

# Biosurveillance in Arizona

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# Epidemiologic point of view

- Goal of biosurveillance
- Factors affecting detection
- Surveillance data sources
- Early event detection
- Conclusions

# Biosurveillance Goals

- Detect Infectious/acute disease
  - Clusters, outbreaks
  - Individual cases
- Monitor
  - Magnitude
  - Trends in person, place and time

# Detection dependencies

## At the individual level

- Disease characteristics
- Patient behavior
- Provider practices and behavior

## At population level

- Susceptibility
- Prevalence or endemicity
- Mobility, migration, environmental factors

# Detection dependencies

## Animal surveillance

- Submission and testing of animals
- Reporting
- Population monitoring

## Environmental Surveillance

- Air, water, sewage, food testing
- Climate
- Individuals

# Detection Assumptions

1. Minimize the time to detection
2. Maximize the sensitivity and specificity
3. Detect Individual cases of disease and small clusters to community-wide outbreaks
4. Different data sources will detect different types of outbreaks
5. Each outbreak has a characteristic footprint or picture – recognizing an unusual footprint is key

# Monitoring

- Provide baseline data
- Situational awareness
  - Impact on health care and public health
- Redirect or target resources
- Evaluate intervention and effectiveness of control measures and policy
- Provide follow up and patient tracking

