TABLE OF CONTENTS

10 Aging and Brain Injury Resource List
   Kelly K. Campbell, RN, BSN, CP, CLNC, CLCP
   Jenn Craigmyle, RN, BSN, CLNC, LNCP-C, CLCP

13 Dear Carole

15 Disorders of Consciousness: High Intensity, Early Mobility.
   Jordana Lockwich, DPT, PT

20 Using Balance Testing to Better Understand Sex Differences after Mild Traumatic Brain Injury
   Kristen N. Schleich, BS
   Donna M. Duffy, PhD
   Christopher K. Rhea, PhD

26 Rehabilitation Considerations Following Mild Traumatic Brain Injury
   Robert Fabiano, PhD
   Samantha Sharrard, BA

36 Music Therapy for the Brain Injured Client: A Closer Look for the Life Care Planner
   Jon Lieff, MD
   Jenn Craigmyle, RN, BSN, CLNC, LNCP-C, CLCP

40 The Impact of Vertigo on Employment and Activities of Daily Living
   David San Fillippo, PhD

DEPARTMENTS

3 From the Editor

4 Information for Authors

6 A Message from the President

8 Contributors to this Issue

49 Issue Index

Errata

The JNLCP XVI.4 omitted the inclusion of Table 7 of Nellie Kreimer’s article on Home Care Services Costs and the Fair Labor Standards Act. We regret the omission and have included it in this issue on page 7.
If all goes as planned, this issue should reach your inbox about the time you are completing your final travel preparations for the annual conference at We-Ko-Pa Resort in Scottsdale, Arizona. Through the leadership efforts of co-chairs Jenn Craigmyle and Kelly Campbell, the Journal Committee has been preparing for this event for several months. Be sure to attend the welcome reception on Friday and stop by the Journal table to introduce yourself. The committee welcomes issue themed topics and member interest in the opportunity to become involved in any aspect of the Journal’s production. Whether your forte is personal communication, networking, critiquing, writing, or editing, the Journal Committee has a role where your talent can shine, and your expertise grow.

With this in mind, I am pleased to announce the premier of two new features in this issue: the Dear Carole Column and the Aging and…. Resource List. The Dear Carole Column is anticipated to provide answers to questions that enhance members’ business and Life Care Planning practice. Responses published in each issue will address questions submitted to DearCaroleColumn@gmail.com. The resource list is anticipated to provide the readership easy access to aging-related information that targets the issue specific topic. Please check out these new additions.

The Journal Committee is committed to offering articles that align with the editorial vision of providing interesting, timely, and scholarly peer-reviewed articles as a vehicle which furthers a collegial exchange of theoretical and didactic discussions aimed at engaging, enlightening, and expanding the knowledge and skill set of our Nurse Life Care Planning community and readership. As you read this brain injury issue, note that three of the articles were written by speakers that were recruited from the October Annual Conference of the International Association of Rehabilitation Professionals in Pittsburg, Pennsylvania: 1) Lockwood, Disorders of Consciousness: High Intensity, Early Mobility; 2) Fabiano & Sharrard, Rehabilitation Considerations Following Mild Traumatic Brain Injury; and 3) San Filippo, The Impact of Vertigo on Employment and Activities of Daily Living. Rounding out the issue are Lieff and Craigmyle’s piece regarding Music Therapy for the Brain Injured Client: A Closer Look for the Life Care Planner, and Schleich, Duffy, and Rhea’s article on Using Balance Testing to Better Understand Sex Differences after Mild Traumatic Brain Injury.

As always, the Journal Committee welcomes your feedback and input. Please send your comments to the Editor.

May you have safe travels. See you in Scottsdale!
Information for Authors

AANLCP® invites interested nurses and allied professionals to submit article queries or manuscripts that educate and inform the Nurse Life Care Planner about current clinical practice methods, professional development, and the promotion of Nurse Life Care Planning within the medical-legal community. Submitted material must be original. Manuscripts and queries may be addressed to the Editorial Committee. Authors should use the following guidelines for articles to be considered for publication. Please note capitalization of Nurse Life Care Plan, Planning, etc.

Text
Manuscript length: 1500 – 3000 words

- Use Word© format (.doc, .docx) or Pages (.pages)
- Submit only original manuscript not under consideration by other publications
- Put the title and page number in a header on each page (using the Header feature in Word)
- Use Times New Roman 12 point font
- Place author name, contact information, and article title on a separate title page, so author name can be blinded for editorial review
- Use APA style (Publication Manual of the American Psychological Association 6th Ed)

Art, Figures, Links
All photos, figures, and artwork should be in JPG or PDF format (JPG preferred for photos). Line art should have a minimum resolution of 1000 dpi, halftone art (photos) a minimum of 300 dpi, and combination art (line/tone) a minimum of 500 dpi. Each table, figure, photo, or art should be on a separate page, labeled to match its reference in text, with credits if needed (e.g., Table 1, Common nursing diagnoses in SCI; Figure 3, Time to endpoints by intervention, American Cancer Society, 2003) Live links are encouraged. Please include the full URL for each.

Editing and Permissions
The author must accompany the submission with written release from:
- Any recognizable identified facility for the use of name or image
- Any recognizable person in a photograph, for unrestricted use of the image
- Any copyright holder, for copyrighted materials including illustrations, photographs, tables, etc.

All authors must disclose any relationship with facilities, institutions, organizations, or companies mentioned in their work. All accepted manuscripts are subject to editing, which may involve only minor changes of grammar, punctuation, paragraphing, etc. However, some editing may involve condensing or restructuring the narrative. Authors will be notified of extensive editing. Authors will approve the final revision for submission. The author, not the Journal, is responsible for the views and conclusions of a published manuscript. Submit your article as an email attachment, with document title articlename.doc, e.g., wheelchairs.doc

All manuscripts published become the property of the Journal. Manuscripts not published will be returned to the author. Queries may be addressed to the care of the Editor at: smfc@surewest.net

Manuscript Review Process
Submitted articles are peer reviewed by Nurse Life Care Planners with diverse backgrounds in life care planning, case management, rehabilitation, and the nursing profession. Acceptance is based on manuscript content, originality, suitability for the intended audience, relevance to Nurse Life Care Planning, and quality of the submitted material. If you would like to review articles for this journal, please contact the Editor.

AANLCP® Journal

Reviewers for this issue
Barbara Bate, RN-BC, CCM, CRRN, CNLCP®, LNCC, MSCC
Kelly K. Campbell, RN, BSN, CP, CLNC, CLCP
Jenn Craigmyle, RN, BSN, CLNC, LNCP-C, CLCP
Dawn Cook, RN, LNCP-C, CLCP, CLNC
Wendie Howland, MN, RN-BC, CRRN, CCM, CNLCP, LNCC
Linda Husted, MPH, RN, CNLCP®, LNCC, CCM, CDMS, CRC
LaToya Lowery, RN, BSN, MBA, CCM, CNLCP®
Kathy Pouch, MSN, RN-BC, CCM, CNLCP, LNCC
Carole Upman, RN, MA, CCM, CRC, CDMS/R, CNLCP
A CORE CURRICULUM for NURSE LIFE CARE PLANNING

American Association of Nurse Life Care Planners

Dorajane Apuna-Grummer Wendie A. Howland Editors
A Message from the President

On January 2, 2017, I assumed the role of president of AANLCP. I am proud and humbled to serve as president of this amazing association. I will work to see that the association is a good steward of your interests and resources, and of our profession. As I reflect on this great opportunity and the advances of the association this past year, I also want to share with you how we will continue to focus on what is important to members as we move forward in 2017.

I wish to start by thanking Pat Rapson, RN, CCM, CNLCP, CLCP, LNCC, MSCC, the 2016 president, for her extraordinary commitment. I also want to thank the management team KAMO and the executive board: Rebecca E. Czarnik RN, MS, CLNC, LNCP-C, CMSP (secretary), Cynthia Town, BSN, RN-BC, CCM, CNLCP (treasurer), Lori Moore Dickson, MSN, RN, MSCC, CLCP, CNLCP (president-elect), and Beth Wood, RN, MMA, MIS, CCM, CNLCP (secretary-elect) for their extraordinary service and dedication to AANLCP. We are here to serve you and open to hearing from you. We encourage you to continue to lend support and get to know the leadership team.

In 2016, we completed an exhaustive search for a new journal editor. I am pleased to announce the instatement of Mariann F. Cosby DNP, MPA, RN, PHN, CEN, NE-BC, LNCC, CLCP, CCM, MSCC as the new editor for the Journal of Nurse Life Care Planning (JNLCP). Dr. Cosby is the owner of MFC Consulting in northern California, providing legal nurse consulting, life care planning, medical cost projections, case management, and expert witness services. She has extensive experience in clinical, management, teaching, and consulting positions in emergency nursing, pediatrics, geriatrics/public health, and school nursing; currently consulting for California Correctional Health Care Services. She is president of the Greater Sacramento Area Chapter of the American Association of Legal Nurse Consultants. Dr. Cosby will also serve as the senior co-editor for the upcoming fourth edition of the American Association of Legal Nurse Consultants’, Legal Nurse Consulting, Principles and Practices.

Mariann’s vision for the JNLCP is to provide interesting, timely, scholarly peer-reviewed articles as a vehicle that furthers a collegial exchange of theoretical and didactic discussions aimed at engaging, enlightening, and expanding the knowledge and skill set of our Nurse Life Care Planning community. We feel very fortunate to have found someone like Dr. Cosby to cover these areas of strength for the journal, and to help us further expand our expertise as Nurse Life Care Planners.

I also want to extend compliments to Wendie A. Howland, MN, RN-BC, CRRN, CCM, CNLCP, LNCC outgoing editor. Her diligent pursuit of high standards in the Journal of Nurse Life Care Planning and her vision to publish a topical, lively, accessible quarterly journal has pushed our professional association to a higher plane. Join me in recognizing Wendie’s outstanding contributions as an editor, mentor, colleague, and friend.

This past October, the executive board held their annual strategic planning meeting in Reno, Nevada. Our mission in 2017 continues to focus on supporting the nursing community’s efforts to achieve excellence in the practice of Nurse Life Care Planning. During the planning sessions, the board identified five drivers of organizational performance with goals designed to move the association closer to the vision, mission, and values of the association over the next three to five years. The five strategic domains are membership, finance, education, research, and practice management. These five strategic domains are to become the pillars of the association in 2017. The domains support the organization’s mission. They focus on action and define the specific strategies to attain our crucial goals.

Now, for what will be the highlight of 2017, the annual education conference in Scottsdale, Arizona. The conference is March 9-12, 2017. The association will celebrate its 10th anniversary of providing exceptional educational opportunities. Yes, I cannot believe we are reaching a great milestone, one we are all excited to celebrate. During the 10th anniversary celebration, we have the pleasure of hosting keynote speaker J.R. Martinez, a world-renowned motivational speaker, actor, best-selling author, and U.S. Army veteran. The conference committee put together a rock-star lineup of speakers to motivate, inform, and inspire you to continue serving others as you take care of yourself.

As you can see, this year promises to be an exciting year. Help us grow your association for continued success. Joining your professional association gives you access to specialized nursing education and numerous publications, such as the peer-reviewed Journal of Nurse Life Care Planning. Membership also provides you with networking and mentoring opportunities, discounts to the annual conference, webinars, and the Nurse Life Care Planning Scope & Standards of Practice, which is an essential knowledge resource for your practice.

Finally, as we prepare for another great year, your executive board looks forward to sharing current and ongoing work and plans for the organization in 2017.

Denise W. Wrenn
Denise W. Wrenn, RN, BSN, MHSA, CCM, CWCP, COHN-S, CLCP, CMSP
President, AANLCP
dwrenn@denisewrenn.com
### Home Care Services Costs and the Fair Labor Standards Act

