IMPACT OF AN EDUCATIONAL PROGRAM ON THE TREATMENT PRACTICES OF DIARRHEAL DISEASES AMONG PHARMACISTS AND DRUGSELLERS

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Abstract. The impact of an intervention program, measured by changes in the prescription of ORS, antibiotics and antidiarrheal drugs by those pharmacists and drugsellers after administering the proposed educational package was assessed. The results of the study indicated that, before the educational program started, ORS was prescribed by pharmacists for 31.4% and 15.7% of watery diarrhea and dysentery episodes, respectively. Only 18.9% and 13.3% of drugsellers gave ORS to assessors in case of watery diarrhea and dysentery. Antibiotics and antidiarrheal agents were prescribed extensively, watery and dysenteric diarrhea (84% and 56% for watery diarrhea by pharmacists and drugsellers; 92% and 60% for dysentery). Antidiarrheal drugs were used as frequently. After the educational program, the assessment of the prescription behavior of the pharmacists showed no change in ORS, antibiotics and antidiarrheal drugs prescribed to treat watery diarrhea. In dysentery, the effective percent change in prescribing ORS between pre- and post- intervention program was much higher in intervention group than the control group. For drugsellers, effective percent change in ORS usage in treatment of watery diarrhea was 11.8% compared with -7.7% in the control group. No such change was observed in treatment of dysentery. There was a slight significant change in behavior concerning use of antibiotics among subjects getting information by mail, compared to those who got full intervention, when the pre-intervention behavior, store type and treatment type was taken into account.

INTRODUCTION

In Thailand, diarrheal disease ranked second among the leading causes of morbidity in children under five and sixth among the leading causes of mortality for the whole country in 1986 (Ministry of Public Health, 1986). Since 1980, the Diarrheal Disease Control Program, a strategy designed to reduce mortality via the use of Oral Rehydration Salt (ORS) was reinforced. During this decade mortality due to diarrheal disease has been gradually decreasing (Ministry of Public Health, 1988). Oral rehydration therapy, either by ORS or other fluids, accompanied by adequate food intake, is used as the main strategy for reduction in incidence of dehydration and diarrhea-related malnutrition. Efforts to encourage ORS use have mainly occurred within the existing primary health care intrastructure (Ministry of Public Health, 1988; Vorakitphokathorn, 1988; Varavithya *et al,* 1986). The government's target objectives for ORS access and use, by the year 1990, are 90 percent and 60 percent of diarrheal episodes, respectively. However, survey data indicated that only 20 percent of episodes were treated with ORS in 1988 (Ministry of Public Health, 1988). This low use rate is due in part to the people's perception of mild diarrhea as a natural phenomenon of childhood developmental transitions (Thongkrajai *et al,* 1987; Premsrirat and Varavithya 1986), lack of confidence in ORS as a method of choice (Vorakitphokathorn, 1986), and over-use of antibiotic and antidiarrheal drugs (Ministry of Public Health, 1987).

In Thailand, the major contact point for the general population in terms of care-seeking behaviors is the drugstore. Preliminary national surveys, conducted by the Ministry of Public Health in 1970 and 1979, showed the majority of care-seeking behaviors as buying drugs from drugstores for self-treatment (42.3%), particularly high among rural communities. In a study of 21 low-income urban communities in Bangkok, it was found that 63% of them would go to drugstores for treatment of mild diarrhea in children under five (Vathanophas *et al,* 1986). There are two major types of drugstores where people seek modern medication. The first category *(type 1 drugstore)*

are drugstores under supervision of registered pharmacists. This type of drugstore provides all kinds of medicine (without doctor's prescription) with an exemption for some addictive drugs. The second type *(type 2 drugstore)* is drugstores taken care by registered drugsellers who had been trained for drug dispensing. The service within this type of drugstore is limited to providing only simple and commonly-used household medicine for mild illnesses, including diarrhea. Therefore drugsellers and pharmacists are an important group of health-care providers at present in both urban and rural communities. To achieve the goal of increasing the use of ORS and proper management of diarrheal disease, pharmacists and drugsellers are the prime targets for educational program introducing new concepts of diarrheal disease treatment. The program proposed here emphasizes the immediate use of ORS, the recommendation of continuation of feeding, the use of antibiotics only in the case of dysentery, and the reduction in usage of antidiarrheal drugs.

