Scientific Research Publishing

Health, 2023, 15, 517-524
https://www.scirp.org/journal/health
ISSN Online: 1949-5005
ISSN Print: 1949-4998

The Impact of Behavioural Insights on Effective Prescription of Antibiotics by Doctors: A Case Study from Latifa Hospital for Women and Children, Dubai Health Authority

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How to cite this paper: Tahlak, M.A., Fazari, A.B., Khan, F., Abukaf, R., Zadeh, L.G., Alsheikh, A. and Istaitieh, A. (2023) The Impact of Behavioural Insights on Effective Prescription of Antibiotics by Doctors: A Case Study from Latifa Hospital for Women and Children, Dubai Health Authority. *Health*, **15**, 517-524.
https://doi.org/10.4236/health.2023.156035

Received: April 30, 2023
Accepted: June 24, 2023
Published: June 27, 2023

Abstract

Introduction: Wise prescription of antibiotics is an ethical duty of physicians in view of rising antimicrobial resistance in the community, it should be balanced between the health requirements of the patients and resulting long-term antibiotics resistance. Overuse of antimicrobials is a major cause of emerging resistance to antimicrobials. There are multiple factors in the community that influence the physician's antibiotic prescriptions. **Methods:** This is a systematic case-control study on antibiotics prescription for paediatric patients attending Latifa Hospital for Women and Children (LWCH), Dubai Health Authority, to know the effects of behavioral interventions on rates of inappropriate antimicrobials prescription by doctors in the Paediatric Emergency Department. **Results:** The results of our study showed the effectiveness of behavioral insights by peer comparison in antibiotic use among paediatricians in Latifa Hospital had a statistical significance (P = 0.0038). The rate of the prescription decreased from 41% to 21%, a difference of 20%. **Conclusion:** The study concluded behavioural intervention is an effective measure in reducing the improper prescription of antibiotics in the hospital setting.

Keywords

Behavioural Intervention, Antibiotics Prescription, Behavioral Economics, Health Economics, Behavioural Insight

1. Introduction

The discovery of antibiotics in 1920 and the emergence of the field of bacteriology have revolutionised health care and made surgical operations successful through the wise use of antibiotics in the prevention of infections [1].

Resistance: It is a natural biological phenomenon, which is increasing tremendously due to various factors, such as misuse of medicines, poor infection control practices, global trade and travel.

The World Health Organization has called for the intensified implementation of the Global Strategy, stressing the need to strengthen surveillance of antibiotic resistance, enhance laboratory capacity for detection, and reduce inappropriate use of antibiotics. Important factors contributing to the overuse of antibiotics are prescribing antibiotics before receiving the results of the tests that determine the true cause of the infection, pressure from patients on the doctors to prescribe antibiotics, and self-treatment by people with over-the-counter available antibiotics. Research has revealed that of more than 500,000 antibiotic prescriptions, nearly half were prescribed without an infection-related diagnosis. About 20% of the antibiotics were given over the phone without visiting a doctor's office [2].

The National Committee for Combating Antimicrobial Resistance at the Ministry of Health and Community Protection organized health conferences, dedicated to combating antimicrobial resistance and issued a decree prohibiting the dispensing of antibiotics in private pharmacies without a prescription. The work plan of the National Antimicrobial Resistance Control Committee has been developed at the national and regional levels, multi-resistant organisms surveillance programs, infection prevention, healthcare-associated infection prevention management program monitoring, occupational health issues for infection prevention, the role of the national reference laboratory, and information technology [3].

In the United Arab Emirates, the Ministry of Health and Community Protection (2019) is making great efforts within the framework of the ministry's strategy aimed at promoting community health and building quality and therapeutic, health and drug safety systems in accordance with international standards, and in cooperation with government and private health agencies, which resulted in a 43 percent decrease in the use of antibiotics, according to studies conducted at Sheikh Khalifa Hospital in Abu Dhabi [4].

There is a big difference and disparity in dispensing antibiotics between doctors, in the Paediatric Emergency Department at Latifa Hospital rates ranged from 5% to 74% among 33 practitioners whereas the rate was 12% among family physicians [5].

