Pharmacotherapy in Geriatric Mental Health Care in Georgia

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Emory University
Disclosures

• APA Council on Quality and Research
  – Task Force for ECT guidelines
• Neuronetics and NIMH (R01 MH069886) trials in rTMS
• Neurostar (Neuronetics) device on loan for an investigator funded trial
• Emory University has a patent for Neuronetics neurostimulator
• Research funded by Cervel in rTMS
• Research funded by Stanley Foundation using the Soterix tDCS stimulator
• Contract with Oxford University Press to co-edit a book on the Clinical Guide to Transcranial Magnetic Stimulation in the Treatment of Depression
Demographics

Borson, et.al., Am J of Geriatric Psych, 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Total U.S. Population</th>
<th>&gt; 85 years of age</th>
<th>&gt; 65 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>132 million</td>
<td>.3%</td>
<td>1%</td>
</tr>
<tr>
<td>1960</td>
<td>180 million</td>
<td>.5%</td>
<td>6.8%</td>
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<tr>
<td>1980</td>
<td>227 million</td>
<td>.97%</td>
<td>9.2%</td>
</tr>
<tr>
<td>1990</td>
<td>249 million</td>
<td>1.2%</td>
<td>11.3%</td>
</tr>
<tr>
<td>2010</td>
<td>298 million</td>
<td>1.91%</td>
<td>13.3%</td>
</tr>
</tbody>
</table>
Georgians 60 years+ are the fastest growing age group

Source: U.S. Census Bureau Projections, 2009
Consensus Statement on the Upcoming Crisis in Geriatric Mental Health: Research Agenda for the Next 2 Decades JAMA Psychiatry 1999; Dilip V. Jeste, MD; George S. Alexopoulos, MD; Stephen J. Bartels, MD, MS; Jeffrey L. Cummings, MD; Joseph J. Gallo, MD, MPH; Gary L. Gottlieb, MD, MBA; Maureen C. Halpain, MS; Barton W. Palmer, PhD; Thomas L. Patterson, PhD; Charles F. Reynolds III, MD; Barry D. Lebowitz, PhD
Community Mental Health Services

• Older persons appear underrepresented
  – 2.5 percent of the people served by the Georgia mental health system were ages 65 and older or approximately 4,040 people.

• Lack staff trained to address medical needs

• Often lack age-appropriate services
## Number of Consumers Served
### By Age Cohort and Modified NRI Diagnostic Category
#### Adult Mental Health
**FROM 7/1/2013 TO 6/30/2014**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>40-44</th>
<th>45-49</th>
<th>50-54</th>
<th>55-59</th>
<th>60-64</th>
<th>65-69</th>
<th>70-74</th>
<th>75-79</th>
<th>80-84</th>
<th>85+</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Schizophrenia</td>
<td>2,038</td>
<td>2,409</td>
<td>2,879</td>
<td>2,401</td>
<td>1,540</td>
<td>653</td>
<td>302</td>
<td>96</td>
<td>43</td>
<td>21</td>
<td>12,272</td>
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<tr>
<td>Other Psychoses</td>
<td>190</td>
<td>207</td>
<td>252</td>
<td>151</td>
<td>91</td>
<td>49</td>
<td>20</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>977</td>
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<tr>
<td>Major Depression</td>
<td>2,536</td>
<td>3,539</td>
<td>4,370</td>
<td>3,587</td>
<td>1,958</td>
<td>585</td>
<td>189</td>
<td>71</td>
<td>43</td>
<td>15</td>
<td>16,751</td>
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<tr>
<td>Bipolar</td>
<td>1,948</td>
<td>2,118</td>
<td>2,021</td>
<td>1,400</td>
<td>701</td>
<td>264</td>
<td>93</td>
<td>34</td>
<td>9</td>
<td>1</td>
<td>8,516</td>
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<tr>
<td>Other Affective Disorders</td>
<td>390</td>
<td>514</td>
<td>519</td>
<td>454</td>
<td>269</td>
<td>69</td>
<td>25</td>
<td>14</td>
<td>1</td>
<td>2</td>
<td>2,255</td>
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<tr>
<td>Other Mood Disorders</td>
<td>243</td>
<td>223</td>
<td>237</td>
<td>158</td>
<td>67</td>
<td>18</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>959</td>
</tr>
<tr>
<td>Anxiety Disorders</td>
<td>590</td>
<td>638</td>
<td>727</td>
<td>504</td>
<td>339</td>
<td>122</td>
<td>38</td>
<td>24</td>
<td>8</td>
<td>3</td>
<td>2,985</td>
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<tr>
<td>MR/DD</td>
<td>36</td>
<td>45</td>
<td>36</td>
<td>27</td>
<td>20</td>
<td>13</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>187</td>
</tr>
<tr>
<td>SA</td>
<td>314</td>
<td>382</td>
<td>391</td>
<td>260</td>
<td>107</td>
<td>14</td>
<td>11</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1,477</td>
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<tr>
<td>Other Organic Brain Disorders</td>
<td>38</td>
<td>45</td>
<td>76</td>
<td>49</td>
<td>25</td>
<td>15</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>261</td>
</tr>
<tr>
<td>Dementia</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>Other disorders</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>17</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>54</td>
</tr>
<tr>
<td>Unknown/Other</td>
<td>3,849</td>
<td>4,026</td>
<td>3,753</td>
<td>2,431</td>
<td>1,187</td>
<td>384</td>
<td>142</td>
<td>66</td>
<td>33</td>
<td>14</td>
<td>15,841</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>10,133</td>
<td>11,819</td>
<td>12,884</td>
<td>9,873</td>
<td>5,560</td>
<td>2,020</td>
<td>785</td>
<td>310</td>
<td>131</td>
<td>63</td>
<td>52,600</td>
</tr>
</tbody>
</table>
Georgia’s Older Adult Population

