Award Number: W81XWH-07-1-0261

TITLE: California’s Parkinson’s Disease Registry Pilot Project – Coordination Center and Northern California Ascertainment

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The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.
The primary goal of this project is to conduct a pilot study for the legally mandated population-based Parkinson's disease (PD) registry in the state of California. This study is one of two linked research programs with the goals of establishing and using California PD registry data. The Parkinson's Institute was funded to serve as the coordinating center for the pilot project (including maintaining a secure data enclave), conduct ascertainment work in Santa Clara County and explore utilization of registry data. To date, approximately 8,000 parkinsonism cases have been identified in Santa Clara County via legally mandated reporting sources, including physicians and health care facilities. With the majority of case-finding work accomplished, project effort is being directed to investigate possible associations between PD and toxicant exposure using state databases, to define disease prevalence and care patterns among registrants, and to assess the value of the registry to stakeholders.

**Subject Terms**
Parkinson's disease, disease registry, pilot feasibility study, toxicant exposures.
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A. Introduction

This project consists of a pilot study conducted in partnership with the California Department of Public Health (CDPH) and the University of California-Los Angeles School of Public Health (UCLA) to implement a legally mandated statewide population-based Parkinson’s disease (PD) registry in California to serve health surveillance and research aims. As the coordinating center for the surveillance activities, the Parkinson’s Institute has achieved multiple milestones, including the development of data collection tools, staff training materials, a secure database, and policies and procedures for registry operations. Case ascertainment activities by the PI and UCLA have been underway in the four target counties in northern and southern California for more than two years with approximately 10,000 PD cases identified to date. As the database grows, we are applying systematic de-duplication procedures to ensure unique entries, validating registry content (i.e. confirmation of diagnosis and other qualifying criteria) and evaluating the quality and completeness of registry data using census, Medicare and death certificate data. Other analyses considered include assessing differences in PD prevalence and patterns of care across different groups, exploring associations between toxicant exposure and PD patterns utilizing state hazardous substances databases, determining the value of the registry to key stakeholder groups, and evaluating the cost of registry operation.

B. Body

The goals of this project are to conduct a feasibility study for the legally mandated California statewide population-based PD registry and utilize pilot registry data to explore trends in PD prevalence, patterns of care, possible relationship to the distribution of environmental toxicants, stakeholder priorities and cost efficiency of operations. This project is linked with a USAMRMC-funded project based at UCLA (Award Number W81XWH-07-1-0005, Principal Investigator: Beate Ritz), under which case ascertainment in Southern California and exploratory analyses are being performed.

The initial phase of this project focused on the establishment of a secure, high quality registry database, and launch of health surveillance activities, including active case ascertainment and clinical abstraction. This initial project phase encountered significant administrative and regulatory delays. As a result, we have requested and been granted a project extension (copy of request and approval attached) in order to be able to carry out the next phase of the project, which involves ongoing organization and compilation of data and initiating analyses.

C. Key Accomplishments

1. Deputization status from the CDPH as designated agents for creation of a state registry: Zero-dollar contracts between CDPH and PI were developed, and signed in October, 2007.

2. Approval from Institutional Review Boards: Human subjects research waivers for the initial surveillance-oriented work were obtained from the Army Medical Research and Materiel Command Office of Research Protections Human Research Protection Office, the State of California Committee for the Protection of Human Subjects (CPHS), the Kaiser Permanente Northern California Institutional Review Board and the UCLA Office for Protection of Research Subjects. CPHS has also authorized work to link registry data
with Medicare data from the Center for Medicare and Medicaid Services (CMS), in order
to evaluate the efficiency of the registry ascertainment methods utilizing capture-
recapture analytic methods. A joint TPI-UCLA application to conduct exploratory
analyses (evaluating diagnostic validity, linkage to toxicant databases, defining patterns
of PD care) has been approved by CPHS.

3. Notification of case reporting sources and professional organizations of registry
implementation, as required by the California Parkinson’s Disease Registry Act: A
formal notification letter was developed in conjunction with CDPH, and mailed on
January 2008 to the state Medical Board and the Board of Pharmacy, professional
organizations representing potential case reporting sources (pharmacists, physicians and
health care facilities) and public health officers in the project target counties. Inquiries
from reporting sources/organizations about the registry have been addressed via email,
telephone and in public and scientific gatherings.

