Capture and Coding of Occupation and Industry Measures: Findings from 10 Central Cancer Registries

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Objectives

- Describe methods and quality of Occupation and Industry (O/I) collection practices
  - As part of a special study involving 10 NPCR states
- Overview of a tool to code O/I data
- Explore ability of the tool to assign O/I codes
Background

- Estimated annual impact of occupational exposure\(^1\)
  - 40,000 new cancer cases and
  - 20,000 cancer deaths

<table>
<thead>
<tr>
<th>Occupation(s)</th>
<th>Associated Cancer(s)</th>
</tr>
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<tbody>
<tr>
<td>Asbestos fibers(^2)</td>
<td>Mesothelioma</td>
</tr>
<tr>
<td>Semi-conductor workers, dry cleaners, hairdressers, and mechanics(^3)</td>
<td>Acute myeloid leukemia</td>
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<tr>
<td>Firefighting(^4)</td>
<td>Colorectal, lung, non-Hodgkin lymphoma, and leukemia</td>
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Cancer Registry Amendment Act

- Established National Program of Cancer Registries in 1992
- “To support the operation of population-based, statewide cancer registries...to collect...data concerning--

  (1) demographic information about each case of cancer;

  (2) ...industrial or occupational history of the individuals with the cancers, to the extent such information is available from the same record;

  (3) ...date of diagnosis and source of information;

  (4) pathological data...”

42 U.S. Code Section 280e
# Occupation and Industry Definitions

<table>
<thead>
<tr>
<th>Patient’s Usual Occupation</th>
<th>Patient’s Usual Industry</th>
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<td>Type of job patient engaged in for the greatest number of working years</td>
<td>Type of business or industry where patient worked in his or her usual occupation</td>
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<td>Example: Registered Nurse Tour Guide</td>
<td>Example: Hospital Tourism</td>
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**A Cancer Registrar’s Guide to Collecting Industry and Occupation**

Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

OSHA
NIOSH Industry & Occupation Computerized Coding System (NIOCCS)

- Web-based system that translates text into standardized O/I codes
- Goals
  - Consistent terminology
  - Increased capture
  - Lower cost of manual coding
Coding of Cancer Data with NIOCCS Tool

- NAACCR Data Dictionary recommends O/I coding at the CCR
NPCR Special Study

- **Comparative Effectiveness Research**
  - Supported by American Recovery and Reinvestment Act funds
  - Expanded data collection in 10 registries (CCRs)
  - 2011 incident cases: breast, colon, rectum, and CML
    - Biomarkers in diagnostic work-up
    - Beyond first course of treatment
    - SES, BMI, smoking
    - Occupation and Industry

- CCRs were encouraged to recode textual O/I into census numeric codes, using NIOCCS
Data Sources

- NPCR CER Project – 8 complete states and 2 specified county groupings within California and Florida

- Census.gov – Census estimates of occupation and industry groups for 2011 were obtained for RI and NH
Methods

- Available text data submitted to the NIOCCS tool (v3) at CDC
- Both medium (70%) and high (90%) NIOCCS confidence levels used
  - Confidence: “only matched candidates where NIOCCS has _% or greater confidence of accuracy will be automatically coded”
- SAS v. 9.3 (32) used to determine percentage of the NIOCCS auto-coded codes that were sufficiently analyzable O/I codes
  - Insufficient codes: unknown, retired, never worked, military
Analysis

- Assessment of O/I data assignment
- Comparison of auto-coding ability of the NIOCCS tool by confidence level and by state
- Examination of the quality of the data that was auto-coded by the NIOCCS tool
  - Sufficient/Analyzable vs. insufficient (unknown, retired, never worked, military)
- Comparison of O/I groups among two CER states with Census estimates for the same year
Note: ‘Auto-coded’ data includes codes for unknown, retired, never worked, military.
Industry text auto-coded by NIOCCS tool

Note: ‘Auto-coded’ data includes codes for unknown, retired, never worked, military.
Types of Occupation data auto-coded by NIOCCS tool

*Includes homemaker, student, volunteer, never worked.
Types of Industry data auto-coded by NIOCCS tool

*Includes homemaker, student, volunteer, never worked.
Occupational groups
CER cases compared to Census estimates

NH
State
RI

Percent

- Construction, Extraction, Maintenance & Repair
- Management, Professional & Related
- Production, Transportation & Material Moving
- Sales & Office
- Service
Top 6 Industry groups
CER cases compared to Census estimates
Findings

- O/I for many cases was missing, unknown, or otherwise insufficient for analysis (33-85% of auto-coded cases)

- CODING: Occupational results mirror industry results

- Census comparison
  - Mean ages different
  - Women > men in CER study
  - Latency periods between occupational exposures and cancer
  - Limited number of sites examined by the CER project (breast, colon, rectum, CML)
Use of NIOCCS Tool

- Easy to use, but uploaded files require specific formatting

- NIOCCS tool confidence levels
  - Medium (70%): more cases auto-coded, relatively less reliable codes
  - High (90%): fewer cases auto-coded, relatively more reliable codes

- Computer-assisted coding available, but requires knowledge base of O/I assignment
Reflections from Participating States

- Hospital medical records often have insufficient documentation for O/I fields, especially in elderly patients that are now retired.
- The coding still requires extensive manual review and manipulation.
- Ongoing training needed for hospital registrars to collect better quality text information on O/I.
Implications

- Minimum percentage of sufficient/analyzable O/I codes needed for analysis

- Collection of O/I data among central cancer registries is sub-optimal, but can be improved upon

  - Study in New Hampshire: emphasized statewide training to highlight importance of O/I data, which improved O/I data quality across the state

Strengths

- Examination of the utility and capabilities of the NIOCCS tool
- Identification of specific factors for consideration when analyzing O/I with cancer cases
- Comparison to Census estimates
Limitations

- Limited to auto-coded data from the NIOCCS tool, manual coding was too time and labor intensive to complete at this time
- CER project focused on breast, colon, rectum, and CML diagnoses
- Only one year of data analyzed
Future Directions

- Electronic Health Records – Natural Language Processing
- Linkage of Central Cancer Registries to Occupational Registries
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Questions?

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