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**The Telehealth Network Grant Program (TNGP)**

**Office of the Advancement of Telehealth  
Office of Rural Health Policy  
Health Resources and Services Administration**

**A Report Summarizing Performance of the TNGP**

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Appreciation is further extended to the Cecil G. Sheps Center for Health Services Research at the University of North Carolina for their extensive efforts in the creation of the data sets for this report.

## GLOSSARY OF TERMS

**Consulting practitioner:** Practitioner who provides care for a referred patient.

**Encounter:** An interaction between a health care provider and a patient, during which the health care provider uses telehealth technologies to deliver clinical care at a distance.

**Formal supervision and mentoring:** Supervision and mentoring requirement by professional practice regulations or educational programs, including medical residency and medical schools, nursing and physician assistant schools, pre-medical high school programs, and other allied health professional training programs.

**Informal supervision and mentoring:** Supervision of clinicians that is not required to meet formal education requirements. This includes sessions required to meet regulatory practice requirements, as well as supervision/advice requested by remote practitioners.

**Preceptor:** An expert or specialist, such as a physician, who gives practical experience and training to a student, especially of medicine or nursing.<sup>1</sup>

**Interactive encounter:** Real-time interaction between a patient and a health care provider.

**Non-clinical uses of telehealth:** Uses of telehealth for purposes beyond clinical patient care including grand rounds, administrative meetings, health education, and support groups, which support clinical telemedicine and improve the efficiency of health systems.

**Referring practitioner:** Health care provider who refers a patient for telehealth services.

**Store-and-forward encounter:** Transmission of static images or audio-video clips to a remote data storage device, from which they can be retrieved by a health care provider for review and consultation at any time, obviating the need for the simultaneous availability of the consulting parties and reducing transmission costs due to low bandwidth requirements.<sup>2</sup>

**Telehealth:** The use of electronic information and telecommunications technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health, and health administration.<sup>3</sup> Included in this definition are patient counseling, case management, and supervision/preceptorship of rural medical residents and health professions students when such supervising/precepting involves direct patient care.<sup>4</sup>

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<sup>1</sup> The American Heritage® Medical Dictionary Copyright © 2007, 2004 by Houghton Mifflin Company.

<sup>2</sup> <http://www.hrsa.gov/ruralhealth/about/telehealth/glossary.html#t>.

<sup>3</sup> <http://www.hrsa.gov/ruralhealth/about/telehealth/glossary.html#t>.

<sup>4</sup> <http://www.hrsa.gov/ruralhealth/about/telehealth/glossary.html#t>.

## EXECUTIVE SUMMARY

The Telehealth Network Grant Program (TNGP) is a key telehealth program administered by the Office for the Advancement of Telehealth (OAT). OAT is part of the Office of Rural Health Policy (ORHP), located within Health Resources and Services Administration (HRSA) at the U.S. Department of Health and Human Services. OAT promotes the use of telehealth technologies for health care delivery, education, and health information services to increase access to quality health care and help meet the needs of underserved populations.

*Telehealth* is the use of electronic information and telecommunications technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health, and health administration.<sup>5</sup> Through the implementation of a telehealth model, communities challenged by barriers to accessing health services can benefit from increased health coverage and increased numbers of health providers per capita.

Every six months, OAT requires that TNGP grantees report data for a series of performance indicators to monitor TNGP grantee performance for the preceding six-month period. Grantees report on these indicators by entering program data into a Performance Improvement Measurement System (PIMS), a secured online performance monitoring and reporting system. The performance indicators address four major telehealth goals, which reflect integral programmatic emphases of the TNGP:

- I. Improving access to needed services
- II. Reducing rural practitioner isolation
- III. Improving health system productivity and efficiency
- IV. Improving patient outcomes

### ***Report Purpose***

This report summarizes how TNGP grantees performed relative to these indicators for fiscal years 2004-2010 and aims to:

- Describe TNGP grantee performance, so that OAT can enhance TNGP planning and continuous quality improvement efforts;
- Increase awareness and understanding about the TNGP activities to invested constituencies, including Congressional audiences, ORHP, HRSA, TNGP grantees, health care providers and grantee communities; and
- Demonstrate how the investment of federal funds in the TNGP has benefitted underserved communities through increased access to services and improvements in health system productivity.

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<sup>5</sup> <http://www.hrsa.gov/ruralhealth/about/telehealth/glossary.html#t>.

## ***Report Findings***

Grantee performance results indicate that:

- **Telehealth encounters through the TNGP bring many needed services to rural communities.** Over 760,000 telehealth encounters occurred from 2004-2010 because of the availability of TNGP grants. An encounter is an interaction between a health care provider and a patient, during which the health care provider uses telehealth technologies to deliver clinical care at a distance.
- **TNGP grantees provide a wide range of services via telehealth in rural communities.** Fifty five (55) types of services are offered in communities. The most commonly offered services are:
  - Adult Psychiatry
  - Chronic Disease Counseling
  - Clinical Pharmacology/Clinical Pharmacy
  - CT and MRI Interpretations
  - Diabetes Clinical Services
  - General Radiology
  - Home Health
  - Pediatric/Adolescent Psychiatry
  - Routine Adult Cardiology
- **From 2004-2010, there was ongoing participation in the TNGP telehealth networks of clinicians as well as recruitment of new practitioners.** In each year of funding, the majority of clinicians referring patients participated in telehealth for the entire reporting year. Grantees were also able to recruit new referring and consulting practitioners to serve patients via telemedicine.
- **The TNGP enables patients to be served in a wide variety of settings.** Hospital outpatient (34.6%) and patient's home (32.1%) setting represented the greatest proportion of encounters by setting.
- **The TNGP allows students/trainees in health care professions who are located in isolated areas to receive mentoring and training.** Over 33,000 formal and informal mentoring sessions occurred as a result of the availability of the TNGP from 2004-2010.
- **Telehealth encounters through the TNGP saved over 38 million dollars in nursing resources on home care visits and patient travel from 2004-2010.** The TNGP saved patients approximately \$41,700,000 in travel costs and approximately \$352,000 in nursing resources for home care visits.
- **The TNGP is ensuring the success of telehealth programs.** 98% of TNGP grantees sustained the telehealth programs funded through TNGP.

The findings in this report will help inform efforts by OAT to monitor and improve the performance of TNGP grantees and enhance ongoing program planning and monitoring activities. The TNGP offers a promising model of telehealth services that can help address the challenges of limited access to health care in rural and underserved areas.

# CHAPTER 1

## PROGRAM OVERVIEW

The Telehealth Network Grant Program (TNGP) is a key telehealth program administered by the Office for the Advancement of Telehealth (OAT). OAT is part of the Office of Rural Health Policy (ORHP), located within Health Resources and Services Administration (HRSA) at the U.S. Department of Health and Human Services. OAT promotes the use of telehealth technologies for health care delivery, education, and health information services to address the needs of underserved populations in rural and remote areas.

*Telehealth* is the use of electronic information and telecommunications technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health, and health administration. This includes patient services such as counseling, case management, and supervision/preceptorship of rural medical residents and students of health professions when such supervising/precepting involves direct patient care.<sup>6</sup>

Telehealth offers promising solutions to improve poor health outcomes associated with rural populations. Rural communities often face barriers to health care. Through the implementation of the telehealth service model, these barriers can be diminished. Telehealth can bring a variety of medical specialty services to patients in many settings, helping to improve access to needed services, reduce rural practitioner isolation, improve health system productivity and efficiency, and improve patient outcomes. Rural communities can benefit from improved health outcomes as telehealth improves access to health care services that were not available before telehealth was offered.

The TNGP has four telehealth goals that reflect integral programmatic emphases:

- I. Improving access to needed services
- II. Reducing rural practitioner isolation
- III. Improving health system productivity and efficiency
- IV. Improving patient outcomes.

The primary goal of the TNGP is to demonstrate how telehealth networks can improve access to quality health care services in underserved communities.<sup>7</sup> Grantees are awarded up to \$250,000 per year per grantee, and grants are awarded for 3 year periods. During this reporting period, three cohorts, each representing a 3-year period for grantees, were successfully funded by the OAT TNGP program. For cohort one, 5 million dollars were available to 15 grantees. In cohort two, 4.25 million dollars were available to 16 grantees. Finally, in cohort three, 3.43 million dollars were available to 17 grantees.

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<sup>6</sup> <http://www.hrsa.gov/ruralhealth/about/telehealth/glossary.html#t>.

<sup>7</sup> HRSA (2011). Office of Rural Health Policy 2010 Annual Profile. <http://www.hrsa.gov/ruralhealth/pdf/Annual%20Report/annualreport2010.pdf>.

This report presents data collected from TNGP grantees funded by OAT from the years 2004-2010.<sup>8</sup> TNGP grantee activities, settings, populations reached, services rendered, and other factors related to this grant program, in accordance with federal mandate, are also described. This report is designed to (1) apprise Congressional audiences and other OAT constituencies about TNGP grantee activities and (2) inform TNGP efforts to enhance program monitoring and programmatic decision-making.

### ***GPRA and Performance Reporting Requirements for TNGP Grantees***

Per the Government Performance and Review Act (1993) (GPRA), all federal agencies must develop strategic plans that contain quantifiable measures of each program's progress in meeting stated goals and objectives. To report the impact and effectiveness of the TNGP to Congress, OAT convened an advisory committee in 2003 to provide guidance on the development of performance indicators and a performance improvement measurement system. The advisory committee was comprised of telemedicine program directors, federal officials, and contracted staff. The advisory committee was charged with the development of performance indicators that would accurately reflect TNGP goals and program activities.

TNGP grantees and the advisory committee collaborated to develop a series of major performance indicators for program monitoring and continuous quality improvement. These indicators reflect significant programmatic emphases including advancing the effective practice of telehealth to achieve grantee program goals and the four goals of telehealth. A list and operational definition of these performance indicators is available in Appendix 1.

TNGP grantees report on each of these performance indicators bi-annually, using the Performance Improvement Measurement System (PIMS), a secured on-line performance monitoring and reporting system.

***Data Reporting Periods.*** TNGP grantees report performance data for two data reporting periods each fiscal year, which account for a full reporting cycle. During these bi-annual reporting periods, data are reported by grantee programs for the previous six months of activity.

***Considerations in Interpreting Findings.*** This report covers seven years of grantee reporting and summarizes data across three consecutive TNGP cohorts. Several factors impinge on multi-cohort data, including varying grantee guidance and specification requirements provided in the Funding Opportunity Announcements, different funding amounts, and differences in grantee service array and service population. These fluctuations help account for apparent differences between cohorts and do not necessarily reflect the overall impact of the full seven (7) years of grant funds awarded by the TNGP.

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<sup>8</sup> The report was completed with the assistance of the Cecil G. Sheps Center for Health Services Research at the University of North Carolina through cooperative agreement number U1GRH07633.

Additionally, fluctuations in data during the first year of each cohort are partly due to the effect of no-cost extensions.<sup>9</sup> The first year of a three-year grant cycle includes both new grantees and grantees from the previous cohort who have received a no-cost extension. Grantees that received no-cost extensions or consecutive awards may have more established telehealth programs than new grantees.

