Smartphone Applications for Private Practice Audiologists

Abram Bailey and Brian Taylor
Disclosures

• Clinical Audiology Advisor, Fuel Medical
• Adjunct Professor, A.T. Still University
• Editor, Audiology Practices
• Editor, Hearing News Section, HHTM
Disclosures

- Founder and CEO of Hearing Tracker, Inc, which manages HearingTracker.com
Agenda

• What is a smartphone app?
• Why smartphone apps will be a significant part of how audiology is practiced in the future (mHealth)

• Overview of Audiology Apps
  • Hearing Screening
  • Remote programming, adjustment & counseling
  • Amplification

• What does the future hold?
  (Getting started with apps in your practice)
The Burden of Modern Healthcare

• Make it Accessible
• Reduce the Cost
• Improve the Quality
June 2016 NASEM Report

• 12 Recommendations
• #4: Empower Consumers and Patients in their use of Hearing Health Care.
• #5: Improve Access to Hearing Health Care for Underserved and Vulnerable populations
• #10: Evaluate and Implement Innovative models of Hearing Health Care to improve access, quality and affordability
“There’s an app for that.”

• A software application designed to run directly on a smartphone or tablet computer
  • Apple – App Store
  • Android – Google Play
Mobile Health: Consumer-Driven & Personalized

• Smartphone
• App
• Broadband wireless internet connection
• Low cost attachments
Low Cost Attachments

• Cupris Medical in UK
• $150
• Photograph TM and email to healthcare professional
Smartphone as Hub

• Medical records
• Personal health history
• Diet and fitness regimen
• A record of lifestyle, physical environment and location
Apps in Healthcare

• Ultrasound scans
• Measurement of vital signs
• Execute lab tests
• Photo of tympanic membrane
• Hearing testing

hearscreen.com
The future of healthcare

“In five years’ time, smartphones will take the burden away from the limited number of human specialists we have. People will get really intelligent triage that’s personalized to them from their phones, or be empowered to look after their own chronic conditions, like diabetes, via home monitoring.” - Dr. Keith McNeil, CIO, NHS (Jan. 2017)
Common Question

“My typical patient is older than 65. Are these patients using smartphones and Wi-Fi ?”
Smartphone adoption among seniors has nearly quadrupled in the last five years

% of U.S. adults who say they have or use the following

Source: Survey conducted Sept. 29-Nov. 6, 2016. Trend data are from previous Pew Research Center surveys. “Tech Adoption Climbs Among Older Adults”

PEW RESEARCH CENTER
### Roughly four-in-ten seniors are smartphone owners

% of U.S. adults ages 65 and older who say they own the following ...  

<table>
<thead>
<tr>
<th></th>
<th>Cellphone of any kind</th>
<th>Smartphone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total 65+</strong></td>
<td>80</td>
<td>42</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-69</td>
<td>95</td>
<td>59</td>
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<tr>
<td>70-74</td>
<td>93</td>
<td>49</td>
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<tr>
<td>75-79</td>
<td>63</td>
<td>31</td>
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<tr>
<td>80+</td>
<td>58</td>
<td>17</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS or less</td>
<td>75</td>
<td>27</td>
</tr>
<tr>
<td>Some college</td>
<td>83</td>
<td>45</td>
</tr>
<tr>
<td>College+</td>
<td>87</td>
<td>65</td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$30K</td>
<td>73</td>
<td>27</td>
</tr>
<tr>
<td>$30K-$50K</td>
<td>82</td>
<td>32</td>
</tr>
<tr>
<td>$50K-$75K</td>
<td>86</td>
<td>53</td>
</tr>
<tr>
<td>$75K+</td>
<td>97</td>
<td>81</td>
</tr>
</tbody>
</table>

Source: Survey conducted Sept. 29-Nov. 6, 2016.  
“Tech Adoption Climbs Among Older Adults”  
PEW RESEARCH CENTER
Internet use and broadband adoption among seniors varies greatly by age, income and education

% of U.S. adults ages 65 and older who say they use/have the following ...

<table>
<thead>
<tr>
<th>Age</th>
<th>Internet</th>
<th>Home broadband</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 65+</td>
<td>67</td>
<td>51</td>
</tr>
<tr>
<td>65-69</td>
<td>82</td>
<td>66</td>
</tr>
<tr>
<td>70-74</td>
<td>75</td>
<td>61</td>
</tr>
<tr>
<td>75-79</td>
<td>60</td>
<td>41</td>
</tr>
<tr>
<td>80+</td>
<td>44</td>
<td>28</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Education</th>
<th>Internet</th>
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<tr>
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Source: Survey conducted Sept. 29-Nov. 6, 2016.
“Tech Adoption Climbs Among Older Adults”
PEW RESEARCH CENTER
mHealth Applications in Audiology

