UPMC, a global integrated delivery and finance system which encompasses both a multi-hospital health care provider system and the UPMC Health Plan commercial insurer is based in Pittsburgh, Pennsylvania. As one of the largest employers in Pennsylvania, with over 60,000 employees and $12 billion in revenues, the UPMC health system is committed to leading the transformation of healthcare. Through UPMC’s focus on clinical excellence and developing new models of accountable, cost-effective, patient-centered care delivery it is reshaping the future of healthcare and integrating telehealth and telemedicine as part of regular healthcare delivery.

“Impact of travel on patients is devastating. Take healthcare back to patients, where healthcare belongs, for both wellness and illness” – Andrew Watson, MD, Medical Director, UPMC
UPMC has learned to maximize the value of its telehealth technology in non-traditional ways. What started with two high-need clinical services—telestroke and telepsych visits—now spans over 34 subspecialty clinical areas and provides coordinated access to patient care across both in-patient, out-patient, acute care, and direct to consumer services. UPMC’s telemedicine services provide patients with access to both primary and specialty care services, while avoiding unnecessary travel and expenses related to delivery of care at an urban medical center, emergency department, urgent care or retail clinic. Further, telemedicine supports maintaining patients in their communities to receive in-patient and out-patient services while avoiding unnecessary travel time and expenses. In addition, through expansion of international telemedicine services, UPMC offers consultative services to locations overseas, some of which include real-time, ICU monitoring, coaching, and expertise, offering a win-win for patients and providers.

UPMC encompasses a partnership with a major academic medical center, over 20 community, and specialty hospitals, more than 500 doctors’ offices and outpatient sites, employs more than 3,500 physicians, and offers an array of rehabilitation, retirement, and long-term care facilities.

With more than $1 billion invested in information technology over the past several years, UPMC has also been innovating and refining the technology, protocols, and applications for telemedicine to maximize efficiencies and value. UPMC has partnered with leading vendors to develop technology solutions that will benefit health care providers and patients worldwide.
Governance
Determining what Telemedicine services to offer is driven by an Executive Telehealth Leadership team, made up of a core eight members, who examine the business, technology, and clinical needs of each telemedicine proposal, with two members who specifically assess the operational, administrative and economic impact of each new service considered. If the request can enhance efficiencies, then it is reviewed and considered by the Telehealth Leadership team during regularly scheduling meetings. As part of the process, there is an alignment check with the strategic goals of the organization, including those of the health plan, international services, community provider services and health services.

Onboarding Process for Physicians
Working to streamline onboarding for physicians, the UPMC Telehealth team developed a specific telehealth online eLearning curriculum, resulting in training and certification. This training is focused both on the various considerations around telehealth etiquette, as well as specific details around virtual interactions with patients and maximizing the use of technology while establishing a relationship of trust. In addition, the technical components, as well as a brief overview of legal and regulatory considerations is covered. At the completion of the eLearning module, the user takes a short quiz and receives a certificate that confirms that they have successfully completed and passed
the training. In addition, to the eLearning module, UPMC has developed a Telemedicine curriculum which will be introduced to medical students at the University of Pittsburgh to allow for early awareness and education and foster the integration of telemedicine in the overall practice and delivery of high quality patient care.

Challenges & Opportunities
Although UPMC has been in the Telemedicine business for over a decade, there are still existing challenges to fully expanding and integrating Telehealth and Telemedicine across all areas of the care continuum. Recognizing and overcoming these challenges is not unique to UPMC, as they are common across telemedicine. For purposes of this case study, it is valuable to the reader to understand how an organization which is mature in its Telehealth adoption process still has barriers to overcome which are often outside of its direct control.

IT & Technology Challenges:
- Lack of IT funding at small rural community hospitals to purchase necessary equipment and contract with the necessary specialists to provide critical specialty services (e.g., Telestroke) which are key to providing patients with timely access to care, which often results in costly and unnecessary patient transfers to distant hospitals for care that could have been provided remotely.
- Lack of IT infrastructure within small rural community hospitals to support the connectivity requirements and ongoing equipment support and maintenance necessary to facilitate telemedicine services over time.
- Insufficient bandwidth is sometimes a barrier to rural locations and often the small community hospitals/clinics.
- Often, small hospitals and clinics cannot afford to upgrade their existing connectivity speeds in order to enable access.