Table 1.1 shows the number of grantees and number of sites funded for each year from 2004-2010. The number of grantees funded for each TNGP grantee cohort has increased slightly from cohort 1 (15) to cohort 3 (17). Each TNGP grantee represents a telehealth network, each of which has anywhere from 2 to 100 sites within their network that they are able to serve as a result of grant support. The majority of these sites are in rural areas.<sup>10</sup> A list of all programs contributing data to this report is available in Appendix 2.

Table 1.1 also shows the number of grantees that overlap cohorts as a result of no-cost extensions. No-cost extensions can only last up to 12 months after the grantee's project period ends. However, grantees on a no-cost extension are still required to provide their performance data into the OAT PIMS tool on a semi-annual basis.

It is important to note that data collection for the third grant period was still under way during the completion of this report. Therefore, data for cohort 3 are only available for funded grantee year 2010. Additionally, all grantees in Cohort 3 had either established telehealth programs or had been grantees in earlier TNGP cohorts. Therefore, these grantees already had infrastructure and existing systems in place when they received Cohort 3 funding.

**Table 1.1 Programs and Sites Funded by Reporting Year, 2004-2010**

	<b>COHORT 1</b> 9/1/03 – 8/31/06			<b>COHORT 2</b> 9/1/06 – 8/31/09			<b>COHORT 3</b> 9/1/09 – present
<b>Funded Year</b>	2004	2005	2006	2007	2008	2009	2010
<b># of Grantees</b>	15	15	15	16	16	16	17
<b># of Sites</b>	274	311	339	637	690	711	921
<b># of Grantees on No Cost Extension (NCE)</b>	11	0	0	8	0	0	7
<b>Total # of Grantees Reporting in PIMS</b>	26	15	15	24	16	16	24

<sup>9</sup> The no-cost extension provides the grantee extra time beyond the original project period in order to complete the project goals and objectives with the remaining grant funds. Since newly funded projects often face challenges during project start-up, the no-cost extension is most often approved to extend the project period. Grantees may request to extend the project period for up to twelve months beyond the original project expiration date shown on the Notice of Grant Award.

<sup>10</sup> ORHP uses the Office of Management and Budget's (OMB) definition of rural to determine if sites are in rural areas.

## CHAPTER 2

### IMPROVING ACCESS TO NEEDED SERVICES

Telehealth can allow for increased access to needed medical services for patients in remote locations.<sup>11</sup> TNGP-funded services enhance service availability in rural communities characterized by a scarcity of resources. In fact, in some communities, TNGP-funded telemedicine provides the only access to certain medical services for patients. Without the availability of TNGP-funded telemedicine services in these areas, patients would *not* be able to receive these services within their communities and would have to travel extensively to obtain needed health care.

Telemedicine can be provided in the form of consultations between clinicians and patients as well as between clinicians consulting on a patient. Each instance of patient care is defined as an “*encounter*.” Types of encounters vary by specialty and can occur either as *interactive* or as *store-and-forward* encounters:<sup>12</sup>

- Interactive encounters are real-time interactions between patient and provider. This would include phone conversations and online communications. Videoconferencing equipment is now one of the most common forms of interactive telemedicine. Peripheral devices can also be attached to computers or video-conferencing equipment which can aid in an interactive examination. Telemedicine equipment has become a lot cheaper over the last 10 years, allowing for more cost-effective direct two-way audio and video streaming between patient and provider.
- By contrast, store-and-forward encounters involve acquiring medical data (e.g. images, biosignals, etc.) and then transmitting (“forwarding”) this data securely to a doctor or specialist for him/her to assess at their convenience. Their assessment is then transmitted back. Such encounters can occur between doctors and remote specialists, or between patients and doctors/specialists. It does not require the presence of both parties at the same time, as an interactive encounter would. The store-and-forward process requires the clinician to rely on medical history reports and audio/video/digital information in lieu of a real-time examination.

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<sup>11</sup> Schlachta-Fairchild, Loretta, Victoria Elfrink, and Andrea Deickman. "Patient Safety, Telenursing, and Telehealth." Ed. Ronda Hughes. *Patient Safety and Quality: An Evidence-based Handbook for Nurses*. Rockville, MD: Agency for Healthcare Research and Quality, U.S. Dept. of Health and Human Services, 2008.

<sup>12</sup> These distinctions are important to grantees because the Centers for Medicare and Medicaid Services (CMS) require that telemedicine providers conduct interactive encounters as a condition of payment. Store-and-forward encounters do not meet the definition of telemedicine for CMS, except when the originating site of the encounter is Alaska or Hawaii. More information can be found at: <http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/TelehealthSrvcsfctst.pdf>.

Although many services can be provided through either interactive or store-and-forward encounters, services in certain specialties, such as adult psychiatry, genetics counseling, and obstetrics/gynecology, are more likely to be provided in an interactive manner. In specialties such as dermatology, radiology and pathology, store-and-forward technology is the preferred vehicle.

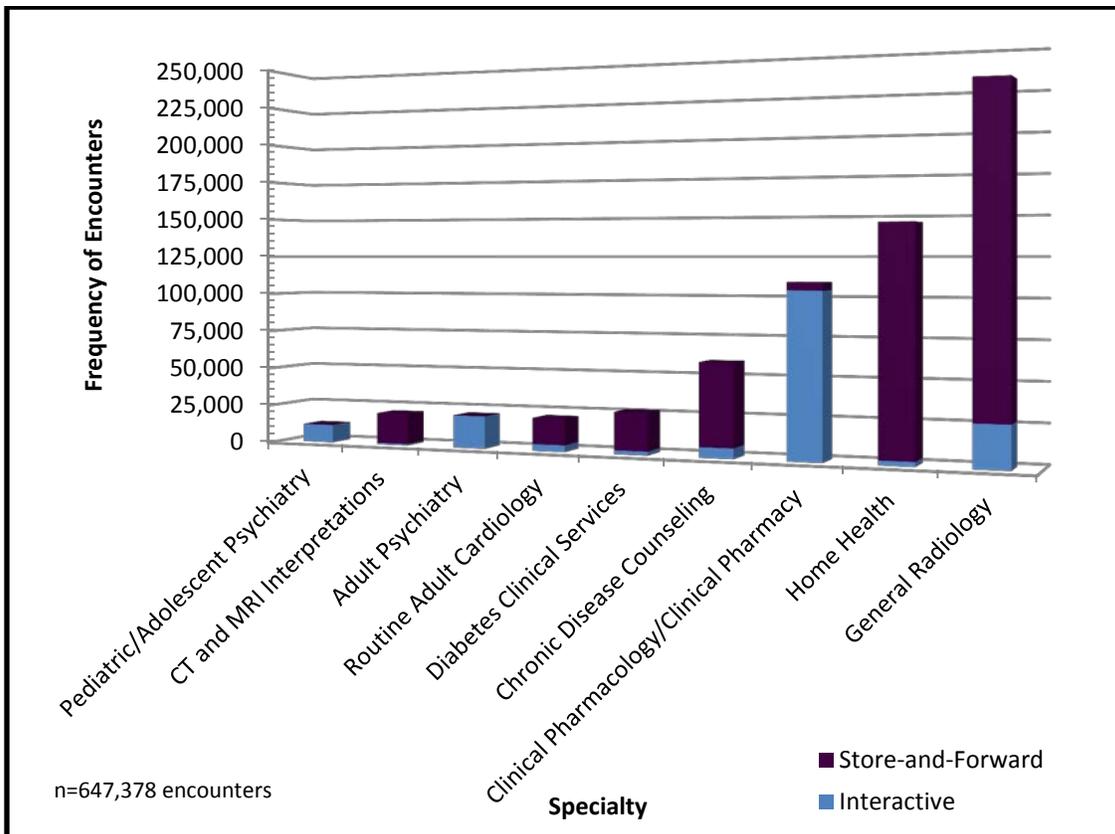
TNGP grantees report utilizing telehealth for a large number of encounters and for a diverse range of specialties. Key findings of the TNGP grantee reporting are described below.

## Key Findings

### *Telemedicine Encounters by Clinical Specialty and Type of Encounter*

Over 760,000 telehealth encounters occurred from 2004-2010 within the TNGP grantee program. Grantees reported on a wide range of encounters in many specialties. Figure 2.1 illustrates the volume of telemedicine encounters for specialties with the highest number of encounters (greater than 10,000). These include both interactive and store-and-forward services provided from 2004-2010. The greatest number of encounters occurred in general radiology, with 230,785 encounters from 2004-2010. The category general radiology includes both adult and pediatric services other than CT and MRI interpretations (e.g. x-ray imaging, ultrasound imaging, and nuclear imaging).

**Figure 2.1 Encounters by Type: Medical Specialties Reporting over 10,000 Encounters, 2004 – 2010.**



Of all grantee-reported encounters from 2004-2010, 35.9% were interactive and 64.1% were store-and-forward encounters. Among the four most commonly used clinical specialties, clinical pharmacy services accounted for the highest number of interactive encounters (104,408) and general radiology accounted for the highest number of store-and-forward encounters (203,757). Chronic disease counseling, diabetes clinical services, and home health also reported primarily store-and-forward encounters.

### ***Behavioral and Mental Health***

Patients seeking behavioral and mental health care in rural areas frequently encounter several barriers to care. Rural communities in particular, tend to have more cohesive social networks that can decrease anonymity, inhibiting residents from seeking needed care, and posing a barrier to accessing mental health services. In addition to the geographical barriers frequently associated with accessing many medical services, mental health patients may also experience stigma and ostracizing social effects that may deter them from seeking appropriate care.<sup>13</sup> Telehealth provides much needed behavioral and mental health care to isolated rural areas.<sup>14</sup>

Telehealth can also facilitate the treatment of certain disorders such as posttraumatic stress disorder (PTSD). Patients with PTSD may avoid going outside for treatment, as social isolation is a key feature of the disorder.<sup>15</sup> Telehealth allows patients to seek mental health care in a safer and more confidential environment, while saving patients time and money.<sup>16</sup>

Two behavioral and mental health specialties are represented among the set of most commonly offered telehealth services, demonstrating the extensive use of telehealth for mental health services and specialties. Figure 2.2 depicts the frequency of encounters (both interactive and store-and-forward combined) for mental health specialties for 2004-2010. The vast majority of mental health encounters (99.8%) were conducted in an interactive manner.

