بنام خداوند بخشنده مهربان

CHALLENGES AND OPPORTUNITIES OF TELE-AUDIOLOGY IN HEARING CARE PROGRAMS

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WEBINAR ON TELE-AUDIOLOGY

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What is Tele-Audiology?

- Alvin Toffler in the book "Third wave" 1980
  - The Third Wave is the post-industrial society. Toffler says that since the late 1950s most countries have been transitioning from a Second Wave society into a Third Wave society.
  - Maybe Toffler claims that because of the discovery of the Internet:
    - First steps before the discovery of the Internet in 1961
    - packet switching and the ARPANET
    - Galactic Network

- The term "Tele-Audiology" was first used by Dr. Gregg Givens in 1999 in reference to a system being developed at East Carolina University in North Carolina, USA. The first Internet audiological test was accomplished in 2000 by Givens, Balch and Keller.

REASONS FOR THE EMERGENCE OF TELEAUDIOLOGY

- The Tele-health had emerged before the Teleaudiology.
- With recent advances in technology and the widespread access to and use of the Internet, providing health care and health-care related services remotely has become a possibility.
- Teleaudiology can be used in testing young & adults who they are under the special home care. It also can be used in testing people who they are living in rural areas which are far from the cities.
- Maybe in the past no one thought about the special status like a pandemic, but with the advent of the COVID 19 pandemic, the idea of using Teleaudiology became stronger.
- It seems that Teleaudiology can respond properly to clinical challenges associated with social distancing.

REASONS FOR THE EMERGENCE … (SPECIAL CONSIDERATIONS)

- Approximately 360 million people worldwide have disabling hearing loss.
- The prevalence of hearing loss is greatest in developing countries, where access to hearing healthcare is limited.
- Hearing loss is associated with multiple adverse developmental, social, occupational, and economic consequences.

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1) The Global economy and recognition of the value of hearing healthcare
2) The graying of population
3) Shortage of audiologists and other skilled hearing care professionals
4) Provide audiologic services to remote areas