Reimbursement Challenges:
- Lack of parity reimbursement laws & policies across each state which mandate that private payers cover Telemedicine visits.
- Differing and often lower reimbursement rates when compared to in-person visits.
- Arbitrary geographic restrictions for reimbursement, i.e., CMS and the rHPSA (rural health provider shortage area requirements).
- Distinctions in reimbursement policies for synchronous-live, interactive audio and video enabled visits v. asynchronous-store and forward (TeleDermatology visits) which limit access across various services, including Dermatology care.

Legal/Regulatory Challenges:
- Policies/procedures which prohibit treating patients via live, interactive audio & video enabled communication without having a prior “in-person” face to face visit before a Telemedicine visit.
• Policies/procedures which require the in-person collection of certain biometric data prior to rendering a telemedicine visit
• State by State medical licensing requirements
• Differing or silent state board definitions around telemedicine

**Education & Awareness Challenges:**
• There currently exists an enormous opportunity to educate the provider and patient communities about the opportunities that Telemedicine offers to expand delivery and access to high quality clinical care, in an efficient manner, regardless of where the patient is located

**Telehealth Adoption Model**
The process of applying and achieving recognition from the HIMSS Electronic Medical Record Adoption Model (EMRAM) led UPMC on its own journey to partner with E&Y and other telehealth experts across the country to develop a Telemedicine Adoption Model which would help the industry understand "How do we get started to maximize value by integrating telehealth across our organization?" and "Where do we go next with leveraging technology and expanding telemedicine to maximize resource efficiencies, care coordination and return on investment?"

This journey is an iterative process, and one that takes time, with UPMC considering itself to be at Stage 6, as they are not yet fully integrated/interoperable across the system’s multiple EHR systems, differing diagnostic coding systems which limit the ability to actively track all tests/procedures related to each visit. Nevertheless, UPMC is heavily investing in a system that will allow it to achieve full interoperability and include patient generated data, remote monitoring devices and related health tools, in order to achieve Stage 7.

The seven levels of the Telehealth Adoption Model include the following:

<table>
<thead>
<tr>
<th>Level</th>
<th>Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Full interoperability to include patient generated data</td>
</tr>
<tr>
<td>6</td>
<td>Services across the care continuum for multiple specialties</td>
</tr>
<tr>
<td>5</td>
<td>Remote monitoring</td>
</tr>
<tr>
<td>4</td>
<td>Complex synchronous and asynchronous services</td>
</tr>
<tr>
<td>3</td>
<td>Simple synchronous and asynchronous services</td>
</tr>
<tr>
<td>2</td>
<td>Patient health portal</td>
</tr>
<tr>
<td>1</td>
<td>Provider education and e-consults</td>
</tr>
<tr>
<td>0</td>
<td>Centralized governance, standardization and scalability</td>
</tr>
</tbody>
</table>

The specific criteria that delineates each level can be found in the Appendix.

**Telemedicine Services Offered**
UPMC offers the following telemedicine services:
• Telestroke
• Teledermatology
• Teleburn
• Teletrauma
• Teleophthalmology
• TeleICU
• Telewound care
• Telepsychiatry
• Telepathology
• Teleradiology
• Telerheumatology
• Telecardiology
• TeleMFM (Maternal-Fetal Medicine)
• Teleendocrine (Diabetes)
• Pediatric telemedicine
• Emergency care
• Specialty teleconsultations in neurology, neurosurgery, gastroenterology, liver disease, pancreatic cancer, and other specialties
• Pre- and post-surgical follow-up care across multiple clinical specialties
• Employer onsite clinic
• E-visits & On-Demand virtual visits (for low acuity conditions)
• Remote Monitoring- (CHF)
• Telerounding
• Telementoring
• Continuing medical education (CME)
• Teleconferencing and grand rounds

UPMC AnywhereCare.com

Increased Access to “On-Demand-Care”
UPMC offers on-demand, convenience care for low-acuity, primary care type visits. The virtual UPMC AnywhereCare visits are available to anyone located in Pennsylvania and in Maryland, regardless of insurance. UPMCAnywhereCare supports timely, convenient access to care, and continuity of care, as it incorporates the outpatient EMR and provides “after visit” PCP summary letters.