**Nellie Kreimer, MSHCA, RN, CNLCP, CLNC, CLCP**

#### Table 7

**Annual Cost of Care: Five Year Annual Growth and Annual HHA Salaries**

<table>
<thead>
<tr>
<th>Location</th>
<th>Homemaker services</th>
<th>5-year annual growth rate</th>
<th>Homemaker Home Health Aide</th>
<th>5-year Annual growth</th>
<th>Annual mean salary HHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA-National</td>
<td>$45,760</td>
<td>2.13%</td>
<td>$46,332</td>
<td>1.28%</td>
<td>$17,480-$29,950</td>
</tr>
<tr>
<td>Alabama</td>
<td>$36,608</td>
<td>1.30%</td>
<td>$37,752</td>
<td>0.64%</td>
<td>$19,720</td>
</tr>
<tr>
<td>Alaska</td>
<td>$59,488</td>
<td>0.04%</td>
<td>$61,776</td>
<td>0.37%</td>
<td>$30,160</td>
</tr>
<tr>
<td>Arizona</td>
<td>$45,760</td>
<td>2.13%</td>
<td>$47,979</td>
<td>1.73%</td>
<td>$23,240</td>
</tr>
<tr>
<td>Arkansas</td>
<td>$41,184</td>
<td>2.38%</td>
<td>$41,184</td>
<td>2.38%</td>
<td>$18,830</td>
</tr>
<tr>
<td>California</td>
<td>$52,624</td>
<td>2.83%</td>
<td>$54,912</td>
<td>2.71%</td>
<td>$27,580</td>
</tr>
<tr>
<td>Colorado</td>
<td>$51,480</td>
<td>2.38%</td>
<td>$54,912</td>
<td>2.71%</td>
<td>$26,190</td>
</tr>
<tr>
<td>Connecticut</td>
<td>$45,760</td>
<td>1.08%</td>
<td>$50,336</td>
<td>0.36%</td>
<td>$26,940</td>
</tr>
<tr>
<td>Delaware</td>
<td>$50,336</td>
<td>1.92%</td>
<td>$53,768</td>
<td>2.77%</td>
<td>$28,910</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>$36,608</td>
<td>2.33%</td>
<td>$54,912</td>
<td>2.02%</td>
<td>$26,240</td>
</tr>
<tr>
<td>Florida</td>
<td>$42,328</td>
<td>1.71%</td>
<td>$45,188</td>
<td>1.87%</td>
<td>$22,920</td>
</tr>
<tr>
<td>Georgia</td>
<td>$41,184</td>
<td>1.15%</td>
<td>$41,184</td>
<td>0.57%</td>
<td>$20,960</td>
</tr>
<tr>
<td>Hawaii</td>
<td>$54,912</td>
<td>1.08%</td>
<td>$57,772</td>
<td>0.00%</td>
<td>$26,410</td>
</tr>
<tr>
<td>Idaho</td>
<td>$45,760</td>
<td>3.30%</td>
<td>$45,760</td>
<td>2.13%</td>
<td>$27,710</td>
</tr>
<tr>
<td>Illinois</td>
<td>$48,345</td>
<td>2.15%</td>
<td>$50,336</td>
<td>2.31%</td>
<td>$23,640</td>
</tr>
<tr>
<td>Indiana</td>
<td>$44,616</td>
<td>2.64%</td>
<td>$45,760</td>
<td>2.13%</td>
<td>$22,090</td>
</tr>
<tr>
<td>Iowa</td>
<td>$48,048</td>
<td>1.76%</td>
<td>$52,624</td>
<td>2.58%</td>
<td>$23,920</td>
</tr>
<tr>
<td>Kansas</td>
<td>$45,760</td>
<td>3.15%</td>
<td>$46,332</td>
<td>2.25%</td>
<td>$21,270</td>
</tr>
<tr>
<td>Kentucky</td>
<td>$41,184</td>
<td>1.15%</td>
<td>$42,900</td>
<td>1.39%</td>
<td>$23,620</td>
</tr>
<tr>
<td>Louisiana</td>
<td>$34,892</td>
<td>-0.81%</td>
<td>$36,608</td>
<td>0.08%</td>
<td>$20,160</td>
</tr>
<tr>
<td>Maine</td>
<td>$50,336</td>
<td>2.44%</td>
<td>$54,340</td>
<td>2.07%</td>
<td>$23,930</td>
</tr>
<tr>
<td>Maryland</td>
<td>$45,485</td>
<td>0.65%</td>
<td>$47,476</td>
<td>0.74%</td>
<td>$24,270</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>$56,857</td>
<td>2.01%</td>
<td>$57,772</td>
<td>0.00%</td>
<td>$26,670</td>
</tr>
<tr>
<td>Michigan</td>
<td>$46,332</td>
<td>2.10%</td>
<td>$48,048</td>
<td>2.2%</td>
<td>$22,210</td>
</tr>
<tr>
<td>Minnesota</td>
<td>$54,912</td>
<td>1.76%</td>
<td>$59,488</td>
<td>0.19%</td>
<td>$25,420</td>
</tr>
<tr>
<td>Mississippi</td>
<td>$38,896</td>
<td>1.22%</td>
<td>$38,896</td>
<td>1.6%</td>
<td>$21,270</td>
</tr>
<tr>
<td>Missouri</td>
<td>$42,603</td>
<td>0.42%</td>
<td>$43,472</td>
<td>0.00%</td>
<td>$22,310</td>
</tr>
<tr>
<td>Montana</td>
<td>$52,624</td>
<td>2.91%</td>
<td>$52,624</td>
<td>2.33%</td>
<td>$22,500</td>
</tr>
<tr>
<td>Nebraska</td>
<td>$52,624</td>
<td>4.45%</td>
<td>$53,768</td>
<td>3.28%</td>
<td>$24,320</td>
</tr>
<tr>
<td>Nevada</td>
<td>$48,620</td>
<td>0.72%</td>
<td>$48,048</td>
<td>0.33%</td>
<td>$26,680</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>$54,912</td>
<td>2.22%</td>
<td>$57,200</td>
<td>0.20%</td>
<td>$26,670</td>
</tr>
<tr>
<td>New Jersey</td>
<td>$48,048</td>
<td>1.49%</td>
<td>$50,336</td>
<td>0.82%</td>
<td>$23,020</td>
</tr>
<tr>
<td>New Mexico</td>
<td>$47,453</td>
<td>1.52%</td>
<td>$53,768</td>
<td>1.42%</td>
<td>$22,210</td>
</tr>
<tr>
<td>New York</td>
<td>$50,336</td>
<td>2.44%</td>
<td>$52,624</td>
<td>1.84%</td>
<td>$23,730</td>
</tr>
<tr>
<td>North Carolina</td>
<td>$40,612</td>
<td>0.87%</td>
<td>$41,184</td>
<td>-0.55%</td>
<td>$19,680</td>
</tr>
<tr>
<td>North Dakota</td>
<td>$63,972</td>
<td>4.46%</td>
<td>$63,972</td>
<td>3.80%</td>
<td>$30,160</td>
</tr>
<tr>
<td>Ohio</td>
<td>$44,616</td>
<td>1.61%</td>
<td>$45,184</td>
<td>2.04%</td>
<td>$20,980</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>$45,760</td>
<td>2.71%</td>
<td>$47,705</td>
<td>2.98%</td>
<td>$23,550</td>
</tr>
<tr>
<td>Oregon</td>
<td>$52,624</td>
<td>2.83%</td>
<td>$52,624</td>
<td>1.36%</td>
<td>$23,560</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>$49,192</td>
<td>2.50%</td>
<td>$49,306</td>
<td>1.50%</td>
<td>$22,000</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>not available (NA)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>$17,410</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>$52,624</td>
<td>0.44%</td>
<td>$57,200</td>
<td>1.46%</td>
<td>$26,610</td>
</tr>
<tr>
<td>South Carolina</td>
<td>$34,892</td>
<td>1.76%</td>
<td>$38,896</td>
<td>1.6%</td>
<td>$21,270</td>
</tr>
<tr>
<td>South Dakota</td>
<td>$52,647</td>
<td>5.03%</td>
<td>$53,768</td>
<td>1.84%</td>
<td>$26,500</td>
</tr>
<tr>
<td>Tennessee</td>
<td>$41,184</td>
<td>1.76%</td>
<td>$41,184</td>
<td>1.15%</td>
<td>$19,450</td>
</tr>
<tr>
<td>Texas</td>
<td>$43,358</td>
<td>2.20%</td>
<td>$43,472</td>
<td>1.14%</td>
<td>$19,950</td>
</tr>
<tr>
<td>Utah</td>
<td>$48,048</td>
<td>2.02%</td>
<td>$48,048</td>
<td>0.53%</td>
<td>$24,450</td>
</tr>
<tr>
<td>Vermont</td>
<td>$50,336</td>
<td>1.42%</td>
<td>$53,768</td>
<td>2.09%</td>
<td>$26,440</td>
</tr>
<tr>
<td>Virginia</td>
<td>$43,472</td>
<td>2.18%</td>
<td>$44,593</td>
<td>1.05%</td>
<td>$22,390</td>
</tr>
<tr>
<td>Virgin Islands</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>$23,820</td>
</tr>
<tr>
<td>Washington</td>
<td>$56,834</td>
<td>4.18%</td>
<td>$56,834</td>
<td>2.23%</td>
<td>$25,720</td>
</tr>
<tr>
<td>West Virginia</td>
<td>$36,333</td>
<td>0.81%</td>
<td>$37,752</td>
<td>1.26%</td>
<td>$19,110</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>$51,480</td>
<td>2.90%</td>
<td>$52,624</td>
<td>2.33%</td>
<td>$21,130</td>
</tr>
<tr>
<td>Wyoming</td>
<td>$59,488</td>
<td>6.47%</td>
<td>$52,052</td>
<td>2.61%</td>
<td>$26,790</td>
</tr>
</tbody>
</table>

Note: Adapted from Genworth, 2016; BLS, 2015
Contributors

JENN CRAIGMYLE
RN, BSN, CLNC, LNCP-C, CLCP
Jenn Craigmyle is a bachelor’s prepared Registered Nurse with experience as a clinical nurse in neurology and critical care, nursing educator for an ADN school of nursing, legal nurse consultant, and life care planner. She earned her certification in life care planning in 2012 and is the owner of Craigmyle Legal Nurse Services, LLC based out of Southern California. Recently she was appointed as the journal committee co-chair for the Journal of Nurse Life Care Planning.

ROBERT FABIANO, PHD
Dr. Robert Fabiano is a licensed psychologist who specializes in the areas of clinical neuropsychology and rehabilitation. Dr. Fabiano completed his Master’s Degree in Rehabilitation Counseling at Southern Illinois University followed by a Doctorate in Counseling Psychology at Michigan State University. He served as Administrative Supervisor at the Rehabilitation Institute of New Orleans, a free standing rehabilitation hospital with specialty units in spinal cord injury, traumatic brain injury, and stroke. He is the founder and Executive Director of PAR Rehab Services, a multidisciplinary mental health clinic in Lansing, Michigan for the past 25 years (www.parrehab.org). He specializes in the areas of clinical neuropsychology and rehabilitation. He has published numerous articles in areas of traumatic brain injury and vocational outcome. He has served as Adjunct Professor at Michigan State University, College of Education and Assistant Clinical Professor in the School of Osteopathic Medicine, and Consulting Clinical Neuropsychologist at Sparrow Hospital, the regional Neurotrauma Center in the mid-Michigan region for the past 25 years. He has provided numerous lectures and class instruction in areas of neuropsychology, intellectual assessment and diagnosis, traumatic brain injury and rehabilitation.

DONNA M. DUFFY, PHD
Dr. Duffy is the Program Director for the Program for the Advancement of Girls and Women in Sport and Physical Activity, which is housed in the Center for Women’s Health and Wellness at University of North Carolina at Greensboro. Dr. Duffy’s research focuses on neuromotor and neurocognitive assessment before and after concussions in female athletes. Dr. Duffy’s work has been funded by the Women’s Football Foundation.

DAVID SAN FILIPPO, PHD
Dr. San Filippo is the Chair of the Health Studies Programs in the College of Professional Studies and Advancement (CPSA) at National Louis University (NLU) in Chicago, Illinois. He is the Faculty Advisor for the NLU Student Veterans of America chapter and the Quality Matter Coordinator for NLU’s learning management platform. Dr. San Filippo is also a former Faculty Senate Chair for National Louis University. He also teaches online courses in critical thinking, strategic management, leadership, and ethics. Additionally, he teaches online courses in consciousness studies, death, dying, and near-death experiences. Dr. San Filippo serves as a vocational expert involving workers’ compensation, personal injury, automobile, and social disability matters. He also represents disabled individuals before the Social Security Administration. Dr. San Filippo is a licensed mental health counselor, certified disability management specialist, a Florida qualified rehabilitation provider, and Quality Matters Peer Reviewer. Dr. San Filippo has started five companies related to medical cost containment, vocational rehabilitation services, and software and systems development. He has consulted for organizations in Colombia, South America regarding medical cost containment, human resources development, bereavement, and cost containment software. Dr. San Filippo offers seminars nationally on the topics of international business, online education, death and dying, near-death experiences, and marriage.
Contributors to this issue

KRISTEN N. SCHLEICH, BS
Ms. Schleich is a MS student in the Department of Kinesiology at the University of North Carolina at Greensboro (UNCG). Ms. Schleich's research focuses on concussion assessment and management in female athletes.

JONATHAN D. LIEFF, M.D.
Dr. Lieff graduated from Yale College and Harvard Medical, and specialized in psychiatry, geriatric psychiatry and neuropsychiatry. He is a past president of the American Association for Geriatric Psychiatry, the national subspecialty association. As president, he helped found the American Journal of Geriatric Psychiatry. He has published over twenty articles and three books on geriatric psychiatry and high technology, and has lectured widely in geriatric psychiatry and neuroscience.

Dr. Lieff has written a blog since 2012 about neuroscience and studies on mind in nature—Searching for the Mind.com or jonlieffmd.com. He posts daily articles relevant to his blog at Facebook: Searching for the Mind and twitter @jonlieffmd. Best Online Universities named Dr. Lieff’s website as number 80 of the world’s top 102 online universities for “The Science of Learning: Resources on How our Brains Learn Best,” along with Harvard, MIT, Stanford, and Oxford.

JORDANA LOCKWICH, DPT, PT
Jordana Lockwich works full time as a Physical Therapist at University of Pittsburgh Medical Center Mercy Hospital in inpatient rehabilitation on the traumatic brain injury unit in Pittsburgh, Pennsylvania. She is the traumatic brain injury clinical mentor for the neurological residency program as well as a clinical instructor for the Doctor of Physical Therapy students from multiple graduate programs. Dr. Lockwich is also an adjunct clinical faculty member at the University of Pittsburgh for the Doctor of Physical Therapy program and assists with the neurological rehabilitation courses. She graduated with her doctorate in physical therapy from the University of Pittsburgh in 2010. Her special interests include treatment of traumatic brain injury patients as well as management of persons with disorders of consciousness.

SAMANTHA SHARRARD, BA
Samantha Sharrard earned her Bachelor of Arts degree in Psychology from Michigan State University. Her undergraduate work also includes a specialization in Health Promotion. After graduation, Samantha worked as a psychometrician at PAR Rehab Services in Lansing, Michigan administering psychological and neuropsychological evaluations. At PAR, Samantha worked with a diverse clinical population of children and adults spanning various neurologic and psychiatric disorders including child behavioral and developmental disorders, adult neurologic disorders including traumatic brain injuries, dementia, and strokes, along with mood disorders, personality disorders, anxiety disorders, and occasional somatoform disorders. Samantha also worked as a research lab manager in the Department of Psychology at Michigan State University. To further her academic journey, Samantha is currently pursuing a Masters of Social Work degree from the University of Michigan, specializing in geriatrics. After graduation, she hopes to work as a gerontological social worker to address the concerns of the growing aging population.

CHRISTOPHER K. RHEA, PHD
Dr. Rhea is an Associate Professor in the Department of Kinesiology at University of North Carolina at Greensboro and his primary research interest is the control of gait and balance. Dr. Rhea’s research team is exploring novel ways to quantify a person’s movement ability by using smartphone and virtual reality technology as assessment and rehabilitation tools. Dr. Rhea’s research has been funded by the Department of Defense, the US Navy, and the Women’s Football Foundation.

KIRSTEN N. SCHLEICH, BS
Ms. Schleich is a MS student in the Department of Kinesiology at the University of North Carolina at Greensboro (UNCG). Ms. Schleich's research focuses on concussion assessment and management in female athletes.
Aging and Brain Injury Resource List

Compiled by: Kelly K. Campbell, RN, BSN, CP, CLNC, CLCP
Jenn Craigmyle, RN, BSN, CLNC, LNCP-C, CLCP

1. How the Brain Ages

2. Neurocognitive Disorder and Brain Injury
https://medlineplus.gov/ency/article/001401.htm

3. Dementia and Brain Injury
www.alz.org/dementia/traumatic-brain-injury-head-trauma-symptoms.asp

4. Brain Training for Seniors
https://familydoctor.org/brain-training-for-seniors/?adfree=true

5. Topic sheet about Dementia and Traumatic Brain Injury
This online program will prepare you to work in a variety of areas including child/elder abuse, domestic violence intervention, life care planning, sexual assault examination, case management, mass disaster response, and death investigation.

