



Evaluating the Quality and Effectiveness of a Community Hospital's Antimicrobial Stewardship Program – University of Southern California - Verdugo Hills Hospital

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Introduction

- As of 2015, CA required all acute care hospitals to implement an Antimicrobial Stewardship Program (ASP)
- The CDC 7 Core Elements were constructed to guide hospitals in developing an appropriate ASP
 - Improve antibiotic use
 - Reduce costs
 - Reduce length of hospital stay
 - Reduce burden of antibiotic resistance
 - Improving patient outcomes



Introduction

- 1 of the 7 Core Elements include:

Drug Expertise	Established at facility	
Is there a pharmacist leader responsible for working to improve antibiotic use at your facility?	Yes	No

- Most institutions do not have a single appointed pharmacist leader
 - USC-VHH appointed a single ID pharmacist leader in 2015



Objectives

- To assess whether USC-VHH meets the CDC ASP Core Elements
- To evaluate outcomes of an ID pharmacist-led ASP
- To evaluate rates of HACDI, antibiotic utilization, bacterial susceptibility rates to levofloxacin, and intervention acceptance rates



Methods

- Retrospective evaluation of the USC-VHH ASP
- Assessment conducted using the CDC ASP Core Elements Checklist
- Data on antibiotic utilization measured as Days of Therapy (DOT) per 1000 patient days
 - DOT = Total days of therapy; normalized value for days of therapy
 - The CDC Core Elements use this value to measure antibiotic use



Methods

- Interventions documented as accepted/rejected rates
 - Ex: days of therapy, renal/dose adjustments, recommending ID physician to see patients, etc.
 - Top intervention made: discontinuation of antibiotics
- Yearly susceptibility rates calculated for target pathogens
- Statistical analysis: Pearson Correlation



Results

- USC-VHH ASP:
 - Met all CDC Core Elements
 - Demonstrated average intervention acceptance rates of ~99% per quarter
 - Had significant decreases in levofloxacin use



Results - Levofloxacin DOT

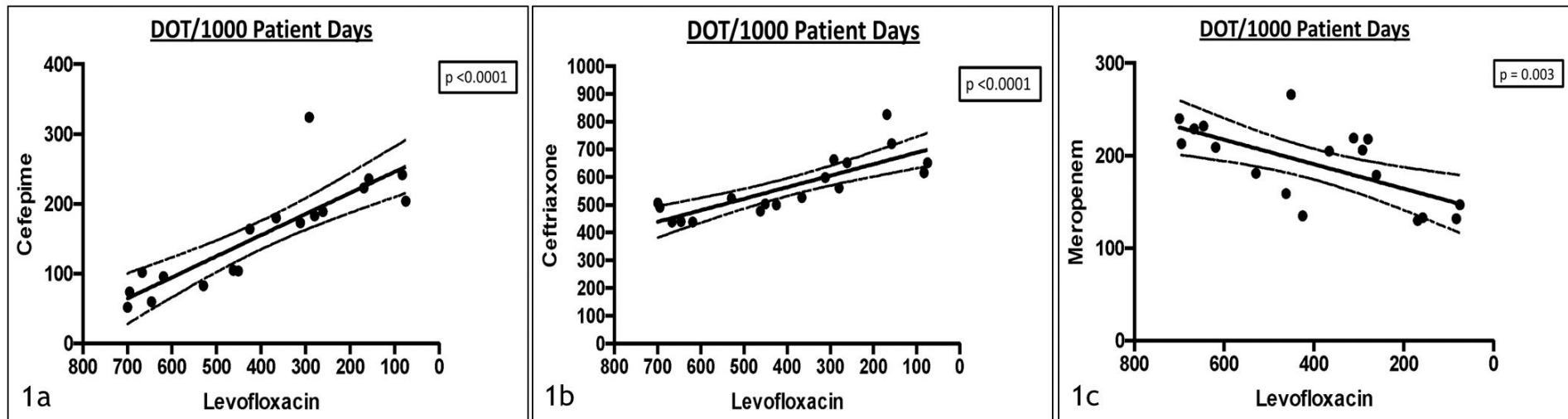


Figure 1 | Correlation of the days of therapy (DOT) per 1000 patient days of levofloxacin with (a) cefepime, (b) ceftriaxone, and (c) meropenem, respectively. Data corresponds to the years of 2015 to 2018.