- In Georgia, 294,000 older adults with have a mental illness in a one year period
- Top mental illnesses in the elderly
  - Mood and anxiety disorders
  - Substance abuse
  - Severe and persistent mental illnesses
  - Alzheimer’s dementia and related psychiatric problems

http://www.apsero.com/Downloads/Mental%20Health%20Gap%20Analysis/?14@873.az53apBRbgM.1@
Mood and Anxiety Disorders
Older adults who experience recurrent depression and anxiety are more likely to report serious health problems.

Source: BRFSS, 2011
Depression in the elderly

Depression in the elderly is associated with:

- Treatment resistance
- High rates of recurrence
- Higher suicide rates and premature mortality compared to younger adults
- Dementia

MR Scans of Depressed Patients
Suicide by race and gender

Figure 1: Suicide Rates USA 2010 (Centers for Disease Control and Prevention, 2013)
Completed Suicides

Age-Specific Suicide Rates by Age Group and Sex, Georgia, 2006-2009

Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 14</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>15 to 19</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>20 to 24</td>
<td>9</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>25 to 29</td>
<td>18</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>30 to 34</td>
<td>17</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>35 to 39</td>
<td>19</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>40 to 44</td>
<td>20</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>45 to 49</td>
<td>22</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>50 to 54</td>
<td>28</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>55 to 59</td>
<td>15</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>60 to 64</td>
<td>23</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>65 to 69</td>
<td>25</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>70 to 74</td>
<td>27</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>75 to 79</td>
<td>19</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>80 to 84</td>
<td>38</td>
<td>38</td>
<td>0</td>
</tr>
<tr>
<td>85+</td>
<td>48</td>
<td>42</td>
<td>6</td>
</tr>
</tbody>
</table>

Rate per 100,000 population
Methods used to Suicide

- Firearms were used most frequently (59%) in Georgia to commit suicide.

*Includes: blunt instrument, drowning, falls, fire or burns, motor vehicle, personal weapons, and other.
Ratio of Attempted to Completed Suicide

<table>
<thead>
<tr>
<th></th>
<th>ER Visits</th>
<th>Hospitalizations</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Population</td>
<td>30</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Older Adults</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Kim Van Orden, PhD ; Center for the Study and Prevention of Suicide
Suicide Prevention

• Screen for depression
• Collaborative care addressing physical issues including pain
• Suicide prevention plan
  – Decreasing isolation
  – Addressing family discord
  – Remove firearms
  – Assess triggers including alcohol; encourage plan should thoughts occur
  – Behavioral activation
Basic elements of treating older depressed adults

• Symptoms
  – Anxiety, pain, cognitive problems, hopelessness

• Comorbidity
  – Why wouldn’t I be depressed, I have Parkinson’s disease?

• Stigma
  – Do you think I am crazy?