# Detecting Disease



\_\_\_\_\_ **Animal surveillance** —————>

\_\_\_\_\_ **Environmental surveillance** —————>

# Detecting Disease



\_\_\_\_\_ **Animal surveillance** —————>

\_\_\_\_\_ **Environmental surveillance** —————>

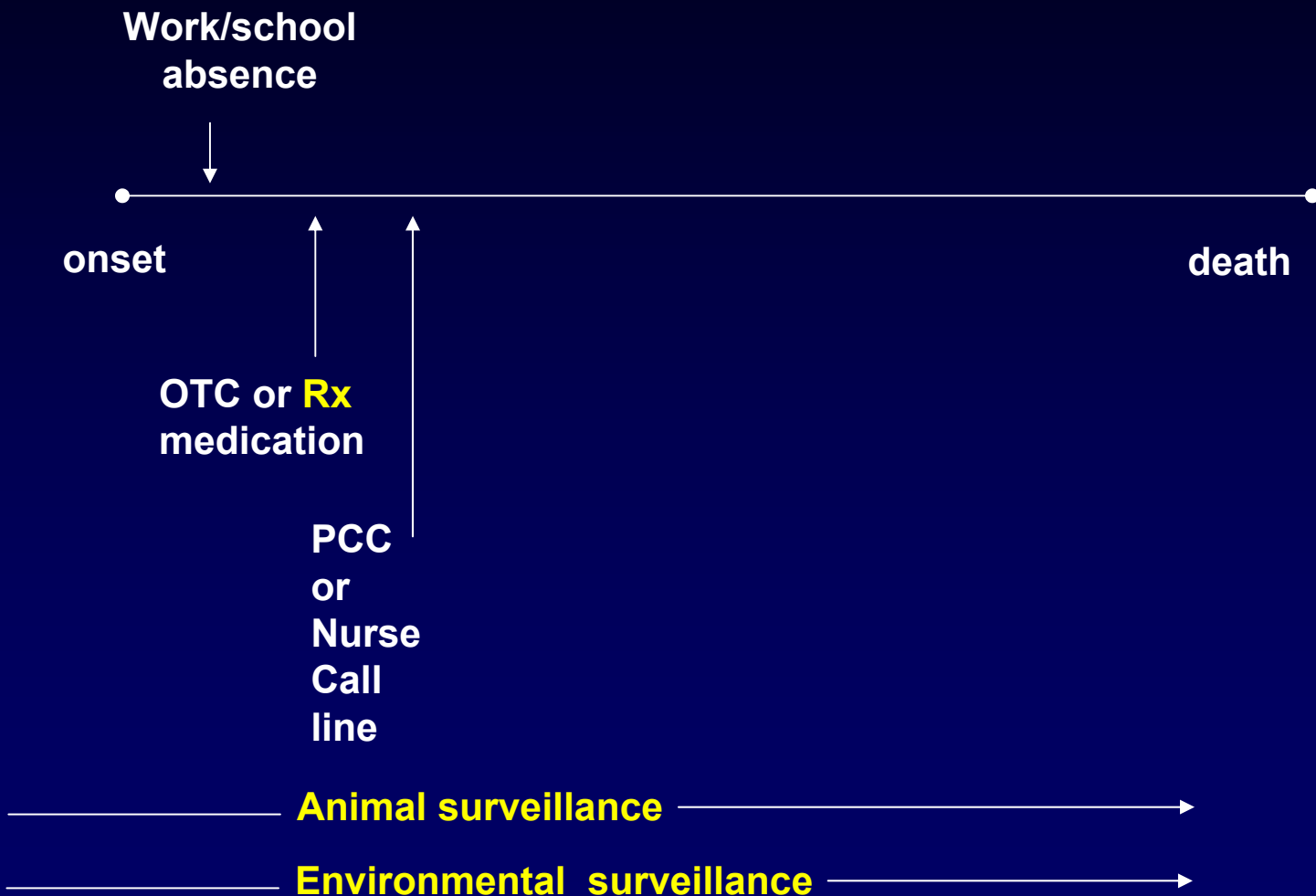
# Detecting Disease



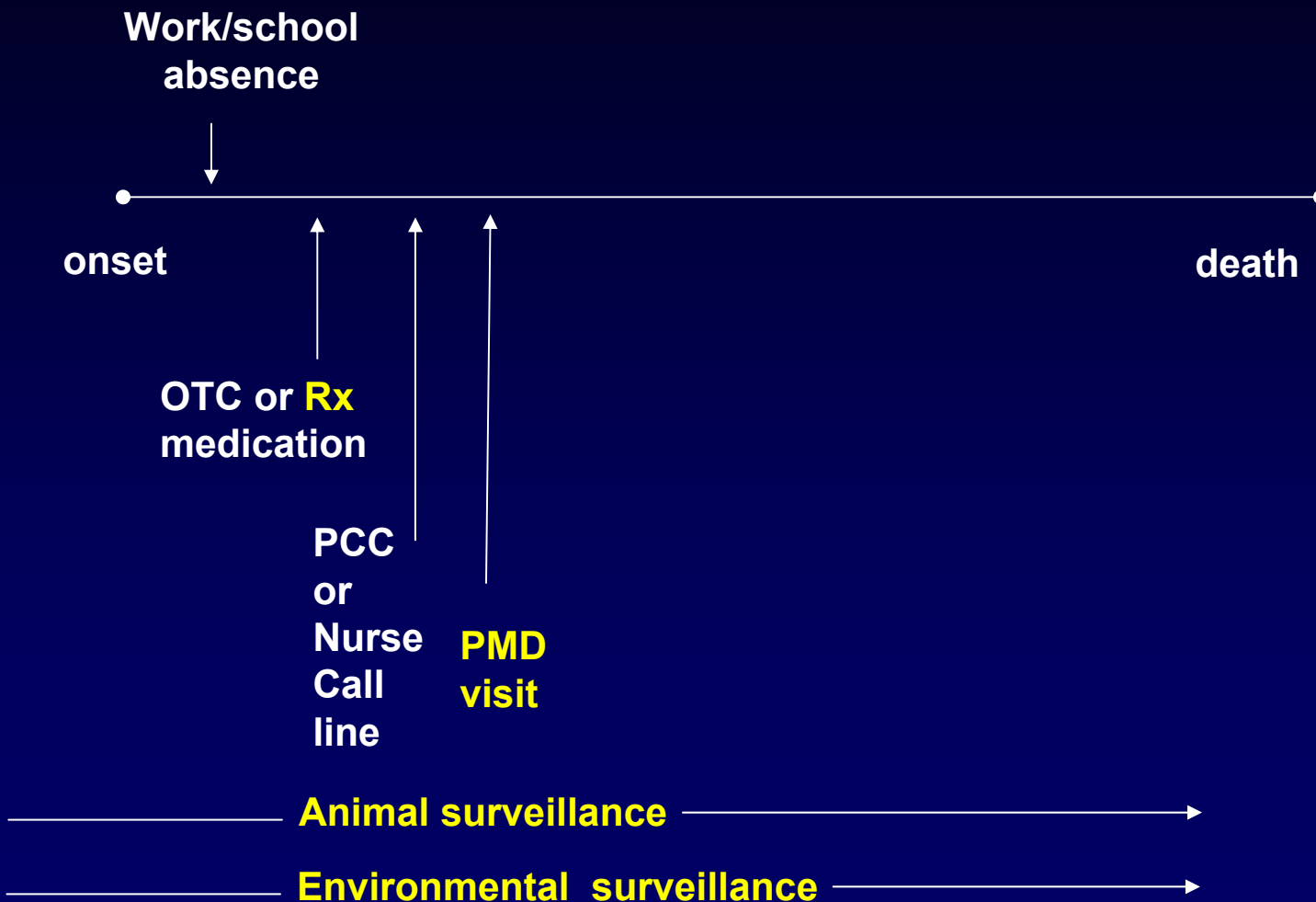
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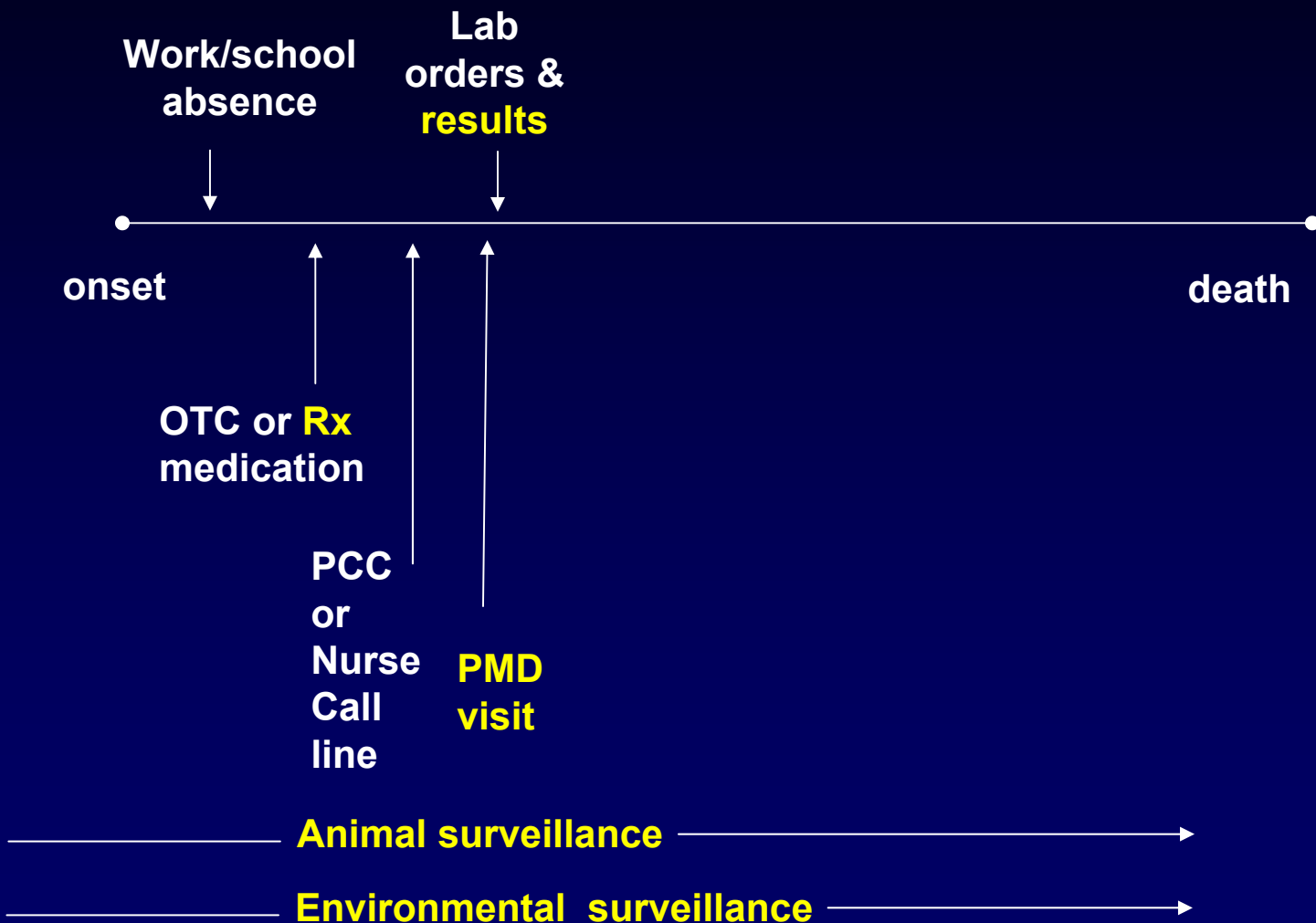
# Detecting Disease