- 39-credit 100% online program
- Allows specialization such as Care Management or Interpersonal Violence
- Individualized mentoring for Practicum & Seminar experiences
- IAFN SANE Clinical Skills Lab Site

Applications accepted year-round!
Show Them The Evidence
Evidenced-based practice begins with research.
If you write life care plans you already do research.
No fear! Lighten the load! Strengthen the practice!
Come join us as we find the evidence to support our practice!

Are you...
... curious about how and why the nursing process supports our specialty practice of Nurse Life Care Planning? Are you in a formal education/practice program and need ideas for a research project and paper? Let’s talk!

Your Research Committee is currently studying how and why Nurse Life Care Planners put case management services into life care plans. We need help doing literature reviews and identifying tools to determine variables in using case management services.

... already working on research in a formal advanced education/practice program? Did you know that AANLCP would love to know about your research project?! Tell us about it!

~ Colleen Manzetti, DNP, RN, CNLCP, CNE
Chair, AANLCP Research Committee

Together we can learn the scoop
share knowledge
build a body of evidence
by life care planners
for nurse life care planners

Participate:
email cmanzetti@aol.com
Phone 732-261-1761
Welcome to the Business of Life Care Planning

The journal committee is excited to offer a new means of support and information to all who read this publication. We want this to be member driven and are counting on your questions to make this a tool to enhance your business and practice of Life Care Planning.

If you are new to setting up a business, you will have many questions, and we hope to answer some of those for you. Starting a business is an exciting new adventure! Let us help you with some of the details of this challenge.

Where to start may be a question that you are asking yourself about establishing a business. If it isn’t, you may want to step back and ask that question as there are a few moving parts to starting any business. Have you considered where and how to generate referrals, what business model might work, what accounting system will be comfortable to use, who will do the billing and taxes, who will do the final review of your documents, what taxes will need to be paid, etc.

There may be more questions than answers in the early hours of declaring your organization as a business entity and not as an individual in business. First and foremost you may find it helpful to write a business plan to create a measurement tool for your success.

We are here to help! The Dear Carole Column will allow you to reach out by email and ask questions about starting a business. Just send those questions to: DearCaroleColumn@gmail.com

In this column, we will address the questions raised by those of you who are starting a business or meeting new challenges that you need a little help getting through early on in your business endeavor. We hope to hear from you so we can learn what information you will want us to generate…we are in this together and look forward to helping you manage this part of your work life.

Work can and should be fun…we hope to help you see it that way with this column’s support.

Please ask us what you want to know!
Coming!
Summer 2018

Core Curriculum for Nurse Life Care Planning
2nd edition

To contribute, contact
AANLCP
801-274-1184
Introduction

Suffering from a severe traumatic brain injury requires a lifetime of care planning to optimize an individual's quality of life. With the advancements in technology and modern medicine, survival rates are at their highest for individuals specifically who suffer from a disorder of consciousness, one of the most severe forms of brain injury. The aim of this article is to convey the importance of correctly identifying the different types of consciousness disorders so that early mobility opportunities are recognized and optimally introduced during the patient's rehabilitation.

The coma recovery scale (revised) (CRSR) is introduced as a tool that clinicians and family members can utilize to track emergence...
and identify various benchmarks of the recovery process (Giacino & Kalmar, 2004; http://www.tbims.org/combi/crs/CRS%20Syllabus.pdf). A case example is discussed to demonstrate the use of the scale and its relationship to other treatment strategies. Lastly, a focus on future Life Care Planning is explored with an emphasis on caregiver education to optimize the quality of life for individuals with disorders of consciousness.

**Secondary Complications**

According to the Centers for Disease Control and Prevention (n.d.), traumatic brain injury related hospitalizations have increased 25% for people ages 45 and older. It is certain that individuals with disorders of consciousness will have prolonged hospital stays with lifelong care needs that continue after discharging from the hospital (Cifu, Kaelin, & Wall, 1996).

Numerous complications include a high risk of deep vein thrombosis, contractures, pressure sores, weakness and impaired mobility (Pangilinan & Kelly, 2016). These complications are due to an overall decrease in opportunities for functional mobility secondary to prolonged bed rest (Rocca et al., 2016). It is crucial to combat these secondary complications early on in recovery with intense therapy and mobility. Further, this type of therapy can optimize progression towards maintaining an active quality of life while decreasing the risk of a sedentary lifestyle. The road to recovery extends beyond hospitalization and requires extensive caregiver education to optimize the quality of life for these individuals. The long-term care is extensive including new physical demands, environmental modifications, and changes in the roles of caregivers. Individuals can participate in a high-intensity rehabilitation program to start early mobilization to prevent these secondary complications and provide extensive family education to ease the transition back to home (Rocca et al., 2016).

**Disorders of Consciousness**

Consciousness is defined as having the present knowledge or perception of one’s self-acts and surroundings (Zeman, 2001). After suffering a severe brain injury these acts of awareness are disrupted and result in alterations of wakefulness or consciousness that impair one’s ability to interact with the surrounding environment (Zeman, 2001). The different states or disorders of consciousness are coma, vegetative, and minimally conscious.

When individuals are in a coma, there is no presence of sleep-wake cycles, and when an external stimulus is provided, there is no evidence of eye opening. At this state, all behavioral responses are reflexive with no evidence to support cognitive mediated actions (Gossseries et al., 2011). These individuals require extensive physical demands with transfers and bed mobility to minimize the risk of pressure ulcers. Equipment needs include Hoyer lifts and wheelchairs, to minimize the risk of injury to the individual and caregiver. The focus for these patients is to incorporate a long-term range of motion and stretching program to minimize the risk for future contractures. Out of bed activities should be emphasized as tolerated to improve arousal and promote upright posture to decrease endurance deficits (Turner-Stokes, Pick, Nair, Disler, & Wade, 2015).

The vegetative state is defined by a person’s eyes opening with a generalized motor response to all external sensory stimuli. A presence of intermittent wakefulness with inconsistent sleep/wake cycles drives the arousal system. At this state, there is still no command following or verbalization. The absence of behaviors that typically accompany conscious awareness of one’s environment is evident. An environment that promotes arousal best suits an individual at this stage. Introducing familiar objects, former pictures, an individual’s personal clothing, or favorite music are examples of strategies that can improve arousal at this level of care.

An awareness of one’s self and the environment is described as a minimally conscious state. A localized motor response occurs when a sensory stimulus is presented (Gossseries et al., 2011). The minimally conscious state may also include periods of arousal throughout the day, comprehension of simple sounds, manipulation of objects, and early start of communication. Individuals at this stage should be engaged with their environment as much as possible to improve following instructions, basic activities of daily living, and start functional mobility as able. Individuals at this point should be participating in daily therapy programs to maximize this state of recovery (Turner-Stokes et al., 2015).

Despite the clear distinctions between the disorders of consciousness, the frequency of misdiagnosis is high. The interpretation of behaviors is highly subjective, and studies have found that 40% of individuals with a disorder of consciousness were misdiagnosed (Schnakers et al., 2009). This inaccuracy leads to confusion within families, inaccurate treatment strategies, and poor progression with therapy programs. It is important for clinicians who recognize the different criteria for each state to introduce the appropriate treatment, and set realistic goals to improve the quality of care.

**Rehabilitation: High Intensity, Early Mobility**

Individuals with disorders of consciousness need high-intensity rehabilitation and early mobilization. This level of care is warranted to combat the long list of secondary complications that accompany immobility due to the high severity...
of this type of injury. Contractures, pressure sores, heterotopic ossification, deep vein thrombosis, pulmonary emboli, and spasticity are some of the most prominent complications that interfere with lifelong immobility. Out of bed tolerance, frequent weight-bearing activities, standing frame sessions, and aggressive exercise programs reduce the risk of these secondary complications (Ginny & Livingston, 2015). Early introduction of mobilization in recovery can decrease the number of complications and facilitate an easier transition into a home environment. Once home, families can focus on improving their loved one’s quality of life and maintaining gains achieved in early recovery.

**Coma Recovery Scale (Revised) (CRSR)**

A tool that can be utilized with individuals with disorders of consciousness is the CRSR (Giacino & Kalmar, 2004; http://www.tbims.org/combi/crs/CRS%20Syllabus.pdf). The scale consists of 25 items arranged in a hierarchy with six subscales. Points are scored for the presence or absence of the desired motor behavior as a sensory stimulus is presented. The maximum score is 24. Higher scores indicate cognitively mediated behaviors. Low scores indicate reflexive activity.

The CRSR can be used to assist with differential diagnosis, prognostic assessment, and treatment planning in individuals with disorders of consciousness (Giacino & Kalmar, 2004). The tool can pick up the small yet meaningful changes that are not detected with standard inpatient rehabilitation outcomes such as the functional independence measure. Detecting changes in recovery allow for targeted treatment strategies to be implemented improving mobility. It is a comprehensive tool to track behaviors that may demonstrate emergence from an alerted state of conscious and should be taught to caregivers to track emergence in all stages of recovery. Furthermore, utilization of this tool across the continuum of care allows for improved communication between all healthcare providers to adequately address the needs of the individual.

**Case Study Example**

This case study is an example of a young individual who suffered a disorder of consciousness. The road to recovery is presented including treatment strategies, progression in therapy, and emerging behaviors tracked by the CRSR.

The individual is a 27-year-old male who had no significant past medical history. He was involved in a motor vehicle incident and admitted to the emergency room. He was unrestrained and was ejected from the car and found unconscious by a bystander.

A computerized tomography scan at the hospital revealed multiple severe brain injuries including bilateral subdural hematoma, bilateral subarachnoid hematoma, bilateral interventricular hemorrhage, and a global diffuse axonal injury. There was a concern for brainstem involvement. Orthopedic injuries included a right clavicle fracture, left ankle intra-articular fracture, and left calcaneus fracture. The plan of care included non-weight bearing on the left lower extremity. Hospital complications included pneumonia and pulmonary emboli. He was described as being in a vegetative state and was admitted to inpatient rehabilitation once he was medically stable.

Initial physical therapy examinations determined he was dependent for all functional mobility tasks and activities of daily living. Although non-ambulatory, he had the full range of motion of all extremities without any presence of spasticity. His arousal level was impaired and was able to maintain his eyes open less than 25% of the time. There was no demonstration of command following, no purposeful tracking, and no awareness of his environment. The initial coma recovery scale (revised) score was five out of 24.

Physical therapy interventions for the first week included both static and dynamic sitting balance activities, out of bed activities to improve arousal, command following tasks, and visual scanning activities that emphasized familiar faces and pictures from the past. Object manipulation tasks were completed with simple, familiar objects. He demonstrated improved initiation, arousal, and command following with interventions. Coma recovery scale (revised) scores after the first two weeks were 10.

Early goals for rehabilitation were to promote improved endurance and tolerance to everyday tasks. An environment was provided that promoted the familiar day to day tasks to elicit emergence, including getting out of bed, daily hygiene, sitting balance activities when appropriate, and frequent opportunities to interact with his environment.

After two weeks of inpatient rehabilitation were completed, his weight bearing restrictions were...
removed. This was the turning point in his rehabilitation stay. The focus shifted to intense functional mobility. Progress continued to improve for the next three to five weeks with emphasis on ambulation and standing balance activities. Treatments focused on multiple forms of ambulation, including over ground walking, body weight support training, and non-supported gait training to elicit cognitive mediated balance reactions. He required moderate assistance for all mobility tasks. At this point of recovery, he displayed signs of frustration, decreased insight into deficits, and was easily distracted in a high stimulation environment. Coma recovery scale (revised) score after the first five weeks was a 22.

The final week of his stay, the focus targeted prior level of function tasks and preparing for discharge. Higher level balance activities and community outings to improve attention in an open environment ensued. He was discharged home with supervision provided by his family. His final coma recovery scale (revised) score was 23 out of 24.

**Caregiver Education and Support**

The previous case demonstrates an example of the progression of treatment strategies guided by the coma recovery scale (revised) to track progress and improve interaction with an individual's environment. The individual's parents were present throughout the inpatient rehabilitation stay and were given the opportunity to share in the decision-making for their son. The main goal for the family was to improve his walking ability because they were unable to assist physically. At discharge, they were the sole providers of care due to the patient's long-standing cognitive deficits, especially with problem-solving and safety awareness. They were given the opportunity to modify the living environment per the therapist's recommendations to optimize a safe discharge.

Caregiver education and support are crucial at all stages of recovery of individuals with disorders of consciousness. Caregivers must take on the role of the advocate, therapist, medical provider, and sole support personnel throughout the recovery process. Shared decision-making between healthcare providers, Life Care Planners and caregivers allow for improved quality of life. The coma recovery scale (revised) should be used with caregivers to track progress and provide benchmarks for their loved one's recovery.

**Summary**

High-intensity rehabilitation and early mobilization therapy are indicated for individuals with disorders of consciousness. With the complexity of traumatic brain injuries, it is important to provide this type of environment to prevent secondary complications. Inpatient rehabilitation programs provide an optimal environment for around-the-clock and strict monitoring of adverse reactions to treatment. A specialized healthcare team can make adjustments as needed to utilize the time spent during therapy sessions to maximize goals for functional gains.

