Overview of MASCAL Training Exercise

Shawn L. Shah
Acknowledgements

Kenneth G. Proctor, PhD
Michael P. Ogilvie, MD, MBA
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Ryder Trauma Center
University of Miami Miller School of Medicine
Reduce Trauma M & M...

Training

Novel therapeutic strategies

Novel monitoring strategies
A Profile of Combat Injury

Howard R. Champion, MD, FRCS (Edin), FACS, COL (Ret) Ronald F. Bellamy, MD, FACS, Colonel P. Roberts, MBE, QHS, MS, FRCS, L/RAMC; Ari Leppaniemi, MD, PhD

<table>
<thead>
<tr>
<th></th>
<th>Head &amp; neck (%)</th>
<th>Thorax (%)</th>
<th>Abdomen (%)</th>
<th>Limbs (%)</th>
<th>Other (%)</th>
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<tbody>
<tr>
<td>World War II</td>
<td>4</td>
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<td>Korea</td>
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<td>Chechnya</td>
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<td>9</td>
<td>4</td>
<td>63</td>
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<tr>
<td>Somalia</td>
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<td>8</td>
<td>5</td>
<td>65</td>
<td>2</td>
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<td>Afghanistan</td>
<td>16</td>
<td>12</td>
<td>11</td>
<td>61</td>
<td></td>
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</tbody>
</table>

During a 23 d period, 555 FST evaluated 154 patients

<table>
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<th>Abdomen (%)</th>
<th>Limbs (%)</th>
<th>Other (%)</th>
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<tr>
<td>Iraq</td>
<td>13</td>
<td>10</td>
<td>8</td>
<td>56</td>
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US soldiers, POW, civilians
U. S. Army Forward Surgical Teams

*Reserve or regulars ± trauma training*

Rapidly mobile; deployed near combat front

Self-contained---> 30 casualties/72 hrs

Since 9/11, >90 FSTs have been evaluated at Univ of Miami, incl all sent to Iraq & Afghanistan
The problems...

• Long delays are common
• Casualty waves overwhelm resources
• Less than ideal conditions
• Greatest good for greatest number
• On the job training
On multiple severely-injured casualties, demonstrate and evaluate individual and FST capabilities to

1) triage,
2) resuscitate,
3) damage control,
4) stabilize for evacuation
Design of MASCAL Exercise

- slide presentation 20 min
- FST organization/prep 1 hr
- Airway/anatomy demo 10 min
- Animal Lab 2-4 hr
- Skills lab (± ATOM) <1 hr
- After action review 1-2 hr

→ 12-13 days lessons applied
Unfamiliar, crowded, obnoxious environment...
Radio: in 2 min; incoming helicopter; wounded on-board!!

Patient Abel

50% TBSA burn  
<simulated>

Inhalation injury  
<simulated>
Patient Abel

50% TBSA burn

Inhalational injury

1°/2° survey
Stabilize
Resuscitate?
Parkland burn formula?
Optimal vent settings?

Radio: 4 wounded incoming!!!
Abdominal wall lac
Extensive bowel evisceration thru R anterior abd
Unexploded RPG impaled in R anterior abd

Patient Baker
R-L transmediastinal penetr wound
R lateral oblique thoracoabd penetr wound

Patient Charles
Abdominal wall lac
Extensive bowel evisceration thru R anterior abd
Unexploded RPG impaled in R anterior abd

Patient David
R scalp lac
R fem art lac
Partial R lower extrem amp with soft tissue degloving

Patient Edgar
R neck, zone II, penetr wound
30% TBSA upper extrem burns
Multiple ant and post frag wounds
Supply shortages
Resource/personnel allocation?
Power Failure

Supply shortages?
Communication??
Command??
Chaos!!
In OR1:
HR=40
SAP=45
Radio: 2-4 casualties in 2 min!!
"Faulty intelligence"
End exercise

Skills lab ± ATOM

After Action Review

Time line in each “clinically relevant” model un_masks --->
- situational triage/1° & 2° survey
- communication/team dynamics
- resource utilization
Surprising “wake-up call”

*With every FST,* including those with combat experience, collapses in either situational triage, 1°/2° surveys, and/or basic ATLS principles (ABCs) resulting in *preventable deaths*

By prospectively identifying deficiencies, future FST performance during actual MASCAL should be improved