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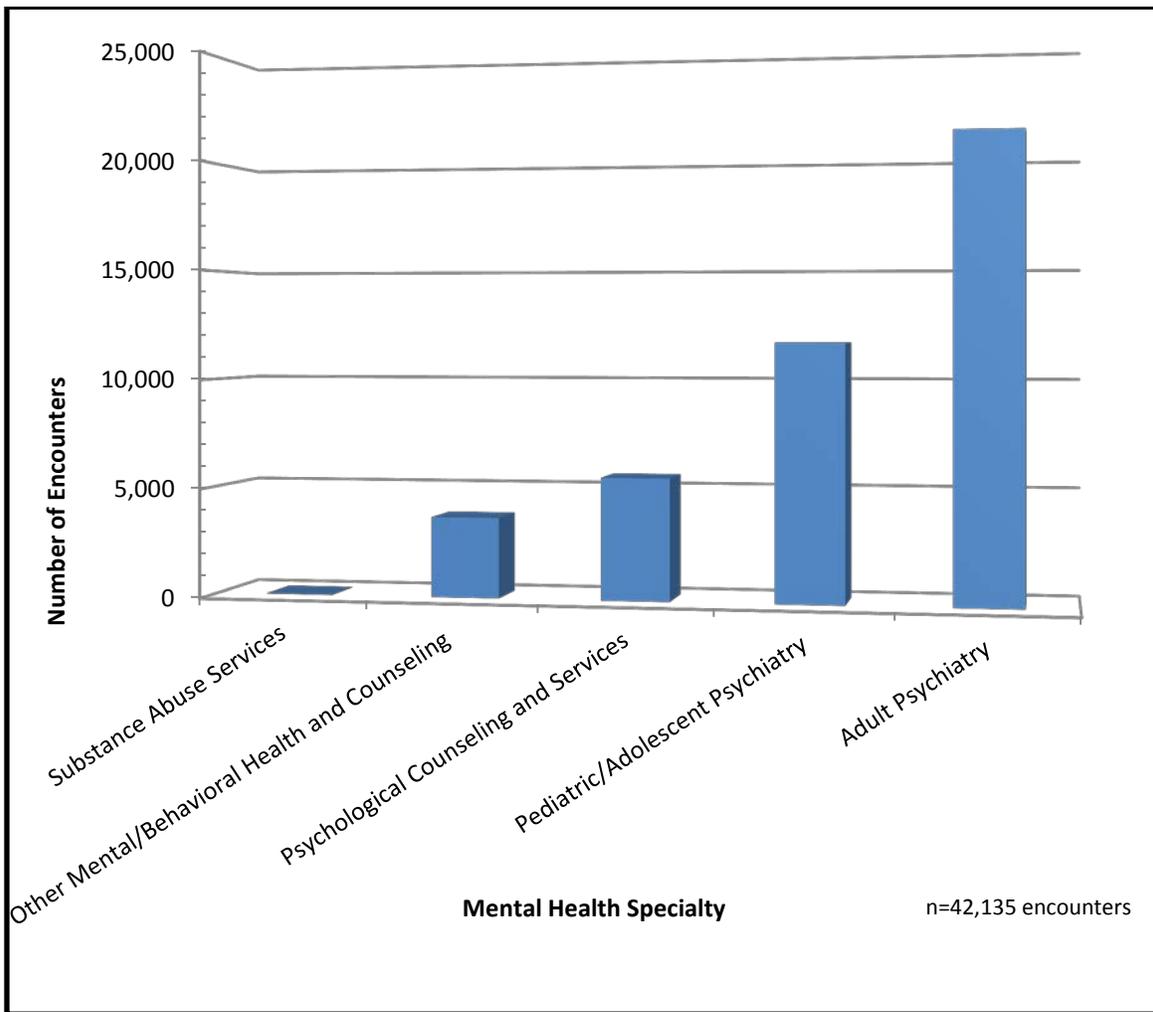
<sup>13</sup> Cummings, N. A., & O'Donohue, W. T. (2011). *Understanding the behavioral healthcare crisis: The promise of integrated care and diagnostic reform*. New York, NY: Routledge/Taylor & Francis Group.

<sup>14</sup> Grubaugh, A. L., Cain, G. D., Elhai, J. D., Patrick, S. L., & Frueh, B. C. (2008). Attitudes toward medical and mental health care delivered via telehealth applications among rural and urban primary care patients. *The Journal of Nervous and Mental Disease*, 196(2): 166-170.

<sup>15</sup> Grubaugh, A. L., Cain, G. D., Elhai, J. D., Patrick, S. L., & Frueh, B. C. (2008). Attitudes toward medical and mental health care delivered via telehealth applications among rural and urban primary care patients. *The Journal of Nervous and Mental Disease*, 196(2): 166-170.

<sup>16</sup> Harwood, T. M., Beutler, D., Bongar, L. E., Lenore, B. M., Forrester, S., & T., B. (2011). Special Issue: Telehealth and Technology Innovations in Professional Psychology. *Professional Psychology: Research and Practice*, 42(6): 448-454.

**Figure 2.2 Mental Health Specialty Encounters by Type, 2004-2010**



It is important to note that there are a low number of reported telehealth substance abuse encounters. Substance abuse issues are a growing problem in rural as in urban areas.<sup>17</sup> The number of adults requiring substance abuse treatment services is expected to grow substantially as the population ages, and telehealth may be an effective means to address the needs of this subpopulation. The existing infrastructure available as a result of the implementation of the TNGP grant program is uniquely positioned to address this growing need.

***Services/Specialties Available to Communities Only via TNGP Networks***

Not only does the TNGP program provide a wide range of services to communities with limited access, in some cases the program provides the **only** source of certain services. Grantees have used TNGP funding to offer services which would not otherwise have been available to these communities. TNGP grantees offered services to patients in 55

<sup>17</sup> Capers, M. (2003). More older Americans will need substance abuse treatment by 2020. SAMHSA News. 11(1).

types of health care specialties, across 6 areas of health care: primary care, medical specialty, medical subspecialty, surgery and surgical subspecialties, behavioral and mental health, and oral health and allied sciences. A complete list of categories and the specialties which comprise them are located in Appendix 4. In total, grantees reported 7,309 instances where a TNGP provider was the sole community provider for a particular specialty. These services would not have been available to these communities without the TNGP.

## CHAPTER 3

### REDUCING RURAL PRACTITIONER ISOLATION

A major challenge in delivering health care to residents in rural areas is retaining practitioners due to practitioner isolation. This contributes to the shortage of physicians in rural areas, and has resulted in efforts by both the federal government and many states to promote remote training opportunities for clinicians in rural areas. This chapter describes how the TNGP serves to reduce the isolation of rural practitioners by ensuring effective engagement and collaboration among practitioners traditionally operating without adequate professional supports.

The TNGP offers multiple vehicles to decrease the isolation of rural practitioners. The program does this by encouraging education in rural areas, enabling referrals, and providing opportunities for other interaction which may not have otherwise occurred. Addressing this isolation may serve to encourage physicians to continue to provide services in underserved areas.

Telemedicine enables practitioners to refer patients to specialists with expertise that are otherwise unavailable in their community. Telehealth networks also provide opportunities for practitioners to engage with experienced professionals with whom they would be unlikely to engage with otherwise.<sup>18</sup>

Practitioners in rural and underserved areas can refer patients to telemedicine for a wide array of services. For example, primary care nurses may refer patients for disease management and physicians may refer patients for specialist consultations. As community practitioners gain experience with telemedicine, they may begin to use telemedicine as a way to meet a broader range of patient needs.

#### Key Findings

##### *Practitioner Participation in Telemedicine*

The TNGP collects information on practitioner referrals and types of care provided in order to track both the number of referrals and the number of different specialties sought by each referring practitioner. Each new patient-care need is treated as a referral. Therefore, a patient having three visits with a cardiologist remotely is counted as one telemedicine referral; if the same patient is referred for a visit with a dermatologist, this is considered a second referral.

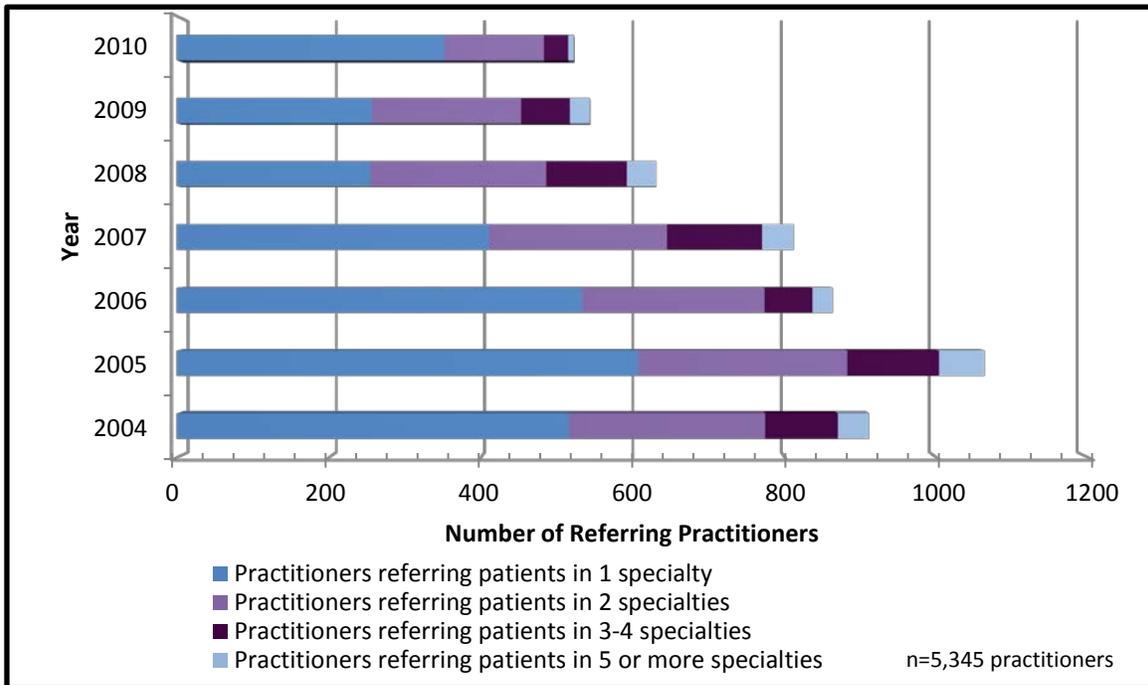
Figure 3.1 demonstrates the number of practitioners supported in some capacity by TNGP grants who refer patients for telemedicine by the number of different clinical specialty referrals they made. In the grantee reporting periods from 2004-2010, 84.1% of all referring practitioners referred patients for telemedicine services in one to two

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<sup>18</sup> Wood, J.A.V., Miller, T.W., & Hargrove, D.S. (2005). Clinical supervision in rural settings: A telehealth model. *Professional Psychology: Research and Practice*, 36 (2): 173-179.

specialties. Practitioners who referred patients for three to four specialties comprised 11.4% of the total number of referring practitioners, and practitioners who referred 5 or more specialties comprised 4.5% of referring practitioners.

**Figure 3.1 Practitioners Referring Patients for Telemedicine by Number of Different Clinical Specialty Referrals.**



It is important to note that practitioners who refer patients for telemedicine encounters may do so at their discretion. Some practitioners may continually make new telemedicine referrals, whereas others make a large number of referrals initially and then decrease the volume of referrals over time. The reasons why practitioners may stop making referrals are diverse. For instance, practitioners may stop making telemedicine referrals due to changes in patient insurance or physician coverage, or patient/physician dissatisfaction with previous experiences. Additionally, as a rural area becomes more populated or if new professional(s) enter the area, the number or type of telehealth referrals needed may decrease. Finally, as patients in smaller communities are referred, the number of patients needing new referrals may decrease.