Results - HACDI

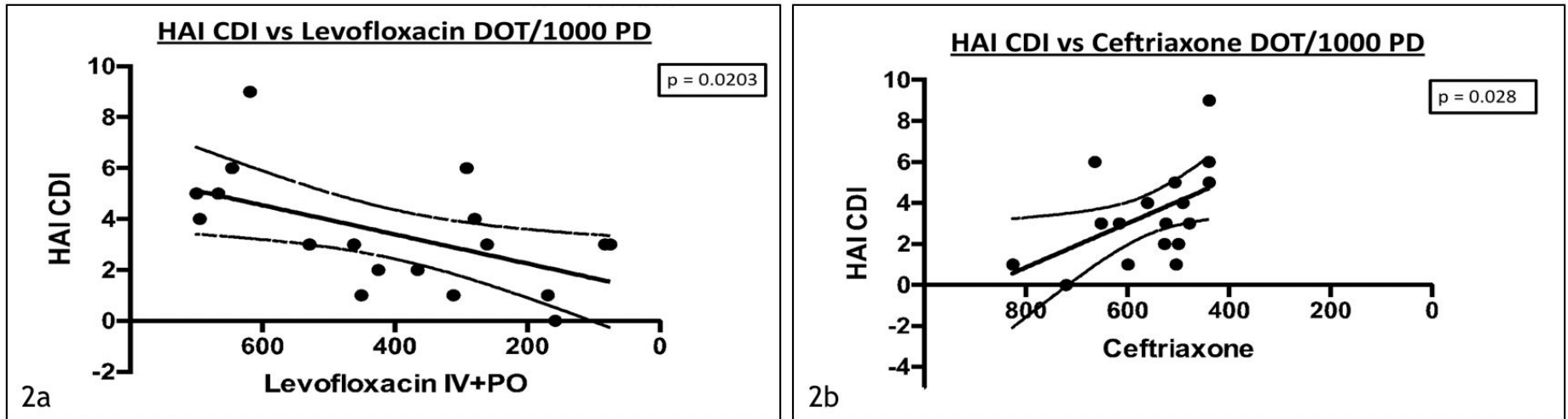


Figure 2 | The relationship between hospital acquired *C. difficile* infections (HAI CDI) with the days of therapy (DOT) per 1000 patient days of (a) levofloxacin (IV+PO) and (b) ceftriaxone, are shown in the figures above respectively. Data corresponds to the years of 2015 to 2018.



Results - Antimicrobial Susceptibility

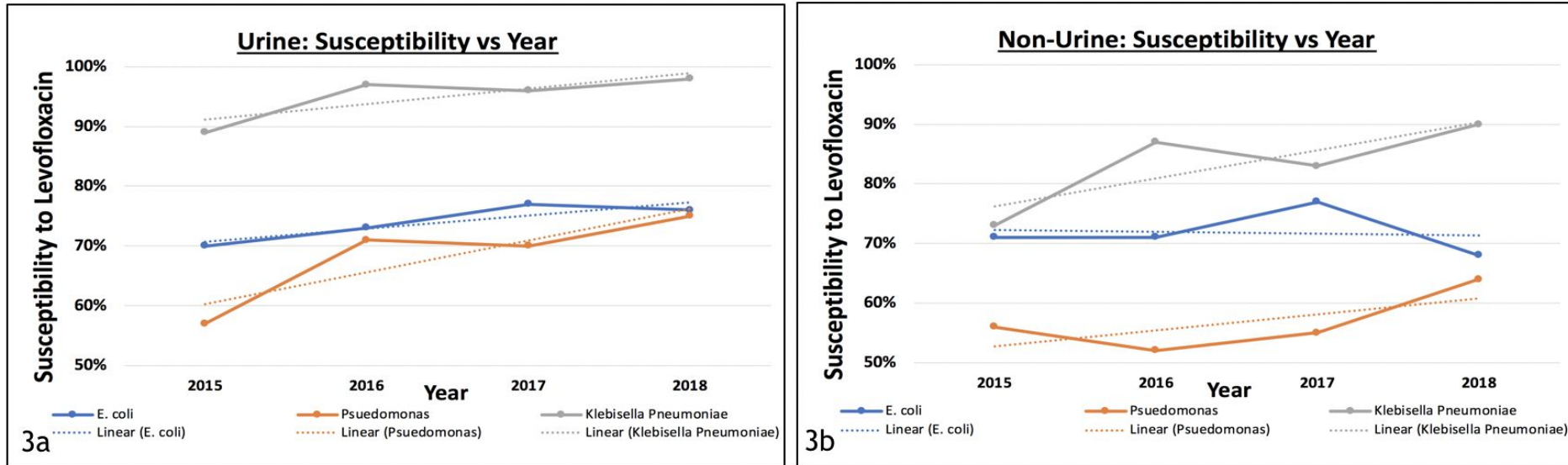


Figure 3 | Antimicrobial susceptibility data for *E. coli*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa* to levofloxacin collected using 2015-2018 (a) urine and (b) non-urine antibiograms from USC-VHH, respectively.



