TELEHEALTH FOR EARS

Why, What, Where & Is It Ethical?

Prof De Wet Swanepoel

1. Dept of Communication Pathology, University of Pretoria, South Africa
2. Ear Sciences Centre, University of Western Australia,
3. Ear Science Institute Australia

OUTLINE

1. *Why* telehealth for ears?
2. *What* is telehealth?
3. *Where* does it fit in audiology?
4. Is it *ethical*?

WHY TELEHEALTH?


Addis Abeba
Ethiopia
Uganda
Kampala
Kenya
Lake Victoria
Nairobi
Rwanda
Bujumbura
Burundi
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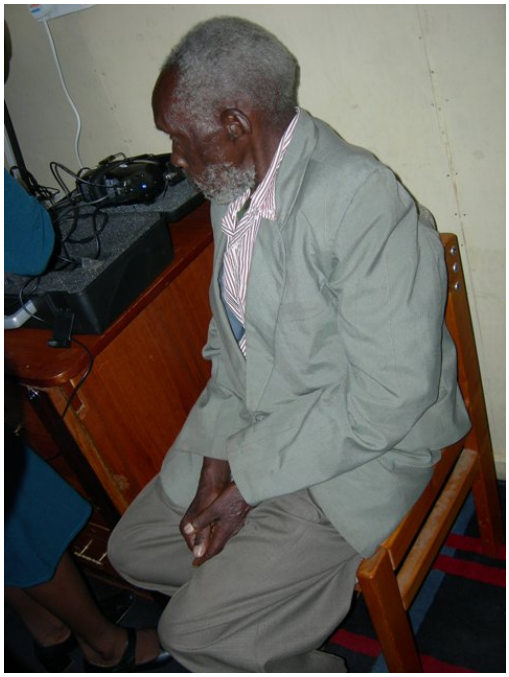
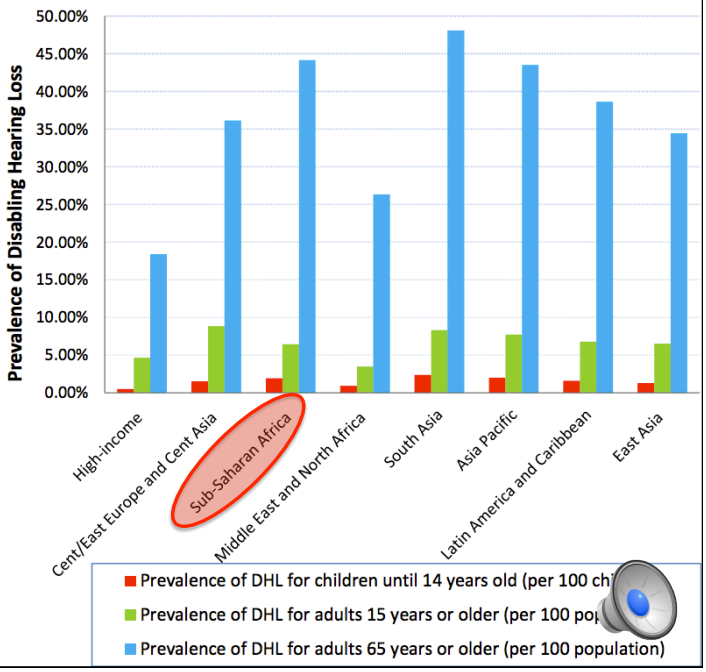


HE IS NOT ALONE….

- Recent analyses of global prevalence indicate:
  - **538** million adults (>15 years of age) have a significant bilateral permanent hearing loss (>35 dB)
  - **15%** of global population have HL – **1/3** disabling HL (>40 dB) – **25%** over the age of 65 years.
- **Most prevalent** chronic disability and sensory disability according to WHO
- **>80%** live in areas where they have **no access** to hearing healthcare professionals

(Stevens et al. 2011; WHO, 2012; WHO, 2006)

PREVALENCE OF DISABLING HL



Increase with age:

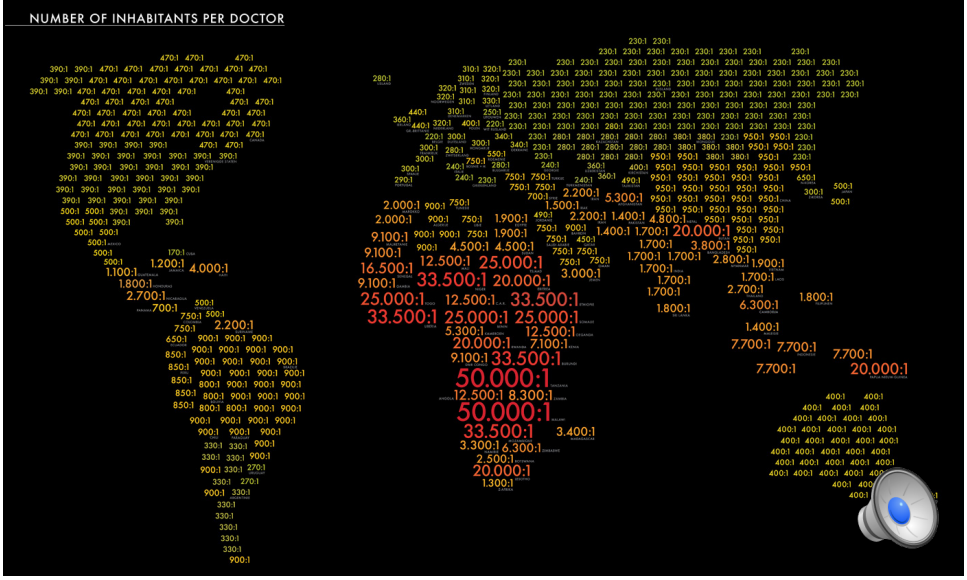
- **1.7%** in children
- **7%** adults (>15yoa)
- Almost **1/3** of adults >65 yoa

INCREASED GLOBAL BURDEN OF HL 2004 – 2030

2004 Disease or injury	As % of total DALYs	Rank	Rank	As % of total DALYs	2030 Disease or injury
Lower respiratory infections	6.2	1	1	6.2	Unipolar depressive disorders
Diarrhoeal diseases	4.8	2	2	5.5	Ischaemic heart disease
Unipolar depressive disorders	4.3	3	3	4.9	Road traffic accidents
Ischaemic heart disease	4.1	4	4	4.3	Cerebrovascular disease
HIV/AIDS	3.8	5	5	3.8	COPD
Cerebrovascular disease	3.1	6	6	3.2	Lower respiratory infections
Prematurity and low birth weight	2.9	7	7	2.9	Hearing loss, adult onset
Birth asphyxia and birth trauma	2.7	8	8	2.7	Refractive errors
Road traffic accidents	2.7	9	9	2.5	HIV/AIDS
Neonatal infections and other[a]	2.7	10	10	2.3	Diabetes mellitus
COPD	2.0	13	11	1.9	Neonatal infections and other[a]
Refractive errors	1.8	14	12	1.9	Prematurity and low bi ight
Hearing loss, adult onset	1.8	15	15	1.9	Birth asphyxia and h a
Diabetes mellitus	1.3	19	18	1.6	Diarrh es

