Cysticercosis
Los Angeles County
Public Health Problem Identified

• LAC Cysticercosis hospitalizations
  – 10-15 cases in 1970’s
  – 80 by early 1980’s
    (F. Richards et. al. 1985, JAMA)

• Severe Disease
  – 56% Seizures, 21% hydrocephalus (N=238) among hospitalized cases (D. Scharf 1988, Arch Neurol)

• Cysticercosis is Preventable!
How to Prevent Cysticercosis

Review of Life Cycle
Public Health Opportunity

In 1988 LAC Public Health identified an opportunity for disease prevention:

• Add cysticercosis to the list of reportable diseases for LAC

• Public health nursing to screen close contacts of reported Cysticercosis cases for Taeniasis

• Refer Taeniasis cases for treatment
Public Health Results

• This intervention method has been successful in identifying cases

  – Taeniasis cases were identified in 7% (5/72) of households tested (1988-1991).

What’s Happening With Cysticercosis in LAC Today?

• Review available data sources:
  – Reported cases
  – Death Certificates
  – Hospital Discharge Data
  – Published Studies
Reported Cases
LAC
Reported Cases, LAC

Figure 1 Cysticercosis Incidence Rates per 100,000, Los Angeles County

\[ y = -0.0366x + 0.7763 \]

\[ R^2 = 0.8124 \]
### Reported Cases, LAC 1993-2006 (N=411)

<table>
<thead>
<tr>
<th>Race/ Ethnicity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latino</td>
<td>371</td>
<td>93%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>17</td>
<td>4%</td>
</tr>
<tr>
<td>Asian</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td>African American</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Unknown</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>216</td>
<td>53%</td>
</tr>
<tr>
<td>Female</td>
<td>192</td>
<td>47%</td>
</tr>
</tbody>
</table>
Trends in Reported Cases, LAC
Early vs. Later Cases

Health Department Cases

- Born in Mexico: 61% (1988-1990), 60% (2003-2006)

Latino Immigrant Born in Mexico U.S Resident >10 yrs Mortality

1988-1990 Study (N=138)
2003-2006 Study (N=60)

Mean Age


Years
## Reported Cases by Health District

**LAC, 2004-09 (n=59)**

<table>
<thead>
<tr>
<th>HEALTH DISTRICT IMPACTED</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL MONTE HD/ Pomona HC (23)</td>
<td>8</td>
<td>14%</td>
</tr>
<tr>
<td>SAN ANTONIO HD/ Compton HC (58)</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>ANTELOPE VALLEY HD/Antelope Valley HC (5)</td>
<td>4</td>
<td>7%</td>
</tr>
<tr>
<td>POMONA HD/ Pomona HC (54)</td>
<td>4</td>
<td>7%</td>
</tr>
<tr>
<td>EAST VALLEY HD/ North Hollywood HC (19)</td>
<td>4</td>
<td>7%</td>
</tr>
<tr>
<td>SAN FERNANDO HD/ Pacoima HC (62)</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>SOUTH HD/ South HC (69)</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>SOUTHEAST HD/Humphrey HC (72)</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>WEST VALLEY HD (86)</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>BELLFLOWER HD/Bellflower HC (6)</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>CENTRAL HD/ Central HC (9)</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>Other Health Districts (2 or fewer cases)</td>
<td>15</td>
<td>3%</td>
</tr>
</tbody>
</table>
Mortality
Cysticercosis Mortality

• National Mortality
  • 221 Deaths 1990-2002 (17 per year)
    • 60% occurred in CA
    • 32% occurred in LAC
  
  F. Sorvillo et. al. 2004, EID

• LAC Mortality
  – Slight decrease over time
  – Demographics
    • 96% Latino
    • Mean age 41.2 years
    • 62% male
Hospitalizations

Hospitalizations 1991-2008 (18 years)

- 7,169 Cysticercosis hospitalizations (398 per year)
- 3,937 NC* Hospitalization (218 per year)
- 1,488 NC* Hospitalization with primary Dx cysticercosis (82 per year)

*NC=neurocysticercosis
Hospitalization Demographics
LAC, 1991-2008 (n=3937)

• 91.6 % Latino

• Male: Female = 1.1:1

• Mean age 38.4 years
  • 31.3 years in 1991
  • 43.1 years in 2008
Hospitalizations

