A Network Model for Decentralized Family Practice Residency Training

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The organization of departments and divisions of family practice in a majority of medical schools in the United States has facilitated a recent trend toward increasing numbers of university affiliations with family practice residency programs in community hospitals. Many difficult issues arise when such affiliations are explored and developed. To date, the literature is meager on this important subject. This paper describes the elements of a network model for decentralized family practice residency training which has been in operation at the University of California Davis for over four years. Common issues are outlined, together with the various advantages of affiliation to the community hospital and the university. An active partnership between the medical school and community through a network of affiliated residency programs can effectively contribute to the quality of medical education and patient care on a regional basis and at the same time directly address the problem of physician maldistribution.

The last ten years have seen growing interest in several new directions in medical education, including increased emphasis on primary care education, increased involvement of community hospitals and practicing physicians in the educational process, and recognition of medical education as a continuum involving undergraduate, graduate, and postgraduate phases. There has been concurrent interest in addressing major problems of maldistribution of physician manpower, both by specialty and by geographic distribution. Medical schools have been expected by government at both state and federal levels to be more responsive to these issues than in the past. Major changes are occurring in medical education, including expanded responsibility for graduate education by medical schools[1] and the rapid and impressive development of family practice.

Since its inception as a specialty in 1969, there has been an impressive development of family practice residency programs throughout the country. Table 1 shows the rapid growth in the absolute number of programs and number of residents enrolled between 1970 and 1973. Since 1973, while numbers of programs and residency positions have continued to increase, the rate of growth is somewhat less. The average number of residents per program has increased from 5.9 in 1970 to 17.2 in 1976. These data suggest that family practice residency programs are consolidating at or near their full complement of residents.

Initially, the large majority of family practice residency programs were in unaffiliated community hospitals. More recently, however, as departments/divisions of family practice have been organized in a majority of the nation's medical schools, the number of university-based and university-affiliated programs has steadily increased. Many medical schools are seriously exploring or starting development of additional affiliated relationships with outlying community hospitals, so that the number of university-affiliated programs can be expected to continue to increase.

A number of difficult issues present themselves as these affiliations are planned and implemented. To date there has been no report in the literature dealing specifically with this subject. Based on the experience at the University of California Davis in developing a regional network of affiliated family practice residency programs over the past four years, this paper will describe the elements of an operational network model for decentralized family practice residency training, outline some common issues involved, and list the various advantages to the community hospital and the university in developing affiliated relationships.

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Rationale for Regional Network Approach

In recent years, a number of medical educators have called for an expanded role of the medical school on a regional basis.[2-6] The traditional role of the university medical center as a tertiary care center has been under pressure, not only through the development of excellent secondary and tertiary care capabilities in the larger community hospitals, but through the increasing pressure on university medical centers to provide primary care services as well. The relationship of the university medical center to the community now requires reassessment and the development of new linkages to the community, involving the extension of university resources to the adjacent region in a non-competitive and supportive way.

The spiraling costs of health care and medical education have brought serious reassessment of present funding methods, and major changes are in the legislative hopper at both state and federal levels. Funding to medical schools is increasingly in short supply for present and projected needs, and stipend support for residency training in some fields is being contracted or withdrawn altogether. It seems clear that we will have to fully utilize short resources in coming years if we are to

Table 1. Growth of Family Practice Residencies*

Year	Number of Approved Programs	Number of Residents	Average Number of Residents Per Program
1970	49	290	5.9
1971	87	534	6.1
1972	133	1,015	7.6
1973	191	1,771	9.3
1974	233	2,671	11.4
1975	259	3,720	14.4
1976	272	4,675	17.2

*Information for this table was provided by the Division of Education, American Academy of Family Physicians, Kansas City, Missouri.

address societal needs and maintain adequate quality in medical education. The sharing of teaching and evaluation resources on a network basis allows access by each affiliated program to substantial resources not otherwise available or affordable.

Legislative and societal interest in the problems of maldistribution of physicians by specialties and by geographic area has reached a high level and intense pressures have been placed on the medical education system to respond to such gaps. Based on the precept that family practice residency training should be patterned closely on the realities of the future family physician's practice, a well-developed network of affiliated programs should logically include educational models in urban, suburban, and rural settings. There is good evidence that physicians often locate their practices within 100 miles of the community where they completed residency training,[7,8] so that locating affiliated residencies in or near physician shortage areas can be expected to positively influence physician manpower in such areas.