Treatment behaviors of mothers and child caretakers were analyzed from a surveillance study of diarrheal diseases in children under five in an urban low-income community during 1988-1989 (Varavithya *et al,* 1990). The findings indicated that mothers and child caretakers sought care for 414 episodes of child diarrhea from field investigators (37.1%), drug stores (18.2%), private clinics (12.6%), hospitals (10.2%) and local health centers (4.9%). In another study, also conducted in a low-income community in Bangkok, it was found that as many as 53% of mothers or caretakers gave ORS alone in treating diarrhea in children under 5 years of age when the ORS was available from a nearby drugstore (Punyaratabandhu *et al,* 1991). Almost no data exist on treatment behaviors concerning usual practices in dispensing the ORS, antibiotics and antidiarrheal drugs among drugsellers in other urban areas and no study is known that has attempted to increase the quality of advice provided by pharmacists. The research team aimed to increase the use rate of ORS, to limit the use of antibiotics only to dysentery cases and to reduce the use of antidiarrheal drugs to the minimum, using educational package developed for such purposes. If the package is effective in increasing proper treatment of childhood diarrhea, it will be used for other parts of the country as well.

MATERIALS AND METHODS

The study was a quasi-experimental study, with randomization for areas and drugstores involved. The administrative area of Bangkok Metropolitan Administration was divided into two sectors: north and south to the center of the town. The northern part was considered to be the intervention area and the southern part the control area. The reason for separating the areas was for preventing the contamination between the two groups. Three subdistricts in each sector were randomly selected and all drugstores in the selected subdistricts identified by type of store (type-1 drugstores:- the ones with registered pharmacist, and type-2 drugstores:- the ones with drugsellers). One hundred and twenty type-1 drugstores and 60 type-2 drugstores in the study area were randomly selected. The same process was used to get 60 type-1 drugstore and 60 type-2 drugstores in the control area. Pharmacists in the intervention area were invited to attend a three-hour training course organized by the investigators. The training was conducted on Sunday for the convenience of the target group. For pharmacists who did not come to the course, educational material was sent by registered mail and it was followed by a telephone call to ascertain that they had got the message and the content was further elucidated. Pharmacists in each store were advised to convey the information to other personnel in that store as well. Drugsellers (type-2 drugstores) in the intervention area received the educational material by mail followed by a telephone call. All drugstores in control areas got no information from the research team and served as indicators for natural change in behavior over the period of study.

Data collection

Twelve assessors, who are students in a Master's degree program in public health, were trained by the investigators to serve as "confederates", simulating mothers with a child suffering from diarrhea. Six of these assessors were trained to imitate mothers with a child suffering from *watery diarrhea* and the other six were trained to imitate mothers with a child suffering from *dysentery.* The surveys were conducted twice, one prior to the training program and the other after the training. Therefore each drugstore was visited four times during two month period. In the first two visits, two confederate mothers would ask for

drugs in treating an 8 month old child with watery diarrhea, or for drugs in treating a 3 year old child with dysentery separately. This was considered as *pre-intervention* practice. In the second two visits, conducted after the training, the confederate mothers would ask for treatment of watery diarrhea and dysentery, and this was considered as *post-intervention* practice. In the control area, the assessors did the same for assessing pre-intervention and post-intervention practice, even though no intervention was implemented in this group. The information obtained here is the possible change in behavior over time without the interference of intervention program.

Assessors recorded all the advice obtained from pharmacist/ drugsellers, immediately after leaving the store, on a structured recording form. In addition, the confederates collected all the purchased drugs, put the label on, and brought back to the research center for drug-identification by doctors and pharmacists at Mahidol University. Some drugs so obtained were herbal and chinese traditional medicine, and they were sent to the laboratory unit at the Department of Medical Science for analysis of drug ingredients. The investigators made spot-checks periodically to ensure the reliability of data obtained by the assessors.

