.

Jimmy L. Simon, MD
Project Chairperson

Russell W. Chesney, MD
Project Vice Chairperson

Errol R. Alden, MD
Principal Investigator

Holly J. Mulvey
Director

Workforce Survey for Child Health Care

Demographics of Respondents

On average, the respondents were 48 years of age and planned to fully retire from the practice of medicine at age 66. Female geneticists were, on average, four years younger than male geneticists (age 46 vs. 50), and planned on retiring at a younger age (65 vs. 67). Overall, 10% of the respondents intended to retire in the next five years. Fifty nine percent (59%) of the respondents were male and 41% were female. In terms of ethnicity, 87% were White/Non-Hispanic, 6% were Asian/Pacific Islanders, 4% were White/Hispanic, 1% were African American, and the remainder identified themselves as belonging to other racial or ethnic groups.

Eighty four percent (84%) of the respondents were graduates of U.S. medical schools, 2% were graduates of Canadian medical schools, and 14% were graduates of medical schools in other countries. The respondents' average year of graduation from medical school was 1977.

Specialty, Residency Training, and Board Certification

The survey instrument asked respondents to list the specialties and subspecialties in which they have been trained, to specify the year they completed residency training, and to indicate for each specialty/subspecialty listed whether they are board certified. Respondents could list up to three specialties/subspecialties.

Table 1 below presents a summary of the specialty, residency training, and board certification information on those who responded to the survey. Virtually all of the respondents (98%) listed medical genetics as one of the specialties in which they had been trained, while three fourths also listed general pediatrics. Approximately 90% of those who listed these specialties indicated that they are board certified. Table 2 presents information on fellowship training and certification of geneticists.

Table 1. Residency Training and Board Certification of Survey Respondents

Specialty	**Number** (Mean)	**Percent of Total** (#)	**Percent Board Certified** (%)	**Residency Completion Year** (%)
General pediatrics	382	75.5	90.6	1982
Medical genetics	495	97.8	89.3	1987
Internal medicine	26	5.1	76.9	1979
Obstetrics/gynecology	41	8.1	85.4	1987
Maternal and fetal medicine	27	5.3	59.3	1991
Other	54	10.7	64.8	--

Table 2. Fellowship Training and Certification of Survey Respondents

Specialty	**Number** (Mean)	**Percent of Total** (#)	**Percent Board Certified** (%)	**Residency Completion Year** (%)
Clinical biochemical genetics	51	10.1	94.1	1988
Clinical cytogenetics	47	9.3	93.6	1986
Clinical molecular genetics	30	5.9	83.3	1992

Main Practice Site

Respondents were asked to specify their main employment site; that is, the setting in which they spend the most time. Table 3 provides a breakdown of responses for this question. For the respondents overall, approximately two thirds indicated that their main practice setting was at a medical school.

Table 3. Main Practice Site

Main Site	% of Respondents (%)
Medical school	65.9
Community hospital	6.4
Specialty group	5.3
HMO	4.5
Multispecialty group	4.3
Pediatric group	2.7
Solo practice	2.7
Uniformed health services clinic	1.2
Community health center	1.0
Other	6.0

When asked to describe the area in which their primary practice site is located, 47% indicated that it is an urban--not inner city--area; 34%, urban--inner city; 15%, suburban; and 4%, rural.

Time Spent in Professional Activities

Table 4 depicts the average percentage of time spent by pediatric clinical geneticists in various professional activities. On average, approximately one half of the total time spent per week by pediatric clinical geneticists in professional activities is devoted to direct patient care; 13%, administration; 12%, basic science research; and 11%, teaching. On average, the respondents said they typically work 57 hours per week.

Table 4. Average Percent of Time per Week in Professional Activities

Professional Activity	Percentage of Time (%)
Direct patient care	50.7
Administration	13.4
Teaching	10.9
Clinical research	8.1
Basic science research	11.5
Health services research	0.6
Resident or fellow in training	0.2
Other, non-direct patient care	4.6

Seventy seven percent (77%) of the respondents said they spend some of their direct patient care time in a pediatric medical subspecialty (primarily *pediatric* medical genetics); 45% said they spend some time in another specialty (primarily *adult* medical genetics and/or maternal/fetal care); and 29% said they spend some time in primary care pediatrics. Those who reported spending some time in a pediatric medical subspecialty (primarily medical genetics) on average said they devoted over three-fourths of their total professional work hours to that specialty.

