Building the Infrastructure to Support Telemedicine Delivery
Introductions

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Fitzemeyer & Tocci is a full-service MEP engineering and commissioning firm with specialized expertise in health, science and research facilities.

Our Mission
Creating safe, healthy and sustainable building environments through thoughtful, practical engineering.

Services
- MEP Engineering
- Fire Protection
- Life Safety & Code Consulting
- Commissioning & Retro-Cx
- LEED Consulting
- Energy Conservation Measures
- Energy Modeling & Life Cycle Analysis
- Infrastructure Master Planning & Assessments

Boston, Atlanta, Raleigh-Durham
Acentech is a multi-disciplinary acoustics, vibration, audiovisual, IT and security consulting firm serving many markets including healthcare, biotech and research.

Our Mission

We work with clients to create environments that improve efficiency, effectiveness, user experience and productivity.

Services

- Architectural Acoustics
- Audiovisual System Design
- Building Dynamics / Vibration
- IT Infrastructure and Physical Security
- Mechanical System Noise and Vibration Control
- Product Noise and Product Sound Quality
- Transportation, Environmental, and Industrial Acoustics
What is Telemedicine?

- Remote diagnosis and treatment of patients by means of two-way, real time interactive communication between a patient and provider
- *Telehealth* includes remote healthcare services beyond the doctor-patient relationship
- Telemedicine refers solely to *clinical healthcare services*
Telemedicine: A Historical Perspective

- 1879: First Radiologic Images Sent by Telephone
- 1948: First Use of Telephone for Doctor-Patient Communication
- 1959: Closed-circuit Television Used for Psychiatric Consultations
- 1960: First Transmission of Radiologic Images via Coax Cable
- 1967: Voice Radio Channels Used to Transmit EKG Rhythms
- 1975: Radiologists Begin Transferring Images via Phone Lines
- 1980: Rural Native American Patients Linked with Physicians in Indian Health Service Hospitals
- 1990: Rise of Internet Supports Transfer of Most Types of Medical Information
- TODAY: Improved Bandwidth, Security and Mobility Increases Adoption of Telemedicine

Source: CDW Healthcare
Benefits

- Extend service to isolated communities, inner cities
- Serve patients with limited mobility (high acuity)
- Reduced travel
- Faster appointments, diagnoses, and outcomes
- Opportunity to integrate with retail outpatient facilities
- Increased service reach
- Potential for lower net costs
Effective Telemedicine Delivery

Effective acoustics

Clear and direct visual communication

Resilient Infrastructure/Uptime
Acoustic Considerations

- Good “signal-to-noise”
  - Speech well above background and reverberation

- In-person hearing is easier
  - Can use signals from both ears to filter room effects from speech
  - Not helpful for teleconferencing - sound all out of same speaker

- Reduce noise
  - Duct silencers, larger ducts for slower airflow

- Reduce reverberation
  - ACT, some wall panels
Acoustic Considerations

Reverberant, Noisy Room

Acoustically Treated Room

Listener Room

Can you repeat that?

I understand.
Visual Communication

- Clear and direct communication
  - Impacts evaluation, diagnosis, accuracy
  - Eye to eye contact, facial recognition

- Architectural Considerations:
  - Background - neutral colors, pattern-free
  - Patient lighting - 150 FC, diffuse, 3200-4000K

- Limit extraneous visuals, maintain privacy
Infrastructure & Resiliency - Electrical

- Electrical Considerations:
  - Suitable electrical power, including emergency backup
  - Automatic power transfer switching
  - UPS systems
  - Patient exam room load ~ 4 Watts/SQFT
  - Data center power considerations
Infrastructure & Resiliency - HVAC

Provider-side:

- Cooling dominant loads
- Redundancy, especially data centers
- Efficiency considerations - 24/7/365
- 4-Pipe fan-coils, VRF

Patient-Side:

- Air-side requirements - modest impact
- Space temp adjustment ability

NC-30 best practice
Conclusions & Closing Thoughts

- Rapidly changing technology - facilities will be required to adapt
- Infrastructure requirements, investment similar to critical care facilities
- Acoustical consideration necessary
- Broadband access more available in rural areas
- Specialist reach, especially for rural hospitals
- Preferential payment schedules for telemedicine in HPSAs
- Potential multiplicative societal impact: less transportation = less energy
Thank you!

Questions?