Primary Health Care Initiatives (PHCI)

The Effect of Health Education on Antibiotic Use in Two Health Centers in Aqaba

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Dedication

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Summary

Introduction and Objectives:

This study focused on the problem of antibiotic misuse at the health centers within the Aqaba Governorate. The purpose for conducting this study stems from observations indicating high prevalence of antibiotic prescriptions as well as unnecessary individual use by the public. Antibiotic misuse affects both the course of the disease and health care cost. A pilot test was conducted to investigate the reasons behind antibiotic misuse resulted in identifying several concerns. One of the major reasons detected by the pilot was lack of public awareness regarding antibiotic use, side effects and dangers related to misuse.

The overall objective of the study was to improve the rational use of antibiotics through health education of patients and training of local physicians in Aqaba Governorate. The specific objectives were reducing the proportion of prescriptions containing antibiotics, increasing public knowledge of antibiotics and their side effects and reducing misuse of antibiotics.

Methodology:

Study design: The study followed quasi-experimental design and was implemented during the period September 2000-April 2001. Amira Basma and Aqaba health centers were selected as the intervention and control groups respectively. A pretest stage for both groups was carried out where data was collected on patients' knowledge and practices regarding antibiotics, encounter time with physicians and proportion of prescriptions with antibiotics. This was followed by a health education and a training program for patients and physicians respectively for six months duration. Finally, a posttest was carried out repeating data collection as for the pretest stage.

Sampling universe and sample size: All clients visiting the Aqaba (control group) and Amira Basma (intervention group) health centers in Aqaba Governorate

comprised the study universe. A sample size of 150 individuals for each group at each of the pretest and posttest stage resulted in an overall study sample size of 600 individuals.

Data Collection: A specially designed interview questionnaire was used to collect data on antibiotic knowledge and practices from selected subjects. Observation was used to collect data on encounter time with physician in minutes using stopwatches.

Record reviews were used to collect data on the proportion of prescriptions containing antibiotics. Data on this regard was calculated for the month of March 2000 as pretest, instead of September 2000 to avoid the seasonal variation in antibiotic use. The posttest data was collected at the end of intervention during March 2001.

Intervention: The intervention took place at the Amira Basma Health Center and consisted of a training program designed for the physicians working at health center and focusing on antibiotic misuse. The intervention also consisted of health education sessions for the clients visiting the intervention site. Basically, after discussing the topic of antibiotic use and side effects with each client, the physician at the Amira Basma health center gave that client a health education leaflet on antibiotic use. In addition to information on antibiotic use and side effects, the leaflet included the client's record number, diagnosis, treatment, and date of visit. This was expected to help preserve the leaflet for longer periods of time and refer to it at least when a patient decides to visit the health center.

Data analysis: All collected data was entered into the computer and analyzed using the SPSS program. The following techniques were used:

- Description of frequency distributions.
- Comparison of means for continuous variables using independent t test.
- Comparing proportions using chi-square χ^2.
- Comparing ranks using two-independent samples using Mann Whitney U test.

Results:

After carrying out the health education program for patients and training for physicians, the intervention site witnessed some important improvements in the posttest as compared to the pretest stage of the study. The percent of prescriptions containing antibiotics decreased by 13.4% (from 77.6% to 67.2%). This hints to an indirect decrease in the amount of antibiotic. The knowledge about the side effects of antibiotics among clients increased form 40% to 73.3%. Using antibiotics during common colds persistently dropped from 36% to 11.3%. Completing the course of antibiotics and reading the leaflet persistently was reported to have increased from 13.3% to 40.7% and from 26.7% to 69.3% respectively. Furthermore, the percentage of clients who reported receiving clear instructions from treating physicians regarding antibiotic use increased from 37.3% to 63.3%. All the above differences were found to be of statistical significance. No differences were found in the results of the control group.

No substantial statistically significant changes were noted regarding giving antibiotics to neighbors, receiving the antibiotics upon own request, physical examination before prescribing the antibiotic and the encounter time with physicians.

Discussion:

Absence of statistically significant differences for the control group along with significant improvements in the intervention site for a variety of variables hints to the possibility of a positive effect of the intervention. Despite the improvements gained in this study figures of misuse of antibiotics are still huge and need to be tackled seriously at all levels.

The absence of change for some practices might be due to a variety of reasons including the separate pre-posttest design used in this study, small sample size and most importantly the short duration of the intervention that is not sufficient to bring about changes.

Recommendations:

This study resulted in several recommendations, mainly:

- Adoption and incorporation of the health education leaflet on antibiotic nationwide for one year, followed by assessment of the change in the amount of prescribed antibiotics over that year.
- Carrying out health education campaigns on antibiotic use.
- Publicizing the issue of antibiotic misuse through the media.

1. Introduction

1.1 Problem Description

Health of individuals is a mere indicator for civilization, productivity and social development. Some of the current antibiotic practices affect prevention of many infectious diseases by increasing the resistance to available drugs, which in turn negatively influences the health of the individual and community.

Health care services in Aqaba Governorate are provided through one military hospital, two private hospitals, ten primary health centers and eight remote village health centers. The research team in Aqaba identified the problem of antibiotic misuse in the health centers within their Governorate. Clinical observation in Aqaba indicates liberal antibiotic prescription as well as unnecessary use by the public. An example for this is the use of antibiotics in treating common colds caused by viruses that don't respond to antibiotics, which can become ineffective when misused because organisms can gain resistance to them. Prescribing antibiotics is an integrated process that includes many factors, such as: disease, health provider, client's awareness and drug supply system.

1.2 Study Objectives

The research team studied the effectiveness of carrying out a health education and training program in order to limit misuse of antibiotics. The overall objective for this study was to improve the public's use of antibiotics by achieving the following specific objectives:

- Decrease the rate of antibiotics use (rate of prescriptions containing antibiotics) by 10%.
- Increase the public's awareness about antibiotics.
- Limit erroneous practices related to antibiotic use, such as: taking antibiotics without prescription, storing antibiotics at home and giving antibiotics to neighbors and relatives.