Referrals

Ninety one percent (91%) of the respondents reported that they receive referrals for pediatric patients. Table 5 displays the source of these referrals, by specialty.

Table 5. Source of Referrals of Pediatric Patients to Clinical Geneticists

Source of Referrals	**Percentage (%)**
Pediatric generalists	95.0
Family physicians	86.5
Pediatric medical/surgical subspecialists	85.4
Obstetricians/gynecologists	77.7
General internists	60.0
Adult medicine subspecialists	57.9
Pediatric nurse practitioners	57.0
Physician assistants	33.8
Others	23.6

Among those clinical geneticists who said that they receive referrals for pediatric patients, 95% said they receive referrals from pediatric generalists; 87%, family physicians; 85%, pediatric medical/surgical subspecialists; and 78%, OB/GYNs. Over one half said they receive referrals from general internists, adult medicine subspecialists, and pediatric nurse practitioners.

The respondents also were asked to report whether they receive referrals from urgent care centers, community agencies, and school districts. Twenty one percent (21%) of the respondents reported that they receive referrals from urgent care centers, 64% said they receive referrals from community agencies, and 50% indicated that they receive referrals from school districts.

Only 11% of the respondents said that their pediatric referrals come exclusively from within their own practice or managed care network, while 74% said that some of their referrals come from sources outside of their network (15% said that they were not in a network).

Among those respondents who reported that they receive referrals, 44% said that neither the volume nor the complexity of the pediatric referrals they have received in the last twelve months has changed compared to previously, while 56% said that either the volume, the complexity, or both have changed.

Among those clinical geneticists who have experienced a change in the volume *or* complexity of pediatric referrals, 65% indicated that they have seen an increase in the volume of referrals, 23% said there has been a decrease in the volume of referrals, and 62% said there has been an increase in the complexity of referrals. Twelve percent (12%) said they have experienced no change in the volume of referrals and 36% said they have experienced no change in the complexity of the cases referred to them. Only two percent noted a decrease in the complexity of referred cases.

Respondents who indicated that they have experienced a change in the volume or complexity of pediatric referrals in the last twelve months were asked to describe the factors to which this change could be attributed (more than one factor could be specified). Fifty three percent (53%) of the respondents said that an increased likelihood of general pediatricians and other generalists to treat less complex subspecialty patients has caused a change in the volume or complexity of pediatric referrals, 49% pointed to increased referrals from adult subspecialists, and 25% cited increased competition from other pediatric subspecialists.

Of the respondents who have experienced an increase in the volume of referrals, 62% attributed it to increased referrals from adult subspecialists. Of those who have seen a decrease in the volume of referrals, 70% attributed it to an increased tendency for general pediatricians and other generalists to treat less complex subspecialty patients.

Of those respondents who have experienced an increase in the complexity of the cases referred to them, 59% attributed it to an increased likelihood of general pediatricians and other generalists to treat less complex subspecialty patients and 55% attributed it to an increase in referrals from adult subspecialists.

Need for Additional Training

Despite whatever changes are taking place in health care, a majority of the respondents did not feel that the changes have resulted in a need for additional training on their part. Seventy percent (70%) of the respondents indicated that the changes in health care have not necessitated additional training in primary care, and 68% said that the changes have not necessitated additional training in their subspecialty. Twenty three percent (23%) of the respondents indicated a need for a "little" additional training in primary care and 28% expressed a need for a little additional training in their subspecialty. Only 7% of the respondents indicated a need for "much more" training in primary care and only 4% indicated a need for much more training in their subspecialty.

Competition

Only one half of the respondents said they face competition for pediatric subspecialty services in their geographical area. Those who said they face competition for pediatric subspecialty services are more likely to practice in urban--inner city--areas or in the suburbs. Those who said they do not face competition are more likely to practice in urban--not inner city--areas, or in rural areas.

Among those who said they face competition, the major source of competition, which was mentioned by 87% of the respondents, was other pediatric subspecialists. (See Table 6.) Another significant source of competition, cited by nearly one fifth of the respondents, was general pediatricians.

