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## Non-Physician Providers as Clinical Providers in Cystic Fibrosis: Survey of US Programs

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### Abstract

**Background and Methods**—Non-Physician Providers (NPPs) including Nurse Practitioners (NP) and Physician Assistants (PA) are important members of CF care teams, but limited data exist about the extent NPPs are involved in CF care. A subcommittee was established by the CF Foundation to gather information about current involvement of NPPs. Surveys were sent to adult, pediatric and affiliate CF program directors (PDs) and NPPs working in US CF programs.

**Results**—Responses were received from 108 PDs (49% pediatric, 34% adult, 17% affiliate). Overall, 53% of the 108 programs had NPPs and 70% had or planned to hire NPPs. Reasons for NPP use included ideal clinical role (75%), expansion of services (72%) and physician shortage (40%). The survey collected 73 responses from NPPs (96% NPs, 4% PAs) who worked in pediatric (49%), adult (29%), affiliate (3%) or multiple programs (19%). Training occurred on the job in 88% and from prior CF experience in 21%. NPPs provided coverage in outpatient clinics (82%), inpatient care (64%), and weekend and/or night call (22%). In addition to clinical roles, NPPs are involved in education (95%), research (81%) and leadership (55%). The major obstacle reported by PDs and NPPs was billing with only 12% of programs reporting NPP salaries covered by billing revenue alone. Salary support included hospital support (67%), billing (39%), center grant (35%), and other grant/contract (25%). NPPs bill for outpatient and inpatient care in 65% and 28% of programs, respectively.

**Conclusions**—NPPs are working with physicians in many centers and have the potential to help meet the increasing clinical workforce demands. Further evaluation of financial issues is indicated to continue the support of NPP jobs in CF. Roles and expectations need to be clearly defined. Initial and ongoing training standards and opportunities should be explored.

### Keywords

workforce; physician assistant; advanced practice nursing; nurse practitioner

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## INTRODUCTION

Cystic fibrosis (CF) occurs in 30,000 people in the United States and in 70,000 individuals worldwide. One in 3500 children are born with CF in the US<sup>1</sup>. Most people in the US with CF receive care in a network of CF Centers accredited by the Cystic Fibrosis Foundation. Through aggressive treatment, the median survival has increased from 25 years of age in 1980 to 37 years in 2008<sup>1</sup>. As the CF population grows and ages, the demand for clinical care is expanding at a time when the nation is facing a shortage of physicians.

By 2025 the Association of American Medical Colleges (AAMC) anticipates a shortage of 124,400 physicians<sup>2</sup>. The physician population is also aging with 37.6% of active physicians 55 years-old or older<sup>3</sup>. This shortage is projected in both primary and subspecialty areas of clinical care<sup>4</sup>. Nurse practitioners (NPs) and physician assistants (PAs) are already providing care in some CF programs and are a potential source for expansion of the clinical workforce in CF.

NPs and PAs deliver clinical care in several areas including primary care, neonatal intensive care units, pediatric intensive care units, adult critical care units and subspecialties including surgery and cardiology. Data on one model of NP utilization in CF have shown pediatric NPs as inpatient care coordinators have reduced the time for completion of ancillary service consultation, reduced the length of stay, and improved both the patient and health care provider's satisfaction with care<sup>5</sup>. NPP utilization within CF programs has not been evaluated or tracked, and no data exist regarding the extent of involvement of NPPs in CF programs. The purpose of this study was to assess NPP involvement in CF programs and their role in CF clinical care.

## MATERIALS AND METHODS

The CF Foundation established a subcommittee including pediatric, adult, and affiliate CF program directors and NPs to examine the current involvement and roles of NPPs in CF care centers. Two surveys were developed: one for program directors and one for NPPs in CF programs accredited by the CF Foundation. IRB approval was obtained for the study. Data were collected and managed using REDCap Survey electronic data capture tools hosted at Vanderbilt<sup>6</sup>. The CF Foundation provided contact information for the network of CF program directors and NPPs. A complete NPP database was not available at the time of the survey, so program directors were also asked to forward the NPP survey to those providers working in their program. The surveys were distributed between February and March of 2009.

### Program Director Survey

Data were collected regarding program characteristics, physician workforce, and current and future planned use of NPPs. For those programs with NPPs, data were collected regarding NPP roles and scope of practice, physician supervision, billing and financial support, training of NPPs in CF, and obstacles and benefits to their involvement.

### NPP Survey

Data were collected regarding characteristics of NPPs, their roles and scope of practice, and physician supervision. In addition, information including regulations and restrictions of their billing practices and financial support for their positions, training received in CF, and obstacles and benefits for NPPs in CF clinical care were reviewed.

