Background

• Meningitis
  • A process that involves inflammation of the outer lining covering the brain and spinal cord.
    • Infection is the most common etiology (i.e. Viral, bacterial, fungal)
    • Patient usually present with classic triad of fever, nuchal rigidity & neurological symptoms (i.e. ALOC, Convulsions, Sensitivity to light)
  • Acute meningitis is very aggressive disease that requires immediate diagnosis and intervention.
  • Delays in accurate diagnosis increases the risk of severe disability and/or mortality.
Immunosurpression & Meningitis

- Cryptococcus is the most common cause of meningitis in AIDS population.
- In Kenya, up to 40% of people with AIDS develop cryptococcal meningitis.
- The mortality rate of patients with cryptococcal meningitis having AIDS is 10-25%, most deaths occurring within the first 2 weeks of onset of therapy.
Cryptococcus Meningitis in Kisumu District

- Kanji S. et al., 2011 –
  - Features of Cryptococcus in Nyanza province
  - 202 patients (aged 26-47) from 4 hospitals (2 private, 2 government) – cross sectional survey (questionnaires)
- Findings
  - Most common symptoms - Headache (94%), fever (63%), nuchal rigidity (64%) & ALOC (47%)
  - 30 days from onset of symptoms to the time patients present at the hospital
  - Patients often self medicated for suspected malaria infection
  - Treatment initiated 3 days after admission
  - Length of Hospitalization – 12 days, Overall mortality rate of 23.4%
Lumbar Puncture

- In settings with ready access to and no contraindication
  - LP + culture or antigen specific test are the gold standard for diagnosis of Meningitis
  - Cerebral spinal fluid
    - protein, glucose and WBCs
  - Stains, cultures and antigen/antibody specific test for TB, fungal and other bacterial causes
  - Negative results, work up Viral meningitis via PCR
    - Herpes, CMV, HIV, etc
Research Question

In rural setting such as Siaya County Referral Hospital (SCRH), the diagnostic capabilities are not as well develop:

1. What clinical and laboratory tools used in the diagnosis of meningitis at SCRH?
2. Does the use of lumbar punctures improve outcomes of patients at SCRH?
Objective

1. Determine most common signs and symptoms in patients diagnosis or suspected of having meningitis.

2. Determine the frequency of patients receiving lumbar punctures suspected of having Meningitis and comparing rates other factors such as gender, signs & symptoms, type of meningitis, HIV status and malaria parasite.

3. Compare outcomes in terms of mortality and length of stay of patients who received LPs.
Methods
Methodology

- Retrospective chart review of all patients diagnosis with or suspected of having meningitis between the months of April 2013 and March 2014.
  - Total cases = 108

- Based on previous studies, the expected a compliance rate of approximately 95%.

- The number needed for statistical significance with an expected compliance rate of 95% is 64.
  - 58 files obtained from records department
Study Parameters

- Demographic Data
  - Age, gender, occupation

- Clinical Presentation
  - Headache, ALOC, Fever, Nuchal Rigidity
  - Comorbidities –HIV, TB, Malaria
  - Type of Meningitis Diagnosis

- Diagnostic test results
  - Lumbar Puncture results in chart and/or within laboratory records
    - Siaya County Referral laboratory and CDC laboratory

- Clinical Outcomes
  - Length of stay, Case Fatality rate
Results
# Demographic Characteristics of Study Population