After the first round of the survey in both areas, invitations to attend a luncheon meeting and discussion on modern concepts of diarrheal disease treatment were sent, followed by a verbal invitation on telephone call, to 120 type-1 drugstores in the intervention area. Thirty-nine of them showed up and actively participated in the discussion with the investigators. The educational material was mailed to the rest of the intervention group (84 pharmacists and 44 drugsellers). The 39 pharmacists who came to the discussion were labeled as "trained" group, those (84 pharmacists and 44 drugsellers) who got the mailed material were labeled as the "partially trained" group and those (68 pharmacists and 46 drugsellers) in the control area who got none of the materials were labeled as the "untrained" group. The number of drugsellers was less than expected since some of the stores on the list had terminated activity and therefore no drug was available from such stores.

The educational package

The educational package consisted of:

1. Brief lecture on epidemiology, pathophysiology and clinical characteristics of childhood diarrhea, the role of ORS and the new concepts of treatment of watery diarrhea and dysentery, criteria for referral and proper feeding practice during diarrheal episodes. The emphasis was based on the use of ORS as the most effective drug in all cases of diarrhea. It was pointed out that feeding should not be interrupted, especially breast-feeding, antibiotics should be used only in case of dysentery, and antidiarrheal drugs were not necessary and may be harmful to very small children.
2. Group discussions, each led by one of the investigators, were conducted in small groups of 8-10 participants. The main emphasis in the discussion was the effectiveness of ORS in treating diarrhea, the advantages of continuity of feeding and the adverse effect of antibiotics and antidiarrheal drugs in diarrheal management.
3. Provision of educational materials, which consisted of
   - "Manual of diarrheal in children suffering from acute and severe diarrhea, ORS usage, antibiotic and antidiarrheal agents",
   - posters on simple treatment of diarrhea,
   - a decision tree on management of diarrhea based on symptoms and signs,
   - a guide book titled "Questions and answers about diarrheal disease, its treatment and prevention".

One month after the intervention, the second round survey was conducted to get the information on the drug dispensing behavior of pharmacists and drugsellers at the stores in the intervention and control areas.

Data analysis was done using two statistical program packages: SPSS/PC+ and SPIDA at the Department of Epidemiology, Faculty of Public Health, Mahidol University.

RESULTS

Pattern of prescription of drugs among pharmacists and drugsellers in the first round survey (pre-intervention) showed the difference in practice between the two groups. The ORS use rates among the pharmacists in treatment of watery diarrhea

and dysentery were 31.4% and 15.7% respectively; the corresponding figures among drugsellers were 18.9% and 13.3%. Antibiotics were prescribed in 83.8% of watery diarrhea cases treated by pharmacists, while the drugsellers dispensed antibiotics for watery diarrhea in just 55.6%. The usage of antibiotics for dysentery were 92.1% and 60.0% among pharmacists and drugsellers, respectively. The antidiarrheal drugs were also used at the high percentages: 78.0% (in watery diarrhea) and 87.4% (in dysentery) by pharmacists; 56.7% (in watery diarrhea) and 57.8% (in dysentery) by drugsellers (Table 1). Antispasmodics were found to be used in less than half a percent.

To measure the impact of our educational program, a standard Effective Percent Change (EPC) in the behavior of pharmacists and drugsellers in intervention and control groups was calculated. Although this statistic does not provide a significance of difference between groups, it does help summarize the general effect of the program.

Table 2 shows the effective percent changes of behavior among pharmacists (trained and partially trained were combined and were labeled as 'intervention group') concerning ORS usage, the prescription of antibiotics and antidiarrheal drugs.

For watery diarrhea, there was a slight unfavorable change for ORS and antidiarrheal drugs prescribed by pharmacists in the intervention group, however there was a slight decrease in antibiotics used. These changes seemed not to be a result of the intervention since there were favorable changes in the control group as well. For the treatment of dysentery, the behavior in the intervention group showed more favorable changes in ORS, antibiotics and antidiarrheal prescription.

In Table 3, the drugsellers in the intervention group who received only educational material and individual telephone calls had increased the use of ORS in treatment of watery diarrhea (EPC = 11.8). In the control group, the percent change went toward the unfavorable direction (EPC = -7.7).

Concerning antibiotics and antidiarrheal drugs, it seemed that the intervention group, there were a decrease in dispensing antibiotic and antidiarrheal drugs in treatment of dysentery. In the control group, there was an increase in using antidiarrheal drugs for watery diarrhea.