The progressive extension of specialty and subspecialty expertise and modern facilities to smaller communities throughout the country in recent years, together with the interest of many practicing physicians in teaching and the availability of excellent clinical facilities, allows for extension of residency training into new community settings. Many physicians recognize the teaching process as a stimulating and effective form of continuing medical education. Favorable experience has been reported during the past ten years with new approaches to decentralized medical education.[9,10]

Of all specialties within medicine, family practice lends itself most readily to residency training in decentralized settings. Instead of requiring exposure in depth to tertiary care problems, as is the need of most other specialty residency programs, a broad experience with primary and secondary care problems is essential in family practice, including emphasis on ambulatory care training. Reality-based learning settings are needed, including teaching by family physicians and consultants in other specialty disciplines. Smaller community hospitals can provide excellent teaching settings if support and interest within the medical community are high.

An Operational Network Model

The essential elements of an operational model can be briefly outlined for the University of California Davis Family Practice Residency Network Program, a decentralized regional program now in its fifth year of development. Some specifics of this program have been more fully described in a previous paper.[11] The intent, here, is to identify critical elements which particularly relate to network function. They are presented as one approach to the challenge of decentralizing resident training. Many of these approaches may be applicable elsewhere, although the details of implementing similar programs in other parts of the country must necessarily be adapted to existing local and regional needs and available resources.

Overall Philosophy

The intent has been to develop a residency network in University of California Davis Affiliated Hospitals for Family Practice which provides a spectrum of teaching and learning settings in order to meet varied interests and needs of individual residents at geographically and culturally diverse locations. This network has been viewed as a dynamic system of closely interrelated programs, a "family" of programs, within which educational and clinical resources are shared to best provide excellent learning climates in each setting. Individual programs within the network are encouraged to develop specific strengths, and it is expected that curricular and teaching strategies may vary somewhat among the affiliated programs. At the same time, the network is integrated through various common approaches to general needs. The residency network is also seen as a basic structure upon which other teaching programs can be superimposed, both within the University Department of Family Practice and other clinical departments.

Varied Program Settings

There are 89 residents in five component programs within the network during the 1976-1977 year (Table 2). The University-based program is situated at Sacramento Medical Center, a 450-bed teaching hospital with a housestaff of 280 representing all major disciplines. A satellite family practice center is being developed in Davis, 14 miles from Sacramento, as an integral part of the University-based program. The affiliated program at San Joaquin General Hospital in Stockton, 65 miles south of Davis, is a full three-year program in a 249-bed hospital with a total housestaff of 52 (including residents in family practice, internal medicine, surgery and obstetrics-gynecology). The affiliated program at Martinez, 60 miles southwest of Sacramento, is located at Contra Costa County Hospital, a 250-bed facility, without other housestaff. The affiliated programs in Merced and Redding are located 130 and 150 miles from Sacramento, respectively, in smaller community hospitals without other specialty residents. Each of these programs provides training for second and third-year residents who have completed their first year at Sacramento Medical Center.

There are currently 40 family practice residents in the University-based program at Sacramento Medical Center, including 24 (eight in each of three years) based there, eight in the Davis satellite part of the program, and eight categorical first-year family practice residents who will complete their training in Merced and Redding. The Davis-based residents relate to a family practice center and small community hospital in Davis, and serve inpatient clinical rotations on the major teaching services in Sacramento hospitals. There are 16 family practice residents (5-6-5) in the Stockton program, which also includes second and third-year inpatient rotations in the 300-bed St. Joseph's Hospital in Stockton. The Martinez program was converted to family practice last year from its previous structure as a general practice residency program, and is based in a hospital with a full-time staff of over 30 physicians serving a large urban-rural county. There are eight residents (0-4-4) in both the Merced and Redding programs, which are integrated with the University-based program for first-year training.