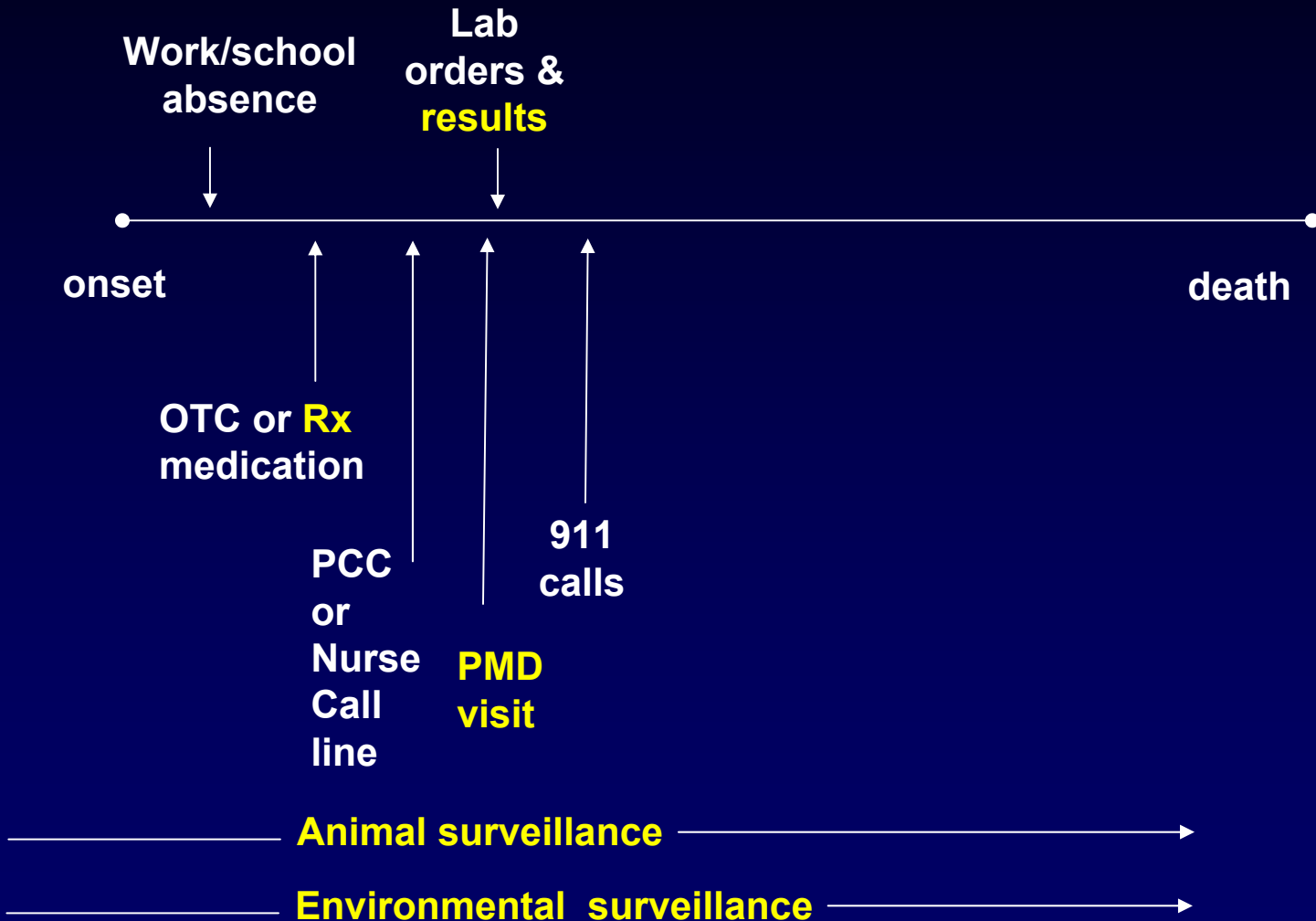
# Detecting Disease



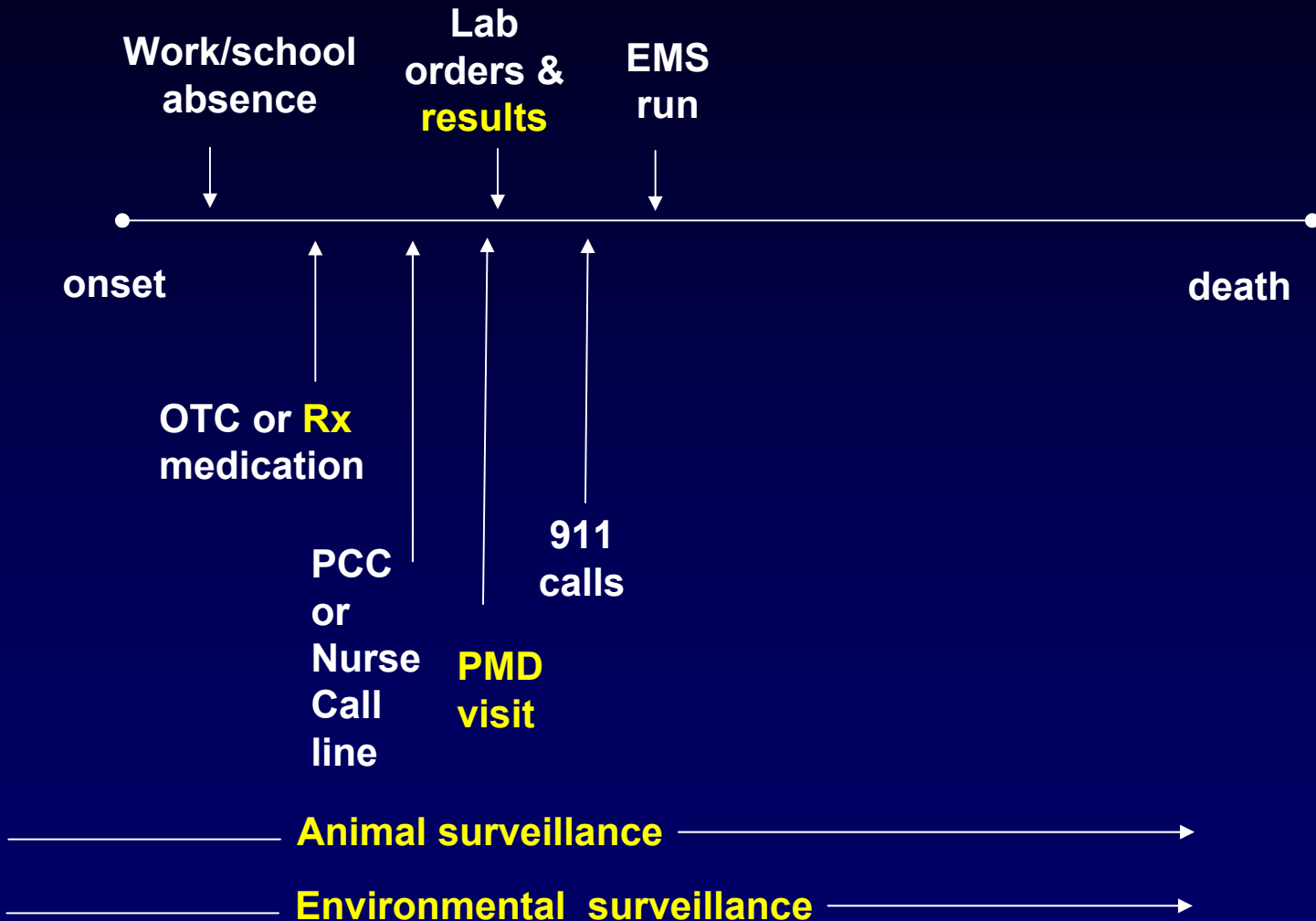
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