WHO, 2004

HEARING HEALTH CARE ACCESS

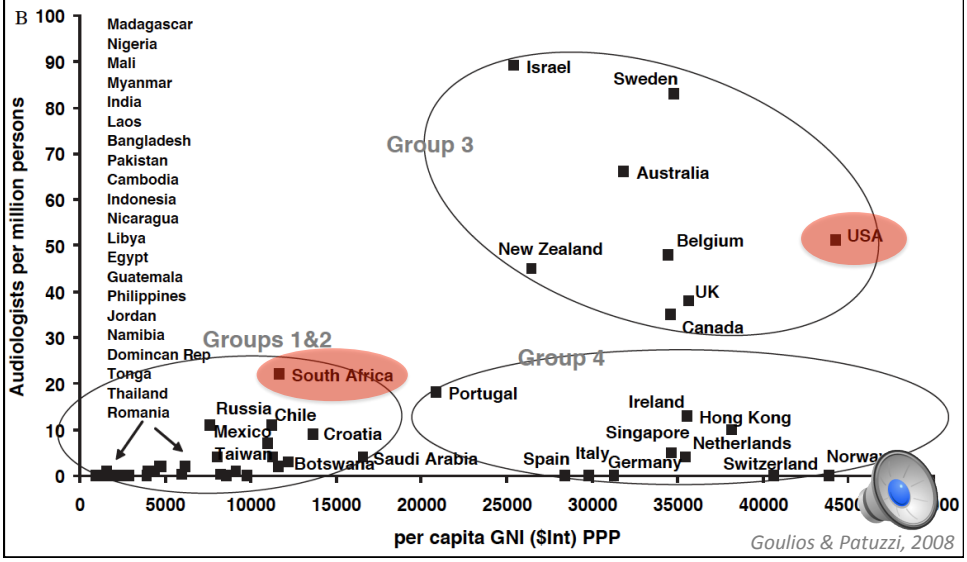


HEARING HEALTH CARE ACCESS

- Less than **1** in **40** people receive HA's in developing countries (**2.5%** penetration)
- Africa – 53 countries. Two offer professional education in Audiology (1 in SSA)
- **Mismatch** in **need** and **capacity**
- Ratio of audiologists to people:
  - Developing World **1 : 0.5 – 6.25 million**
  - Developed World **1 : 20 000**

WHO, 2009; Goulios & Patuzzi, 2008; Fagan & Jacobs, 2009

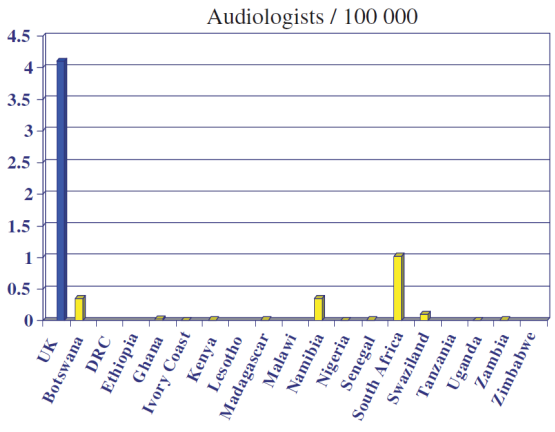
HEARING HEALTH CARE ACCESS



Goulios & Patuzzi, 2008

HEARING HEALTH CARE ACCESS

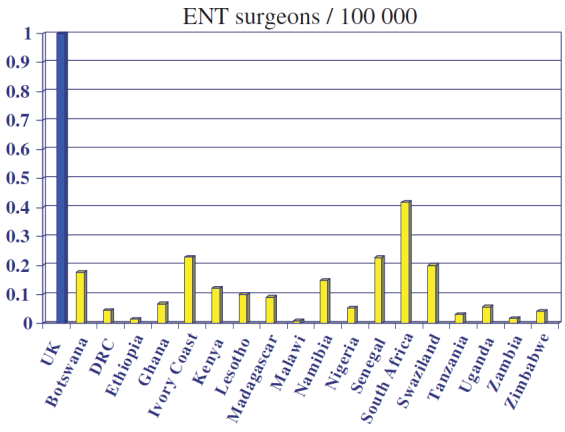
Survey of hearing health care services in SSA (Fagan & Jacobs, 2009):



Fagan & Jacobs, 2009

HEARING HEALTH CARE ACCESS

ENT distribution across SSA countries:



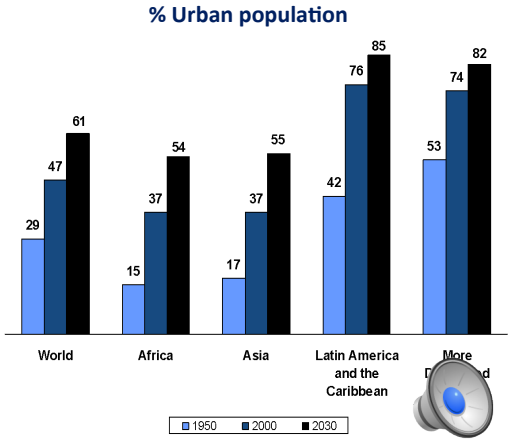
1: 250 000 – 7.1 mil

Goulios & Patuzzi, 2008, Fagan & Jacobs, 2009

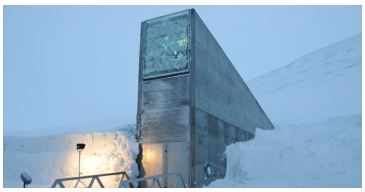
DISTRIBUTION OF SERVICES

Fagan & Jacobs (2009) survey:

- **50%** of SSA countries surveyed have **no ENT** services **outside big cities**.
- **67%** have **no** or **poor availability** of **ENT** services outside big cities
- Audiology similar
- Unequal distribution



NOT ONLY DEVELOPING COUNTRIES



NOT ONLY DEVELOPING COUNTRIES

Western Australia

Area: 2,532,473 km^2

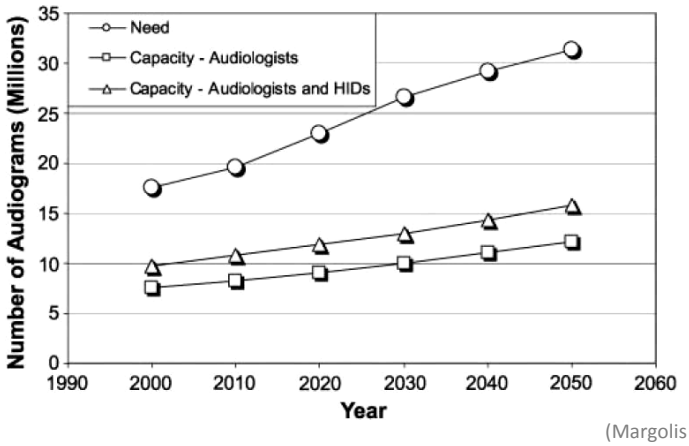
Population: 2,296,411 (2010)

ENT's: 32 fulltime
All in Perth except 1 in Bunbury

Audiologists: 80 – 100
Perth, Albany, Esperance, Bunbury, Kalgoorlie and Geraldton (nothing north)

NOT ONLY DEVELOPING COUNTRIES

USA – Need and capacity to delivery audiometric testing



(Margolis & Morgan, 2008)

CHALLENGES

- Hearing loss is increasing
- Dearth of hearing health professionals
- Unequal distribution of hearing health access
- Geographical, weather and infrastructure obstacles
  - *Large distances & remote communities*
  - *Poor transport infrastructure*
  - *Expensive referral pathways*

SOLUTIONS?

Considerations

- Sustainability
- Sufficient Reach
- Effective and Efficient

Options

- Developing and initiating more training programmes
- Improved infrastructure, access & referral mechanisms
- Humanitarian projects
- **Innovative technology & expanding connectivity** (Telehealth, eHealth, mHealth)

TELEHEALTH OPPORTUNITIES

- Healthcare can **penetrate underserved** areas
- **Distances, geographical, weather** obstacles can be **bridged**
- **Equitable distribution** of professional expertise - urban/rural, developed/developing
- **Asynchronous** protocols – automation of standard assessments and procedures
- **Integrated** data management

WHY NOW?

