

# Toxic Exposure Surveillance System (TESS):

The American Association of Poison Control Center

WA Watson<sup>1</sup>, T Litovitz<sup>1</sup>, C Rubin<sup>2</sup>, E Kilbourne<sup>3</sup>, MG Belson<sup>2</sup>, MM Patel<sup>2</sup>, JG Schier<sup>2</sup>, AB Funk<sup>2</sup>

1. American Association of Poison Control Centers 2. NCEH, CDC 3. ATSDR



## Introduction

TESS is a database of all human exposures reported to poison centers in the United States since 1985. Through December 2002 there are 33,820,996 cases. Non-exposure information calls and animal exposure cases have been included in recent years. Annual reports are available at <http://www.aapcc.org/poison1.htm>.

Poison centers are contacted by telephone, with calls primarily from residences (75%); 15% originate from EMS or health care sites and the remainder from schools, workplaces, and other sites. Callers seek prognostic, diagnostic or treatment recommendations and are not simply reporting the event. Special lists in poison information (health care professionals with training in clinical toxicology) collect case data while providing triage and case management recommendations. Coding definitions are standardized across all poison centers and incorporated into specialist in poison information training and center quality improvement processes. Approximately 44% of cases are followed-up, allowing the clinical course of the exposure and its outcome to be documented.

Cases are uploaded to TESS in real-time from poison centers covering the entire United States except Puerto Rico. The AutoUpload process allows real-time toxicsurveillance of approximately 6,500 new exposures daily. (Figure 1) Based on the site of call origination (residences), approximately 4,000 of these cases daily may not come to the attention of other health care surveillance systems.

## Case Data Fields

Data Fields include:

- Reporting poison center, date and time
- Call type, exposure site, reason for exposure
- Caller location (zip code or area code and prefix)
- Patient age, sex, weight, pregnancy status
- Exposure acuity, duration, substance, number of substances, route, amount
- Clinical effects and their relationship to the exposure
- Management site
- Therapy provided
- Outcome

## Clinical Effects

131 clinical effects, physical findings, diagnostic tests and laboratory results are independently documented in human exposures. Each variable is documented as either related, not related, or unknown if related to the exposure. The effects are categorized as (n=number of effects in category):

- |                                |                  |
|--------------------------------|------------------|
| 1) Cardiovascular (n=11)       | 6) Dermal (14)   |
| 2) Hematological/Hepatic (n=9) | 7) Ocular (n=13) |
| 3) Gastrointestinal (n=20)     | 8) Renal (n=10)  |
| 4) Respiratory (n=10)          | 9) Misc (n=20)   |
| 5) Neurological (n=24)         |                  |

Figure 2. 5/13/2003 Clinical Effect Outliers (Using MMWR Fig 1-based method) (reported 12:45 PM 5/14/2003)

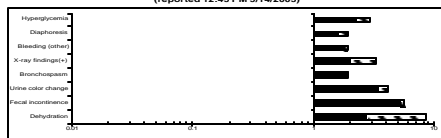


Figure 1. TESS - Daily Count of Information Calls, Human Exposure Cases, and Total Volume (1/1/2000 through 8/31/2003). (9/1/2001 through 12/1/2001 bracketed)

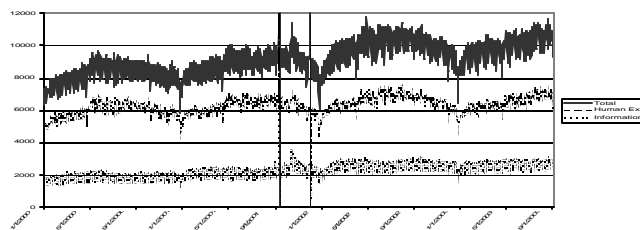
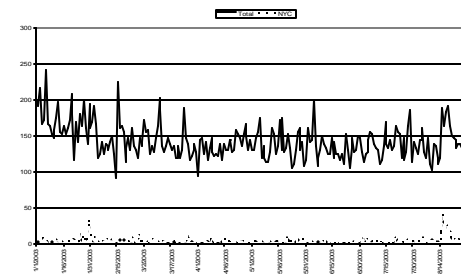


Figure 4. TESS Cases of Food Poisoning and Spoiled Food 2003 – US and New York City



## Methods

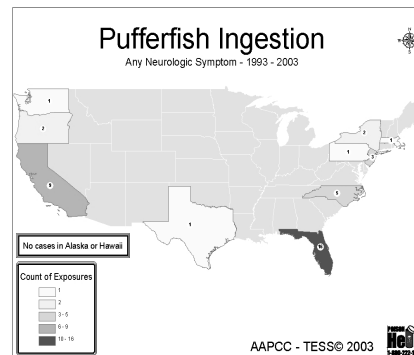
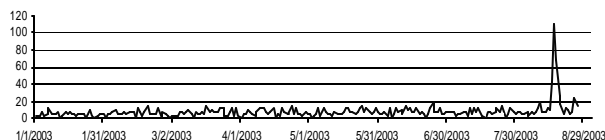
1. Daily count of clinical effects are monitored and signals evaluated:
  - Nationally
  - For 12 individual poison centers (pilot)
2. Individual syndromic surveillance has been implemented and signals evaluated for various substances including arsenic, botulism, nerve agents, cyanide, and paraquat.
3. Additional approaches, combining substances, routes and syndromic surveillance are being explored, for example - puffer fish ingestion with any neurological clinical effect.
4. Volume of poison center activity (hourly case volume reported at 2 hr intervals) is monitored.
5. Monitoring defining any value > either baseline mean + 2 or 3 SD as a signal, depending on the variable monitored. EARS has recently been implemented. Additional statistical approaches are being developed to achieve temporal-spatial analysis.
6. All signals are reviewed by a clinical toxicologist.

## Results

Monitoring of TESS cases using individual clinical effects, syndromic surveillance and case volume has identified various events. Clinical effect monitoring has identified 3 bioterrorism preparedness exercises, each involving a single state or city. For example, TOPOFF 2 included 10 cases reported to the Illinois Poison Center with a positive chest radiograph, fever, and coughing. These cases produced clinical effect outliers when national data was reviewed, and were identified by daily case review. (Fig 2)

Substance monitoring is currently being implemented, and may complement syndromic surveillance as suggested by the impact of the Aug 14, 2003 electrical blackout on poison center calls about food poisoning and contaminated water. (Fig 3; Fig 4) The addition of a GIS component is currently being developed, and has been used for puffer fish ingestions (map).

Figure 3. TESS - Contaminated Water Calls - 2003 (1/1/2003 through 8/26/2003)



## Conclusions

The Toxic Exposure Surveillance System database can contribute significantly to surveillance of chemical, environmental, product and pharmaceutical toxicity events. It has the advantages of: 1) national coverage (except Puerto Rico), 2) continuous updating, 3) 20 years of historical baseline data, 4) standardized data definitions, and 5) specialist in poison information data collection and entry.

Continued development of database surveillance will address: 1) data accuracy and validity, 2) correlation of data with known events, 3) enhance statistical and presentation methods, and 4) communication of findings through an organized process.