

Introduction

The antibiogram is a useful tool for providers when selecting empiric antibiotic coverage. Previous studies have demonstrated that there is a lack of understanding regarding the antibiogram among medical residents [1]. This lack of exposure during residency training leads to provider uncertainty. It has been shown that prescribers at multiple acute-care hospitals felt that they had not received adequate training regarding antimicrobial prescribing and as much as 30% reported they lacked confidence when using antibiogram data to select empiric therapy [2]. We designed and implemented a quality improvement project to assess and improve the understanding, utilization, and comfort with the antibiogram among our family medicine, internal medicine, and surgery residency programs.

Assessment

Forty-two residents completed a 9-question survey that assessed their ability to access, previous use of, and comfort with the antibiogram.

Information about participants' prior infectious disease rotation exposure was also obtained.

Surgery April 2021		Fam Med April 2021		I.M. April 2021	
Antibiogram	Residents (6)	Antibiogram	Residents (8)	Antibiogram	Residents (28)
Used in Patient Care	0%	Used in Patient Care	50%	Used in Patient Care	42.8%
Knew how to Access	16.6%	Knew how to Access	12.5%	Knew how to Access	25%
Av. Comfort Level out of 5	2.66	Av. Comfort Level out of 5	3.0	Av. Comfort Level out of 5	3.0

Analysis

- 32 % increase in the total number of residents who reported they knew what an antibiogram was ($p < 0.001$).
- 69 % increase in residents who could accurately describe a method for accessing the institution's antibiogram ($p < 0.001$).
- 19 % increase in residents who reported using the antibiogram at least once in patient care ($p = 0.027$).
- 54 % increase in residents who reported the antibiogram was easy to access ($p < 0.01$).
- Average reported comfort level with the antibiogram increased from 3.0 to 3.7 on a scale of 1 to 5 ($p < 0.01$).
- Average reported helpfulness of the antibiogram as a tool when trying to select empiric antibiotics increased from 3.6 to 4.3 ($p = 0.015$).

After Interventions
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Surgery Jan 2022		Fam Med Jan 2022		I.M. Jan 2022	
Antibiogram	Residents (10)	Antibiogram	Residents (16)	Antibiogram	Residents (51)
Used in Patient Care	80%	Used in Patient Care	56%	Used in Patient Care	64.7%
Knew how to Access	90%	Knew how to Access	93%	Knew how to Access	88%
Av. Comfort Level out of 5	3.6	Av. Comfort Level out of 5	3.375	Av. Comfort Level out of 5	3.9

Interventions

- Administered a nine-question survey to every PGY1 resident in Creighton University's family medicine, internal medicine, and surgery residency programs in April 2021.
- Updated CHI antibiogram website for proper display on smart devices.
- Created an educational poster with quick response codes linked to the institution's antibiograms.
- Placed posters in all family medicine, internal medicine, and surgery team rooms at the main teaching hospital.
- Gave residency specific lectures focused on explaining the role of the antibiogram in July/August 2021.
- Readministered the nine-question survey to every PGY1 and PGY2 resident in the respective programs in January 2022.

References

1. Tallman GB, Vilches-Tran RA, Elman MR, et al. Empiric antibiotic prescribing decisions among medical residents: the role of the antibiogram. *Infect Control Hosp Epidemiol* 2018;39:578–583.
2. Salsgiver E, Bernstein D, Simon MS, et al. Knowledge, attitudes, and practices regarding antimicrobial use and stewardship among prescribers at acute-care hospitals. *Infect Control Hosp Epidemiol* 2018;39:316–322.

Are you Starting your Patient on an Antibiotic?

Empiric therapy can be guided with the **Antibiogram**

It's as **EASY** as:

1. Determine the type of infection and the most likely organisms responsible:
2. Consider the Severity of the infection and the Patient's Clinical Setting:
3. Reference your Antibiogram to determine the regional susceptibility of the suspected organisms to various antibiotics:

UTI/Pyelonephritis: Escherichia coli, Proteus, Klebsiella, and Enterobacter.

Cellulitis: Streptococcus species, Staphylococcus species.

Intra-Abdominal Infection: Polymicrobial Anaerobes, Enterobacteriaceae, E. coli.

*Use these to determine appropriate route of administration and spectrum of coverage needed. Remember to check the patient's records for previous infections with resistant strands like MRSA and ESBL.

Organism (Gm -)	Antibiotics						
	Cefazolin	Ceftriaxone	Cefepime	Pip/Tazo	Cipro	TMP/SMX	Nitro/Ep
E. coli	89	94	95	97	80	78	96
P. aeruginosa	*	*	91	91	84	*	95

Organism (Gm +)	Antibiotics				
	Cefazolin	Ceftriaxone	Penicillin	Oxacillin	Vancomycin
Strep. pneumoniae	*	100	97	84	100
MSSA	100	*	100	97	*

Finally: Select the appropriate Antibiotic Regimen considering steps 1-3! Greater than 90% susceptibility is preferred. Remember to always revise antibiotic regimens based upon a patient's individual lab susceptibility results.

CHI Health Laboratories' Antibiograms

Gram Positive Antibiogram | Gram Negative Antibiogram

Find CHI Health Laboratories' Antibiogram with these QR codes or google "Creighton Antibiogram".

Secondary Analysis

- 14 residents in 2021 and 35 in 2022 reported completion of an infectious disease (ID) rotation in residency or medical school ($p > 0.05$).
- In the 2021 survey more residents with prior ID training 12/14 (86%) could define an antibiogram, compared to 12/28 (43%) of residents with no prior ID training ($p < 0.05$).
- More residents with prior ID training reported they knew how to access the institution's antibiogram 7/14 (50%) compared to 2/28 (7%) ($p < 0.05$).
- More residents with prior ID training reported having used the antibiogram in patient care 9/14 (64%) compared to 7/28 (25%) ($p < 0.05$).
- The average comfort level with antibiograms was 4 for residents with prior ID training and 2.5 for residents with no prior training on a scale of 1 to 5 ($p < 0.05$).

Conclusion

Our results confirm that there is a lack of exposure to antibiograms at the residency level and that simple inexpensive measures can be taken to correct this. Our results also demonstrate that residents with prior ID rotation exposure in either medical school or residency reported significantly higher understanding, comfort, and utilization of the antibiogram than those without prior ID experience. We recommend other residency programs assess their physicians' comfort with accessing and using the antibiogram. We encourage the duplication of and improvement upon the intervention efforts implemented in this project.