## RESULTS

### Program Director Responders

The CF Foundation reported 115 pediatric, 95 adult and 50 affiliate care centers<sup>7</sup>. Responses were received from 108 program directors: 53 pediatric, 37 adult and 18 affiliate programs which provided a response rate of 46% of pediatric programs, 39% of adult and 36% of affiliate programs. Academic institutions comprised 78% of responses, and an additional 14% were affiliated with an academic institution. The program sizes varied from 30–700 patients. Tables 1 and 2 include further demographic details.

### Non-Physician Responders

Seventy-three NPP responses were received. Of those, 4% were from PAs with the remaining 96% from NPs and Advanced Practice Nurses (APNs) (Tables 1 and 2). NPPs reported working in pediatric programs 36(49%), adult programs 21(29%), and affiliate programs 1(1%) with 14(19%) working in more than 1 program. Of those working in multiple programs, 9(64%) reported pediatrics as their primary program.

### CF Physician Workforce

Program directors had 1–33 years of experience as the CF program director, with a mean of  $11.5 \pm 7.7$  (mean  $\pm$  SD) years in their position. Ninety-five percent of the 108 program directors reported a single subspecialty with 5% reporting two specialties (Table 3). Pediatric pulmonology was the most common specialty with 64(59%) of responses and adult pulmonology second with 33(31%). In addition to program directors, the number of physicians involved in CF programs was  $3.9 \pm 2.8$ . The majority of programs had pediatric pulmonologists (54%) and/or adult pulmonologists (48%) involved in CF. There were  $1.85 \pm 1.45$  physicians per 100 patients in programs. By program type, adult programs had  $1.70 \pm 1.40$  physicians per 100 patients, pediatric programs had  $1.45 \pm 0.89$ , and affiliate programs had  $3.39 \pm 1.87$  physicians per 100 patients. Residents participated in 84% of programs and fellows in 57%.

The survey revealed that hospitalists are also care providers for CF patients in 33% of programs, predominantly providing inpatient care. This survey did not collect specific data regarding the role of hospitalists in CF care.

### CF NPP Workforce

NPPs were present in 53% of the 108 responding CF programs. Breakdown of NPPs based on program type and size are further illustrated in Figures 1 and 2. NPPs have been involved in CF programs for 1–25 ( $7.2 \pm 5.9$ ) years. Of the programs with NPPs, 69% have used NPPs less than 10 years, 24% have used them between 10–19 years and 7% have used NPPs for 20 years or more (Figure 3).

### NPP roles in CF

**Clinical**—The reasons for hiring NPPs included job appropriate for NPPs (75%), expansion of clinical services (72%), and physician shortage (40%). Separated into adult and pediatric data, reasons for NPP use included job appropriate for NPPs 75%/70% (adult/pediatric program directors), expansion of clinical services 55%/77%, and physician shortage 40%/50%. NPPs provide outpatient care in 84% of programs and inpatient care in 64% (Table 4). Outpatient care included routine clinic visits (82%), sick clinic visits (82%), and hospital follow-up clinic visits (84%). Inpatient care was provided by NPPs in 64% of programs, and 12% worked only in the inpatient setting. NPPs reported covering call for weekend (22%)

and weeknight (23%). 81% of NPPs provide clinical care for pulmonary diseases in addition to CF.

**Non-clinical**—95% of NPPs had an educational role, 81% were involved in research and 55% had an additional leadership role. Seventy-one percent of NPPs reported working in a program with residents and 53% worked with fellows. Education was provided for patients and families by 92% of the NPPs, medical trainees by 56% of the NPPs, and NPP trainees by 41% of NPPs. The breakdown of NPP clinical and non-clinical roles is included in Table 4. 16% of NPPs have an academic appointment.

### Training

NPPs received training in CF clinical care through a combination of on the job training (88%), previous work in a CF center prior to obtaining NPP degree (21%), and other forms of training (7%). This survey did not gather specific data on the training received by NPPs.

### Supervision

Physician supervision occurs more frequently for inpatient visits than outpatient visits. The reasons cited for direct physician supervision of inpatient and outpatient CF clinical care by NPPs varied between programs but severity of disease was the most common (Figure 4). Similar results were reported by adult and pediatric program directors: severity of disease 46%/43% (adult/pediatric program directors), practice regulations 8%/18%, billing 20%/18%, style of practice 33%/41%, and experience of NPP 8%/20%. NPPs reported that physician supervision and support was good with 3% describing the supervision as too much. No NPP reported inadequate supervision or support. Supervision of the NPPs was provided by one or more of the following sources: all physicians involved in CF care for 55(75%) of programs, a single CF doctor for 18(25%), and senior NPPs for 2(3%). Forty-eight percent of NPPs reported a physician was always in clinic with them, and 37% reported that a physician was available by pager if needed. The remaining 11 NPPs either did not perform outpatient care or reported another model of physician supervision.

