



TeleAudiology: A Key to Early Identification of Hearing Loss

**TeleAudiology Learning Community
Salt Lake**

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TeleAudiology?



Huh?

Help meet EHDI 1-3-6 goals?

Improve loss to follow-up rates in the EHDI process?

Is TeleAudiology possible in a clinical setting?

Solution?

Marshfield Clinic TeleHealth!

Dedicated TeleHealth Department with Supporting Infrastructure

- **Established in 1997**
- **Based in operational clinical approaches**
- **Not Technology oriented**
- **Providing over 40 different specialty services**
- ***Experienced TeleHealth Nurse Clinicians***

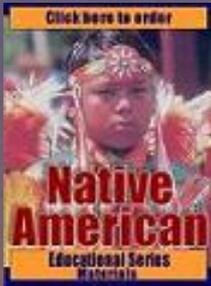


Marshfield Clinic TeleHealth



**Marshfield Clinic
Centers**

Hospitals



**Indian Health
Centers**

GREAT LAKES INTER-TRIBAL COUNCIL



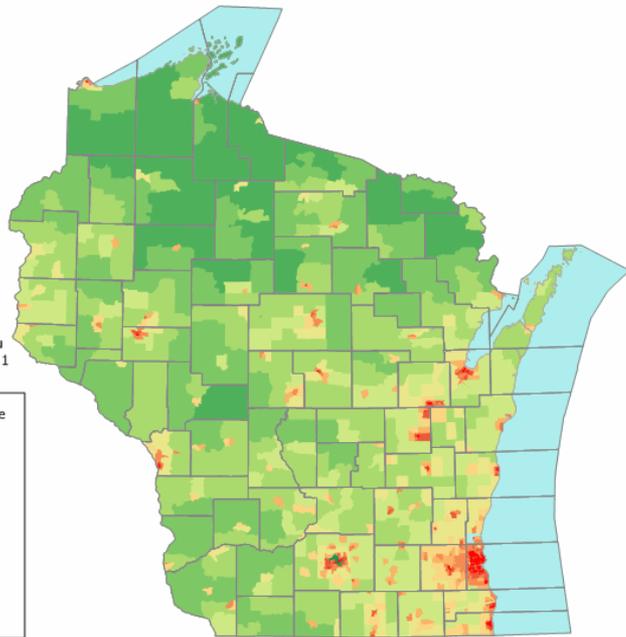
**Skilled Nursing
Facilities**

Head Start Centers



National Head Start Association





Marshfield Clinic Rural Wisconsin

Geography: Marshfield Clinic Audiology Locations

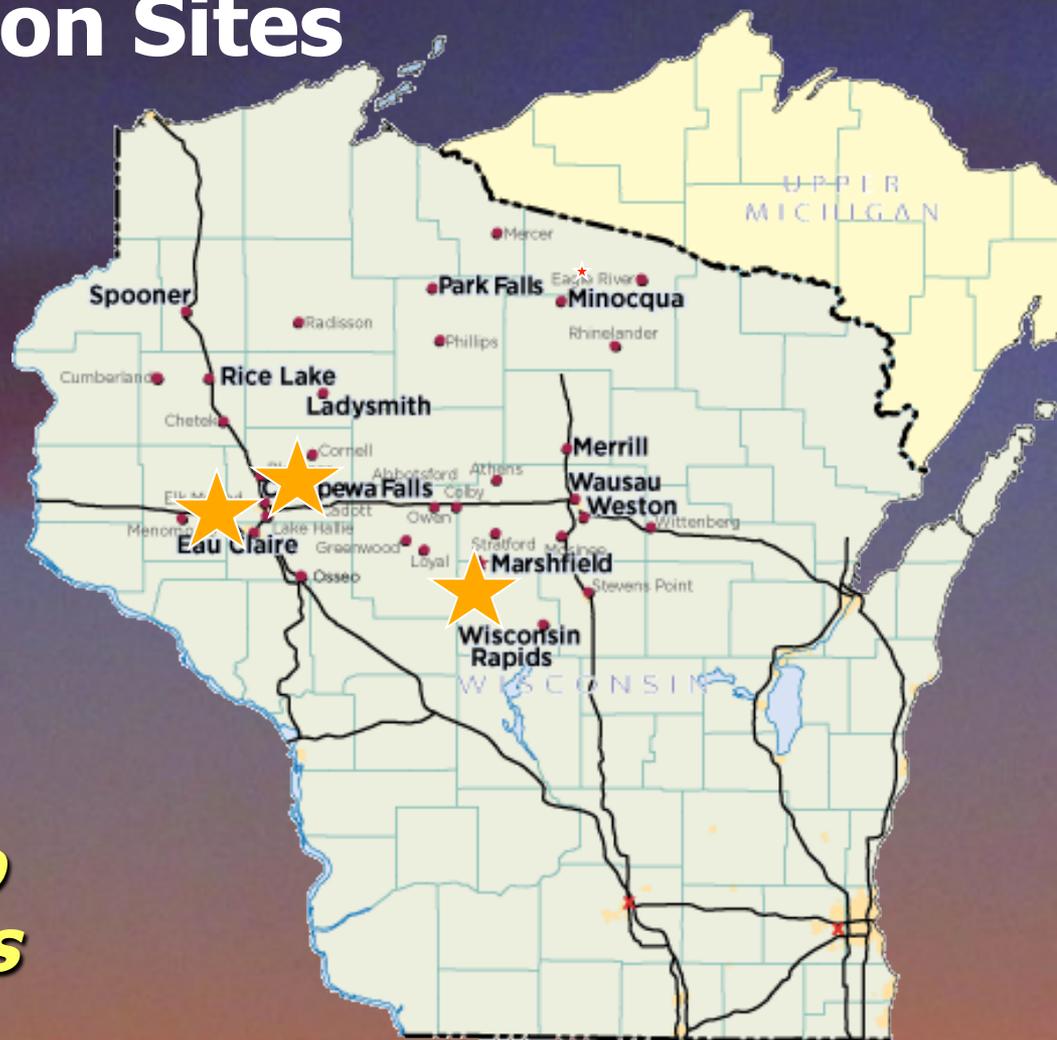
- Chippewa Falls
- Eau Claire
- Marshfield
- Menomonie
- Merrill
- Minocqua
- Park Falls
- Rice Lake
- Spooner
- Stanley
- Wausau
- Weston
- Wisconsin Rapids



Audiology In-person Sites prior to Grant Funding

- Marshfield
- Chippewa Falls
- Eau Claire

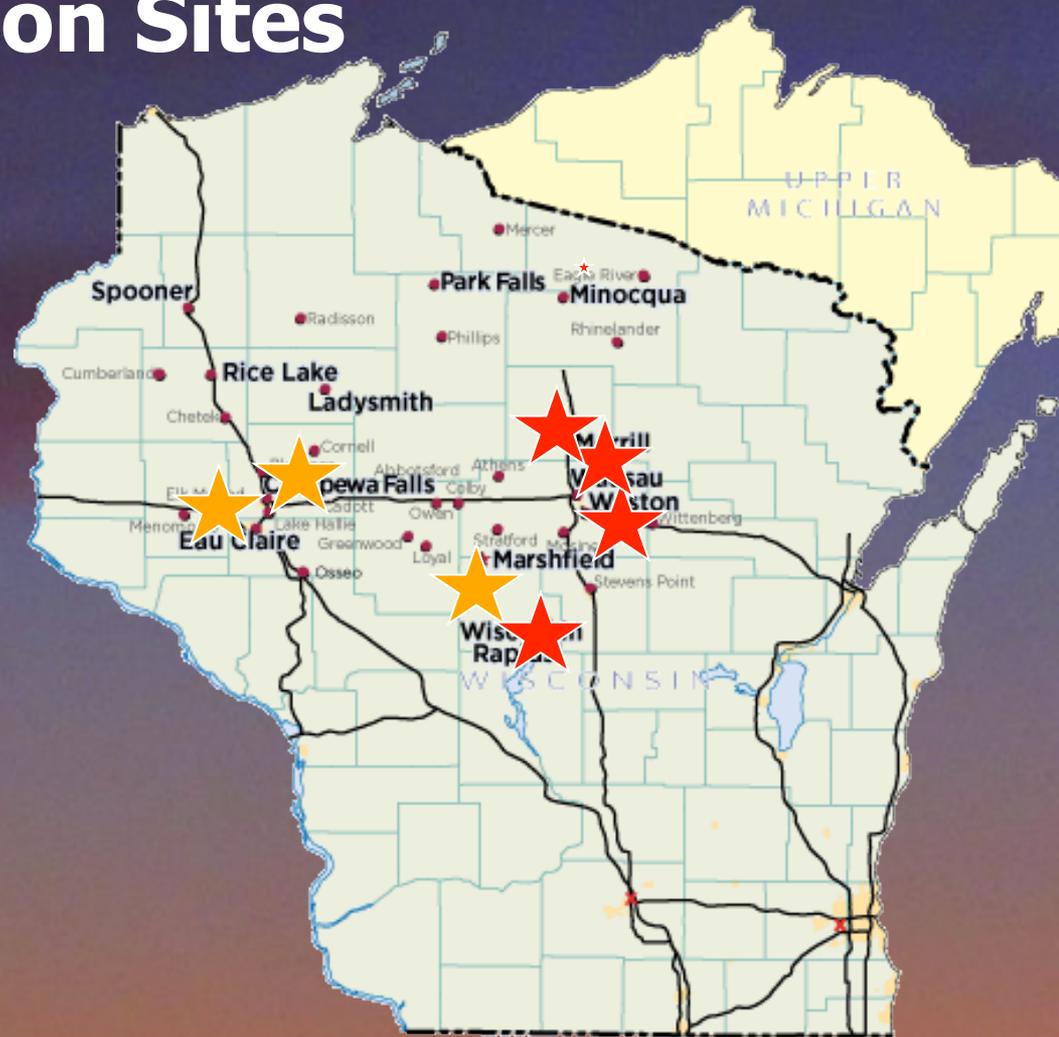
*Problem: Travel to
these 3 locations
may exceed 2-3
hours one way!*