• Barriers
  – Work with aging services
Signs of Geriatric Depression
Triad of depression, anxiety and somatization

- Worry, obsessive ruminations
- Restlessness, pacing
- Sleep loss
- Complaints of physical symptoms
- Irritability, hostility
- Social withdrawal
- Delayed recovery from illness
- Refusal of treatment
Pharmacotherapy

- **First Line**
  - Selective serotonin reuptake inhibitors (SSRIs)
    - Escitopram (Lexapro), citalopram (Celexa), sertraline (Zoloft), paroxetine (Paxil), fluoxetine (Prozac)
  - Serotonin and norepinephrine reuptake inhibitor (SNRIs)
    - Venlafaxine (Effexor), duloxetine (Cymbalta), mirtazapine (Remeron)

- **Side Effects**: Serotonergic - agitation/tremor, nausea, apathy, decreased libido
Pharmacotherapy for Anxiety

- Benzodiazepines are effective but use should be short term because of side effects such as cognitive impairment, gait instability and falls, sedation, disinhibition and dependency.
  - Alprazolam (Xanax)
  - Clonazepam (Clonopin- long acting benzo)
  - Older medications such as diazepam (Valium) and clordiazepoxide (Librium) are likely to accumulate and create toxicity
Pharmacotherapy for Anxiety

- Buspirone
  - Trials show fewer adverse effects, reduced chronic anxiety
  - Experience suggests inconsistent benefit
- Diphenhydramine, hydroxyzine- caution
- Trazodone
- Quetiapine- caution
- SSRI’s

Lauderdale, Sheikh, Clinical Geriatric Medicine, 2003
Venlafaxine XR is Effective for Depression with Associated Symptoms of Anxiety


* $P \leq .01$, † $P \leq .001$ vs. placebo
Recommendations

- Use SSRI’s/ SNRI’s in the elderly
  - They have similar efficacy
  - May work on anxiety but that can take weeks, not days

- The medications made need comparable doses as younger patients but not always

- Treatment may take up to 10-12 weeks so be patient and don’t keep switching if a medication is well tolerated

- Psychotherapy is important!
Case Study

• A 72 year old man presents with apathy and lack of energy. He had a myocardial infarct 3 months earlier. His wife says he has completely withdrawn from the family. He says he is not depressed but that his main problem is feeling tired since his MI. He had previously been very active and engaged with his family and church.
Substance Abuse
30-Day Binge Drinking Among Older Georgians

Binge drinking decreases with age

Source: BRFSS, 2011
Prevention and Early Interventions

• Brief Advice

• Brief Interventions – using motivational interviewing techniques

• Referral Management
Brief Interventions

- **Definition**
  - Time-limited (20 minutes in 1-3 brief sessions) and targets alcohol misuse

- **Goals**
  - Facilitate treatment entry
  - Change in behavior
Use of 12 Step Group Oriented Treatment 1 Month after Residential Care

<table>
<thead>
<tr>
<th></th>
<th>Elderly Subjects</th>
<th>Middle Aged</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attend AA</td>
<td>81.2</td>
<td>91.1</td>
<td>0.372</td>
</tr>
<tr>
<td>Have a sponsor</td>
<td>54.6</td>
<td>64.7</td>
<td>0.076</td>
</tr>
<tr>
<td>Attend Aftercare</td>
<td>31.2</td>
<td>56.4</td>
<td>0.039</td>
</tr>
<tr>
<td>Abstinent</td>
<td>84.0</td>
<td>85.1</td>
<td>0.133</td>
</tr>
</tbody>
</table>
Nationally illicit drug use has more than doubled among 50-59 year olds since 2002 (SAMHSA)

SAMHSA National Survey on Drug Use and Health (NSDUH)
(http://www.oas.samhsa.gov/2k9state/Cover.pdf)
Treatment admissions aged 50 years and older by substance used

Source: Treatment Episode Data Set (TEDS), 2010: TEDS data are collected by states that accept Substance Abuse Prevention and Treatment (SAPT) Block Grant funds
Specialty Addiction Services

- Compliance with treatment is greater in older adults compared to younger adults.
- Age specific programming (groups, focus, etc) appears to have an impact on outcome in 1 randomized study and several observational studies.
Pharmacotherapy

- Alcohol dependence
  - Naltrexone (oral and depot)
  - Acamprosate
  - Antabuse
- Opioids
  - Buprenorphine
  - Methadone
  - Naltrexone
- Cocaine
  - ?
- Nicotine
  - Nicotine replacement
  - Bupropion
  - Varenicline
Drug-related ED visits involving pharmaceutical misuse by older adults

- In 2004, there were an estimated 115,803 emergency department (ED) visits involving pharmaceutical misuse and abuse by adults aged 50 or older; in 2008, there were 256,097 such visits (increase of 121%)
- One fifth of ED visits involving pharmaceutical misuse and abuse among older adults were made by persons aged 70 or older
  - pain relievers were the type of pharmaceutical most commonly involved (43.5 percent), followed by drugs used to treat anxiety or insomnia (31.8 percent) and antidepressants (8.6 percent)