The TNGP also collects information about consulting physicians who provide care to referred patients. The participation of consulting clinicians receiving referrals may vary from one reporting period to the next. Consulting clinicians who provide patient care in consecutive reporting periods are considered to be continuing consultants. As is the case with clinicians who discontinue referrals, clinicians who discontinue consults via telemedicine may do so for a variety of reasons.

Table 3.1 highlights the number and percentage of consulting clinicians that continued to consult from one reporting period to the next. From 2004-2010, the majority of consulting physicians continued utilizing the telehealth model. To measure participation

of the consulting clinicians using telemedicine, data were collected on continuing participation of clinicians consulting from one reporting period to the next, during each year from 2004-2010. Over all reporting years, the majority of TNGP program consulting clinicians continued to consult throughout two reporting periods. New consulting practitioners are reported each year, at rates which exceed those who discontinued consulting.

**Table 3.1 Annual Participation of Consulting Clinicians, Reported Every 6 Months.**

<b>Telehealth Participation of Consulting Clinicians Participation</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Consulted entire year	565 63.3%	557 64.6%	671 72.2%	633 70.8%	547 81.3%	607 78.0%	688 74.2%
Consulted in second reporting period only	204 22.9%	185 21.5%	148 15.9%	141 15.8%	86 12.8%	110 14.1%	160 17.3%
Consulted in first reporting period only (specialty not sought or not working in the same health system)	110 12.3%	109 12.6%	106 11.4%	118 13.2%	31 4.6%	41 5.3%	67 7.2%
Consulted in first reporting period only (refused)	13 1.5%	11 1.3%	4 0.4%	2 0.2%	9 1.3%	20 2.6%	12 1.3%
Total	892	862	929	894	673	778	927

The trend of consultants continuing to participate in telemedicine from one period to the next mirrors an overall trend of continued participation among referring physicians in the entire OAT network of providers. OAT collects data among referring physicians as a staple indicator across all OAT programs (including both TNGP and other programs). This aggregate data is described further in Appendix 6.

### ***Practitioner Supervision and Training***

A challenge for rural health care sites is the retention of clinical staff due to the remote nature of the work site. Rural clinical settings can also experience decreased opportunities for supervised training that may result in health care workforce shortages.<sup>19</sup> TNGP grantees have recognized the need to train health professionals in health care shortage areas, and have adapted a telehealth approach for training to address these challenges. Two types of training effectively implemented by TNGP grantees include supervision services for trainees in formal educational programs with degree or licensure requirements, and informal training for licensed professionals.

Formal clinical supervision may constitute a requirement by professional practice regulations or may be requested by remote practitioners on an as-needed basis. This requirement could be a part of a variety of educational programs, including medical residencies and medical schools, nursing schools, physician assistant schools, pre-

<sup>19</sup> Stamm, B. H. (Ed.). (2003). *Rural behavioral health care: An interdisciplinary guide*. Washington, DC: American Psychological Association.

medical high school programs, and other allied health professional training programs. For example, a medical resident doing an ambulatory care rotation in a rural community would require a certain amount of supervised training hours that could be attained by a student-mentor agreement for a remote preceptorship.

Telehealth allows students/trainees in isolated areas to receive mentoring and training. Over 33,000 formal and informal mentoring sessions occurred via the TNGP from 2004-2010. For the 2004-2010 reporting periods, grantees monitored and reported on remote training/supervision sessions which they supported. They reported remote training sessions, for both trainees and professionals, in a variety of health professions education programs. To report both informal and formal types of training, grantees selected types of training from a predefined list provided by OAT. They had the option, however, to specify other types.

### ***Formal Training/Supervision***

Grantees reported an estimated 4,476 formal training sessions involving their sites. Health professions trainees enrolled in a variety of formal educational programs, including medical residency and medical schools, nursing and physician assistant schools, pre-medical high school programs, and other allied health professional training programs.

Figure 3.2 illustrates total formal training sessions by type of training program. Grantees reported that approximately 26.1% of the training was geared towards medical students, residents and interns. In addition, approximately 13.7% of training was geared toward nursing students.

A wide variety of other health providers or students also participated in the training. The “other” category comprised approximately 52.8% of the formal training/supervision and includes:<sup>20</sup>

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<sup>20</sup> These categories are reported as the grantees reported the data. Grantees had the option to write in their own category under “other.”

- Allied health students
- Certified pharmacy technicians
- Community health aides
- Community health workers
- Dentists
- Developmental specialists/service coordinators
- Educators
- Health related professionals
- Licensed mental health counselors
- Podiatry students
- Students with MAs
- Mental health students
- Mental health center staff
- Nurse practitioners

**Figure 3.2 Formal Supervision of Students/Trainees in Education Programs.**

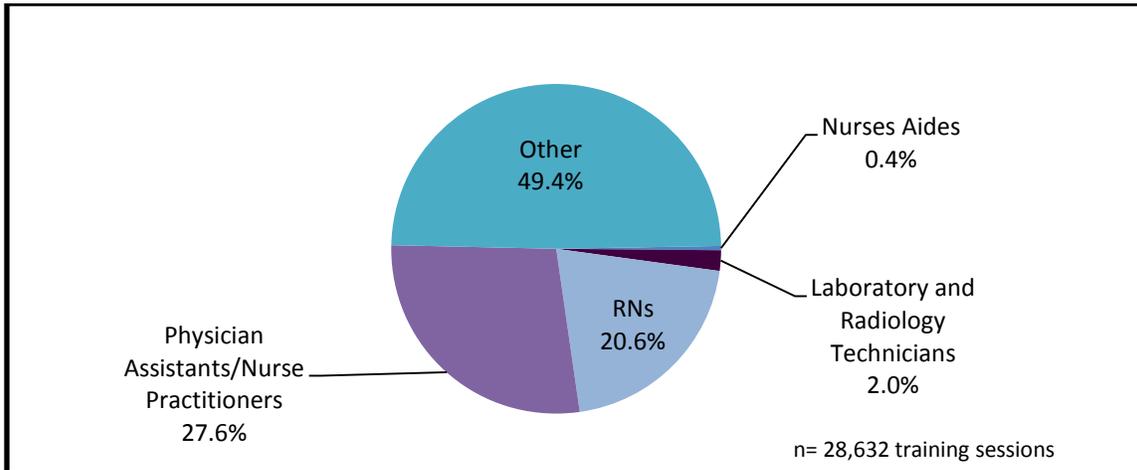
### *Informal supervision/training*

Informal supervision and trainings are generally given to licensed health professionals who do not require additional formal training and supervision as a condition for the professional licensure procedures that govern their clinical practice. Figure 3.3 illustrates mentoring and informal supervision of clinicians by profession for 2004-2010 in funded grantee programs. Mentoring/supervision geared towards nurse practitioners and physician assistants comprises a large amount of the informal training reported (27.6%). Registered nurse training/supervision comprised 20.6% of the sessions.

Grantees added a wide variety of other categories of training/supervision. A large portion (49.4%) of the remaining training/supervision sessions were geared towards these other categories, including:

- Allied health students
- Certified pharmacy technicians
- Community health aides
- Community health workers
- Dentists
- Developmental specialists/service coordinators
- Doctoral students
- Educators
- Health related professionals
- Licensed mental health counselors
- Students with MAs
- Medical residents
- Mental health students
- Mental health center staff
- Nursing students
- Pharmacists
- Pharmacy technicians
- Physicians
- Podiatry students
- Provisionally licensed mental health practitioners
- Psychiatrists
- Psychologists
- Social workers
- Speech language pathologists
- Women's wellness outreach staff

Figure 3.3 Mentoring and Informal Supervision.<sup>21</sup>



<sup>21</sup> Informal supervision and trainings are given to health professionals who receive training and supervision on a job that is not part of an academic institution or a requirement for professional licensure procedures that govern their clinical practice.

## CHAPTER 4

### IMPROVING HEALTH SYSTEM

#### PRODUCTIVITY AND EFFICIENCY

Telehealth aims to improve health system productivity and efficiency by allowing patients to receive care in a variety of settings.<sup>22</sup> These diverse settings include health department facilities and mental health agencies, patient homes, hospital in-patient and hospital outpatient rooms, non-hospital clinics (e.g., rural health clinics, migrant health clinics), private medical practices or physicians' offices, and schools.

Increased productivity and efficiency are fundamental goals of the TNGP and constitute important expectations of grantee performance. For the purposes of the TNGP, productivity refers to the number of patients seen by TNGP grantees. TNGP operationalizes efficiency as "resource efficacy," which translates to maximizing the use of available time, staffing resources, and money and allows both patients and practitioners to save time and money on travel.

Although increased availability of patient and clinical services are among the many benefits of telehealth, the application of telehealth in clinical practice can also help to:

- Increase the level of quality care;
- Increase revenue generation;
- Improve communication efficiency between health providers and patients; and
- Facilitate colleague collaborations.<sup>23</sup>

The applicability of telehealth is currently centered on clinical services and direct patient care, with clinical services comprising the majority of all services provided from 2004-2010. However, telehealth also has applications in several non-medical or non-patient care areas. This chapter focuses on how the TNGP has addressed productivity and efficiency in health care service delivery in rural areas via the use of telehealth.

#### Key Findings

##### *Telemedicine Encounters by Patient Setting*

Telehealth enables patients to be served in a wide variety of settings, including patients' homes. Figure 4.1 illustrates the distribution of total telemedicine encounters by setting for 2004-2010. The **most frequently** used settings for telemedicine encounters were hospital outpatient settings (34.6%), patient homes (32.1%), and non-hospital clinics

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<sup>22</sup> Dixon, Brian E., Julie M. Hook, and Julie J. McGowan. "Using Telehealth to Improve Quality and Safety: Findings from the AHRQ Health IT Portfolio." *Using Telehealth to Improve Quality and Safety: Findings from the AHRQ Health IT Portfolio*. AHRQ National Resource Center for Health Information Technology, Dec. 2008. Web. 17 Jan. 2013.