**Locations with
In-person
Pediatric Diagnostic ABR**

Audiology In-person Sites After Grant Funding

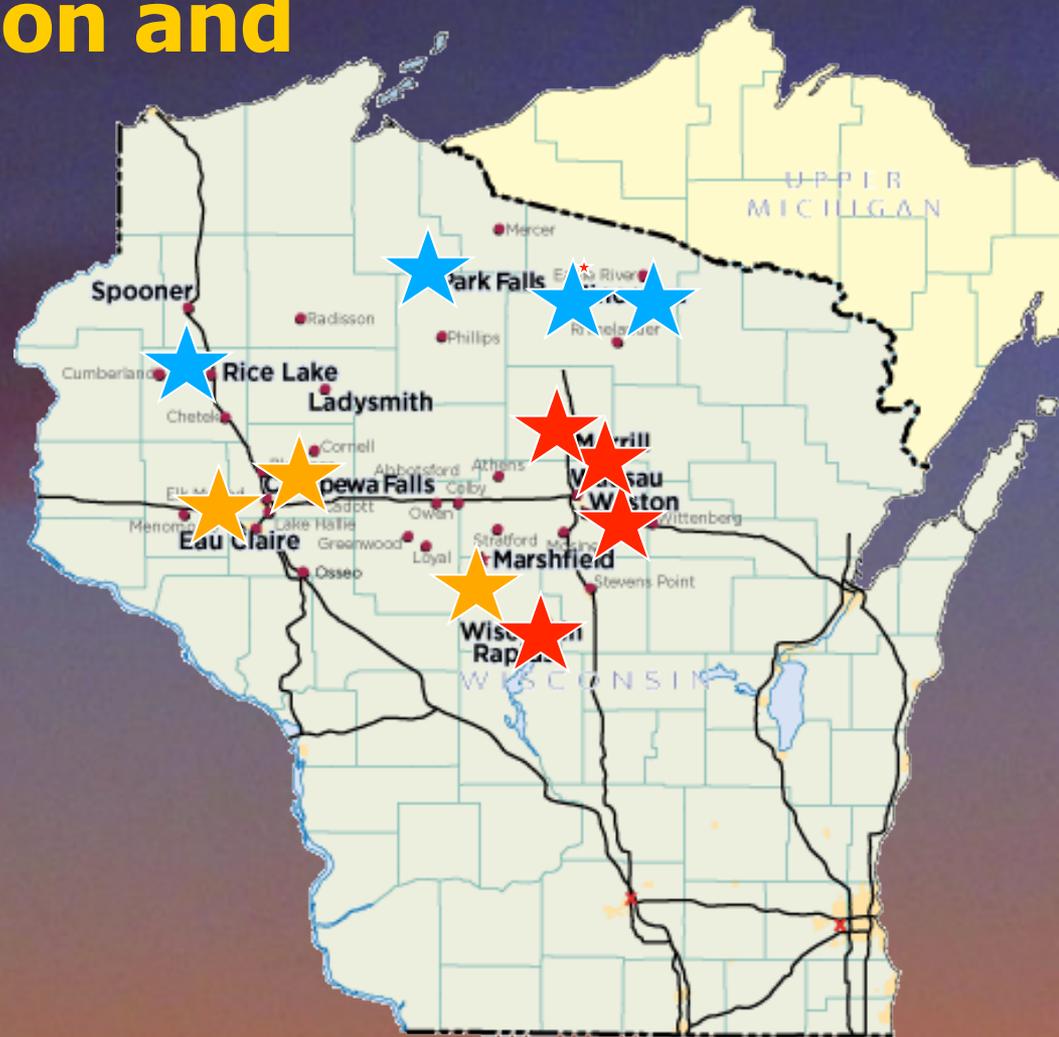
- Marshfield
- Chippewa Falls
- Eau Claire
- Wausau
- Weston
- Merrill
- Wisconsin Rapids



Locations with
In-person
Pediatric Diagnostic ABR

Audiology In-person and TeleHealth Sites

- Marshfield
- Chippewa Falls
- Eau Claire
- Wausau
- Weston
- Merrill
- Wisconsin Rapids
- Minocqua
- Rice Lake
- Rhinelander
- Park Falls



**Locations with
In-person & TeleHealth
Pediatric Diagnostic ABR**



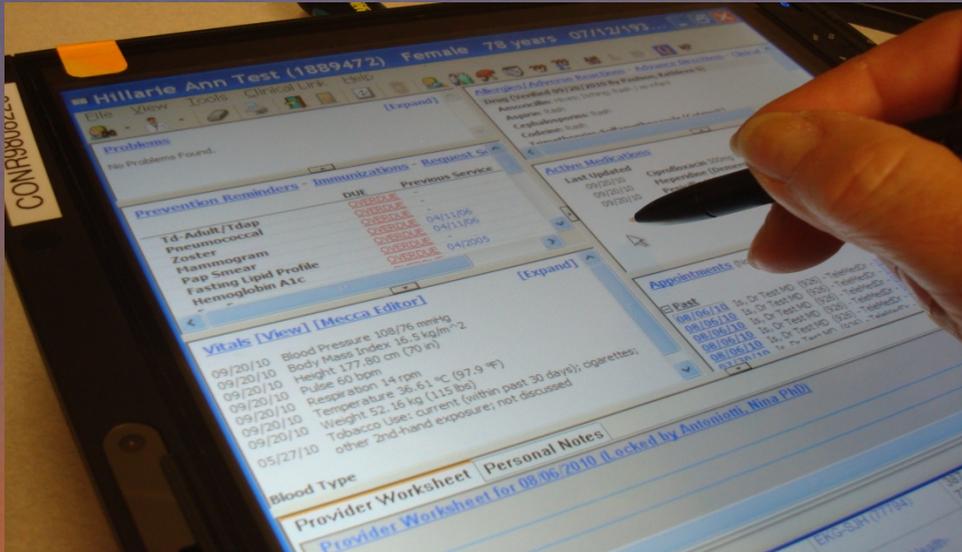
Cattails Software Suite

A Service of Marshfield Clinic

Electronic Health Record

CattailsMD

Wireless Tablets for Patient Care



MARSHFIELD CLINIC®



Think big, start small

With Wisconsin Sound Beginnings:

- Data Analysis
- Key locations to develop onsite and TeleAudiology services.
 - Loss to follow-up rates
 - Geographic access to services

Hire a Care Coordinator

- **Track babies at high risk for loss to follow-up**
- **Promote WSB EHDI Quality Improvement Bundles**
- **Support and promote TeleAudiology**
- **Coordinate Pediatric Hearing Loss Clinic**