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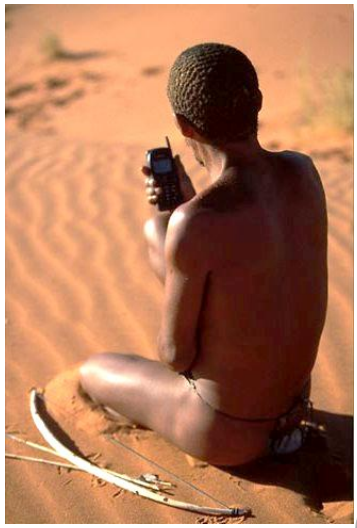
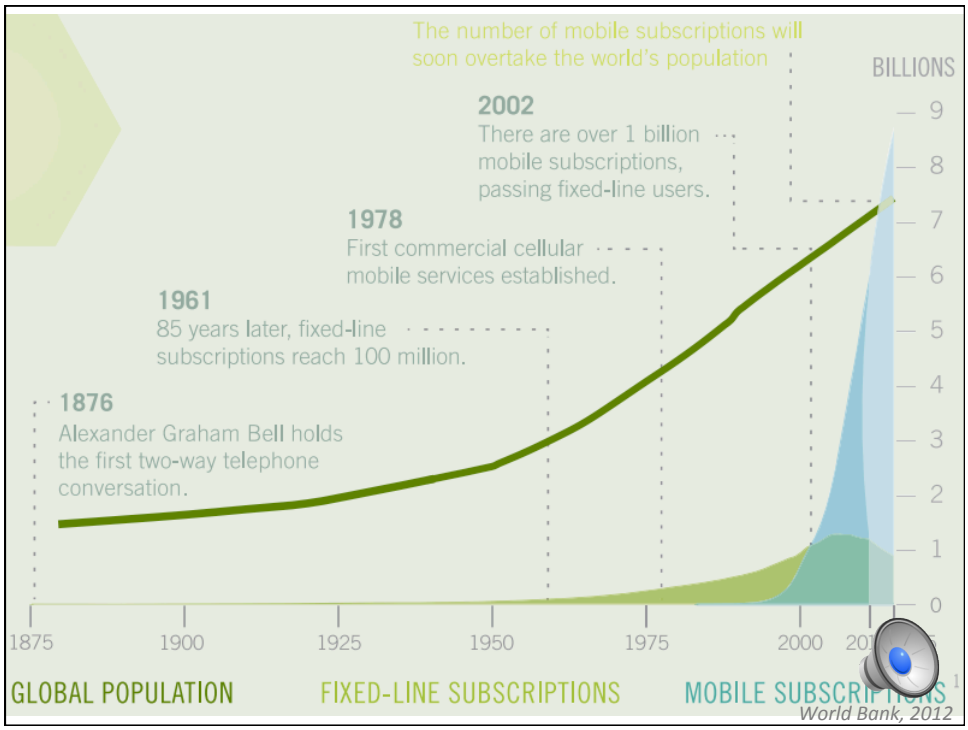
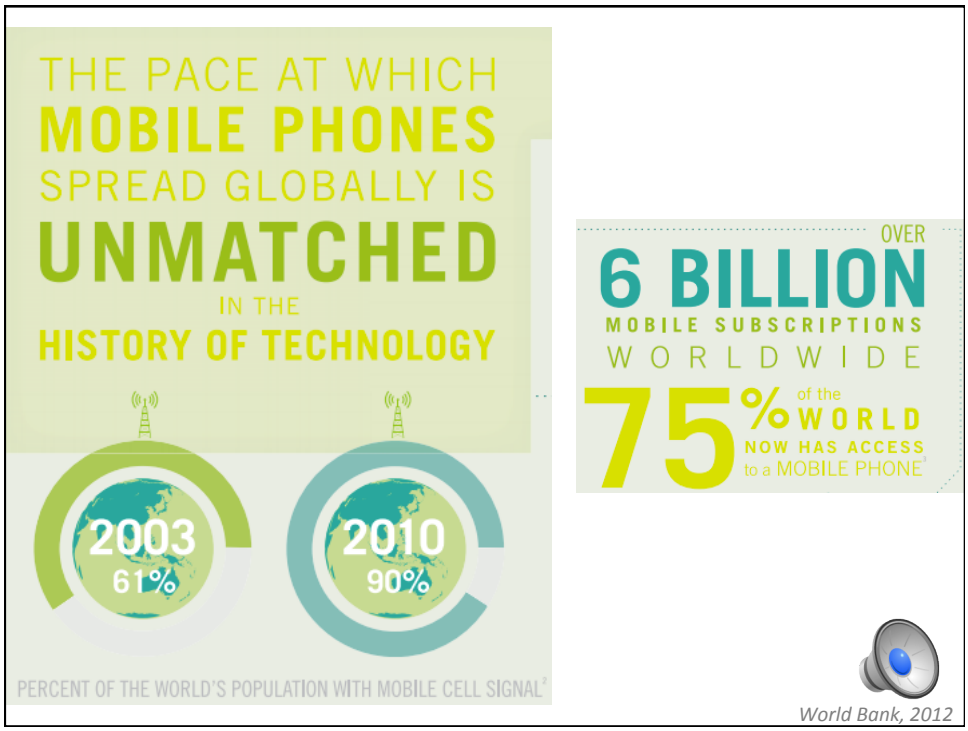
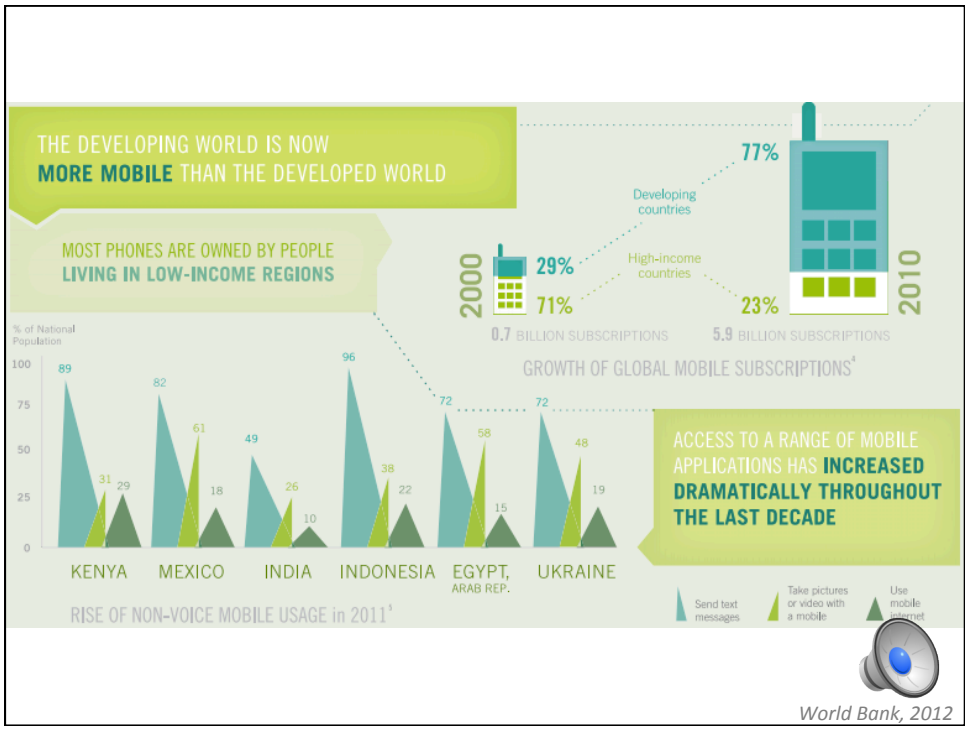






World Bank, 2012



World Bank, 2012

WHAT IS TELEHEALTH?