More appropriate patient triaging= Decreased Costs
UPMCAnywhereCare supports the goal of providing more efficient, high quality care, at a lower cost. As UPMC launched the AnywhereCare virtual visits, the health system was very interested in overall ongoing clinical quality review, as well as measuring the economic impact of virtual visits to ensure that the patient was receiving appropriate care at a lower cost.

In addition, the UPMC Telehealth team wanted to make sure that the virtual AnywhereCare visits adequately resolved the patient’s clinical problem and that patients were not presenting to a PCP, Urgent Care provider or coming to the ED for the same diagnosis within a two-week time period.

Therefore, UPMC Health Plan conducted a data analysis and reviewed 542 patient visits between 11/4/13 and 2/24/14 to determine the overall impact. The result of this analysis demonstrated that, on average the AnywhereCare virtual visits were $86.64 less costly when compared to an ED, Urgent Care, Retail or PCP office visit.
A New Model of Multi-Specialty Outpatient Visits- The UPMC Teleconsult Centers

In an effort to meet the needs of patients across rural and community locations, the UPMC Telehealth team developed a multi-specialty virtual out-patient clinic model branded as the UPMC Teleconsult Center which is now available across four rural locations. The UPMC Teleconsult Centers provide access to over 34 specialty services which are provided by Physicians who are located in urban locations and deliver virtual care to patients within their own communities, close to home. With over 34 telemedicine specialty service lines, UPMC has completed over 2,069 Telespecialist visits, with high patient satisfaction results which consistently achieve average ratings of 4.8 out of 5.0. As UPMC continues to deliver virtual visits, the patient satisfaction scores are measured and patients are asked if they would have forgone care if the telemedicine visit was not available. In response to this question, 40% of patients have shared that they would not receive much-needed specialist care if it was not available via telemedicine. Telemedicine specialty service lines include the following:

- Cardiac Electrophysiology
- Oncology: Breast Consultations
- Colorectal Surgery (Pre and Postoperative consults)
- Pediatrics Allergy and Asthma
- Dermatology Pediatrics Gastroenterology
- Diabetes Management Pediatrics Nutrition
- Endocrine Surgery Plastics: Head and Neck Reconstruction
- Oncology
- Genetic Counseling Plastics: Breast Reconstruction Oncology
- Heart Failure Plastics: Hand Surgery
- Infectious Disease Plastics: Post Weight Loss
- Inflammatory Bowel Disease Pulmonary
- Maternal Fetal Medicine Reproductive Endocrinology and Infertility
• MFM: Diabetes Education Management (Type I & II and Gestational)
• Rheumatology
• Neurology: Movement Disorders Sleep Disorder Evaluations (Restless Leg Syndrome)
• Neurology: Multiple Sclerosis Vascular
• Neurology: Follow-up Stroke Voice Therapy
• Neurosurgery: Cranial Nerve and General Neurosurgery
• Wound Evaluations
• Neurosurgery: Neuro-Oncology

UPMC Stroke Institute and the UPMC Telestroke Program

The UPMC Stroke Institute was formed in 1995 as a subspecialty within the Department of Neurology at the University of Pittsburgh. The primary practice setting exists in a 760 bed academic medical center. In 2006, a Hub and Spoke Telestroke network was established and has expanded to include 21 spoke hospitals. UPMC’s ability to recruit study patients in large national clinical research trials in stroke is well established.