Preparation



Audiology Equipment

Equipment Cases



Supplies





Procedure-3853.0 Cross Loop.DOC - Microsoft Word

File Edit View Insert Format Tools Table Window Help

Type a question for help

95% Read Normal + Centu Century Gothic 10.5

1 2 3 4 5 6 7

3.3. Your PC will be assigned a 12-digit access code each time you start the pro
You then give that number to the audiologist. The number is found under the
tab. It will have your name and your PC or laptop. The TeleHealth nurse will k

CrossLoop Create Account | Login

Access Share

Tell a Friend your Access Code

Name
kaisertm on CONR9906038

Access Code
3919 2875 5331

Connect

Need to access your home or work computers while traveling with your laptop?
CrossLoop Home does it! Buy Now

Page 4 Sec 1 4/6 At Ln Col REC TRK EXT OVR

start practice crossloop... Procedure-3853.0... CrossLoop

10:49 AM Tuesday

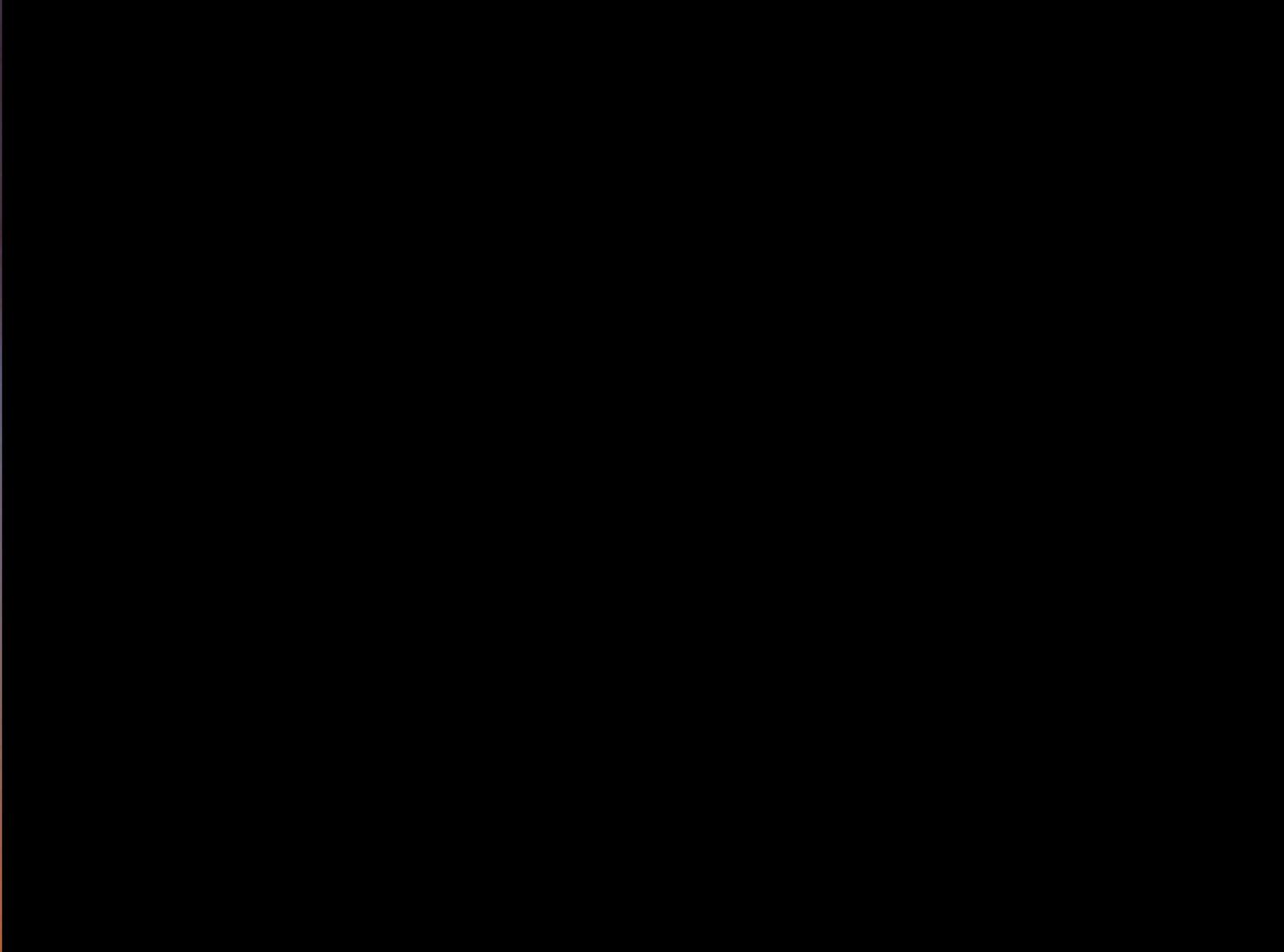
Crossloop



Crossloop

- **Software that allows remote access of ABR computer**
 - **128-bit encryption algorithm**
- **Randomly generated 12-digit access code for each session**

