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Original Article

From Research to Public Health Interventions. I. Impact of an Educational Strategy for Physicians to Improve Treatment Practices of Common Diseases[1]

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Abstract

Errors in treating common diseases occur very frequently in primary health care practice While many of these mistakes are not life-threatening, the costs of abuse in drug prescription may be greatly increased An educational strategy aimed to improve physicians' prescribing practices for acute diarrhea (AD) and acute respiratory infection (ARI) was developed as a research study, involving three medical care units The strategy was largely based on promoting active participation of the trainees in the whole process, including (a) group participation in a literature review of updated articles related to management of AD and ARI, (b) analysis of prescribing practices before the intervention, (c) participation in the development of a clinical algorithm for the therapeutic management of these illnesses, and (d) discussion of the usefulness of the algorithm during peer review committee meetings Successful results of this intervention, as judged by the improvement of treatment practices and the persistence of changes for up to 2 years after the intervention, as well as its ease of application and low costs, motivated its extension to a health District and a State In these sites, the intervention was in charge of medical leaders from the clinics and medical heads of the local health systems, respectively The extension of the educational strategy was accompanied by a relative reduction in AD from 46 7% to 6.5% and in ARI from 32 6% to 8 5% However, the benefit-cost ratio showed a dramatic increase when comparing results from the research study and from the State intervention, for both AD (from 3.3 to 4 4) and ARI (from 16 2 to 21.6), for an overall net increase of 33 3% Based on these results, the educational strategy was adopted by the National Program for the Control of Diarrheal Diseases, and was used to train public health physicians throughout the country, from 1992 to 1994 (*Arch Med Res* 1995, 26 S31)

KEY WORDS Training, Education, Primary health care, Acute diarrhea Acute respiratory infections, Public health

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Introduction

Errors in medical practice are a common occurrence in any health care system (1,2) The causes that lead to these errors are various and usually multifactorial in genesis, and include cultural, social, economic and technical aspects However, errors in medical practice often reflect a lack of training of the physician, thus potentially representing a serious problem (3) Errors in medical practice are more likely to occur in common diseases, which account for the largest number of consultations at the primary health care level, such as acute diarrhea (AD) and acute respiratory infections (ARI), as well as in chronic diseases, such as hypertension, diabetes and rheumatic disorders

Focusing specifically on acute infectious diseases (AD and ARI, which are the subject of the present article), errors in medical practice can be categorized in two broad areas errors due to omission and errors due to abuse Among the first ones, the most common error in treating AD is the lack of prescription of oral rehydration therapy (ORT) The effectiveness of ORT in saving children's life is of such magnitude that this treatment should be prescribed in all diarrhea-affected patients, as a means to prevent dehydration, which is the main cause of death in this disease (4) Further, it should also be prescribed in all cases of dehydrated children, provided they are not in shock (5) This, unfortunately, is not the case (3) Three recent national surveys on the use of ORT showed that the percentage of mothers who had used such therapy were 24 3% in 1988, 22% in 1991 and 41 9% in 1993 (6-8) In 1993, in Mexico, 6,748 children under 5 years of age died due to acute diarrhea Seventy percent had been seen by a licensed physician prior to dying (9) With proper medical care, which relies mainly on appropriate and timely use of ORT, following the treatment guidelines proposed by the Mexican Ministry of Health and endorsed by the World Health Organization (WHO) (4,5), 95% of these deaths should have been avoided (10) Errors in the abuse of drug prescription, on the other hand include the use of antimicrobial and antidiarrheal drugs (3) The first ones are only justified in cases of infections by *Shigella* sp or *Entamoeba histolytica* (4), while the second ones are not justified in any case (4) Their use has actually been banned from the official Mexican drug list

A similar situation is found in relation to ARI In Mexico, in 1993 8,610 children under 5 years old died due to ARI 70% of them had been seen by a physician previous to their death (11) With proper treatment about 80% of these deaths should have been avoided (12) The most common omission error is physician s failure to identify pneumonia (13) The most common abuse errors in the treatment of ARI include the use of cough suppressants and antihistamines and an improper selection of an antibiotic when its use is required (3)