Table 6. Perceived Source of Competition for Pediatric Subspecialty Services

Source of Competition	**Percentage of Clinical Geneticists* (%)**
Other pediatric subspecialists	87.1
General pediatricians	19.0
Physicians trained in adult medicine in my subspecialty	14.2
Family physicians	9.5
Non-physician medical personnel (*eg*, advanced practice nurses, chiropractors)	6.0
Related health professionals (*eg*, psychologists, nutritionists)	2.6
Urgent care centers	1.7
Other	15.5

* Percent of respondents who said they face competition from any source

Of those respondents who said they face competition for pediatric subspecialty services in their geographic area, only 35% have modified their practice as a result of competition. Among those who have modified their practices, 40% have increased office hours, 32% have decreased their research and administrative activities, 21% have increased their research and administrative activities, 20% have decreased support staff, and 18% have decreased fees (see Table 7).

When asked whether, during the last twelve months, their practice had been sold to or merged with another practice or health care organization, only 10% responded affirmatively.

Table 7. Practice Modifications as a Result of Competition

Change	Increased (%)	Decreased (%)	No Change (%)
Office hours	40.0	2.2	57.8
Fees	2.2	17.8	80.0
Number/responsibilities of support staff	16.7	20.0	63.3
Number of advanced practice nurses	6.7	4.4	88.9
Number of physicians for practice	12.2	11.1	76.7
Amount of research/administrative activities	21.1	32.2	46.7

Workforce

Forty five percent (45%) of the respondents said they anticipated that their communities would need additional pediatric subspecialists in the next 3-5 years. Thirty nine percent (39%) said there would be a need for more pediatric subspecialists in their discipline, while only 15% felt there would be a need for additional pediatric subspecialists in other pediatric subspecialties. When asked whether they or their employer would be hiring additional, non-replacement pediatric subspecialists in their field in the next 3-5 years, 23% of the respondents said “yes,” 38% said “no,” and 39% said they were unsure.

Income

Clinical geneticists rely on a variety of payment sources for their income, but straight salaries are the most common by far (see Table 8). Nearly two thirds of the respondents said they receive some income from salaries, compared to less than one third who said they receive income from other sources, such as fee for service, capitation, and salaries with performance incentives.

Table 8. Sources of Income for Clinical Geneticists

Source of Income	Percentage With Income from Each Source (%)
Traditional fee for service	28.9
Discounted fee for service	25.2
Prepaid, capitated, nonsalaried	18.7
Prepaid, capitated, salaried	20.4
Salary	64.0
Salary with performance incentive	29.3

Table 9 provides information on the percentage of pediatric clinical geneticists' income that comes from various sources. Excluding those who said they did not know the breakdown of their total income by source, most of the respondents who said they receive some income from traditional fee-for-service payment indicated that this source accounts for 33% or less of their total income. Similarly, among those who said they receive some income from prepaid, capitated arrangements--salaried or nonsalaried--most said that this source accounts for 33% or less of their total income. For those who indicated that they receive some income from salaries--or salaries with performance-based incentives--most said this source accounts for two thirds or more of their total income.

Table 9. Percent of Income by Source

Income Source	0-33%	34-66%	67-100%	Don't Know
Traditional fee for service	52.8	11.8	6.3	29.1
Discounted fee for service	47.3	20.5	0.9	31.3
Prepaid, capitated nonsalaried	47.7	11.6	2.3	38.4
Prepaid, capitated, salaried	36.3	6.6	19.8	37.4
Salary	6.7	7.1	74.9	11.3
Salary with incentive	20.8	5.4	53.8	20.0

Finally, when asked whether they have used telemedicine, fax machines or other forms of information technology as part of a consultation with another practitioner because of lack of ready access to appropriate subspecialists (*eg*, in a rural area), 59% answered affirmatively.

Pediatric Clinical Genetics Survey

Practice Characteristics

On average, the respondents reported that they see seven new genetic patients and six follow-up patients per week. Just under two-thirds of the respondents (64%) said they reasonably could see more genetic patients per week than they currently are seeing.

A majority of the respondents (60%) reported that their practices are located in areas with one million or more residents. Sixteen percent (16%) said the population area they serve has between 500,000 and 999,999 residents; 19%, 100,000 to 499,999 residents; and 5%, less than 100,000 residents. On average, the respondents estimated that there are a total of eight clinical geneticists serving their population area.

The respondents reported that their practices have an average of three clinical geneticists (including themselves) and three genetic counselors. The median for both clinical geneticists and counselors was two. Those respondents who reported that their practices included genetic counselors (82% of respondents) were asked to describe the functions performed by such practitioners. Table 10 lists the functions commonly performed by genetic counselors, with the corresponding percentage of respondents who said that the genetic counselors in their practices provide such functions. Over 90% of the respondents said that the genetic counselors in their practices take pedigrees on patients; over 80% said they see patients with supervision in the outpatient clinic and write summary letters to patients; and 50% or more said they see patients independently in the outpatient clinic, see patients with supervision in the hospital, and write/compose clinical notes or evaluations.