2010 summary from the SAMHSA Center for Behavioral Health Statistics and Quality report from the Drug Abuse Warning Network (DAWN). DAWN comprises a nationwide network of hospital emergency rooms (ERs) http://www.samhsa.gov/data/2k10/WebSR018Pharma50+/Pharma50+HTML.pdf
Recommendations

• Use brief interventions techniques
• Refer to treatment programs particularly residential treatment
• Ask about illicit drug abuse
• Monitor for prescription drug abuse
Case Study

• 69 year old females comes to the ED and you are called to evaluate her because she is acting belligerent toward the staff
Psychosis and SPMI

Thanks to Carl Cohen
1 in 4 Lifetime Risk

- Up to 23% of the older adult population will experience psychotic symptoms at some time, with dementia being the main contributing cause.

- Community: 0.2% to 4.7%
  - In NYC study: 3% psychosis
  - 14% if paranoia included

- Age 85+ (without dementia): 7.1% to 13.7%
  - May be prodromal for dementia

- Age 95+ (without dementia): 7.4%

(Khouzam & Emes, 2007; Cohen et al, 2004)
Etiologies of Psychoses in Older Adults (order of frequency)

1. Alzheimer’s disease and other dementias (40%)
2. Depressive disorder (33%)
3. Medical/toxic causes including substances (11%)
4. Delirium (7%)
5. Bipolar Affective Disorder (5%)
6. Delusional disorder (2%)
7. Schizophrenia spectrum disorders (1%)

Manepalli et al, 2007 and Webster et al, 1998
Severe and Persistent Mental Illness (SPMI)

• Increased comorbid medical problems
  – Metabolic syndrome, chronic smokers, dementia
• Community reintegration programs with nursing homes
• Lack of resources in the mental health centers
SPMI in the community

Georgia can estimate a 6% prevalence of SPMI among older adults, about 88,700 individuals
- 85% in the community, 12% in nursing homes and 3% in long term care in psychiatric hospitals
- More comorbid medical problems
- Higher rates of substance abuse
- More neuropsychological deficits
MRI changes in elderly patients with SPMI
Based on long-term studies carried out in Europe ranging from 22 to 37 years, Ciompi found:

* 20 to 27% of patients attained complete symptomatic remission,
* 22 to 33% attained mild end states,
* 24% to 29% attained intermediate end-states,
* 14 to 18% attained severe end-states.

Thus, roughly half of persons exhibited recovery or mild end-states, and half showed moderate or severe end states.

Types of Antipsychotics

**Typical**

- Haloperidol (Haldol)
- Thioridazine (Mellaril)
- Chlorpromazine (Thorazine)

**Atypical**

- Clozapine (Clozaril)
- Olanzapine (Zyprexa)
- Risperidone (Risperdal)
- Quetiapine (Seroquel)
- Ziprasidone (Geodon)
- Aripiprazole (Abilify)
Typical antipsychotic side effects

**Haloperidol**
- Parkinsonian symptoms: tremor, rigidity, short stepped gait
- Akasthesia “internal feeling of restlessness
- Acute dystonia “sudden tensing of a muscle group”

**Chlorpromazine**
- Sedation
- Hypotension
- Constipation, dry mouth
Atypical Side Effects of Atypicals and Metabolic Syndrome

- Hyperglycemia/Insulin Resistance
- Hyperlipidemia
- Weight Gain
Diabetes is a Major Health Concern

- Up to 50% of people with diabetes are undiagnosed in general population\(^1\)
- It is important to note that the risk of diabetes is increased in patients with schizophrenia and bipolar disorder\(^2\)\(^-\)\(^4\)

Prevalence (%) of Diabetes in US Population and in Patients With Schizophrenia or Bipolar Disorder*

<table>
<thead>
<tr>
<th></th>
<th>US Population(^2)</th>
<th>Schizophrenia(^3)</th>
<th>Bipolar(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence (%)</td>
<td>6.2%</td>
<td>13%</td>
<td>9.9%</td>
</tr>
</tbody>
</table>

*Prevalence percentages for schizophrenia are based on small study populations.

