Duration of Antimicrobial Therapy: The Impact of Defaults

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Abstract

Background: Default durations imbedded in the electronic prescription (e-script) order entry process may be interpreted by providers as duration recommendations. This process could lead to inappropriately long durations of therapy for antibiotics, especially at hospital discharge when patients have received inpatient antibiotics.

Methods: Default durations of 7 or 10 days for fluoroquinolones (FQ) were removed from inpatient and outpatient e-scripts from Duke University Health System (DUHS) hospitals (1 academic, 2 community) and clinics (N=86) on 12/19/17. We evaluated the impact on FQ duration by comparing mean duration and percent of 10 day durations in the 12 months pre-default duration removal (DDR) and 3 months post-DDR. All inpatient or outpatient encounters with a FQ e-script with days duration less than 31 days were included. FQ durations were captured in days duration fields or calculated from sig and quantity fields. We used descriptive statistics to compare FQ duration pre- and post-DDR using a chi-squared test.

Results: A total of 35,765 FQ e-scripts and 276,056 FQ e-script days of therapy were included pre-DDR. The post-DDR included 9,526 FQ e-scripts and 71,028 FQ e-script days of therapy. Mean (standard deviation) durations in the pre and post periods were 7.78 (4.35) and 7.55 (3.99), respectively (p<0.001). Common discharge durations in both time periods across all settings were 5, 7, and 10 days. The 10-day default duration was the most common in the pre-DDR with 11,000 e-scripts (31%), and declined by 16% (2475 e-scripts, 26%) in the post-DDR period. The academic center realized the greatest shift away from 10-day default duration (Table 1).

Conclusion: Removal of default e-script durations, a novel and minimally resource intensive strategy, reduced prescribed duration of FQ therapy.

Table 1. Ten-day durations for Fluoroquinolone E-scripts Pre- and Post-DDR

Practice Setting	Pre-DDR N (%) of 10 day E-scripts	Post-DDR N (%) of 10 day E-scripts	% Change Pre-Post
Academic Medical Center	771 (20)	125 (11)	-42
Community hospital	452 (20)	90 (15)	-23
Community hospital	514 (24)	126 (21)	-16
Outpatient	9263 (34)	2134 (30)	-12
Total	11000 (31)	2475 (26)	-16

Background

- Excess days of antimicrobial therapy can lead to unintended patient safety risks, antimicrobial resistance, and cost
- Antimicrobial courses are often completed in the outpatient setting
- Decisions on duration of therapy are frequently determined during a dynamic and pressured discharge process.

Methods

- Multicenter intervention trial with historic control
- Default EMAR e-script durations of 7 or 10 days for systemic fluoroquinolones (FQ) were removed (DDR) on 12/19/2017
  - Pre-DDR: 12/18/16 -12/18/17
  - Post-DDR: 12/20/17- 3/31/18
- Cohort included a 957 bed academic hospital (AH), two 300-plus bed community hospitals (CH1 and 2), and 86 clinics
- Reference links to concise, evidence-based duration recommendations were added to FQ e-scripts
- Control group consisting of trimethoprim-sulfamethoxazole and amoxicillin-clavulanic acid did not have standard duration of 10 days removed
- Two Sample t-test used to compare FQ duration pre- and post-DDR

Results

- Over 45,000 fluoroquinolone (FQ) e-scripts, accounting for 347,000 days of therapy, were analyzed

