Interactive Environments to Facilitate Patient-Provider Communication for Aphasia Patients

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Patient-Provider Communication

Effective Patient-Provider communication (PPC) is defined as the “successful joint establishment of meaning wherein patients and health care providers exchange information”. (Joint Commission, 2010)

- Successful communication occurs when...
  - providers understand and integrate the information gleaned from patients
  - patients comprehend accurate, timely, complete, and unambiguous messages from providers

- The goal of PPC is to enable patients to participate responsibly in their care.
Patient-Provider Communication (PPC)

Ineffective PPC can lead to...
- Reduced patient satisfaction
- Lack of adherence to provider recommendations
- Increased healthcare costs
- Increased hospital readmissions

Effective PPC can lead to...
- Increased patient satisfaction
- More accurate diagnoses and treatment recommendations
- Positive effects on blood pressure and glucose levels
- Increased compliance and safety
Patient-Provider Communication

Common PPC barriers

• Hearing, vision, and cognitive impairments
• Limited health literacy
• Limited English proficiency
• Lack of health care provider knowledge & training for communication

Common techniques for PPC barriers

• Using “plain language”
• Teach-Back strategy
• Communication boards and technologies
• Writing
• Trained medical interpreters
What is Aphasia?

• Aphasia is a communication disorder that typically results from damage to the left side of the brain that controls language and causes difficulties in speaking, listening, reading, and/or writing.

  ◦ An estimated 7 million Americans have had a stroke

  ◦ Over 2 million have developed aphasia as a result

  ◦ Damage to these areas of the left side usually causes language disorder (aphasia) in adults.

An estimated 7 million Americans have had a stroke and over 2 million have developed aphasia as a result. Damage to these areas of the left side usually causes language disorder (aphasia) in adults.
What is Aphasia?

Imagine waking up and finding yourself in the hospital. You desperately want to found out what has happened to you, but even simple words come out wrong. You can think, but you can’t understand what other people are saying, and writing won’t help because your writing doesn’t make sense. This is a terrifying situation that has happened to millions of people who have suddenly experienced aphasia.

From *Aphasia in North America*, Aphasia Access, 2018
**Aphasia’s unique PPC barriers:**
- Difficulty understanding speech and reading
- Difficulty speaking and writing
- Range of severity
- Working memory deficits
- Greater reliance on family members/caregivers

**Current methods for aphasia PPC involve...**
- Decreased amount of text on page
- Pictures/symbols to augment printed key words
- Decreased provider rate of speech
- Pauses to allow for processing time
- Presentation of one idea at a time
- Gestures layered with verbal information

**Aphasia and PPC**
Aphasia and PPC

As a result, ineffective PPC can lead to...

- Decreased understanding of stroke, aphasia, medical recommendations & treatment expectations of multidisciplinary team
- Higher risk of medical complications and errors
- Reduced participation through the continuum of their care

Current methods cannot fully address barriers

- Lack of consistency when providing supported-communication techniques across health care providers and medical encounters
- Low frequency of written health education material and visual aids
- Lack of multimodal, aphasia-friendly health education materials
Aphasia and PPC

How can we facilitate better PPC for patients with aphasia?

**Constraints**
- Affected Brain Regions
  - Verbal Communication
    - Spoken
    - Written

**Opportunities**
- Unaffected Brain Regions
  - Intelligence
  - Visual processing
Patient-Provider Communication
- Narrative Information
- Visual Information
- Interactive Information

Constraints
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Opportunities
- Unaffected Brain Regions
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Patient-Provider Communication

• Narrative Information
  • We easily process stories
  • Memory stored as narratives
  • We enjoy the absorption

• Visual Information
  • Visuals are more concrete
  • Visual memory lasts longer
  • Information compacted and organized
  • Visuals readily available and accessible

• Interactive Information
  • We can consume narrative/visual information at the speed and in the order most effective and engaging for us

Opportunities

• Unaffected Brain Regions
  • Intelligence
  • Visual processing
Patient-Provider Communication

- Strong connection between content and participant
  - More personal and meaningful
- Content easily recalled in real life
- Shows connections between many aspects of their lives
- All of which facilitate learning and retention

Opportunities

- Unaffected Brain Regions
  - Intelligence
  - Visual processing
Pilot Study

Internally funded by...

The Seed Grant for Interdisciplinary Research (Round 2 Office of the Vice President for Research) $90,000

The Seed Grants for Interdisciplinary Research (SGIR) was designed to promote interdisciplinary research and scholarly activities among tenure and tenure-track faculty. In addition to attracting federal funding that would support collaborations the SGIR promoted research that included the arts, education, humanities and/or social sciences.