While many of the common errors in primary health care practice may not endanger life, they do pose a threat to the economy, both to the patient and to the institution (14) In the first case, the patient is advised to buy one or several drugs which are strictly not required to cure the disease In the second case, inadequate treatment complicates the course of a disease, leading the otherwise unnecessary hospitalizations, which increase the cost of treatment, both due to expensive patient-day costs as well as to the use of sophisticated procedures, including intravenous fluids, antibiotics, diagnostic procedures, etc (15,16)

In our view, the lack of proper physician training in Mexico (as may also be the case in other countries) include deficiencies in pregraduate medical training due to an increased emphasis on drug use, a lack of proper training environments, especially at the primary health care level, and a general lack of sensitivity for fostering physician-patient relationship, including proper advice to the mother in relation to alarm signs that should prompt her to return to a medical facility if the child becomes sicker Once physicians have completed medical school, the absence of a requirement for periodic recertification exams facilitates the loss of therapeutic skills Also, this situation does not force physicians to keep updated To worsen the picture, there is a lack of medical training courses for continued education Alternate sources of information for physicians are provided by constant visits from pharmaceutical company representatives, who promote the use of their products All of these situations lead to a deterioration of the quality of medical practice (17)

The main options to reverse these conditions are

To revise the medical curriculum at the university and in-hospital residency level
To legislate and control the information provided by the pharmaceutical industry
To legislate mandatory medical recertification
To require physicians to have a minimal number of hours of continuing medical education

Along these lines there have been a number of studies focused on the impact of different educational strategies directed at physicians Results have been more or less successful (18) However, most of these studies stop short of demonstrating changes in actual practices Very few of them actually report on changes in the medical health care system The present paper reports on three studies intended to improve physicians' treatment practices for ARI and AD at the primary health care level The first one was carried out as a research project, at a local level, successful results from this experience motivated an intervention, at a District level, which was further expanded to a State level While the extension of

the educational strategy to a larger level was accompanied by a relative decrease of its impact on improving treatment practices, from a cost-benefit perspective there were significant gains

Methods

The intervention strategy, the methodology to evaluate its impact on improving treatment practices and the cost-benefit of the intervention were the same in the research study and in the district and statewide programs

Research Study

Study Population The research study, focused specifically on AD, was carried out in 1987 in two medical units of the Mexican Social Security Institute in Mexico City Thirty six physicians received the intervention, and were compared with 33 physicians in a control group Complete results from this study have been published previously (19) The research study on ARI took place in the same year, in another medical unit of the same institution Twenty eight physicians received the intervention Results from this study have not been published previously

Intervention Strategy Prior to the intervention, a baseline evaluation of prescribing practices was done through interviews applied to four randomly selected patients per physician, who were interviewed after the consultation The interview registered symptoms, signs, evolution of the illness and prescribed treatment The intervention then began with a workshop consisting of five one-hour sessions (one per day) During the first session participants were informed about the purpose of the study, and received a set of updated articles on proper medical care for either AD or ARI After critical reading, these articles were discussed during the second session During the third session, results from the baseline evaluation, including diagnosis, prescribed treatment, evolution of the patient and results from stool or pharyngeal cultures (respectively) were presented An active discussion of each case, referring to the previously discussed literature was fostered by the investigator conducting the workshop During the fourth session the research team proposed a therapeutic schedule (algorithm) based exclusively on clinical data, which had been devised and tested in a previous study (19) These therapeutic schedules conformed to WHO treatment guidelines for AD and ARI (4,20) The schedule was critically discussed according to physicians clinical experience, and modified accordingly The modified schedule was printed and posted in each office as a reminder During the last session, physicians reviewed the clinical algorithm applying it to simulated clinical cases followed by group discussion

In a follow-up stage, peer review committees were organized, which included one of the investigators and three physicians The committee reviewed clinical records from ten randomly selected cases from those seen the previous week by physicians in the clinic Physicians participating in the peer review committee were rotated so that each physician attended a minimum of three sessions This activity lasted 6 months