In 2006, the UPMC Stroke Institute implemented the first stroke telemedicine program in western Pennsylvania. The UPMC Telestroke program uses state-of-the-art, synchronous, audio and video enabled, HIPAA secure technology which links experts at the UPMC Stroke Institute to emergency department (ED) physicians, allowing more patients to be treated faster and closer to home. These special units feature a computer monitor and remote-controlled camera to allow for two-way audio/video communication with stroke experts, who are able to “see” and assess the patient. Neurologists based in Pittsburgh can ask questions of the patient, family members, and local physicians and view CT scans — all live and in real-time — to help assess the patient’s condition and help ED physicians determine if the patient is a candidate for acute stroke therapy, including intravenous tPA. UPMC Stroke experts see more than 1,500 patients each year, and provide consultation for hundreds of others through UPMC’s Telestroke program.

Lawrence R. Weschler, MD – Henry B. Higman Professor and Chair Department of Neurology, University of Pittsburgh Medical School, Vice President for Telemedicine, UPMC
“Lack of skilled physicians is a widespread problem, particularly those with expertise in patients with complex medical problems, such as congenital heart disease,” said Dr. Muñoz, Medical Director, Global Business and Telemedicine, at Children’s. “The use of telemedicine services within pediatric cardiac intensive care units (CICUs) can be used as an assisting technology, allowing more expertise and knowledge to be shared with remote centers in need.”

International Telehealth - Use Case

The Challenge: Addressing an urgent, unmet need in Sicily, Italy:

- High incidence of disease requiring transplantation
- No comprehensive organ transplant facility
- Increased patient migration

The Need: Bringing transplantation services to Sicily, Italy

Meeting the Need: A cross-continental partnership between Cervello and Civico hospitals of Palermo, the Region of Sicily, and UPMC

A Comprehensive Approach: Establishing excellence in transplantation services

- Clinical and administrative staff training
- Clinical program development
- Health care information technology (IT)
- Facility design and construction management

Telemedicine, as a disruptive technology, can improve healthcare, and serve to transform volume-based to value-based patient-centered care. As part of UPMC’s International Services Division, UPMC partnered with the Region of Sicily to offer transplantation services at Istituto Mediterraneo per Trapianti e Terapie ad Alta Specializzazione (ISMETT) in Palermo, Italy. Their innovative use of home monitoring technology post liver transplant, has led to a length of stay reduction of six days (average), a considerable cost savings, given the cost of 1,000 Euro per inpatient day compared to the cost of home monitoring, at 7 Euros per patient per day.

The virtually paperless Children’s Hospital of Pittsburgh of UPMC was the nation’s first pediatric hospital to achieve HIMSS Stage 7, the highest level of electronic health record implementation. Overall, more than a dozen of UPMC’s hospitals are at the highest levels of EHR adoption, as are its outpatient locations, enhancing the quality and safety of patient care. Telemedicine can be used to supplement care overseas by providing constant monitoring,

“Being part of the UPMC network means having access to an enormous amount of knowledge, in addition to the latest technology and equipment” - Dr. Bruno Gridelli, CEO of ISMETT and Executive Vice President of UPMC International Services

www.himss.org/connectedhealth  |  November 2015
coaching, and expertise, providing a win-win for patients and providers. Housed in the Children’s Hospital of Pittsburgh of UPMC is a command center providing real-time virtual monitoring and telemedicine. The June 2014 edition of Telemedicine and e-Health, featured a UPMC case study, “International Telemedicine in Pediatric Cardiac Critical Care: A Multicenter Experience” highlights from this journal article include the following:

“...this study showcased Children’s unusual multicenter experience in telemedicine at three hospitals in Colombia and one in Mexico from July 2011 to June 2013. Children’s physicians provided 1,040 consultations for 476 patients, with a real-time intervention taking place in 23 percent of those encounters, including echocardiography, adjustment of pacemaker settings and pharmacologic therapy. In 6 percent of the tele-consultations, a different diagnosis was suggested based on the interpretation of cardiac or imaging studies.

The number and type of patients seen by Children’s e-CICU were selected by local physicians at each hospital.

Although Children’s physicians in Pittsburgh did not have remote access to the children’s electronic medical records, relevant patient data was provided in a secure database and telemedicine hardware was used for real-time consultations. A CICU physician from Children’s participated in all the encounters, with some being joined by other specialists, including cardiac surgeons and neonatal intensivists.

