Presenting Author: Yen-Ni Hung
School of Gerontology Health Management & Master Program in Long-term Care, College of Nursing, Taipei Medical University, Taipei, Taiwan

Co-authors: Shu-yu Yang, Shu-Ching Chang
2 Taipei City Psychiatric Center, Taipei City Hospital, Taipei, Taiwan.
3 Graduate Institute of Clinical Pharmacy, College of Pharmacy, Kaohsiung Medical University, Kaohsiung, Taiwan
4 Department of health and welfare, University of Taipei

Section title: Scientific topics in dementia

MEDICATION PATTERN FOR DIFFERENT TYPE OF DEMENTIA
PROFILE

- Population: 23.5 million
- Land area: 36,191 km²
- Aging population
  (2016): 3,106,105 (13.2%)
- Life expectancy
  (2013): 77.01 (M) / 83.62 (F)

Source: Directorate-General of Budget, Accounting and Statistics; ROC; MOHW
Aging Population in Taiwan

Note: 2018 population is estimated amount.
Reference:
BACKGROUND
TAIWAN DEMENTIA POPULATION ESTIMATED

Reference:
1. Chu et al. (2011). Epidemiological Study of Dementia (including Mild Cognitive Impairment) and Research for Dementia Care
Dementia population rate

- 2016 Dementia population analysis, very mild dementia (VMD) and mild dementia accounted for 74%.

<table>
<thead>
<tr>
<th>level</th>
<th>CDR</th>
<th>Dementia population (Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Mild dementia (VMD)</td>
<td>0.5</td>
<td>101,860 (39%)</td>
</tr>
<tr>
<td>Mild dementia</td>
<td>1</td>
<td>91,410 (35%)</td>
</tr>
<tr>
<td>Moderate dementia</td>
<td>2</td>
<td>31,340 (12%)</td>
</tr>
<tr>
<td>Severe dementia</td>
<td>3</td>
<td>36,570 (14%)</td>
</tr>
</tbody>
</table>

CDR: Clinical dementia evaluation scale, total scores from 0-5, if the scores are higher then the dementia risk are also higher.
Reference:
1. Chu et al. (2011) Epidemiological Study of Dementia (including Mild Cognitive Impairment) and Research for Dementia Care
OBJECTIVES

- To investigate the medication pattern for different type of dementia in their first year after diagnosed in Taiwan using data from the National Health Insurance Research Database (NHIRD).
BACKGROUND OF TAIWAN’S NHI PROJECT

- Implemented in 1995
- Universal coverage (>99%)
- Single-payer system → Uniform data profile
- 92.47% of health provider signed contracts with the BNHI
METHODS-DESIGN AND DATA SOURCE

- Cross-sectional study design
- Data source (2004-2013)
  - Longitudinal Health Insurance Database (LHID) 2005 (1 million random samples of all beneficiaries in 2005)
    - Registry for beneficiaries (ID)
    - Ambulatory care expenditures by visits (CD)
    - Details of ambulatory care orders (OO)
    - Expenditures for prescriptions dispensed at contracted pharmacies (GD)
    - Details of prescriptions dispensed at contracted pharmacies (GO)
Methods – Study Population & Outcome Variable

- Study population
  - >=50 years old
  - >=2 visits or one hospitalization included a primary or secondary diagnosis of dementia
  - ICD-9-CM: 290.xx, 294.1x, 331.0
    - Alzheimer disease (AD): ICD-9-CM=331.0
    - Vascular dementia (VaD): ICD-9-CM=290.4X
    - Others: 290.0 Senile dementia, uncomplicated ;290.1 Presenile dementia ;290.2 Senile dementia with delusional or depressive features ;290.3 Senile dementia with delirium ;294.1 Dementia in conditions classified elsewhere
  - Newly diagnosed as dementia between 2005 to 2012

- Study periods
  - Follow up from index date for 1 year period.

