5-31-2017

Analysis of Clostridium difficile patterns at Thomas Jefferson University Hospital

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Background

- *Clostridium difficile* infection (CDI) is a healthcare-associated infection (HAI) associated with about half a million infections a year in the U.S[1].
- In 2011, 29,000 people died within 30 days off CDI diagnosis[1].
- Age > 65 , antibiotics, and nursing homes residence stay increase the risk of *C. difficile* infections[1].
- *C. difficile* infections negatively impact patient outcomes and hospital reimbursement.
- A clear understanding of temporal and spatial relationships of CDI cases at Thomas Jefferson University Hospitals is lacking.

Recent Performance

We analyzed and reviewed CDI data collected by infection control between March 2015 and September 2016 and identified "Opportunity Units" that could benefit from intervention.

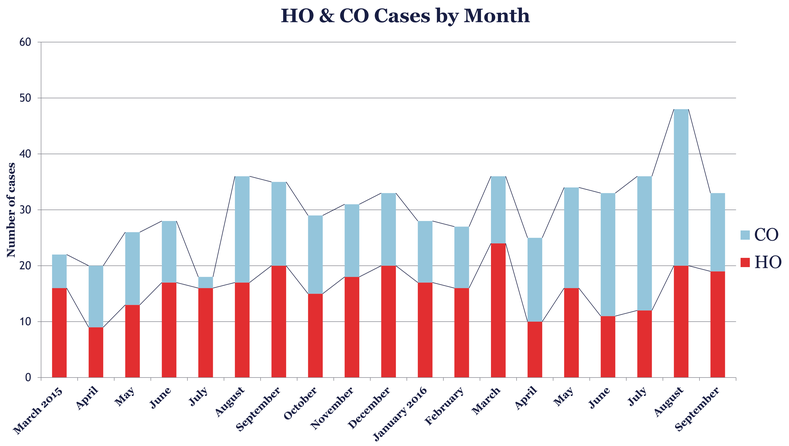

Figure 1. *C. difficile* cases by month separated by hospital onset (HO) and community onset (CO).

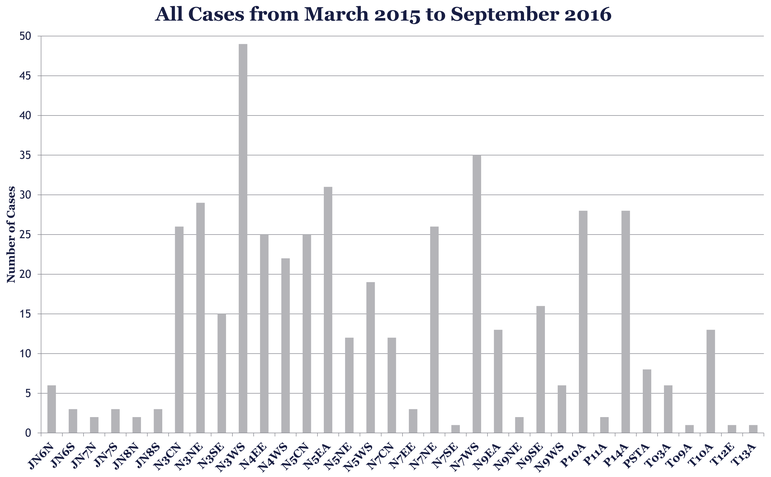

Figure 2. All *C. difficile* cases by units from March 2015 to September 2016.

Aims

- To analyze CDI patterns at TJUH, particularly in Opportunity Units
- To visually examine the relationship between CDI cases within units
- Provide data analysis to the CDI working group

Heat Mapping an "Opportunity Unit"