Program directors reported that patients and families were comfortable overall with NPP care although 34% believe families would also like to see the physician during NPP visits (Figure 5). No program directors reported that patients and families were uncomfortable with NPP care. Similar results were noted between adult and pediatric program directors with 45%/60% (adult/pediatric program directors) reporting families and patients were comfortable with NPP care the majority of the time, 45%/30% reporting comfort with NPP care but would also like to see a physician, and 5%/10% reporting comfort with NPP care for limited visits.

### Billing and Financial support

NPPs were allowed to bill for outpatient services (65%) more often than inpatient services (28%) (Figure 6). In adult programs, 55% of NPPs billed for outpatient services compared with 77% pediatric and 71% affiliate programs. NPPs billed for inpatient services in 25% of adult programs, 30% pediatric and 19% affiliate programs. NPPs reported restrictions on their billing at the state level (25%), from their hospital (29%), and through third parties (32%). The data collected regarding billing are weakened since twenty six percent of the physicians did not know if NPPs could bill for inpatient services.

Financial support for NPP positions was generated by billing alone in 12% of programs. Billing completely covered the NPP's salary in 43% of affiliate programs compared to 10% of pediatric and 5% of adult programs. Other support was provided by a combination of

sources including the hospital (67%), center grant (35%) and other grants or contracts (25%).

### Future Plans

Program directors reported active recruitment for CF physicians in 39%(42/108) of programs, with 81%(34/42) reporting difficulty recruiting physicians. Physician recruitment was occurring in 45% of pediatric, 38% of adult and 22% of affiliate programs. Of those programs, 88% of the pediatric, 71% of the adult and 75% of the affiliate programs reported difficulty recruiting physicians.

Seventy percent of the 108 CF programs (81% adult, 72% pediatric, 44% affiliate programs) had plans to begin or continue to use NPPs in the clinical care of CF patients. NPP recruitment was in process at 12(11%) of the 108 programs, with 9% of pediatric programs and 19% of adult programs actively recruiting. Of those 12 programs, 8(67%) reported difficulty filling NPP positions. This survey did not collect data regarding the specific problems encountered during recruitment of physicians or NPPs.

## DISCUSSION

This study documents that NPPs are providing care for CF patients throughout the US and are filling vital roles in both clinical and non-clinical aspects of CF programs of all sizes and types. NPPs educate patients and families in addition to medical trainees including residents, fellows and NPP trainees. They also participate in CF research as well as quality improvement and leadership within their institutions. A majority of program directors plan to continue NPP involvement. Several obstacles to incorporating NPPs into CF care programs were identified including billing and financial support as well as training in CF. Increasing the NPP workforce in CF requires overcoming these obstacles.

The expansion of NPPs in CF is timely since the physician workforce as a whole is facing a shortage. In particular, access to pediatric subspecialty care is limited in the US due to several factors including an insufficient number of subspecialists in pediatrics in conjunction with an increasing demand for these services and inefficient systems for providing pediatric primary and subspecialty care<sup>8</sup>. When comparing the number of diplomats certified in pediatric pulmonology by the American Board of Pediatrics, the 2010–2011 workforce data reveals that 17.7% of the workforce is aged 31–40 compared with 30.4% of the workforce between the ages of 56–65. The average age of pediatric pulmonologists is 51.7 years<sup>9,10</sup>. The number of physicians entering pediatric pulmonology is overall less than the number reaching the age of retirement. With a larger proportion of pediatric pulmonology physicians at the age of 56–65 compared with those entering the subspecialty at 31–40 years of age, the ability to sustain an adequate pediatric pulmonology workforce is threatened. At the same time, the absolute number of NPs has been increasing over the past 20 years<sup>11–13</sup> with projections that NPs will increase from 90,000 in the year 2000 to 135,000 in the year 2015<sup>14</sup>. The anticipated shortage of physicians may be alleviated by developing an extended role of NPPs in providing clinical care<sup>2,15–17</sup>. A problem identified by this study was difficulty recruiting both physicians and NPPs into CF programs. While the overall number of NPs is increasing, those NPs choosing to specialize in pediatrics is remaining constant<sup>18</sup>. In addition, the majority of pediatric NPs work in primary care<sup>19</sup>. As the physician shortage increases, recruitment and retention of NPPs into subspecialties will be essential to provide care in CF.