2. Methodology

2.1 Study Design

A Quasi-Experimental design was used to carry out a pretest and posttest phase on two different groups (intervention and control). The following diagram summarizes the study:

Study Phase / Group	Sampling	Pretest	Intervention	Posttest
Intervention (Amira Basma Health Center)	**[R]**	**P1**	**I**	**P3**
Control (Aqaba Health Center)	**[R]**	**P2**	**0**	**P4**

P1 Pretest for the intervention group

P2 Pretest for the control group

P3 Posttest for the intervention group

P4 Posttest for the control group

I Implementation of a health education and training program

0 no intervention

[R] Random selection of subjects

Amira Basma health center was selected as the intervention site and Aqaba health center as the control. A pretest was carried out for each site followed by the intervention that lasted 6 months. The intervention consisted of a training program for the physicians and a health education program for the clients. A posttest was done following the intervention in order to measure the change in the two groups and thus determine the intervention's effect.

2.1 Variables

2.1.1 Dependent Variable

Antibiotic use as measured by the rate of prescriptions containing antibiotics.

2.1.2 Independent variables

- Public's awareness of the side effects of antibiotics.
- Public's practices related to:
  - Use of antibiotics during common colds.
  - Storage of antibiotics.
  - Giving available antibiotics to neighbors or relatives.
  - Clients' persistent request to receiving antibiotics.
  - Completing the course of antibiotics.
- Physicians' practices:
  - Giving the client enough time to describe his/her condition.
  - Giving the client instructions on how to use the drugs.
  - Encounter time with the physician.

2.3 Study Universe

The target population for this study was clients visiting the Aqaba and Amira Basma health centers. These two centers are not representative of all the health centers in Aqaba because they were selected for having the highest rate of clientele in Aqaba and for being convenient to data collectors. Consequently, results of the study can only be generalized to the target population, that is: clients visiting the two health centers and not all health care seekers in Aqaba Governorate.

2.4 Study Sample

2.4.1 Sample Size

Study sample was selected based on the following:

$$n = (z)^2 pq / (d)^2$$

$$n = (1.96)^2 (0.5)(0.5) / (0.1)^2 = 150$$

where:

n = sample size

z = confidence limit (1.96 standard deviations)

p = rate of knowledge and awareness of the side effects of antibiotics and various practices (a rate of 50% was predetermined in order to guarantee the highest possible variability)

q = 1-p = 0.5

d = precision level = 10%

A total of 150 clients were selected for each of the control and intervention groups and for the pretest and posttest phases alike. The pretest and posttest groups were therefore considered as two separate entities. Ideally, the same group of individuals should be followed through the pretest and posttest stage. However, this was not possible due to time limitation. Therefore, the results were most probably influenced by the small sample size and the threat of selecting different pretest and posttest groups of individuals with varied characteristics, such as: age, sex, educational and social backgrounds.

All medical prescriptions registered at the two health centers were included when computing the rate of prescriptions containing antibiotics.

2.4.2 Sample Selection

Systemic random sampling selection was used in identifying the clients. Starting with the second comer, 150 clients visiting the general physician at each health center were randomly selected for each group. Selection was carried out over a period of three weeks.

As mentioned previously, all medical prescriptions for the month of March in the year 2001 were included to represent the posttest phase. In order to avoid seasonal variations in the nature of prescriptions, the month of March in the year 2000 was identified for the pretest phase.

2.5 Data Collection Methods

Data was collected using the following methods:

2.5.1 Personal Interview

Research assistants who interviewed the clients or those accompanying them used a specially designed questionnaire (Appendix 1). The questionnaire included 10 background questions, such as: sex, education level, and health insurance availability. Other questions relevant to the research topic were included, such as: knowledge of antibiotics and their side effects, practices related to antibiotic use (completion, use during common colds, storage, recommending and offering available antibiotics to neighbors and relatives).

2.5.2 Observation

Observation was used as a tool to measure encounter time of the client with the physician. Using stopwatches assigned specifically for this purpose, time was observed and measured in minutes from the instant that the client entered the physician's office until exiting. A special space on the questionnaire was assigned to record the measured time (Appendix 1).

2.5.3 Using Available Data

Registries were examined to determine the rate of prescribing antibiotics for the control and intervention groups during March 200 and March 2001 (Appendix 2).

2.6 Data Collection Plan

The data collection plan included pilot testing for all tools used in the study as well as training of research assistants that helped in data collection. Research assistants were distributed for collecting pretest and posttest data from the control and intervention groups. The main investigators carried out supervision of data collection. Collected data was tabulated and entered into the computer for analysis.

2.7 Intervention

Following the pretest phase, intervention was carried out at the Amira Basma health center for a period of six months (September – April). Intervention included the following:

2.7.1 Training of Physicians

The pharmacist at the Aqaba Health Directorate prepared special training material on misuse of antibiotics (Appendix 3). This material was used to guide in the training of physicians, which included:

- Introduction on antibiotics and their misuse.
- Forms of antibiotic misuse.
- Basic principles in choosing the appropriate antibiotic.
- Side effects of antibiotics.
- Clients' utilization of antibiotics.
- Physician's recommendations for limiting antibiotic misuse.

2.7.2 Distribution of Health Education Material

In coordination with the research component at the PHCI, the research team prepared and printed 5,000 copies of the health education leaflet on antibiotic misuse (Appendix 4). The leaflet contained the following information:

- Definition of antibiotics.
- Important instructions and recommendations on the use of antibiotics.
- Important facts about the use of antibiotics.

- Name, age, record number, diagnosis, name of antibiotic and date.

After offering a short advice regarding antibiotics, the physicians at the health center distributed this leaflet to clients visiting the general clinic. In order to preserve the leaflet and portray its importance, the client's record number, diagnosis, treatment and date of treatment were included on it.