CH Foundation Arts In Medicine Grants $10,000

The grant program seeks to integrate the fields of art and medicine, to promote interdisciplinary research projects and collaboration between both fields, and to integrate the arts within the healthcare environment, thereby both inspiring creative thinking and facilitating wellness by connecting people with the power of the arts at key moments in their lives.
Scene 0-2
Hi, this is me.
I wake in the morning.
I make my bed.
I get dressed.
What should I wear?

Scene 2A
So this was my ordinary life.
When I am healthy, I breathe in air.
Oxygen goes..from nose to lungs.

Scene 3
My brain is inside my head.
Suddenly there was an explosion in my brain!
I had a stroke.

Outside, I walk the dog.
Everyday I exercise by walking the dog.

Blank Grey screen hold for a second or two
MFA Art Students/Professor Stacy Elko

Storyboards to outline text narrative
Grant funded us to further develop storyboards using Procreate on iPad

Generic M/F image. Future iteration will be race, age, ethnicity specific.
Game Design

We then worked with a script writer with knowledge of Unity 3D game engine to begin constructing the narrative.

We wrote out a health script and acquired an actor to play our doctor.
Pilot Study

- N = 16
  - Severity ranging from mild to severe

- Crossover experimental study (8 Weeks)
  - VINI vs. Doctor Video
  - Examining effectiveness of VINI to educate participants
    - The cause of their stroke
    - Their symptoms
    - Their treatment plan
    - Their prognosis
<table>
<thead>
<tr>
<th>Week</th>
<th>Group A</th>
<th></th>
<th>Group B</th>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>– Western Aphasia Battery</td>
<td>– Aphasia Knowledge Test</td>
<td>– Western Aphasia Battery</td>
<td>– Aphasia Knowledge Test</td>
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<tr>
<td>2-3</td>
<td>VINI</td>
<td></td>
<td>Doctor Video</td>
<td></td>
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<tr>
<td>4</td>
<td>– VINI</td>
<td>– Aphasia Knowledge Test</td>
<td>– Doctor Video</td>
<td>– Aphasia Knowledge Test</td>
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<td></td>
<td>– Intervention Eval.</td>
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<td>5</td>
<td></td>
<td></td>
<td><strong>WASH OUT WEEK</strong></td>
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<tr>
<td>6-7</td>
<td>Doctor Video</td>
<td></td>
<td>VINI</td>
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</tr>
<tr>
<td>8</td>
<td>– Doctor Video</td>
<td>– Aphasia Knowledge Test</td>
<td>– VINI</td>
<td>– Intervention Eval.</td>
</tr>
</tbody>
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Pilot Study

Measures

◦ Aphasia Knowledge Test
  ◦ 15-item multiple choice and True/False measure related to diagnostic and prognostic information
  ◦ Presented using visuals and text on an iPad

◦ Intervention Evaluation
  ◦ 9-item measure assessing participants’ perceptions of the VINI and video intervention
    ◦ Liking
    ◦ Intervention adoption

◦ Non-verbal measurements
  ◦ Heart Rate
  ◦ Skin Conductance Level
  ◦ Eye-Tracking
Brain Bleed

Question 3:
Verbal Presentation of question to patient “What changed about you?”

Aphasia Knowledge Test
EVERYTHING WAS DESIGNED WITH APHASIA-FRIENDLY IMAGES
What happened to you?
Question 4.
Verbal Presentation of question to patient "What can you still do?"

4a. Art Appreciation
4b. Humor: Nightclub/TV/Slapstick
4c. Counting cash/coins
4d. Multitasking

Question 5.
Verbal Presentation of question to patient "How do you get better?"

- Appreciate Art
- Counting cash and coins
- Laugh and have fun
- Multitasking
Electrocardiogram (EKG)

Changes in Heart Rate over time indicate the level of resources allocated.

- Decreased HR = Resources devoted to encoding the external environment (the VINI or the video!)
- Increased HR = Resources devoted to internal mental processes (inferences, retrieving memories, etc.)
Skin Conductance Level (SCL)

Changes in SCL are tied to changes in the activation of the parasympathetic nervous system.

- Measured via the Eccrine sweat glands on the palms of the hands.
- Is a measure of prepping for action.
Eye tracking

Changes in eye fixation are a measure of visual attention.

• Has a dual purpose in our study:
  • As a manipulation check of where the participants are looking during the VINI and the doctor video.
  • As a measure of visual attention paid to the elements of the VINI.
Goals and Future Directions

- Circumventing damaged areas of the brain
- Can the three types of information increase patients’ comprehension and engagement with health information
- Delivery method for other types of information including therapy?
- Help other patients with communication deficiencies?