DEFINITION, CHALLENGES & OPPORTUNITIES

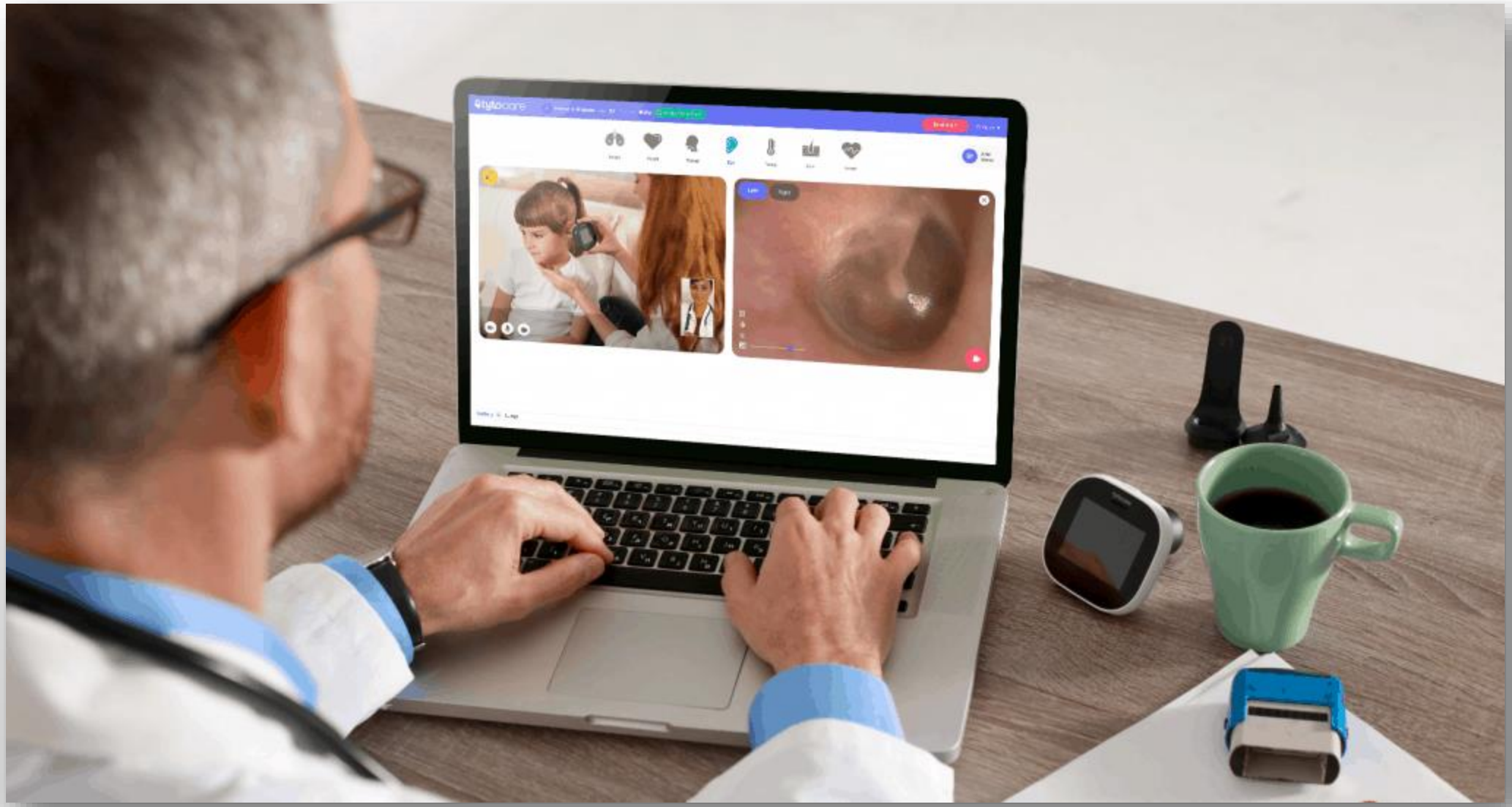
- Tele-audiology is the utilization of Telemedicine to provide audiological services and may include the full scope of audiological practice.
- Actually, Teleaudiology is the delivery of audiologic services and information via telecommunication technologies.
- There are 2 types of tele-audiology tests:
  - Store-and-forward (Asynchronous) tests Testing a patient and then transferring the results via emailing or the Internet to a professional that will look at the results.
  - Real-time (Synchronous) tests Testing a patient in real-time as if the patient is sitting in front of you. **(Example)**
- Content experts in different areas of audiology have shared how Teleaudiology services are laying the groundwork for "the new normal" condition.

- The main areas in Audiology that Teleaudiology can provide services for them:
  - Identification and diagnostic assessment of hearing disorders.
    - Remote Otoscopy/Video Otoscopy
    - Basic hearing evaluation
    - Diagnostic evaluation
  - Intervention for hearing loss and related disorders
    - Hearing aid dispensing and post-fitting care
    - Cochlear Implant post fitting care
    - Auditory training
    - Tinnitus management

Challenges & Opportunities … cont.

Remote Otoscopy

- Lancaster et al. (2008) compared on-site hearing screening results to tele-health screening results for a rural elementary school in Utah. The screening, which utilized otoscopy, pure-tone audiometry, and immittance measures, was conducted on 32 children in the 3rd grade.
- In-person otoscopy and remote video-otoscopy results yielded the same outcome for all of the children.
- However, because only one child was referred based on otoscopy, this study does not provide insight on abnormal otoscopy.
- That is, future research should compare in-person otoscopy to remote video-otoscopy for children with abnormal findings from otoscopy to ensure that results are comparable between the two methods.