2.8 Data Analysis Plan

Data entry into the computer was followed by analysis using the SPSS program. Data analysis was done using the following statistical procedures:

- Description of means and percentages.
- Comparison of means for continuous variables using independent and paired t tests.
- Non-parametric analysis – Comparing proportions using chi-square.
- Comparison of ranks using 2 independent Mann Whitney U test.

3.Results

3.1 Background Variables

Participants for the control and intervention groups during the pretest and posttest phase totaled 600 clients, with 150 participants for each group and phase. Response was therefore complete and equivalent to the predefined sample. Female participants in both the control and intervention group outnumbered the males both at the pretest and posttest phase (Table 1).

Table (1): Distribution of Background Variables for Control and Intervention Groups During Pretest and Posttest Phase

Study Phase / Variable	Intervention Group		Control Group	
	Pretest	**Posttest**	**Pretest**	**Posttest**
	%	**%**	**%**	**%**
Sex				
Female	54.7	70.7	55.3	58.7
Male	45.3	29.3	44.7	41.3
Educational Level				
Illiterate	10	5.3	14.7	21.3
Preparatory School	18	24	41.3	24
High School	38	40.7	21.3	21.3
College	20.7	22.7	14	20.7
University	13.3	7.3	8.7	12.7
Health Insurance				
Present	67.3	67.3	82.7	65.3
Not Available	32.7	32.7	17.3	34.7

The variation between the educational level categories (shown in Table 1) for the pretest and posttest phase of the intervention group was not significant. The percentage of those who finished high school was highest during the pretest phase (38%) as well as the posttest (40.7%). Differences shown in Table 1 in terms of educational level variations were not statistically significant ($p = 0.17$, using χ^2).

Analysis showed considerable variation between pretest and posttest educational levels for the control group (Table 1). Consequently, 41.3% of the clients at the pretest phase had completed preparatory school as opposed to 24% in the posttest phase. This variation was found to be statistically significant ($p < 0.01$, using χ^2).

Table 1 portrays the status of health insurance for the control and intervention group at the pretest and posttest stage. The percentage of participants who reported having health insurance at the pretest stage for the control group was 82.7% compared with 67.3% for the intervention group. Differences between the pretest and posttest data on health insurance for the control group were found to be statistically significant ($p < 0.001$, using χ^2).

The variations in some background variables that might be related to antibiotic use could have been primarily produced by independent pretest and posttest samples (different clients) which prevented follow up for the same interviewees. Moreover, it was expected that the small sample size could result in pretest and posttest variations.

3.2 Antibiotic Prescription

Table 2 compares numbers and percents of antibiotic prescriptions for March 2000 (pretest) with that of March 2001 (posttest) for both the control and intervention groups. The rate of antibiotic prescription for the intervention group dropped from 77.6% at the pretest phase to 67.2% at the posttest phase, thus yielding a decrease of 13.4%. This change in antibiotic prescription rate was found to be statistically significant ($p = 0.03$, using χ^2).

Table (2): Antibiotic Prescription for the Control and Intervention Groups at the Pretest and Posttest Phase

Study Group	Pretest (March 2000)			Posttest (March 2001)		
	Total Prescriptions	Prescriptions Containing Antibiotics	%	Total Prescriptions	Prescriptions Containing Antibiotics	%
Intervention Group	2330	1809	77.6	2299	1544	67.2
Control Group	3751	2375	63.3	3853	2401	62.3

The rate of antibiotic prescriptions for the control group was almost similar at the pretest and posttest phase with a mere decrease of 1.6%. This difference (from 63.3% to 62.3%) was not statistically significant ($p = 0.3$, using χ^2).

3.3 Knowledge of Side Effects of Antibiotics

3.3.1 Intervention Group

Table 3 shows a notable increase in knowledge of antibiotics' side effects among participants from the intervention group. The percentage of participants in the intervention group, who reported knowledge of antibiotics' side effects, increased from 40% at the pretest phase to 73.3% at the posttest phase. This difference was found to be statistically significant ($p < 0.0001$, using χ^2).

Table (3): Knowledge of Antibiotics' Side Effect for the Intervention Group

Knowledge of Antibiotics' Side Effects	Study Phase			
	Pretest		Posttest	
	N	%	N	%
Yes	60	40	110	73.3
No	52	34.7	23	15.3
Not Sure	38	25.3	17	11.3
Total	150	100	150	100

3.3.2 Control Group

Table 4 shows that at the pretest phase 48% of the participants in the control group knew of antibiotics' side effects compared with 47% at the posttest phase. This difference was not found to be statistically significant ($p = 0.968$, using χ^2).

Table (4): Knowledge of Antibiotics' Side Effect for the Control Group

Knowledge of Antibiotics' Side Effects	Study Phase			
	Pretest		Posttest	
	N	%	N	%
Yes	72	48	71	47.3
No	56	37.3	58	38.7
Not Sure	22	14.7	21	14
Total	150	100	150	100

No significant difference in knowledge regarding antibiotics' side effects was found when comparing pretest results (Table 3 & 4) for the control and intervention groups ($p = 0.064$, using χ^2).

3.4 Practices Related to Antibiotic Use

3.4.1 Using Antibiotics in Common Colds

Table 5 shows that there was a noticeable decrease in the regular use of antibiotics for the common cold treatment by the intervention group. The percentage of participants who reported always using antibiotics during common colds dropped from 36% during the pretest phase to 11.3% during the posttest phase. This difference proved to be statistically significant ($p < 0.0001$, using Mann Whitney u test).

Table (5): Distribution of Antibiotic Usage in the Treatment of Common Colds for the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Use of Antibiotics in the Treatment of Common Colds				
		Always %	Sometimes %	Rarely %	Never %	Total Number
Intervention	Pretest	36	34.7	18	11.3	150
	Posttest	11.3	20	24.7	44	150
Control	Pretest	60	6	21.3	12.8	150
	Posttest	44	20.7	26.7	8.7	150

As shown in Table 5, the percentage of control participants who reported always using antibiotics in the treatment of common colds dropped from 60% during the pretest phase to 44% during the posttest. Analysis showed that this decrease was not statistically significant ($p = 0.119$, using Mann Whitney test).