Pre-Post Evaluation Survey Data to describe physicians' treatment practices before and after the intervention were obtained from three different sources patients' clinical records, a pre-coded questionnaire applied to patients after the medical consultation, and the prescription given by the physician The number of cases reviewed by each physician included a minumum of four and a maximum of 15 patients, selected at random on a daily basis The following data were obtained from each case with ARI or AD patients' age and sex, clinical characteristics and prescribed treatment

The evaluation for the AD study included 401 cases in the basal evaluation and 960 in the post-intervention survey i e , after peer review committee ARI patients included 202 cases in the basal evaluation and 305 in the post-intervention survey Eighteen months after the AD intervention finished, a second evaluation took place, including 20 physicians out of the 36 who participated in the study This long-term evaluation was not done in the ARI study

Impact Evaluation The impact of the intervention was evaluated calculating the percentage of change pre-post intervention with respect to use of ORT, drug prescription and use of restrictive diets, in AD, and use of antimicrobials, cough suppressant drugs and antihistamines in ARI A global measure of impact also included the percentage of change in adequate integral management of each disease, according to WHO treatment guidelines Integral management for AD included the use of ORT, continued habitual feeding and no antibiotic treatment except in bloody diarrhea (4,5) Integral management for ARI included use of antimicrobial drugs in suspected or confirmed cases of pneumonia, otitis, sinusitis, purulent tonsillitis or tonsillitis without accompanying rhinorrhea and no antimicrobial drugs in rhinopharyngitis bronchitis or laryngotracheitis Use of cough suppressants or antihistamines was considered inadequate in all cases (21)

District Level Intervention

Study Population This intervention was carried out in 1989, in Coyoacán, a district in Mexico City This intervention included 18 medical health care units, four from IMSS and 14 from the Ministry of Health (MoH)

There were 172 physicians working in the 18 medical units All received the educational intervention, for both AD and ARI As the effectiveness of the intervention had been previously tested, there was no control group at this stage

Intervention Strategy The intervention followed the same guidelines as described for the research study The only difference was that the intervention was in charge of a staff physician in each unit who was identified by the investigators at the time of the basal study These

Table 1

Principal Characteristics of the Educational Intervention in the Analyzed Studies

Characteristics	Research Studies		District Program (AD[1] ARI[2])	State Program (AD[1]-ARI[2])
	Acute Diarrhea	Acute Respiratory Infection		
General				
Year	1987	1988	1989	991
Place	Mexico City	Mexico City	Coyoacán, Mexico City	Tlaxcala
Number of Medical Units	2	1	18	124
Number of practicing physicians	69	34	172	165
Population served	135 000	95 000	678 000	714,000
Number of cases treated during two years following the intervention[a]	25,037	42,336	52 416[1]	126,605[1]
Teaching Intervention				
Trainers	Investigators	Investigators	Medical Leaders	Heads of Local Health Systems
Number of physicians trained	36	10	119	160
Length of the training (weeks)				
Workshop (1 hour per day)	1	1	2	2
Peer review committee (1 hour per week)	24	24	24	24
Evaluation				
Interviewers	Public Health Nurses	Public Health Nurses	Pregrad Nurses	Pregrad Social Workers
Number of physicians evaluated	31	28	65	157
Length (months)				
Pre intervention	3	1 5	3	3
Post-intervention	24	9	9	9
Number of cases evaluated				
Pre-intervention	401	202	501[1]	749[1]
			1,787[2]	762[2]
Post-intervention	960	305	520[1]	743[1]
			675[2]	825[2]

[a] Two years was the length of follow-up for the research studies

physicians were identified as potential leaders in their units, as judged by the director of the clinic and of the rest of the physicians working there Once this group was recruited, they received a 2-week training course by the investigators, following the same methodology described for the intervention in the research study, complemented by a review of potential problems they would encounter when being trainers themselves For the follow-up stage, the peer review committees were organized by these physicians, according to the same methodology described in the research study

