

ATiA 2016

Session Code: AAC-41

Technology to support the needs of patients in critical care.

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Handouts are available at www.atia.org/forlandhandouts




Learning Objectives

- Identify three **adverse medical outcomes** that result from a patient's inability to summon help and effectively communicate.
- Identify three **intentional gestures** that critically ill and intubated patients can make that can be detected by the noddle smart-switch.
- Identify three core **communication categories that should be included in communication** templates for use in the critical care setting.

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The Problem



- Acute Care Patients Often Face Barriers to The Communication Necessary For Effective Care
 - Limited Access To The Nurse Call
 - Inability To Use Normal Modes of Communication
 - Oral
 - Written
- Many Acute Care Patients Are Unable to Access Environmental Controls
 - Room Lighting
 - Room Fans
 - TV

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**Patient-Provider Communication:
A Key To Good Medical Outcomes And Patient Satisfaction**

- Patient
 - Summon Help
 - Communicate Needs
 - Participate in Care & Decision Making
 - Maintain Personal Identity / Personality
- Provider
 - Respond to Summon for Help
 - Understand Patient Needs
 - Engage Patient in Care & Decision Making
 - Treat Patient not only the Disease

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The Magnitude Of The Problem

- 13.5% of patients have experienced adverse events.
- 1.5% of patients experienced adverse events that contributed to their deaths.
- As a result of their inability to effectively communicate with medical providers, approximately 15,000 Medicare patients die each year.

The Department of Health and Human Services (HHS), Office of the Inspector General (OIG) released a report on the incidence of Medicare beneficiaries' adverse hospital events (Levinson, 2010).

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Adverse Medical Outcomes

- Pressure Ulcers
 - Number of Avoidable Errors = 481,762
 - Cost Per Error = \$8730.00
- Falls
 - Number of Avoidable Errors = 180,734
 - Cost Per Error = \$17500.00
- Adverse Drug Reactions
 - Number of Avoidable Errors = 52,727
 - Cost Per Error = \$3600.00
- Aspiration Pneumonia
 - Number of Avoidable Errors = 7,957
 - Cost Per Error = \$14511.00

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Impact Of Communication Barriers

- Intensive care (ICU) patients with physical communication problems were **three times** more likely to experience one or more adverse medical events.
- The quality of the communication plays a significant role in
 - medical **outcomes & satisfaction** of both patient and caregivers
- The estimated cost of treatment for medical errors was over **one billion dollars** a year.

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Patients With Complex Communication Needs At UIHC

Conscious Patients (Over The Age of Three) Who Were Unable To Access The Nurse Call or Speak Without Intervention

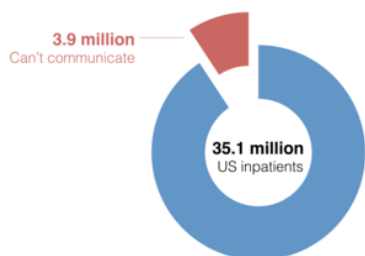
	Number of patients (daily average)	Percentage (%) of patients unable to access nurse call	Percentage (%) of patients unable to use speech	Percentage (%) of patients unable to access nurse call who also could not use their speech
Intensive care units	91	33	33	19

Zubow & Hurtig 2013

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Magnitude Of The Problem



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Populations That Are Communication Vulnerable

- Individuals With Complex Communication Needs (CCN)
 - Acute and Temporary conditions
 - due to trauma, acute disease or surgery
 - Pre-existing conditions
 - due to developmental disorders (CP, MD)
 - due to acquired disorders (ALS, PD)
- Individuals With Limited English Proficiency

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Study Of Nurses Reported Use Of Communication Strategies

Communication strategy	Percentage (%) of nurses indicating use of strategy
Paper and pencil	96
Picture or symbol board	80
Lip reading	70
Alphabet boards	65
Electronic voice output device	46
Sign language	35
Other	18