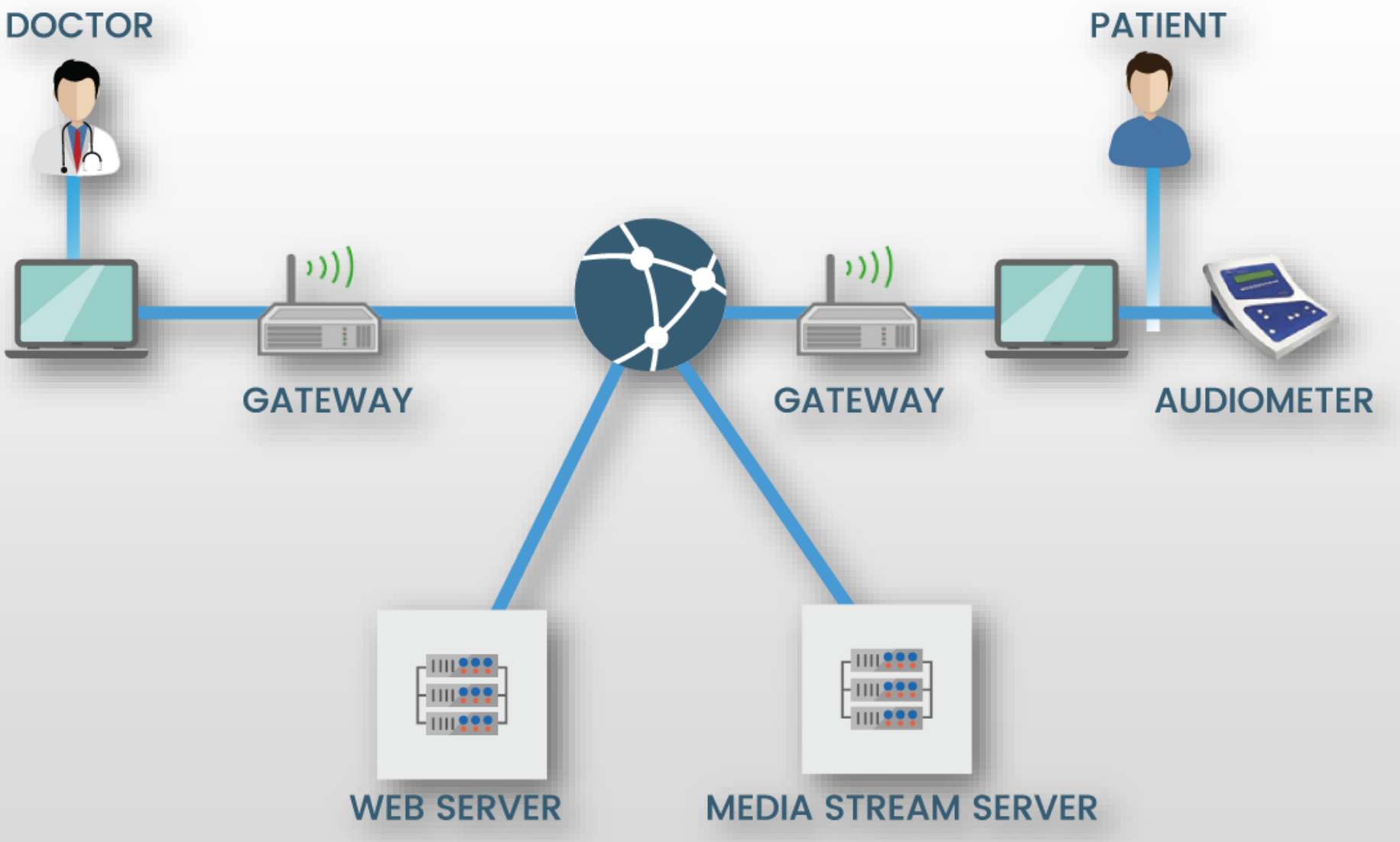


REMOTE TYMPANOMETRY

- Lancaster et al. (2008) also compared the result of remote Tympanometry to in-person:
- Tympanometry screening results also yielded the same outcomes for all of the children, when comparing remote and in-person testing.
- Five of the children in the study responded differently to the pure-tone stimuli during the tele-health testing compared to the on-site testing.
- Further research should investigate why there was a difference and what implications it could have for future use of tele-audiology.
- However, no statistically significant differences between delivery methods were found in the screening tools utilized (Lancaster et al., 2008).