<sup>23</sup> OTP Report. (2004). *Innovation, Demand and Investment in Telehealth*. Available at <http://www.hrsa.gov/ruralhealth/about/telehealth/innovation.pdf>

(12.7%), accounting for approximately 80% of all telemedicine encounters during the reporting period. The “other” category is comprised of settings that each accounted for less than 1% of the total encounters in a particular setting including:

- Assisted living facilities
- Licensed nursing homes
- Prisons
- Mobile units
- Hospital emergency rooms
- Community health centers
- Indian health clinics

**Figure 4.1 Total Telemedicine Encounters by Setting, 2004-2010.**

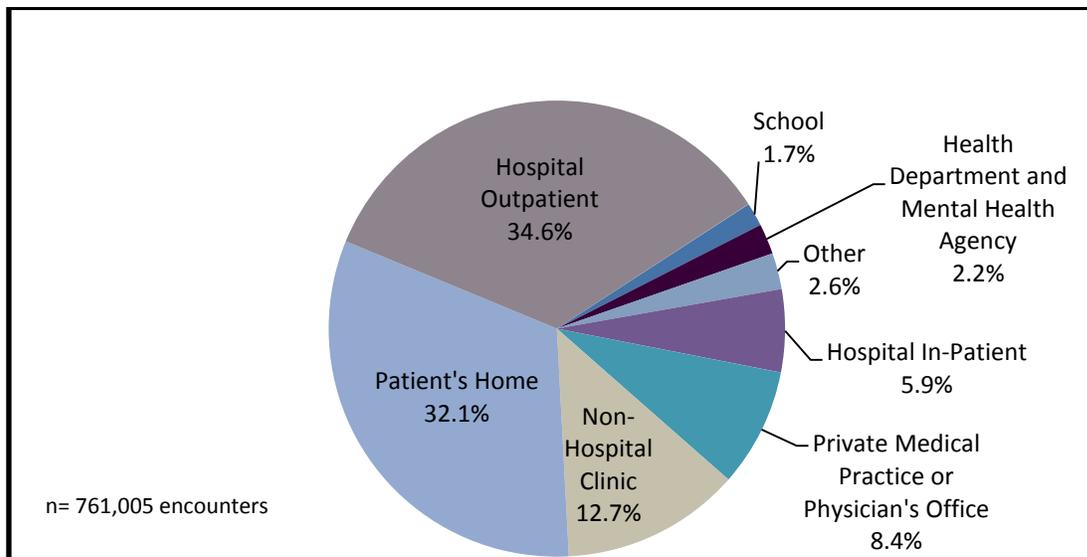


Figure 4.2 shows the frequency of telemedicine encounters by year and setting from 2004-2010.

**Figure 4.2 Number of Telemedicine Encounters by Setting, 2004-2010.**

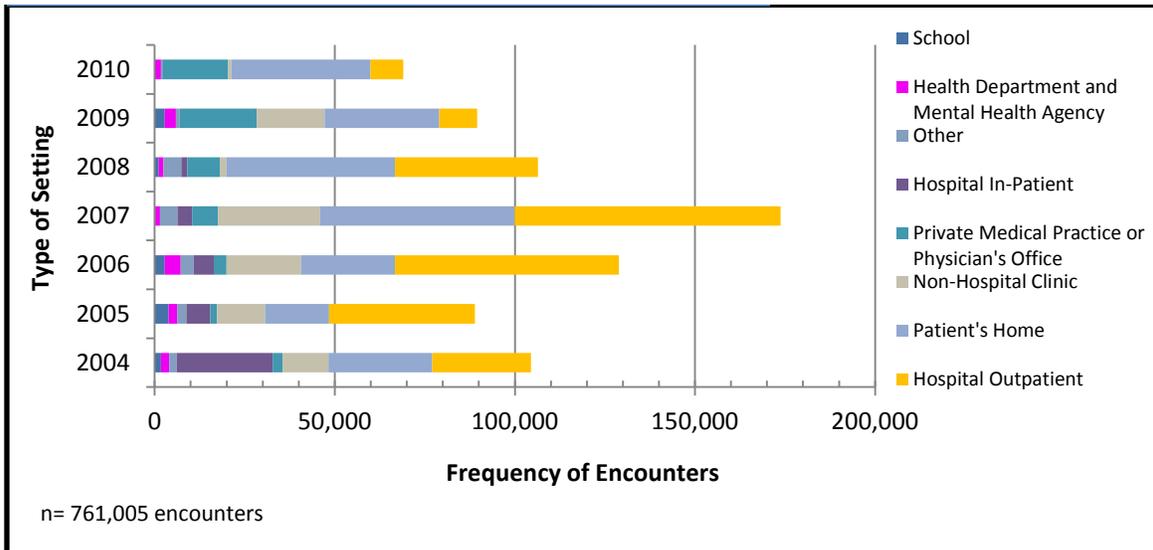


Figure 4.3 shows telemedicine encounters in various hospital-based settings from 2004-2010. Of the 312,912 hospital-based telemedicine encounters, 84.1% occurred in a hospital outpatient setting (263,224), 14.3% occurred in a hospital in-patient setting (44,717), and 1.6% occurred in a hospital emergency room (4,971).

**Figure 4.3 Telemedicine Encounters by Hospital-Based Settings (Including Hospital Clinics), 2004-2010.**

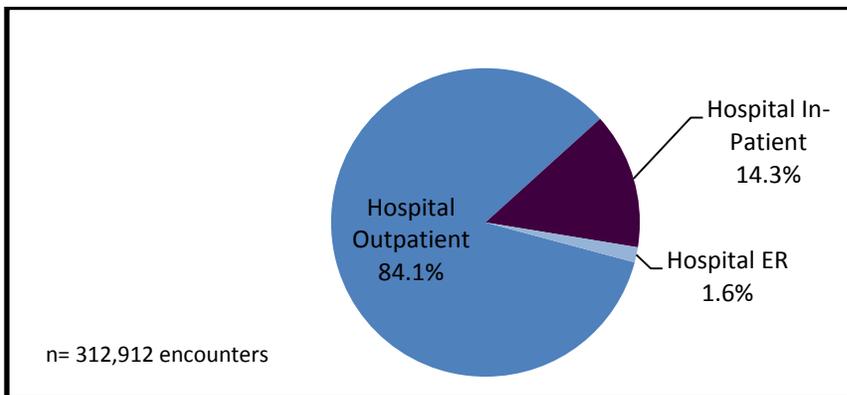


Figure 4.4 illustrates the number of encounters in various outpatient clinic settings for 2004-2010. Of the 187,402 outpatient clinic encounters, the majority of encounters occurred in non-hospital clinics, such as migrant and rural clinics (96,536).

**Figure 4.4 Telemedicine Encounters by Outpatient Clinic Settings, 2004-2010.**

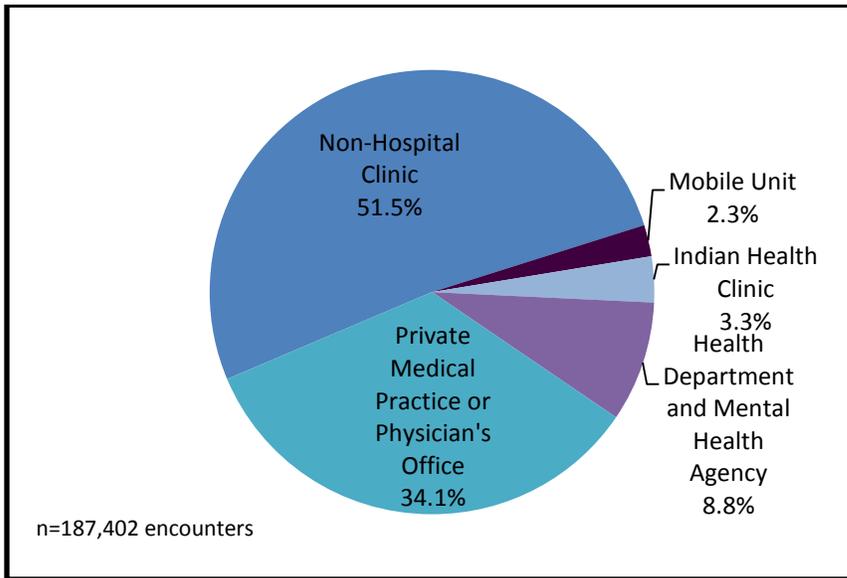
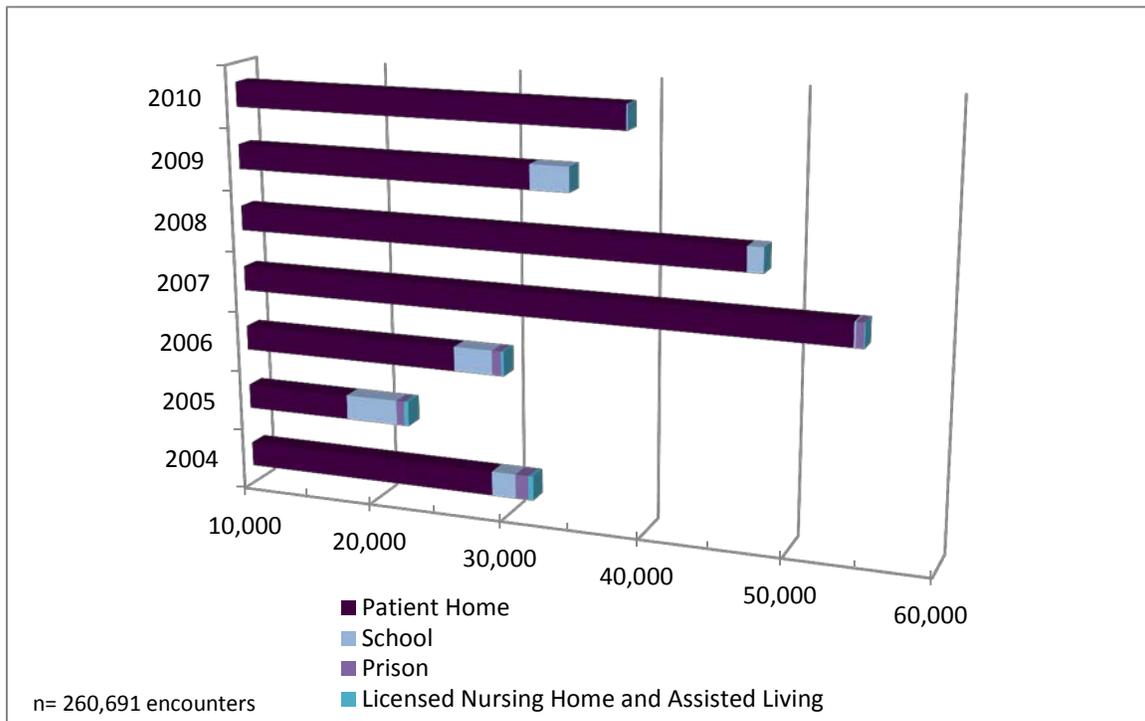


Figure 4.5 displays telemedicine encounters by setting in settings other than a hospital or outpatient clinic, including assisted living facilities, licensed nursing homes, patient homes, prisons and schools.

**Figure 4.5 Telemedicine Encounters in Settings Other than a Hospital or Outpatient Clinic, 2004-2010.**



### *Savings on Patient Travel*

For many patients, travel from rural communities to medical centers poses a significant barrier to timely and necessary care. In the absence of telemedicine, patients would be advised to travel to a medical center for each medical visit. Receiving care via telemedicine, however, results in patient savings with respect to travel and time because access to appropriate care needed to address medical conditions is available closer and sooner than would otherwise be possible.

The TNGP saved patients an estimated \$41,674,513 on travel for specialist consultations from 2004-2010. Table 4.1 shows the total number of patient sessions, total patient travel miles, average miles traveled per session, total dollar amount saved and average dollar amount saved per session for 2004-2010. The mileage represents the distance, in miles, from the rural telemedicine installation to the location of the presumed consulting specialist, which varied in each year. Telemedicine services allowed patients to save an average of 205.84 driving miles per session, which translates to an average monetary savings of approximately \$114 per session based on the 2012 Federal mileage reimbursement rate of \$0.555 per mile.