Discussion

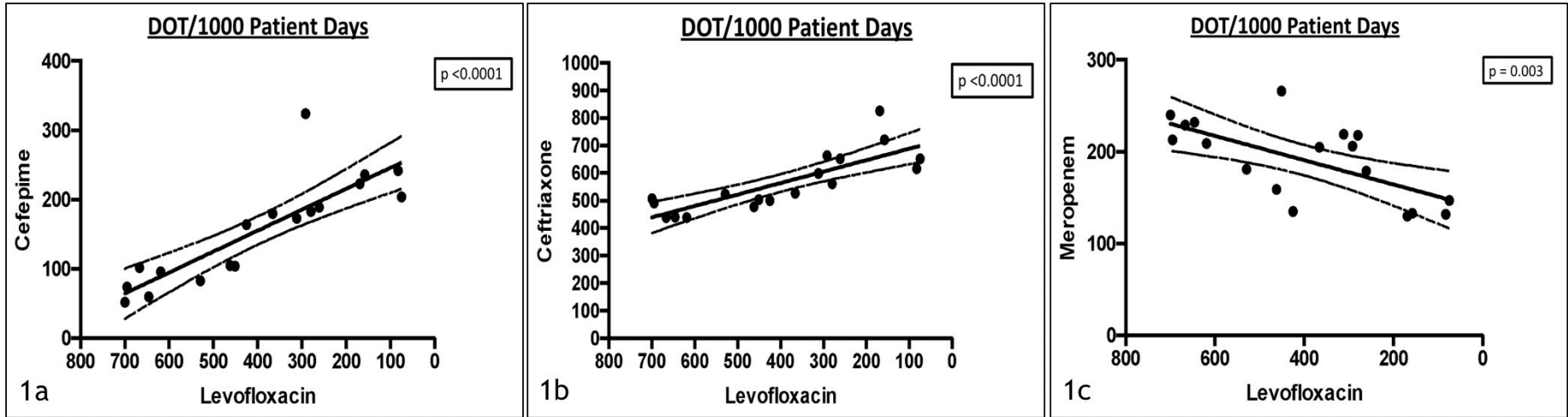


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- Decreased utilization of a largely prescribed broad-spectrum antibiotic → increased use of more narrow spectrum antibiotics (Figures 1a and 1b)
- Decreased DOT of levofloxacin did not correspond with an increase in DOT of meropenem (Figure 1c)

Discussion



- Changes in antibiotic usage → positive outcomes in HACDI rates (Figures 2a and 2b)

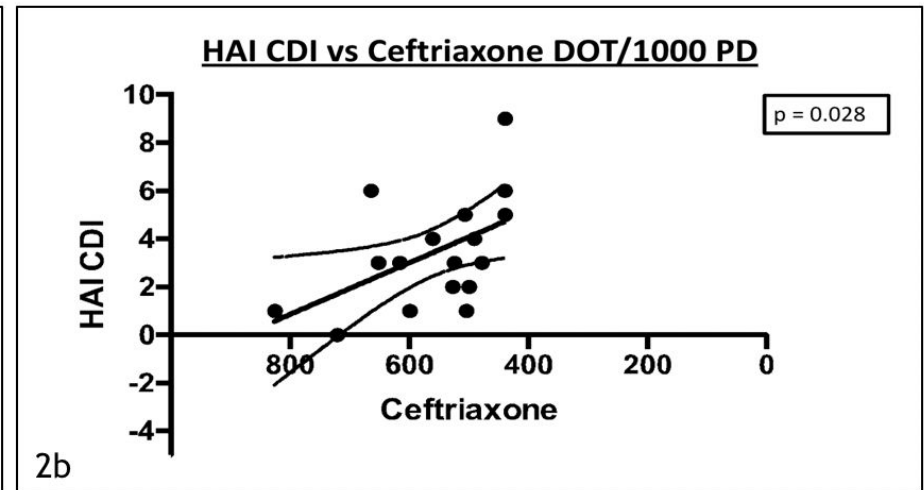
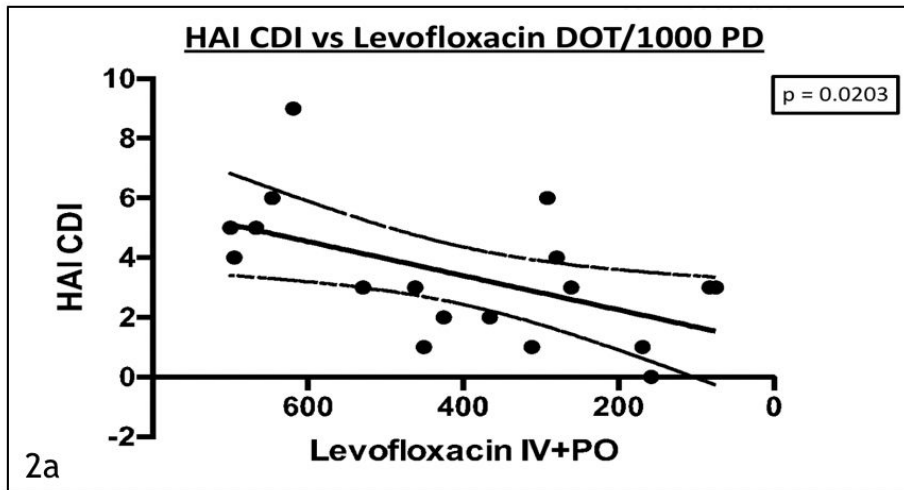