Table 10. Functions of Genetic Counselors

Function	Percentage Who Provide Each Function (%)
Take pedigrees on outpatients	91.5
See patients independently in the outpatient clinic	50.0
See patients with supervision in the outpatient clinic	83.6
See patients independently in the hospital	19.2
See patients with supervision in the hospital	50.3
Write summary letters to patients	81.8
Write/compose clinical notes or evaluations	55.1
Other functions	17.2

On average, the respondents reported that 54% of their total work time is spent in clinical practice. Of the time spent in clinical practice, the respondents reported spending an average of 22% in a specialty or multispecialty clinic; 7% in general pediatrics outpatient; 46% in genetic outpatient; 4% in general pediatrics inpatient; 12% in genetic inpatient; and 9% in other clinical activities. However, many geneticists reported spending no time in these clinics; 48% spend no time in a specialty or multispecialty clinics; 86% spent no time in a general pediatric outpatient clinic, 21% spent no time in a genetic outpatient clinic, 72% spent no time in a general inpatient setting, and 30% reported spending no time in a genetic inpatient setting.

The respondents reported spending an average of 3.1 hours with new patients, including library and letter writing time. Thirteen percent (13%) of the respondents said they spent one hour or less with new patients; 36%, between one and two hours; 26%, between two and three hours; 14%, between three and four hours; and 11%, over four hours.

The respondents reported spending an average of 1.4 hours with follow-up patients. Twenty-five percent (25.3%) of the respondents said they spent thirty minutes or less with follow-up patients; 37%, between thirty minutes and one hour; 30%, between one hour and two hours; and 8%, over two hours.

Over forty percent (43.2%) said that they serve as an inpatient primary care attending. Six out of ten of those who reported serving as a primary care attending said they did so in the specialty of general pediatrics, 62.0%; 8% in OB/GYN; and 18% in other specialties.

The respondents who said they serve as an inpatient attending reported spending an average of 9.5 weeks (and a median of 4 weeks) per year as a primary care attending. Those who served as an inpatient attending in general pediatrics reported spending an average of 7 weeks (and a median of 4 weeks) per year; and OB/GYN (prenatal development), an average of 18 weeks (and a median of 10 weeks) per year.

Almost three fourths of the respondents (74%) reported that they participate in or direct a specialty clinic but do not direct. Of those, 70% said they direct one or more clinics and 62% said they participate in, but do not direct, at least one clinic. Of the respondents who said they direct a specialty clinic(s), 29% said they direct a single gene disorder clinic; 42%, a medical specialty clinic; 12%, a surgical specialty clinic; and 17%, some other type of clinic. Of the respondents who said they participate in at least one clinic, 22% said they participate in a single gene disorder clinic; 30%, in a medical specialty clinic; 35%, in a surgical specialty clinic; and 12% in some other type of clinic.

Patient Characteristics

Table 11 provides a breakdown of the types of patients seen by clinical geneticists. On average, the respondents reported that 21% of their patients are prenatal patients; 18%, newborns; 18%, toddlers; 13%, preteens; 7%, adolescents (non-prenatal); and 11%, adults (non-prenatal).

Table 11. Types of Patients Seen By Clinical Geneticists

Type of Patient	Percentage of Patients (%)
Prenatal patients	21.1
Newborns	18.4
Toddlers (1-3 years)	18.0
Preschool (3-4 years)	13.2
Middle school/preteen (5-11 years)	10.5
Non-prenatal adolescents (12-17 years)	7.3
Non-prenatal adults (18 years or older)	11.5

Twenty five percent (25%) of the respondents said they do not provide care to prenatal patients, while 5% said they provide care exclusively to such patients; 13% said they do not provide care to newborns; 11% said they do not provide care to toddlers; 14% said they do not provide care to preschoolers or preteens; and 19% said they do not provide care to non-prenatal adolescents or adults.

Excluding those who did not know or were unsure of their patients' insurance coverage, the respondents estimated that, on average, 35% of their patients were covered by Medicaid; 34%, by an HMO, PPO, or IPA; 18%, by traditional insurance; 8%, by self pay; and 5% by some other form of insurance or payment.