Tardive Dyskinesia

• Movement disorder caused by medications that block the dopamine receptor
  – 15% prevalence from 1959-1979\(^2\); 24% in review from 1992\(^3\)
  – Antipsychotics (54 million prescriptions in 2011 and >3-fold increase over 10 years)\(^1\)
  – Metoclopramide (7 million prescriptions annually)

Tardive Dyskinesia

- Linear increase in TD with the duration of exposure
  - 5%/ year to 25% in five years; 49% in ten years and 68% after 25 years
  - Over age 45 years: 12-25%/ year
Uses of Atypicals

FDA Approved  vs.  “Off Label”

- Schizophrenia
- Bipolar Disorder (Mania)
- Depression
- Agitated dementia
- Autism
- Anxiety Disorders
- Insomnia
Atypical Comparison

- Olanzapine (Zyprexa)- most sedating, most weight gain
- Risperidone (Risperdal)- most parkinsonism, hyperprolactinemia
- Aripiprazole (Abilify)- akasthesia, less wt gain
- Ziprasidone (Geodon)- cardiac, less wt gain
- Quetiapine (Seroquel)- sedating, less parkinsonism
- Clozapine (Clozaril)- lowest parkinsonism, most side effects
Recommendations

- Use atypical antipsychotics over typical
- Consider limiting off label use
- Monitor for metabolic syndrome
- Monitor for tardive dyskinesia
- Monitor for cognitive changes
Case Study

• A 68 year patient which chronic schizophrenia is being managed with haloperidol decanoate for 20 years and has been without any episodes of psychosis.
  – What sort of health maintenance would you do regularly?
Dementia
Risk for Alzheimer’s disease

- Age is most important risk factor
  - Annual incidence worldwide increases from 1% between the ages of 60 and 70 years to 6 to 8% at the age of 85 years or older
  - In countries in which survival to the age of 80 years or older is not uncommon, the proportion of persons in this age group with Alzheimer's disease now approaches 30% and is expected to continue to increase substantially

Epidemiology of Alzheimer’s disease

Projected Alzheimer’s Disease Prevalence,*
2000–2100

Number of Cases (in Thousands)

*PhRMA projections calculated by applying current prevalence rates to population projections.

Data sources: U.S. Census Bureau²; Hebert et al.³
Psychiatric and Behavioral Symptoms in AD

- Apathy (50%-70%)
- Agitation (40%-60%)
- Mood lability (40%)
- Blunted affect (40%)
- Disinhibition (30%-40%)
- Withdrawal (30%-40%)
- Delusions (20%-40%)

- Anxiety (30%-50%)
- Suspiciousness (30%)
- Dysphoria (20%-40%)
- Hostility (30%)
- Aggression (10%-20%)
- Hallucinations (5%-15%)

Delusions in Alzheimer’s Disease

- Delusional thought content (e.g., paranoia) is common (studies suggest 34%-50% incidence)
- Common Delusions
  - Marital infidelity
  - Patients, staff are trying to hurt me
  - Staff, family members are impersonators
  - People are stealing my things

Medications used to treat dementia

Cognitive symptoms
• Cholinesterase inhibitors
  – Donepezil
  – Reminyl
  – Galantamine
• Glutamitergic
  – Memantine

Behavioral symptoms
• Benzodiazepines
• Trazodone
• Valproic acid
  – Carbamazepine
• Typical neuroleptics
  – Haloperidol
• Atypical neuroleptics
  – Risperidone
• SSRI’s
The Food and Drug Administration has determined that the treatment of behavioral disorders in elderly patients with dementia with atypical (second generation) antipsychotic medications is associated with increased mortality.

- Of a total of seventeen placebo controlled trials performed with olanzapine (Zyprexa), aripiprazole (Abilify), risperidone (Risperdal), or quetiapine (Seroquel) in elderly demented patients with behavioral disorders, fifteen showed numerical increases in mortality in the drug-treated group compared to the placebo-treated patients.
Recommendations

• Try cholinesterase inhibitors for one year and discontinue if there is no benefit
• Maximize medical care
• Focus on psychosocial interventions particularly with the caregiver
• Avoid polypharmacy
Sources

• BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM (http://www.cdc.gov/brfss/), CDC. Atlanta, Georgia: U.S. Department of Health and Human Services, 2010 and 2011. BRFSS is “the world’s largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984. Currently, data are collected monthly in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam.” BRFSS data are collected by local jurisdictions and reported to the CDC.

• Georgia Policy Academy State Profile (Dec 2012) developed by the Substance Abuse and Mental Health Services Administration in partnership with the U.S. Administration on Aging.
Additional Information on Geriatric Depression

- Fuqua Center Website
  www.fuquacenter.org