Evidence-Based Treatments and Community Resources for Persons with Memory Loss

Presented by:
Sandy C. Burgener, Ph.D., R.N., FAAN
Associate Professor Emerita
University of Illinois College of Nursing
Adjunct Associate Professor of Neurology
Southern Illinois University School of Medicine
Center for Alzheimer’s Disease and Related Disorders

Prevention vs. Treatment

✓ Prevention: Before symptoms appear
  – Broader range of treatments
  – Cornerstone: “Nun” studies by Dr. David Snowdon
  – ‘Cognitive reserve’ building
✓ Treatment: After diagnosis and pathology progresses sufficient to produce symptoms
  – Fewer treatments, but increasing number of studies with positive outcomes
  – However, few community-based treatment resources are available

Why Non-Pharmacological Treatments for Memory Loss?

✓ Self-identified need of persons with early-stage dementia (Results of AA town hall meetings)
✓ Gap in community-based services: Diagnosis → Adult day care services
✓ Limitations of current drug therapies
✓ Growing body of research supporting positive effects of non-pharmacological treatments
Why Non-Pharmacological Treatments Work!

Plasticity Theory
- Early animal studies suggest brain, after injury, is capable of responding to external stimuli, called ‘enriched environments.’ (EE) (Black, Sirevaag, Greenough, 1987)

- EE effects on brain structure:
  - Increased connections between nerve fibers
  - Increased nerve cell density
  - New nerve cell sprouting: increased numbers of nerve cells
  - Slowing of cell death

Plasticity Theory
- Behavioral and cognitive effects of EE include:
  - Increased spatial learning
  - Improve overall learning
  - Regaining of motor skills

- Effects suggest positive benefits of non-pharmacological treatments as both prevention of and treatment for memory loss.

Enriched Environment Components
Based on animal and human (TBI) studies:
- Structured exercise (beyond baseline)
- Multiple environmental stimuli:
  - Cognitive tasks
  - Music/artistic expression
  - Opportunity to explore environment
- Social interactions
- Varied, intense stimuli (multi-modal programs)
  - Novel stimuli
Non-Pharmacological Treatments

✓ Physical exercise
✓ Cognitive (mental) training exercises
✓ Music therapies
✓ Meditation
✓ Biofield therapies
✓ Nutritional therapies
✓ Brain stimulation
✓ ‘Other’ recreational and social therapies

Physical Exercise Treatments

✓ Outcomes include:
  - Improved mental ability
  - Improved physical and functional ability
  - Less depression
  - Fewer behavioral symptoms in exercisers compared to non-exercisers

✓ Tested exercise forms include:
  - Home-based aerobic/endurance activities
  - Strength training
  - Balance and flexibility training
  - Tai Chi

Effects of Aerobic Exercise on Brain

✓ Delay or reverse cerebral structural & functional changes*
✓ Delay beta-amyloid accumulation*
✓ Improves memory*
✓ Increases brain-derived neurotrophic factor (BDNF): a neurotrophin associated with learning, cell health

*Studies with transgenic mice
Effects of Aerobic Exercise on Brain

- Protects against hyperinsulinemia and insulin resistance
- Increased dopamine levels in the brain
- Increases cerebral vasculature and blood flow

Exercise Studies: Conclusions

- Importantly, the exercise type with greatest benefits (animal studies):
  - Aerobic
  - Acrobatic exercises:
    - Require motor learning
- Recommended exercise forms:
  - Aerobic exercises: Pulse exceeds baseline
  - Exercises that require motor learning, ie, Tai Chi, dance

Cognitive (Mental) Training & Enhancement Treatments

- Outcomes include:
  - Improved memory and mental ability
  - Errorless learning achievement
  - Improved executive functioning
  - Improved functioning in activities of daily living
  - Lower depression
- Importantly, in studies where a comparison group was used, persons with memory loss who received a mental training treatment maintained higher mental status scores compared to the comparison group for up to two years following the treatment.
Effects of Cognitive (Mental) Training on the Brain

- Increased dendritic sprouting
- Enhanced brain plasticity
- Improved memory storage and retrieval
- Improved executive functioning
- Decreased depression
- Effects of cognitive training similar to effects of dementia-specific medications on cognitive functioning