**General App Categories**
- Hearing screening
- Audiometers and Kiosks
- Amplification
- Sound broadcast
- Sound Awareness
- Live Captioning
- Alerting
  - Tinnitus relief apps
  - Hearing loss simulation
  - Aural Rehab / Listening

**Manufacturer apps**
- Hearing aid control
- Accessory control
- Informational
- Made For iPhone
- Remote care
- Apps that fit in most of general app categories
Hearing Screening Apps

Mimi Hearing Test

- CE Certified Medical Device in EU
- Tests 100 – 12kHz
- Tracks changes to hearing over time and reminds users to re-check their hearing
- “Audiogram” export
- Calibrated for Apple EarPods and others
- “Earprint” can be used for mimi music, but currently not available for live amplification
Hearing Screening Apps

Jacoti Hearing Center

• CE Certified Medical Device in EU
• Class II FDA listed Medical Device in USA
• Fully-functioning “professional clinical audiometer that partially conforms to EN 60645-1 for audiometers and ANSI S3.6 for Type 4 audiometers”
• Calibrated for Apple EarPods
Hearing Screening Apps

**Jacoti Hearing Center Pro**

- **Portable:** Works outside traditional sound booths and can be easily transported to remote locations to perform hearing assessments.
- **Automated:** The test is performed automatically and requires little guidance by the hearing professional.
Hearing Screening Apps

Jacoti Hearing Center Pro

- **Intelligent**: smart noise monitoring prevents inaccurate measurements in noisy environments.
- **Compliant**: conforms with ISO and ANSI requirements.
- **Approved**: Listed as a Class II medical device with the FDA
Other Hearing Screening Apps
Audiometer Apps

Shoebox Audiometry

• Automated tests that give diagnostic thresholds in a variety of settings
• Designed for **non-audiologists** including primary care physicians, nurses, occupational hearing testers, teachers, researchers, and more
Audiometer Apps

**Shoebox Audiometry Pro**

- Air and bone conduction
- Automated tests for adults and kids
- Test can be performed as a game
- Manual hearing test (up to 16kHz)
- Speech tests (NU-6, PBK), HHIA-S
- ANSI calibrated / FDA cleared
- Data backed up to HIPAA-compliant cloud while iPad connected to net
Audiometer Apps

**Otohub - OtoPad**

- ANSI and ISO compliant
- NOAH compatible
- AC/BC
- Speech (SRT, NU-6, W-22, etc)
- Tinnitus evaluations
- PDF reports
- Can be paired with OtoRemote for remote testing at patient site
  - Pharmacy, PCP, satellite clinic

**Release dates:**
- **OtoPad** – July 2017
- **OtoRemote** – September 2017
Hearing Screening Kiosks

**Otohub - OtoKiosk**

- First ANSI calibrated kiosk
- AC test - Hughson-Westlake
- NOAH integration (import to clinic)
- Compatible with multiple transducers
- HIPAA compliant data storage
- Integrated HA Simulation based on audiogram
- Web-portal to remotely manage leads
Hearing Screening Kiosks

**Unitron – uHear Kiosk**

- Three free hearing screening tests
- Emails lead results and contact info to audiologist to schedule a follow up consultation.
Hearing Screening Kiosks

Hearing Care Marketing - Hearing Touch Machines

- Tests 4 tones in each ear
- Results shown to customer after test
- Option to request a consultation or copy of their free report
- If they choose either option audiologist receives lead information
Hearing Screening Kiosks

Shoebox Quicktest

• Tests 4 tones in each ear
• User enters contact details in order to see test results
• You can follow up with good candidates
Amplification Apps

Jacoti ListenApp

- CE and FDA registered medical device.
- Uses test results from Jacoti Hearing Center (or input audiogram) to provide amplification for:
  - Live speech
  - Jacoti Lola (wireless audio system)
  - Jacoti Music / iTunes
  - Any other iOS app using Apple’s Inter-App audio technology
  - Calibrated for Apple AirPods
Amplification Apps

**EarMachine**

- Funded in part by NIH
- Research partners
  - Northwestern University Audiology Clinic
  - University of Minnesota HRL
- Advanced signal processing / simple interface
- “EarShare” suggests settings based acoustic environment, user history, and other user preferences
Amplification Apps

Petralex Hearing aid

• Tests hearing to setup amplification
• Low latency amplification from iPhone microphone
• Can use wired or Bluetooth earphones
• Multiple listening programs
Other Amplification Apps
Sound Broadcast

Jacoti Lola

- Low-latency multi-peer audio streaming over consumer grade Wi-Fi
- Bi-directional communication
- Support for 3rd-party applications support
- Jacoti Lola works in standalone mode (normal hearing), with Jacoti Listenapp, standard hearing aids, cochlear implant speech processors, and with the Made for iPhone® hearing aid platform.
Sound Broadcast

Tunity

- Scan the TV
- Stream the Audio
- Bars, gyms, etc
- At home or anywhere someone with hearing loss wants to listen louder without affecting others
Sound Broadcast