Table 2. Residents in Component Network Programs 1976-1977

Component Program	Residents by Year	*Total Number of Residents
University of California Davis —		
Sacramento Medical Center	8-8-8	24
Davis satellite	4-4-0	8
First year for Merced and Redding	8-0-0	8
San Joaquin General Hospital, Stockton	5-6-5	16
Merced Community Medical Center	0-4-4	8
Shasta Cascade Program, Redding	0-4-3	7
Contra Costa County Hospital, Martinez	6-6-6	18
	Total	89

*Total number of residents in network will ultimately be 96 (4-4-4 in the Davis satellite of the Sacramento program, 6-6-6 at Stockton and 0-4-4 at Redding).

Merced and Redding represent the smallest communities within the network, each with a population in their immediate areas of approximately 50,000, and each involving the participation of at least 50 teaching physicians representing all major specialty disciplines. The Merced program involves one 160-bed hospital, while the Redding program involves two hospitals totalling 296 beds; the three-year integrated program for Merced and Redding residents also relates to the 450-bed Sacramento Medical Center for first-year and subsequent selective/elective experiences. The size of the teaching practice in the Family Practice Center of each of the component programs within the network varies with the size of each residency program.

Affiliation Agreements

Affiliation agreements have been concluded with each of the outlying community hospitals which define general responsibilities of the participating parties. Specific operational procedures subject to periodic revision are intentionally not spelled out in these agreements, but are verbally agreed upon between the university and community hospital before the affiliated relationship is initiated. Affiliation agreements which are now in force within the network call for joint responsibility between the university and community hospital for such functions as development, operation and evaluation of the family practice residency program, supervision of instruction, selection of residents and faculty, and malpractice liability. The dean of the medical school (through the director of the network program in the Department of Family Practice) is ultimately responsible for quality control of the educational program throughout the network, while residents in outlying affiliated hospitals are directly responsible to their base hospitals for performance of their everyday patient care responsibilities.

Program Administration

Monthly meetings are held at the University of California Davis, Sacramento Medical Center involving all program directors within the network. These sessions allow free interchange of ideas, coordination of common activities, troubleshooting of problem areas, and joint planning of educational and evaluational strategies.

The network base is responsible for all support mechanisms serving the network as well as overall coordination and quality control of the network. Application procedures are centralized so that resident applicants can arrange coordinated interview visits to any hospital and make application to the network as a whole, ranking individual preferences. Presently, three National Intern and Resident Matching Program (NIRMP) matching numbers are used, one for the Stockton program, one for the Martinez program, and one for Sacramento Medical Center and its integrated outlying programs, so that internal matching is also required in the selection process. Resident contracts are signed by the three involved parties – the resident, the community hospital, and the university. All residents within the network are registered as graduate students of the university and are employees of their base hospital.

Curriculum Development

The initial design, development, evaluation and revision of the curriculum for the family practice residency is a collaborative effort involving the University and the affiliated community hospital. Initial and follow-up applications for accreditation by the Residency Review Committee in Family Practice are jointly prepared. Major changes of the curriculum in any affiliated program involve mutual agreement. The length and design of specific clinical rotations are adapted to the resources and needs of each affiliated hospital, and necessarily vary somewhat among hospitals within the network. Since both the Merced and Redding programs are integrated with the University-based program at Sacramento Medical Center for first-year resident training as well as later subspecialty selectives, careful coordination is required for scheduling of clinical rotations.

Visiting Professor Program

An active Visiting Professor Program, carried out for all affiliated programs, involves faculty from the various clinical departments in the School of Medicine. This program is conducted on a biweekly basis, the fields and subjects supplementing the educational resources available to each affiliated program. The format of the Visiting Professor Program varies with the consultant's field of interest and expertise but usually includes a didactic presentation as well as an informal seminar including case presentations by residents. Consultants may make rounds on hospitalized patients and audit selected charts as the basis of a teaching seminar. The presence of visiting professors from the university medical center in outlying affiliated hospitals allows productive exchange with practicing physicians and increases their awareness of consultation and referral services available through the medical school.

Visiting family practice faculty are also involved on a regular basis in supporting the teaching program in affiliated residency programs. They assist the affiliated program director with resident evaluation and teaching in the family practice center, troubleshoot problems in the training program, and coordinate the needs of the affiliated program for supplemental teaching through the Visiting Professor Program and self-instructional materials.