4. Conduct outreach to stakeholders: A public stakeholders’ meeting was convened in
March, 2006. A free-standing website (www.capdregistry.org) and email box were
created and launched in March, 2008. Requests for information about the registry from
patients, colleagues and the public have consistently been answered within several days
of receipt. A public fact sheet and informational brochure were developed and have been
utilized in mailings, at patient-oriented events and are also posted on the website.

5. Convene a Stakeholders’ Advisory Committee: Under the direction of its leaders, Mr.
Greg Wasson, Ms. Anne Wasson and Mr. Mark Siegel, a committee is acting to create a
forum and network in which registry stakeholders can be informed of project activities,
provide valuable input to the project and strategize about future funding and expansion
opportunities for the registry. In addition, two new members, Dr. James Wong and Dr.
Ronald Kobayashi have joined the committee. In the past year, a Stakeholder’s
Committee Teleconference meeting was conducted on March 9, 2010. Email
communication was used otherwise to review project strategies and project output.

6. Define case ascertainment strategies: Investigators at the PI and UCLA initiated case
ascertainment activities by approaching physician offices (neurology practices in
particular), medical groups and large health care facilities, to enhance the willingness of
these high-yield sources to cooperate with the reporting requirements.

7. Creation of tools and instruments for data collection: A data collection form and
Microsoft Access database was developed and pilot-tested by staff (both physicians and
non-physicians) at the PI. The form includes fields for obtaining information on basic
demographics, key clinical parameters and characterization of data collection feasibility.

8. Establishment of a secure registry database: A secure, non-networked data repository was
established in a dedicated room with access limited to trained project personnel.

9. Develop policies and procedures for ensuring data confidentiality, quality and appropriate
use: Policies and procedures have been developed, together with staff training materials.
TPI and UCLA project employees have attended group training sessions in September
and October, 2008 and again in June and July of 2009. With the launch of field data
collection in October, 2008, weekly conference calls have been held to keep all field staff
updated on progress and the latest standard operating procedures on safe data
collection/transmission and storage. In addition, all registry staff members are required
to complete Information Security training in a yearly basis.
10. **Hiring and training staff:** Registry staff members have been hired and trained in communication with potential reporting sources, project security procedures, data collection and clinical abstraction. In addition, weekly conference calls between TPI and UCLA staff members and principal investigators have continued to keep all registry staff updated on progress and the latest standard operating procedures for field work and data safety.

11. **Active case ascertainment and data collection in designated counties:** The cumulative data collection accomplishments from October 2008 through March 2012 are shown in the table 1 in Reportable Outcomes section. The table shows the total number of patients reported to us as well as the total number of unique cases identified after systematic de-duplication procedures have been applied. All reported cases have basic identifying data and some demographic information available. Detailed clinical information has been collected directly from medical records on a random subsample of cases for diagnosis validation purposes.

12. **Development of systematic de-duplication procedures:** Because cases are being ascertained from multiple reporting sources, some cases are reported more than once. Utilizing the CDC’s LinkPlus software platform, procedures have been developed to compare all new incoming data against existing registry data to identify duplicate cases in the database. This ensures a more accurate estimate of the cases within the designated reporting areas.

13. **Activation of voluntary patient self registration:** A mechanism for self registration has been established. Interested patients can print a registration form directly from the registry website (http://www.capdregistry.org/NewPatient.html).

14. **Application for external validation data:** Assessment of registry validity and ascertainment efficiency can be accomplished through linkage with external datasets listing Parkinson’s disease cases. Applications have been filed for Medicare data with the University of Minnesota Research Data Assistance Center/CMS, and with the California Vital Statistics Advisory Committee/CPHS for death certificate data. Both applications have been approved and datasets have been received, however receipt of Medicare data from CMS was significantly delayed due to administrative barriers on the part of CMS. The Medicare dataset was obtained in February 2011.

There are 170,322 entries (service records) in the datasets received, representing 4,274 individuals. On average, each individual had 40 entries. Among the 4,274 individuals, 49.3% are male and 50.7% are female. 77.8% are non Hispanic White, 9.8% are Asian, 6.2% are Hispanic, 2% are black, and 4.2% are others. 80% reported single diagnosis of Parkinson’s disease, 8% reported single diagnosis of Parkinsonism, and another 12% reported multiple diagnoses of Parkinson’s disease and Parkinsonism. Table 2 below lists the cases by county.