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Discussion

- Trend for increasing bacterial susceptibility to levofloxacin → decrease in levofloxacin resistance (Figures 3a and 3b)

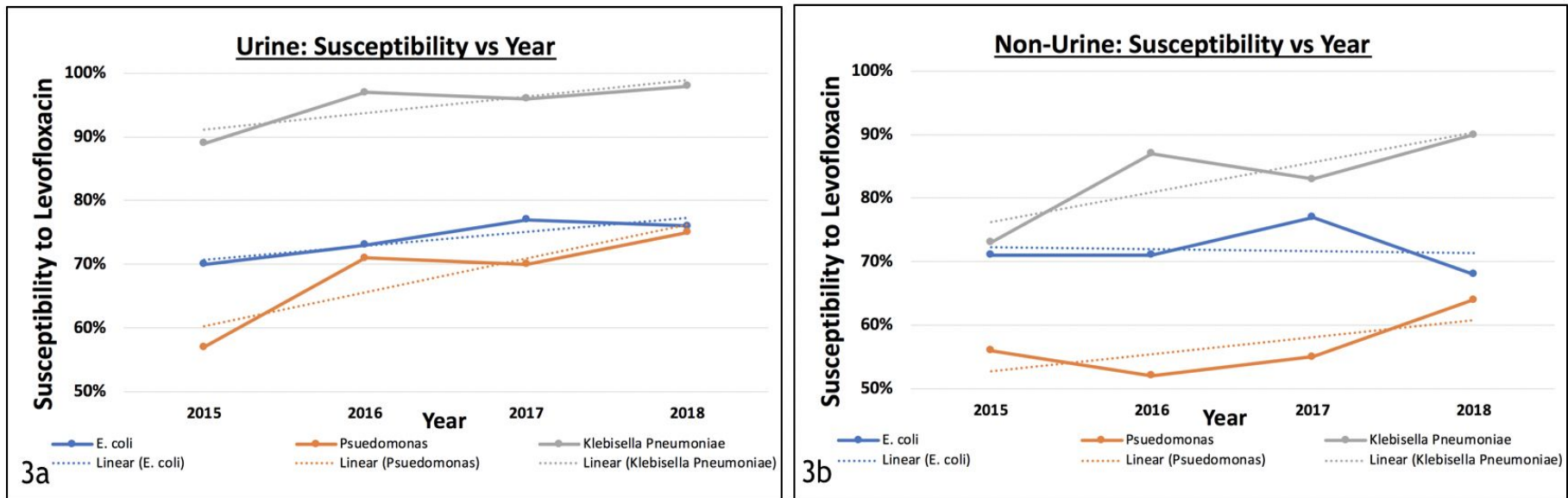


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Conclusion

- The ID pharmacist-led ASP at USC-VHH has made a significant impact on the hospital by:
 - Meeting the CDC ASP Core elements
 - Maintaining high intervention rates
 - Decreasing levofloxacin use
 - Decreasing HACDI rates
 - Decreasing resistance rates in common pathogens



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References

1. Ventola CL. The antibiotic resistance crisis: part 1: causes and threats. *P T*. 2015;40(4):277–283.
2. Ventola CL. The antibiotic resistance crisis: part 2: management strategies and new agents. *P T*. 2015; 40(5):344-352.
3. Centers for Disease Control and Prevention (CDC). Checklist for Core Elements of Hospital Antibiotic Stewardship Programs. <https://www.cdc.gov/antibiotic-use/healthcare/implementation/checklist.html>. Updated February 23, 2017. Accessed May 5, 2019.
4. Wong-Beringer A, Nguyen LH, Lee M, et al. An Antimicrobial Stewardship Program with a Focus on Reducing Fluoroquinolone Overuse. *Pharmacotherapy* 2009;29(6):736-43.
5. Holt JS. Pharmacist-Led Antibiotic Stewardship Program Reduces Inappropriate Antibiotic Use and Hospital-Acquired *C. difficile*. *Case Study - Pharmacy Practice Model Initiative*. http://www.ashpmedia.org/pai/docs/casestudy_holt.pdf.
6. CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. <https://www.cdc.gov/antibiotic-use/healthcare/pdfs/core-elements.pdf>
7. CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. <https://www.cdc.gov/antibiotic-use/core-elements/hospital.html>. Published November 2019. Accessed December 2019.