REMOTE AUDIOMETRY TESTING

- The remote audiometric testing was performed by a clinician in Dallas, Texas, while a physician acted as a facilitator in South Africa. The researchers found that the patients' thresholds between the two delivery methods did not differ significantly and that the observed threshold differences were no greater than normal test-retest variability, indicating that remote audiometric testing yields valid air conduction pure tone thresholds.
- Swanepoel, Koekemoer, and Clark (2010) demonstrated that remote audiometry is feasible between even further distances and can be accomplished between the U.S. and Africa (Swanepoel, Koekemoer & Clark, 2010).


DOCTOR
PATIENT
GATEWAY
GATEWAY
AUDIOMETER
WEB SERVER
MEDIA STREAM SERVER

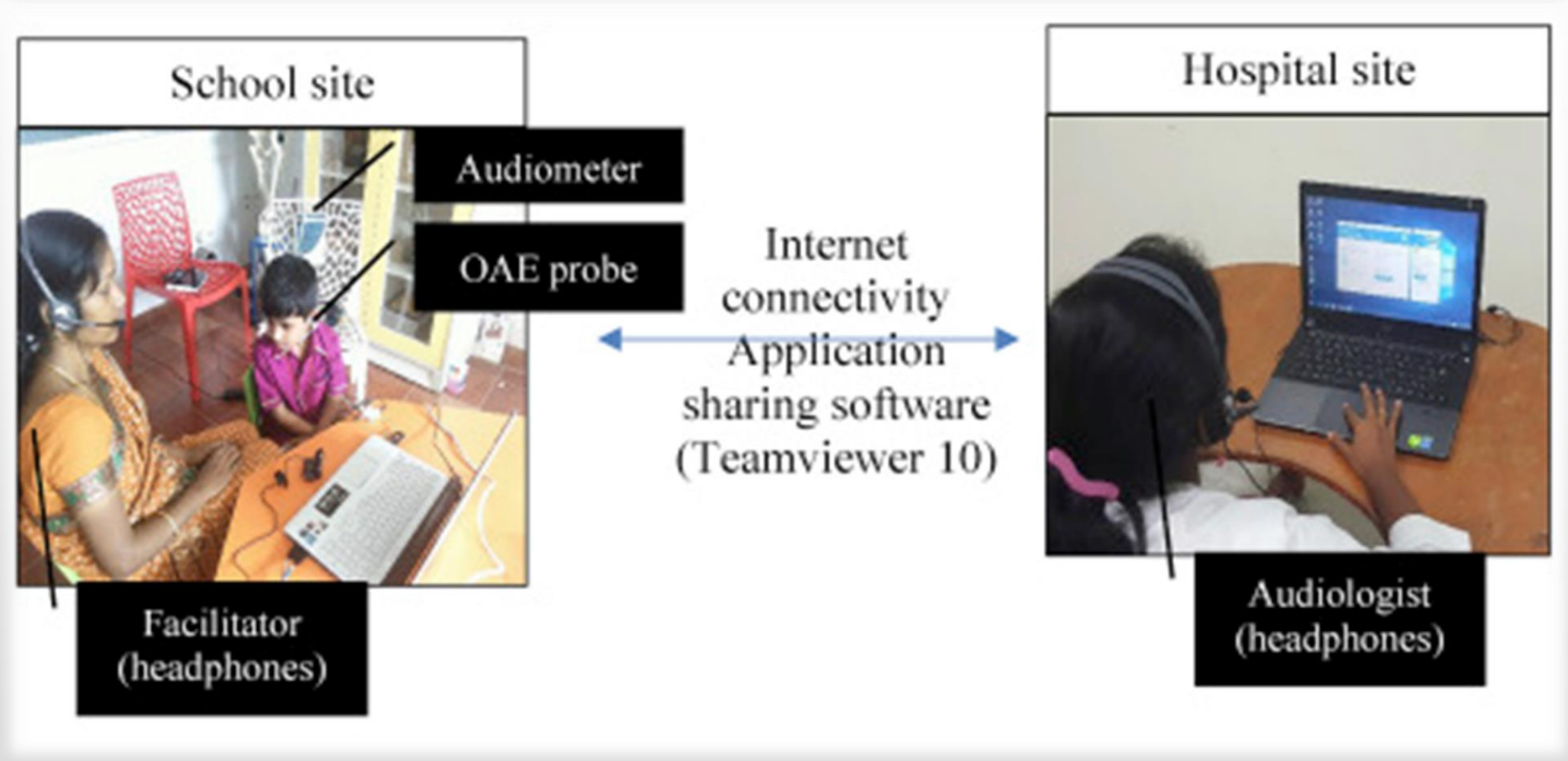
REMOTE HEARING SCREENING

- Universal newborn hearing screening (UNHS) and school hearing screening programs can also utilize tele-audiology. It is difficult to set up UNHS programs due to the lack of essential resources, including personnel, in rural communities (Krumm et al., 2005).
- However, it is likely that more UNHS will be implemented in rural communities, largely because of tele-audiology, which will lead to more timely diagnoses of hearing loss and increase provisions of audiologic habilitation and rehabilitation.
- Providing school hearing screenings through tele-audiology can reduce the amount of time and money that audiologists spend travelling to perform screenings, while also saving the school districts money (Lancaster et al., 2008).

Audiologist at the tertiary care hospital in Chennai conducting real-time ABR testing on the infant in the community

Mobile telemedicine van at the rural community stationed for diagnostic ABR testing

- Tele-audiology can be used for a variety of services.
- Otoacoustic emissions, auditory brainstem evoked potentials, and high-frequency tympanometry are the common tools used for hearing assessment in rural areas (Krumm et al., 2005).
- While tele-audiology may be ideal for hearing screenings or diagnostic testing, other services, such as hearing aid fittings and rehabilitation, are more challenging because of the need for audiologists or highly-skilled technicians (Nemes, 2011).


School site
Audiometer
OAE probe
Facilitator
(headphones)
Internet
connectivity
Application
sharing software
(Teamviewer 10)
Hospital site
Audiologist
(headphones)