Comparison of the pretest results for the control and intervention groups (shown in Table 5) reveal that the participants who didn’t use antibiotics for treating common colds equaled 11.3% for the intervention group and 12.8% for the control. Hence participants of the intervention group were the most users of antibiotics in treating common colds during the pretest phase. The overall difference between the control and intervention groups in using antibiotics during common colds was statistically significant ($p = 0.024$, using Mann Whitney test).

3.4.2 Participants Completion of Antibiotics

Table 6 shows the percentage distribution for completion of prescribed antibiotics for the control and intervention groups during the pretest and posttest phase. It can be detected that the percent of participants from the intervention group who reported completing the prescribed antibiotics at all times rose from 13.3% during pretest to 40.7% during posttest. This difference was found to be statistically significant ($p < 0.0001$, Mann Whitney u test).

As for the control group, the percent of participants reporting to complete their prescribed antibiotics at all times decreased from 40% during pretest to 26.7% during posttest. This decrease was statistically significant ($p = 0.038$, Mann Whitney u test).

Table (6): Distribution of Participants who Complete the Prescribed Antibiotic in the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Completion of Prescribed Antibiotics				
		Always %	Sometimes %	Rarely %	Never %	Total Number
Intervention	Pretest	13.3	37.3	15.3	34	150
	Posttest	40.7	26	14.7	18.7	150
Control	Pretest	40	23.3	3.3	33.3	150
	Posttest	26.7	23.3	13.3	36	150

Significant differences in completing prescribed antibiotics become evident when comparing the pretest results for the intervention and control groups ($p = 0.001$, using Mann Whitney u test). This difference was for the benefit of the control group, where control participants were keener at completing the prescribed antibiotics.

3.4.3 Reading the Leaflet Accompanying the Antibiotic

Table 7 clearly portrays a difference in the percentage of participants from the intervention group who said that they always read the leaflet information accompanying the antibiotics. Participants from the intervention group who reported always reading the information leaflet increased from 26.7% during the pretest phase

to 69.3% during the posttest phase. This difference was statistically significant ($p < 0.0001$, using Mann Whitney u test). It is noteworthy to mention that the health education leaflet emphasized the importance of reading the information leaflet.

As for the control group, there was a significant decrease in the percent of participants who reported reading the information leaflet at all times from 40% during the pretest stage to 26.7% during the posttest phase ($p < 0.0001$, using Mann Whitney u test).

Table (7): Distribution of Participants who read the Information Leaflet of the Antibiotics for the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Reading Antibiotic Information Leaflet				
		Always %	Sometimes %	Rarely %	Never %	Total Number
Intervention	Pretest	26.7	34	23.3	16	150
	Posttest	69.3	22	3.3	5.3	150
Control	Pretest	40	32.7	20	7.3	150
	Posttest	26.7	16	26	31.3	150

When comparing the pretest results for the control and intervention group, a noticeable difference was observed in reading the information leaflet of the antibiotics in favor of the control group.

3.4.4 Giving Antibiotics to Neighbors and Relatives

Table 8 shows that the percent of participants in the intervention group who reported never giving antibiotics to their neighbors and relatives have increased from 20% to 38.7% for the pretest and posttest respectively. This difference was found to be statistically significant ($p = 0.018$ using Mann Whitney u test) in a positive direction of not giving antibiotics to neighbors or relatives.

Table (8): Distribution of Participants who Give Antibiotics to their Neighbors and Relatives for the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Giving Antibiotics to Neighbors & Relatives				
		Always %	Sometimes %	Rarely %	Never %	Total Number
Intervention	Pretest	24	42	14	20	150
	Posttest	22	30.7	8.7	38.7	150
Control	Pretest	55.3	22	5.3	17.3	150
	Posttest	41.3	23.3	18.7	16.7	150

Table 8 shows that pretest and posttest results for the control group were similar regarding the percent of participants who reported never giving antibiotics to neighbors or relatives (17.3% and 16.7% respectively). The overall differences in the control group were also found to be statistically significant ($p = 0.023$ using Mann Whitney u test) and in a positive direction as the intervention group.

Comparing pretest results for the control and intervention groups showed significant differences in favor of the control group ($p < 0.0001$ using Mann Whitney u test).

3.4.5 Storing Antibiotics at Home

Although the percent of participants from the intervention group who reported storing antibiotics at home constantly (shown in Table 9) increased from 18% at the pretest phase to 32% at the posttest, the overall difference between the pretest and posttest responses was statistically insignificant ($p = 0.282$ using Mann Whitney u test). In other words, the practice of storing antibiotics in the intervention group was not affected by the intervention.

Table (9): Distribution of Participants who Store Antibiotics at Home in the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Storing Antibiotics at Home				
		Always %	Sometimes %	Rarely %	Never %	Total Number
Intervention	Pretest	18	49.3	18.7	14	150
	Posttest	32	35.3	10.7	22	150
Control	Pretest	56.7	30.7	6.7	6	150
	Posttest	34	28	23.3	14.7	150

Table 9 also shows that the percent of participants from the control group who constantly store antibiotics at their homes decreased from 56.7% at the pretest phase to 34% at the posttest. This difference was also found to be statistically significant ($p < 0.0001$ using Mann Whitney u test).

3.5 Physician's Practice Related to Antibiotic Prescription

3.5.1 Prescribing Antibiotics per Client's Request

Table 10 shows that the percent of participants from the intervention group who were prescribed antibiotics according to their condition and not as requested, increased from 23.3% to 56.7% during the pretest phase. This increase was found to be statistically significant ($p < 0.0001$, Mann Whitney u test). It is worth noting that the training program offered for the physicians focused on the misuse of antibiotics and on the need to prescribe antibiotics relevant to the client's condition and not request. The need to dispute the client's request for antibiotics was stressed during the training.