- Medication pattern
  - We have analyzed the types of prescribed medication according to the Anatomical Therapeutic Chemical (ATC) classification developed by WHO
RESULTS 1 - NEW CASES BY YEAR

<table>
<thead>
<tr>
<th>Year</th>
<th>New Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1886</td>
</tr>
<tr>
<td>2006</td>
<td>1745</td>
</tr>
<tr>
<td>2007</td>
<td>1838</td>
</tr>
<tr>
<td>2008</td>
<td>1857</td>
</tr>
<tr>
<td>2009</td>
<td>1874</td>
</tr>
<tr>
<td>2010</td>
<td>1990</td>
</tr>
<tr>
<td>2011</td>
<td>2020</td>
</tr>
<tr>
<td>2012</td>
<td>1995</td>
</tr>
</tbody>
</table>
RESULTS 2- DEMOGRAPHIC CHARACTERISTICS OF NEW CASES

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-64 YRS</td>
<td>780</td>
<td>833</td>
</tr>
<tr>
<td>65-74 YRS</td>
<td>2174</td>
<td>1743</td>
</tr>
<tr>
<td>75-84 YRS</td>
<td>3560</td>
<td>3181</td>
</tr>
<tr>
<td>&gt;=85 YRS</td>
<td>1585</td>
<td>1349</td>
</tr>
</tbody>
</table>
RESULT 3- AGE DISTRIBUTION BY TYPE OF DEMENTIA

<table>
<thead>
<tr>
<th>Age Group</th>
<th>VaD</th>
<th>AD</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=85 yrs</td>
<td>323</td>
<td>136</td>
</tr>
<tr>
<td>75-84 yrs</td>
<td>512</td>
<td>392</td>
</tr>
<tr>
<td>65-74 yrs</td>
<td>203</td>
<td>211</td>
</tr>
<tr>
<td>50-64 yrs</td>
<td>211</td>
<td>89</td>
</tr>
</tbody>
</table>
RESULT 4- GENDER DISTRIBUTION BY TYPE OF DEMENTIA

- Male: 364 VaD, 1005 AD
- Female: 456 VaD, 843 AD
RESULT 5- TOP 10 MEDICATIONS FOR ALZHEIMER DISEASE (AD)

<table>
<thead>
<tr>
<th>ATC5</th>
<th>medication</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>N06BX</td>
<td>Other psychostimulants and nootropics</td>
<td>1934</td>
<td>13.56</td>
</tr>
<tr>
<td>N06DA</td>
<td>Anticholinesterases</td>
<td>1215</td>
<td>8.52</td>
</tr>
<tr>
<td>B01AC</td>
<td>Platelet aggregation inhibitors excl. heparin</td>
<td>864</td>
<td>6.06</td>
</tr>
<tr>
<td>C04AE</td>
<td>Ergot alkaloids</td>
<td>653</td>
<td>4.58</td>
</tr>
<tr>
<td>N05BA</td>
<td>Anxiolytics(Benzodiazepine derivatives)</td>
<td>608</td>
<td>4.26</td>
</tr>
<tr>
<td>N05AH</td>
<td>Antipsychotics(Diazepines etc.)</td>
<td>545</td>
<td>3.82</td>
</tr>
<tr>
<td>C08CA</td>
<td>Dihydropyridine derivatives</td>
<td>406</td>
<td>2.85</td>
</tr>
<tr>
<td>A06AB</td>
<td>Contact laxatives</td>
<td>396</td>
<td>2.78</td>
</tr>
<tr>
<td>N07CA</td>
<td>Antivertigo preparations</td>
<td>384</td>
<td>2.69</td>
</tr>
<tr>
<td>N04BA</td>
<td>Dopa and dopa derivatives</td>
<td>332</td>
<td>2.33</td>
</tr>
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</table>
**RESULT 6- TOP 10 MEDICATION FOR VASCULAR DEMENTIA (VaD)**