Network Teaching Bank

The program incorporates family practice self-teaching materials as integral supplements to the residency program. Through the support of a grant from the Kellogg Foundation, a Network Teaching Bank of self-instructional materials has been developed.[12] The Network Teaching Bank stresses the use of media which are portable and easily maintained and which facilitate individualized learning by the residents. Learning carrels are established in the family practice center of each affiliated residency site for the use of video cassettes, tape-slides, and other self-instructional media. Selected self-instructional units in the major clinical disciplines are rotated monthly to each affiliated program. In addition, residents, faculty, and local physician groups can request specific materials at any time from the Network Teaching Bank catalog. *Elective* usage of Network Teaching Bank materials involved 166 audiovisual units and over 4,500 days used during the 1974-1975 year, and 231 units and 10,110 days during the 1975-1976 year.

Network Self-Assessment Center

The Network Self-Assessment Center has developed several major components in an effort to monitor and improve the quality of resident training in all affiliated hospitals. These include a data bank of examination questions, an annual self-assessment examination, and performance files for each resident, including personality profiles and completed self-assessment and examination materials. Data collected on individual residents are considered confidential. The purpose of self-assessment is to provide individual feedback to each resident as well as to serve program directors by giving them overall information on resident characteristics for planning purposes.

The self-assessment examinations are geared to specific knowledge and skills considered by a criterion group of experienced family physicians and teachers as essential to the acceptable practice of family medicine. They are also used to facilitate continuing medical education for practicing family physicians in the region. The self-assessment examinations include two basic parts: a multiple-choice section and a section of slides which tests visual recognition of common clinical entities. Testing techniques include those used in the American Board of Family Practice examination. Confidential profiles of test results in each major clinical discipline assist each

resident in identifying strengths and weaknesses, and question-specific feedback facilitates learning.[13]

Self-assessment procedures are closely related to other ongoing evaluation methods throughout the Network, including medical audit and data retrieval of resident experience. Criteria and results of audits in individual programs are shared throughout the network. The Network Self-Assessment Center is also involved in ongoing longitudinal follow-up of residency graduates from all hospitals within the network. This effort provides feedback on such questions as the adequacy of their residency training for their practices, the spectrum and location of their practices, and their experience with certifying examinations of the American Board of Family Practice.

Teacher Development

An active teacher development program for members of the clinical faculty is considered vital to effective resident teaching. Periodic workshops are held in affiliated community hospitals for members of the network clinical faculty. Typical content areas include orientation to program objectives; overview of residency program curriculum and resident capability levels in each residency year; the ingredients of effective learning experiences; roles of the teacher and the resident in hospital and family practice center settings; use of the problem-oriented record as a teaching tool; audit of medical records; teaching techniques with emphasis on the critiquing approach; and resident and teacher use of self-instructional materials and self-assessment methods.

The teacher development program helps to increase the effectiveness of teaching by members of the clinical faculty in outlying communities, as well as increase the satisfaction from resident teaching derived by participating physicians. Teaching and learning activities are seen as dynamic opportunities for continuing medical education for the participating physicians.

Resident Exchange

An essential principle is that the Family Practice Center in each component program serves as home base for the residents assigned there. There are opportunities, however, for a resident in any part of the University of California Davis Family Practice Residency Network Program to take electives in another part of the overall program, based upon individual needs and the particular strengths of the other parts of the program. For example, residents in affiliated programs in smaller communities can probably best meet their objectives in medical subspecialties and rehabilitation at the Sacramento Medical Center. Conversely, residents in larger hospitals may arrange for electives in smaller hospitals within the network for those experiences best offered there. Meanwhile, continuity of care for the resident's patients during these elective experiences away from home base is provided by other residents through a team approach.[14]

Locum Tenens Exchange

The preceptorship-locum tenens rotation is a required six-week rotation during the third resident year throughout the network. It is considered an important opportunity for an advanced resident to experience a real practice setting similar to that which he or she anticipates selecting on completion of training. The involved program director makes a site visit in advance to approve a potential locum tenens site as an effective learning setting. It is required that the resident have consultation readily available for outpatients and for any patients admitted to the hospital locally. The first two weeks of the six-week rotation are a preceptorship, during which the resident becomes acquainted with the practice, office staff, procedures, and local medical community. The practicing family physician may then return to the University of California Davis for two or four weeks of postgraduate training which includes self-assessment through the Network Self-Assessment Center, individualized learning through the Network Teaching Bank and individualized training using the resources of the Sacramento Medical Center or another university facility.