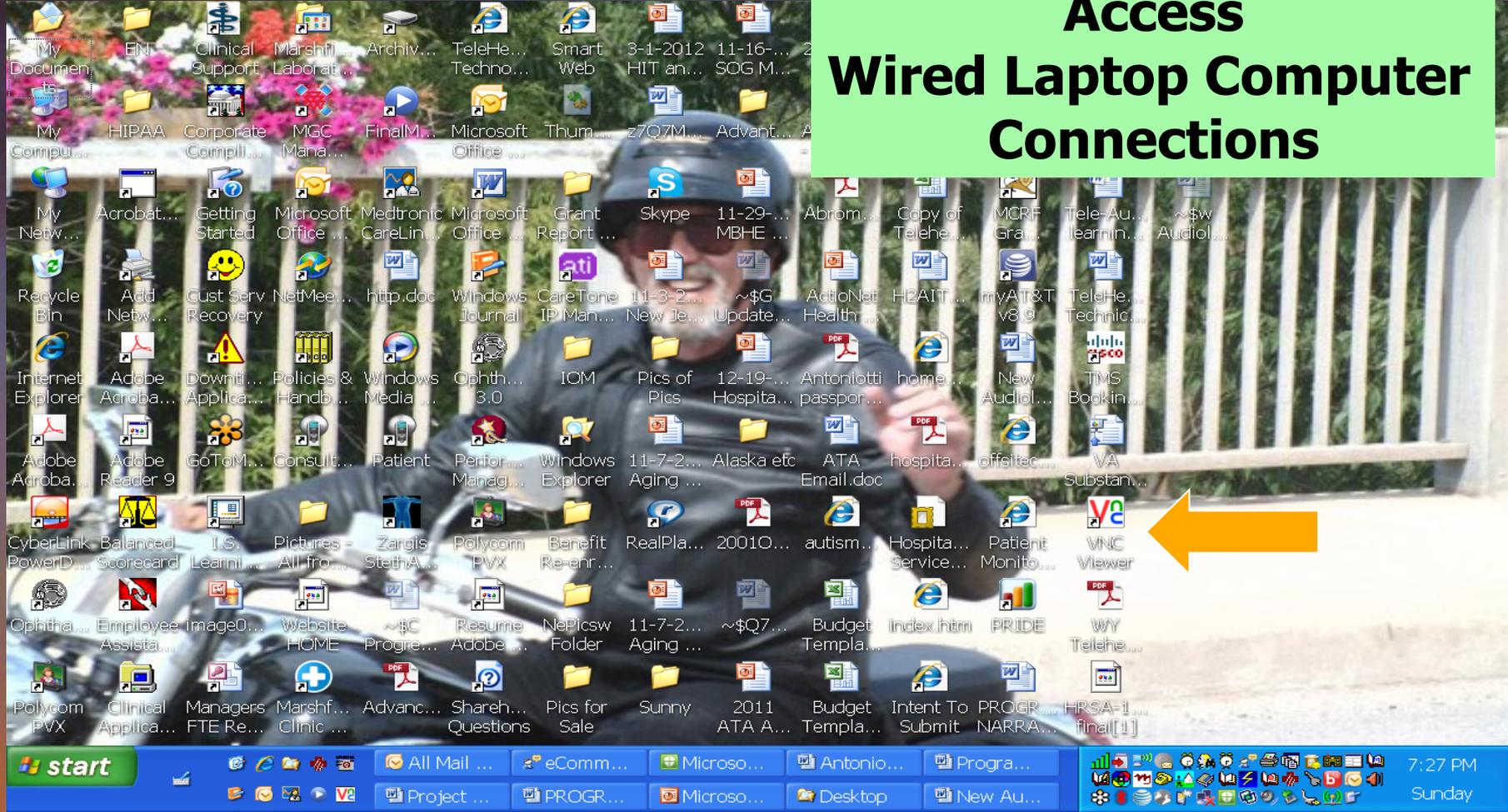
Crossloop Video





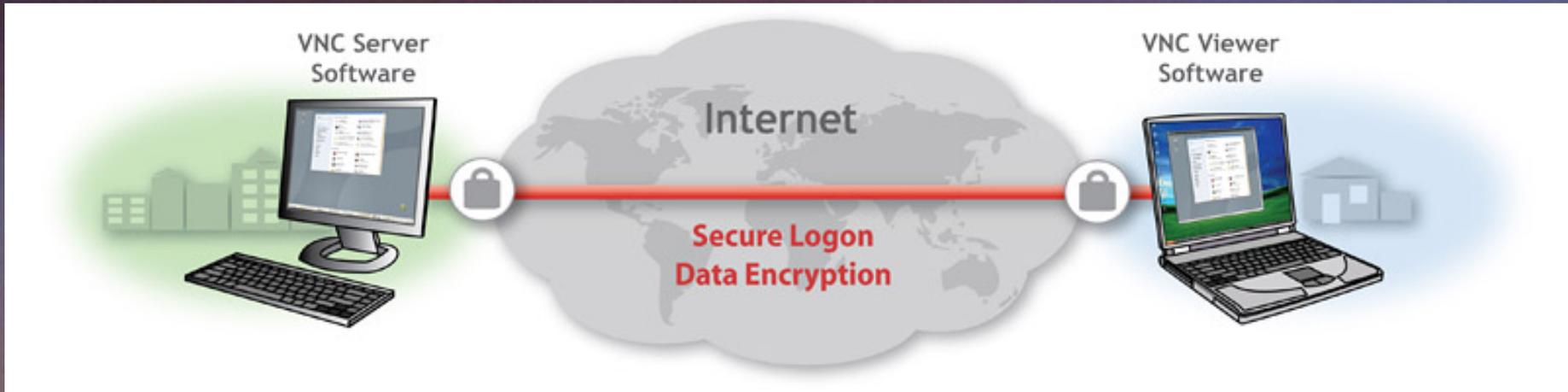
VNC Remote Access

**Remote Computer
Access
Wired Laptop Computer
Connections**





Real VNC Access





User Authentication

Requires user name and password – set up to use network log in credentials

A screenshot of the VNC Viewer authentication dialog box. The title bar reads "VNC Viewer : Authentication [128-bit AES Encryption]". On the left is the VNC logo. To its right are two input fields: "Username:" and "Password:". To the right of the "Username:" field is an "OK" button. To the right of the "Password:" field is a "Cancel" button.

VNC Viewer : Authentication [128-bit AES Encryption]

 Username:

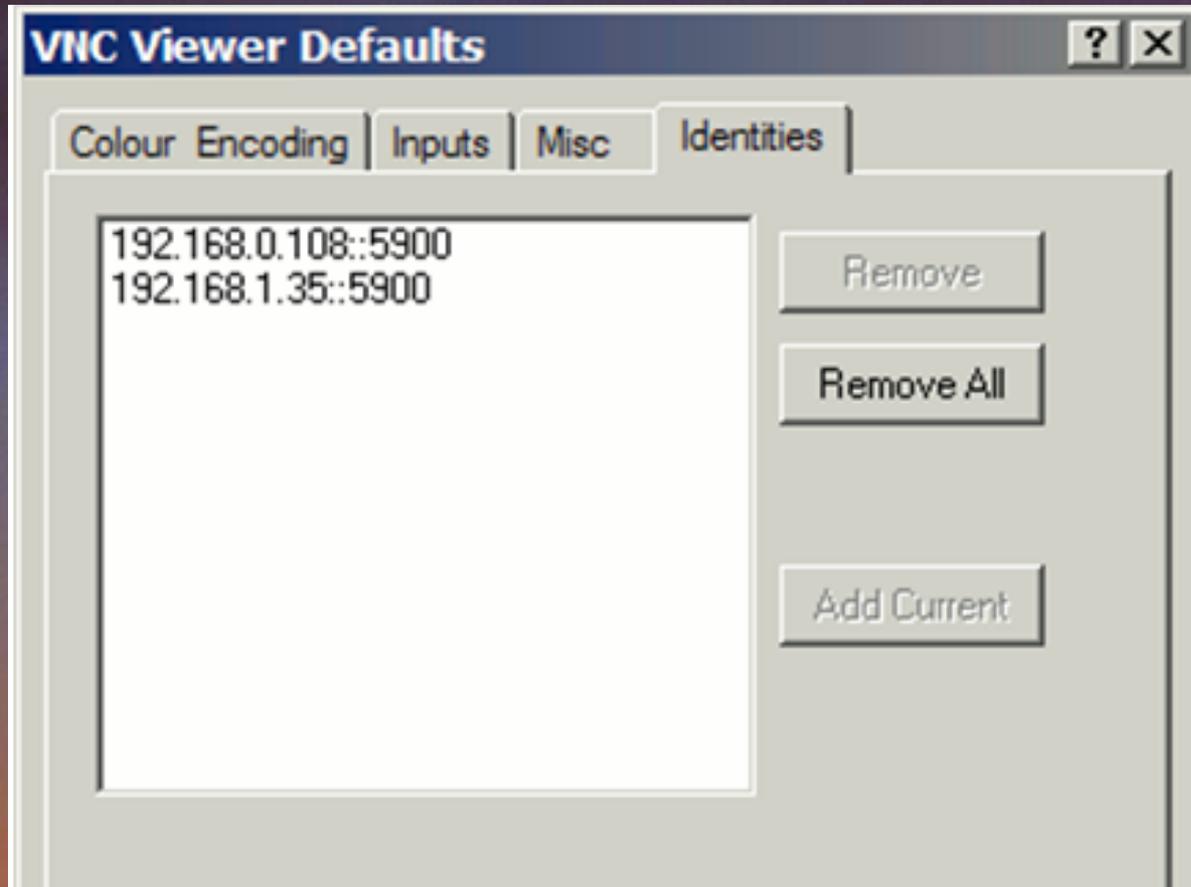
Password:

OK

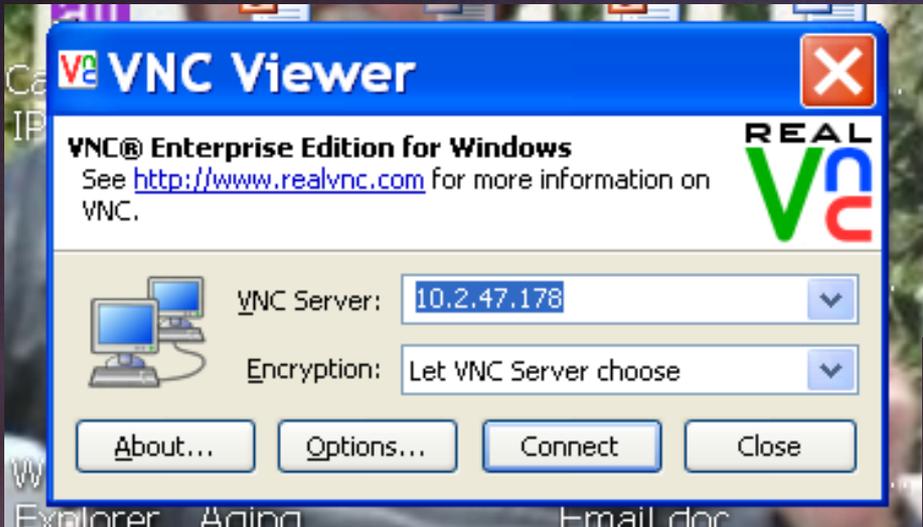
Cancel



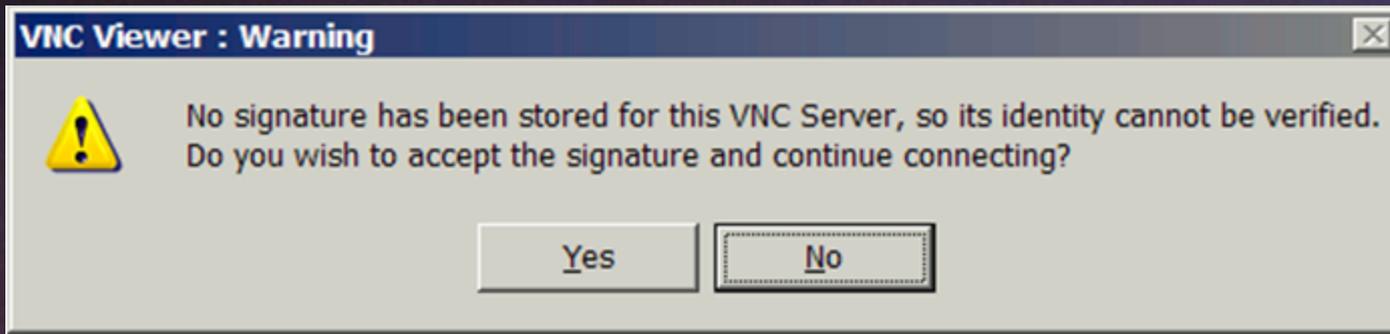
Naming of Sites



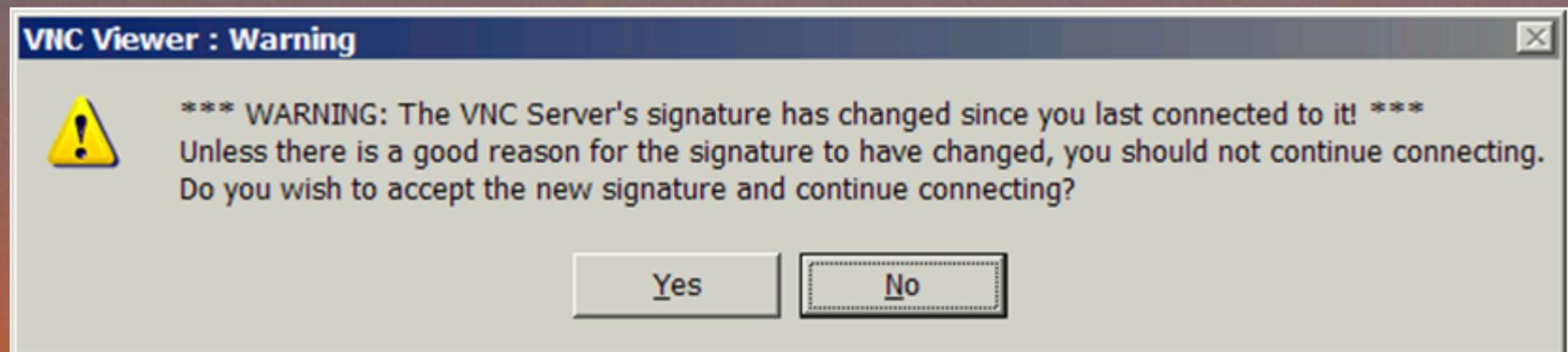
After log-in...



- Audiologist clicks on VNC icon
- Audiologist selects name of site from drop down menu (showing ip address)
- Audiologist clicks on “connect”



Server security controls are in place to disallow connections to the computer destination if not authorized by server or authentication credentials.





VNC Remote Access

- **VNC Enterprise System for Windows**
- **Runs as a stand-alone product**
- **Purchased License**
- **Local installation on computing device**
- **Server based application for connections**
- **Requires user name and password**
- **Complies with Security Rules (HIPAA)**

TeleHealth Video Conference Systems



The patient site is a designated clinical exam room enabled for TeleHealth

- Polycom© VSX7000s codec technologies

Audiologist uses the pc-based H.323 video system provider workstation

- Polycom PVX Software only codec with Logitech 9000 camera and pc speakers
- Includes remote control access of the exam room camera.



Technical Specifications

- **H.323 video equipment**
 - Runs on 10-100 meg fiber network, using standards based video.
- **Uses IP (Internet Protocol)**
 - 512 kbps over proprietary fiber optic cable leased from two Local Exchange Carriers.

Video Conference Systems

MC TeleHealth Approach to Care Delivery

- **Sessions are real-time interactive**



- **All calls are considered patient consultations and are treated as such for HIPAA and HITECH requirements.**



TeleAudiology







Page 1 of 1

- Authored by TeleHealth Director and TeleHealth Nurse Project Coordinator in consultation with Audiology
- Available on the Marshfield Clinic Intranet for easy access

Procedure Development

The screenshot shows the Marshfield Clinic Intranet Home Page in a Windows Internet Explorer browser. The page features a navigation menu on the left, a search bar, and a main content area with a grid of links. A yellow arrow points to the 'Telehealth' link in the 'Clinical' column of the grid.

Directories	Schedules	Clinical	Reference	Other
Phone Directory	Call Schedule	QI Resources & Guidelines	Medical Library	Pulse
Provider Directory	Class Offerings	Lab Test Manual	Human Resources	Podcast: Patient Listening
MC Org Chart	Grand Rounds	Microfex	Policies, Handbooks & Forms	On-Demand Video
Paging Gateway	Conferences/CME	Advanced Access	Corporate Compliance	Logowear
E-mail Addresses	Resident/Student, Locum Schedules	Medline/Ovid	Purchasing Catalog/ Materials Management	PerkSpot
Zip Code		Telehealth	Grateful Patient Referral Form	My Marshfield Clinic

News and Announcements

- Changes coming soon to Intranet home page. MC Bulletin Board
- In Pulse - Research Foundation clinician-led research increases sharply in 2010
- Marshfield Clinic to Hold Bariatric Weight Loss Education Session at Sacred Heart Hospital
- Marshfield Clinic Diabetes Education Program in Park Falls Eams ADA Recognition
- Marshfield Clinic Menomonie Center Welcomes Family Medicine Physician
- Bariatric Surgery Information Sessions Offered in Rice Lake, Eau Claire
- Marshfield Clinic Offers Free Wellness Program That Benefits Women Following Breast Cancer Treatment

Procedure Information Includes:

- **Pre-consult preparation of infant**
 - **Equipment set-up**
 - **Skin & ear preparation**
 - **Electrode placement**
 - **Infant positioning**
- **Post-consultation considerations**



3. PROCEDURE BODY

All clinical staff responsible for the presenting of patients to Audiology Services or any provider who may need a component of audiology services shall be proficient in providing audiology data via TeleHealth technologies.

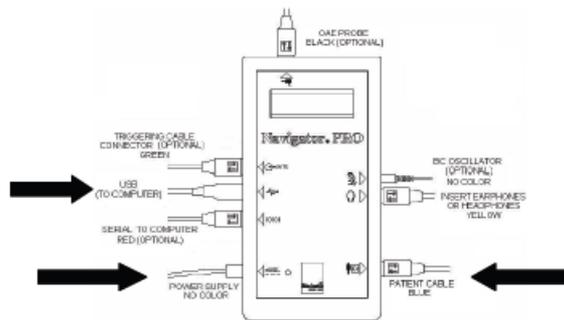
All clinical staff responsible for the presenting of patients to Audiology Services or any provider who may need a component of audiology history or physical exam shall be appropriately trained.

3.1. Pre-Consult Preparation:

- Prepare technology to include the Navigator Pro box, Biologic software, bone oscillator, otoscope and connection to CrossLoop.
- Frame patient so Audiologist can see the infant while testing is taking place.
- A quiet infant is imperative for proper testing.
- All electronics should be turned off including cell phones.
- Assist parent(s) as needed to keep the infant settled.

3.2. Biologic/ Navigator Pro equipment set-up:

- The Navigator Pro box is colored coded to assure proper connections.
- Plug USB cable into the laptop with the Biologic Software.
- Assure the earphones are plugged into the Navigator Pro box.
- There is no ON/OFF button. The Navigator Pro automatically turns on when plugged into the computer.
- The diagram below shows placement only. Please disregard the color scheme. The Navigator Pro is color coded as follows: Power cord is orange, USB is yellow, and insert earphones are pink.



Procedures

- Position the infant so the left ear is exposed. Complete testing on the left ear (blue transducer). Settle infant as needed.

3.9. Bone Conduction ABR: Test only done at provider's discretion:

- Plug oscillator into the Navigator Pro.
- Firmly hold the oscillator to the infant's mastoid with 1 index finger. Push the oscillator on the mastoid until you could almost push the child's head away from you.
- Make sure the oscillator is not touching the pinna.
- Never use 2 fingers to hold the oscillator as this can dampen the output.
- The provider will adjust settings and complete the testing.