GUIDELINES FOR BUILDING A SUCCESSFUL TELE-AUDIOLOGY PROGRAM

DIRECTIONS FOR BUILDING A SUCCESSFUL TELE-AUDIOLOGY PROGRAM

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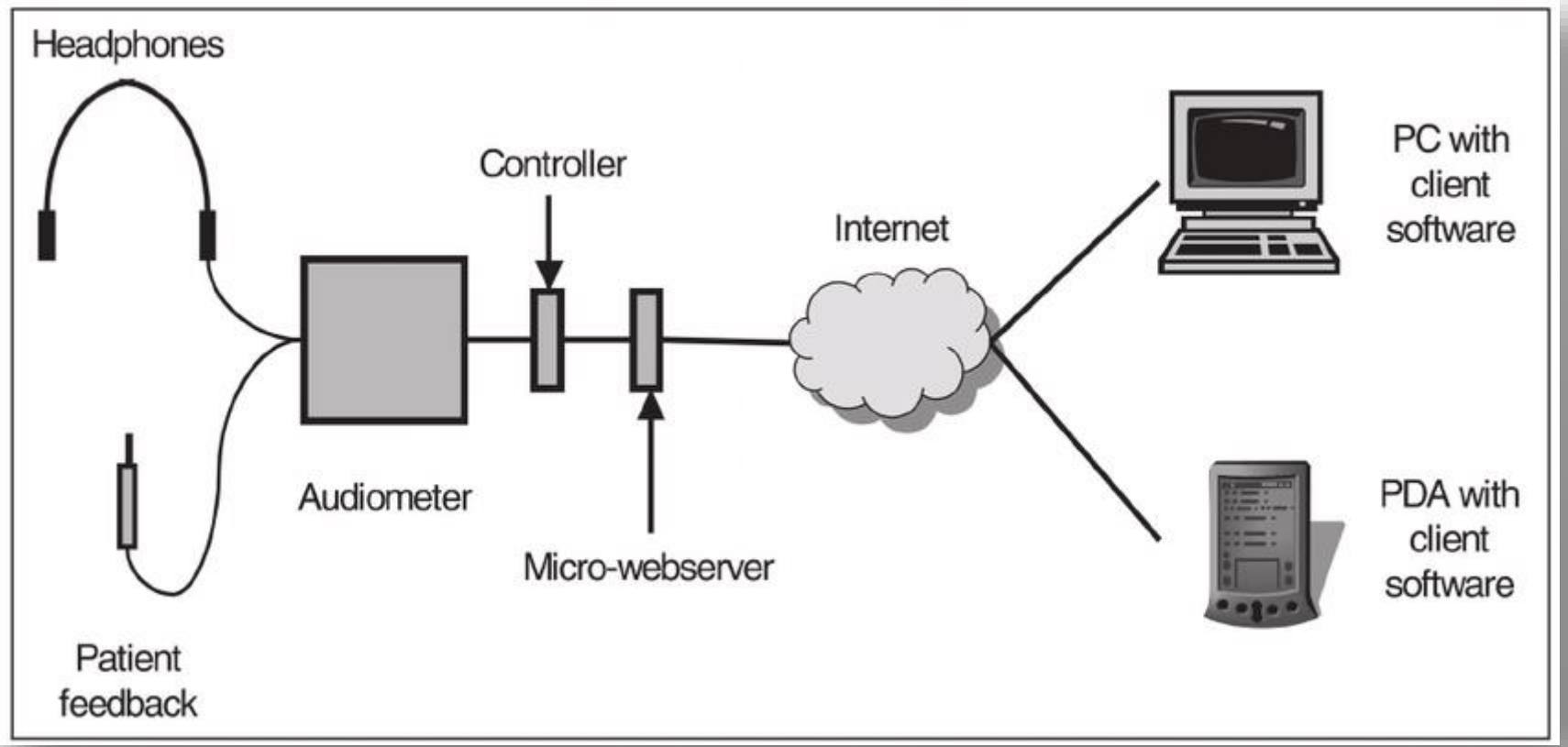

PDA=Personal Digital Assistant.

GUIDE TO BUILDING A SUCCESSFUL TELE-AUDIOLOGY PROGRAM

1) **Assess and confirm your readiness to start a teleaudiology program.**

- There is no sugar-coating the required work and capital that goes into establishing an efficient teleaudiology program; it is costly, time-consuming, and challenging to start , even if it may sound and look easy.
  - Match the mission/vision and goals of the organization, clinic or practice
  - Align itself with a full SWOT analysis of the clinic/organization (knowing about Teleaudiology components
  - Identify and recruit appropriate people to start this program
  - Identifying the equipment needed should not be your highest priority; this should be a component of the pre-planning phase.

2) Perform a market analysis and write a business plan.

- A market analysis will help determine demand for the proposed services. A business plan will help identify resources, allocation of funds and approval from the appropriate personnel.
  - Is there a clear need for and a significant demand for the services provided in that geographic area?
  - Focus beyond the "here and now". Don't base your plan on speculation.
  - Identify and develop revenue opportunities and fiscal estimates.
  - Reimbursement/payment is one of the most challenging items in implementing a sustainable Teleaudiology program.
  - The plan must include detailed information on timelines, deliverables and milestones, technical requirements and potential challenges.

3) Build a team trained to forge ahead.