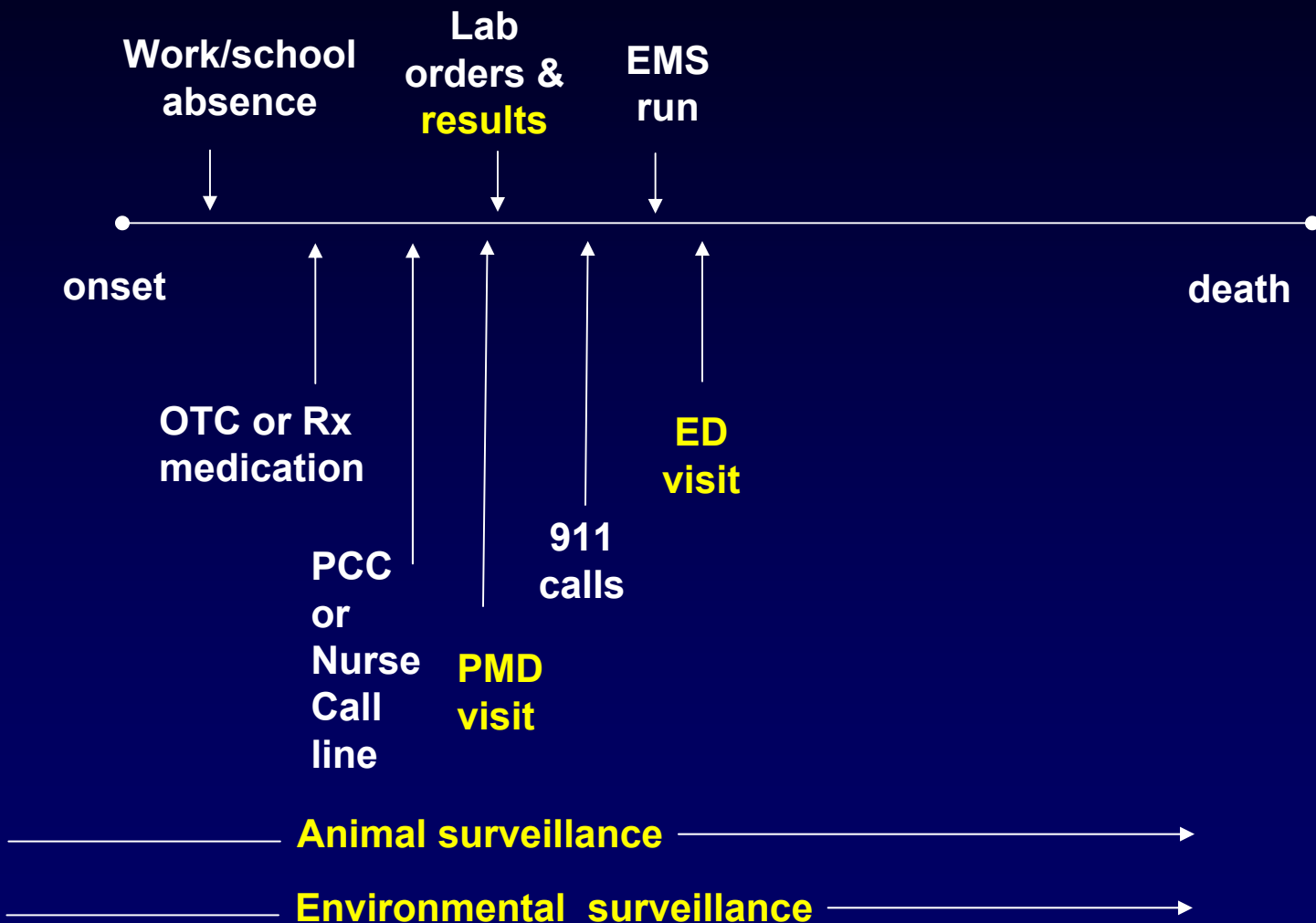
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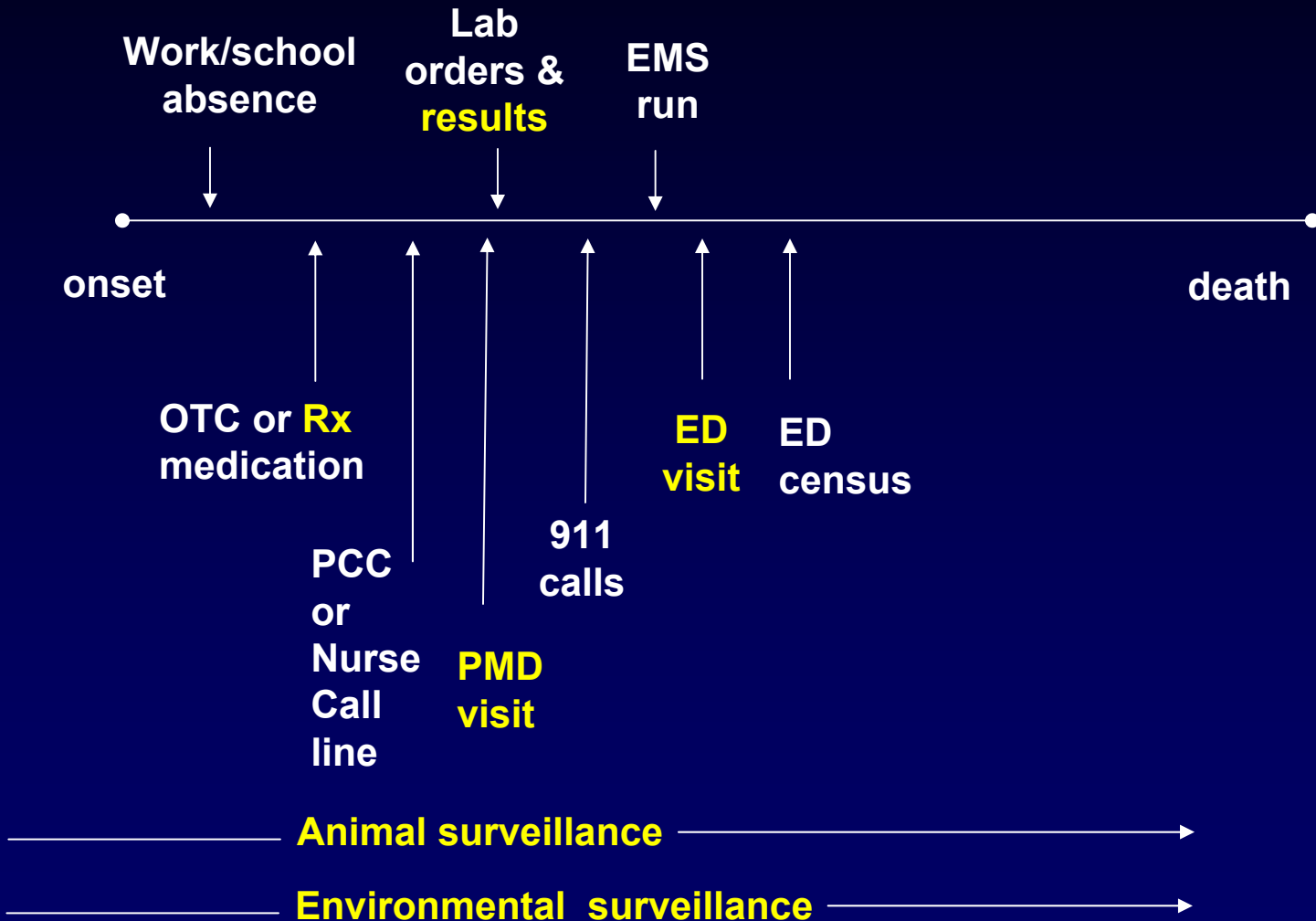