2. Objectives of the Study

To measure the effectiveness of behavioral insights methodologies in changing the behavior of physicians not to over-dispense antibiotics to children in Latifa Hospital and adhere to scientific standards.

3. Methodology

A systematic case-control study on Antibiotics prescription for pediatric patients attending LHWC emergency department between September 2018 and November 2018 was conducted during this period (One of the peak times in the department is the fall and winter months, when colds and chest diseases are common). A letter was sent to each emergency physician on their rate of antibiotic prescription and their individual accountability on each prescription, which was compared among the peers at the end of the study.

3.1. Study Area

Latifa Hospital for Women and Children receives approximately 30,000 children in the emergency department annually its consultant led department. The department follows the Canadian Class I through Class 5 emergency classification system. The emergency department is one of the departments that work around the clock.

3.2. Data Collection and Management

The data was collected by group of trained nursing staff using specific data collection sheet, data collected from the hospital database available in the Health Information System (Salama). These data include the cases' diagnosis, prescribed antibiotics, and the treating doctors. Sorting all antibiotics prescription by doctors and compared to the number of patients attending the emergency department for each doctor.

A message was sent from a supervisory authority in the hospital to find out the effect of behavioral insights on the behavior of doctors through reminders and comparison between peers in the percentage of antibiotics prescribed by them.

The data was analysed using Statistical Package for the Social Sciences 26 (SPSS) and generated graphs and tables using the Microsoft 365 and windows 11 computer facilities.

4. Results

At Latifa Hospital Emergency Department, the clinical indications for antibiotics description are listed in Table 1 where acute tonsillitis is the common indication while gastroenteritis is the least one and in between the other common infections are seen.

The total numbers of cases (from September 2018 to November 2018) were 12,252, all were triaged into level 1 to 5 according to the clinical emergency (Table 2 and Table 3).

The results of our study showed the effectiveness of behavioral insights by peer comparison in antibiotic use among paediatricians in Latifa Hospital had a statistical significance (P = 0.0038). The rate of the prescription decreased from 41% to 21%, a difference of 20%.

Table 1. Shows the percentage of antibiotic prescriptions.

Diagnosis	Percentage
Acute tonsillitis	34%
Upper Respiratory Tract Infection (URTI)	24%
Pneumonia	20%
Acute otitis media	10%
Urinary Tract Infection (UTI)	7%
Gastroenteritis	5%

Table 2. Shows total attendance and rating levels (September-November 2018).

Rating level	September 2018	October 2018	November 2018
1	6	9	9
2	150	209	231
3	1161	1567	1538
4	1237	1596	1838
5	795	834	1072
Total	3349	4215	4688

Table 3. Shows total attendance and rating levels (November 2019-January 2020).

	Total attendance	November 2019 5939	December 2019 4452	January 2020 4210
Classification Levels	1	11	2	5
	2	192	142	141
	3	1861	1477	1523
	4	2810	2119	1904
	5	1065	712	637

5. Discussion

The results of the study were compatible with Linder study in which interventions or "stimulus", most used in behavioural economics, is very effective in reducing inappropriate antibiotic prescriptions. In literature inappropriate antibiotic prescription rates reduced from 30% to 6% in the peer-to-peer comparison [6].

Results of our study also were matching the results of study done by Hallsworth, where Behavioral Insights reduced antibiotic prescription by physicians when compared to their peers (**Figure 1**). This reduction amounted to 75,000 fewer doses across 800 clinics. Similarly study results were comparable to Meeker's study where rates of antibiotic prescriptions decreased from 22.1% to 6.1%. In this randomized clinical trial among 47 primary care practices in Boston and Los Angeles for an 18-month period.

The results of the study showed that the use of the comparison tool with peers, which is a tool of behavioral insights, succeeded in reducing the rate of dispensing antibiotics by 5%, with a statistical significance of (P = 0.0038) (Table 4 and Table 5).