**Table 4.1 Savings on Patient Travel.**<sup>24</sup>

<b>YEAR</b>	<b>Total Patient Sessions</b>	<b>Total Patient Travel Miles Saved</b>	<b>Average Miles Saved per Session</b>	<b>Average Dollar Amount Saved per Session</b>	<b>Total Dollar Amount Saved</b>
2004	23,097	7,093,093	307	\$170	\$3,935,382
2005	42,798	12,219,747	286	\$159	\$6,793,327
2006	72,307	17,729,495	245	\$136	\$9,831,944
2007	56,593	11,919,075	211	\$117	\$6,627,323
2008	46,144	10,391,067	225	\$125	\$5,762,232
2009	43,157	8,295,155	192	\$107	\$4,598,810
2010	80,797	7,461,925	92	\$51	\$4,125,495
<b>Total</b>	<b>364,893</b>	<b>75,109,557</b>	<b>205.84</b>	<b>\$114</b>	<b>\$41,674,513</b>

### *Augmenting In-Home Services*

Telemedicine can enhance access to care for isolated rural patients receiving in-home nursing services. Telemedicine encounters can substitute for an in-person doctor's visit. For example, a diabetic patient may be unsure of how much insulin to inject at home; telehealth technology allows the nurse to see the blood glucose reading, see the syringe that the patient has filled (up close, calibrated), and advise the patient to use the correct

<sup>24</sup> Savings on patient travel were calculated using estimated mileage associated with health care encounters with specialists which would have otherwise been made in-person, and are now being made via telehealth. This excludes home care visits where, by definition, the nurse would travel to the patient, not the other way around. The 2012 Federal mileage reimbursement rate of \$0.555 per mile was used to estimate the mileage savings as a result of this reduced travel. Dollar amounts were rounded to the nearest dollar. There are limitations to measuring patient travel saved, such as being able to determine which specialist a patient would have seen in the absence of telemedicine. Consequently, only travel that would have been required to see the specialist offered by the telemedicine network can be estimated.

dose. Such an interaction does not require an in-person visit, but the patient may require more support than can be provided during a telephone call.

Telehealth technology provides the connectivity that eliminates the need for a visit in such cases, saving valuable time and resources spent traveling to and from rural patients' homes. Reducing travel time allows nurses to provide health care services to a larger number of patients during each shift, increasing the availability of nursing services and productivity of the nurses.<sup>25</sup>

The TNGP saved an estimate of over \$352,000 in homecare nursing resources. Table 4.2 shows the number of nurse hours, dollar amount saved on salary, miles saved, dollar amount saved on travel, and total dollar amount saved for each year from 2004-2010. A total of over 6,000 of nurse hours were saved through reduced travel for homecare visits from 2004-2010, which translates to a total monetary savings of over \$352,000.

**Table 4.2 Savings on Homecare Nursing Resources.**<sup>26</sup>

<b>YEAR</b>	<b>Hours Saved</b>	<b>Dollar Amount Saved on Salary</b>	<b>Miles Saved</b>	<b>Dollar Amount Saved on Travel</b>	<b>Total Dollar Amount Saved</b>
2004	177	\$5,505	30,797	\$17,092	\$22,597
2005	1619	\$50,351	96,867	\$53,761	\$104,112
2006	1829	\$56,882	83,045	\$46,090	\$102,972
2007	856	\$26,622	26,314	\$14,604	\$41,226
2008	1096	\$34,086	27,942	\$15,508	\$49,593
2009	307	\$9,548	10,897	\$6,048	\$15,596
2010	338	\$10,512	11,076	\$6,147	\$16,659
<b>Total</b>	<b>6221</b>	<b>\$193,473.10</b>	<b>286,938</b>	<b>\$159,251</b>	<b>\$352,775</b>

### *Non-Clinical Uses of Telehealth*

Telehealth offers innovative tools that can be applied to a variety of platforms in health care settings to improve patient outcomes and gain operational efficiency. Non-clinical uses of telehealth facilitate collaborations and save on travel time. Accordingly, time and resources that administrators and administrative staff would otherwise have spent on travel to other areas can be freed up and devoted to other responsibilities, resulting in increased productivity and efficiency.

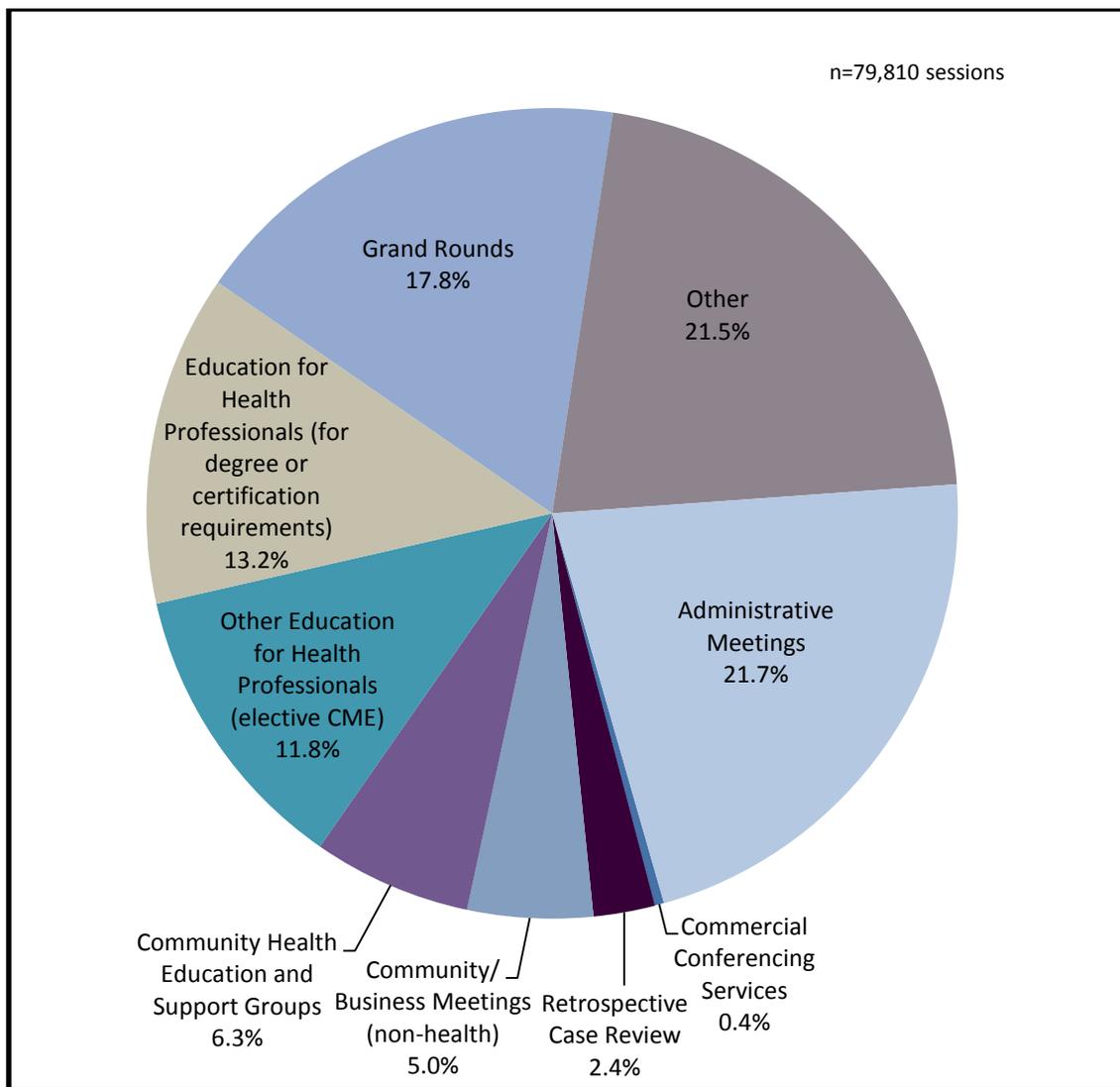
<sup>25</sup> Schlachta-Farichild, L., Elfrink, V., & Deickman, A. (2008). Patient Safety, Telenursing, and Telehealth. In R. Hughes, *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Rockville: Agency for Healthcare Research and Quality.

<sup>26</sup> Savings on homecare nursing resources were calculated using the driving time and miles associated with nursing trips that would otherwise have been made in-person and are now being made via telehealth. According to the Bureau of Labor Statistics, the median R.N. salary for 2010 was \$31.10 per hour for full time employees. This salary was used to estimate dollar savings for nurses' time saved through reduced travel to patient homes. (Source: <http://www.bls.gov/ooh/healthcare/registered-nurses.htm>.) The 2012 Federal mileage reimbursement rate of \$0.555 per mile was used to estimate the mileage savings as a result of this reduced travel. Dollar amounts were rounded to the nearest dollar.

TNGP grantees were asked to identify areas in which telehealth were used for sessions other than direct patient care. A total of 79,810 telehealth sessions unrelated to direct patient care occurred among TNGP grantees from 2004-2010.

Figure 4.6 illustrates a total of eight different types of services reported by the grantees, demonstrating the versatility of applications of telehealth services in fields as diverse as higher education, business, and personnel training, among others. The largest percentage of telehealth usage in non-direct patient care was for administrative meeting purposes (21.7%), including meetings related to the telehealth network such as those regarding operations and staffing. This category was followed closely by grand rounds (17.8%), education for health professionals for degree or certification requirements (13.2%), and other education for health professionals (11.8%).

**Figure 4.6 Non-Clinical Uses of Telehealth, 2004-2010.**



## CHAPTER 5

### FINDINGS AND FUTURE DIRECTIONS

Telehealth services have been offered in the United States for decades and the demand for telehealth has significantly increased in recent years. Improved technology and increased need for care in rural areas are factors that contribute to the increase in interest on the part of medical professionals and community advocates in telehealth. The TNGP housed in ORHP at HRSA promotes the use of telehealth technologies for health care delivery, education, and health information services to address the needs of underserved populations in rural and remote areas, as specified by the HRSA mission.

Increased productivity and efficiency are fundamental goals of the TNGP and constitute important expectations of grantee performance. Report findings focus on how TNGP grantees performed on indicators designed to assess performance in major areas of program emphasis, including improving access to needed services, reducing rural practitioner isolation, and improving health system productivity and efficiency. The TNGP has had demonstrable success in meeting program goals:

- **The TNGP brings many needed services to rural communities.** In some communities, TNGP-funded telemedicine provides the only access to certain clinical specialty services for patients. Without the availability of these TNGP-funded telemedicine services, patients would have to travel extensively to obtain medical services.
- **TNGP grantees provide a breadth of services via telehealth in rural communities.** Fifty five (55) types of healthcare services are offered in communities. The most commonly offered services include the following:
  - Adult Psychiatry
  - Chronic Disease Counseling
  - Clinical Pharmacology/Clinical Pharmacy
  - CT and MRI Interpretations
  - Diabetes Clinical Services
  - General Radiology
  - Home Health
  - Pediatric/Adolescent Psychiatry
  - Routine Adult Cardiology
- **Over 760,000 telehealth encounters occurred from 2004-2010 using TNGP grants.** The greatest number of encounters occurred in Radiology, with 230,785 encounters from 2004-2010. Additionally, providers participated in a diverse set of other clinical specialty service encounters.
- **The TNGP enables patients to be served in a wide variety of settings.** The most frequently used settings for telemedicine encounters were hospital outpatient settings (34.6%), patient homes (32.1%), and non-hospital clinics (12.7%). These settings accounted for approximately 80% of all telemedicine encounters during the reporting period.