Possible options to increase recruitment of NPPs into CF care include creating clinical rotations within CF programs for NPPs in training, and expanding CF training and curriculum for NPPs already in practice. In order to increase recruitment of NPPs, funding

for their positions must be obtained. Physicians and NPPs alike reported difficulties with NPP billing. One obstacle noted was the decreased reimbursement of clinical encounters staffed by NPPs compared with that of physicians. In addition, local, institutional, third party payers, state and national agencies place varying restrictions on the services for which NPPs can bill. Lower reimbursement and restrictions on NPP billing limits the ability of the NPP to cover the salary with revenue from billing alone. Due to the variations and complexities in billing between institutions and across the US, we were unable to generate summary data about billing and funding problems. Most CF Centers are associated with an academic institution; therefore one limitation of this study is that barriers to NPP use within an academic setting might be different when compared with a private practice setting. Since this survey was not designed to fully evaluate billing regulations and reimbursement of NPPs, future research in this area would be beneficial in both academic and private practices. In addition, the anonymity of the survey did not allow identification of regional variations in obstacles encountered with NPPs. The extent of physician supervision of NPPs is also driven by the variability in state regulations. While not evaluated in this survey, state and local regulations in billing and physician supervision may limit the extension of the NPP role in some settings. A lack of knowledge or understanding of these regulations also provides a barrier to implementation of a NPP role in a clinical setting.

Raising awareness of the contributions and achievements of NPPs in CF programs within their institutions is needed to underscore the value of the NPP in chronic disease settings such as CF. As NPPs are recognized as critical providers of medical care, further definition of their scope of practice is a challenging but necessary process to continue to improve their contribution to the multidisciplinary CF team. Program director responses to this survey indicate that families and patients are comfortable with the care received from the NPPs however, a large proportion would either prefer to have a physician in addition to the NPP or would see the NPP for only limited visits. These results suggest that NPPs supplement but do not completely replace the care provided by physicians within the CF programs. NPPs receive training that differs from training received by physicians. These differences in training may provide NPPs with skills which can enhance the care provided by a CF program. Provider versatility can be a huge benefit to a program, but caution must be used when determining how the NPP will function. Less defined scopes of practice may lead to NPPs' feeling overworked and unsatisfied with their jobs. Ensuring that NPPs are functioning at their full level of training optimizes the use of this valuable resource and improves job satisfaction and retention.

In addition to matching duties with training and scope of practice, formal CF training was limited since many NPPs had only received on the job training. On the job training often does not prepare NPPs for the less common clinical manifestations of CF, and formal training in CF both initially and as part of a continuing education program may better prepare NPPs for their role as CF providers. The annual North American CF Conference (NACFC) is a commonly accessed venue for continuing education in CF, but in past years, the NACFC provided few resources and courses developed for NPs and PAs. Future surveys of the training needs for NPPs in CF are needed to develop opportunities and ongoing educational activities to meet this need.

This survey documented that NPPs are providing clinical care as well as performing other important roles in CF programs across the US. Benefits of their involvement in CF programs include expansion of services, increased flexibility of outpatient clinic schedules, and coordination and continuity of care. NPPs also fill educational, research and leadership roles within their institutions. As the demand for CF clinical providers increases, NPPs are alleviating a portion of this demand on CF teams. A focus on NPP training in CF care as



well as recruitment and retention of the NPP workforce in CF programs will be essential to continue to meet the projected need for CF providers.