- Telehealth literally means "**health care at a distance**".
- Refers to "**utilization of information and communication technology in health care**".
- Provision of health services from one location to another using a **telecommunications medium.** Includes concepts of surveillance, health promotion and public health functions
- Terminology: **telemedicine**, online health, **e-Health**, telepractice. "**Tele**" i.e. Tele-audiology, tele-therapy, tele-intervention.
- Recent addition – **mHealth** – provision of health care and pu health, supported by mobile devices

Wootton 2009; WHO, 2013

TeleAudiology

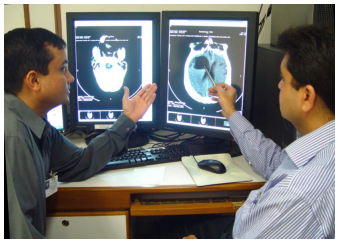
TELEHEALTH - ICT

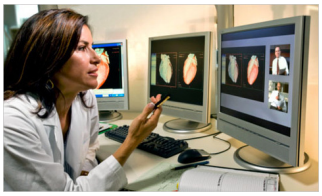
TeleAudiology

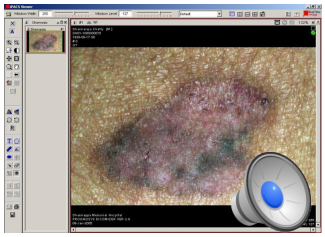
Concept as old as telecommunication mediums

NASA – Manned space missions. Health Monitoring (e.g. heart rate, respiration, blood pressure, body temperature, radiation levels etc) & remote diagnosis, treatment

TELEMEDICINE APPLICATIONS

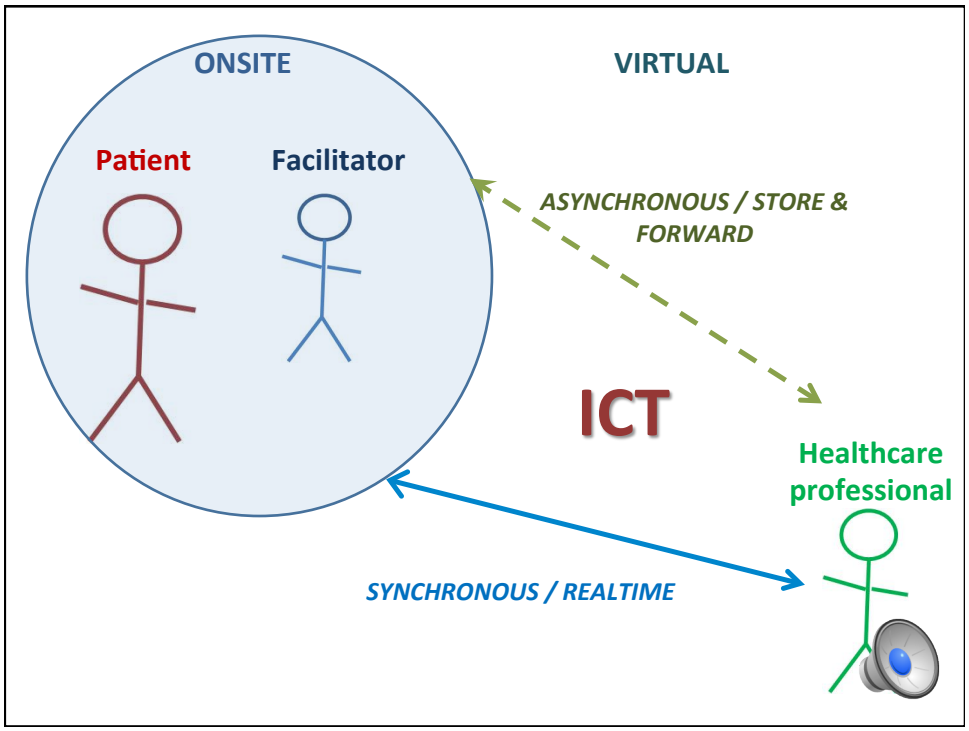




TELEMEDICINE MODELS

- **Synchronous, real-time**
  - *Videoconferencing*
  - *Desktop sharing software*
  - *Remote hardware control*
- **Asynchronous, store-and-forward**
  - *Fax, Email, Server uploads*
  - *Self-testing, monitoring*
    - *Automation NB component*
- **Hybrid model**

WHERE DOES TELEHEALTH FIT IN AUDIOLOGICAL PRACTICE?

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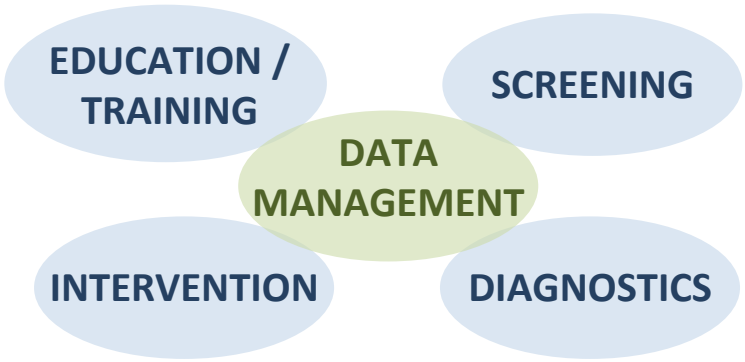

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TELE-AUDIOLOGY APPLICATIONS

- **Systematic review** of literature < May 2009 *(Swanepoel & Hall, 2010)*
- **386** Reports (**3** databases) - final within study scope **26**
- Reports: **5 screening**; **12 diagnostics**, **7 intervention**; **2 patient perceptions**
- Populations: **Children** & **Adults**
- Models: **Synchronous** & **Asynchronous**

TeleAudiology

TELE-AUDIOLOGY APPLICATIONS

SCREENING

- ***Telephone*** & ***internet*** – possible and accepted
- ***DPOAE*** & ***AABR*** screening in infants – equivalent results
- ***Otoscopy***, ***immittance*** & ***PT AC*** in pre-school children – equivalent results

TELE-AUDIOLOGY APPLICATIONS

DIAGNOSTICS

- ***Balance*** disorder consultation and testing
- ***PT AC*** & ***BC*** audiometry - equivalent findings
- ***Video-otoscopic*** images - equivalent findings
- ***HINT*** results - comparable findings
- ***ABR*** and ***OAE*** testing - comparable results
- ***Intraoperative monitoring –*** CI device check and responses

TELE-AUDIOLOGY APPLICATIONS

INTERVENTION

- ***Internet-based*** self-help ***tinnitus*** treatment program – similar results to conventional therapy
- ***Internet-based counselling*** program for new hearing aid fittings in adults – powerful tool
- ***Cochlear implant mapping*** – easily done and no significant differences – subjects report satisfaction with methods
- ***Probe microphone*** measurements in adults comparable

THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF AUDIOLOGY
VOLUME 31 NUMBER 2 NOVEMBER 2009 pp. 96–100

A Pilot Investigation Into the Provision of Hearing Services Using Tele-Audiology to Remote Areas

WENDY PEARCE, TERESA Y.C. CHING AND HARVEY DILLON
Australian Hearing, National Acoustic Laboratories, Australia

Teleintervention for Infants and Young Children Who Are Deaf or Hard-of-Hearing

Teleintervention for Infants and Young Children Who Are Deaf or Hard-of-Hearing

Melissa McCarthy, Karen Muñoz and Karl R. White

Pediatrics 2010;126;S52-S58

AUTHORS: Melissa McCarthy, MEd,[a] Karen Muñoz, EdD,[b] and Karl R. White, PhD[b]