Cognitive Training Definitions

- Cognitive training: Mental tasks designed to reflect particular cognitive functions, such as memory, attention, or problem-solving (executive function).
  - On-line resources, e.g., AARP Web site: aarp.org (free on-line mental exercises)
  - Important: Just doing crossword puzzles isn’t enough!
- Training effects do not generalize to other functions; positive effects are found only for target mental function

Reference: Clare, et al., 2009

Music Therapies

- Music therapies may improve mental functioning through music experiences that include:
  - Singing
  - Listening to and discussing music
  - Moving to music
- Music therapy can be done in a group setting or on a 1:1 basis, using either ‘relaxing’ music or the person’s preferred music style.
- Neurological Music Therapy (NMT): Neuroscience model of music therapy
- Effects of music therapy have been documented using PET scans or functional magnetic resonance imaging (fMRI)
**Music Therapies**

Effects of music therapies on the brain:

- Increases (activates) secretion of steroids:
  - 17beta-estradiol steroids improve spatial memory
  - Estrogen suppresses beta amyloid elevation and deposits in the brain
- Buffers the hyper-secretion of corticosteroid associated with stress (impaired HPA axis regulation), which damages nerve cells
- Regulates brain-derived neurotrophic factor (BDNF), known to facilitate nerve cell integrity

**Meditation**

Types of meditation studied:

- Mindfulness
- Insight
- Sahaja Yoga
- Transcendental meditation (TM)

Mental outcomes include:
- Improved performance on verbal tasks
- Lower depression

Meditation Effects:

- Preserves cortical thickness in specified brain regions
- Decreases corticosteroid response to stress
- Increased melatonin secretion:
  - Reduces harmful effects of stress-induced cortisol secretion on the hippocampus
- Regulates negative emotions
Biofield Therapies

May include:
✓ Healing Touch
✓ Therapeutic Touch
✓ Reiki
✓ Polarity Therapy

Positive effects on cognitive functioning include:
1. Increased relaxation response resulting in buffering the hyper-secretion of the corticosteroid associated with stress and impaired HPA axis regulation
2. Increased immune function leading to reduction in neuroendocrine stress responses
3. Increased alpha-band activity in the frontparietal lobes

‘Other’ Treatments

✓ Nutritional treatments: Most support for benefits of naturally occurring anti-oxidants:
  ✓ Strawberries
  ✓ Spinach
  ✓ Blueberries
✓ Brain stimulation:
  ✓ TENS units attached externally
  ✓ Entorhinal cortex (medial temporal lobe) activated with direct stimulation from electrodes:
    ✓ Improved spatial memory
Recreational & Social Treatments

‘Other’ potentially positive treatments:
✓ Social Interaction
✓ Art therapies
✓ Writing therapies
✓ Animal Assisted therapies
✓ Interacting with the natural environment
✓ Relaxation therapies, ie., QiGong

Back to the Beginning....

Combined treatments inherent in ‘enriched environments’ are optimal:
✓ Exercise (aerobic, endurance, Tai Chi, strength training, balance, flexibility training)
✓ Mental exercises
✓ Music therapies
✓ Relaxation & Biofield therapies
✓ Volunteer or meaningful community service
✓ College course for persons with memory loss
✓ Recreational and social therapies
✓ Nutritional therapies

Community-Based Programs

- Minds in Motion: Offered weekly (4 hours)
  ✓ Mental exercises and training
  ✓ Tai Chi and QiGong exercises
  ✓ Creative and social activities
  ✓ Community engagement activities
  ✓ Community enrichment activities
- Positive outcomes
- Older adults with and without memory loss
- Sadly, one of only two such continuously offered programs in Illinois
Positive Outcomes of Community-Based Programs

- Improved or sustained cognitive functioning compared to controls (mental status scores)
- Improved (less) depression
- Higher quality of life scores
- Improved self-esteem compared to controls
- Improved physical functioning (balance and lower leg strength)
- Lower stress
- Overall improved social functioning

Conclusions

- Evidence exists for the effectiveness of a variety of non-pharmacological therapies.
- Non-pharmacological therapies are rarely recommended following a diagnosis of progressive memory loss.
- Availability of non-pharmacological therapies is limited, presenting barriers to participation and possible positive benefits.
- Dual therapies may offer significant benefits over medication-therapy alone, but they are not widely tested.