Basic principles are being applied to develop new concepts in research and training for civilian & military trauma care
Condensation of Neuronal Nuclei in the Caudate and Putamen of a Huntington mouse model

Daniella Barker
Summer Research 2010
Charles Ouimet, Ph.D.
Huntington’s Disease

Familial inheritance of a movement disorder with choreatic movements

**Signs and symptoms:**

**Motor:** involuntary movements
- chronic, progressive chorea

**Psychiatric:** mood changes, apathy, depression, hostility, personality changes, psychotic behavior

**Cognitive:** dementia, working memory deficits, loss of concentration
Polyglutamine (PolyQ) Disorder

17-36 repeats average length for normal protein

> 38 repeats leads to Huntington’s disease

huntingtin (IT15)
Neurons in the caudate and putamen degenerate
R6/2 Mice: A Huntington Model

- Human gene for huntingtin protein with 160 CAG repeats
- Huntington phenotype = clumsiness
- Mice die at age 13-17 weeks
- Caudate and putamen do not degenerate
Measuring Nuclei
## R6/2 Mice: A Huntington Model

<table>
<thead>
<tr>
<th></th>
<th>Wild Type Average Nuclei Area ($\mu^2$)</th>
<th>Huntington Carrier Average Nuclei Area ($\mu^2$)</th>
</tr>
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<tbody>
<tr>
<td><strong>Male</strong></td>
<td>39.33</td>
<td>31.64</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>46.45</td>
<td>42.11</td>
</tr>
</tbody>
</table>
Accounting for the Size Difference

- **Apoptosis?**
  - No literature demonstrating that apoptosis responsible for neuronal death in HD
  - TUNEL stain for apoptosis in the same model was negative
    - Gillian Bates’ lab, Dr. Ouimet
  - Also, TUNEL staining in human brains negative for apoptosis
    - Dr. Ouimet

- **Reduced gene expression?**
  - The role of histones
A. Regulation of DNA Methylation by Histone Acetylation

Heterochromatin (Chromatin Supercoiled)  Transcription blocked

HAT  HDAC

Euchromatin (Chromatin Relaxed)  Transcription permitted

http://www.accesscellscience.com/NE/CG/nucleosome.gif
DAPI staining: chromatin condensation

A

B

WT

R6/2
HDAC4 Knockout

R6/2 Mouse

Huntington Phenotype

R6/2 Mouse with HDAC4 Knockout

No Huntington Phenotype
Repetitive and stereotyped movements (RSM) and gait disturbances in children under 36 months with Autism Spectrum Disorder (ASD)

Cindy Susan Lorelei Turco
Advisors: Dr. Kathy Lee, Dr. Amy Wetherby
Introduction

- DSM-IV Diagnostic Criteria
  Autism Spectrum Disorder (ASD)
    - Impairments in social interaction
    - Impairments in communication
    - Restricted interests and *repetitive & stereotyped movements* (RSM)

(American Psychiatric Association, 2000).
Gait and postural disturbances

- Examples- tandem walking with outstretched arms, toe walking, shuffling, and asymmetrical movements involving arms and legs during gait
- Truncal and postural instability
  - Manifested by forward falls
- Role of the basal ganglia and cerebellum
  - Cerebellar Purkinje cell depletion → repetitive behavior (lever pressing)
    - Martin, Goldowitz, & Mittleman, 2010
  - Relationship to Parkinson’s disease- shared pathology in basal ganglia?
    - Vilensky, Damasio, and Maurer (1981)
Purpose

- To investigate early motor behavioral characteristics of children later diagnosed with autism, focusing on extrapyramidal motor functions.
- Determine if the atypical motor behaviors, gait disturbances, and postural instabilities can be observed before 36 months of age and in what settings.
- To develop an emerging coding system to be used to assess the aforementioned atypical motor behaviors, gait disturbances, and postural instabilities.
Participants and Methods

- Participants- 11 children (9 boys, 2 girls) under 36 months with ASD and a Mullen Scales of Early Learning score 1 SD below the mean in fine and/or gross motor development.
- Participants videotaped in 1, 2, or 3 settings
  - Administration of the Communication and Symbolic Behavior Scales Developmental Profile (CSBS)
    - n=6
  - Administration of Autism Diagnostic Observation Schedule (ADOS)
    - n=6
  - Systematic observation at home
    - n=4
- Behaviors observed and data from participants obtained from videos
Results