[a]Royal Institute for Deaf and Blind Children, Sydney, Australia; and [b]National Center for Hearing Assessment and Management, Utah State University, Logan, Utah

Rehabilitative Online Education versus Internet Discussion Group for Hearing Aid Users: A Randomized Controlled Trial

DOI: 10.3766/jaaa.22.5.4

Elisabet Thorén*†
Monica Svensson‡
Anna Törnqvist‡
Gerhard Andersson§**††
Per Carlbring§§
Thomas Lunner*†§

J Am Acad Audiol 22:274–285 (2011)

Original Article

Artigo Original

Patrícia Danieli Campos[1]
Deborah Viviane Ferrari[2]

Teleaudiology: evaluation of teleconsultation efficacy for hearing aid fitting

Telessaúde: avaliação da eficácia da teleconsulta na programação e adaptação de aparelho de amplificação sonora individual

Use of Telehealth for Research and Clinical Measures in Cochlear Implant Recipients: A Validation Study

Michelle L. Hughes,[a] Jenny L. Goehring,[a] Jacquelyn L. Baudhuin,[a] Gina R. Diaz,[a] Todd Sanford,[a] Roger Harpster,[a] and Daniel L. Valente[a]

Journal of Speech, Language, and Hearing Research • Vol. 55 • 1112–1127 • August 2012

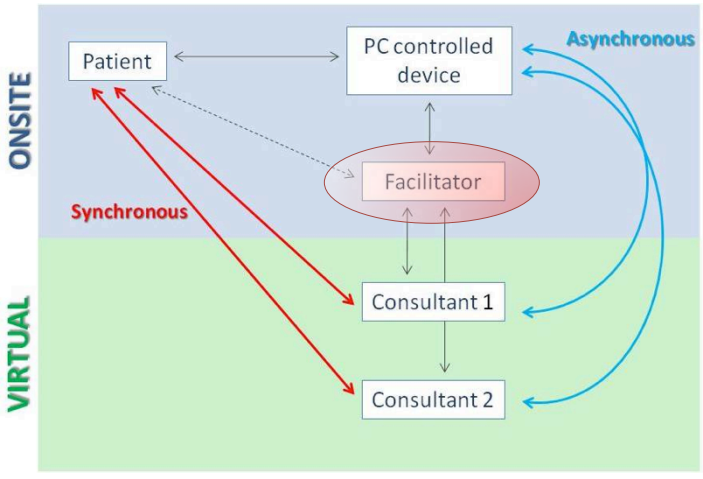
WHERE DOES TELEHEALTH FIT IN AUDIOLOGICAL PRACTICE?

- A South African example of a telehealth audiology service
- **Witkoppen** Primary Healthcare Clinic, Diepsloot
- **Hybrid telehealth model** – Diagnostic Audiometry & Video-otoscopy

TeleAudiology

WITKOPPEN CLINIC - DIEPSLOOT

TELE-AUDIOLOGY CLINIC



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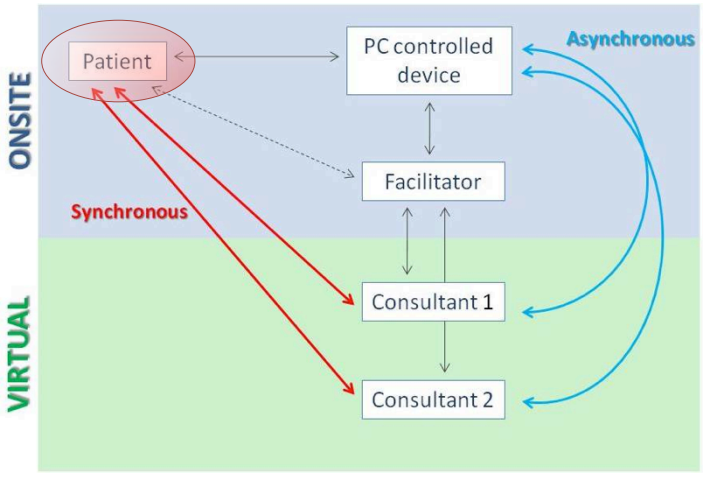
TELE-AUDIOLOGY CLINIC



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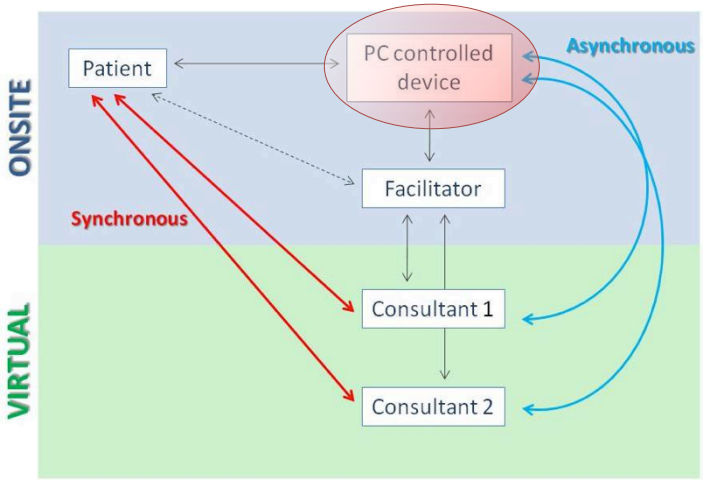


TeleAudiology

AUDIOMETRY FOR THE UNDERSERVED

Requirements:

1. Accurate testing **without a sound booth** - Mobile diagnostic audiometry
2. Increased capacity – **Automated audiometry** (asynchronous telemedicine)
3. Remote expert services – **face-to-face audiometry** (synchronous telemedicine)

1. AUDIOMETRY OUTSIDE A BOOTH

AIMS

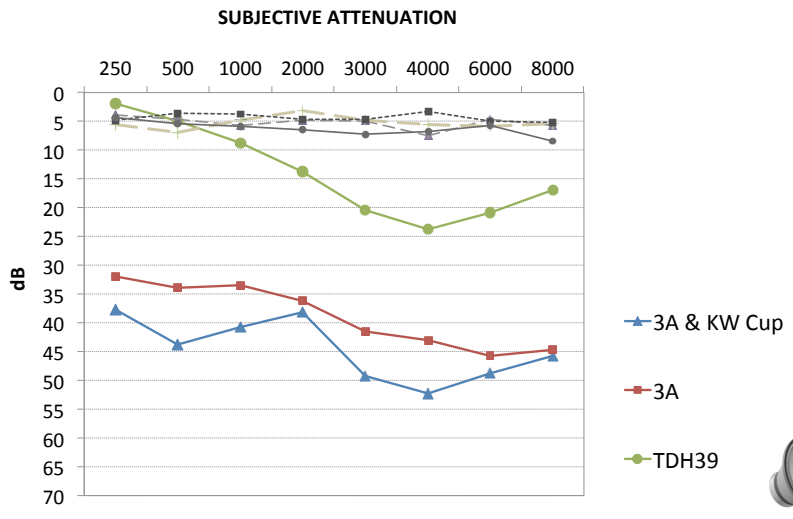
1. Attenuation and permissible ambient noise levels