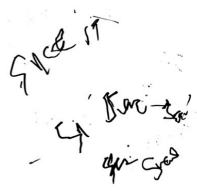
Hurig & Downey 2009

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Problem With Pen & Pencil Strategies

Illegible writing



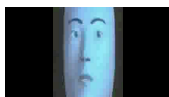
Hurig et al. 2015

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Problem With Lip Reading

- A difficult skill
 - Oral Obstruction makes it hard to articulate clearly
 - Not all speech sounds are visible
- McGurk Effect
 - What you perceive is biased by
 - What you see
 - What you hear



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Problem With Electronic Voice Output Devices



- Access Modality Mismatch With Patient's Physical Abilities.
- Physical Barriers To Deployment In Intensive Care Settings
- Absence of Templates Suited To The Communication Needs Of Patients
- Require Staff As Well As Patient Training

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The Joint Commission Hospital Accreditation Standards

- Meet The Communication Needs of All Patients
 - Insure Patients Have Access To The Nurse Call And Effective Communication (including pain management)
 - Support Medical Decision Making
 - Address End of Life Communication Issues
 - Maintaining Patient's Personality (allowing for everything from anger to humor)

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A Culture Of Communication Requires

- Advocacy for Supporting Patients' Communication Needs
- Strategies to Meet the Communication Needs from Pre-admission to Discharge
- Establishing Ways of Assessing Communication Needs & Strategies to Address Needs
- Establish Systems for Tracking Needs & Communication Strategies in the Medical Record
- Inter-Professional Training and Practice
- Make Patient Safety & Satisfaction with Care a Priority

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The Voxello noddle™

- Single Input Sensor
 - Microphone
 - Proximity Sensor
 - Pressure Sensor
 - IR Reflectance Sensor
- Intentional Gesture Detection Algorithm
- Gesture Counting Algorithm
- Controls Multiple Devices
- Multiple Outputs
 - Isolated Relay Contacts
 - Bluetooth

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noddle™ Sensors

- Miami J Collar Mount
 - noddle-mic™
 - noddle-touch™
- Vent Line Mount
 - noddle-mic™





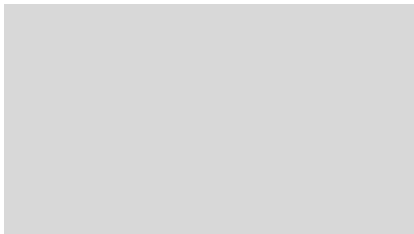

noddle-touch™ Alternate Uses



Detect small low force finger gesture





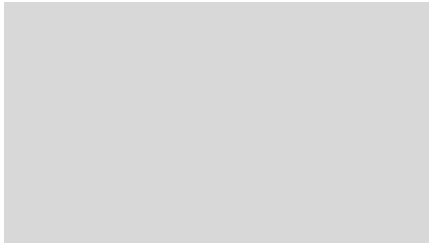

Positioning The noddle™ And The noddle-chat™ SGD At The Bedside.



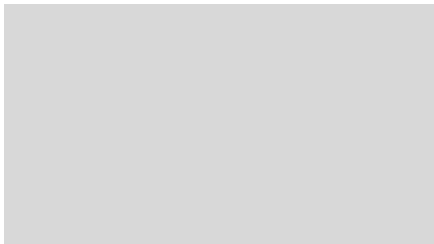
Example Of The noddle™ Counting Gestures

noddle



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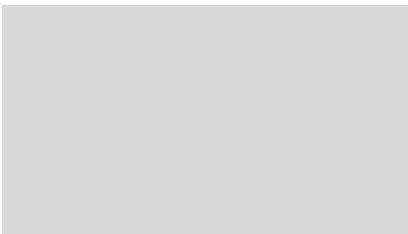
Using The noddle™ For Row-Column Scanning On An SGD



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Example Of Patient Using A Minimal Tongue Click Gesture To Summon Nurse And Control A Speech Generating Device