Family input and prior level of function drive the specific therapy goals. This approach allows for shared decision-making in an individual's care which in turn improves outcomes and patient and family satisfaction. The coma recovery scale (revised) should be administered to track signs of emergence no matter how small the gains may seem. The need for high-intensity rehabilitation and early mobilization is considered to be a standard of care for individuals with disorders of consciousness. It is important to recognize that recovery for individuals with disorders of consciousness will require lifelong care planning at different stages of recovery. Healthcare providers need to identify proper treatment strategies to minimize complications and emphasize improvement in overall quality of life.
REFERENCES


JORDANA LOCKWICH, DPT, PT

Jordana Lockwich works full time as a Physical Therapist at University of Pittsburg Medical Center Mercy Hospital in inpatient rehabilitation on the traumatic brain injury unit in Pittsburgh, Pennsylvania. She is the traumatic brain injury clinical mentor for the neurological residency program as well as a clinical instructor for the Doctor of Physical Therapy students from multiple graduate programs. Dr. Lockwich is also an adjunct clinical faculty member at the University of Pittsburgh for the Doctor of Physical Therapy program and assists with the neurological rehabilitation courses. She graduated with her doctorate in physical therapy from the University of Pittsburgh in 2010. Her special interests include treatment of traumatic brain injury patients as well as management of persons with disorders of consciousness.
Introduction

Concussions have become a major public health concern (Moser, 2007; Wiebe, Comstock, & Nance, 2011). Although female sports participation is at an all-time high, the majority of concussion research to date has focused on males (Arnold, 2014). This is the case despite the fact that females experience concussions at a higher rate than males and concussion symptoms can be stronger and last longer in female athletes (Covassin, Elbin, Crutcher, & Burkhart, 2013; Dick, 2009; Noble & Hesdorffer, 2013). This review covers the prevalence of sport-related concussions in the United States, describes emerging research showing that males and females respond differently to a concussion, and provides an overview of ways to test for deficits after a concussion. The goal of this review is to shed light on sex-specific balance differences after mild traumatic brain injury and to bring professionals working in the Nurse Life Care Planning community into this conversation to enhance the healthcare of future patients.

Defining mild traumatic brain injury

A traumatic brain injury (TBI) is due to a hit to the head causing the brain to rapidly move back and forth (Centers for Disease Control and Prevention [CDC], 2015)—an injury that accounts for 30% of injury-related deaths every year (Faul, Xu, Wald, & Coronado, 2010). The primary

KRISTEN N. SCHLEICH, BS,
DONNA M. DUFFY, PHD,
CHRISTOPHER K. RHEA, PHD

Using Balance Testing to Better Understand Sex Differences After Mild Traumatic Brain Injury
cause of a TBI is a fall (40.5%), followed by unintentional blunt trauma (15.5%), motor vehicle accidents (14.5%) and assaults (10.7%). Traumatic brain injuries are rated on a scale from mild to severe, with the mild form (mTBI) being the most common. An mTBI is synonymous with the term concussion and is described as mild because it is not life-threatening at the time of the injury (Blennow, Hardy, & Zetterberg, 2012). While mTBIs occur in a variety of environments, an estimated 1.6 to 3.8 million sport-related concussions are reported each year in the United States in athlete populations (Daneshvar, Nowinski, & Cantu, 2011). These sport-related concussions typically occur from player-to-player contact, yet contact with equipment and a surface also contribute to many concussive events (Zuckerman, Kerr, Yengo-Kahn, Wasserman, & Covassin, 2013). Thus, understanding the etiology of an mTBI, as well as factors that affect recovery may help the Nurse Life Care Planning community in the course of care.

When the brain suffers a jolt or sudden movement, tiny lesions or tears in the hemispheres occur resulting in symptoms such as balance deficits, nausea, headaches, and dysfunction in complex cognitive functioning, including reductions in mental speed, concentration, and overall cognitive efficiency (Blennow et al., 2012). Neuroscientists have found that a temporary, but complex cascade of neurometabolic processes happens following a concussion that can affect brain function for days to weeks post-injury (Giza & Hovda, 2001). While concussions are typically associated with short-term motor or cognitive dysfunction, long-term dysfunction is also reported (Ingriselli et al., 2014). There are two general types of behavioral effects that result from concussions: 1) impairment of the specific functions associated with the direct impact to that area of the brain (coup) or opposite side of the brain (countercoup) or 2) more generalized impairments due to widespread trauma from the injury. Severe and repeated concussions can lead to worse conditions, including a slower recovery and prolonged impairment in acute and chronic motor and cognitive dysfunctions. The risk of repeated concussion is greatest in the first seven to ten days after return to play (Noble & Hesdorffer, 2013). This is due in part to the heightened sensitivity to perturbations following the initial head trauma, which increases athletes’ vulnerability to post-concussion syndrome (PCS) (Blennow et al., 2012; Kemp, Patricios, & Raftery, 2016).

**Sex differences after a concussion**

While females account for fewer TBIs than men, the number of female TBIs is on the rise (CDC, 2016). With Title IX as part of the Equality in Education Act of 1972, there has been a significant increase in women’s participation in sport over the past few decades (National Coalition for Women & Girls in Education, 2012). The National Collegiate Athletic Association (NCAA) has reported an 80% increase in female sports participation between 1988 and 2004, while men’s sports only increased 20% during that period. With the increase in sports participation, especially collision and contact sports, comes an expected increase in sport-related concussions (Covassin et al., 2013). Despite the increase in female athlete participation, most concussion studies focus on males or a combined male/female population without recognition of sex differences between males and females. However, emerging data suggest that females experience concussions differently than males (Arnold, 2014; Covassin et al., 2013; Dick, 2009; Noble & Hesdorffer, 2013). To understand how women are specifically affected by a concussion, several epidemiological studies have been conducted. In the collegiate athlete setting, approximately 11.4% of women athletes will experience a concussion comparative to 7% in men (Noble & Hesdorffer, 2013). The higher percentage may be due to multiple confounding biological differences that separate males and females. Females have differing hormonal, neuroanatomical, and cerebrovascular characteristics such as higher blood flow and increased levels of glucose metabolism, exacerberating the negative effects following a concussion compared to male counterparts (Covassin et al., 2013). In soccer, general trends show that females tend to have a larger head-to-ball ratio compared to males, making females more susceptible to faster acceleration and displacement after heading the ball (Arnold, 2014).

A review by Dick (2009) suggested that sex is an independent predictor of brain injury. That is, evidence showed that females experience worse traumatic brain injury outcome compared to males. Females were 1.57 times more likely than their male counterparts to experience poorer outcomes after a concussion, including severe disability. Dick (2009) also highlighted a greater cognitive impairment, specifically in simple and complex reaction times, in female athletes compared to males. Females have also been suggested to be more likely to report more concussion symptoms, and higher severity of those symptoms resulting in more accurate concussion symptom reporting compared to their male counterparts (Arnold, 2014; Covassin & Elbin, 2011). Covassin and colleagues showed that females reported a longer time off from sports to recover than male counterparts. Specifically in soccer, female soccer players took an average of nine days to return compared to six days in male populations (Covassin, Moran, & Elbin, 2016). The researchers showed the same trend in basketball, with women taking an average of seven days to return while males took only an average of five days to recover. The longer recovery period may be explained by differences seen in symptom reporting. If women are reporting both a higher number of symptoms and more severe symptoms, it could equate to more time needed before returning to play to ensure complete recovery. Males report less total number of symptoms and severity of symptoms leading to less recovery time before returning to play. Therefore, current data suggest that males and females should be assessed by sex-specific return-to-play guidelines taking into account both differing symptomology and recovery time patterns.

Covassin and colleagues have also shown differences between male and female...
Balance assessments

Maintaining upright stance requires the integration of the visual, vestibular, and somatosensory systems, which could be affected after head trauma. Balance dysfunction is one of the cardinal symptoms following a concussion, typically resolved within three to five days post-injury (Buckley, Oldham, & Caccese, 2016). However, if an athlete returns to play before complete recovery, it could put them at a higher risk for another concussion. Assessments of balance are recommended before the season and these data are commonly used for comparison of post-concussion balance behavior. The authors are unaware of any research examining baseline balance assessments prospectively relative to concussion risk. In any case, balance assessments have been recognized as an integral component of evaluation after a concussion with various mechanisms of assessing in the general sport and clinical settings (McCroty et al., 2013; U.S. Department of Veterans Affairs Department of Defense, 2016).

Balance assessments fall into one of two categories: subjective assessment or objective assessment. Subjective assessment relies on the clinician to rate a person’s balance ability typically based on watching the person in a series of static balance or walking tasks. This method requires a set of guidelines that the clinician must follow to determine a person’s balance ability. Subjective assessments are valuable in the clinic or on the sideline because they typically require little or no equipment and they are relatively quick. However, they do rely on the clinician’s ability to judge a person’s balance congruent with the guidelines and for all clinicians to assess balance in the same way. This potential variation can lead to inconsistencies within and between clinicians. On the other hand, objective assessment is typically conducted with a machine (e.g., force plate or smartphone), so the reliability between test assessments is increased.

One of the most common subjective methods of balance assessment is the balance error scoring system (BESS) test. The BESS test was designed as a cost-effective way to assess athletes’ balance ability, developed by Kevin Guskiewicz and colleagues (Guskiewicz, 2011; Riemann, Guskiewicz, & Shields, 1999). The BESS uses three stances (single leg, double leg, and tandem) on two surfaces (hard and foam surfaces), leading to six conditions. Participants are instructed throughout each stance to place their hands on the top of their iliac crests and when their eyes close, the 20 seconds of that particular trial begins (Guskiewicz, Ross, & Marshall, 2001; Riemann et al., 1999). If the participant moves from the starting position with any of the following movements, an error is counted: (1) removing hands from the hips, (2) opening the eyes, (3) taking a step, (4) abduction/flexion of the hip beyond 30 degrees, (5) lifting the heel or forefoot off the ground, or (6) remaining out of the beginning position for more than five seconds. After all stances are completed, errors are added up, giving the clinician a total error score and subjective measurement of balance capabilities.

When administering the BESS test one day after a reported concussion, there is an average of four errors on a firm surface and 13 errors on a foam surface in a concussed athlete while a control group averages only two errors on a firm surface and six errors on a foam surface (Riemann & Guskiewicz, 2000). By day five, a concussed athlete averages three errors on a firm surface and eight errors on a foam surface. As an athlete’s neurological system returns to normal in days following a concussive event, the average errors in each stance decrease, demonstrating balance ability that matches baseline scores (Riemann & Guskiewicz, 2000). However, the BESS has been reported to have low reliability due to between tester subjectivity in how errors are counted (Chang, Levy, Seay, & Goble, 2014; Hunt, Ferrara, Bernstein, & Baumgartner, 2009). Also, after multiple administrations, a practice effect can occur (Chang et al., 2014; Hunt et al., 2009). Therefore, objective methods of balance assessment may be a better way to identify balance dysfunction after a concussion over subjective methods that could have between- and within-rater reliability issues.

Objective assessment removes subjectivity by using a machine to measure a person’s balance ability. This can be done by tracking a person’s center of pressure (COP), which is the location of the average pressure exerted by the feet on the ground. Measuring the COP over
time provides an assessment of postural sway. Increased postural sway relative to a baseline test or normative data is associated with postural instability, which can occur after head trauma (Chang et al., 2014). Force plates are commonly used to measure COP movement, but have traditionally been confined to the laboratory due to their high cost and need to be in controlled environments (e.g., level surface with low vibration). However, the development of more robust portable force plates provide an avenue for balance testing in a wider variety of settings and could increase the ecological validity of balance assessment.

For example, Dr. Daniel Goble and colleagues have developed a portable force plate that overcomes previous limitations (Chang et al., 2014; O’Connor, Baweia, & Goble, 2016). The Balance Tracking System (BTrackS; San Diego, CA https://balancetrackingsystems.com/) consists of a portable force plate and software designed to objectively test postural control in a laboratory or field-based setting. The testing consists of three 20 second static stance trials with the eyes closed and feet shoulder width apart. The software records the average path length of the COP during the three trials and archives it for comparison in case a concussion was to occur in the future.

### Other concussion assessment tools

Historically, concussions have challenged clinicians and researchers due to the subjective symptoms and vague knowledge that could be obtained to make appropriate assessment and treatment decisions. From a diagnostic perspective, one of the perplexing issues with traumatic brain injury is misdiagnosis because effects of the sustained injury are not characterized by obvious neurological signs or abnormalities when looking at a brain in a computerized tomography (CT) or magnetic resonance imaging (MRI) scan. Magnetic resonance spectroscopy (MRS) is the only medical instrument as of now that has the potential to diagnose a TBI accurately. Acute impairment is often associated with injury to the frontal and temporal lobes, where the brain is most susceptible to TBI and concussions.

Therefore, a wide variety of tools and assessments have been created to objectively measure behavior in hopes of increasing the diagnostic accuracy after head trauma.

There has been an effort to create a more standardized screening to reduce the amount of uncertainty when assessing a potential concussion (Guskiewicz et al., 2013; McCrea et al., 1998). Two popular assessments are the Sideline Concussion Assessment Tool (SCAT, http://bjsm.bmj.com/content/47/5/269.full.pdf) and Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT, https://www.impacttest.com). Both include cognitive and motor assessments to quantify behavior associated with head trauma. One advantage to using one of these assessment tools is that they can also act as a preseason evaluation, potentially screening out athletes who have existing head trauma if appropriate normative data are available for comparison.

### Deciding to test before the season or to rely on normative data

Having access to evaluations for each athlete before the start of a season is recommended to make concussion assessment easier and safer (Wojtys, Hovda, Landry, Boland, & Lovell, 1999). There is a wide disparity between individual athletes in regards to their performance on memory, attention, concentration, and motor control. Preseason testing offers a baseline standard, unique to each athlete, giving a clinician a measure of performance prior to the head trauma. The preseason scores can then be used for comparison if an athlete is assessed following a suspected concussion, allowing the medical staff to accurately see the disparity between non-concussed behavior and concussed behavior for that athlete in order to make appropriate return-to-play decisions (McCrea et al., 1998). Individual preseason performance has the greatest clinical accuracy for interpreting post-injury results. However, individual baseline assessment does come with assumptions.

Baseline testing is vulnerable to athlete manipulation by intentionally performing poorly on a baseline concussion test, which is referred to as “sandbagging”—significantly lowering the baseline scores to avoid being benched should a concussion occur. Sandbagging acts as a threshold buffer, dropping the minimal score an athlete needs to obtain to return-to-play under safe measures, thus decreasing the difference between typical performance and possible motor and cognitive deficits following a concussion. There are natural declines in motor and cognitive testing scores following a concussion, so the lower score an athlete can establish as their baseline or “normal”, the greater the possibility of returning to play before full healing has occurred. Much attention has focused on assuring the integrity of baseline tests by establishing “red flags” as indicators of poor performance, typically two standard deviations below a normative mean, which alerts testers of poor performance (Erdal, 2012). However, Erdal (2012) suggests that athletes seem to still be able to sandbag without detection. Erdal intentionally looked at the motivations and strategy behind successfully sandbagging without reported “red flags”. It was found that eight athletes out of a group of 75 undergraduate athletes were able to purposely sandbag their baseline testing by reporting using less purposeful faking strategies, which would typically facilitate errors. This suggests that athletes need significant motivation, instruction, and expertise with specific testing to effectively sandbag, which can be the case if the same baseline tests are given season after season (Erdal, 2012).