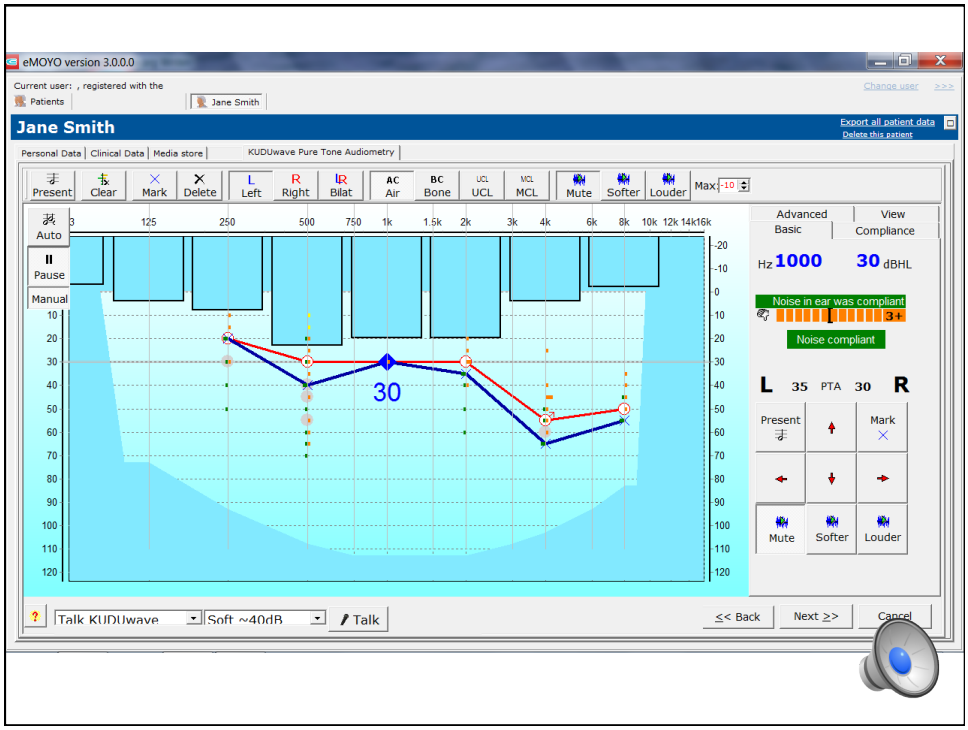
- **13** normal hearing adult subjects tested in free-field in several attenuated conditions

2. Validity of audiometry outside a booth

- **147** Geriatric subjects tested in natural environment and soundbooth
- **171** children tested in natural environment and soundbooth

1. AUDIOMETRY OUTSIDE A BOOTH





1. AUDIOMETRY OUTSIDE A BOOTH?

Validity of diagnostic pure-tone audiometry without a sound-treated environment in older adults

Felicity Maclennan-Smith*, De Wet Swanepoel*,†,‡,# & James W. Hall III*

*Department of Communication Pathology, University of Pretoria, South Africa, †Callier Center for Communication Disorders, University of Texas at Dallas, USA, ‡Ear Sciences Centre, School of Surgery, the University of Western Australia, Nedlands, Australia and #Ear Science Institute Australia, Subiaco, Australia

International Journal of Audiology 2013; 52: 66–73

Conclusion: Valid diagnostic pure-tone audiometry can be performed in a natural environment with recently developed technology, offering the possibility of access to diagnostic audiometry in communities where soundtreated booths are unavailable.

Maclennan-Smith, Swanepoel & Hall, 2013

1. AUDIOMETRY OUTSIDE A BOOTH?

DIAGNOSTIC PURE-TONE AUDIOMETRY IN SCHOOLS: MOBILE TESTING WITHOUT A SOUND-TREATED ENVIRONMENT

De Wet Swanepoel[1,2,3], Felicity Maclennan-Smith[1], James W Hall[1]

Conclusions: **Diagnostic air- and bone-conduction audiometry** in schools, **without a sound treated room**, is possible with sufficient earphone attenuation and real-time monitoring of environmental noise.

Currently in review at the JAAA

Swanepoel, Maclennan-Smith & Hall, IN REVIEW

2. AUTOMATED AUDIOMETRY

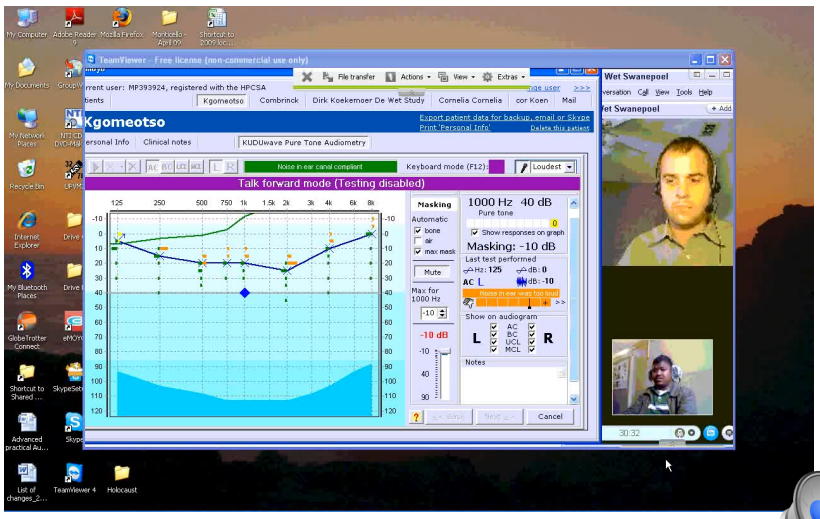
• VOL. 16 NO. 5 • JUNE 2010 **TELEMEDICINE and e-HEALTH**

Hearing Assessment–Reliability, Accuracy, and Efficiency of Automated Audiometry

De Wet Swanepoel, Ph.D.,[1,2] Shadrack Mngemane, B.Comm.Path.,[1] Silindile Molemong, B.Comm.Path.,[1] Hilda Mkwanazi, B.Comm.Path.,[1] and Sizwe Tutshini, B.Comm.Path.[1]

Conclusions: Automated audiometry provides **reliable, accurate, and time-efficient hearing assessments** for normal-hearing and hearing-impaired adults.

3. REMOTE AUDIOMETRY



3. REMOTE AUDIOMETRY

RESEARCH **Original article**

Intercontinental hearing assessment – a study in tele-audiology

De Wet Swanepoel*‡, Dirk Koekemoer† and Jackie Clark‡§

*Department of Communication Pathology, University of Pretoria, Pretoria; †Research and Development Department, GeoAxon, Pretoria, South Africa; ‡Callier Center for Communication Disorders, University of Texas at Dallas, Texas, USA; §Department of Speech and Hearing Therapy, University of the Witwatersrand, Johannesburg, South Africa

Journal of Telemedicine and Telecare 2010; **16**: 248–252

Conclusions: There were **no clinically significant differences** between the results obtained by **remote intercontinental audiometric testing** and conventional **face-to-face audiometry**.