Audio Everywhere

• Requires purchase / install of network box
• Much cheaper than telecoil loop and popular in churches
• Users need iPhone / iPod Touch, etc
• Very good audio quality over 5GHz WiFi
• Can be used with any device connected to phone (hearing aids, etc)
Sound Awareness

NIOSH SLM

- Raises workers’ awareness about their work environment
- Serves as a research tool to collect noise exposure data
- Accurate, can be calibrated with an external mic
Sound Awareness

VenueDB

• Created by EarMachine developers
• Turns your phone into a sound level meter
• Uses GPS for location
• See measurements from other users
• Displays the Recommended Exposure Limit
Sound Awareness

iHEARu Here

• Mic measurement
• User rating of quieter/louder
• May include written review and photos
• Day and time of review
• Map finder
Live Captioning

Google Doc

• Live transcription using Google’s voice recognition
• Page scrolls as you record
• Can bump up the font size if needed

This is just a test to see if Google is able to transcribe my voice live through a Google doc. So far this seems to be working great and I can take pauses without the microphone stopping.
Live Captioning

Ava

- Captions for one-on-one or group chats
- All users install app and use their own phone’s microphone for their voice
- Hosting group chats limited to 5h/m on free plan
Live Captioning

InnoCaption

- Phone calls
- Voice mails
- No 911 support
- Uses live stenographer to create real-time captions
- Captioners funded by federally-funded Telecommunications Relay Service (TRS)
Alerting

*Ditto*

- Vibrates when you leave phone
- Vibrates for calls, notifications
- Customizable
- Waterproof
- Battery lasts 3-6 months
- Range 50-100 ft
- $39.95
Alerting

**Sound Alert**

- Detects some sounds natively:
  - Doorbells, Telephone, Microwave, Burglar Alarm, Intercom
- Can add custom sounds
- Vibrates, triggers camera flash, shows alert on screen that matches sound type
- Works with Pebble watch
- App costs £69.99
Manufacturer Apps

- Hearing aid control
- Accessory control
- Informational
- Made For iPhone
- Remote care
Manufacturer Apps

Hearing Aid Control

- Display hearing aid settings, battery status, etc
- Adjust hearing aid settings
  - Volume
  - Program
  - Balance
  - Tone
  - Mute
  - Other advanced program settings
Manufacturer Apps

Accessory Control

• Pair accessories
• Setup accessory preferences
  • Voice alerts
  • Call settings
• Control accessories
  • Streaming source from accessory
Manufacturer Apps

**Informational**

- Product instructions
- Walk-throughs
- Troubleshooting
- Clinic contact data
- Sound exposure monitoring

Take the sticker off the battery.
Manufacturer Apps

Made For iPhone (MFi)

- Audio streaming from apps and phone mic
- Call streaming
- Remote control (volume/tone, etc)
- User-generated programs
- Geotagging/beacons
- Audio recording/playback
- Hearing aid finder
- IFTT
Manufacturer Apps

Remote Care – ReSound Smart 3D app

- Patient submits request.
- Survey results about use/setup
- Explanation of issue
- Data logging
- Provider sends updates along with written message for patient
- + Other app features
Manufacturer Apps

Remote Care – Signia TeleCare 2.0

• Tracking of daily satisfaction
• Real-time text, voice and video CareChat
• Adjustment delivery via TeleLink
• 4-band equalizer
• Configure directionality, balance, etc
• Access to data logging
• + Other features
What does the future hold?

• Apps as Opportunities
Back to Brian......
The Limitations of the Current Service Delivery System

- Inconvenient
- Inaccessible
- Expensive
- Opaque
The Limitations of the Current Service Delivery System

• Wait for patients to schedule an appointment
• Conduct a test, talk about options
• Fit hearing aids (counseling and fine tune devices)
• Fine tune and adjust: 3-4 follow-up appointments spread over a year

.....works for those that can afford it and that make time
Apps as a Tool to Improve the Current Service Delivery System

• Improve Convenience
• Reduce Barriers to Care
• Lower Cost of Care
• Greater Transparency
Old Success Geometry

Great Product

Great Counseling

Great Service
Pressure of Digital Momentum

Old Success Geometry

Great Counseling
Great Service

New Processes
[Services ... Counseling]

ReShaped Geometry of Success

Schweitzer & Kaal, Hearing Review, July 2017
What you can do today with apps

- Gateway products
- Remote programming and adjustment
- Remote counseling
- Hearing Triage
The Future of Healthcare?

- Babylon App:
  - Instant video or audio conferencing
  - Stores clinical records
  - Clinical tests kits
  - Book consultations
References/Further Reading

- March-April 2017 ENT and Audiology News, mHealth Technologies issue
- Schweitzer & Kaal Hearing Review July 2017
- NASEM Report on Affordable and Accessible Hearing Health Care, 2016
Questions

- brian.taylor.aud@gmail.com
- abram@hearingtracker.com