Based on anonymous surveys of physicians participating at the international centers, 96 percent of respondents reported being satisfied or highly satisfied with the telemedicine service, while 58 percent rated the promptness and time dedicated by the tele-intensivist as very high. Physicians reported that they changed their clinical practice sometimes in relation to the telemedicine encounters, with changes in surgical management noted most frequently.”

What’s Next?

UPMC has been in the Telemedicine space for over a decade and has strategically expanded its Telehealth program to match the evolving healthcare delivery needs and maximize opportunities to leverage resources, technology investments and enhance value across the delivery system.

As next steps, UPMC is working to expand its “MyUPMC - patient portal” and “UPMC Anywhere Care - direct to consumer/patient visits” to allow chronic care patients to better manage their conditions and ensure care
coordination, patient engagement, and utilize technology to facilitate real-time remote patient monitoring.

In addition, UPMC is continuing to expand its Teleconsult Centers and the virtual multi-specialty visits available throughout Western Pennsylvania.

The focus on developing a unified patient portal will facilitate a single access point for “cradle to grave” wellness and healthcare services.

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Andrew Watson, MD, VP International and Medical Director for Telemedicine, UPMC

Harun Rashid, MBA, Vice President UPMC International Services

Larry Wechsler, MD, Henry B. Higman Professor and Chair Department of Neurology, University of Pittsburgh Medical School, Vice President for Telemedicine, UPMC

Ed McCallister, CIO, UPMC

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For more information, visit www.himss.org/connectedhealth
## APPENDIX:

### UPMC Telehealth Adoption Model

<table>
<thead>
<tr>
<th>Level</th>
<th>Capabilities</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Full interoperability to include patient generated data</td>
<td>All medical device data is transmitted, analyzed and accepted into the EHR (internal) Ability to exchange data with external organizations such that it appears as primary data EHR and ancillary clinical systems interoperability to support multiple sources of patient data Ability for patients to self-report and track health or lifestyle data to support customized programs; data is analyzed and contained within the EHR as primary data</td>
</tr>
<tr>
<td>6</td>
<td>Services across the care continuum for multiple specialties</td>
<td>Portfolio of telemedicine services across the entire care continuum Telemedicine services offered by at least 60% of clinical departments Highly integrated care delivery approach that is regularly used for ongoing patient management (e.g., psych / behavioral health)</td>
</tr>
<tr>
<td>5</td>
<td>Remote monitoring</td>
<td>Remote monitoring of patients at home Home medical equipment capable of transmitting basic clinical data; may include messaging and webcam to support patient to clinician visit Medical equipment dispensed by the provider as part of the care treatment plan</td>
</tr>
<tr>
<td>4</td>
<td>Complex synchronous and asynchronous services</td>
<td>Multiple asynchronous and synchronous services across several specialties / sites to support care for various levels of patient acuity Specialized cameras with remote control Integration with numerous medical equipment and devices Two or more complex synchronous services (e.g., telestroke, eICU or trauma consults)</td>
</tr>
<tr>
<td>3</td>
<td>Simple synchronous and asynchronous services</td>
<td>Virtual consults with patients, second opinions, pre- and post-operative visits, etc Relatively simple patient exam cameras and viewing monitors Simple store and forward capabilities that do not require a high level of technical requirements or infrastructure within a few clinical specialties</td>
</tr>
<tr>
<td>2</td>
<td>Patient health portal</td>
<td>Dedicated patient health portal that may include customized health, wellness or disease management content based on EHR data, if applicable Capabilities may exist for patients to integrate data from mobile applications into the EMR</td>
</tr>
<tr>
<td>1</td>
<td>Provider education and e-consults</td>
<td>The use of telemedicine technologies, including video conferencing, to support clinician / provider consults and education (GME, CME)</td>
</tr>
<tr>
<td>0</td>
<td>Centralized governance, standardization and scalability</td>
<td>Scalable IT strategy that accounts for a high level of interoperability with EHR, CIS, devices and medical equipment Workflows, processes, policies and procedures designed for telemedicine and standardized across the enterprise Policies defined for security and regulatory compliance</td>
</tr>
</tbody>
</table>