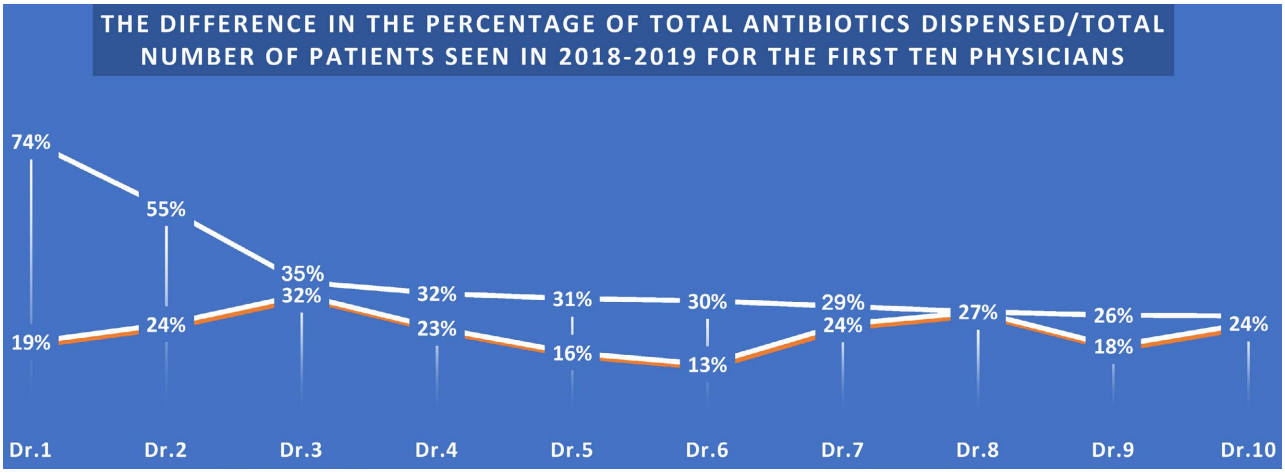

Figure 1. Shows the difference in the percentage of total antibiotics dispensed/total number of patients seen in 2018-2019 for the first ten physicians.

Table 4. Shows total antibiotics dispensed in emergency and outpatient clinics (September 2018-November 2018).

Doctor's No.	September 2018		October 2018		November 2018		September-November 2018		Total antibiotics dispensed/total number of patients seen
	The total number of antibiotics dispensed	The total number of patients seen	The total number of antibiotics dispensed	The total number of patients seen	The total number of antibiotics dispensed	The total number of patients seen	The total number of antibiotics dispensed	The total number of patients seen	
Dr. 1	13	31	23	13	14	24	50	68	74%
Dr. 2	0	0	22	0	24	83	46	83	55%
Dr. 3	25	80	31	71	13	44	69	195	35%
Dr. 4	90	290	115	329	127	407	332	1026	32%
Dr. 5	16	50	11	34	24	81	51	165	31%
Dr. 6	7	28	6	16	7	22	20	66	30%
Dr. 7	91	336	140	444	129	469	360	1249	29%
Dr. 8	36	170	64	199	73	263	173	632	27%
Dr. 9	13	74	25	106	22	47	60	227	26%
Dr. 10	11	41	1	33	19	44	31	118	26%
Dr. 11	4	39	20	75	12	40	36	154	23%
Dr. 12	8	60	17	95	25	74	50	229	22%
Dr. 13	44	189	51	260	3	6	98	455	22%
Dr. 14	12	68	16	71	20	86	48	225	21%
Dr. 15	13	90	26	133	2	5	41	228	18%

Continued

Dr. 16	15	71	16	100	5	31	36	202	18%
Dr. 17	25	178	36	203	37	234	98	615	16%
Dr. 18	13	67	5	49	13	81	31	197	16%
Dr. 19	10	62	14	60	10	95	34	217	16%
Dr. 20	0	0	9	37	42	300	51	337	15%
Dr. 21	20	116	13	88	25	180	58	384	15%
Dr. 22	5	54	11	69	9	60	25	183	14%
Dr. 23	14	100	9	88	27	180	50	368	14%
Dr. 24	10	44	6	57	16	139	32	240	13%
Dr. 25	17	166	42	198	17	219	76	583	13%
Dr. 26	9	144	33	185	26	243	68	572	12%
Dr. 27	0	0	4	10	11	117	15	127	12%
Dr. 28	4	20	35	296	28	286	67	602	11%
Dr. 29	27	314	34	362	46	402	107	1078	10%
Dr. 30	7	42	5	92	13	134	25	268	9%
Dr. 31	7	116	0	0	4	61	11	177	6%
Dr. 32	6	56	0	64	4	49	10	169	6%
Dr. 33	2	12	0	55	6	81	8	148	5%

Table 5. Shows the total number of antibiotics dispensed in emergency and outpatient clinics (November 2019-January 2020).