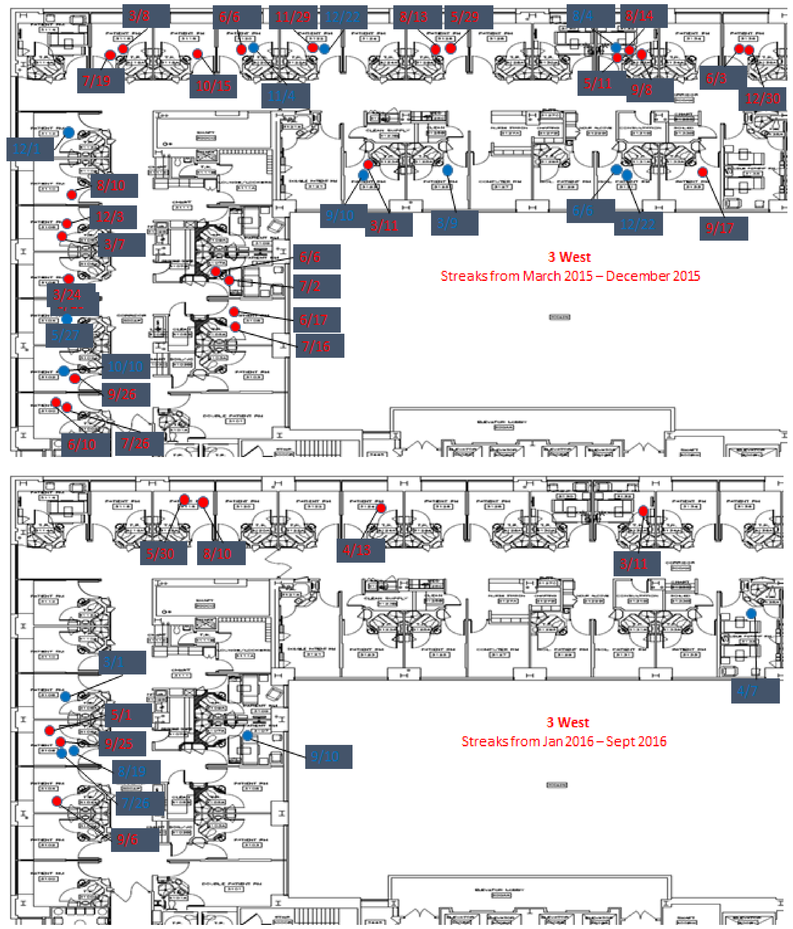

Figure 3. Floor plans of 3 West showing cases that occurred within 30 days of a prior case.

3 Gibbon	4 Gibbon	5 Gibbon	7 Gibbon	9 Gibbon	10 Pavilion	14 Pavilion	13 Pavilion
3140P	4108P	5142P	7135B	9254P	1013B	1414P	1324P
3218P	4112P	5203P	7206P	9317P		1405P	
3209P		5246P	7238P				
3314*		5219P	7226P				
3107P		5116P					
3106P							
3132P							

Table 1 . Hospital beds with subsequent HO infections within 60 days after an onset case of HO/CO infection.

UNIT	Number of Cases
3 Center	11
3 Northeast	9
3 Southeast	4
3 West	31
4 East	15
4 West	11
5 Center	17
5 East	12
5 Northeast	4
5 West	10
7 Center	4
7 Northeast	16
7 West	16
9 East	5
9 Southeast	7
TOTAL	172

Table 2 . Hospital units with subsequent HO infections within 30 days after an onset case of HO/CO infection in Gibbon.

Further Analysis

- Huddles and changes were initiated in May 2016. Further analyses including pattern assessments may define additional opportunities for improvement
- Perform root cause analysis on opportunity units and provide feedback to front line providers
- Observe healthcare provider hand hygiene and PPE compliance to understand correlations between CDI within units and hygiene protocol adherence

Proposed Interventions

- Establish a screening program in high risk unit patients
- Reassess terminal cleaning protocol of the room and equipment
- Improve communication of patient CDI status to family members
- Earlier testing of patient at the first sign of loose stool in all units
- Track antibiotic usage, especially in the high risk units

Limitations

- The study population included CDI patients only. Further studies may include case control studies in patients without CDI
- Bed transfers between and within units were not included in the analysis
- Hospital floors have different turnover rates and different patient populations
- Patients on antibiotics are at increased risk of having a CDI[2]. Further analyses which incorporate risk factors for CDI (antibiotic use, age, nursing home stay) are warranted

References

1. Centers for Disease Control and Prevention. (n.d.). Deadly Diarrhea: *C. Difficile* causes immense suffering, death.
2. Brown, K., Khanafer, N., Daneman, N., Fisman, D.(2013). Meta-analysis of Antibiotics and the Risk of Community-Associated *C. difficile* infection. *Antimicrobial Agents and Chemotherapy*, 57(5).