Table (10): Distribution of Antibiotic Prescription according to the Participant's Request in the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Prescribing Antibiotics According to Clint's Request				
		Always %	Sometimes %	Rarely %	Never %	Total Number
Intervention	Pretest	14.7	38	24	23.3	150
	Posttest	4.7	26.7	12	56.7	150
Control	Pretest	27	40.7	3.3	28	150
	Posttest	16	30.7	16.7	26.7	150

When examining the control group data, results indicated that the percent of participants from this group who reported not receiving antibiotics based on their request remained almost unchanged (28% at the pretest and 26.7 at the posttest stage). However the overall changes in antibiotic prescription per request in the control group was statistically significant and in the positive direction ($p = 0.001$, using Mann Whitney u test).

Comparison of pretest data for the control and intervention group showed significant differences ($p = 0.021$, using Mann Whitney u test), where receiving antibiotics based on the participant's request was higher in the intervention group.

3.5.2 Giving Instructions for Use of Antibiotics

Table 11 shows that the percent of participants from the intervention group who received clear instructions from the physician relevant to the use of prescribed antibiotics increased from 37.3% during the pretest to 63.3% during the posttest. This difference was statistically significant ($p< 0.0001$, using χ^2). It is worth mentioning that the training program offered to the physicians emphasized the importance of giving clients clear instructions for antibiotic use.

Table (11): Distribution of Giving Instructions for using Antibiotics by the Physician for the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Giving Instructions Relevant to Antibiotic Use			
		Yes %	No %	Don't Know %	Total Number
Intervention	Pretest	37.3	62	0.7	150
	Posttest	63.3	30	6.7	150
Control	Pretest	54.7	41.3	4	150
	Posttest	56	38	6	150

The percent of participants from the control group who reported receiving clear instructions relevant to the use of antibiotics (shown in Table 11) increased from 54.7% in the pretest phase to 56% in the posttest. This increase was not found to be statistically significant ($p = 0.678$, using χ^2).

Comparison of pretest results for the intervention and control group reveal that there was a statistically significant difference in the percent of giving instructions on use of antibiotics by the physician to the participants of both groups, in favor of the control group ($p = 0.001$, using χ^2).

3.5.3 Giving Adequate Encounter Time for the Participant

Table 12 shows that the percent of participants from the intervention group who reported having adequate encounter with the physician to explain their condition rose from 42.7% during the pretest to 62.7% during the posttest ($p < 0.001$, using χ^2).

Table (12): Distribution of Giving Adequate Encounter Time by the Physician for the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Giving Adequate Encounter Time			
		Yes %	No %	Don't Know %	Total Number
Intervention	Pretest	42.7	44	13.3	150
	Posttest	62.7	23.3	14	150
Control	Pretest	33.3	58.7	8	150
	Posttest	42.7	44	13.3	150

A significant increase in the percent of participants who reported receiving adequate encounter time with the physician to listen to their medical complaints was also noted when comparing pretest and posttest data for the control group. Consequently, 33.3% of the control participants reported receiving adequate encounter time at the pretest phase rising to 42.7% at the posttest phase ($p = 0.01$, using χ^2).

3.5.4 Examining the Client prior to Prescribing Antibiotics

Table 13 shows that the percent of participants from the intervention group who were examined prior to receiving antibiotics increased from 48.7% at the pretest phase to 66.7% at the posttest. Analysis showed that this increase was statistically significant ($p = 0.002$, using χ^2).

Table (13): Distribution of Performing a Physical Exam Prior to Prescribing Antibiotics for the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Physical Exam prior to Prescribing Antibiotics		
		Yes %	No %	Total Number
Intervention	Pretest	48.7	51.3	150
	Posttest	66.7	33.3	150
Control	Pretest	52.7	47.3	150
	Posttest	58.7	41.3	150

Analysis also showed that the percent of participants from the control group who reported being examined by the physician prior to receiving antibiotics increased from 52.7% at the pretest phase to 58.7% at the posttest. This increase was not statistically significant (p =0.296, using χ^2).

Comparison of pretest results for the intervention and control group did not show a significant difference between those who were examined before receiving antibiotics, where the relevant percents were 52.7% for the control group and 48.7% for the intervention group (p =0.05, using χ^2).

4.5.5 Encounter Time with the Physician

Table 14 shows an increase in the participants' average encounter time with the physician for the intervention group, whereby the average time increased from 5.4 minutes during the pretest phase to 6.3 minutes during the posttest (p = 0.007, using t test).

Table (14): Average Participants' Encounter Time (in minutes) with the Physician for the Control and Intervention Group by Study Phase

Study Phase	Average Time for the Intervention Group	Average Time for the Control Group
Pretest	5.4	4.4
Posttest	6.3	5.7

A statistically significant increase in the encounter time spent by the control group was also found when comparing pretest (4.4 minutes) and posttest (5.7 minute) data (p < 0.0001 using a t test).

The difference in encounter time with the physician between the intervention and control groups at the pretest phase was found to be statistically significant (p = 0.002, using t test).

Table 15 shows the time categories for physician's encounter time. A clear drop in the percent of participants who spent less than 3 minutes was noted in the intervention group (20.7% for the pretest compared with 18.7% for the posttest). However, this difference was not found to be statistically significant (p = 0.078, using Mann Whitney u test).

Table (15): Distribution of Encounter Time Categories (in minutes) for the Control and Intervention Groups by Study Phase

Study Group	Study Phase	Encounter Time Categories (in minutes)				
		< 3 %	3 - 6 %	7 - 9 %	> 9 %	Total Number
Intervention	Pretest	20.7	54.7	12	12.7	150
	Posttest	18.7	47.3	8.7	25.3	150
Control	Pretest	44	39.3	4.7	12	150
	Posttest	25.3	43.3	16	15.3	150

In addition, Table 15 shows a decrease in the percent of participants from the control group who had less than 3 minutes encounter time with the physician, where this percent dropped from 44% (pretest) to 25.3% (posttest). The differences in the encounter time categories for the control group were statistically significant (p < 0.0001, using Mann Whitney u test).