15. **Assessment of Surveillance efficiency:** We have initiated collaborative planning with Dr. Lorene Nelson (Stanford University) for the capture-recapture analytic work to evaluate registry data collection efficiency, and have completed the analysis plan. We are awaiting receipt of final 2007 ascertainment data from Dr Ritz at UCLA.
D. Reportable Outcomes

### Table 1, Number of Reported Cases from Providers

<table>
<thead>
<tr>
<th>County</th>
<th>Santa Clara</th>
<th>Fresno</th>
<th>Kern</th>
<th>Tulare</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Population (Census)</strong></td>
<td>1,764,499</td>
<td>909,153</td>
<td>800,458</td>
<td>426,276</td>
<td>3,900,386</td>
</tr>
<tr>
<td><strong>Population &gt;65 (Census)</strong></td>
<td>192,330</td>
<td>90,006</td>
<td>72,041</td>
<td>40,922</td>
<td>395,299</td>
</tr>
<tr>
<td>Physicians Reporting</td>
<td>18</td>
<td>15</td>
<td>16</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>Medical Groups and Facilities Reporting</td>
<td>6</td>
<td>10</td>
<td>7</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total Patients Reported</strong></td>
<td>5078</td>
<td>2202</td>
<td>2751</td>
<td>2037</td>
<td>12,068</td>
</tr>
<tr>
<td><strong>Total Records w/ queries in progress</strong></td>
<td>-</td>
<td>225</td>
<td>226</td>
<td>-</td>
<td>451</td>
</tr>
<tr>
<td><strong>Total Unique Patients Reported</strong></td>
<td>4413</td>
<td>1337</td>
<td>1689</td>
<td>1282</td>
<td>8,721</td>
</tr>
<tr>
<td>Constitution of each county</td>
<td>50.6</td>
<td>15.3</td>
<td>19.4</td>
<td>14.7</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Data records w/ queries under investigation
**Unique cases after duplicates reported from multiple sources have been removed

### Table 2, Number of Reported Cases From Medicare Data

<table>
<thead>
<tr>
<th>County</th>
<th>Santa Clara</th>
<th>Fresno</th>
<th>Kern</th>
<th>Tulare</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Patient Reported</strong></td>
<td>1710</td>
<td>1227</td>
<td>775</td>
<td>562</td>
<td>4,274</td>
</tr>
<tr>
<td>Constitution of each county</td>
<td>40.0</td>
<td>28.7</td>
<td>18.1</td>
<td>13.2</td>
<td>100%</td>
</tr>
<tr>
<td>% of patients with diagnosis of PD within the county</td>
<td>94.9%</td>
<td>84.0%</td>
<td>96.1%</td>
<td>93.1%</td>
<td>79.5%</td>
</tr>
<tr>
<td>% of patients who visited neurologists in the year 2007</td>
<td>24.9%</td>
<td>14.3%</td>
<td>17.7%</td>
<td>14.0%</td>
<td>19.3%</td>
</tr>
</tbody>
</table>
An abstract was accepted by the American Academy of Neurology (AAN). A poster was presented at the AAN meeting (April 9-16, 2011) in Honolulu, Hawaii. The poster included information on the history and start-up of the surveillance project, as well as prevalence and demographic characteristics of registry PD cases.

E. Conclusions

Since our last annual progress report, most milestones in the project’s primary specific aims, including developing methods for active ascertainment and registration of cases with PD and parkinsonism have been successfully achieved. Establishment of the registry now enables us to transition our effort to organize the data and address the exploratory aims of the project which will utilize the registry data. Important next steps for the project include the following:

1. Ongoing data cleaning and application of systematic de-duplication methods to ensure unique entries in registry database from multiple reporting sources.
2. Ongoing case ascertainment and clinical abstraction.
3. Review and rectification of discrepant diagnosis information reported by providers for cases within and across data sources.
4. Review and rectification of discrepant diagnosis information reported by Medicare data.
5. Diagnosis validation comparing source-reported cases with detailed clinical information abstracted from medical records.
6. Awaiting receipt of complete 2007 data from UCLA in order to:
   a. Compile and summarize demographic characteristics of reported cases.
   b. Carry out capture-recapture validation analysis to assess the efficiency of data collection approaches using census, Medicare and California death certificate data.
   c. Implement projects analyzing patterns of PD prevalence and care, and explore the feasibility of assessing possible associations between toxicant exposure and PD.
7. Conduct ongoing meetings with project staff at TPI and UCLA and convene Working Group and Stakeholder’s Committee meetings, as necessary.