- **Telemedicine encounters can substitute for an in-person doctor’s visit.** The substitution of in person visits with patient home visits will be particularly important as the population ages and requires more care.
- **The TNGP provides much needed behavioral and mental health care to patients in isolated rural areas that frequently encounter significant barriers to care, including geographical barriers and stigma.** Two out of five behavioral and mental health specialties are represented among the most commonly offered and extensively used telehealth services.
- **From 2004-2010, there was an ongoing diffusion of the telehealth model of services among practitioners.** The majority of clinicians referring patients and consulting with patients participated in telehealth for an entire reporting year. In addition, each year telehealth grantees were able to recruit new referring and consulting practitioners to serve patients via telemedicine.
- **Receiving care via telemedicine creates savings in patient and provider time and travel, and expedites access to appropriate care that might otherwise be impossible.** Telemedicine services allowed patients to save an average of 205.84 driving miles per session with specialists, which amounts to a monetary savings of approximately \$114 per session. A total of over 6,000 of nurse hours were saved through reduced travel for homecare visits from 2004-2010, which translates to a total monetary savings of over \$352,000.
- **The TNGP allows students/trainees in isolated geographic areas to receive mentoring and training.** Over 33,000 formal and informal mentoring sessions occurred via the TNGP from 2004-2010, providing support to students/trainees in isolated areas.
- **As a result of the TNGP, telehealth is used for important non-clinical purposes, including grand rounds, administrative meetings, health education, and support groups.** This type of telehealth utilization supports clinical telemedicine applications and helps improve the efficiency of health systems.

### *Sustainability*

OAT aims to ensure the success of the telehealth grantee programs funded through TNGP. A measure of success is whether TNGP programs are able to be sustained once HRSA grant funding ceases. Data obtained from TNGP grantees indicate that telehealth services were sustained by 98% of TNGP grantees (only one program discontinued services). This high percentage of sustainability among formerly funded TNGP grantees is a significant accomplishment, particularly in a challenging economic climate. TNGP grantees were able to leverage interest in telehealth and engage stakeholders to continue to provide access to health care services for underserved populations, particularly those in rural and medically underserved areas.

OAT will continue improving access to quality health care services in underserved rural communities. OAT has begun collecting clinical outcome data for the TNGP to assess whether desired results are achieved after implementation of telemedicine programs for chronic disease, rehabilitation, and dermatology conditions. In the near future, TNGP grantees will report data about patient-level clinical outcome indicators across the full range of telehealth services to track patient health outcomes and improve programmatic decision-making.

An important measure of success for TNGP is improvement in clinical outcomes for patients. The TNGP has begun clinical outcome data collection. Clinical outcomes can help determine whether desired results were achieved in this area as a result of implementation of telemedicine programs. Outcome measures can also be used to compare the effectiveness of telemedicine program implementation across grantees.

Efforts are currently underway to refine the data collection and reporting processes of these outcomes to ensure they accurately evaluate patient clinical outcomes. Examples of outcome measures that are or will be reported in the future include three conditions: chronic disease, rehabilitation, and dermatology. More detail about these outcome indicators and how they are measured is available in Appendix 5. When these data are available, the TNGP will report on patient-level clinical outcome indicators across the full range of telehealth services to track patient performance and improve programmatic decision-making.

TNGP offers a promising model of telehealth services and supports that can help address the challenges of limited access of health care in rural and underserved areas. The findings in this report will help inform OAT efforts to improve the performance of TNGP grantees and enhance ongoing program planning and monitoring activities.

## **APPENDICES**

***APPENDIX 1: Performance Indicators and Operational Definitions<sup>27</sup>***

Performance Measure	Operational Definitions
<p><b>1. Specialties and Services</b></p>	<p>Grantees were asked to report patient setting, specialty or service, type of telemedicine encounter, and whether a patient was present.</p> <p>Encounters include therapy and counseling (including nutritional, group counseling, etc.) but NOT didactic education, community meetings or administrative sessions (these data are captured in later forms). Types of encounters include:</p> <p><b>Interactive/Real-Time Encounters (IN):</b> Encounters done in an interactive (real-time) video-conferencing format.</p> <p><b>Store-and-Forward Encounters (SF):</b> Encounters done in a format where information/images are gathered and sent electronically to be viewed at a later time by a telehealth provider; encounters are not interactive and not in real-time.</p>
<p><b>2. Service Availability in Remote Communities</b></p>	<p>Grantees report information about availability of services in the local community served by each remote patient site including how far one would have to drive from the local community to see a specialist in-person and whether</p> <p>a specialty/service is available in the local community  a visiting specialist provides service regularly  the OAT telemedicine program offers services to this site  another telemedicine program offers the service/specialty</p> <p>No specific rule exists for defining <i>local community</i>.</p>
<p><b>3. Patient Travel</b></p>	<p>Encounters include therapy and counseling (including nutritional, group, etc.) but NOT didactic education, community meetings or administrative sessions.</p> <p>To estimate patient travel that is ‘saved’ or avoided through the use of telemedicine, grantees report the distance from patient sites to the remote service site for each patient receiving care via telemedicine. This did <i>not</i> include telehealth home care visits.</p>
<p><b>4. Number of Practitioner Referrals</b></p>	<p>Rural practitioners may rely on telehealth for more patients and for different clinical needs. The focus here is on the reliance of referring practitioners on telemedicine. Grantees track the number and type of patients each practitioner refers for telemedicine.</p>

<sup>27</sup> Abstracted from *Performance Improvement Measurement System for the Office for the Advancement of Telehealth (Version 3.1)* produced by the Office of Rural Health Policy.

Performance Measure	Operational Definitions
<p><b>5. Supervision of Students/Trainees</b></p>	<p>Grantees report the number of sessions conducted over their system, in which students were supervised as part of a formal educational program. For each type of student/trainee where the system was used for supervision, grantees report the number of sessions taking place during each data collection period consultant sites and patient/patient data sites from which data was reported for this form.</p> <p><b>Supervisory Session:</b> Telemedicine interactions used for the purpose of overseeing students or trainees involved in formal educational programs. These sessions are used to fulfill formal education, licensure or certification requirements.</p> <p><i>Example:</i> A student PA doing a remote clinical rotation requires a certain number of supervised hours to complete degree requirements; this trainee is supervised by his/her instructor via telemedicine.</p>
<p><b>6. Other Uses of Your System</b></p>	<p>Grantee communities leverage the availability of telecommunications for purposes beyond clinical patient care. These other services are enabled by the availability of infrastructure. Grantees collect information on sessions for purposes other than clinical patient care and record them using a set of specified categories. Grantees should consistently count each session only once, in one specified category, and create a new category if needed should enter the number of sessions conducted via the grantee network in each category (regardless of the number of sites participating or the number of individuals participating) then record the average number of sites participating in each session</p>
<p><b>7. Estimated Provider Travel Saved</b></p>	<p>Another way to meet patients' needs is through visiting clinicians; that is, the <i>specialist travels</i> rather than the patient. Grantees report how much travel would have been needed to supply the same care using specialists who would travel to the patient's community. This does <i>not</i> include home care visits.</p>
<p><b>8. Telehealth Consultants Continuing Participation</b></p>	<p>One indication of clinician acceptance of telemedicine is whether they continue to participate over time. Grantees report information on the number of consultants providing care in this reporting period, and compare this figure to the previous period, to determine how many clinicians began/continued/discontinued participation.</p>

Performance Measure	Operational Definitions
<b>9. Referring Practitioners Continuing Participation</b>	<p>Since both a referral and a consultation are needed for telemedicine to occur, acceptance on both ends is important. Grantees report information on the number of consultants providing care in this reporting period, and compares this to the previous period, to determine how many clinicians began/continued/discontinued participation.</p>
<b>10. Homecare</b>	<p>Many OAT programs are now involved in tele-homecare, meeting the needs of homebound patients, especially those who require frequent monitoring. Most telehealth programs already ask telehealth home nurses to fill out forms reporting date, time, purpose, etc. of their televisits. Grantees are asked to modify the nurse's forms and ask them, for each telehealth home visit, to report</p> <ul style="list-style-type: none"> <li>• whether they would have made this visit to the patient's home in-person (if telemedicine were not available)</li> <li>• roundtrip miles to the patient's home</li> <li>• estimated roundtrip driving time to the patient's home</li> </ul>

## ***APPENDIX 2: Programs Contributing Data, 2004-2010***

### **COHORT 1 (2004-2006)**

#### **Arizona**

- Arizona Board of Regents, The University of Arizona

#### **Arkansas**

- University of Arkansas for Medical Sciences\*

#### **Georgia**

- Ware County Health Department \*

#### **Kansas**

- University of Kansas Medical Center Research Institute\*

#### **Kentucky**

- University of Kentucky, Research Foundation

#### **Maine**

- Eastern Maine Healthcare Systems
- Regional Medical Center at Lubec, Inc.

#### **Minnesota**

- University of Minnesota

#### **Montana**

- Benefis Healthcare Foundation

#### **New Mexico**

- University of New Mexico Health Sciences Center

#### **North Carolina**

- Duke University

#### **Ohio**

- Southern Consortium for Children

#### **South Dakota**

- Avera Health

#### **Tennessee**

- University of Tennessee

#### **Texas**

- University of Texas Health Science Center at San Antonio

#### **Wisconsin**

- Marshfield Clinic Research Foundation\*

### **COHORT 2 (2007-2009)**

#### **Arkansas**

- University of Arkansas for Medical Sciences\*

#### **California**

- Northern Sierra Rural Health Network

#### **Georgia**

- Ware County Health Department\*

#### **Hawaii**

- Queen's Medical Center

#### **Idaho**

- Public Hospital Cooperative- Southeast Idaho, Inc.

#### **Illinois**

- Illinois Department of Human Services

#### **Kansas**

- University of Kansas Medical Center Research Institute\*

#### **Maine**

- Eastern Maine Healthcare Systems

#### **Minnesota**

- Tri-County Hospital

#### **Missouri**

- Citizens Memorial Hospital District

#### **Montana**

- St. Patrick Hospital & Health Foundation

#### **North Carolina**

- Duke University

#### **Ohio**

- Children's Hospital Medical Center of Akron

#### **Pennsylvania**

- Home Nursing Agency & Visiting Nurse Association

#### **Washington**

- University of Washington

#### **Wisconsin**

- Marshfield Clinic Research Foundation\*

\*Indicates participation in multiple cohorts

### **COHORT 3 (2010)**

#### **Alaska**

- Alaska Native Tribal Health Consortium\*

#### **Arkansas**

- University of Arkansas for Medical Sciences\*

#### **Idaho**

- Saint Alphonsus Regional Medical Center

#### **Iowa**

- Iowa Chronic Care Consortium

#### **Kansas**

- University of Kansas Medical Center Research Institute

#### **Mississippi**

- Delta Health Alliance, Inc.