The double number of physicians in the control group compared with the intervention group during this study might have affected the average encounter time spent by the participants.

4. Discussion

Amira Basma and Aqaba Health Centers were selected as the intervention and control sites respectively. Equivalent to the nature of a quasi-experimental design, the two selected sites were similar in terms of the served population number, monthly clientele, and type of rendered services. However after launching the study, it became obvious that the control site had a larger number of physicians, which in turn could have affected the results, such as encounter time with the physician. The results of this study should be cautiously interpreted due to: a) small sample size at each phase and for each group; b) independence of the pretest and posttest groups; c) clear difference in background variables of the groups, such as the educational level and health insurance; d) dependence of the intervention on the clients' visit and presence at the health center could have interfered with exposure of selected participants from the intervention group to the intervention itself.

The most outstanding result for this study was the indirect decrease in antibiotic utilization evidenced by a 13% decrease in the rate of antibiotic prescription by the intervention group. Unlike the unchanged antibiotic prescription rate of the control group, the decrease of the intervention group was statistically significant. It can therefore be concluded that the intervention in the form of training and health education was successful at increasing the public's awareness thus influencing the achieved outcome.

It is worthwhile mentioning that various factors interfere in directing and managing antibiotic prescriptions making it a difficult process to implement. Perhaps the physician's practice is the most pronounced factor affecting such a process demanding prolonged actions to achieve substantial results. A study done in England confirms that studies focusing on misuse of drugs require long periods of time[*]. Over a period of 5 years (1993-1997), the percent of antibiotic use in this study decreased by 16%. In addition, the number of prescriptions containing antibiotics dropped from 963 per

[*] MID Consult, today in medicine, further reduction in unnecessary use of antibiotics needed, 2001 April.

1,000 clients to 807. This result was mainly attributed to the decrease in the number of prescriptions for upper respiratory infections and throat ailments.

Another study focusing on misuse of antibiotics was carried out locally in Wadi Al-Hajar health center/Zarka in 1999**. In this study, the percent of Antibiotic prescription for adults was reported to be 77% and 81% for children. After carrying out an intervention, the rate of antibiotic prescriptions decreased by 5.4% for adults and by 2% for children.

A highly significant difference between the pretest and posttest level of knowledge regarding antibiotic side effects was markedly noted in the intervention group of this study. No changes in this respect were noted for the control group, thus indicating an effective intervention.

Significant positive variations were also noted in the intervention group in relation to use of antibiotics during common colds, finishing the prescribed antibiotic, reading the antibiotic information leaflet, and offering information by the physician. No significant changes in these variables were noted in the control group. These results can be possibly accounted for by the positive effect of the training and health education program.

Similar significant changes were found in the intervention and control group in reference to giving antibiotics to neighbors and relatives, prescribing antibiotics in accordance with the participant's request, examining the client prior to prescribing antibiotics and encounter time with the physician. This indicates that aside from those factors included in the intervention, some extraneous factors have probably affected the results. The short duration of the study (six months) together with the need for longer periods to achieve changes in knowledge and practices have to be reiterated.

In conclusion, this study showed that there are various erroneous practices involved in the misuse of antibiotics. These practices, whether patient or physician oriented, pose a problem that should be addressed with deliberate and collective efforts.

**Jordan Health Bullet. August 2000. Center for Human Resource Development.

5. Recommendations

- Utilize the health education material used in this study in Aqaba Governorate, and implement a study on antibiotics prescription a year after that.

- National consideration for using the health education material prepared for this study.

- Use the public media to highlight the issue of antibiotic misuse.

- Carry out health education campaigns that focus on antibiotic misuse. This can be done through the marketing component at the PHCI project and in collaboration with the Ministry of Health. These campaigns should target health center clientele, schools and other communities.

6. Appendices

Appendix (1)	Copy of the Questionnaire
Appendix (2)	Copy of the monthly prescription for antibiotic.
Appendix (3)	Copy of the physicians' training program.
Appendix (4)	Copy of the health education material.

Appendix 1 – Questionnaire

"In the Name of God Almighty"

Ministry of Health

Questionnaire on Misuse of Antibiotics

Sex: Male ☐ Female ☐

Educational Level: Illiterate ☐ Preparatory ☐

Secondary ☐ College ☐ University ☐

Health Insurance: Present ☐ Absent ☐

Time client enters physician's examination room (hour:minute:second) ☐

Time client enters physician's examination room (hour:minute:second) ☐

1. Do you use antibiotics during common colds?
    a. Always
    b. Rarely
    c. Sometimes
    d. Don't use

2. Are there side effects for antibiotics?
    a. Yes
    b. No
    c. Not sure

3. Do you feel that the physician gave you enough time to explain your condition?
    a. Yes
    b. No
    c. Don’t know

4. Did the physician examine you before prescribing antibiotics?
    a. Yes
    b. No
    c. Don’t know

5. Did the physician give you instructions about using antibiotics when prescribing it?
    a. Yes
    b. No
    c. Don’t know

6. Do you finish the antibiotics prescribed by the physician?
    a. Always
    b. Sometimes
    c. Rarely
    d. Don’t finish

7. Do you read the information leaflet accompanying the medicine?
    a. Read it always
    b. Read it sometimes
    c. Rarely read it
    d. Never read it

8. Do you store antibiotics at home?
    a. Always
    b. Sometimes
    c. Rarely

d. Don’t store

9. Do you give your neighbor or relative antibiotics (capsules, syrup or tablets) if available at your home?
    a. Always
    b. Sometimes
    c. Rarely
    d. Don’t give

10. Did it happen that the physician give you antibiotics according to your request?
    a. Always
    b. Sometimes
    c. Rarely
    d. Don’t give me