3.10. Testing complete:

- Remove electrodes.
- Remove and discard foam tip. *Careful not to discard black tube socket.*
- Disconnect the Navigator Pro box from infant and computer.
- Audiologist will discuss results with family.

3.11. Post-consultation Considerations:

- Reframe infant and parent(s) so the provider has good eye contact with family for follow up discussion.
- When testing is complete, the Audiologist will verbalize when to shut down the computer.
 - ◊ Go to the start menu.
 - ◊ Select turn off computer.

Training of TeleHealth Nurse Clinicians

- Prepared In House Video
- Video Conference Presentation
- Individual one on one consultation before “go live” date
- + From:



Training of TeleHealth Nurses

Audiology participation in TeleHealth Skills Day





- For babies who refer on the hearing screen, the goal is to schedule **two appointments prior to hospital discharge**
- 2 weeks and 4 weeks of age

Program Components

**If opportunity doesn't
knock, build a door.**

Milton Berle



Audiology

Follow-up Appointment Request

It is recommended that follow-up appointments be made before discharge from the hospital or within 1 week of the final hearing screening. *Schedule a 2-week evaluation, as well as a 4-week evaluation at the selected facility below.*

Baby's name _____ DOB _____

Final hearing screening results – Right: Pass Refer Left: Pass Refer

Guide By Your Side information offered to parent: Yes No Unknown

Primary care provider (required) _____

Parent's phone number: Home _____ Cell _____

Contact the following with the 2-week and 4-week follow-up appointment information:

Parents Phone _____ Birth unit Phone _____ Midwife Phone _____

Check (✓) parent's preferred location for follow-up appointments:			
<input type="checkbox"/> Marshfield Center	<input type="checkbox"/> Merrill Center	<input type="checkbox"/> Chippewa Falls Center	<input type="checkbox"/> Eau Claire Center
<input type="checkbox"/> Minocqua Center (telehealth)	<input type="checkbox"/> Wausau Center		
<input type="checkbox"/> Rice Lake Center (telehealth)	<input type="checkbox"/> Weston Center		
<input type="checkbox"/> Wisconsin Rapids Center			
Fax 715-389-7622 Or call directly at 1-800-273-5245	Fax 715-847-3257 Or call directly at 715-847-3232	Fax 715-726-4234 Or call directly at 1-888-206-9112, ext. 3-4160	Fax 715-858-4505 Or call directly at 715-858-4747

Any questions or concerns about Early Hearing Detection & Intervention (EHDI), call EHDI Care Coordinator at 1-800-782-8581, ext. 1-7128.

Comments _____

Additional ABR testing sites:

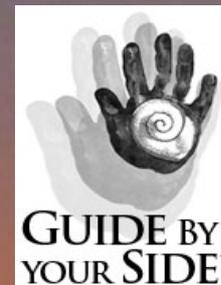
ENT Professional Associates
Ashland
715-682-9311

Ministry Medical Group-Rice Clinic
Stevens Point
715-342-7949



Audiology Appointment Request Fax:

- Contact Info
- Screening Results
- Guide By Your Side Checkbox
- PCP required
- Insurance Info



Program Components

TeleAudiology Scheduling

Patient Q Test (1818358) Male 56 years DOB=06/10/1954 - Patient Schedule

File Edit View Tools Clinical Link Help

Date	Time	Provider	Appt Type	Comment	Add'l Prv	Facility
Jun 15, 2011, Wed	08:45	Abr Machine 3-Minocqua (187496)	NOTE (90)			Minocqua Center
	08:45	Minocqua Telehealth Room (90564)	NOTE (90)			Minocqua Center
	08:45	Antoniotti, Nina PhD (50528)	NOTE (90)	prep time		Minocqua Center
	09:00	Antoniotti, Nina PhD (50528)	TMPT (429)	2 week failed newborn screening	Yes	Minocqua Center
	09:00	See, Cynthia AuD CCCA (65179)	TMDR (428)	2 week failed newborn screening	Yes	Marshfield Center
	09:00	Mfld Audiology Telemed Rm (189382)	NOTE (90)			Marshfield Center

Patient Q Test (1818358) Male 56 years DOB=06/10/1954 - Patient Schedule

File Edit View Tools Clinical Link Help

Date	Time	Provider	Appt Type	Comment	Add'l Prv	Facility
Jun 29, 2011, Wed	08:45	Abr Machine 3-Minocqua (187496)	NOTE (90)			Minocqua Center
	08:45	Minocqua Telehealth Room (90564)	NOTE (90)			Minocqua Center
	08:45	Antoniotti, Nina PhD (50528)	NOTE (90)	prep time		Minocqua Center
	09:00	Antoniotti, Nina PhD (50528)	TMPT (429)	4 week failed newborn screening	Yes	Minocqua Center
	09:00	See, Cynthia AuD CCCA (65179)	TMDR (428)	4 week failed newborn screening	Yes	Marshfield Center
	09:00	Mfld Audiology Telemed Rm (189382)	NOTE (90)			Marshfield Center

For Help, press F1

For Help, press F1

See, Cynthia I Clinical Link On

NUM





Preparing your baby for a hearing test

Your baby is scheduled for hearing test as a follow-up to initial screening at the hospital. This comprehensive evaluation will help diagnose any hearing loss. If a loss is detected, it's important to begin intervention services early so your child can develop key social and communication skills.

These suggestions will help you prepare your baby for the hearing test. This is an hour-long appointment.

- Testing is easiest when babies are full, sleepy and feeling well. We recommend feeding your baby about 20 minutes before the hearing test. A full tummy will help your baby feel calm and more likely to sleep.
- Testing may be done if your baby is awake. Bring along a blanket to decrease restlessness.

- Dress both of you comfortably.
- Testing works best in a quiet environment. If siblings or small children accompany you to this appointment, please bring another caretaker to watch them in the waiting area. Your baby may need your full attention during the test.
- If your baby has a cold or is not well, reschedule the hearing test. To reschedule, call 1-800-273-5245 or 715-387-5371.

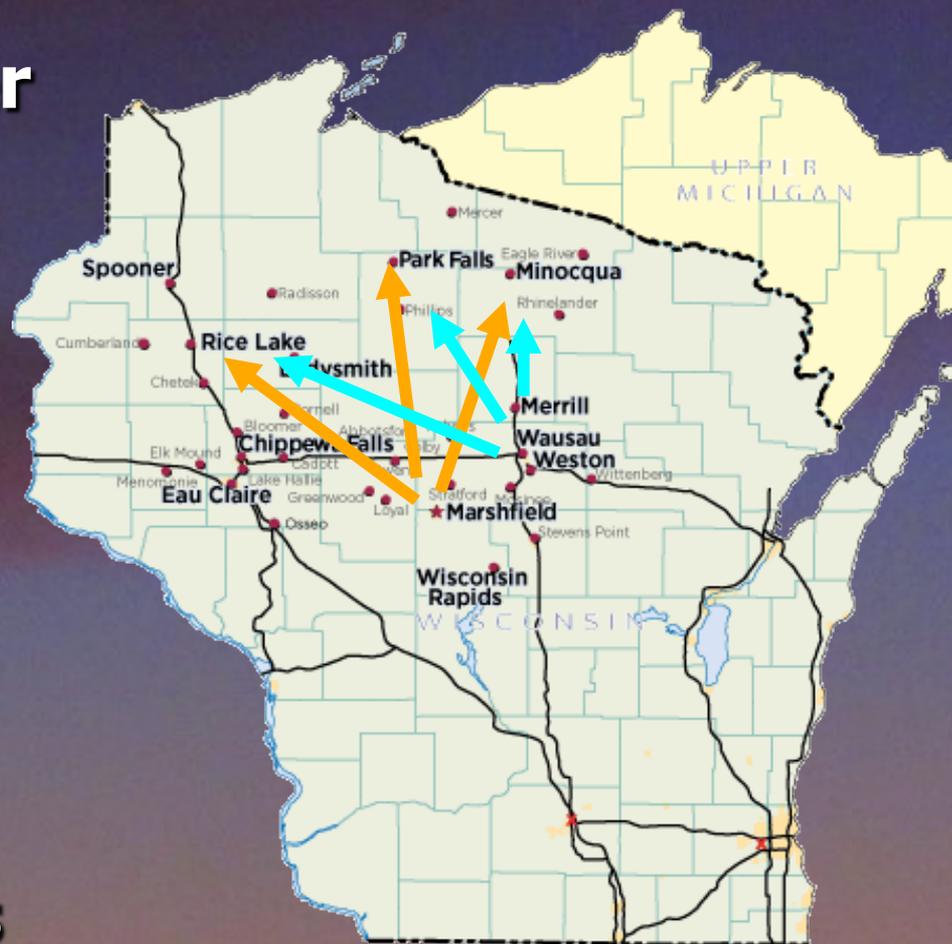
It is not always possible to finish a hearing test in one appointment. If a second appointment is required, we will schedule it as soon as possible.