To steer away from problems of sandbagging and time commitment of individual baseline testing, another option to detect cognitive or motor deficits is to use a normative database made up of scores from numerous athletes participating in the same task. Although recent research has concluded that both baseline comparisons and normative database comparisons methods have a similar reliability rate in identifying sport-related concussions, majority opinion continues to advocate for individual baseline comparison.
for specificity and increased accuracy (Schmidt Register-Mahlik, Mihalik, Kerr, & Guskiewicz, 2012; Zimmer, Marcinak, Hibyan, & Webber, 2014).

Conclusion

The major goal of this paper was to highlight the emerging role that sex has in concussion testing and management—a research area that is underrepresented. The authors hope that describing balance tests and other ways to assess the effects of concussion with clinicians will result in the acknowledgment that males and female may respond differently to head trauma. For professionals in the Nurse Life Care Planning community, the acute and chronic effects of concussions may be experienced on a greater scale as researchers continue to investigate how sex influences the symptoms and acute and chronic outcomes of concussions. As researchers develop a stronger understanding of the effects of head trauma, and as communication between researchers and clinicians continue to grow, future patients will benefit from enhanced healthcare.

REFERENCES


Noble, J. & Hesdorffer, D. (2013). Sport-related concussions: A review of epidemiology, challenges in diagnosis, and potential risk...
KRISTEN N. SCHLEICH, BS
Ms. Schleich is a MS student in the Department of Kinesiology at the University of North Carolina at Greensboro (UNCG). Ms. Schleich’s research focuses on concussion assessment and management in female athletes.

DONNA M. DUFFY, PHD
Dr. Duffy is the Program Director for the Program for the Advancement of Girls and Women in Sport and Physical Activity, which is housed in the Center for Women’s Health and Wellness at University of North Carolina at Greensboro. Dr. Duffy’s research focuses on neuromotor and neurocognitive assessment before and after concussions in female athletes. Dr. Duffy’s work has been funded by the Women’s Football Foundation.

CHRISTOPHER K. RHEA, PHD
Dr. Rhea is an Associate Professor in the Department of Kinesiology at University of North Carolina at Greensboro and his primary research interest is the control of gait and balance. Dr. Rhea’s research team is exploring novel ways to quantify a person’s movement ability by using smartphone and virtual reality technology as assessment and rehabilitation tools. Dr. Rhea’s research has been funded by the Department of Defense, the US Navy, and the Women’s Football Foundation.
Introduction
Traumatic brain injuries (TBIs) occur at epidemic rates with annual estimates in the United States exceeding 1 million (Faul, et. al. 2010). Annually, over 275,000 people with TBIs are hospitalized and over 52,000 die from their TBI (Faul, et. al. 2010). Roughly 75% of all TBIs are classified as mild in severity (Centers for Disease Control and Prevention, n.d.; Gamboa, 1994). These individuals show a very good prognosis with the vast majority returning to independent living and competitive employment (Fabiano & Daugherty, 1998; McCrea, 2008). However, given the complexity of changes in neurocognitive functioning in concert with changes in psychosocial and behavioral functioning, these individuals can present as challenging cases when developing the Life Care Plans. Challenges to health care providers include issues related to accurate diagnosis, treatment plan development and compliance, and employment.

While the majority of those who have incurred mild traumatic brain injuries (MTBIs) will return to work, one-third will experience difficulties such as reduced productivity, frequent job changes, and lowered levels of responsibility that often culminate in considerable costs to businesses (Gamboa, 1994; McMahon & Flowers, 1987). The estimated economic costs related to TBIs are between $48.3 billion to $76.5 billion annually ($63.4-$79.1 billion in 2013 dollars) (Corso, Finkelstein, Miller, Fiebelkorn, & Zaloshnja, 2006, 2015; Ma, Chan, & Carruthers, 2014). One way to reduce these staggering costs is for rehabilitation professionals to improve their understanding of, and ability to, efficiently rehabilitate persons with MTBIs. Delayed diagnosis can result in a greater exacerbation of symptoms due to the development of psychological problems (Clements, 1997). The purpose of this article is to provide an overview of rehabilitation following MTBIs. Emphasis includes the contributions of neuropsychological assessment to the rehabilitation process, the types of rehabilitation services to employ for persons with MTBIs, and the critical role of vocational rehabilitation.

Definition and Clinical Features
The two parameters utilized to
establish the severity of TBIs include the depth of alteration in mental status and the length of disrupted mental status (Fabiano, 2016). The standard for measurement of the depth of alteration in mental status is the Glasgow coma scale (GCS) (Balestreri, et al., 2004; Teasdale & Jennett, 1974). In brief, the GCS assesses three categories of functioning: spontaneous eye opening, best verbal response, and best motor response. The grades of the three categories are from a low score of one to four points for spontaneous eye opening, one to five points for best verbal response, and one to six points for the best motor response. The resulting GCS scores range from three, for those who are entirely unresponsive, to 15, for those who are fully oriented and capable of following simple commands (McCrea, 2008). Based upon the GCS rating, persons with a GCS of 13 to 15 have sustained a MTBI. Scores ranging from 9 to 12 are considered moderate in severity. Those with a GCS at or below eight have a severe TBI (Teasdale & Jennett, 1974).

The second parameter involves the length of disruption of mental status. The two measures include loss of consciousness (LOC) and period of post-traumatic amnesia (PTA). Post-traumatic amnesia includes the period in which the production of memories is disrupted from the impact until the retention of active memories is restored (Levin, O'Donnell, & Grossman, 1979). Stein & Spettell (1995) indicate that those who demonstrate a LOC at 20 minutes or less and a period of PTA of less than 24 hours meet criteria for MTBI. Those who have LOC of 30 minutes to 24 hours and/or PTA of one to seven days are considered moderate in severity (McCrea, 2008). Those who have LOC exceeding 24 hours and/or PTA exceeding seven days have sustained a severe TBI (McCrea, 2008).

There are several alternative measures to the GCS. The full outline of unresponsiveness (FOUR) is a coma scale that offers promise. The FOUR scale is used to assess patients incapable of providing a valid verbal response due to intubation and also offers additional brain stem measures (Wijdicks, Bamlet, Maramatton, Manno, & McClelland, 2005).

### Common Symptoms Associated with Mild Traumatic Brain Injury

It is commonly understood and well documented that a significant number of the individuals with MTBIs will have continued symptoms well beyond the first several days from the time of the accident (Alves, Macciocchi, & Barth, 1993; Dikmen, Machamer, Winn, & Temkin, 1995; Fabiano & Daugherty, 1998; McCrea, 2008; Stoler & Hill, 2013). Reductions in cognitive functions including attention, concentration, memory, mental speed, and higher-level problem solving are frequently reported (Gasquoine, 1997; McGrath, 1997). Attention processes, often disrupted following MTBIs, permeate all aspects of behavior, often resulting in adverse effects in the ability to demonstrate other important cognitive functions (Wood, 1992). Many of the cognitive changes of MTBIs are nonspecific and may fall into the categories of what have been referred to as disorders of executive functioning (Posthuma & Wild, 1988). These include the capacity for planning and organization, problem-solving skills, mental flexibility, abstract reasoning, initiation, motivation, and regulation of behavior. Alterations in mood, including irritability, reduced frustration tolerance, anxiety, and depression; are frequent sequelae of MTBIs. Survivors of MTBIs who had no previous history often present with symptoms of depression. Advancing research suggests that depression may result from neurochemical changes following TBIs in addition to psychological reactions (Dixon, Taft, 2013).

#### Table 1. Common Symptoms Associated with Mild Traumatic Brain Injury

<table>
<thead>
<tr>
<th>Acute Symptoms</th>
<th>Long-Term Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-traumatic amnesia</td>
<td>Memory</td>
</tr>
<tr>
<td>Nausea</td>
<td>Concentration</td>
</tr>
<tr>
<td>Vertigo</td>
<td>Mental efficiency</td>
</tr>
<tr>
<td>Headaches</td>
<td>Distractibility</td>
</tr>
<tr>
<td>Acute Confusion</td>
<td>Mood swings</td>
</tr>
<tr>
<td></td>
<td>Problem solving</td>
</tr>
<tr>
<td></td>
<td>Attention</td>
</tr>
<tr>
<td></td>
<td>Fatigue</td>
</tr>
<tr>
<td></td>
<td>Irritability</td>
</tr>
<tr>
<td></td>
<td>Depression</td>
</tr>
</tbody>
</table>

Contributions of Neuropsychological Assessment

The primary goals of a neuropsychological assessment usually includes a history of the client's problems, including a review of past and current medical conditions; a description of the client's intellectual, cognitive, sensory, and psychomotor skills; a description of the client's emotional and behavioral status; and a description of family and social support systems and their value to the client. The information contained in the neuropsychological report is intended to facilitate and enhance rehabilitation treatment planning and goal setting (D'Amato & Hartlage, 2008). The main challenge to the neuropsychologist is to extract and integrate all of the above information in order to develop a coordinated treatment plan that incorporates the client's unique neuropsychological profile. Because persons with head injuries constitute a diverse group, the assessment process should be tailored to meet the unique needs of the client and answer the questions most important to the professionals who treat them (Bergquist, et al., 1994; Stoler & Hill, 2013). The assessment and descriptive report should address referral questions pertaining to the client's intellectual, cognitive, sensory, psychomotor, and emotional skills. Questions may be diagnostic in nature, asking for information concerning the nature of the client's symptoms and complaints in terms of their etiology and prognosis (see Table 1). Questions may also be descriptive, inquiring into the characteristics of the client's condition, such as asking how the client's problems are expressed (Lezak, 1983). Referral questions may be prognostic in nature with an estimated forecast of functional outcome. TBI can result in a wide variety of symptoms. Therefore, it is important to evaluate clients using diverse tests that are indicative of a wide variety of abilities and to communicate the results in a manner that is useful for other rehabilitation professionals (Kreutzer, Leininger, & Harris, 1990).

In analyzing and interpreting neuropsychological test results, the neuropsychologist is asked to make three important judgments for each skill area assessed (Kreutzer, Leininger, & Harris, 1990). First, clients' performance within a given functional domain is determined by comparing their performance to that of the normative sample. This comparison should be made to those of a similar sex, age, and level of education (Lezak, 1983). Second, a determination is made about how the client's performance has been affected by the injury. The clinician should use knowledge of common TBI sequelae, reported symptoms, estimation of the premorbid level of ability, and review of academic and vocational history to determine which functional skills are impaired relative to pre-injury status. Lastly, the neuropsychologist estimates whether a client's functioning in each skill area has declined, improved, or remained the same. Information is analyzed by direct comparisons with prior test scores, self and family report, subsequent injury or disease, recovery, medication, emotional and personality data.

Pre-Injury Factors

As part of a presentation over 20 years ago when the topic of MTBI was still in its infancy, a nurse offered the following observation: “It’s not just the injury to the brain, but also the brain that was injured”. She was brilliantly referring to the pre-existing factors, or premorbid personality, of the injured person. Pre-existing factors including depression,

<table>
<thead>
<tr>
<th>Cognition</th>
<th>Executive Functions</th>
<th>Personality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Perception</td>
<td>Complex Attention</td>
<td>Psychiatric Disturbance</td>
</tr>
<tr>
<td>Language</td>
<td>Speed of Processing</td>
<td>Personality Disorder</td>
</tr>
<tr>
<td>Memory</td>
<td>Psychomotor Efficiency</td>
<td>Depression</td>
</tr>
<tr>
<td>Attention</td>
<td>Mental Flexibility</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Concentration</td>
<td>Problem Solving</td>
<td>Impulsivity</td>
</tr>
<tr>
<td>Intellectual Functioning</td>
<td>Initiation</td>
<td>Post-Adjustment Disorder</td>
</tr>
<tr>
<td>Academics</td>
<td>Planning</td>
<td>Feigning/Malingering</td>
</tr>
<tr>
<td>Sensory-Motor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

substance abuse, and personality disorder can manifest symptoms that can often be misconstrued as those of MTBI or aggravate what are otherwise mild and treatable MTBI symptoms. Many studies have implicated a history of substance abuse as exerting an adverse effect on outcome following TBIs (Andelic, et al., 2010; Corrigan, 1995). Studies indicate that nearly 50% of those incurring a TBI had consumed alcohol with up to 45% legally intoxicated at the time of the injury (Andelic, et al., 2010).

Pre-existing health concerns including prior TBI, stroke, a history of heart disease, and various neurological disorders can contribute to the effects of MTBI in a cumulative manner (Cifu, 2014). In fact, the cumulative effects of multiple concussions have given rise to the term chronic traumatic encephalopathy, with many of these patients experiencing long-term chronic changes in cognitive and neurobehavioral functioning (U.S. Department of Veteran Affairs, 2015). There are indications based in part upon post-mortem examinations that cumulative concussions can result in morphological and neurobehavioral symptoms similar to dementia (Fazzini, 2016). The effects of aging following MTBIs can have adverse effects on recovery (Testa, Moessner, & Brown, 2005). As with any bodily injury, those of advanced age often show much greater and adverse effects in neurocognitive functioning following MTBIs. A thorough biosocial history and careful examination of pre-existing symptoms are essential in accurate diagnosis.

Post-injury psychiatric disorders can further challenge the pursuit of an accurate diagnosis. Depression, anxiety, post-traumatic stress disorders, and in more rare instances, conversion disorders and malingering can also be manifested following traumatic events and assumed accidents (American Psychiatric Association, 2013; Perry, et al., 2016). The ability to differentiate the competing explanations of post-injury symptoms places added importance on the neuropsychological evaluation (see Table 3).

In conclusion, the neuropsychological evaluation provides unique and critical information in the overall diagnosis, treatment, and outcome of persons with MTBI/concussions. The comprehensive assessment should address the client’s strengths and weaknesses in functional areas, learning style, psychosocial adjustment and personality style, value system, and ethnic/cultural considerations. Furthermore, it should establish a communicative link with the rehabilitation counselor and other rehabilitation team members.