Appendix 2 – Prescribed Antibiotics

Percent of Antibiotics Prescribed during March, 2000 in Aqaba Health Center (Control) during the Pretest

Date	Total Number of Prescriptions	Number of Antibiotic Prescriptions	Percent of Antibiotic Prescriptions
01/03/2000	147	89	61
02/03/2000	117	76	65
04/03/2000	230	160	70
05/03/2000	141	77	55
06/03/2000	174	150	86
07/03/2000	190	135	71
08/03/2000	146	80	55
09/03/2000	118	47	40
11/03/2000	210	153	73
12/03/2000	127	66	52
13/03/2000	170	126	74
14/03/2000	192	103	54
20/03/2000	233	133	57
21/03/2000	210	126	60
22/03/2000	160	80	50
23/03/2000	144	84	58
25/03/2000	210	180	86
26/03/2000	167	102	61
27/03/2000	220	184	84
28/03/2000	167	98	59
29/03/2000	160	64	40
30/03/2000	118	62	53
Total	**3751**	**2375**	**63**

Percent of Antibiotics Prescribed during March, 2001 in Aqaba Health Center (Control) during the Posttest

Date	Total Number of Prescriptions	Number of Antibiotic Prescriptions	Percent of Antibiotic Prescriptions
01/03/2001	280	199	71
03/03/2001	255	170	67
10/03/2001	181	118	65
11/03/2001	162	134	83
12/03/2001	155	75	48
13/03/2001	188	131	70
14/03/2001	201	126	63
15/03/2001	121	105	87
17/03/2001	290	180	62
18/03/2001	204	165	81
19/03/2001	229	110	48
20/03/2001	159	89	56
21/03/2001	150	71	47
22/03/2001	167	104	62
24/03/2001	184	118	64
25/03/2001	177	86	49
27/03/2001	224	147	66
28/03/2001	166	100	60
29/03/2001	180	86	48
31/03/2001	180	87	48
Total	**3853**	**2401**	**62**

Percent of Antibiotics Prescribed during March, 2000 in Amira Basma Health Center (Intervention) during the Pretest

Date	Total Number of Prescriptions	Number of Antibiotic Prescriptions	Percent of Antibiotic Prescriptions
01/03/2000	102	85	83
02/03/2000	92	54	59
04/03/2000	97	96	99
05/03/2000	103	74	72
06/03/2000	104	71	68
07/03/2000	77	61	79
08/03/2000	101	76	75
09/03/2000	123	93	76
11/03/2000	95	87	92
12/03/2000	106	92	87
13/03/2000	118	94	80
14/03/2000	140	114	81
20/03/2000	105	74	70
21/03/2000	92	63	68
22/03/2000	109	71	65
23/03/2000	118	93	79
25/03/2000	122	95	78
26/03/2000	120	103	86
27/03/2000	111	92	83
28/03/2000	78	50	64
29/03/2000	109	95	87
30/03/2000	108	76	70
Total	**2330**	**1809**	**78**

Percent of Antibiotics Prescribed during March, 2001 in Amira Basma Health Center (Intervention) during the Posttest

Date	Total Number of Prescriptions	Number of Antibiotic Prescriptions	Percent of Antibiotic Prescriptions
01/03/2001	170	126	74
03/03/2001	154	116	75
10/03/2001	98	79	81
11/03/2001	81	56	69
12/03/2001	82	60	73
13/03/2001	121	80	66
14/03/2001	120	96	80
15/03/2001	123	82	67
17/03/2001	123	78	63
18/03/2001	92	69	75
19/03/2001	132	73	55
20/03/2001	90	69	77
21/03/2001	74	53	72
22/03/2001	112	78	70
24/03/2001	116	86	74
25/03/2001	113	76	67
27/03/2001	117	74	63
28/03/2001	126	53	42
29/03/2001	158	73	46
31/03/2001	97	67	69
Total	**2299**	**1544**	**67**

Appendix 3 – Physician's Training Program

Physician's Training Program for Antibiotic Misuse

Introduction:

Due to its effect on treatment and its high cost, prescribing medicines is an important component within the rendered health services. The Aqaba research team initiated a study focusing on antibiotic misuse in an attempt to avoid irrational use of drugs and assure sufficient supplies of essential drugs to the public.

Types of Antibiotic Misuse:

Some examples of clients' misuse of antibiotics include:

- In an attempt to gain a longer treatment period, some clients decrease the prescribed dose of antibiotics. Some people increase the dose thinking that a larger dose can help speed recovery.
- Not taking the antibiotics on time or totally forgetting the dose.
- Discontinuing the antibiotics when feeling better.

Erroneous practices that accompany antibiotic use stem from lack of knowledge in relation to usage and side effects. As a result many people don't recover from their disease and the use of antibiotics is wasted. Other factors that cause misuse of antibiotics include:

- Physicians don't record the prescribed antibiotic on the patient's chart.
- Not giving information when prescribing antibiotic to clients, such as: usage, duration, and side effects.
- Not giving clients sufficient time to listen to their complaints, and not giving emphasis to the physical exam.
- Prescribing antibiotics based on the clients' request and not need.

Principles in Selecting Appropriate Antibiotic:

1. Diagnosis which includes:
   a. Clinical diagnosis: This represents the first step in deciding appropriately on the needed antibiotic.
   b. Laboratory diagnosis: Which provides precision for selecting the appropriate antibiotic by identifying the causative agent and the level of sensitivity of the required antibiotic.

2. Consider the following when prescribing antibiotics:
   a. Nature of infection: Is it communicable or not. Does it respond to a treatment or anti microbial drug?
   b. Description of the antibiotic, which includes:
      i. Side effects
      ii. Excretion of the antibiotic and its metabolism.
      iii. Socio economic status of the client, which can affect the price and type of prescription.