#### **Montana**

- Billings Clinic Foundation
- St. Vincent Healthcare Foundation

#### **Nebraska**

- NE Hospital Association Research & Education Foundation

#### **North Carolina**

- FirstHealth of the Carolinas

#### **Oklahoma**

- Sequoyah County - City of Sallisaw Hospital Authority

#### **Oregon**

- Asante Health System

#### **Tennessee**

- Community Health Network
- Mountain States Health Alliance

#### **Texas**

- Driscoll Children's Health Plan, Inc.

#### **Virginia**

- University of Virginia

#### **Wisconsin**

- Marshfield Clinic Research Foundation\*

\*Indicates participation in multiple cohorts

### *APPENDIX 3: Types of Service Offered by TNGP Grantees, 2004-2010*

AREA OF HEALTH CARE	TYPES OF SERVICES	
<b>Primary Care</b>	<ul style="list-style-type: none"> <li>• Chronic Disease Counseling (diabetes, cardiac rehabilitation, etc.)</li> <li>• General Pediatrics</li> <li>• Primary Care (adult)</li> </ul>	
<b>Medical Specialty</b>	<ul style="list-style-type: none"> <li>• Genetics and Genetic Counseling (adult and pediatric)</li> <li>• Neurology and Neurodevelopmental (adult and pediatric)</li> <li>• Dermatology (adult and pediatric)</li> <li>• Obstetrics/Gynecology</li> <li>• Emergency Medicine</li> </ul>	<ul style="list-style-type: none"> <li>• Pathology</li> <li>• Physiatry/Physical Medicine</li> <li>• CT and MRI Interpretations (adult and pediatric)</li> <li>• General Radiology (adult and pediatric)</li> <li>• Telestroke</li> </ul>
<b>Medical Subspecialty</b>	<ul style="list-style-type: none"> <li>• Oncology (adult and pediatric)</li> <li>• Pulmonology (adult and pediatric)</li> <li>• Diabetes Clinical Services (adult and pediatric)</li> <li>• Infectious Disease/HIV (adult and pediatric)</li> <li>• Other Endocrinology Services (adult and pediatric)</li> <li>• Routine Adult Cardiology (includes CHF)</li> </ul>	<ul style="list-style-type: none"> <li>• Routine Pediatric Cardiology Interventional Cardiology</li> <li>• Echocardiology (adult and pediatric)</li> <li>• Allergy/Rheumatology/ Immunology</li> <li>• Nephrology (adult and pediatric)</li> <li>• Geriatrics</li> <li>• Hematology (adult and pediatric)</li> <li>• Neonatology</li> <li>• Intensivist/Intensive Care Unit Services</li> <li>• Gastroenterology (adult and pediatric)</li> </ul>
<b>Surgery And Surgical Subspecialties</b>	<ul style="list-style-type: none"> <li>• ENT (adult and pediatric)</li> <li>• Wound Care/Decubitus Ulcers (adult and pediatric)</li> <li>• ENT Surgery (including pre- and post-surgery care)</li> <li>• Trauma</li> <li>• Cardiovascular Surgery</li> </ul>	<ul style="list-style-type: none"> <li>• Orthopedics (adult and pediatric)</li> <li>• Orthopedic Surgery</li> <li>• Plastic Surgery</li> <li>• General Surgery</li> <li>• Other Surgical Specialties</li> <li>• Surgical Procedure Mentoring</li> </ul>
<b>Behavioral And Mental Health</b>	<ul style="list-style-type: none"> <li>• Adult Psychiatry</li> <li>• Pediatric/Adolescent Psychiatry</li> <li>• Psychological Counseling and Other Services (adult and pediatric)</li> </ul>	<ul style="list-style-type: none"> <li>• Substance Abuse Services</li> <li>• Other Mental/Behavioral Health and Counseling (family, adult, pediatric)</li> </ul>
<b>Oral And Allied Health</b>	<ul style="list-style-type: none"> <li>• Speech Therapy (adult and pediatric)</li> <li>• Home Health Clinical Pharmacology/ Clinical Pharmacy</li> <li>• Dentistry (adult and pediatric)</li> <li>• Hospice Services</li> </ul>	<ul style="list-style-type: none"> <li>• Physical Therapy (adult and pediatric)</li> <li>• Other Rehabilitation (adult and pediatric)</li> <li>• Other Therapy (adult and pediatric)</li> <li>• Other Services</li> </ul>

***APPENDIX 4: Number and Types of Services Offered by TNGP Grantees,  
Which Would Otherwise Have Been Unavailable to the Community,  
2004-2010***

OAT grantees offered 55 types of health care services to which communities would not have otherwise had access. For reporting purposes, these 55 types of services were organized into six areas of health care. The tables below illustrate the type and number of services made available by the TNGP in each area of health care for 2004-2010.

<b><i>Primary Care</i></b>	<b><i>Total 2004-2010</i></b>
Chronic Disease Counseling (diabetes, cardiac rehabilitation, etc.)	141
General Pediatrics	50
Primary Care (adult)	1
<b>Total</b>	<b>192</b>

<b><i>Medical Specialty</i></b>	<b><i>Total 2004-2010</i></b>
Genetics and Genetic Counseling (adult and pediatric)	441
Neurology and Neurodevelopmental (adult and pediatric)	363
Dermatology (adult and pediatric)	277
Other Radiology (adult and pediatric)	268
Obstetrics/Gynecology	160
Emergency Medicine	12
Pathology	10
Physiatry/Physical Medicine (adult and pediatric)	85
CT and MRI Interpretations (adult and pediatric)	80
Telestroke	1
<b>Total</b>	<b>1697</b>

<i>Medical Subspecialty</i>	<i>Total 2004-2010</i>
Oncology (adult and pediatric)	316
Pulmonology (adult and pediatric)	287
Diabetes Clinical Services (adult and pediatric)	254
Infectious Disease/HIV (adult and pediatric)	222
Other Endocrinology Clinical Services (adult and pediatric)	138
Routine Adult Cardiology (includes CHF)	126
Gastroenterology (adult and pediatric)	113
Pediatric Echocardiology	110
Allergy/Rheumatology/Immunology	103
Nephrology (adult and pediatric)	96
Geriatrics	87
Interventional Cardiology	36
Routine Pediatric Cardiology	34
Hematology (adult and pediatric)	32
Neonatology	21
Adult Echocardiology	16
Intensivist/Intensive Care Unit Services	0
<b>Total</b>	<b>1991</b>

<i>Surgery and Surgical Subspecialties</i>	<i>Total 2004-2010</i>
ENT (adult and pediatric)	211
Wound Care/Decubitus Ulcers (adult and pediatric)	206
ENT Surgery (including pre- and post- surgery)	136
Trauma	127
Other Surgical Specialties (including pre- and post- surgery)	124
Cardiovascular Surgery (including pre- and post- surgery)	118
Orthopedic Surgery (including pre- and post- surgery)	96
Orthopedics (adult and pediatric)	53
Plastic Surgery (including pre- and post- surgery)	44
General Surgery (including pre- and post- surgery)	19
Surgical Procedure Mentoring	12
<b>Total</b>	<b>1146</b>

<b><i>Behavioral and Mental Health</i></b>	<b><i>Total 2004-2010</i></b>
Adult Psychiatry	476
Pediatric/Adolescent Psychiatry	540
Psychological Counseling and Other Services (adult and pediatric)	359
Other Mental/Behavioral Health and Counseling (family, adult, pediatric)	233
Substance Abuse Services	5
Total	1613
<hr/>	
<b>Oral Health and Allied Health</b>	<b>Total 2004-2010</b>
Other	348
Speech Therapy (adult and pediatric)	140
Home Health	56
Clinical Pharmacology/Clinical Pharmacy	41
Other Therapy (adult and pediatric)	32
Other Rehabilitation (adult and pediatric)	27
Physical Therapy (adult and pediatric)	16
Dentistry (adult and pediatric)	7
Hospice Services	3
Total	670

*APPENDIX 5: Examples of TNGP Outcome Indicators Currently Under Development*

Condition	Patients	Outcome Indicators
<b>Chronic Disease</b>	Every patient diagnosed with a chronic disease	<ul style="list-style-type: none"> <li>• Type of chronic disease (diabetes, asthma, COPD, congestive heart failure, chronic mental health conditions, other)</li> <li>• Setting of telehealth care (patient home, outpatient provider, combination)</li> <li>• Age category (&lt;18, 18-64, 65+)</li> <li>• Number of hospitalizations patient had (if any) in previous six months</li> <li>• Of these hospitalizations, how many were within               <ul style="list-style-type: none"> <li>○ 30 days of a hospital discharge for the same condition?</li> <li>○ 60 days?</li> </ul> </li> <li>• Number of emergency department visits patient had (if any) in previous six months</li> <li>• Number of skilled nursing facility admissions patient had (if any) in previous six months</li> </ul>
<b>Rehabilitation</b>	Every patient admitted to rehabilitation programs via telemedicine	<ul style="list-style-type: none"> <li>• Type of injury (stroke, other brain injury, orthopedics, other)</li> <li>• Depression at intake? At discharge? (measured using standardized scale)</li> <li>• Rehabilitation goal (paid employment or independent lifestyle without paid employment)</li> <li>• Functional status at intake to rehabilitation? At discharge? (measured using standardized scale)</li> <li>• Overall change in functional status and progress toward achieving the patient’s rehabilitation goal (measured using standardized scale)</li> </ul>
<b>Dermatology</b>	Every new patient seeking a diagnosis report following a dermatology telemedicine encounter	<ul style="list-style-type: none"> <li>• What technology was used (store-and-forward, interactive, both)?</li> <li>• Was this technology adequate to make a diagnosis (in clinician’s opinion)?</li> <li>• Was an in-person visit to the dermatologist required for diagnosis?</li> <li>• What was the primary diagnosis?</li> </ul>

**APPENDIX 6: Annual Participation of Referring Practitioners in the Entire OAT  
Telehealth Grant Portfolio, Reported Every 6 Months**

<b>Telehealth Participation of Referring Practitioners'</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Referred patients throughout entire year	2,588 76.8%	1,827 65.6%	2,963 77.5%	2,891 79.8%	2,668 82.1%	2,445 83.3%	2,114 85.9%
Referred patients in 2 <sup>nd</sup> reporting period only	476 14.1%	611 21.9%	427 11.2%	465 12.8%	283 8.7%	275 9.4%	214 8.7%
Referred patients in 1 <sup>st</sup> reporting period only (no need for consults or not working in same health system)	306 9.1%	335 12.0%	415 10.8%	264 7.3%	285 8.8%	216 7.4%	132 5.4%
Referred patients in 1 <sup>st</sup> reporting period only (refused to refer)	0 0.0%	11 0.4%	20 0.5%	1 0.0%	14 0.4%	0 0.0%	2 0.1%

The table above illustrates the number and percentage of all OAT telehealth grantees who continued to refer patients from one reporting period to the next. It also presents the numbers and percentages of practitioners that discontinued referrals. Over all reporting years, the majority of all OAT telehealth grantees continue to refer patients throughout two reporting periods. New referring practitioners are reported each year, at rates which generally exceed those who discontinued referring.