• Economic Burden over 18 years
  – $136.2 million total hospitalization charges
    • Averaging $7.9 million per year
  – Average charge per patient was $37.6 thousand
  – Most common payment method
    • Medicaid (43.9%)
    • Private insurance (24.5%)

• The average length of stay was 7.2 days.
Hospitalizations 1991-2008

- 3,937 neurocysticercosis hospitalizations identified
  - 72.8% seizure or convulsion (2,866)
  - 30.9% hydrocephalus (1,217)
  - 6.2% cerebral cyst (244)
  - 2.2% cerebral edema (866)
  - 2.0% death (77)
Figure 1. Neurocysticercosis Hospitalizations and Hospital Charge by Year
Los Angeles County 1991-2008

Neurocysticercosis Hospitalizations
\[ y = -0.26x + 221.09 \ (R^2 = 0.01) \]

Hospital Charge for Neurocysticercosis
\[ y = 0.63x + 1.89 \ (R^2 = 0.74) \]
# Hospitalizations Procedures

**Los Angeles County 1991-2008 (N=3937)**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>n</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS Procedure</td>
<td>1273</td>
<td>32.3%</td>
</tr>
<tr>
<td>Lumbar Puncture</td>
<td>472</td>
<td>12.0%</td>
</tr>
<tr>
<td>Brain Procedure</td>
<td>842</td>
<td>21.4%</td>
</tr>
<tr>
<td>Any Ventricular Shunt</td>
<td>564</td>
<td>14.3%</td>
</tr>
<tr>
<td>Shunt Removal / Replace</td>
<td>217</td>
<td>5.5%</td>
</tr>
<tr>
<td>Ventriculostomy</td>
<td>155</td>
<td>3.9%</td>
</tr>
<tr>
<td>Brain Excision</td>
<td>131</td>
<td>3.3%</td>
</tr>
<tr>
<td>Craniotomy</td>
<td>23</td>
<td>0.6%</td>
</tr>
<tr>
<td>MRI or CT Scan of Brain</td>
<td>1256</td>
<td>31.9%</td>
</tr>
</tbody>
</table>
Cysticercosis Trends

1993-2006 (16 years)
Cysticercosis in Los Angeles County

Reported cases down 49%

- 1993-1999: 227
- 2000-2006: 115

Reported Cases  Deaths  Hospitalization  NC Hospitalization  NC Hospitalization (Primary Dx)
Cysticercosis in Los Angeles County

Reported cases down 49%
Mortality down 37%
Cysticercosis in Los Angeles County

Reported cases down 49%
Mortality down 37%
Hospitalizations up 5%

- Reported Cases: 227 vs. 115
- Deaths: 24 vs. 15
- Hospitalization: 2755 vs. 2883

Legend:
- 1991-1999
- 2000-2006
Cysticercosis in Los Angeles County

- Reported cases down 49%
- Mortality down 37%
- Hospitalizations up 5%
- NC hospitalizations up 5%

[Graph showing comparison of reported cases, deaths, hospitalization, and NC hospitalization between early and later cases.]
Cysticercosis in Los Angeles County

- Reported cases down 49%
- Mortality down 37%
- Hospitalizations up 5%
- NC hospitalizations up 5%
- NC hospitalizations (primary Dx) down 12%
Cysticercosis in LAC

Early Cases vs. Later Cases

49% decrease in reported cases

37% decrease in mortality

5% increase in hospitalizations

5% increase in NC hospitalizations

12% decrease in NC hospitalizations (primary diagnosis)

NC = neurocysticercosis
Other Published Studies
Cysticercosis and Taeniasisis are Still Prevalent In and Around LAC

The sero-prevalence in a mostly Hispanic immigrant population in Ventura County approximates the prevalence in some endemic areas of Latin America.

METHOD

– Obtain finger pick blood samples from 1) Select persons living in a federally funded, predominantly Hispanic residential community 2) and in two migrant farm worker camps in rural Ventura County, California

– Test serum immunoblots for both cysticercosis and taeniasis.
DeGiorgio C, et al 2005

RESULTS (N=449)

– 1.8% positive for *T. solium* cysticercosis

– 1.1%. Positive for *T. solium* taeniasis
Conclusion

• Cysticercosis remains a public health problem in LAC

• The disease is severe and represents a significant economic burden to LAC

• The disease can be prevented through detection and treatment of taeniasis cases

• Implementing improved testing methods for taeniasis will increase the likelihood of detection
Questions?
References


References


References