Pre-Post Evaluation Survey The same methodology as described in the research study was followed to apply the pre- and post-evaluation surveys, with the only difference being that the interviewers in this stage were pregraduate nurses instead of public health nurses, who participated in the research study Due to logistic reasons only 65 out of the original 172 physicians were evaluated pre-post intervention In total, 501 AD and 1,787 ARI cases were analyzed previous to the intervention, and 520 and 675 cases, respectively, were analyzed after the intervention

Impact Evaluation The same analyses as described for the research study were used for the impact evaluation of this intervention

State Level Intervention

Study Population The extension of the intervention program to a whole State took place in 1991 This intervention took place in the State of Tlaxcala, which at the time of the study had 714,000 inhabitants There were 124 primary medical health care units in the entire State, staffed by 165 physicians All received the educational interventions, including AD and ARI

Intervention Strategy The only difference with the previously described intervention was that the trainers at this stage were the heads of the local health systems At the time of the study, the State was divided into 17 local health systems, so there were 17 trainers All received the training by the investigators, in the same way as described for the local leaders in the district level intervention Once trained, the heads of the local health systems conducted both the workshop and the peer review committee's meetings, as previously described

Pre-Post Evaluation Survey The interviewers at this stage were pregraduate social workers One hundred and fifty seven out of the 165 physicians who were trained were evaluated before and after the intervention A total of 749 AD and 762 ARI cases were analyzed in the pre-intervention survey, and 743 AD and 825 ARI cases were included in the post-intervention survey

Impact Evaluation The same methodology as described in the previous interventions was applied

Cost-Benefit Analysis

The cost of each intervention was calculated taking into account salaries and per diem of the investigators and trainers involved in each phase of the study, according to the percent of their time spent in preparing and carrying out the educational intervention, including the training sessions and the time spent in the peer review committees Expenses in training material and photocopies of the bibliography reviewed were also included in costs Expenses related to pre- or post-intervention surveys were not included, as it was considered that these were not part of the intervention per se As the research study took place in the last months of 1987 and all of 1988 the exchange rate present in April 1988 was used to express all costs in US$ Costs of subsequent interventions were detailed accordingly (22)

The benefit was calculated on the basis of savings in the reduction of drug prescription (including antibiotics, antidiarrheal medications, cough suppressants and antihistamines) The cost of these drugs was also calculated at 1988 prices, using current drug prices for each of the participating institutions (IMSS and MoH) A mean price was calculated for grams or milligrams of each drug, taking into account its usual way of dispensing (liquid form, pills, capsules or injection) Special care was taken to consider the increment in treatment costs associated with the increased prescription of oral rehydration salts An average savings cost was calculated on the basis of the number of patients treated Total

Table 2

Percentage of Selected Treatment Practices for Acute Diarrhea and Acute Respiratory Infection in Three Different Surveys Conducted, Before the Educational Strategy was Implemented in Primary Health Care Units (Basal Studies)

Treatment practice	Research study	District program	State program
Acute diarrhea			
Oral rehydration therapy	33 7	45 4	74 6
Antimicrobial drugs	76 3	85 3	82 3
Antidiarrheal drugs	79 4	44 2	19 6
Restrictive diets	46 5	48 5	33 3
Acute respiratory infection			
Antimicrobial drugs	85 7	78 5	70 2
Cough suppressants	46 0	42.5	67 5
Antihistamines	18 6	16 8	22 6

savings (i e , benefit) were calculated by extrapolation of data obtained in each of the educational strategies to the number of cases actually treated in each clinic studied during the 2 years following the intervention (Table 1) The rationale for this came out of the research study, which showed that a positive change in prescribing practices was still present 2 years after the intervention Once the benefit and the costs were calculated, the ratio between both was obtained for each of the three interventions analyzed for each of the two diseases under study