Considering that the study was conducted by doing repeated surveys in the same population, the further analysis took paired-measurement into account. Logistic regression analysis was carried out to see the effect of intervention program controlled for pre-intervention behavior, types of drugstore (operated by pharmacist or drugseller) and type of intervention (trained, partially trained and untrained). The response variable was changes in behavior [(Yes-No), (No-Yes)]. The analysis was done separately for watery diarrhea and dysentery.

From Table 4, there was no significant effect of training process on the favorable change in ORS

Table 1

Pattern of prescription of drugs for treatment of watery diarrhea and dysentery in children under 5 in Bangkok Metropolitan area by types of dispensing personnel.

Type of diarrhea	Prescription	Pharmacist (n = 191)		Drugseller (n = 90)	
		Number	Percent	Number	Percent
Watery	ORS	60	31.4	17	18.9
	Antibiotics	160	83.3	50	55.6
	Antidiarrheal	149	78.0	51	56.7
Dysentery	ORS	30	15.7	12	13.3
	Antibiotics	176	92.1	54	60.0
	Antidiarrheal	167	87.4	52	57.8

Table 2

Proportions and effective percent changes in pharmacists prescribing ORS, antibiotics and antidiarrheal drugs in treatment of *watery diarrhea* and *dysentery* during the study period (June-July, 1991).

Prescribed product	Intervention group (n = 123)		Control group (n = 68)	
	Watery	Dysentery	Watery	Dysentery
ORS				
pre-intervention	34.1	26.5	15.4	16.2
post-intervention	33.3	27.9	27.6	13.2
EPC_1(%)	-1.2	1.9	14.4	-3.6
Antibiotics				
pre-intervention	82.1	86.8	91.0	94.1
post-intervention	79.7	85.3	90.2	94.1
EPC_2(%)	2.9	1.7	0.9	0.0
Antidiarrheal				
pre-intervention	75.6	82.4	87.0	88.2
post-intervention	77.2	85.3	86.2	89.7
EPC_2(%)	-2.1	-3.5	0.9	-1.7

EPC = Effective Percent Change

$$EPC_1 = \frac{P_2-P_1}{100-P_1} \times 100$$

$$EPC_2 = \frac{P_2-P_1}{P_1} \times 100$$

usage, both in treating watery diarrhea and dysentery. However, the favorable change in antibiotics use was significant in drugsellers, compared to pharmacists. The coefficient was positive, which means that the drugsellers responded in a favorable way, when receiving the same intervention, to a greater extent than pharmacists. The partial training process (partially trained and untrained) had the negative effect on the favorable change in behavior concerning antibiotic uses, to some extent (compared to trained group). That is, full training was somehow more beneficial in creating favorable changes in this kind of behavior. No significant change was observed for antidiarrheal drug use, indicated by logistic regressing analysis.

DISCUSSION

The results of the study showed that, at present, ORS usage by drugstores with or without pharmacist is still lower than the target set by the Ministry of Public Health. Antibiotics were prescribed at a strikingly high rate, even in treatment of watery diarrhea. The use of antibiotics in watery diarrhea is generally considered unnecessary since it is mostly caused by viruses in children under 2 years of age. The findings confirmed the hypothesis that there is an excess use of unnecessary or even harmful drugs in treatment of this common disease.

Although the statistical test revealed no significant difference in changes of treatment behavior in the intervention and control groups, a standard Effective Percent Change indicated that some practices showed slight yet favorable change in the sample groups, both in pharmacists and drugsellers. The proportions of antibiotic and antidiarrheal drug uses were slightly changed (in some instances, unfavorably). This might due to the fact that all drugstores normally prefer to dispense drugs in which broad-spectrum antibiotic and antidiarrheal agents are mixed together in one bottle. When the drugs are still in stock at hand, it is very difficult to persuade them to throw away the rest of the drugs with antibiotics. The non-sig-

Table 3

Proportions and effective percent changes in drugsellers prescribing ORS, antibiotics and antidiarrheal drugs in treatment of *watery diarrhea* and *dysentery* during the study period (June-July, 1991).