- Any program stands and falls by the people implementing it. In the case of Teleaudiology, identifying and/or hiring the right staff at both the satellite (remote) and the control site and clearly defining their roles and responsibilities is crucial.
  - Identify a coordinator to oversee all daily operational activities of the program.
  - Make sure all staff are technically savvy and knowledgeable about the Teleaudiology program and applications.
  - Create an environment in which staff at both sites can work well together to create a seamless, comfortable and reassuring clinical atmosphere for the patients.
  - Develop and implement a formal, comprehensive and standardized training regimen for all staff.

4) Purchase the right equipment.

- Identify and select the right equipment for Teleaudiology application and delivery mode.
  - Clearly identify appropriate specifications for the devices, applications and all communication systems.
  - Identify trustworthy and knowledgeable sources to learn about equipment choices and the ongoing support
  - Be mindful that technology advances quickly and systems and applications well need upgrading and warranty renewals.
  - Test the equipment and their connectivity before announcing or advertising the availability of your Teleaudiology program.

5) Create an effective and professional environment that can emulate a traditional face-to-face encounter.

- The environment at both clinic and satellite locations should be professional and should be able to closely emulate a face-to-face interaction. It should be user friendly, well-equipped with reliable and appropriate technology, and comfortable for patients and staff. Both locations should be designed for effective videoconferencing.
  - Plan carefully and discuss the design with program colleagues and IT personnel.
  - Remember to include necessary design/remodeling costs into the budget.
  - Make sure the design follows the building codes and any other requirements.

6) Plan for the seamless integration of Teleaudiology between sites.

- Teleaudiology activities should be designed to complement standard practices and working methods, not complicate or interrupt them.
  - Think of the Teleaudiology technology as just another tool for the delivery of normal services (patient is far from you)
  - Keep it simple

7) Plan for the availability of IT support at all participating locations.

- Having ready access to trained and knowledgeable IT personnel and network support staff is crucial to the effective running of a Teleaudiology program.
  - Focus on introducing IT personnel at all sites to each other.
  - Educate IT personnel about Teleaudiology needs and technologies and authorize them to work directly with network system and setting.
  - Familiarize all IT staff in your organization with all the systems, applications and network needs.

8) Establishing protocols, policies and procedures, as well as short- and long-term performance goals.

- Written clinical and service protocols should be available to all personnel involved in the Teleaudiology program, similar to the one used for face-to face interactions.
  - Create protocols that are as close as possible to face-to-face interaction.
  - Follow standard recognizable protocols which lead to consistent clinical results that are vital for the evaluations and program monitoring.
  - Establish long-term goals that consider clinical, business and financial outcomes several years (future)

9) Develop an evaluation, monitoring and quality improvement plan.

- Implement an evaluation process to review the program and monitor its performance on a regular basis. Build systems into the program to measure and analyze program performance.
  - Monitor and evaluate all key elements of the program on a regular and ongoing basis.
  - Include a range of topics in the evaluation plan, including service usage, patient and provider comfort level with particular technologies, devices and applications and cost savings analysis.
  - Be sure to monitor and track ancillary or related services benefiting from Teleaudiology program
  - Evaluate the strengths and weaknesses (e.g. SWOT) of the program on a regular basis.
  - Implement new ideas, adjustments and solutions in an organized fashion.
  - Constant quality improvement must be a part of regular operations.

10) Understand the legal and regulatory issues of Teleaudiology.

- There are a wide range of legal and regulatory issues and requirements that must be understood and complied with when developing a Teleaudiology program. Regulations and laws can change periodically and must be implemented as required.
  - Identify the current policies and regulations and determine the impact they may have on a Teleaudiology program.
  - Consult with legal counsel to ensure that the program follows laws and regulations and implement any new requirements.

- **Conclusion**
  - Support from your clinical staff and leadership;
  - Identifying the challenges and opportunities of Teleaudiology;
  - Partnering with industry, clinical, technical and administrative staff;
  - Developing protocols, toolkits and best practices;
  - Being flexible and having staff "buy-in";
  - Carefully evaluating service delivery and outcomes;
  - Providing education and training on an ongoing basis to members of the team.

Thank You for Your Attention