Results

Results of the evaluation carried out prior to the educational intervention, for the research study district and state-wide programs may be seen in Table 2 For acute diarrhea, ORT was more widely used (74 6%) at a state-wide level than at the district level or in the research study Conversely, antidiarrheal drugs were more commonly prescribed in the research study than in the district or state-level programs A similar situation was observed in relation to the use of restrictive diets at the state level these were used less commonly than in the other two programs The use of antimicrobial drugs was not significantly different among the three studies, as in all more than 75% of patients were prescribed one antimicrobial drug For ARI, the use of antimicrobial drugs was larger in the two studies carried out in Mexico City, while the use of cough suppressants and antihistamines were greater in the state program

In summary, the basal evaluations showed that drug management for both acute diarrhea and ARI was inappropriate, as each patient received at least two different drugs at each visit to the doctor, and that most of them were unnecessary Tables 3 and 4 show the impact of the educational strategy on physicians' prescribing practices, including medications and diet The three evaluations showed an increment in the use of ORT and in adequate integral management after the intervention Also there was an important reduction in the prescription of antimicrobial and antidiarrheal drugs cough suppressants antihistamines and restrictive diets

However, it was clearly seen that for most treatment practices the impact, measured by the amount of change observed after the intervention, was greater in the research study, when the intervention was in charge of the investigators and directly supervised by them, than in the district-level program in which the intervention was in charge of properly trained medical leaders These differences were magnified in the state-wide program, in which the educational intervention was in charge of the heads of the local health systems The only place where this pattern was not consistent was in the use of cough suppressants, where the state program showed a greater amount of change than the district or research studies

Other than this it was clear that the percent of change in proper case management after the intervention was as much as 30% more in the research study, both for AD and for ARI, while this impact was less than 10% in the state program, for both diseases

In contrast with the dilution of the impact of the intervention strategy when it was expanded to a larger audience, Tables 5 and 6 show that the cost-benefit increased in direct relation to the expansion of the intervention While the cost of the intervention was progressively more in relation to the extension of the program, savings in drug prescriptions per patient showed

Table 3
Impact of the Educational Strategy on Selected Treatment Practices in Acute Diarrhea

Treatment practice	Percent of change		
	Research study	District program	State program
Increase of			
Oral rehydration therapy	43 0	30 8	13 0
Reduction in prescription of			
Antimicrobial drugs	52 9	57 7	21 3
Antidiarrheal drugs	12 5	10 2	9 3
Restrictive diets	39 8	38 7	29 3
Increase of			
Adequate integral management[a]	46 7	25 6	6 5

[a]Use of oral rehydration therapy, continued habitual feeding, no antibiotic treatment except in bloody diarrhea

Table 4
Impact of the Educational Strategy on Selected Treatment Practices in Acute Respiratory Infection

Treatment practice	Percent of change		
	Research study	District program	State program
Decrease of			
Antimicrobial drugs	30 6	39 1	21 5
Cough suppressants	16 0	3 4	24 5
Antihistamines	5 3	0 0	0 0
Increase of			
Use of adequate treatment algorithms[a]	32 6	28 8	8 5

[a]See text

an opposite trend However, when the number of patients treated during the 2 years of follow-up after the intervention took place (Table 1), total savings (benefit) increased with the expansion of the educational intervention Finally, the benefit/cost ratio also increased progressively with the expansion of the program Thus, it can be seen that for ARI the savings were 21 times greater than the initial costs invested in the program

Discussion

The educational strategy used in the present series of interventions was developed after a research study designed to improve physicians' prescribing practices, taking into account the errors in medical practice that were highlighted in the Introduction The results obtained in this study proved to be highly efficacious (19), as physicians that participated in the training showed a reduction in the use of antibiotics from 78 8% to 39 3% and of restrictive diets from 47 3% to 12 4%, as well as an increase in the use of ORT from 31 4% to 58 4% in treating children under 5 years old with AD Furthermore when we evaluated the intervention in the long-run (i e , 2 years later), positive changes were still present, with no significant decline as compared to the evaluation carried out immediately after the intervention took place (19) The key to this success was the active participation of the physicians intervened during the whole training process, including (a) group participation in the literature review of updated articles related to management of AD and ARI, (b) analysis of prescribing practices before the intervention, (c) participation in the development of a clinical algorithm for the therapeutic management of these illnesses, and (d) discussion of the usefulness of the algorithm during the peer review committee meetings