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>Number Of Patients (N) Total 58</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>35</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28% (16)</td>
</tr>
<tr>
<td>Female</td>
<td>72% (42)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Farmers</td>
<td>14% (8)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>9% (5)</td>
</tr>
<tr>
<td>Business</td>
<td>7% (4)</td>
</tr>
<tr>
<td>Student</td>
<td>9% (5)</td>
</tr>
<tr>
<td>Other</td>
<td>10% (6)</td>
</tr>
<tr>
<td>Unknown</td>
<td>52% (30)</td>
</tr>
<tr>
<td><strong>Comorbidities</strong></td>
<td></td>
</tr>
<tr>
<td><strong>HIV</strong></td>
<td>72% (42)</td>
</tr>
<tr>
<td>Known Pos, ON RVT</td>
<td>88% (37), 54% (20)</td>
</tr>
<tr>
<td>Tested Pos @ Admission</td>
<td>12% (5)</td>
</tr>
<tr>
<td>Non Reactive</td>
<td>20% (12)</td>
</tr>
<tr>
<td>Unknown Status</td>
<td>7% (4)</td>
</tr>
<tr>
<td><strong>Malaria</strong></td>
<td></td>
</tr>
<tr>
<td>Pos</td>
<td>16% (9)</td>
</tr>
<tr>
<td>Neg</td>
<td>36% (21)</td>
</tr>
<tr>
<td>Unknown</td>
<td>48% (28)</td>
</tr>
<tr>
<td><strong>TB</strong></td>
<td>1.7% (1)</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Length of Stay</td>
<td>9.1 days</td>
</tr>
<tr>
<td>Case Fatality Rate</td>
<td>19% (11)</td>
</tr>
</tbody>
</table>
Distribution of Meningitis by Category

- Bacterial (N=5) - 8.7%
- Fungal (N=24) - 41.3%
- Non-Specific (N=29) - 50%

Total = 58
Age Distribution of Meningitis Related Hospitalizations

- Bacterial (n=5)
- Fungal (n=24)
- Non-specific (n=29)

Categories:
- 65 & greater
- 45-64
- 22-44
- 13-21
Common Symptoms & Signs

![Bar chart showing percentages of different symptoms in total meningitis and cryptococcal meningitis.](chart.png)
Number of Signs & Symptoms at Presentation

![Graph showing percentage comparison of signs and symptoms between Total and Crypto categories]
Comparison of Signs & Symptoms and rates of LP

![Bar graph showing % Lumbar Puncture with symptoms and number of symptoms]
Comparison of Gender & LP Rates
Comparison of HIV Status & LP Frequency
Comparison of Malaria rates and LP Frequency
Comparison of Meningitis Category and LP Frequency
Case Fatality Rates

Overall Case fatality rate – 19%
Average Length of Hospitalizations – 9.1 days
Summary
Summary

- Less than half (41%) of all cases received a LP
- Patients that presented with multiple signs and symptoms had higher rates of LP
- Males with unspecified meningitis had lower rates of LP (21%), whereas cryptococcal cases had higher rates (57%)
- Among females, LP was more likely in cases of bacterial meningitis (100%) and least likely in cryptococcal meningitis (31%)
- Patients diagnosis with bacterial meningitis were more likely to receive lumbar punctures (80%)
- 23% of known HIV positive patients diagnosis with Cryptococcal meningitis had a LP
Summary

- Among patients with HIV, KP were least likely to receive a LP (31%), whereas newly diagnosis patients had a higher rate of LP (100%).

- Fatality rates were similar between patients who received and did not receive a LP.

- Cases of meningitis with positive MPS and negative HIV trended towards higher fatalities rates.

- Extended hospitalization was more likely to occur in HIV positive patients diagnosis with bacterial meningitis

- Average hospital stays were shorter in patients that were given steroids or who had positive MPS.
Recommendation

- Develop uniform hospital standards for the diagnosis of meningitis and subcategories
- Increase overall rates of LP among patients diagnosis with meningitis
- Increase utilization of LP in female HIV positive patients suspected of cryptococcal meningitis
- Careful evaluation of patient suspected of meningitis with positive MPS.
- Consider the use of adjuvant therapy such as steriods in select cases
- Implementation of a Discharged Summary - To improve data collection
- Continue heighten surveillance of newly diagnosis HIV patients suspect of having meningitis
- Continue aggressive diagnostic work up of patients with bacterial meningitis
Limitations

- Sample Size

- Data Collection
  - Obtaining Records, log files, LP results
  - Interpreting Files
  - Missing Data

- Unable to confirm diagnosis
  - Received multiple days of Antimicrobials before LP
Acknowledgements

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