AUDIOMETRY FOR THE UNDERSERVED

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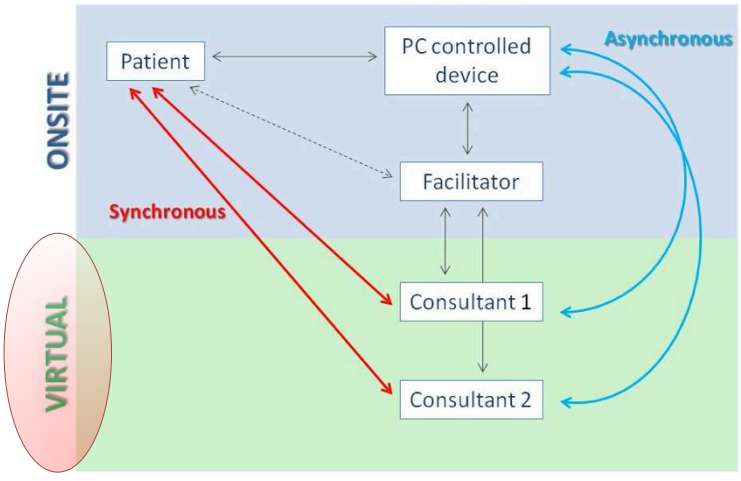
TELE-AUDIOLOGY CLINIC



TeleAudiology

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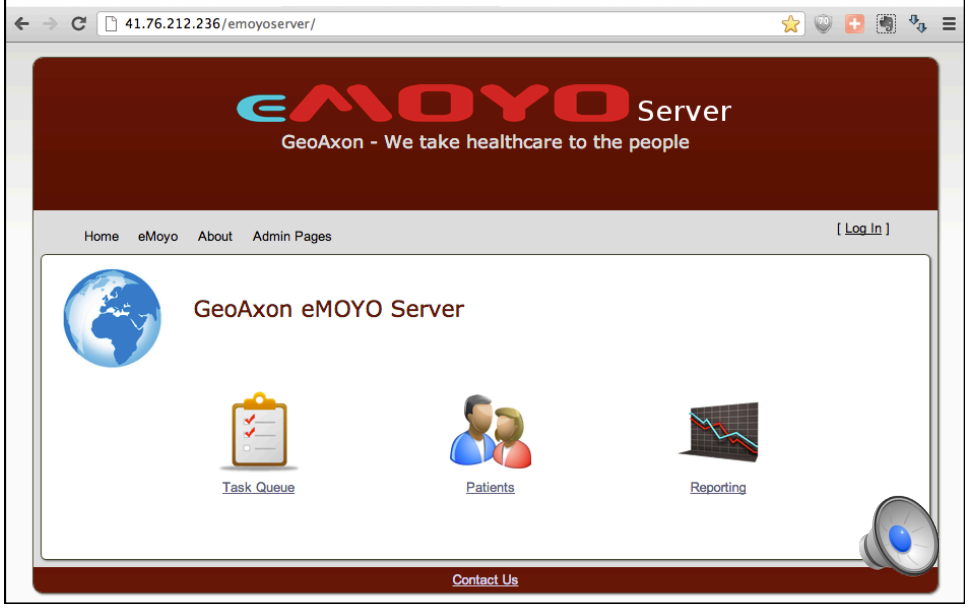

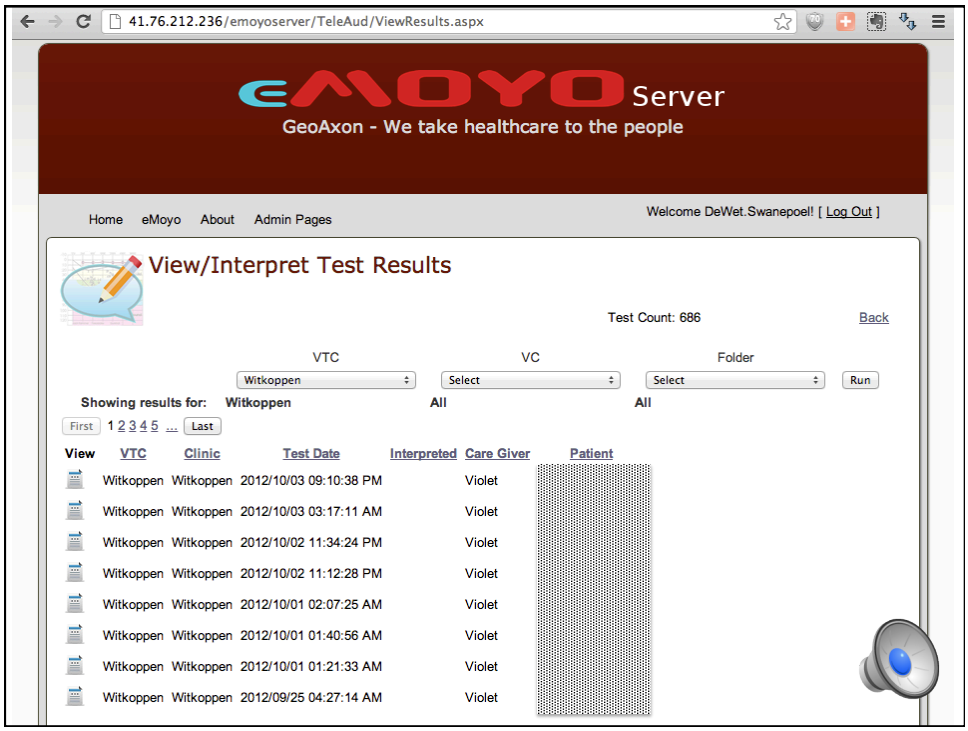
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GeoAxon - We take healthcare to the people
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Test Count: 686
Back
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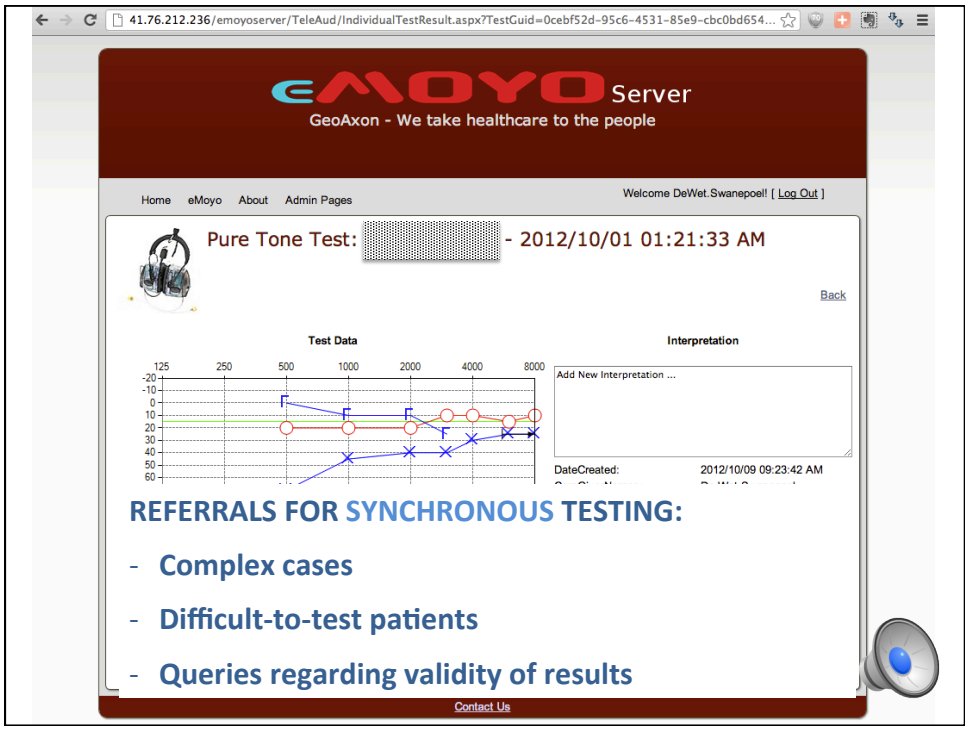
Folder
Witkoppen
Select
Select
Run
Showing results for: Witkoppen All All
First 1 2 3 4 5 ... Last
View VTC Clinic Test Date Interpreted Care Giver Patient
Witkoppen Witkoppen 2012/10/03 09:10:38 PM Violet
Witkoppen Witkoppen 2012/10/03 03:17:11 AM Violet
Witkoppen Witkoppen 2012/10/02 11:34:24 PM Violet
Witkoppen Witkoppen 2012/10/02 11:12:28 PM Violet
Witkoppen Witkoppen 2012/10/01 02:07:25 AM Violet
Witkoppen Witkoppen 2012/10/01 01:40:56 AM Violet
Witkoppen Witkoppen 2012/10/01 01:21:33 AM Violet
Witkoppen Witkoppen 2012/09/25 04:27:14 AM Violet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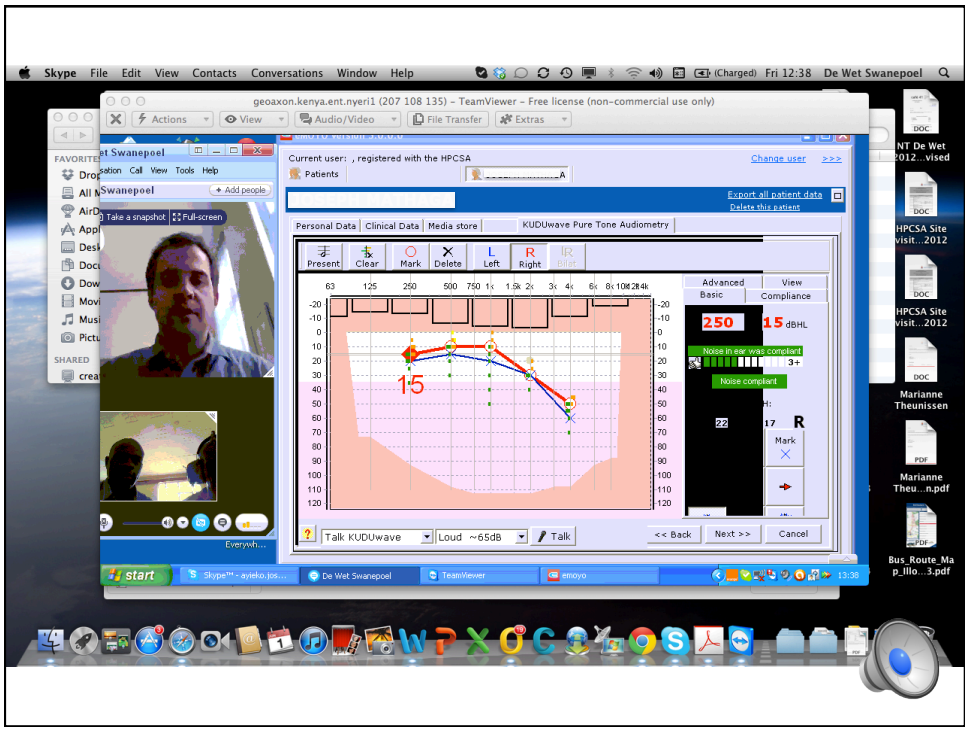
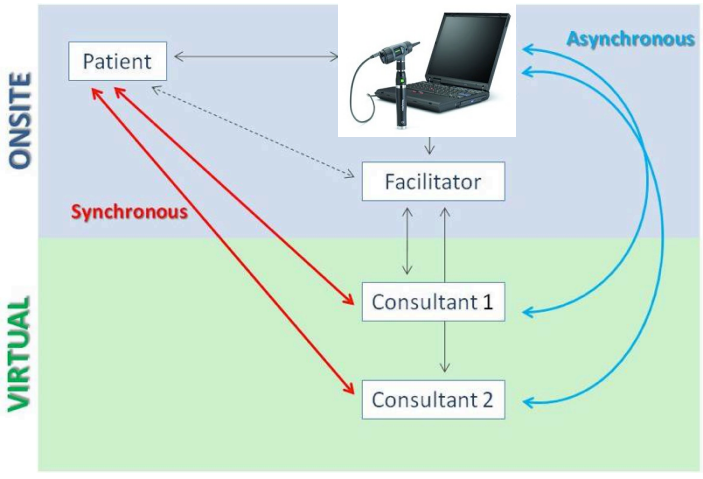
eMOYO Server
GeoAxon - We take healthcare to the people
Home eMoyo About Admin Pages
Welcome DeWet.Swanepoel! [Log Out]
Pure Tone Test: - 2012/10/01 01:21:33 AM
Back
Test Data
Interpretation
125 250 500 1000 2000 4000 8000
Add New Interpretation ...
DateCreated: 2012/10/09 09:23:42 AM
REFERRALS FOR SYNCHRONOUS TESTING:
- Complex cases
- Difficult-to-test patients
- Queries regarding validity of results
Contact Us