Family Practice Clerkships

Since the entire fourth year of the undergraduate curriculum in the School of Medicine at the University of California Davis is composed of elective courses, there is ample opportunity for students interested in family practice to participate in clerkships. Family practice clerkships, developed in conjunction with residency programs in the University of California Davis Affiliated Hospitals for Family Practice, are five to ten weeks in duration.

In a family practice clerkship, fourth-year medical students work under the supervision of faculty members and residents. They see and follow patients in the Family Practice Center, follow selected hospitalized patients, and assist with deliveries and other procedures. Students are expected to attend all teaching conferences, the Journal Club, meetings of the local chapter of the Academy of Family Physicians, and county medical society meetings.

Linkage with Family Nurse Practitioner Program

The Department of Family Practice at the University of California Davis conducts a regional family nurse practitioner program. This program is decentralized to teaching satellites conducted in conjunction with each residency site within the network. Efforts are made to facilitate the team approach to practice in each affiliated residency program. It is considered important that residents learn to share responsibility for patient care with other members of the health-care team, and the network residency

system forms an ideal structure for collaborative training with family nurse practitioners.

Research

An annual conference is held involving residents from all affiliated programs to report the results of research and innovations from the various programs within the network. In addition, residents are given the opportunity of sharing particular strengths and weaknesses of various programs and becoming involved in problem resolution.

As the network matures past the usual initial organizational problems, research and original projects are being encouraged for the residents. Various research tools are implemented in each residency program, including the problem-oriented record, data retrieval systems, medical audit, and library search capabilities using Medline. Faculty from the university are available to outlying affiliated residency programs for assistance with research design, the conduct of projects and data analysis.

Funding

The concept of shared funding of program costs has been utilized from the outset of development of the network residency program. Participating hospitals generally are responsible for payment of their own resident salaries and costs of their related Family Practice Centers; patient-care revenue in turn reverts to each hospital. State funding has been instrumental in providing partial payment of starting costs of some programs within the network. The university shares equally with each community hospital in paying the salary of the program director and supports through grant funding the development and implementation of the various administrative, educational, and evaluation support mechanisms which have been outlined. The great majority of teaching physicians participate in the residency program as clinical faculty members on a volunteer basis without remuneration.

Common Issues Concerning Affiliation

As the University Department of Family Practice enters exploratory discussions with an outlying community hospital regarding a potential affiliated family practice residency program, a number of basic issues are usually raised. Some of the more important issues which we have encountered are likely to be applicable elsewhere.

The medical staff of a community hospital without previous experience with affiliated residency programs may well feel some degree of threat concerning possible excessive university involvement in medical care and existing operations of the hospital. Such fears are generally unfounded but must be dealt with through frank discussion of the goals and expectations of each party to the proposed affiliation.

Since family practice residency training, in contrast to many other specialty residencies, is usually based in large part (or even exclusively) in the participating hospitals and related family practice center, the curriculum and schedule of teaching rotations has maximum impact on the community hospital. In many cases, resident rotations are integral to a portion of patient care services provided by the hospital. Responsibility for curriculum design, evaluation, and revision must, therefore, be clearly understood and agreed upon by both parties to the affiliation.

It can be anticipated that questions will be raised as to responsibility for evaluation and quality control of the teaching program. Who is primarily responsible for this function? How are standards set and how is the experience and performance of each resident monitored? How are problems in resident performance to be dealt with?

Questions will certainly arise concerning the resident selection process – how are residents to be selected, by what criteria, by whom? Specific items requiring clarification and mutual agreement are NIRMP matching numbers, application forms, and resident contracts. Clarification of responsibility in selection of teaching physicians likewise warrants discussion, including criteria for university teaching appointments.

A number of legal considerations must be considered in any proposed affiliation. An affiliation agreement must necessarily clarify responsibility for such matters as curriculum design, program evaluation, resident and faculty selection, malpractice liability of the residents and teaching physicians, employer-employee relationship of residents within the program, and appropriate procedures for research and publication.