 **Marshfield Clinic**
Don't just live. Shine.

99-0633-04

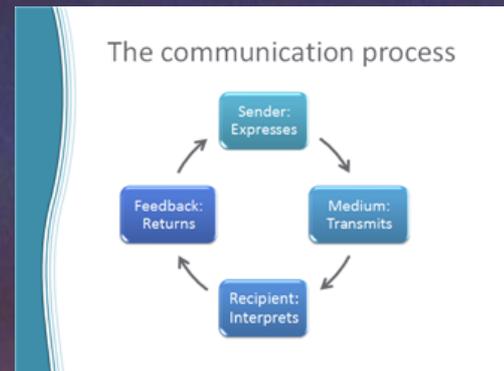
Sent with appointment letter

- **Designed as a center to center program rather than a strict hub & spoke concept.**
- **Audiologist controls the laptop and software remotely and analyzes results in real time.**

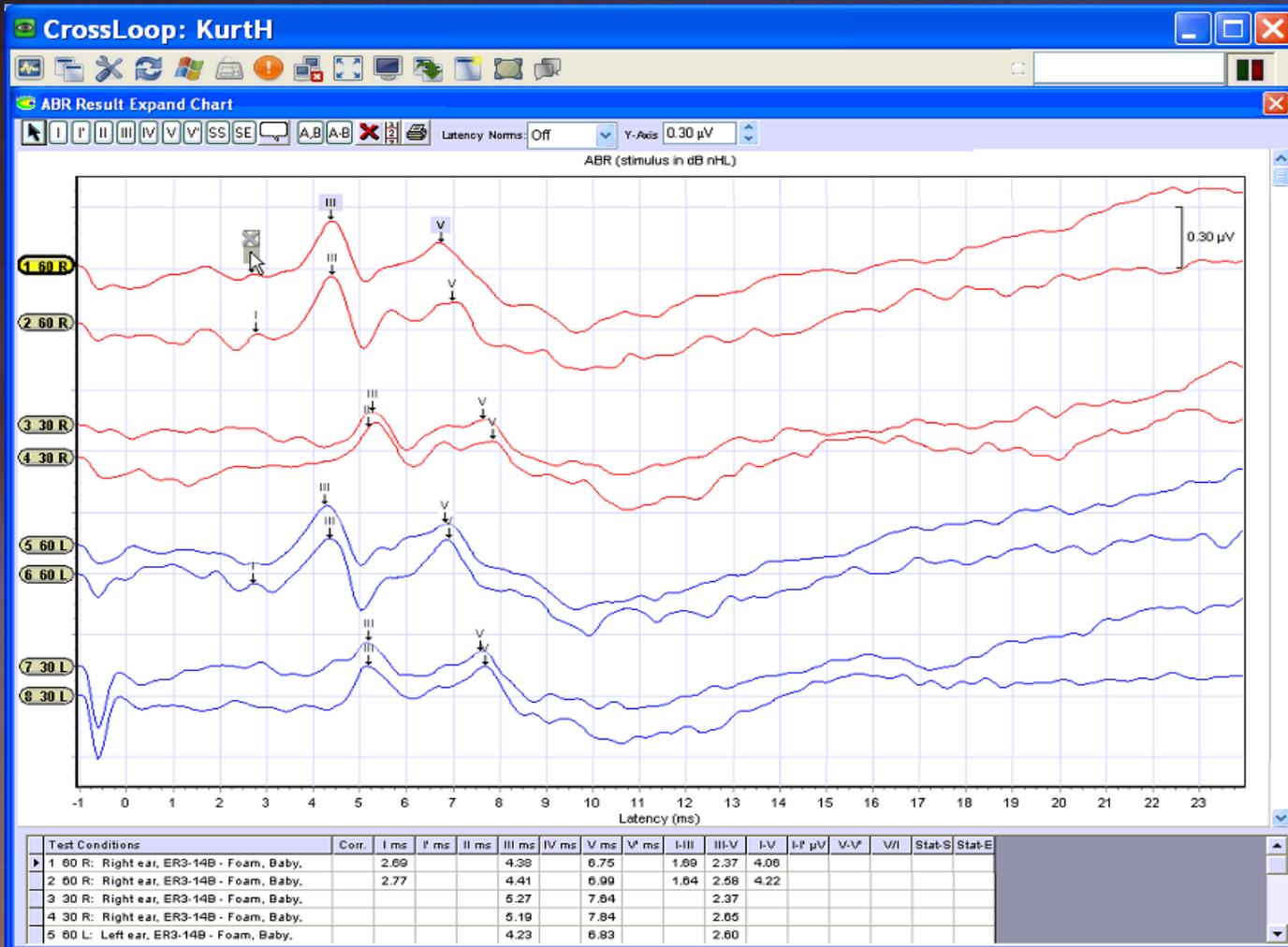


TeleAudiology Program Components

TeleAudiology Program Value-Steps



- **Parents are provided results the same as if they were on site.**
- **The audiologist prints results prior to disconnection of equipment for formal report.**
- **Results are scanned into electronic medical record.**



Vivosonic ABR Screen Shot

TeleAudiology Data:

Sep 14, 2010 – Apr 30, 2012 (19 months)

- 4 Locations: **Minocqua, Rice Lake, Park Falls, Rhinelander**
- Infants scheduled: **36**
- Passed initial appointment: **28 (78%)**
- Average age: **32 days**
- Age Range: **2 weeks – 6 months**

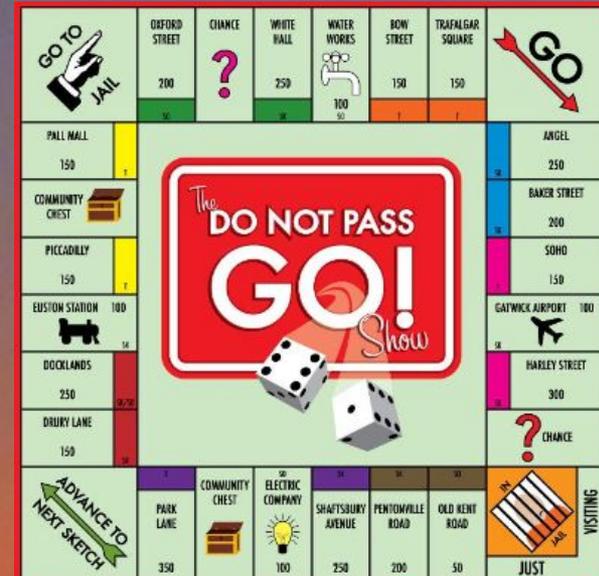
TeleAudiology Data:

Sep 14, 2010 – Nov 30, 2011

Required 2nd appointment: 8 (22%)

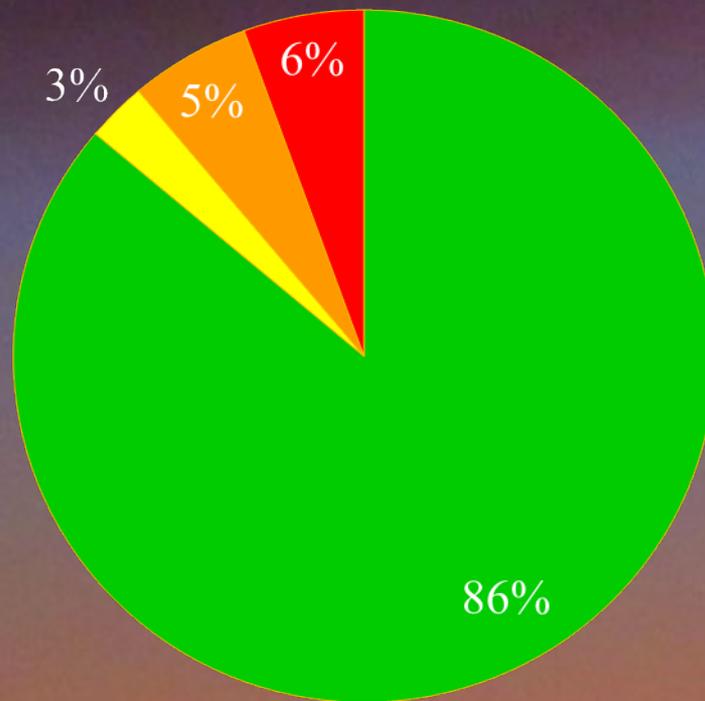
- Need further testing: 2 (9%)
- No Show: 3 (11%)