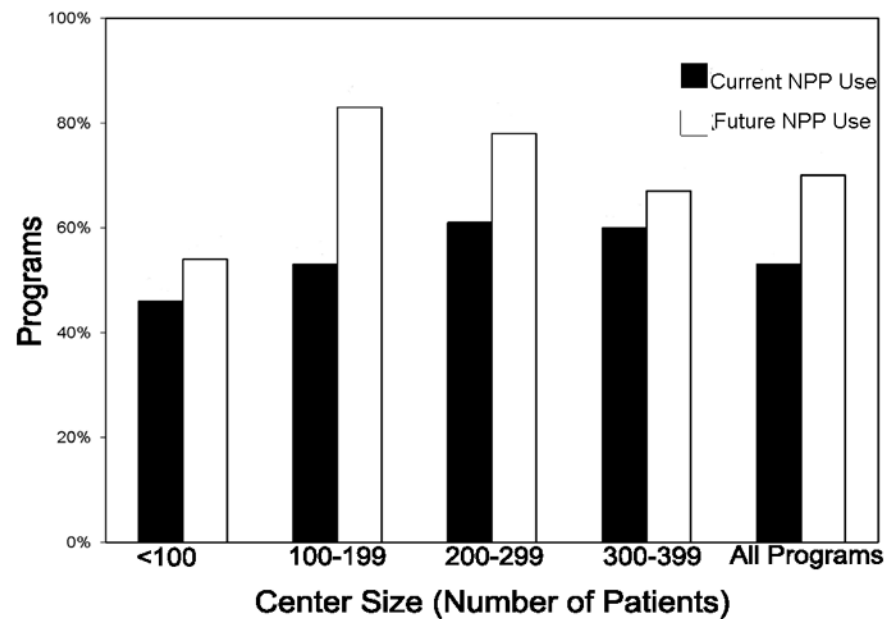
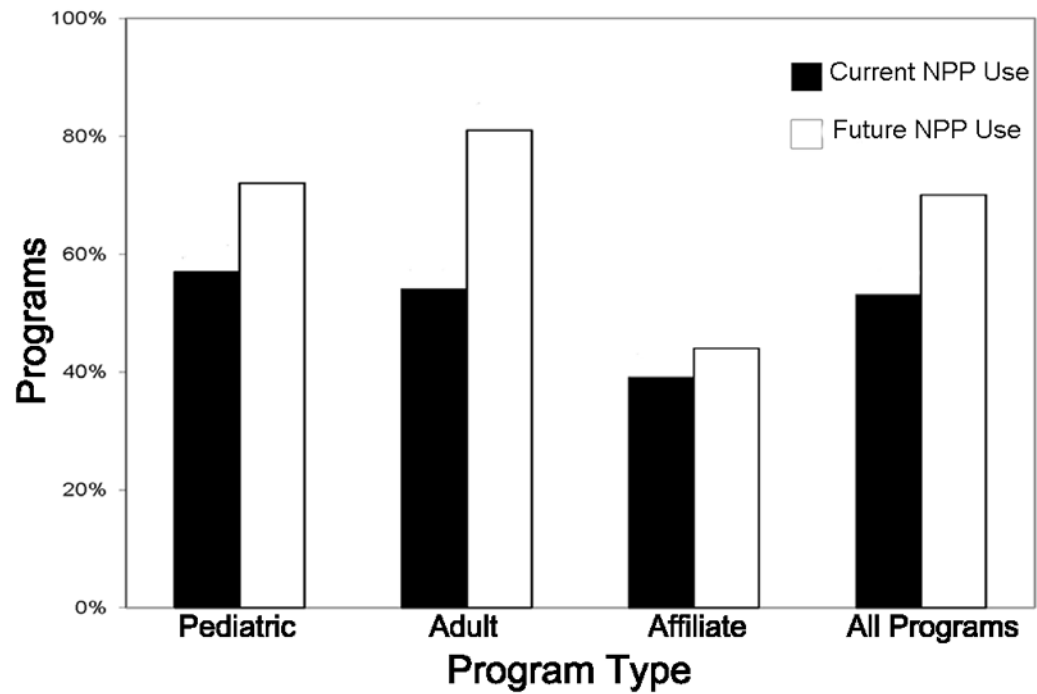
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