RSM

- 3 categories based on location (n=11)
  - Fingers and hands (7/11)
  - Arms, shoulders, legs (10/11)
  - Head, trunk, body (8/11)

Gait and Posture

- Gait disturbances observed in all at-home samples (4/4) and all ADOS administrations (6/6)
  - Heel, toe walking
  - Forearm out
  - Shuffling gait
- Postural instabilities in 3/4 at-home samples and 5/6 ADOS administrations
  - Loss of balance → falls
  - Weight shift (sitting- sacrum, standing, side)

Thelen’s taxonomy of 47 repetitive behaviors, 1979
The importance of the primary care physician– early detection

- Strongly advocated by the American Academy of Pediatrics.
- AAP recommends
  1. Surveillance at routine visits
  2. Standardized screening tool administration at any given visit
  3. Screening of all 18- and 24-month olds for ASD using a standardized autism-specific screening tool.
- Early detection → early intervention

Council on Children With Disabilities, Section on Developmental Behavioral Pediatrics,
Bright Futures Steering Committee, & Medical Home Initiatives for Children With
Special Needs Project Advisory Committee, 2006
Future Directions

- Further development of the coding system.
  - What would be the best setting for observing these behaviors?
- How many children with autism display these extrapyramidal signs (1/2 ? 1/3?)
  - This study focused on participants with known delay in fine and gross motor development.
References

Acknowledgments

- Advisors- Dr. Lee and Dr. Wetherby
- Sheri Stronach and the
- Center for Autism and Related Disabilities
Low-Contrast Sensitivity and Gait Analysis in Parkinson’s Disease: The Effects of High Contrast Yellow Lenses

Austin Henkel & Luby Sidoff
January 6, 2011
What is Parkinson’s Disease?

- Parkinson’s disease (PD) is a degenerative disease of the central nervous system, which affects approximately 1% of persons over age 60.
- Motor symptoms of PD are typically identified in the clinical setting and can include tremor, rigidity, shuffling gait, and postural instability.
- Common non-motor symptoms include autonomic dysfunction, sensory disturbances, and sleep difficulties.
- The symptoms of PD likely result from the dysfunction of dopamine-secreting neurons located in the substantia nigra of the midbrain.
Visual Difficulties in PD

• However, recent evidence has shown that visual symptoms are common in PD patients as well.
• PD patients have been shown to have decreased contrast sensitivity (CS), or the ability to discriminate differences between the amounts of light reflected from two adjacent surfaces. \(^1\)
• Decreased CS has been implicated as a predictor for increased fall risk in the PD population.
The Parkinsonian Retina

- Post-mortem biopsies indicate that PD patients have decreased retinal dopamine concentrations as compared to healthy controls.\(^2\)
- It is theorized that reduced activity of dopaminergic retinal amacrine cells could be responsible for decreases in visual contrast sensitivity observed in PD patients.\(^3\)
Improving Contrast Sensitivity

• Studies have shown that commercially available yellow-tinted lenses can increase CS in healthy volunteers. 4

• In our study, we have investigated whether yellow lenses could be adapted as a potential strategy to improve contrast sensitivity in PD patients under conditions of low luminance, when falls are more likely to occur.
Methods

• Participants

• Measures
  • Contrast Sensitivity
  • Optical Coherence Tomography (OCT)
  • Unified Parkinson’s Disease Rating Scale (UPDRS)
  • Gait Measurement
Participants

• 20 Patients with Parkinson’s recruited by Dr. Maitland during routine examination times in the Neuro-Ophthalmology and Balance Disorders Clinic
  • Excluded only if
    • Legally blind
    • Unable to independently ambulate
    • Have any other neurological condition that might impair gait
    • Have generalized medical disorder that might be compromised by walking or compromise walking (e.g., heart failure, etc.)
Measures

• Contrast Sensitivity
  • Measured using Low-Contrast Sloan Letter Charts (100%, 2.5%, and 1.25% contrast)
  • Room lighting measured to be between 80-100 candela/m²; same room used when testing each patient
  • Chart placed 2 meters from patient’s eyes with premeasured string and held perpendicular to the floor to eliminate any potential glare
  • Patients wore their usual distance correction for testing
  • Patients were tested in the same manner each time and a contrast sensitivity score was determined using the visual acuity equivalent of a standard Snellen visual acuity chart
Sloan Contrast Sensitivity Testing
Optical Coherence Tomography (OCT)