F. References

None.

G. Appendices

1. Poster presented at AAN 2011
The California Parkinson's Disease Registry Pilot Project in Santa Clara County, CA

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1 The Parkinson's Institute 3 California Department of Public Health 5 Parkinson’s Action Network 7 Stanford University
2 German Center for Neurodegenerative Diseases 4 American Parkinson's Disease Association 6 Kaiser Permanente
8 University of California-Los Angeles

Introduction
Population-based characteristics of Parkinson’s disease (PD) are not well defined.

In late 2004, California legislation (AB 2248) was passed, making PD and parkinsonism reportable conditions.

A pilot project was initiated in 4 counties (Santa Clara, Kern, Tulare, Fresno). Results reported here are for Santa Clara County.

Methods, continued
- PO prevalence estimates based on the following:
  1) Parkinson's disease (332.0); 2) Residence in Santa Clara County in 2007; 3) Census 2000 population estimates for the county.

Results
Source 1: Pharmacy Records. Determining the utility of prescription data in ascertaining cases of PD.

- Data from PD cases in Kaiser Permanente Northern California 2006

- Pharmacy data were not pursued as a source for identifying cases of PD due to:
  - Low sensitivity and specificity;
  - No diagnosis in pharmacy records;
  - Numerous vendors;
  - Geographic linkage between provider and patient’s place of residence (e.g., mail order pharmacies).

Source 2: Voluntary self-registration. Number of patients reported: n = 6; number of patients eligible: n = 6

- Physicians and other providers. Due to resource limitation, ascertainment efforts were focused on neurologists, multispecialty groups and large facilities.

Source 3: Data Collection - physicians and other providers

- Includes aim of monitoring of PD associated with suspected chemical agents encountered by the public.

- Permits no expenditure of state funds.

- Identify physicians
- Schedule data collection
- Abstracter collects data
- Data review
- Data cleaning
- Analytic dataset
- Clinical Abstraction Subset
- De-duplication to identify unique cases
- Import all cases into central database

Total Reported N=4625

Group 1 PD (332.0)
86.3% (n=3347)

Group 2 Other Parkinsonism 15.1% (n=532)

Group 3 Other dx 3.8% (n=141)

PD in 2007
57.65% (n=2237)

De-Duplicated
Unique Individuals, n=3890

Summary & Future Work:
- Active ascertainment of PD is feasible when reporting is legally mandated. Advantages include identification of all age groups affected (vs. Medicare eligible only), verification of diagnosis and characterization of disease features and subtypes. Next steps include:
  - Comparison with CMS (Medicare) data
  - Determine efficiency of reporting sources
  - Assess diagnostic validity
  - Determine incidence of PD and related disorders
  - Correlate with concurrent environmental toxicant tracking by CDPH to investigate risk factors for PD and factors modifying PD progression

The California PD Registry will provide information useful to the proposed National Neurological Diseases Surveillance Systems (S 242).

Acknowledgements
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Results, continued

Characteristics of PD cases in Santa Clara County

Total Number of Cases
2237

Age (mean)
74.8

Gender (men)
54.4%

Race (White)
74.1%

Asian
19.9%

American Indian/Alaska Native
0.4%

Native Hawaiian/Pacific Islander
0.1%

Other
4.2%

Parkinsonism (333.0)
5.9% (n=228)

DLB (331.82)
4.2% (n=164)

Drug Induced PD
3.6% (n=139)

- Active ascertainment of PD is feasible when reporting is legally mandated. Advantages include identification of all age groups affected (vs. Medicare eligible only), verification of diagnosis and characterization of disease features and subtypes. Next steps include:
  - Comparison with CMS (Medicare) data
  - Determine efficiency of reporting sources
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