Prescribed product	Intervention group (n = 44)		Control group (n = 46)	
	Watery	Dysentery	Watery	Dysentery
ORS				
pre-intervention	22.7	15.2	20.5	6.5
post-intervention	31.8	8.7	20.5	4.3
EPC_1(%)	11.8	-7.7	0.0	-2.4
Antibiotics				
pre-intervention	54.5	56.5	65.9	54.3
post-intervention	52.3	43.5	68.2	50.0
EPC_2(%)	4.0	23.0	-3.5	7.9
Antidiarrheal				
pre-intervention	56.8	56.5	63.6	52.2
post-intervention	59.1	45.7	75.0	52.2
EPC_2(%)	-4.0	19.1	-17.9	0.0

EPC = Effective percent change

$$EPC_1 = \frac{P_2 - P_1}{100 - P_1} \times 100$$

$$EPC_2 = \frac{P_2 - P_1}{P_1} \times 100$$

The plus sign indicates the effective percent changes in desirable direction.
The minus sign indicates the effective percent changes in undesirable direction.

Table 4

Logistic regression analysis of factors affecting behavior changes in ORS usage in treatment of watery diarrhea and dysentery.

	Independent variable	Coef	SE	p-value
Type: Watery diarrhea				
Response: Favorable change in ORS usage (No-Yes)				
	constant	-1.804	0.648	0.005
	drugseller	-0.112	0.437	0.797
	partially trained	-0.065	0.570	0.909
	untrained	-0.276	0.598	0.644
Type: Dysentery				
Response: Favorable change in ORS usage (No-Yes)				
	constant	-2.438	0.744	0.001
	drugseller	0.269	0.524	0.607
	partially trained	-0.781	0.688	0.257
	untrained	-0.404	0.676	0.550

Table 5

Logistic regression analysis of factors affecting behavior changes in antibiotics use in treatment of watery diarrhea and dysentery.

	Independent variable	Coef	SE	p-value
Type: Watery diarrhea				
Response: Favorable change in antibiotics use (Yes-No)				
	constant	-2.539	0.663	0.000
	drugseller	0.369	0.401	0.356
	partially trained	0.084	0.614	0.891
	untrained	-0.043	0.634	0.946
Type: Dysentery				
Response: Favorable change in antibiotics use (Yes-No)				
	constant	-3.126	0.712	0.000
	drugseller	1.209	0.527	0.022
	partially trained	-1.359	0.682	0.046
	untrained	-1.179	0.686	0.086

Table 6

Logistic regression analysis of factors affecting behavior changes in antidiarrheal drug use in treatment of watery diarrhea and dysentery.

	Independent variable	Coef	SE	p-value
Type: Watery diarrhea				
Response: Favorable change in antidiarrheal drug use (Yes-No)				
	constant	-2.413	0.676	0.000
	drugseller	0.244	0.422	0.563
	partially trained	-0.017	0.621	0.978
	untrained	-0.075	0.639	0.906
Type: Dysentery				
Response: Favorable change in antidiarrheal drug use (Yes-No)				
	constant	-1.719	0.648	0.008
	drugseller	0.014	0.472	0.976
	partially trained	-0.882	0.586	0.132
	untrained	-0.441	0.572	0.440

nificant intervention effect may also be explained by the other two factors. Firstly, the impact of the educational program was measured at only one month after the implementation and this interval was probably too short to create a significant change. Additional, only one pharmacist and primary drugseller at each drugstore was involved in the training process, therefore if there were other people who help selling drugs in those stores, their behavior might not be affected.

The second factor concerns marketing policy. Since the stores had ordered certain brands of drugs containing antibiotic and antidiarrheal agents in large quantities to get the reduction in price from pharmaceutical firms, they will sell them all before ordering or changing to the new ones. The measure of favorable changes in prescribing ORS, antibiotics and antidiarrheal drugs within the intervention group, classified by fully trained or partially trained groups showed a slight

difference in practices. This finding might be useful for further program implementation in a larger scale.

It is recommended for the further study of this type that the stimulation for behavioral alteration might need repetition to ensure a good effect and may need more direct intervention with respect to other drugstore personnel besides pharmacists themselves.

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