• Background
• Status of CIDTs at MDH and other public health labs
• Effect of CIDTs on foodborne disease surveillance
• Opportunities
• Outbreak detection-REQUIRES ISOLATES
• Antibiotic Susceptibility Testing-REQUIRES ISOLATES
• Case counts-ACCURACY/CONSISTENCY REQUIRES ISOLATES
Developed early 1990s
- Rapid (hours)
- Urine specimen (vs urethral swab)
- Includes *Chlamydia trachomatis*
- High sensitivity/specificity
- Specimen incompatible with culture
- No susceptibility data
Implications of reduced culture-GC
Preparing for CIDTs

- John Besser (MN/CDC)
- Workgroups
- APHL guidance documents, factsheets
- Working with industry
- Working with regulators
CIDT Questions

• Are we seeing a decrease in the number of isolates?
• Do CIDTs slow down surveillance?
Large Metropolitan Hospital In Minnesota

Isolates Submitted to MDH

Specimens submitted to MDH

12/19/2017
Confirmation Rate of CIDT Positive-MDH

- Campylobacter: 74.2%
- Cryptosporidium: 95.9%
- Cyclospora: 85.7%
- EAEC: 75.0%
- EIEC/Shigella: 57.1%
- EPEC: 59.0%
- ETEC: 47.3%
- Salmonella: 87.8%
- STEC: 71.9%
- Vibrio: 65.4%
- Vibrio cholerae: 0.0%
- Yersinia: 45.9%

* indicates specialized strains.
Percent Salmonella Confirmed for Days to Receipt at MDH
Confirmation Rates of Biofire and Verigene

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Biofire</th>
<th>Verigene</th>
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</thead>
<tbody>
<tr>
<td>Campy</td>
<td>70.00%</td>
<td>80.00%</td>
</tr>
<tr>
<td>EIEC/Shig</td>
<td>60.00%</td>
<td>80.00%</td>
</tr>
<tr>
<td>Salm</td>
<td>90.00%</td>
<td>80.00%</td>
</tr>
<tr>
<td>STEC</td>
<td>80.00%</td>
<td>80.00%</td>
</tr>
<tr>
<td>Vibrio</td>
<td>90.00%</td>
<td>80.00%</td>
</tr>
<tr>
<td>Yersinia</td>
<td>60.00%</td>
<td>80.00%</td>
</tr>
</tbody>
</table>
Number specimens received by days from collection to received date
Salmonella Trends Since CIDTs Were Introduced

• Important foodborne pathogen

• Before CIDTs, culture was main detection assay
  • STEC-rapid antigen assays, PCR
  • Campy-rapid antigen assays, not required submission in all states

• WARNING-IMPERFECT DATA AHEAD!!!!
  • May include outbreak isolates, duplicates
Salmonella Isolates-Minnesota, 2008-2014 (pre-CIDT)

Yearly average=804

Salmonella isolates recd at PHL
Isolates recovered at PHL from stools
Salmonella Isolates-Minnesota, 2008-2017

Yearly average (2008-2014) = 804

Salmonella isolates recd at PHL
Isolates recovered at PHL from stools
Predicted isolates for remaining 2017

Molecular GI CIDTs introduced January 2015
Salmonella Isolates-South Dakota, Iowa, Wisconsin, Kansas
Salmonella Isolates-Missouri

The Gladbach Effect
Steve Gladbach (MO Dept Health)
- tracks all clinical labs as they go to CIDTs
- requests that they continue culture

Salmonella isolates recd at PHL
Isolates recovered at PHL from stools
Predicted isolates for remaining 2017
Minnesota Isolations-2016

N=873

CIDT positive Salmonella
CIDT positive STEC
CIDT positive Campy
Minnesota Isolations - 2016 and 2017 (includes projected)

N=873

N=1428 (includes estimate for remainder of 2017)

- CIDT positive Salmonella
- CIDT positive STEC
- CIDT positive Campy
• Cause profuse, watery diarrheae
• One of the leading causes of diarrheae in the developing world
• As common as Salmonella*
• Need for additional investigation

*Medus et. al. Open Forum Infect Dis. 2016 Jan 18;3(1)
<table>
<thead>
<tr>
<th>Co-detected w/ETEC</th>
<th>#</th>
<th>% ETEC confirmed</th>
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<tr>
<td>Campylobacter + EAEC + Salmonella</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Campylobacter + EAEC + EPEC</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Campylobacter + EPEC</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Campylobacter + rotavirus</td>
<td>1</td>
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<tr>
<td>Campylobacter</td>
<td>2</td>
<td>50</td>
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<tr>
<td>Campylobacter + STEC non-O157</td>
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<tr>
<td>Campylobacter + STEC O157</td>
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<td>0</td>
</tr>
<tr>
<td>EAEC + EIEC/Shigella + EPEC</td>
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<tr>
<td>EAEC + EIEC/Shigella</td>
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<tr>
<td>EAEC + EPEC</td>
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<td>69</td>
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<tr>
<td>EAEC + EPEC + norovirus</td>
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<tr>
<td>EAEC</td>
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<td>100</td>
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<tr>
<td>EAEC + norovirus</td>
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<td>0</td>
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<td>50</td>
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<tr>
<td>EPEC + Salmonella + Plesiomonas</td>
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<td>50</td>
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<tr>
<td>Salmonella</td>
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<tr>
<td>STEC nonO157</td>
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## ETEC-WGS Characterization

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<tr>
<th>Specimen</th>
<th>Serotype</th>
<th>MLST</th>
<th>Virulence factors</th>
<th>Antibiotic resistance*</th>
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<td>I2017000684-1</td>
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<td>ltcA</td>
<td>Te</td>
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<td>I2017000818-2</td>
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<td>A, Q, Tr</td>
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<tr>
<td>M2017000963-1</td>
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<td>A, B, S, Te, Tr</td>
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<tr>
<td>M2017000965-6</td>
<td>Onovel31:H18</td>
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<td>I2017001980-2</td>
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</tbody>
</table>

A= Aminoglycoside  
B=Beta-lactam  
Q=Quinolone  
S=Sulphonamide  
Te=Tetracycline  
Tr=Trimethoprim
Cases of Cyclosporiasis, Minnesota, 2008-2017

No. of Cases

Year of Specimen Collection

0 5 10 15 20 25

*2017 data through 10/31/17
Conclusions

• Preliminary evidence shows that CIDTs are not having a negative impact on foodborne disease surveillance
  • Isolate numbers are stable or rising since CIDTs
  • Burden on PHLs
    • PHLs will need more resources for the future to maintain culture
• CIDTs are having a tremendous impact on resources at PHLs
• CIDTs may allow us to better identify and understand other pathogens
Acknowledgements

- Steve Gladbach-Missouri
- Tim Monson-Wisconsin
- Chris Carlson-South Dakota
- Ryan Jepson-Iowa
- Carissa Robertson-Kansas
- Elizabeth Cebelinski-Minnesota
Thank you!

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