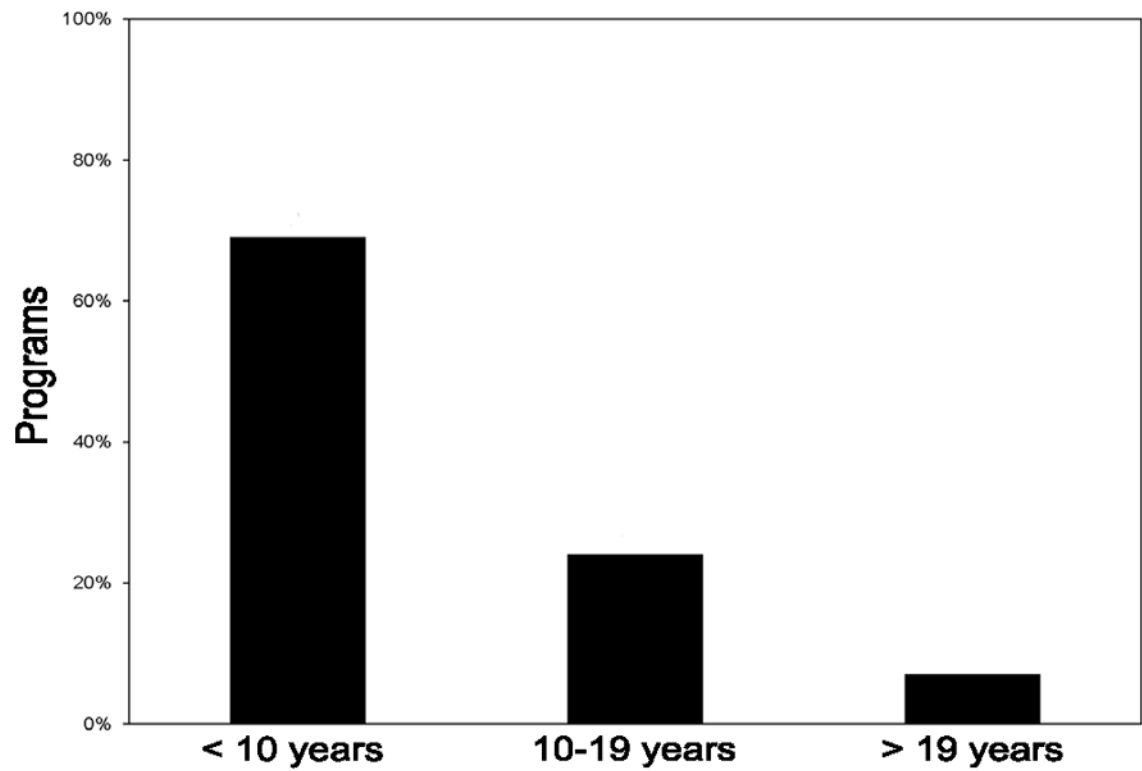
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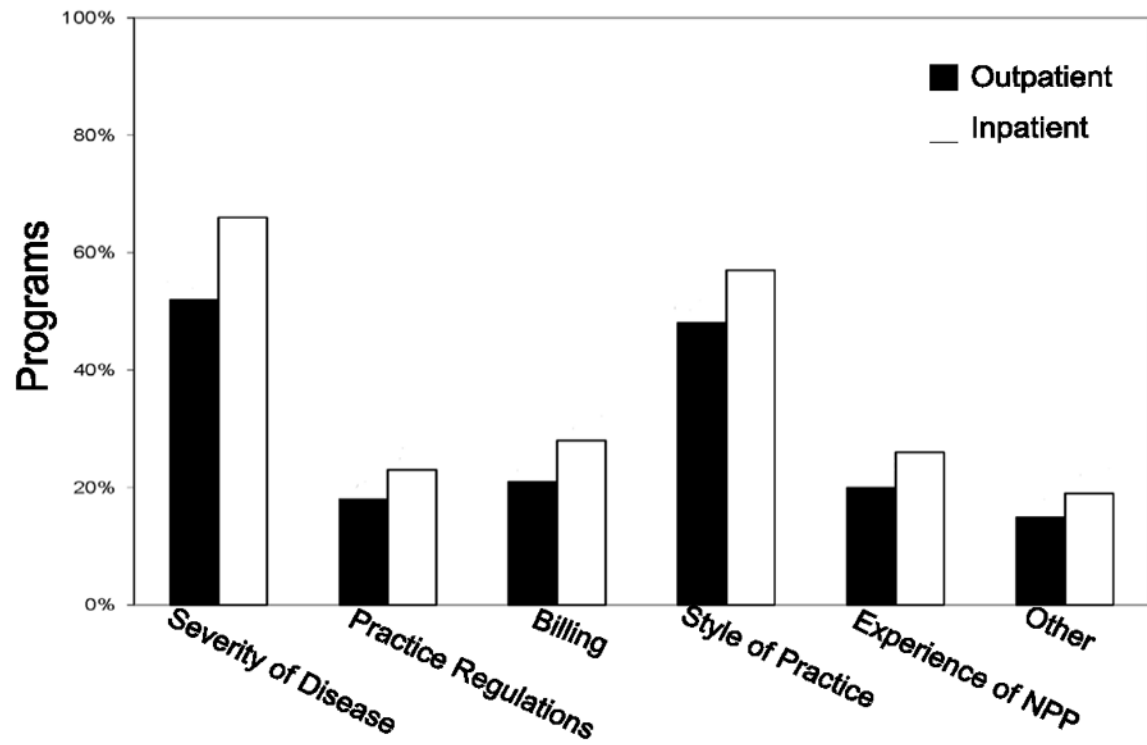
**Figures 1 and 2.**