Doctors No.	November 2019		December 2019		January 2020		Total number		Total antibiotics dispensed/total number of patients seen
	The total number of antibiotics dispensed	The total number of patients seen	The total number of antibiotics dispensed	The total number of patients seen	The total number of antibiotics dispensed	The total number of patients seen	The total number of antibiotics dispensed	The total number of patients seen	
Dr. 1	21	113	12	64	14	68	47	245	19%
Dr. 2	14	54	18	80	23	95	55	229	24%
Dr. 3	54	164	50	150	18	68	122	382	32%
Dr. 4	70	140	13	68	0	0	83	208	23%
Dr. 5	5	30	2	18	14	81	21	129	16%
Dr. 6	26	160	12	146	7	37	45	343	13%
Dr. 7	80	257	20	122	103	469	203	848	24%
Dr. 8	36	170	64	199	73	263	173	632	27%
Dr. 9	3	74	25	106	13	47	41	227	18%
Dr. 10	8	45	7	24	8	26	23	95	24%
Dr. 11	34	201	5	98	16	59	55	358	15%
Dr. 12	25	172	23	98	15	70	63	340	19%
Dr. 13	12	95	25	203	5	32	42	330	13%

Continued

Dr. 14	20	102	12	53	8	43	40	198	20%
Dr. 15	15	98	11	35	16	67	42	200	21%
Dr. 16	30	150	5	86	13	75	48	311	15%
Dr. 17	38	250	13	154	14	65	65	469	14%
Dr. 18	25	168	15	155	22	123	62	446	14%
Dr. 19	32	131	22	143	17	159	71	433	16%
Dr. 20	14	177	10	82	27	161	51	420	12%
Dr. 21	35	249	13	118	22	195	70	562	12%
Dr. 22	42	139	23	165	10	166	75	470	16%
Dr. 23	20	106	10	113	9	131	39	350	11%
Dr. 24	5	69	7	68	15	103	27	240	11%
Dr. 25	10	83	6	167	19	154	35	404	9%
Dr. 26	25	187	19	139	18	140	62	466	13%
Dr. 27	15	180	15	122	19	180	49	482	10%
Dr. 28	7	95	20	199	15	150	42	444	9%
Dr. 29	15	223	32	277	30	277	77	777	10%
Dr. 30	20	219	20	152	15	203	55	574	10%
Dr. 31	8	86	3	32	3	32	14	150	9%
Dr. 32	6	86	12	89	7	109	25	284	9%
Dr. 33	3	55	6	68	3	70	12	193	6%

The study is first in the region and in its specialization (the use of antibiotics by paediatricians) in the field of behavioral insights, and therefore it is considered a scientific reference that can be used in future studies, and similar strategies can be used in other medical fields and insurance sectors. The study added to the importance of behavioral insights and motivation in general and comparison with peers in changing doctors' behaviors for better quality and greater commitment to scientific standards and the importance of experiments in this field to reach appropriate scientific solutions.

6. Conclusions and Recommendations

The study concluded that the use of peer comparison and accountability among physicians as behavioural interventions is an effective measure in reducing the improper prescription of antibiotics in hospital settings. We recommend:

1) The behavioral insights approach can be used to reassess, rethink and redesign entire health systems.

2) Forming the Dubai Insight Lab team to develop a scientific and practical methodology for managing behaviors that support government programs and policies related to the health care system and conduct more future studies.

3) Such studies should be conducted in other medical specialties, such as family medicine in the private and public sectors.

4) Understanding the behavioral and social factors contributes to the success of government policies, including improving patients' health.

7. Limitations of the Study

This research study was conducted in the Paediatric Emergency Department at Latifa Hospital for Women and Children, Dubai Health Authority, and, therefore, this study reflects the paediatric emergencies in the region, therefore, results cannot be generalised to the other faculties in the region. The study is limited to three months period. There is a need for such studies to be conducted on a larger scale and in different healthcare facilities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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