Using Health Data with Environmental Data to Improve Outcomes: Surveillance to Identify Community Needs

Preventing Air Pollution-Cardiopulmonary Illnesses: Innovative, Cross-disciplinary Solutions

U.S. EPA -- Washington, DC

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“The purpose of surveillance is to empower decision makers to lead and manage more effectively by providing timely, useful evidence.” *

Public Health Surveillance

Ongoing, systematic collection, analysis, interpretation of outcome-specific data for use in the planning, implementation and evaluation of public health practice and is integrated with dissemination of these data to prevent and control disease.*

Environmental Public Health Surveillance / Tracking

- Social Determinants
- Other risk factors

Diagram showing the process of tracking hazards, data collection, network integration, assessment, and stakeholder involvement leading to improved public health.
CDC’s National Environmental Public Health Tracking Program

- **Mission**: To provide information from a nationwide network of integrated health and environmental data that drives actions to improve the health of communities
- CDC currently funds 25 states and NYC
The National Environmental Public Health Tracking Network

Current Content

Asthma
Biomonitoring
Birth Defects
Cancer
CO Poisoning
Childhood Lead
Climate Change
Community Design
Dev. Disabilities
Heart Disease

Homes
Lifestyle Risk Factors
Outdoor Air
Pesticide Exposures
Population Characteristics
Reproductive & Birth Outcomes
Toxic Substance Releases
Water

Visit us at - ephtracking.cdc.gov

Red text indicates content area contains nationally consistent data and measures
Sources:

- Health
- Environmental Data
- Exposure/Other

Data and Information

- Administrative data
- Registries
- Surveys
- Vital Stats

- Environmental monitoring
- Satellite observations
- Modelling

- Exposures: NHANES/Labs
- Other: Census, Surveys
Uses of Surveillance/Tracking Data

- Quantify the magnitude of a problem
- Detect unusual trends, occurrences, relationships
- Identify populations at risk
- Generate hypotheses
- Provide data to test some hypotheses
- Direct and evaluate control and prevention measures
- Develop information for better clinical care and individual-health action
- Facilitate policy development
USING DATA TO ADDRESS COMMUNITY NEEDS

Highlights from the Tracking Program
CDC National Portal: CHD Mortality Benefits Associated with a 10% Reduction in PM$_{2.5}$
Connecting Air Pollution and Health in Washington

- Woodstove smoke a major asthma trigger in some AI and AN communities
- Tracking Program and asthma program studied non-certified wood burning stove use in tribal communities with high asthma rates
- Educated tribal leaders about effects of wood smoke on asthma
- Tribal leaders mobilized communities around smoke management
Targeting Sources of Air Pollution in NYC
Investigating the Relationship between Health and Air Pollution

Associations between ambient air pollution concentrations and respiratory emergency department visits among all age groups in the U.S.

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>ARI</th>
<th>Asthma</th>
<th>COPD</th>
<th>Pneumonia</th>
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<tbody>
<tr>
<td>PM$_{2.5}$</td>
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<td>With Ozone</td>
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<td>Unconstrained, distributed lag model (lags 0 – 6) for a 10 µg/m$^3$ increase in 24 hour PM$_{2.5}$</td>
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H. Strosnider, ISEE, Poster Session 1, Thursday, September 1, 13:00
Addressing the Changing Health Care and Technology Landscape

“for surveillance systems to be useful, they must adapt to the changing environment in which they operate and accommodate emerging public health requirements…”

I’ve Got an App for That!
Tracking Application Program Interface (API) Released

- Provides machine-friendly data for a person to program a machine to read and create people-friendly data tools such as apps for your phone

- Part of NEHA’s Innovating for Environmental Health APP Challenge

- Planning our own APP Challenge
Electronic Health Records (EHRs)

- How can we be best positioned to take advantage of these for improving community health?

- Opportunities for Tracking/Surveillance:
  - Improved timeliness
  - Improved population coverage
  - Improved geographic resolution
  - Fill data gaps – e.g. other risk factors

Percentage of office-based physicians with a basic EHR system, by state: United States, 2013

<table>
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<tr>
<th>State</th>
<th>Project</th>
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<tbody>
<tr>
<td>California</td>
<td>Glycohemoglobin testing and diabetes surveillance among members of KPNC living in Contra Costa or Solano Counties</td>
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<tr>
<td>Massachusetts</td>
<td>ALS and pediatric asthma in MDPHnet (connects Atrius Health, Cambridge Health Alliance, and MA League of Community Health Centers)</td>
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<td>Missouri</td>
<td>Focused on technical requirements for using data from ELRs and ESSENCE</td>
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<tr>
<td>New York City</td>
<td>Validation of prevalence of smoking, obesity, hypertension, diabetes, and elevated cholesterol obtained as aggregate counts from 700 ambulatory practices</td>
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Overall Results from Tracking EHR Pilots

- Results are promising; but, vary across outcome and data sources
  - Laboratory data may be sufficient for some outcomes
  - Rx data did not improve validity / reliability

- Validation necessary. Validity may be impacted by...
  - Case definition / indicator definition
  - Population coverage/representativeness
  - Tenure of insurance coverage
  - Data quality
  - Rarity of outcome

- Administrative barriers
  - Data privacy and governance
  - Interoperability / harmonization
  - Training and documentation
Conclusions

- Tracking / Surveillance is foundational to community health and decision making

- Tremendous opportunities with EHRs and the Internet of Things (e.g. wearable technology and apps)

- More work to be done
Discussion