Current and Future Involvement of NPPs by CF Program Type and Program Size (n = 108 program directors)

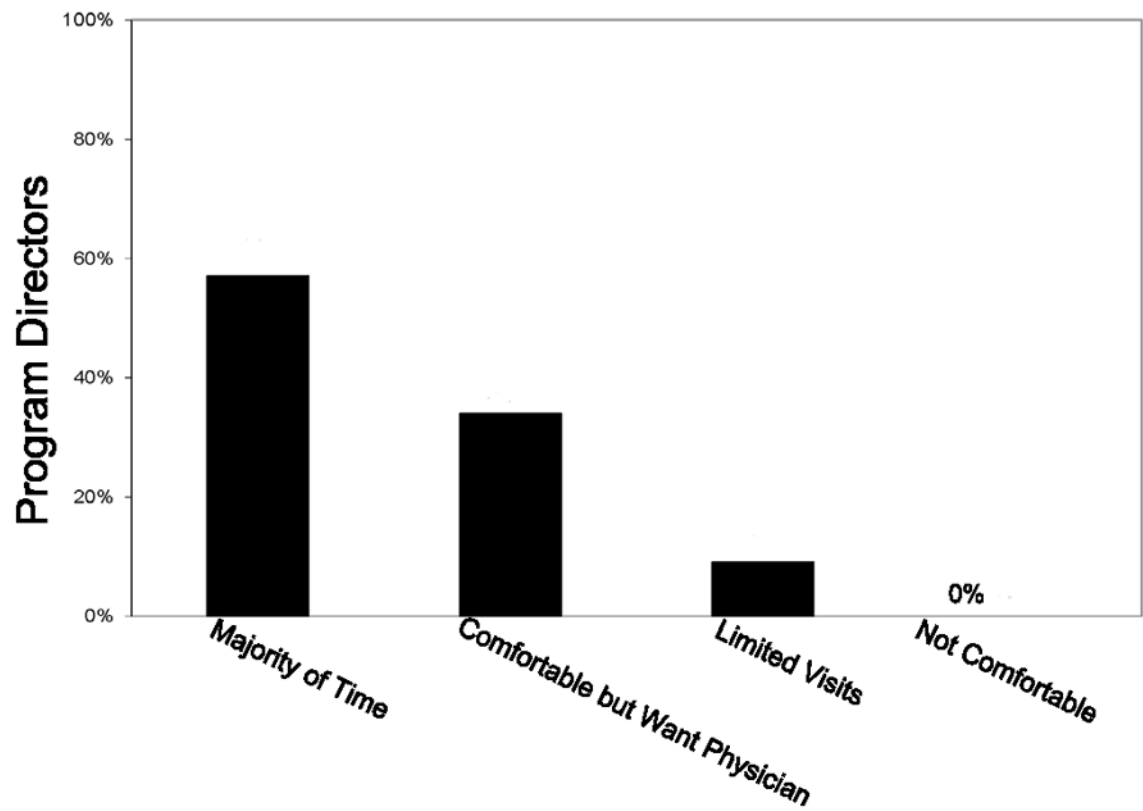




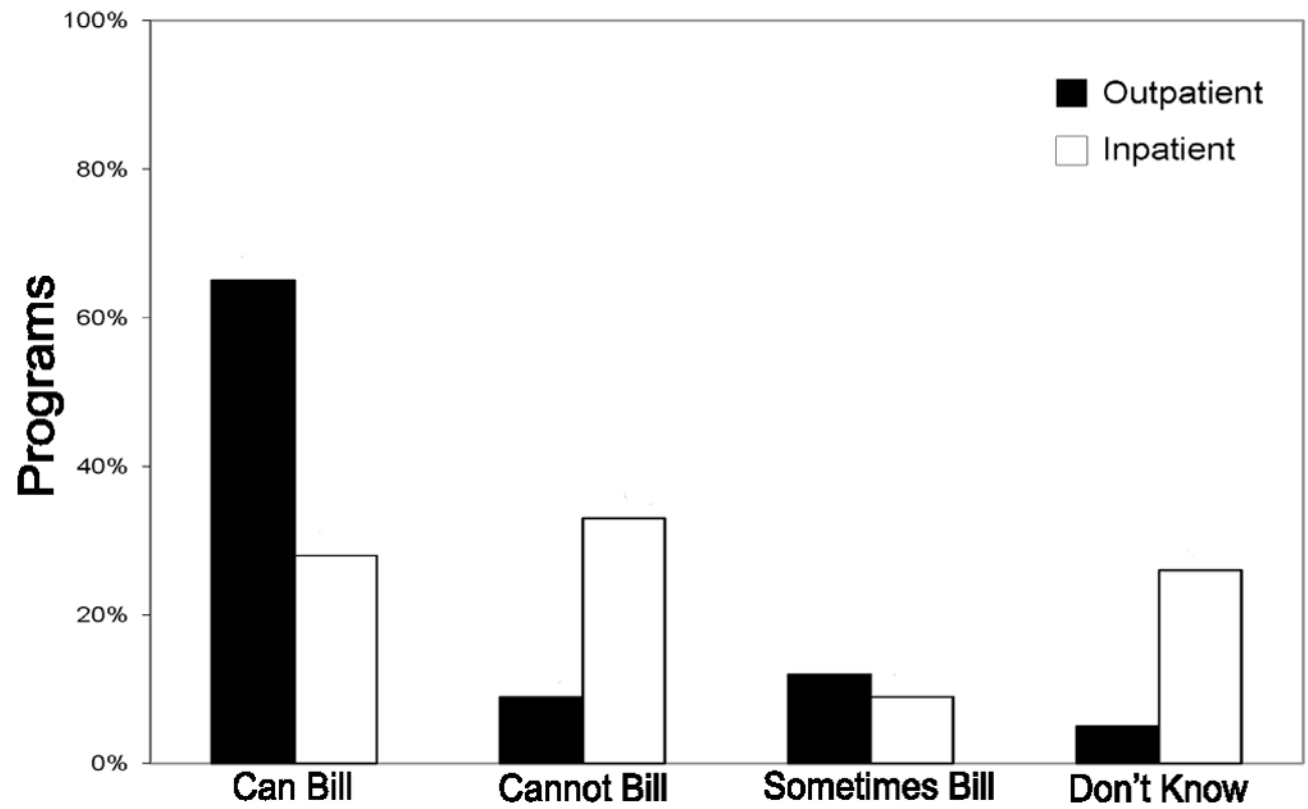
**Figure 3.** Duration of NPP Involvement by CF Programs. 69% of the programs currently with NPPs have been using them as clinical providers for less than 10 years.



**Figure 4.** Factors Determining Physician Supervision of NPPs (outpatient NPPs n = 61; inpatient NPPs n = 47). Multiple responses were allowed, and multiple factors were reported by the respondents rather than single answers.



**Figure 5.**  
Assessment of the Comfort Level of Patients and Families with NPP Clinical Care  
(responses from 56/57 program directors currently with NPPs).



**Figure 6.**  
NPP Billing for CF Clinical Care: Program director responses regarding NPP billing for inpatient (n = 55) and outpatient (n = 54) care.

**Table 1**

## Program Demographics

<b>PROGRAM TYPE</b>	
	<b>NUMBER OF PATIENTS (mean±SD)</b>
Pediatric	38–500 (199±110)
Adult	30–700 (198±153)
Affiliate	35–150 (67±35)
All Programs	30–700 (177±128)
<b>ACADEMIC STATUS</b>	
(n=108)	% (n)
Academic	78% (84)