TELE-AUDIOLOGY CLINIC



TeleAudiology

IS IT ETHICAL?

TELE-AUDIOLOGY GUIDELINES

OFFICIAL POSITION STATEMENTS

- **AAA (2008)** - The Use of Telehealth/ Telemedicine to Provide Audiology Services
- **ASHA (2005)**- Position paper on Audiologists using telepractice (telehealth)
- **CASLPA (2006)**- Position paper Telepractice
- All statement **support** tele-audiology with proper clinician **skills** and environmental **capacity** (and security/ confidentiality)

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION

Audiologists Providing Clinical Services via Telepractice: Position Statement

Working Group on Telepractice

Audiologists Providing Clinical Services via Telepractice: Technical Report

Working Group on Telepractice

ASHA Position Statement (2005)

"...telepractice (telehealth) is an **appropriate model** of service delivery for the profession of audiology... **to overcome barriers** of access to services caused by **distance**, **unavailability of specialists** and/or subspecialists, and **impaired mobility**.

Telepractice offers the potential to **extend clinical services** to rural, remote, and underserved populations, and culturally and linguistically diverse populations."

ASHA Position Statement (2005)

"The use of telepractice **does not remove any existing responsibilities** in delivering services, including adherence to the **Code of Ethics** (ASHA, 2003), **Scope of Practice** (ASHA, 2004), **state and federal laws** (e.g., licensure, HIPAA, etc.), and ASHA policy documents on professional practices."

"Therefore, services delivered via telepractice must adhere to the **same level of quality** as services delivered face-to-face."

ETHICAL ISSUES IN TELEAUDIOLOGY

Personnel

Although only certified and/or licensed audiologists can **provide professional audiology services** via telepractice, **appropriately trained individuals**, *(e.g., health professionals, paraprofessionals, trained family members/caregivers)* may be present at the site to assist the client. It is the **responsibility of the professional** to **direct the session** and to **ensure** that **facilitators** *(e.g., support personnel and family members/ caregivers)* are **adequately trained** to assist in the telepractice session.

The **type of professional required** at the client's site **may vary** depending on the type of service being provided.

ETHICAL ISSUES IN TELEAUDIOLOGY

Equipment

Equipment **specifications vary depending** upon the telepractice application and the desired outcomes of the intervention.

Image and sound quality should be of sufficient quality for the clinical application.

Transmission mediums include plain old telephone system (POTS), ISDN (Integrated Services Digital Network), satellite, cable (broadband Internet connection), and DSL (Digital Subscriber Line).

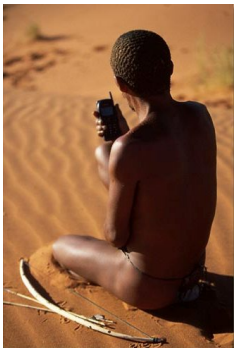
ETHICAL ISSUES IN TELEAUDIOLOGY

General

- Be **educated** and **trained** in **models** of telepractice
- **Inform clients** how **services differ** and **disclose potential risks** and **limitations** as well as **benefits**
- **Evaluate effectiveness** of services rendered via telepractice to ensure methods, procedures, and techniques are **consistent with best available evidence** and adhere to standards of best practices.
- Create a **safe environment** within which to provide services.
- Use **transmission** and **recordkeeping** methodologies that **protect privacy** and **ensure confidentiality** and **security**.

TeleAudiology

THANK YOU



TeleAudiology