### Rehabilitation Following Mild Traumatic Brain Injury

Despite the complexity of diagnostic issues related to MTBI/concussions, with appropriate treatment the prognosis for individuals to approach gross levels of premorbid functioning remains favorable. Group studies indicate that 65-90% of those who have suffered MTBIs are able to return to competitive employment (Denny-Brown, 1942, 1945; Fraser, Dikmen, McLean, Miller, & Temkin, 1988; Sander, Kreutzer, Rosenthal, Delmonico, & Young, 1996; Van Zomeren & Van Den Berg, 1985). In contrast, the unemployment figures approaches 70% for those who have suffered severe TBIs (Fabiano, Crewe, & Goran, 1995). Furthermore, rehabilitation efforts need not be excessive or drawn out, such that overall costs are relatively “mild” in contrast to severe injuries if provided in an appropriate manner. This recommended approach is the result of intense scrutiny concerning the efficacy and cost-effectiveness of rehabilitation for those who have suffered TBIs (Hall & Cope, 1995). The question of efficacy becomes even more obscured as much of literature on rehabilitation effectiveness has been obtained on individuals with severe TBIs.

<table>
<thead>
<tr>
<th>Pre-Existing Personality Disorders</th>
<th>Specific Organic Factors</th>
<th>Post-Adjustment Disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance Abuse</td>
<td>Cognitive Impairment</td>
<td>Adjustment Disorder</td>
</tr>
<tr>
<td>Psychiatric Disturbance</td>
<td>Organic Personality Disorder</td>
<td>Post-Traumatic Stress Disorder</td>
</tr>
<tr>
<td>Personality Disorder</td>
<td>Severity of Injury</td>
<td>Depression</td>
</tr>
<tr>
<td>Learning Disability</td>
<td></td>
<td>Anxiety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Malingering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hysterical Reactions</td>
</tr>
</tbody>
</table>

A number of studies have indicated the benefits of rehabilitation for those who have incurred TBIs. Prigatano et al. (1984) found modest levels of improvement in employment and neuropsychological functioning with subjects who suffered severe TBIs and had completed a comprehensive rehabilitation program compared to a control group. Aronow (1987) found that a treatment group of TBI survivors achieved a better cost outcome than those who did not complete rehabilitation. Cope and Hall (1982) found that TBI patients who received rehabilitation following a longer interval from onset required a longer period of rehabilitation services. Hall and Cope (1995) replicated these findings in a separate study of individuals who received early or late admission for rehabilitation. Ruff and Baser (1990) reported findings of significant improvement in memory and attention following completion of a neuropsychological treatment program.

Rehabilitation following MTBI places emphasis on the treatment of cognitive, psychosocial, and behavioral issues. Specific cognitive rehabilitative activities in attention, concentration, memory, language comprehension, and higher-level problem solving provide an appropriate component of rehabilitation (Sohlberg & Mateer, 1989). Instruction and training in compensatory strategies provide the foundation for a portion of rehabilitation efforts.

A significant component of MTBI is the overall reduction in spontaneous mental efficiency and the resultant need for greater emphasis on the adherence to a more structured approach to daily living (Lezak, 1995, 2012; Sohlberg & Mateer, 1989). Strategies for implementing a more structured lifestyle include developing daily routines, creating structured time for rest, and using daily planners and calendars. Other strategies aimed at producing greater mental efficiency include utilizing recording systems (e.g. cell phones) to compile complex exchanges of information (e.g. meetings) and deconstructing robust tasks into more basic components. The development of and compliance with the above mentioned strategies create environmental modifications to reduce distractions, which place greater emphasis on external assistance, thereby reducing overall cognitive demands to manage large amounts of competing information.

Finally, addressing the psychological issues related to alterations in cognitive functions and affective changes is paramount to the rehabilitation process. Many individuals have been undiagnosed or misdiagnosed before coming to the attention of appropriate health care specialists. The process of healing begins by providing education regarding MTBI symptomatology, which allows individuals to accurately understand their symptoms (Aniskiewicz, 2007). Over time, by providing support for psychosocial needs while simultaneously beginning to empower the individual to manage the condition in an adaptive manner, the majority of these individuals are gradually able to regain confidence in their mental abilities, albeit with the assistance of the compensatory strategies learned in therapeutic sessions. Psychological interventions may be augmented with specific pharmacological agents to treat disorders of depression, anxiety, fatigue, and other symptoms. Offering a favorable prognosis to return to many of their premorbid activities can facilitate the ability to assist clients in regaining their confidence (Kay, 1991). The result is a gradual return to many premorbid activities, school, and employment. Certain activities may be more difficult and persons with TBIs will often have to work harder and in a more organized and systematized manner.

The complex interaction between pre-injury psychiatric disorders, injury effects, and post-injury adjustment reactions can often make achieving a successful outcome challenging for a small percentage of MTBI patients. Issues of treatment compliance and unintended iatrogenic effects can interfere with treating otherwise mild changes in neurocognitive functioning resulting in a protracted or poor outcome.

Vocational

Vocational rehabilitation services are a critical component in the rehabilitation process. While the majority of individuals with MTBIs can return to competitive employment, one-third or more will demonstrate reduced productivity resulting in frequent job changes (Gamboa, 1994; McMahon & Flowers, 1987). By working closely with an interdisciplinary team, the vocational rehabilitation counselor can implement many compensatory strategies at the job site as reasonable accommodations under the provisions of the Americans with Disabilities Act (Sachs & Redd, 1993). Employer education can be a crucial component to the process. By providing appropriate accommodations, reinforcing compensatory strategies, and increasing employer education, many of the problems encountered in the workplace can be reduced. As part of vocational rehabilitation plan development, the rehabilitation professional should assess the client’s premorbid employment and occupational history, post-injury neurocognitive status, and psychosocial adjustment to the effects of the MTBI. Developing a premorbid employment history should include a review of educational attainment,
Table 4. Mild to Moderate Severity of TBI – PAR Rehab Services, 1993-1996

Mild to Moderate Severity of TBI
PAR Rehab Services, 1993-1996

<table>
<thead>
<tr>
<th></th>
<th>PIEMP</th>
<th>PIUNEMP</th>
<th>PAEMP</th>
<th>PAUNEMP</th>
<th>PTEMP</th>
<th>PTUNEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Clients</td>
<td>25</td>
<td>9</td>
<td>22</td>
<td>19</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>

PIEMP= Employed pre-injury  
PIUNEMP= Unemployed pre-injury  
PAEMP= Employed at admission  
PAUNEMP= Unemployed at admission  
PTEMP= Employed post-treatment  
PTUNEMP= Unemployed post-treatment


Table 5. Occupational Demands

Occupational Demands

any vocational training, the types of occupations held, and further details regarding an individual’s employment history. Occupational history should include the number and duration of jobs held, specific occupations, and specific job demands and tasks associated with each occupation.

Consultation with rehabilitation professionals including a physician, neuropsychologist, physical therapist, occupational therapist, and speech and language therapist can provide valuable assistance in identifying strengths and weaknesses related to specific occupational demands and developing compensatory strategies enacted as reasonable accommodations at the work site. These professionals can assist in educating employers about the specific characteristics related to MTBIs, as well as provide consultation within the work environment to implement specific compensatory strategies.

The author’s clinic tabulated data related to return-to-work rates following neurorehabilitation with those who had sustained primarily MTBIs from a motor vehicle accident (see Table 4).

The average length of treatment was 10 weeks with the rehabilitation team. Each client had an individually customized program which, depending upon the symptoms, may include physical therapy, occupational therapy, speech and language therapy, physical medicine, psychiatry, social work, and neuropsychology. The average cost was under $10,000, that, even when accounting for 20 years of inflation, indicates that the costs of rehabilitation were often below the costs of repairs to the damaged automobile. The data shows that those who completed rehabilitation had return-to-work rates that were commensurate with employment rates prior to the injuries (76% pre-injury, 73% post-injury). The data also demonstrates the efficacy of rehabilitation in reducing unemployment from 70% to 27%.

As indicated by Fabiano and Daugherty (1998), although return-to-work rates with those who sustain MTBIs are estimated to be as high as 90%, a closer inspection of these individuals indicate higher rates of reduced work performance, reduced job advancement, and reduced job satisfaction. The effects of MTBI are likely most disruptive when work complexity increases, when cognitive and psychosocial functioning demands are greater. Since increased job complexity, as determined by occupational skill level, requires increased cognitive functioning (see Table 5), MTBIs complicate job performance and challenge employability. As such, the level of job complexity based upon skill level likely has a negative correlation with increasing cognitive difficulties posing a threat to successful employment.

Accommodations

Mild traumatic brain injuries are neurologic disabilities and the disability symptoms are frequently cognitive. Specific accommodations involve various systems and strategies designed to reduce, organize, and retrieve information. Structuring routines, providing tasks and deadlines in writing, developing organizational structures, such as filing systems and daily schedule books all assist in reducing the effects of an individual’s neurological disability and are reasonable accommodations. Using recording features on cell phones or laptops to record meetings or other information can assist in the retention of information necessary to perform a job.

Monitoring an individual’s performance, providing corrective actions, and maintaining contact with the employer can assist in the successful retention of employment. The goals are to achieve an appropriate balance between the physical and cognitive demands of a job and the ability of the individual to meet these demands effectively, often with the assistance of accommodations and environmental modifications.

Conclusion

Despite the controversy regarding the diagnosis of MTBI/concussions for over a century, the unfortunate truth is that the disorder exists and occurs at epidemic proportions. The more favorable news is that with an accurate diagnosis, including a comprehensive neuropsychological evaluation and appropriate treatment by an interdisciplinary rehabilitation team that specialize in the treatment of MTBIs, the vast majority of individuals can restore their lives, stabilize their families, and return to many premorbid activities including employment.

REFERENCES


ROBERT FABIANO, PHD

Dr. Robert Fabiano is a licensed psychologist who specializes in the areas of clinical neuropsychology and rehabilitation. Dr. Fabiano completed his Master’s Degree in Rehabilitation Counseling at Southern Illinois University followed by a Doctorate in Counseling Psychology at Michigan State University. He served as Administrative Supervisor at the Rehabilitation Institute of New Orleans, a free standing rehabilitation hospital with specialty units in spinal cord injury, traumatic brain injury, and stroke. He is the founder and Executive Director of PAR Rehab Services, a multidisciplinary mental health clinic in Lansing, Michigan for the past 25 years (www.parrehab.org). He specializes in the areas of clinical neuropsychology and rehabilitation. He has published numerous articles in areas of traumatic brain injury and vocational outcome. He has served as Adjunct Professor at Michigan State University, College of Education and Assistant Clinical Professor in the School of Osteopathic Medicine, and Consulting Clinical Neuropsychologist at Sparrow Hospital, the regional Neurotrauma Center in the mid-Michigan region for the past 25 years. He has provided numerous lectures and class instruction in areas of neuropsychology, intellectual assessment and diagnosis, traumatic brain injury and rehabilitation.

SAMANTHA SHARRARD, BA

Samantha Sharrard earned her Bachelor of Arts degree in Psychology from Michigan State University. Her undergraduate work also includes a specialization in Health Promotion. After graduation, Samantha worked as a psychometrician at PAR Rehab Services in Lansing, Michigan administering psychological and neuropsychological evaluations. At PAR, Samantha worked with a diverse clinical population of children and adults spanning various neurologic and psychiatric disorders including child behavioral and developmental disorders, adult neurologic disorders including traumatic brain injuries, dementia, and strokes, along with mood disorders, personality disorders, anxiety disorders, and occasional somatoform disorders. Samantha also worked as a research lab manager in the Department of Psychology at Michigan State University. To further her academic journey, Samantha is currently pursuing a Masters of Social Work degree from the University of Michigan, specializing in geriatrics. After graduation, she hopes to work as a gerontological social worker to address the concerns of the growing aging population.
Grow your career with FIG!

- Nurse Life Care Planning
- Life Care Planning
- Medicare Set-Aside
- Case Management
- Pre-approved for CNLCP, CLCP & MSCC
- Online & onsite
- Financing available

- Learning
- Mentorship
- Continuing Ed

Shelene Giles, FIG Founder
MS, BSN, BA, RN, CRC, CNLCP, CLCP, MSCC, LNCC

FIGeducation.com
In recent years, music therapy has blazed a trail into the scientific community as an effective intervention to improve language and motor functions in brain injured clients. The American Music Therapy Association ([AMTA], n.d.-a) defines music therapy as “the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program” (para. 1). Music therapy provides “creative, emotional, and energizing experiences”(AMTA, n.d.-a, para. 3) for injured clients. Learning, memory, emotion, and spirituality are elements uniquely affected by music. By playing, listening to, and creating music, patients stimulate multiple areas of the brain simultaneously and utilize many cognitive skills not addressed by other types of therapy.

Research that demonstrates positive outcomes for clients with traumatic brain injury supports the effectiveness of music therapy. Music therapy improves overall physical rehabilitation and also motivates injured clients and their

**Music Therapy for the Brain Injured Client: A Closer Look for the Life Care Planner**

JON LIEFF, MD, JENN CRAIGMYLE, RN, BSN, CLNC, LNCP-C, CLCP
families to become more engaged in the treatment plan. Additionally, music therapy facilitates an outlet for expression of feelings for those who may not be capable of verbally expressing such feelings with language (AMTA, n.d.-b). The aim of this article is to provide a framework for Life Care Planners of how music therapy affects neuroplasticity in the setting of traumatic brain injury.

Neuroplasticity and Traumatic Brain Injury

According to Lieff (2012), neuroplasticity refers to the brain’s ability to change itself throughout life. The brain is constantly making new cells and creating and altering circuits as the brain is exposed to subjective experiences. Neuroplasticity is particularly important in any discussion of traumatic brain injury because it allows the brain to reorganize its neurons and neural connections to compensate for the injury. Traumatic brain injury often results in cognitive, sensory, motor, language, and emotional impairments (Lieff, 2012). Brain-injured clients often experience deficits in psychological, social, and physical functions which directly affect their quality of life and ability to function independently (Lieff, 2012).

Neuroplasticity is key to rehabilitating patients with traumatic brain injuries (Lieff, 2012). Learning experiences are enhanced and more powerful when larger networks and circuits are involved. Adding a physical movement to a learning experience enlarges the neuroplasticity circuit, therefore increasing the power of the learning experience. Since music therapy activates multiple areas of the brain and also encourages physical movement, it is no surprise that the therapy stimulates traumatic brain injury healing (Lieff, 2012).