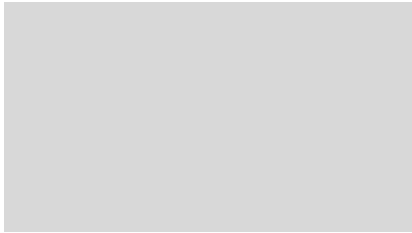
noddle



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Example of Patient Using A Minimal Tongue In Cheek Gesture To Summon Nurse And Control A Speech Generating Device

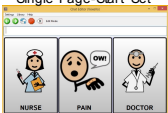
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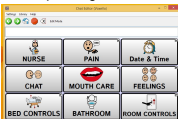
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Noddle-chat™ Template Progression
(Licensed From Saltillo)


Single Page-Start Set



Multiple Page-Basic Set




Multiple Page-Full Set



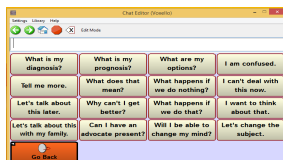
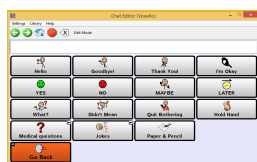
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Communicating About Pain



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Basic Conversation & Basic Medical Questions

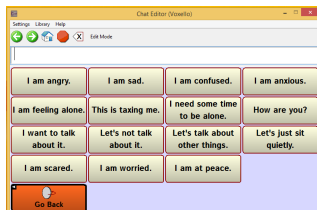


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Expressing Emotions

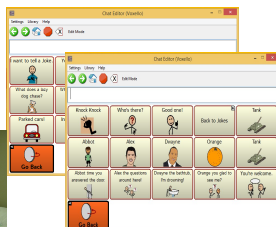
This is not fair!
You are a mean witch!
Get thef### out of myroom!



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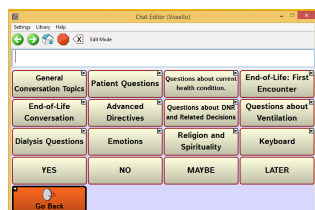
Breaking THE ICE: Humor Makes Us Human



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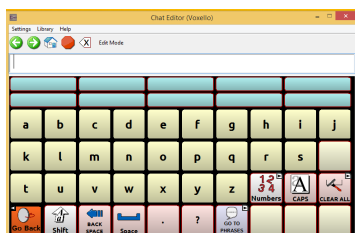
Conversations About Medical Decision Making And EOL



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Novel Phrases: Keyboard With Prediction

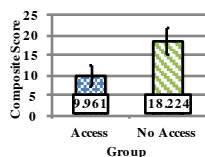


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Impact of Communication On Patient Responses To Outcomes Survey

- Likert Scale Items Administrated Online Via Qualtrics
 - Questions on access to nurse care
 - Questions on access to communication tools
 - Questions about device training
 - Questions about positioning
- Phase 1 - Control Subjects (N=100)
 - Patients with access to the standard nurse call responded more favorably across all of the questions ($Z=8.196, p<.0001$) than patients who did not have access to the standard nurse call.
- Phase 2 - NIH-NINR SBIR Clinical Trial
 - Patients receiving noddle™ and noddle-chat™.



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Return On Investment

- Potential reduction in total number of adverse events.
– **205,194**
- Potential reduction in costs associated with adverse events.
– **\$1,112,739,660**
- ROI based on the cost of noddle™ and savings due to reduced adverse events by an average-sized US hospital.
– **300%**

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Conclusion

- Introducing Assistive Technology in Acute Care
 - Can Reduce Adverse Events
 - Can Reduce Costs of Treating Adverse Events
 - Improves Patient Satisfaction

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References

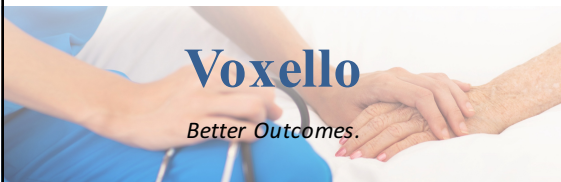
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 - Handout link remains live for 3 months after the conference ends.

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