Various factors have to be defined when prescribing antibiotics, such as:

1. Age
2. Weight
3. General physical condition, especially liver and kidneys
4. Severity of infection
5. Pregnancy

Side Effects of Antibiotics

1. Sensitivity and irritation at the injection site.
2. Nausea, vomiting and abdominal pain or cramps.
3. Residual deposit in the teeth and bones.
4. Anemia.
5. Ear effects, such as hearing and balance.
6. Respiratory effects, which can even reach apnea.
7. Renal failure.

8. Liver outcomes, which can range from mild elevation in enzymes to fatal failure.

How should the client handle antibiotics?

Using simple terminology, the physician should explain to the client several factors related to antibiotics, mainly:

1. Each type of antibiotic has its unique action. A drug that treats one ailment isn't necessarily useful for another disease.
2. The dose of the antibiotic is very important because it becomes ineffective if decreased and can cause toxicity if increased.
3. In order to maintain a specific level within the body, the prescribed dose of antibiotic should be taken regularly.
4. The person taking the antibiotic should make sure to complete the prescribed course and not to withhold it before the treatment period is over.
5. Since children can mistake some drugs for candy and thus develop toxicity if they accidentally ingest them, care should be taken to keep all drugs out of children's reach.
6. When syrup drugs are prescribed for children, mothers should make sure that antibiotic syrups, for which water is added to dissolve them, are completed. If these drugs are not completed as prescribed, then they should not be used another time when the child gets sick again, because they can cause harm to the child.

Appendix – 4 Health Education Leaflet

المضادات الحيوية

المديرية العامة لصحة
محافظة العقبة

عزيزي المواطن

ان استخدامك السليم للمضادات الحيوية يقودك الى الشفاء السريع وبأقل ضرر، فاحرص دائماً على عدم الاساءة لاستخدامها.

مع تمنياتنا للجميع بالشفاء العاجل

لمزيد من المعلومات يرجى الاتصال على

هاتف ٢٠١٢٤٦٥

أعدت هذة النشرة

من قبل قسم الدراسات والابحاث في

مديرية صحة محافظة العقبة

يجب ان يتم تناول المضاد الحيوي لكامل المدة الزمنية التي تحدد من قبل الطبيب.
ان سوء استعمال المضادات الحيوية يؤدي الى ظهور مقاومة الجراثيم مما يعود سلباً على صحتك وصحة عائلتك.

PHCI
Primary Health Care Initiatives is implemented by Abt Associates, Inc., under contract No. 278-C-00-99-00059-00 with the U.S. Agency for International Development (USAID)

ـــم :
ـــر :
الملف :

التشخيص	نوع المضاد الحيوي	التاريـــخ

ا هو المضاد الحيوي :

و عبارة عن مادة كيماوية لها خاصية منع تكاثر او قتل جراثيم التي تسبب الامراض.

عطى المضاد الحيوي بشكل رئيس عن طريق الفم او زرق في العضل او الوريد او بشكل موضعي مثل راهم والكريمات.

شادات ونصائح هامة حول استعمال مضادات الحيوية

- لا تأخذ المضاد الحيوي إلا بوصفة من الطبيب. التزم بجرعة المضاد الحيوي الموصوف بحيث لا تزيد او تنقص عن المطلوب.
- التزم بعدد الايام التي يجب ان يتم خلالها تناول المضاد الحيوي وكذلك مواعيد الجرعات..
- لا تعط المضاد الحيوي لأي شخص تبدو عليه نفس أعراض مرضك، فكل حالة مرضية تختلف عن الاخرى وكل جسم له ظروفة الخاصة.
- لا تقم بتخزين المضادات الحيوية في المنزل مما يجعل استعمالها أسهل ويعود عليك وعلى أطفالك بالضرر الشديد.
- تأكد من صلاحية المضاد الحيوي بقراءة تاريخ الصلاحية على العبوة قبل البدء بالاستعمال.
- المضادات الحيوية التي تعطي للأطفال بشكل سائل تنتهي صلاحيتها خلال اسبوع من بداية استعمالها بغض النظر عن تاريخ الصلاحية على العبوة.
- إحفظ المضاد الحيوي بالطريقة المحددة على العبوة.
- إذا كنتِ امرأة حامل فأخبري طبيبك قبل البدء بتناول أي مضاد حيوي.
- أذا كنت تتناول اي علاج آخر فأخبر الطبيب عنه لتلاشي التداخلات الدوائية الضارة بالجسم.
- توقف عن تناول المضاد الحيوي فوراً عند ظهور أي من الآثار الجانبية والمضاعفات.

☜ لا تنسى ...

الطبيب هو الشخص الوحيد القادر على تشخيص المرض واعطاء العلاج المناسب ولا تشعر بالإهمال من قبل الطبيب إذا لم يقم بإعطائك مضاد حيوي.

حقائق هامة جداً حول استعما المضادات الحيوية ؟

- معظم التهابات الجهاز التنفسي العلوي بما في الرشح والتهاب الحلق واللوزتين هي التهابا فيروسية ولا تحتاج على الاطلاق لاي مض حيوي.
- معظم حالات الاسهال لا تحتاج الى مضادا حيوية حيث قد يؤدي تناولها الى أضرار لا تح عقباها.
- المضاد الحيوي الارخص سعراً ليس بالضرو ان يكون اقل تأثيراً من المضاد مرتفع السعر.
- استعمال المضادات الحيوية المتكرر وعد إكمال العلاج عند الشعور بالتحسن واستعما المضادات الحيوية ذات الفعالية العالية ج لعلاج أمراض بسيطة يؤدي الى ظهور مقاو الجراثيم للمضادات الحيوية مما يجعلها عدي الفائدة.
- تناول المضادات الحيوية بدون استشارة طب وتخزينها في المنزل وتبادلها بين الاقار والاصدقاء تعتبر أشكالاً من سوء الاستخدا الذي يؤدي في النهاية الى الإضرار بصح الفرد والاسرة.
- إن المضادات الحيوية لها آثار جانبية كثيرة وعليه فيجب حصر استعمالها عند الضرورة فقط.