- Takes a non-invasive, non-contact optical picture of the retina
- Spectral imaging technique that uses fast scan programs and is similar to ultrasound
- Captures 3D and HD line scans of the retina
- Imaging done on both the macula and optic nerve of each eye
- All data was reviewed by Dr. Maitland for pathology
Ocular Coherence Tomography (OCT)
Unified Parkinson’s Disease Rating Scale (UPDRS)

- Standardized tool used nationally to quantify a patient’s disability in Parkinson’s
- Quantifies a patient’s functioning and symptoms as it relates to their PD
- Covers mentation, behavior, mood, and activities of daily living and how their PD has affected these functions over the previous week’s time
- Motor exam also given to quantify walking, tremor, and rigidity
- If patient has been experiencing dyskinesias or other complications stemming from their PD, they were asked additional questions
UPDRS

• For our purposes, the first four questions regarding mentation, behavior, and mood were omitted
• Patients were asked about dyskinesias and other complications only if they were experiencing them
• UPDRS scores were adjusted accordingly
Gait Measurement

• Patients walked on a 22 foot GaitRite (CIR Systems, Inc.) gait pad that measures 102 parameters of gait
• As the patient ambulates down the walkway, the system captures the relative arrangement, geometry, and applied pressure of each footfall as a function of time
• Ambulation time, velocity, right and left footfall pressure and duration, and a Functional Ambulation Performance (FAP) score are derived and transferred to computer software for storage and analysis
FAP

• The FAP score is a quantitative means of assessing gait based on specific spatial and temporal gait parameters.

• It is also useful as a predictor of fall risk in the elderly population\(^5\).

• Further, FAP scores for PD patients have been shown to be significantly lower than those of age-matched controls\(^6\).
Gait Measurement

• Each patient walked four different trials in conditions of low illumination (less than 5 candelas)
• 2 trials with wooden platform (29” long x 7” high x 42” wide); 1 trial with high-contrast yellow lenses, 1 trial without them
• 2 trials without the wooden platform; 1 trial with high-contrast yellow lenses, 1 trial without them
GaitRite
GaitRite
GaitRite
Results

• In the trials without the step, the FAP scores improved with statistical significance when the patients wore the high contrast yellow lenses
  • p value = 0.013; significant at the 5% level
• In the trials with the step, there was no statistically significant improvement in the FAP scores when the high contrast yellow lenses were used
  • p value = 0.441; NOT significant at the 5% level
Acknowledgements

• Charles G. Maitland, MD
• Leonard L. LaPointe, PhD
• Charles Saunders, PhD
• Staff of The Neuro-Ophthalmology and Balance Disorders Clinic
• Research Participants
References


Florida State University
College of Medicine

End of Life Care & Palliative Medicine
Student Summer Fellowship
Background
...Blah Blah. 
Blah, blah blah.

AND WHY SHOULD I CARE?
1,450,000

# of individual patients who received hospice care in 2008.

More than 1/3 of all American deaths in that year.
Goals & Objectives

- Improve Knowledge Base
- Increase Early Exposure & Comfort
- Improve Scholarship & Communication Skills
Knowledge Base

- Clinical & Basic Science:
  - Dying Process
  - Common Causes of Death in Hospice
- Social factors surrounding death
  - Religious
  - Psychological
  - Cultural & Ethnic
  - Systemic Effects on Death
- Legal & Ethical Issues
- Interdisciplinary Team Model
Experiential Activities

- Big Bend Hospice-House Rounds
- Periodic Ethics Board Meetings
- Interdisciplinary Team-Member Shadowing
- New possibilities for next year @ TMH, Telemedicine & in-home experiences.
Scholarship & Communication Skills

- Personal reflection
  - experiential & knowledge base activities
- Research in areas of interest
- Presentations
  - Small group & FSU COM
  - National Conference & forums
- Development workshops in:
  - Presenting Skills
  - Adult Education
  - Group & Team Dynamics
2010 Fellows

Each fellow completed all requirements of the fellowship earning a Certificate of Recognition.

Patrick Gill
Shannon Scott
Joshua Smith
Angela Green
Mentors & Faculty

- Dr. Ken Brummel-Smith
- Dr. Jonathan Appelbaum
- Big Bend Hospice of Tallahassee
  - Dr. David Robinson
  - Dr. Ron Hartsfield
- Professor Marshall Kapp
- Michelle Cormier
End of Life & Palliative Medicine Summer Fellowship 2011

Applications will be available early March

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