<table>
<thead>
<tr>
<th>ATC5</th>
<th>medication</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01AC</td>
<td>Platelet aggregation inhibitors excl. heparin</td>
<td>4966</td>
<td>10.95</td>
</tr>
<tr>
<td>N06BX</td>
<td>Other psychostimulants and nootropics</td>
<td>3685</td>
<td>8.12</td>
</tr>
<tr>
<td>A06AB</td>
<td>Contact laxatives</td>
<td>2084</td>
<td>4.59</td>
</tr>
<tr>
<td>N05AH</td>
<td>Antipsychotics(Diazepines etc.)</td>
<td>2049</td>
<td>4.52</td>
</tr>
<tr>
<td>C08CA</td>
<td>Dihydropyridine derivatives</td>
<td>1933</td>
<td>4.26</td>
</tr>
<tr>
<td>A02AA</td>
<td>Magnesium compounds</td>
<td>1643</td>
<td>3.62</td>
</tr>
<tr>
<td>N05BA</td>
<td>Anxiolytics(Benzodiazepine derivatives)</td>
<td>1417</td>
<td>3.12</td>
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<tr>
<td>C04AE</td>
<td>Ergot alkaloids</td>
<td>1037</td>
<td>2.29</td>
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<tr>
<td>N05CF</td>
<td>Hypnotics and sedatives(Benzodiazepine related)</td>
<td>975</td>
<td>2.15</td>
</tr>
<tr>
<td>C09CA</td>
<td>Angiotensin II antagonists, plain</td>
<td>942</td>
<td>2.08</td>
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</tbody>
</table>
COMPARE TOP 10 MEDICATIONS FOR DIFFERENT TYPE OF DEMENTIA

Percentage by type of dementia

- **A06AB** Contact laxatives
- **C08CA** Dihydropyridine derivatives
- **N05AH** Antipsychotics (Diazepines etc.)
- **N05BA** Anxiolytics (Benzodiazepine derivatives)
- **C04AE** Ergot alkaloids
- **B01AC** Platelet aggregation inhibitors excl. heparin
- **N06DA** Anticholinesterases
- **N06BX** Other psychostimulants and nootropics

- Others
- VaD
- AD
THE DEVELOPMENT OF MEDICATION FOR ALZHEIMER DISEASE

Nootropics, Anti-depressants, Antipsychotics

- Acetylcholinesterase inhibitors, NMDA antagonist
- Acetylcholine precursors, Cholinergic agonists

MCI Prevention trials:
- Estrogen, NSAIDs, AChEIs, Statins, Vit. E

Anti-oxidants
- (Vitamin E)

Immunotherapy Trials

Other Anti-amyloid Therapy trials

- Trials

Acetylcholinesterase inhibitors, NMDA antagonist

1970-1980
- Tacrine

1980
- Donepezil

1990
- Rivastigmine

2000
- Galantamine

2001
- Memantine

2003
- T配电

1993

1997

2010

2011

Liver toxicity
Medication covered by Taiwan NHI

**ARICEPT® DONEPEZIL 5,10MG/TAB**

愛憶欣膜衣錠

<table>
<thead>
<tr>
<th>颜色：白/淡黄色</th>
<th>形状：圆凸形</th>
</tr>
</thead>
<tbody>
<tr>
<td>劉型：膜衣錠</td>
<td>標記：有ARICEPT/5,10字樣</td>
</tr>
</tbody>
</table>
**Reminyl® Galantamine**

*4,8,12mg/tab；8,16,24mg/PR cap*

- **Shape:** 圓形
- **Appearance Color:** 白 / 粉紅 / 橘
- **Form:** 膜衣錠
- **Mark:** JASSEN/G4,8,12

**Reminyl HBr Prolonged Release Capsules**

- 白色”G8”
- 粉紅色”G16”
- 焦糖色”G24”

Medication covered by Taiwan NHI
Exelon® Rivastigmine
1.5, 3, 4.5, 6 mg/cap
憶思能

長圓柱形；有 Exelon/1.5mg, 3mg, 4.5mg, 6mg 字樣
1.5mg-淡黃橙色；3mg-明黃橙色；4.5mg-濁紅橙色；6mg深澄色/淡澄黃色膠囊
WITGEN® Memantine 10mg/TAB

威智

顏色：白色  形狀：長圓柱狀
劑型：錠剤  標記：有LO / 10字樣
EBIXA® MEMANTINE 10MG/TAB
憶必佳

白色橢圓形，雙凸，雙面具剝痕之錠劑。
CONCLUSIONS

- The Medication Treatment strategy for dementia
  - Treat the cause of disease (different)
    - AD: to reduce or prevent Neurofibrillary Tangles (NFT) and Amyloid Plaques (AP)
    - VaD: to control the risk factors of vascular related disease
  - Treat the symptom of disease (common)

- Prescription of dementia patients is an important issue. They are usually with multiple comorbid conditions and more likely to have inappropriate medication. Further investigation of the effects on elderly dementia patients may be needed.
THANK YOU