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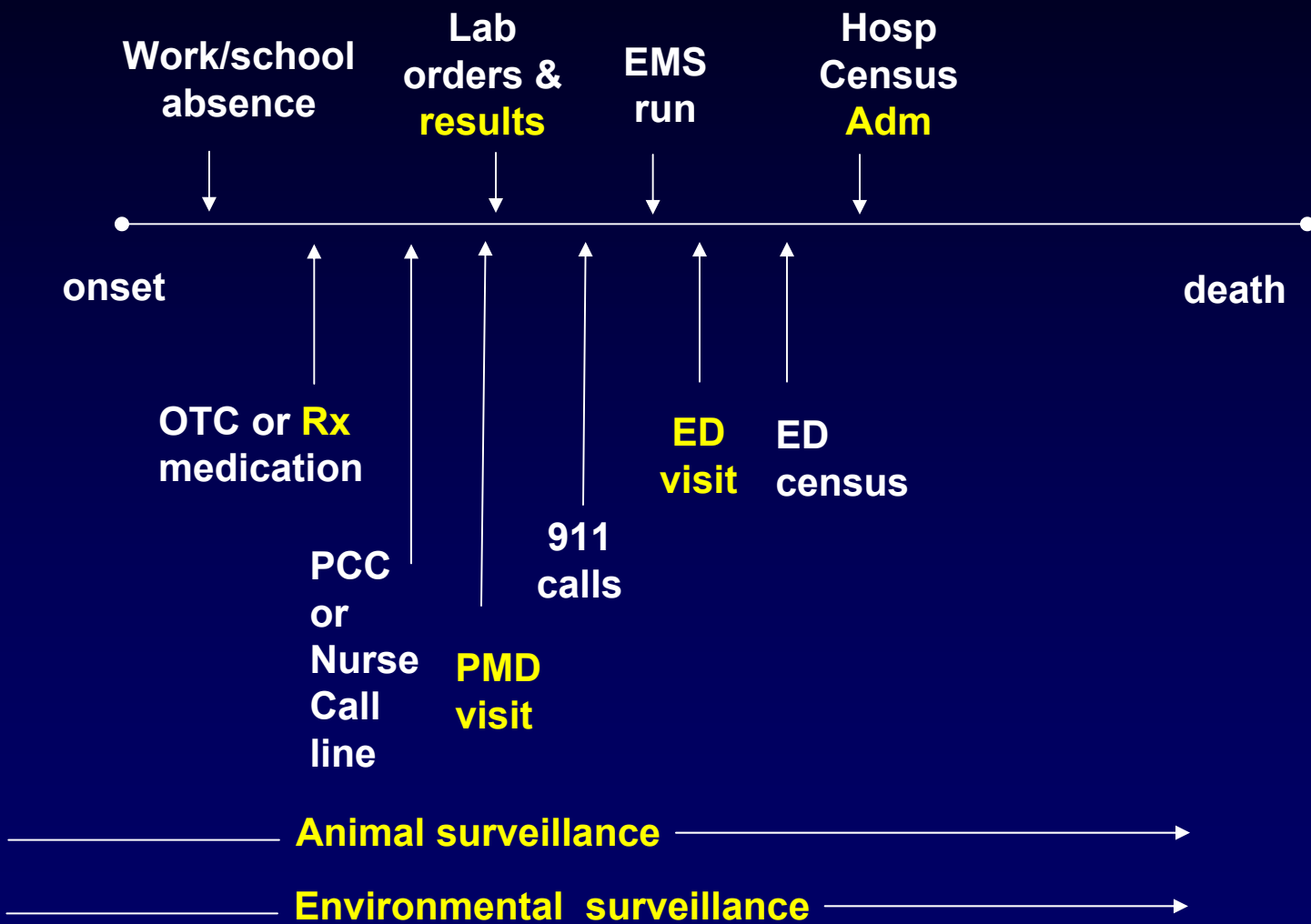
# Detecting Disease