There are reasons to think that music is even more basic than language in evolution (Lieff, 2013). Some theorize that language evolved from music. Perhaps because of its unique place in evolution, music provides unique ways of stimulating neuroplasticity in the brain. Studies show that some types of learning alter the ability to learn anything else (Lieff, 2013). Music uniquely stimulates many parts of the brain at once, which stimulates a powerful type of learning and neuroplasticity. The experience of music includes cognitive abilities connected with the meaning of songs, emotional reactions, expressive movement, and more. The unique effects of music trigger a type of neuroplasticity that affects other abilities called metaplasticity (Lieff, 2013). Metaplasticity triggered by musical learning and musical experiences appears to increase general brain efficiency. Many aspects of music are extremely powerful, but not yet understood. For example, rhythm has very primal effects on the human nervous system, such that it can help override some of the debilitating effects of Parkinson’s disease (Lieff, 2013).

Application of Music Therapy

In 2011, Congresswoman Gabby Giffords suffered a traumatic brain injury following a gunshot wound injury to the head. She credited music therapy for the ability to overcome aphasia. “By layering words on top of melody and rhythm, she trained her brain to use a less-traveled pathway to the same destination” (Moiose, Woodruff, Hill, & Zak, 2011, para 2). Music therapists collaborated with Ms. Giffords’ medical team and implemented an individualized treatment plan, which ultimately resulted in her regaining speech. Specifically, the use of songs in her music therapy program helped her with word finding.

Music is demanding of cognitive capabilities; it challenges the brain to perform executive neural functions. Accurate timing, control of pitch, constant interplay, and the combination of auditory and motor actions challenge the networks and circuits of the brain to strengthen plasticity. The elements of music affect different parts of the brain, using both the left and right side in two parallel systems, balancing motor and sensory stimulation (Lieff, 2013). Timing in music is thought to be organized in the cerebellum with tonal processing in the right hemisphere; musical imagery in the regions of the frontal lobe; singing in the right temporal lobe; and motor processes in the premotor cortex, supplementary motor cortex, cerebellum, and basal ganglia. Listening and performing music requires the use of both motor and sensory systems in the brain, further strengthening neuroplasticity by triggering multiple brain modalities simultaneously (Lieff, 2013).

One of the biggest challenges during rehabilitation of traumatic brain injury is the recovery of consciousness. Despite being currently debatable, therapeutic modalities such as music therapy are considered important in the recovery of consciousness due to neuroplasticity (Schnakers, Magee, & Harris, 2016). There is a limitation on research in music therapy with disorders of consciousness related to insufficient behavioral measures. Due to this lack of sensitive measurement needed for the population, single subject designs and case reports have been used to report outcomes (Magee & O’Kelly, 2015).

A potential impact of music therapy upon consciousness recovery is suggested to enhance arousal, attention, and mental imagery. One study aimed at evaluating the effect of music therapy on cerebral processing found patients demonstrated

Nursing Diagnoses to Consider

<table>
<thead>
<tr>
<th>Domain</th>
<th>Class</th>
<th>Nursing Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Perception/Cognition</td>
<td>Impaired verbal communication</td>
</tr>
<tr>
<td>5</td>
<td>Communication</td>
<td>Readiness for enhanced communication</td>
</tr>
<tr>
<td>6</td>
<td>Self-Perception</td>
<td>Readiness for enhanced hope</td>
</tr>
<tr>
<td>6</td>
<td>Self-Concept</td>
<td>Risk for disturbed personal identity</td>
</tr>
</tbody>
</table>
increased cerebral response after the music condition compared to the control condition (Castro et al., 2015). Following a music condition, patients demonstrated increased cerebral response upon hearing their first name that was measured using bedside electroencephalographic recording. Event-related potentials were the positive findings that demonstrated the music condition impacted arousal or awareness and had a beneficial effect on cognition (Castro et al., 2015).

Another study measured eye blinks in vegetative state patients following live music. Results yielded a significant increase in eye blinks following the live music therapy intervention when compared to baseline silence, further suggesting an increase in the state of arousal (O’Kelly et al., 2013). Music therapy interventions have produced positive outcomes in rehabilitating gait-related problems, reducing anxiety, depression, agitation, improving mood stabilization, speech production, and sensory perceptions (Hegde, 2014).

Implementing Music Therapy in the Life Care Plan

The client population includes children, adolescents, adults, and the elderly. In addition to patients with traumatic brain injuries, music therapy may benefit those with mental health needs, developmental and learning disabilities, age-related conditions, physical disabilities, and acute or chronic pain (AMTA, n.d.-c).

The cost of music therapy ranges from approximately $53.00 to $200.00 per 30 to 45 minute session (Capital Music Therapy Services, n.d.; Levine Music School, 2016). Client sessions are individualized, and no typical session or treatment plan exists. Treatment sessions can be private or group sessions. Approximately 20% of music therapists receive reimbursement through third-party payers for their services (AMTA, n.d.-d).

Music therapy is reimbursable through Medicare, which acknowledges music therapy through the partial hospitalization program (PHP) under the heading of activity therapy, HCPCS code G0176 (AMTA, n.d.-d). Medicare requirements include the following: the music therapy must be an active treatment, prescribed by a physician, reasonable and necessary for the treatment of the individual illness or injury, goal-directed, and the goal of treatment must include an improvement of the current level of function. At this time, only a few states allow payment through Medicaid (AMTA, n.d.-d).

Searching for a music therapist can be performed online through the American Music Therapy Association under the tab ‘Find a Music Therapist.’ Music therapists can be accessed by name, location, credential type, settings served, and populations served (AMTA, n.d.-e).

Conclusion

The relationship between music therapy and neuroplasticity is believed to yield promising benefits in patients with disorders of consciousness resulting from traumatic brain injury. Typical music therapy interventions consist of live music and offer an experience promoting self-relatable and autobiographical mental imagery which increases states of arousal and awareness. The Nurse Life Care Planner aims to promote health and wellness as a long-term outcome for the client with a traumatic brain injury. Music therapy is a therapeutic modality that will complement the treatment plan of brain injured clients by engaging cognitive functions and providing sensory stimulation to improve neuroplasticity.
REFERENCES


JENN CRAIGMYLE, RN, BSN, CLNC, LNCP-C, CLCP

Jenn Craigmyle is a bachelor’s prepared Registered Nurse with experience as a clinical nurse in neurology and critical care, nursing educator for an ADN school of nursing, legal nurse consultant, and life care planner. She earned her certification in life care planning in 2012 and is the owner of Craigmyle Legal Nurse Services, LLC based out of Southern California. Recently she was appointed as the journal committee co-chair for the Journal of Nurse Life Care Planning.

JONATHAN D. LIEFF, M.D.

Dr. Lieff graduated from Yale College and Harvard Medical, and specialized in psychiatry, geriatric psychiatry and neuropsychiatry. He is a past president of the American Association for Geriatric Psychiatry, the national subspecialty association. As president, he helped found the American Journal of Geriatric Psychiatry. He has published over twenty articles and three books on geriatric psychiatry and high technology, and has lectured widely in geriatric psychiatry and neuroscience.

Dr. Lieff has written a blog since 2012 about neuroscience and studies on mind in nature—Searching for the Mind.com or jonlieffmd.com. He posts daily articles relevant to his blog at Facebook: Searching for the Mind and twitter @jonlieffmd.

Best Online Universities named Dr. Lieff’s website as number 80 of the world’s top 102 online universities for “The Science of Learning: Resources on How our Brains Learn Best,” along with Harvard, MIT, Stanford, and Oxford.
Abstract
Vestibular disorders such as vertigo, impact approximately 69 million people in the United States (Agrawal, Carey, Della Santina, Schubert, & Minor (2009). The symptoms of vertigo have a significant impact on many workers’ ability to remain employed in the occupations before the onset of their vertigo and in the performance of many activities of daily living. When developing a Life Care Plan, it is important to consider the vocational aspects and the activities of daily living of the person’s life. This article reviews the impact of vertigo on a person’s ability to perform activities of daily living and a worker’s ability to perform her/his occupation or other occupations. Many worker trait factors and temperaments may be impacted by the symptoms of vertigo and may impede a worker’s ability to safely return to work. These worker trait factors also provide good data-points to assess areas of activities of daily living that may also be impacted by vertigo. The appropriate employment of medical care, case management, and vocational rehabilitation will have the most effective employment and re-employment outcomes for individuals with vertigo.

Keywords:
Vertigo, Occupations and Vertigo, Vertigo and Work, Vestibular Disorders Activity, Vestibular Rehabilitation Therapy, Employment; Vocational Rehabilitation, Balance, Equilibrium, Life Care Planning

Introduction
Vertigo impacts many workers’ ability to continue to perform their occupation upon its onset. The same abilities and limitations of occupational activities can also be attributed to many of the activities of daily living of a person. Vertigo is more frequent in woman up to the age of seventy (Bisdorf, Bosser,
Vertigo can initially be caused by a blow to the head, an inner ear infection, or can spontaneously occur without a specific cause. Vertigo impacts the individual’s ability to maintain equilibrium or orientation in space. This orientation is maintained by a person’s visual, kinesthetic, and vestibular abilities (American Medical Association [AMA], 2007). Vertigo is a sense of movement that is either subjective or objective. The subjective sense is a result of the movement of an individual, such as moving the head or eyes up or down or from side to side. The objective sense is a result of the movement of the environment, such as an amusement ride or the rocking of a boat on the water. There may be a sense of a whirling motion or a sense of rotation.

Vertigo is not the same as dizziness. Vertigo and dizziness are often terms used interchangeably but they are two separate types of equilibrium impairments with different sources of onset and exacerbation. Dizziness is described as a feeling of light-headedness and perhaps a weakness. A person suffering from vertigo may feel a sense of spinning, pulsation, or a tilting of the visual environment with a change in position of the head or eyes. A person with vertigo has a sense of dizziness along with the false interpretation that the environment is moving, sometimes described as a sense that the floor and/or walls are moving or the surrounding environment is moving. Meniere’s disease and some central nervous system impairments have similar symptoms as vertigo (Vestibular Disorders Association, n.d.-c).

This article will provide an overview of vertigo and focus on the impact of vertigo on a person’s activities of daily living and work activities. The awareness of the impact of vertigo on a person’s activities of daily living and work activities, as measured according to the ability to perform specific worker trait factors and temperaments, may benefit Life Care Planners when evaluating clients with vertigo.

Overview of Vertigo

Vertigo can result from a variety of incidents within the central neurological and inner ear. Vertigo can be caused by head trauma, inner ear trauma, brain tumors, central neurological disorders or viral infections, and diseases that impact the inner ear. There are three basic types of vertigo: spontaneous vertigo, recurrent-chronic vertigo, and positional vertigo.

Spontaneous vertigo occurs when a client has an intense sensation of rotation that is aggravated by head motion and change of position. It is difficult to stand and to walk, and there is a tendency to veer toward the affected side (Vestibular Disorders Association, n.d.). The recurring vertigo symptoms can last from minutes to several hours. Recurrent vertigo can be caused by Meniere’s disease, vestibular migraines, vertebrobasilar transient ischemic attacks, vestibular paroxysmia, orthostatic hypotension, panic attacks (Brownfield, 2002). Positional vertigo is caused by movement of the head and/or eyes. It is the most common type of vertigo. The most common form of positional vertigo is benign paroxysmal positional vertigo (BPPV). It is often caused by a blow to the head that impact the inner ear by impeding the motion of small crystals in the inner ear that promote balance (Woodhouse, n.d.).

Vertigo may include some or all of the following symptoms:
- A sensation of motion either of the person or the environment
- A sensation of disorientation or motion
- Nausea or vomiting
- Sweating
- Abnormal eye movement
- Hearing loss & tinnitus
- Visual disturbances
- Weakness
- Difficulty speaking
- Decreased level of consciousness
- Difficulty walking

These symptoms can be chronic or can be exacerbated with the eye, head, and body motions or elements of the external environment such as lighting, noise, colors, and/or ground and wall contours and patterns (Vestibular Disorders Association, n.d.-b).

Impact of Vertigo on Activities of Daily Living and Vocational Activities

Vertigo can impact a person’s activities of daily living and vocationally from a cognitive, physical, and mental health perspective. Cognitive impairments can impact thinking, processing, and retention of information. The physical impact of vertigo is directly related to maintaining equilibrium, balance, and strength. Additionally, visual perception may be impacted. The mental health impact of vertigo may result in a deficiency in one’s ability to maintain concentration, persistence, and pace along with elements of depression and anxiety due to the equilibrium limitations.

A person’s ability to perform activities of daily living and activities associated
with work may be impacted by the symptoms of vertigo. The limitations caused by vertigo may also have a negative impact on many of the worker trait factors and temperaments associated with occupations. Worker trait factors and temperaments also provide measures to assess one’s ability to perform activities of daily living. When developing a Life Care Plan, consideration to a person’s equilibrium impairments, as a result of vertigo, should be taken into consideration as its impact on the person’s activities of daily living. The Life Care Plan “should include reasonable and appropriate recommendations to improve the status of [an] individual” (Deutsch, Kendall, Daninhiirsch, Cimino-Ferguson, & McCollom, 2006, p. 313). Many activities of daily living are replicated in the work force so the use of worker trait factors and abilities are good data-points to reflect aspects of a person’s life that may be addressed in a Life Care Plan.

Worker abilities are defined as the skill level that a worker may perform. A skilled worker has developed a specific set of skills as a result of education, training, and work performance. Skilled work often requires the worker to make decisions and judgments. A semi-skilled worker has less training and/ or education than a skilled worker and has performed the work long enough to perform the semi-skilled work sufficiently. This type of work does not require complex work or decision-making. An unskilled work involves simple, repetitive type tasks which requires little judgment or decision-making (Field, 1992).

Occupational abilities are defined as “enduring attributes of the individual that influence performance” (National Center for ONET Development, n.d.). These abilities are the aptitudes an individual has to perform tasks either in a worker or personal setting. According to National Center for ONET Development (n.d.), the O*Net database has divided the abilities category of occupational data into cognitive, physical, psychomotor, and sensory abilities. The cognitive domain is described as the “abilities that influence the acquisition and application of knowledge in problem-solving” (National Center for O*NET Development, n.d.). The physical domain is described as the “abilities that influence strength, endurance, flexibility, balance and coordination” (National Center for ONET Development, n.d.). The psychomotor domain is described as the “abilities that influence the capacity to manipulate and control objects” (National Center for O*NET Development, n.d.). The sensory domain is described as the “abilities that influence the visual, auditory, and speech perception” (National Center for O*NET Development, n.d.).