Responsibility for funding various parts of the affiliated residency program inevitably needs careful definition. Who is to pay the resident salaries, faculty salaries, and expenses of the family practice center? How is billing for patient care services to be accomplished, and how is patient care revenue applied to program costs? How will grant proposals be initiated for extramural funding?

As the specifics of a proposed affiliated family practice residency program take shape, it is necessary to identify the specific administrative, educational, and evaluational support mechanisms required from the university to carry out the program. Once identified, questions must be raised concerning the availability of such resources and the logistics of extending these resources to the affiliated hospital, which may be located some distance from the university.

Advantages of the Network Approach

It is only natural that both parties to a possible affiliation take a hard look at "What's in it for us?" Clearly, any productive ongoing affiliated relationship between the university and the community hospital requires tangible gains to both parties.

The development and operation of a regional network of affiliated family practice residency programs requires a collaborative effort involving the university and outlying communities. Through formal affiliations in family practice with community hospitals, *participating hospitals* can realize a number of advantages:

1. assistance in residency program development through the pooled experience of other affiliated programs,
2. assistance with the establishment of educational objectives and evaluation of resident performance,
3. expansion of teaching resources

through visiting professor programs and self-instructional materials,
4. augmented effectiveness of teaching through teacher development programs,
5. increased potential to recruit well-qualified program directors and teaching physicians,
6. enhanced potential for recruitment of residents of high caliber because of university affiliation and associated student clerkship programs,
7. increased opportunities for resident electives, both at the university and elsewhere in the regional network program,
8. access to allied health personnel being trained in other university programs, such as family nurse practitioners, and
9. potential for increased funding for some program costs through university and/or grant funds acquired for the network.

At the same time, the *university* will also realize a number of benefits, including:
1. increased opportunity to contribute to the training of an appropriate number of well-qualified family physicians,
2. extension of continuing medical education to a larger area beyond the medical school itself,
3. increased clinical resources and learning opportunities for medical students, residents, and allied health personnel,
4. an augmented range of electives elsewhere in the network of affiliated hospitals for university-based family practice residents,
5. opportunities to participate in the development of new models of education and health-care delivery,
6. enhanced potential for collaborative research in family practice,
7. facilitation of improved linkages between primary, secondary, and tertiary care on a regional basis, and
8. potential for increased utilization of the university for consultation and referral.

The ongoing operation of a regional network of family practice residency programs should increase the quality of education in family practice at all levels – undergraduate, graduate, and postgraduate. Such programs should also tend to increase the quality of care provided in outlying communities. In the long run, it is likely that these decentralized programs will favorably influence physician supply and expand primary care resources within the region.

Discussion

Initial experience with the network program as outlined has been excellent. Network support mechanisms are being well utilized and accepted. The network functions as a dynamic and evolving equilibrium among participating programs, each of which is encouraged to develop its own individual strengths. A cooperative spirit among affiliated programs has been developed and maintained, and has helped to resolve operational problems as they have arisen.

Some examples of effective network functioning through cooperation of affiliated programs include the coordination of site selection for the locum tenens exchange of third-year residents; the involvement of all program directors in teacher development workshops being carried out at any one of the programs; effective planning by residents from all component programs of the annual research conference; sharing of audit criteria and results; and the joint development and testing of new network procedures, such as a manual system for data retrieval in family practice centers.

Despite the progress to date with the network program, continuing efforts are required to address several problem areas. There is a need for improved methods of recording of resident experience and evaluation of resident learning. There is considerable "down time" of faculty participating in the Visiting Professor program, and improved methods of communication within the network for consultation and teaching are needed. Separate NIRMP match numbers (not presently provided for integrated programs) would better facilitate matching first-year residents to individual programs within the network. There is a continuing need for extramural funding to further consolidate network operation as it matures.

It is recognized that there is no single blueprint for development of a regional network residency program in family practice. Network approaches elsewhere must be adapted to particular regional needs and resources as they exist. It appears, however, that many of the concepts described here can be applied in other parts of the country and that such an approach can result in closer and more productive interaction between the medical school and its region. Such an active partnership with affiliated community hospitals can contribute to the quality of medical education and patient care on a regional basis, as well as provide a systematic approach to address the physician maldistribution problem.

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