*Equipment issue: 3 (9%)



TeleAudiology Data

Final Results (19 months, n=36)



- Final Passed: 31
- Cond HL: 1
- Refused f/u: 2
- Lost to f/u: 2



Economic Impact:

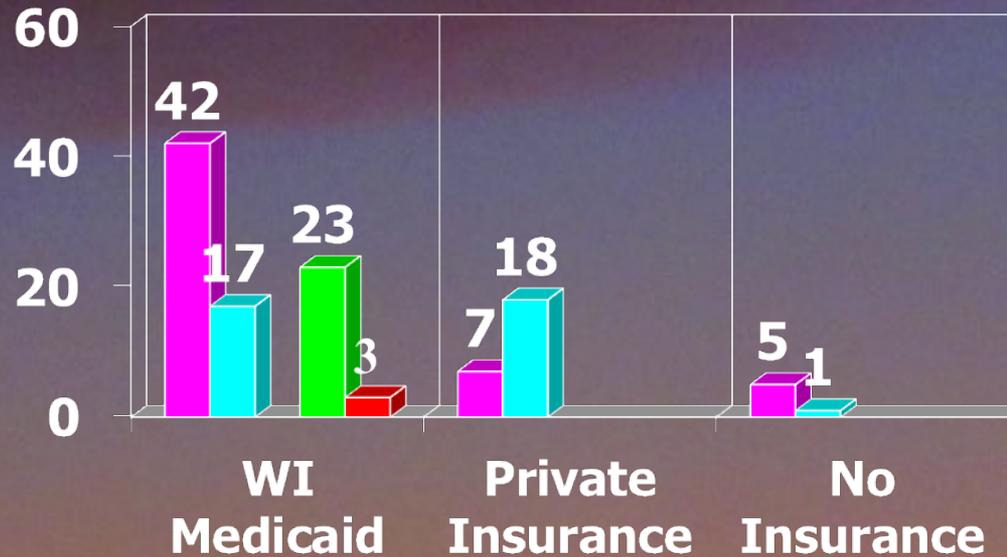


- Travel prior to grant: 105 miles average
- TeleHealth Site: 25 miles average
- Cost savings based on \$3/mile formula calculation
- Round trip distance saved = 160 miles
- \$480 average dollar savings



Financial Considerations

TeleHealth & New Onsite Locations:



- Onsite n=59
- TeleHealth n=36
- Eval Onsite/TeleHealth Closer
- Lost to F/U Onsite/TH Closer

- **BG Normal pregnancy, C-section delivery**
- **Referred newborn hearing screen, bilaterally**
- **History of multiple no-show & cancelled TeleAudiology appointments**
- **Moved twice since birth**
- **Returned to original PCP**



Case Study TeleAudiology

TeleAudiology Results, 5 months old:

- Passed OAE screen left ear
- Referred OAE screen right ear
- Initial ABR recording hard to interpret secondary to awake state
- Mom fed & snuggled baby and was able to get baby to sleep



Case Study continued

Case Study continued

ABR results

- Normal ABR left ear
- ABR 40 dB right ear, with significantly delayed latencies noted, suspect conductive hearing loss
- Contacted local Audiologist & PCP
 - Scheduled for coordinated appointments at 6 months of age

Quotes

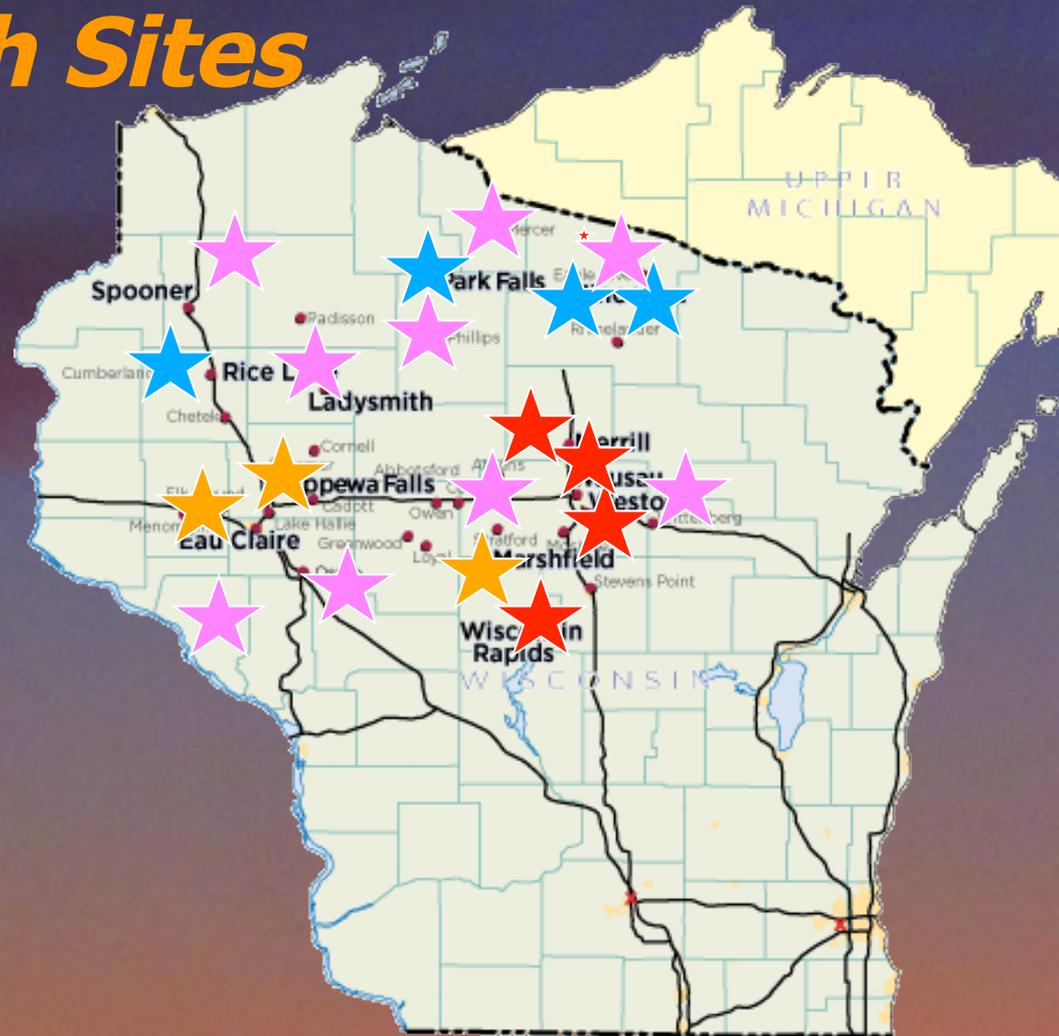
- **TeleHealth Nurse Clinicians**
- **Parents**

We're not done yet!

Future TeleHealth Sites

- Arcadia
- Eagle River
- Hayward
- Ladysmith
- Mercer
- Mosinee
- Osseo
- Phillips
- Wittenberg

+ More to be considered as project moves forward



**Locations with
In-person & TeleHealth Pediatric
Diagnostic ABR**

So Can TeleAudiology?

- Help meet EHDI 1-3-6 goals? **Yes!**
- Improve loss to follow-up rates in the EHDI process? **Yes!**
- Finally, is TeleAudiology possible in a clinical setting? **Yes!**



Muchos Gracias! Merci-Merci!

- **Dr. Elizabeth Seeliger** and Wisconsin Sound Beginnings for the vision behind this project.
- **Dr. Nina Antoniotti** TeleHealth Director for her insight and expertise in development of a TeleHealth program.
- **Karen Wegerer** RN EHDI Care Coordinator for going above and beyond to seek resources and overcome hurdles.

No One Knows what Lies Ahead!





Thank you!
Cindy See, AuD
Nina Antoniotti, RN, MBA, PhD