Medical Education and Training

Eighty two percent (82%) of the respondents said their institution has a genetic elective for medical students; 85% said it has a genetic elective for pediatric residents; and 44% said it has a genetic residency fellowship program.

Ninety one percent (91%) of the respondents said they completed a fellowship or residency in genetics. On average, those who completed such a fellowship or residency estimated that 50% of the fellowship or residency was spent in direct patient care; 13% in a clinical genetic laboratory (cytogenetics, biochemical genetics, molecular genetics); 13% in

clinical research; 23% in basic science research; and 1% in other activities. Thirty percent of those who completed a fellowship did not spend any time in clinical research, and 44% spent no time in basic science research as part of their fellowship.

Those who completed a fellowship or residency in genetics were asked to evaluate the thoroughness of their training in a number of different areas (see Table 2). Over 40% of the respondents said they thought their program should have included more training in clinical biochemical genetics, laboratory biochemical genetics, and administration. Over one-third of respondents felt they needed more training in laboratory cytogenetics, basic science research skills and clinical research skills. Seven percent (7%) of the respondents said they thought their training program should have devoted less time to basic science research skills.

Table 12. Thoroughness of Fellowship/Residency Training in Genetics

Area	Needed Less (%)	Right More (%)	Needed Amount (%)
Dysmorphology	29.0	70.8	0.2
Clinical cytogenetics	22.7	76.4	0.9
Laboratory cytogenetics	34.2	64.2	1.6
Clinical biochemical genetics	45.5	53.6	0.9
Laboratory biochemical genetics	44.7	54.7	0.7
Clinical research skills	38.5	60.6	0.9
Basic science research skills	35.7	57.0	7.2
Administration	46.2	49.6	4.1

Research

Thirty eight percent (38%) of the respondents said they have outside funding for research. The average annual amount of such funding among the respondents for *direct costs* was $199,000; the median annual amount was $126,000. The average annual amount of research funding among the respondents for *indirect costs* was $97,000; the median annual amount was $50,000.

Over one quarter of respondents (26%) receive personal salary support through such research grants. On average, such respondents devoted roughly one half of their total professional time to the research related to that salary support.

Pediatric clinical geneticists who do research on average devote 69% of their time to clinical research; 28% to basic science research; and 3% to other research. Fifty three percent of clinical geneticists who do research spend all of their research time in clinical research; 57% spend more of their research time in basic science research.

Summary

The primary practice location for most pediatric clinical geneticists is at a medical school.

On average, only one half of the total time spent per week by pediatric clinical geneticists in professional activities is devoted to direct patient care.

Among clinical geneticists who receive referrals for pediatric patients, over three fourths receive referrals from pediatric generalists, family physicians, pediatric medical/surgical subspecialists, and OB/GYNs. In addition, one half or more receive referrals from community agencies and school districts.

Among pediatric clinical geneticists who have experienced a change in the volume or complexity of pediatric referrals, nearly two thirds said they have seen an increase in the volume and complexity of referrals.

Most pediatric clinical geneticists do not feel that the changes in health care have necessitated additional training in primary care or in their subspecialty.

Only one half of pediatric clinical geneticists feel they face competition for pediatric subspecialty services in their market. Of these, just over one third have modified their practice as a result, with the major changes being increased office hours and decreased time spent on research and administrative activities.

Nearly one half of pediatric clinical geneticists anticipate their communities will need more pediatric subspecialists in their subspecialty in the next 3-5 years.

Salaried arrangements are the most common source of income for pediatric clinical geneticists.

Most pediatric clinical geneticists practice in markets with populations of one million or more.

Genetic counselors perform a variety of functions in pediatric geneticists' practices, including taking pedigrees on patients, seeing patients with supervision in the outpatient clinic, and writing summary letters to patients.

Over forty percent of pediatric clinical geneticists serve as an inpatient primary care attending, while three fourths participate in or direct a specialty clinic.

On average, 70% of pediatric clinical geneticists' patients are prenatal patients, newborns, toddlers, and preteens. The remainder are non-prenatal adolescents and adults.

Nearly one half of pediatric clinical geneticists who completed a fellowship or residency in genetics said their program should have included more training in administration, clinical biochemical genetics, and laboratory biochemical genetics.

Thirty eight percent of pediatric clinical geneticists have outside funding for research; over one fourth receive personal salary support as part of their research grants. Those who do research reported spending an average of 69% of their time in clinical research, 28% in basic science research, and 3% in other research.