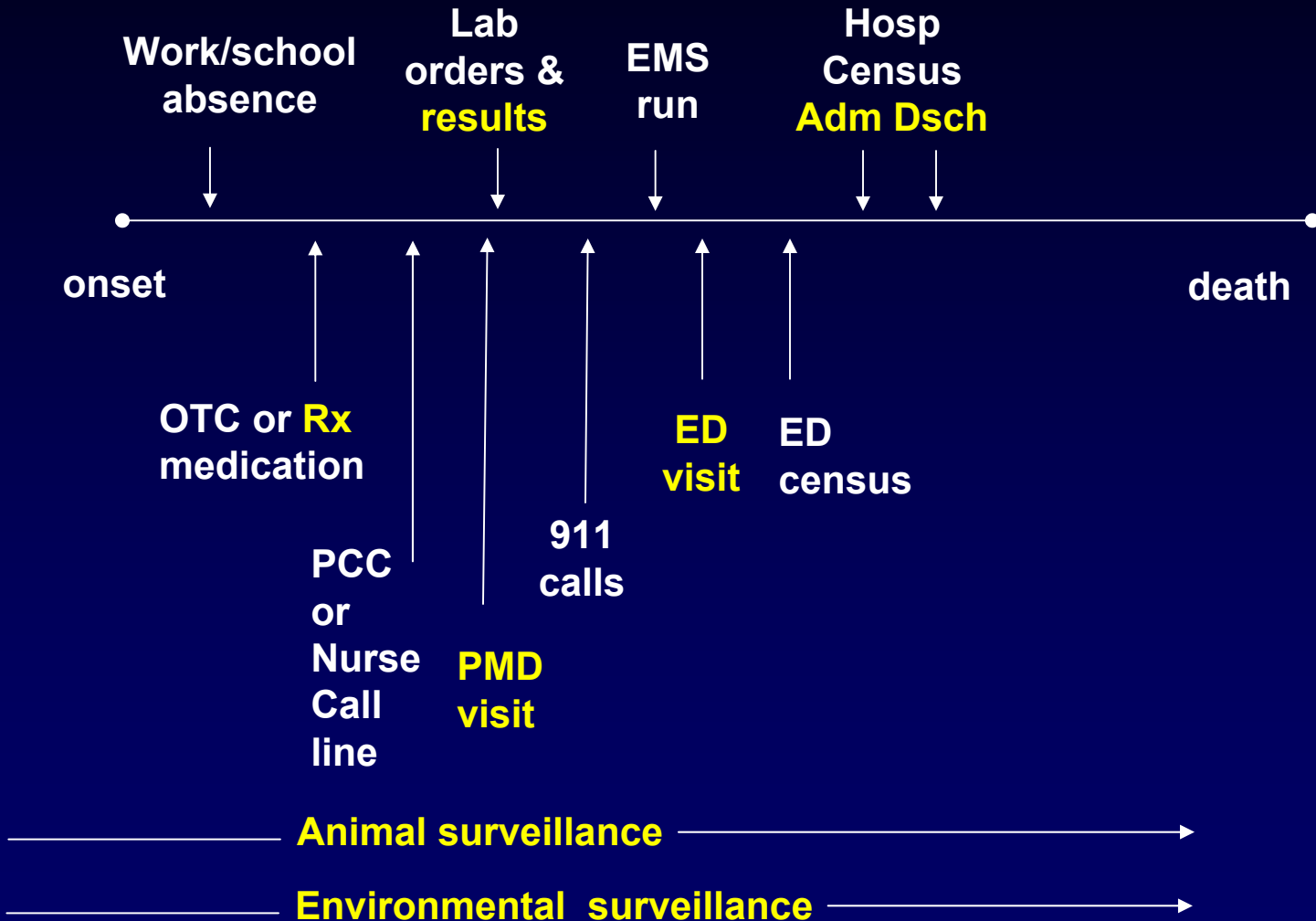
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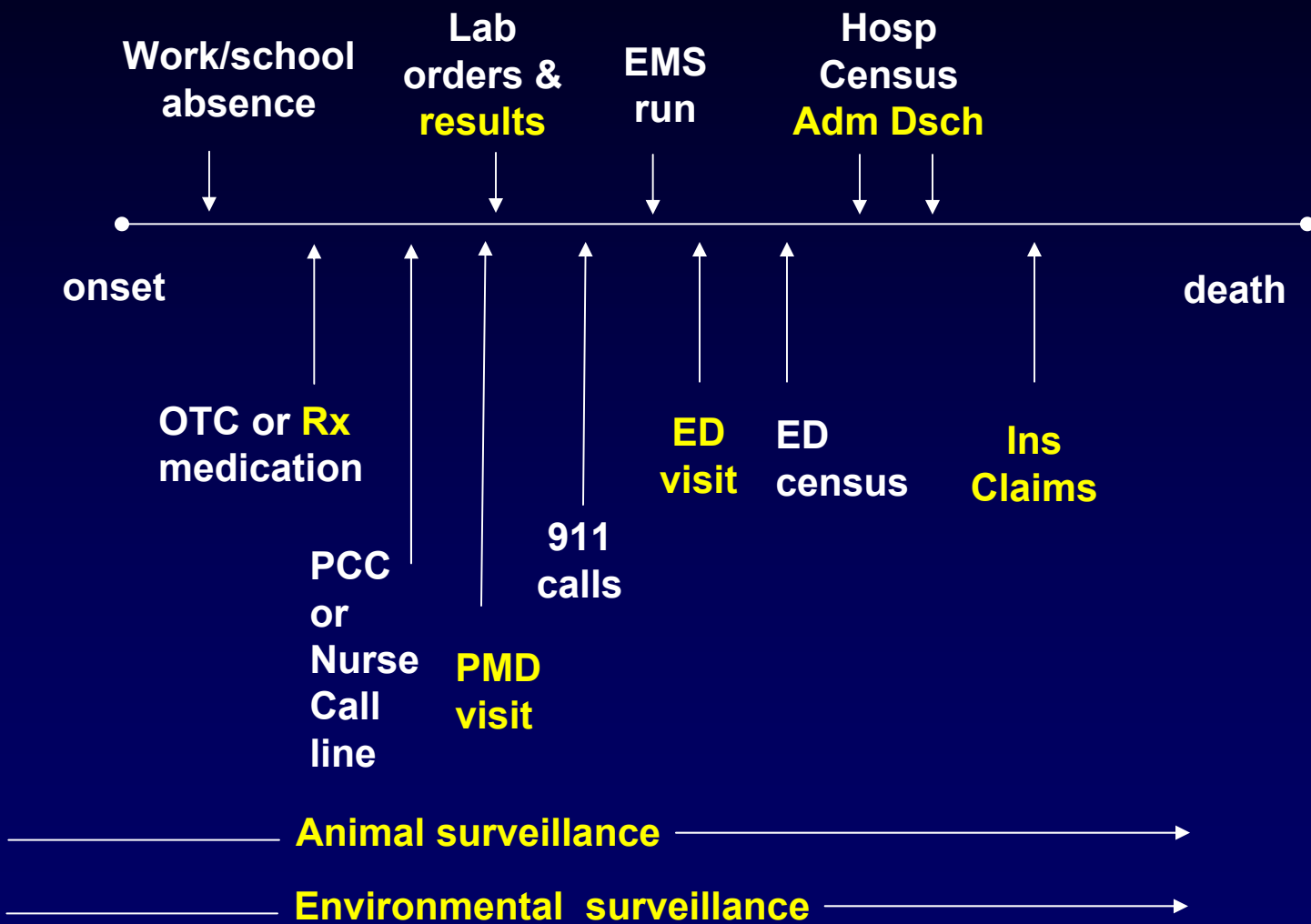
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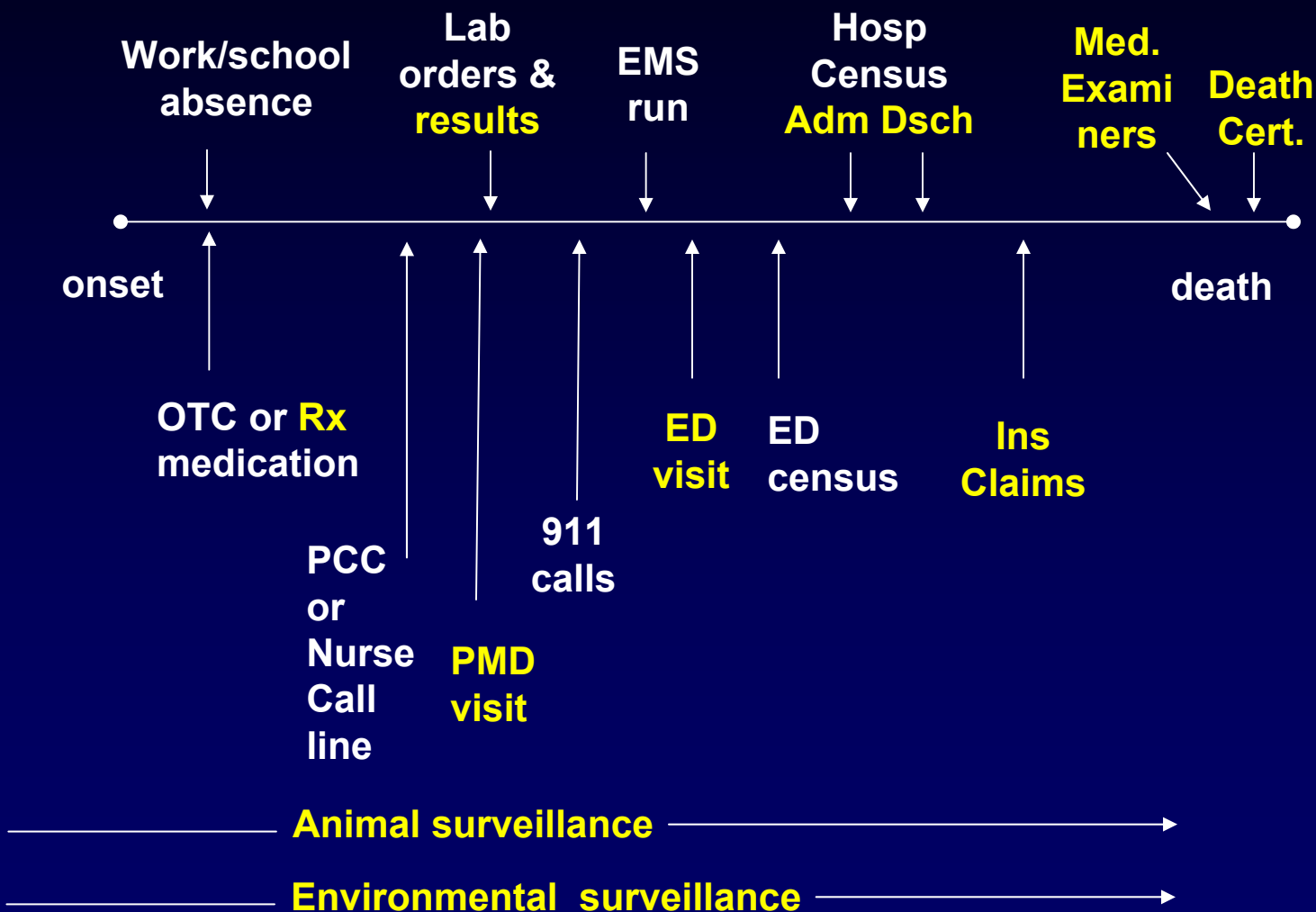
# Detecting Disease