Academic Affiliation	14% (15)
Not academic	8% (9)
Residents	84% (86)
Fellows	57% (59)

**Table 2**

## Survey Participant Demographics

<b>PROGRAM DIRECTOR RESPONDANTS</b>	
	<b>%(n)</b>
Pediatric	49%(53)
Adult	34%(37)
Affiliate	17%(18)
Total	100%(108)
<b>NON-PHYSICIAN PROVIDER RESPONDANTS</b>	
	<b>%(n)</b>
<b>PROGRAM TYPE</b>	
Pediatric	49%(36)
Adult	29%(21)
Affiliate	3%(2)
More than one program	19%(14)
Total	100%(73)
<b>CREDENTIALS</b>	
NPs	96%(70)
PAs	4%(3)



**Table 3**

## Specialties of Program Directors in CF Programs

Specialty	%(n)
Pediatric Pulmonology	59%(64)
Adult Pulmonology	31%(33)
Pediatrics	5%(5)
Internal Medicine	3%(3)
Medicine/Pediatrics	3%(3)
Pediatric Gastroenterology	2%(2)
Other	3%(3)

**Table 4****NPP Roles in CF Programs**

	<b>%(n) of NPPs</b>
<b>CLINICAL</b>	
Outpatient:	84%(61)
Routine	82%(60)
Sick	82%(60)
Hospital Follow-up	84%(61)
Inpatient:	64%(47)
<b>LEADERSHIP</b>	
Newborn Screening	25%(18)
Lung Transplant	8%(6)
Quality Improvement	38%(28)
<b>RESEARCH</b>	
Registry Data Entry	44%(32)
Clinical Research Trial	50%(40)
Research Coordinator	22%(16)
<b>EDUCATION</b>	
Families and Patients	92%(67)
Medical Trainees	56%(41)
NPP Trainees	41%(30)