Table 1: FQ prescriptions at either hospital discharge and clinic encounters

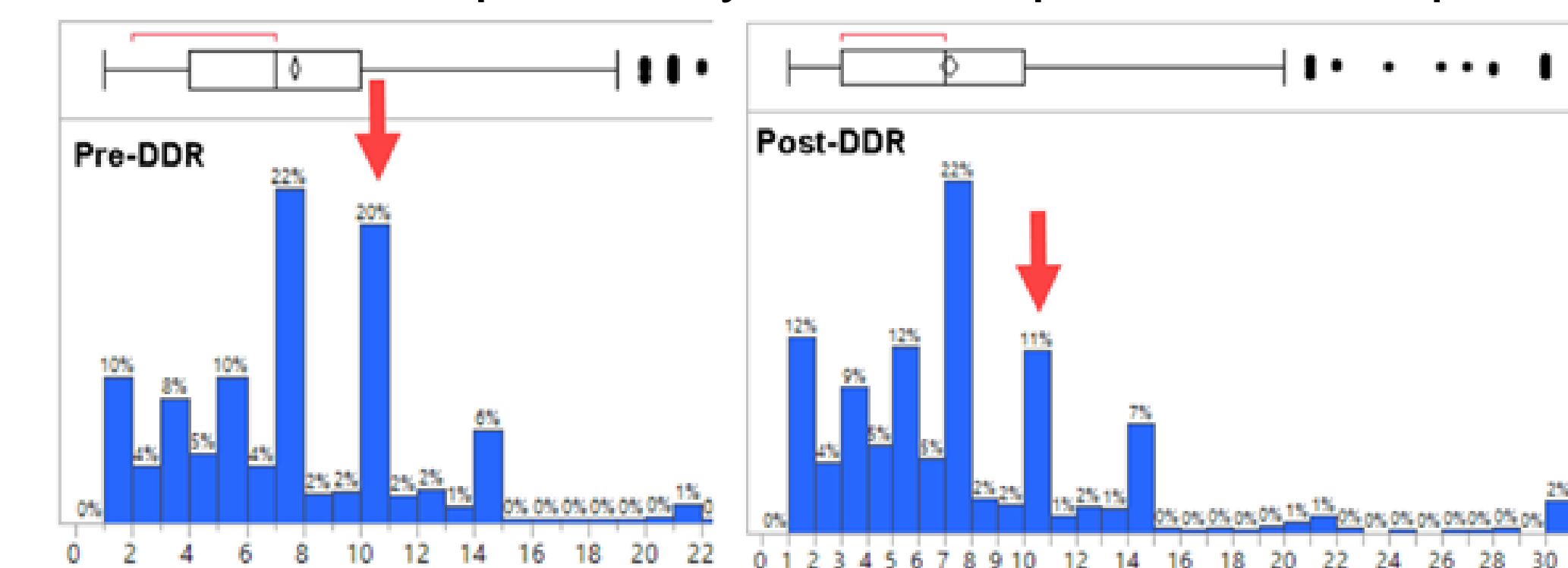|	Hospital Discharge		Clinic Encounters	
	Pre-DDR	Post-DDR	Pre-DDR	Post-DDR
Whole cohort	3647	993	30508	8016
AH	2132	588		
CH1	748	171		
CH2	766	234		

Results

- Signification reduction in FQ days of therapy following DDR seen in all settings excluding CH2

Table 2: Days of Therapy and Mean e-Script FQ Duration

	FQ e-Script Cumulative Days of Therapy		FQ e-Script Mean Duration		
	Pre-DDR	Post-DDR	Pre-DDR	Post-DDR	p
Whole Cohort	276056	71028	7.78	7.55	<0.001
AH	18595	4698	7.74	7.18	0.002
CH1	6100	1346	7.14	6.77	0.025
CH2	5638	1644	6.99	6.68	0.057
Clinics	245723	63340	7.89	7.74	0.004

- High rate of 10 day durations at AH noted pre-DDR declined substantially in post-DDR period
  - A 42% reduction in 10 day duration was realized at AH

Figure 1: AH e-Script 10 Day Duration pre-DDR and post-DDR

- Total length of therapy, including inpatient exposure and e-script FQ duration, was significantly reduced across all sites

Table 3: Cumulative antibiotic duration including inpatient exposure and e-script designated duration

	Total Fluoroquinolone Duration: Inpatient to Outpatient								
	Pre-DDR				Post-DDR				p
	N	Mean	Median	SD	N	Mean	Median	SD	
Whole Cohort	2906	12	11	9.0	748	10	9	5.2	<0.0001
AH	1769	14	11	10.4	451	11	10	5.6	<0.0001
CH1	616	11	10	6.2	138	10	9	4.3	0.0038
CH2	510	10	9	5.2	159	10	9	4.4	NS

- Fluoroquinolone days of therapy (DOT) avoided in the 3 months post-DDR
  - **Whole Cohort**: 2072 days avoided
  - **AH**: 1150 days avoided
- Control group mean durations were unchanged during the study period
  - Trimethoprim-sulfamethoxazole and amoxicillin-clavulanate (9.15 and 9.11, p=0.2).

Conclusions

- Default information in the EMAR can impact length of antibiotic treatment
- Antibiotic exposure declined as a result of default fluoroquinolone duration field removal and provision of easy to access guidance link in e-script reduced antibiotic exposure
- Over 2,000 fluoroquinolone DOT were avoided in the 3 months following DDR intervention
- Antimicrobial stewardship programs aiming to reduce durations of therapy should also target post-discharge days and investigate defaults in ordering systems

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