### Worker trait factors are defined as an individual’s

1. interest in an occupation’s content,
2. general educational development in preparation for the occupation,
3. physical demands for the occupations,
4. temperaments for the occupation,
5. aptitude for the occupation,
6. environmental conditions associated with the occupation, and the
7. occupation’s relationship to data, people, and things.

### The aptitudes defined as worker trait factors are

1. general learning ability,
2. verbal, numerical,
3. spatial,
4. form perception,
5. clerical perception,
6. motor coordination,
7. finger dexterity,
8. manual dexterity,
9. eye-hand-foot coordination, and
10. color discrimination


Vertigo does not directly impact the worker trait factors of interest, except when a person loses interest in an activity due to the symptoms of vertigo and general educational development of the person. However, some of the aptitudes associated with occupations and activities of daily living may be affected by vertigo.

Workers with symptoms of vertigo are employed throughout the workforce in occupations ranging from very unskilled work to highly skilled work. Celebrities who have or have had vertigo include (Ranker, n.d.):

- Janet Jackson
- Nicolas Cage
- LeBron James
- Alan Shepherd
- Vincent van Gogh
- Peggy Lee
- Philip K. Dick
- Emily Dickinson
- Kristin Chenoweth
- George Clinton
- David Duval
- Nick Esasky
- Katie Leclerc
- Richard Lugar

This list of celebrities represents a diverse range of occupational abilities and worker trait factors in the performance of their work. These individuals have learned to accommodate their work performance and/or setting to be successful at their job and with activities of daily living. This demonstrates that with proper care and rehabilitation many persons with vertigo can return to work either at their occupation or another occupation and improve their activities of daily living.

### Rehabilitation of Individuals with Vertigo

The rehabilitation of individuals with symptoms of vertigo requires a multi-disciplined approach of medical care, physical rehabilitation, mental health support, and vocational rehabilitation.

### Medical Care & Physical Rehabilitation

Proper diagnosis and treatment of
Vertigo symptoms are essential to rehabilitate persons with vertigo. The underlying causes of vertigo symptoms will help determine the most effective treatment plan for vertigo clients (Djalilian, 2009). In some cases of vertigo, medication is helpful in alleviating some of the symptoms. Prescribed medications include those that address motion sickness, anti-anxiety medications, and medications associated with the treatment of Meniere’s disease. Many of these medications are over-the-counter medications. A physician consultation is advised before taking any type of medication for the effects of vertigo (Cunha, 2016).

The primary physical rehabilitation that is required to overcome or live with vertigo involves the steps to recalibrate the client’s equilibrium through vestibular rehabilitation therapy (VRT) or other equilibrium treatment (Farrell, n.d.-a). Vestibular rehabilitation (VR), “is a specialized form of therapy intended to alleviate both the primary and secondary problems caused by vestibular disorders. It is an exercise-based program primarily designed to reduce vertigo and dizziness, gaze instability, and/or imbalance and falls” (Farrell, n.d. “What is Vestibular Rehabilitation,” para. 1). The intent of the therapy is to allow the client to learn how to compensate for the equilibrium deficits. Vestibular rehabilitation therapy focuses on three primary exercise forms to rehabilitate the vertigo client: a) habituation, b) gaze stabilization exercises, and c) balance training. The purpose of habituation therapy is to help the client to become familiar with and adapt to the symptoms of vertigo. The brain learns new ways to interpret and overcome the symptoms of vertigo by repeated exposure to movements and/or visual stimulation. T Gaze stabilization exercises are used to stabilize the vision of clients with visual problems that causes the field of vision to move about when attempting to read or look around. There are several eye and head exercises that are employed to help bring stability to the client’s visual field.

Balance training is used to support the independence of the person with vertigo. It prepares those with vertigo to adapt themselves, by retraining their central neurological system to compensate the symptoms of vertigo (Farrell, n.d.-a). Some of these exercises are:

- Visual and/or somatosensory cues
- Stationary positions and dynamic movements
- Coordinated movement strategies - movements from ankles, hips, or a combination of both
- Dual tasks - performing a task while balancing

According to Farrell (n.d. -a), these rehabilitation approaches are counter-indicated for clients with Benign Proximal Positional Vertigo (BPPV). This type of vertigo is caused by movement of the head and/or eyes and is caused by an inner ear crystal disturbance. Appropriate rehabilitation for this type of vertigo is particle repositioning head exercises such as the Epley or Semont exercises (Poinier, 2015a). To improve the brain’s compensation process the Brandt-Daroff exercise can be employed. Improving the compensation process shortens the time for the brain to ignore abnormal motion messages associated with BPPV (Poinier, 2015b).

**Mental Health Support**

People who deal with vertigo on a chronic basis may develop some mental health and/or emotional issues associated with the symptoms of vertigo. Many report being frustrated by their inability to do many of the things they used to do either at home, recreation, or work. Those who used to be good multi-taskers find it frustrating that the symptoms of vertigo impair their reaction time and ability to multi-task. Because of the ongoing effects of vertigo, some people prefer to limit their activities and sometimes become reclusive.

The combination of the chronic effects of vertigo and the associated impairment to personal and work activities can lead some vertigo clients to become anxious and/or depressed. Mental health services should focus on encouraging individuals to consistently do their vestibular rehabilitation exercises and to learn adaptive approaches to compensate for the limitations of equilibrium impairments. Vertigo clients should be encouraged to remain engaged in their life within the limitations of the vertigo symptoms to not become isolated from others. In some cases, cognitive behavioral therapy has been found to be helpful for persons dealing with the dizziness, anxiety, and other effects of vertigo (Obermann, Bock, Sabev, Lehmann & Diener, 2015; Whalley & Cane, 2016).

**Vocational Rehabilitation**

Although this section focuses specifically on workers, occupational impairments can be similar to activities of daily living for the worker and unemployed. Many workers with vertigo will require some vocational rehabilitation services to assist in either maintaining employment or seeking re-employment. Although workers may have a transferable skill set, many workers will find that they are unable to perform their occupation and many other occupations as a result of their equilibrium impairments. Individuals with chronic vertigo may need to have ongoing work restrictions or accommodations to be able to possibly return to work. When considering employment or re-employment opportunities for workers with vertigo, consideration should focus on the limitations imposed by the symptoms on the physical, mental health, and environmental aspects of the effects of vertigo.

According to the [Job Accommodation Network](https://www.jan(us)center.org) (JAN) (2011) accommodations for individuals with vertigo may be in the areas of:

- Accessibility and Transportation
- Attendance
- Lighting
- Computer Use
- Medical Treatment Allowance
- Stress

*Note: JAN (2011) is an organization that provides information on workplace accommodations for workers with disabilities.*
Activities and temperaments that may be impacted by equilibrium impairments may fall in the following vocational categories:

- Dynamic Flexibility
- Extent Flexibility
- Gross Body Equilibrium
- Depth Perception
- Field of Vision
- Glare Sensitivity
- Peripheral Vision
- Reaction Time
- Response Orientation
- Performing Varied Duties
- Dealing with Stress

Work environments also impact individuals with vertigo. The instability that is caused by vertigo can make the following work environments dangerous for individuals with equilibrium issues:

- Vibrations
- Exposure to Noise
- Proximity to Moving Machinery
- Exposure to High Places
- Exposure to Electrical Shock
- Exposure to Radiation
- Working with Explosives
- Exposure to Toxic & Caustic Agents

Limitations in these vocational activities, temperaments, and environments affect many unskilled, semi-skilled, and skilled occupations and activities of daily living. In some cases, when job accommodation and/or transferable skills cannot provide a return to the workers own occupation or any occupation, then retraining to a new occupation should be considered.

Some occupations provide for reasonable accommodations that can provide for a safe and productive work for vertigo clients. Key areas to consider with work site and job accommodation is to minimize eye-head movement, accommodate for the false interpretation that one's environment is moving, the visual impairments caused by vertigo, and the impact on the worker's balance. Some simple accommodations can be made to the work site by properly leveling the height of the work surface and sufficient lighting to minimize eye-head motions and provide illumination to the work surface. These accommodations also can be employed in a personal environment and activities. More specific accommodations should be recommended by certified vocational rehabilitation consultants, medical rehabilitation consultants, Life Care Planners, and physicians.

Conclusion

Symptoms and impairments associated with balance and equilibrium are prominent in the United States with more than a third of the population having encounters with balance dysfunction (Agrawal, Carey, Della Santina, Schubert, & Minor, 2009). The symptoms associated with vertigo have impacted many people's ability to perform activities of daily living and for workers to remain in occupations that they had been employed before the onset of vertigo.

The rehabilitation of individuals with symptoms of vertigo require a multi-disciplined approach of medical care, physical rehabilitation, mental health support, and vocational rehabilitation. Life Care Plans for living with equilibrium impairments should take into consideration adequate medical care and rehabilitation services. The use of vocational and medical rehabilitation services and the development of a specific Life Care Plan focused on compensating for the effects of vertigo symptoms, can assist individuals to return to personal and vocational productivity by learning to live with their symptoms and making accommodations for the effects of the symptoms.
REFERENCES


National Center for O*NET Development. (n.d.). The O*NET® Content Model.


DAVID SAN FILIPPO, PHD

Dr. San Filippo is the Chair of the Health Studies Programs in the College of Professional Studies and Advancement (CPSA) at National Louis University (NLU) in Chicago, Illinois. He is the Faculty Advisor for the NLU Student Veterans of America chapter and the Quality Matter Coordinator for NLU’s learning management platform. Dr. San Filippo is also a former Faculty Senate Chair for National Louis University. He also teaches online courses in critical thinking, strategic management, leadership, and ethics. Additionally, he teaches online courses in consciousness studies, death, dying, and near-death experiences. Dr. San Filippo serves as a vocational expert involving workers’ compensation, personal injury, automobile, and social disability matters. He also represents disabled individuals before the Social Security Administration. Dr. San Filippo is a licensed mental health counselor, certified disability management specialist, a Florida qualified rehabilitation provider, and Quality Matters Peer Reviewer. Dr. San Filippo has started five companies related to medical cost containment, vocational rehabilitation services, and software and systems development. He has consulted for organizations in Colombia, South America regarding medical cost containment, human resources development, bereavement, and cost containment software. Dr. San Filippo offers seminars nationally on the topics of international business, online education, death and dying, near-death experiences, and marriage.
CRASHCART - Is your practice experiencing a Code Blue? Revive it with AANLCP’s resource cart. Forms, templates, contracts and resources all at your fingertips.

MASTERMIND SERIES “Getting Down to Business” - A 12 month learning and business development series designed to build, grow and sustain your life care planning practice. This series offers up to 24 CNE’s.

PMIC’S 2016 MEDICAL FEES BOOK - Need 2016 medical cost? Yep, that’s right, we’ve got it!

EBSCO: REHAB REFERENCE / CINAHL - Bump up your plans with research, journals and industry insights.

FIND-A-CODE - Save time and get access to an expansive medical coding and billing resource, now with Anesthesia crosswalk.

DISCOUNTS, DISCOUNTS, DISCOUNTS... We’ve got member only discounts you won’t want to miss, check out #thriftythursdays

MARKETING MATERIAL - Tired of explaining what a life care planner does? Present your practice with high quality and professionally designed marketing materials that get you hired.

OFFICIAL DISABILITY GUIDELINES - Need a comprehensive tool to assess treatment options? Members have access to the most comprehensive and up to date medical treatment guidelines worldwide. Yep it’s included.

Don’t forget our webinars, journals, Lifeline (mentorship), and much, much more.

*Resource access is dependent upon your individual membership type and tier.
We may be all over the map, but we’re intensely focused on brain injury care.

Our comprehensive therapy programs are available in seven centers of excellence across the country. These community-based programs have been producing enduring outcomes for more than 30 years.

Post-Acute Neurorehabilitation • Neurobehavioral Rehabilitation
Supported Living • Day Treatment Rehabilitation

For more information on our programs, please call 888-419-9955 or visit LearningServices.com
Candidates must meet the following eligibility criteria per the application deadline as indicated in the CNLCP® Handbook for Candidates and on the Website: http://cnlcp.org/certification-by-examination/.

Value of CNLCP® Certification

As healthcare has become more complex, it is increasingly vital to assure the public that healthcare professionals are competent. Individual State Registered Nurse (RN) licensure measures entry-level competence only; and, in so doing, provides the legal authority for an individual to practice nursing. It is the minimum professional practice standard.

Certification, on the other hand, is a formal recognition that validates knowledge, experience, skills and clinical judgment within a specific nursing specialty; and, as such, is reflective of a more stringent professional practice standard. It affirms achievement of proficiency beyond basic licensure.

The Certified Nurse Life Care Planner (CNLCP®) Certification Board is a separately incorporated entity that facilitates consumer health and safety through credentialing/certification of nurse life care planners. It ensures that their practice is consistent with established standards of excellence in the development and defense of the life care planning document.

Similar to consumers knowing to seek out certification status within other professions (e.g., dentists, pharmacists), certification within the field of nurse life care planning has become an important indicator that a certified nurse not only holds state licensure to practice nursing, but is qualified, competent and has met rigorous requirements in the achievement of the CNLCP® credential.

The policies and procedures used by the CNLCP® Certification Board to construct and review items and examination forms for the CNLCP® examination are consistent with guidelines recommended by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (AERA, APA, NCME; 2014) as well as other industry standards such as: Standards for the Accreditation of Certification Programs (National Commission for Certifying Agencies, 2014) and Conformity assessment — General requirements for bodies operating certification of persons (ISO/IEC 17024).

AANLCP® supports certification through the CNLCP® Certification Board.

CNLCP® is a registered trademark of the CNLCP® Certification Board.
2012
XII.1 Coding and Costing
XII.2 Electrical Stimulation Technology
XII.3 Preconference / Brain Injury
XII.4 Veterans Administration

2013
XIII.1 LCP for Motor and Developmental Disorders
XIII.2 Ethical Topics in LCP
XIII.3 Preconference / Exemplars in NLCP
XIII.4 Home Modifications

2014
XIV.1 Technology Updates
XIV.2 LCP Across All Ages
XIV.3 Psych topics in LCP
XIV.4 LCP and the ACA

2015
XV.1 Topics in Transplantation
XV.2 Updates in Spinal Cord Injury
XV.3 Burns
XV.4 Perinatal / Childhood

2016
XVI.1 Pain
XVI.2 GI issues
XVI.3 International LCP
XVI.4 Home Care

2017
XVII.1 JNLCP Brain Injury