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# Detecting Disease



# Issues

- Most syndromic data are not validated for surveillance purposes
  - resolution, quality of data, etc.
- Syndrome categories are not validated
- Current syndrome categories have a relatively low predictive value and specificity (frequent false positive signals, tend to miss small outbreaks)

# Current Use in Arizona

- Influenza-like illness surveillance
- Environmental air sampling and testing
- BioSense (VA, DoD, and Lab Corp)
  - In and outpatient ICD-9 codes, lab orders
- RODS OTC sales
  - Unit sales counts, promotional sales
- EMsystem – ED diversion monitoring

# Early Event Detection

- WNV Syndrome Definition Project
- Scottsdale Healthcare ED data Project
- City fire departments – EMS runs
- Child health indicator program project

# Arizona EED system

Develop flexible system for prediagnostic surveillance with U of A AI Lab

- Easily changeable syndrome categories
- Multiple algorithm/analysis methods
- Interoperable with MEDSIS
- Visualize data across “comparable” sources
- Develop protocols for verification, interpretation and investigation of signals

# Arizona Event Monitoring

- CDC data provisioning – Banner Health hospitals in Arizona
  - Data feed directly to State and CDC
- Ensure Public Health role and needs are integrated in the Governor's Health-e initiative (electronic health record sharing – RHIO)

# Conclusions

- ✓ Early event detection systems
  - not standardized (case definitions, analysis, investigations, etc.)
  - not validated
  - No ideal system has been identified, most are not interoperable or integrated
- ✓ Initially more resources may be required
  - daily monitoring and follow up
  - Automation will reduce some labor
- ✓ Provides some reassurance that there is no large outbreak

# Conclusions

- ✓ Absenteeism, OTC, ED chief complaint surveillance
  - detects community-wide disease activity earlier – difficult to confirm the disease
  - Diseases of less severity
- ✓ 911, EMS, ED ICD-9, Inpatient surveillance
  - may detect individual rare or unique cases
  - More severe cases
  - Provide situational awareness



*W. Hamilton*

*"And it was so typically brilliant of you to have invited an epidemiologist."*