A second advantage of the proposed intervention was its ease of application under everyday conditions of clinical practice The training workshop actually required 1 h per day, in five consecutive sessions, and the review of clinical cases required 1 h per week, for 3 weeks, for each physician Under this scheme, the whole intervention required only 24 weeks for the training team to train all physicians in a clinic

Another important aspect was that the cost of the intervention, including salaries, per diem and educational material, was less than $2,000 USD. This amount was considered low in view of the number of physicians that were intervened In view of these considerations, the authors thought it was quite feasible to extend the intervention to a larger area

Therefore, the main focus of the present analysis was on the evaluation of the impact of the extension of the educational strategy, initially to a health district, and later to a whole State In other words, we were interested in assessing the public health effectiveness of the intervention, once its efficacy had been proven

The limiting factor in extending the intervention to larger areas was that the training sessions had to be delivered by personnel other than the researchers Thus, for the health care District the intervention was in charge of medical leaders from the clinics, and for the State level the intervention was in charge of the medical heads of the local health systems With this approach we were not only trying to subject the intervention to actual practice,

Table 5

Impact of the Educational Strategy in the Research Study and District and Statewide Programs in Acute Diarrhea Cost Benefit Analyses

Analysis	Research study	District program	State program
Cost of the intervention[a] (U S $ at 1988 value)	1,663	3,358	5,152
Savings in prescribed drugs[b] (U S $ at 1988 value)			
Per patient	0 22	0 25	0 18
Total (benefit)	5 508	13,104	22 789
Benefit/cost ratio	3 3	3 9	4 4

[a]Includes salaries and per diem of research or teaching personnel and teaching and training materials

[b]Calculated on the bases of estimated reduction in prescribed drugs, increase in prescription of oral rehydration salts and registered number of cases with acute diarrhea for 2 years after beginning the intervention as specified in Table 1

Table 6

Impact of the Educational Strategy in the Research Study and District and Statewide Programs in Acute Respiratory Infection Cost Benefit Analyses

Analysis	Research study	District program	State program
Cost of the intervention[a] (U S $ at 1988 value)	1 883	3 679	5 937
Savings in prescribed drugs[b] (U S $ at 1988 value)			
Per patient	0 72	0 69	0.54
Total (benefit)	30 482	67 813	128,187
Benefit/cost ratio	16 2	18 4	21 6

[a]Includes salaries and per diem of research or teaching personnel and teaching and training materials

[b]Calculated on the bases of estimated reduction in prescribed drugs and registered number of cases with acute respiratory infection for 2 years after beginning the intervention, as specified in Table 1

we were also trying to develop a multiplicative effect of the training

The results showed two distinctive impacts On the one hand, it was clear that the effect of the intervention was diluted in direct relation to its extension Thus for both AD and ARI the percentage of change before and after the intervention diminished from 46 7% to 6 5%, and from 32 6% to 8 5%, respectively

On the other hand, however, when the impact of the intervention was evaluated taking into account the savings derived from the application of the new treatment schemes to larger numbers of patients, the effect was the opposite We found that the benefit-cost ratio showed a dramatic 33 3% increase when considering results from the research study and from the State intervention, for both AD and ARI

These results, which were brought to the attention of the head of the Program for the Control of Diarrheal Diseases in the country motivated the adoption of the strategy that has been described in this paper for the training of public health physicians throughout the country The educational strategy has been in use from 1992 to 1994 (23) Although its impact has not been evaluated specifically, there has been a significant drop in mortality rates of children under 5 years of age due to this illness in the country (24) Better treatment practices by physicians are sure to play a role in such a decline

Further research avenues have been motivated by these experiences Elaborating on the role of active participation of physicians as a key to the adoption of new practices, we have focused our attention on the establishment and evaluation of in-service training centers, as has been recommended by the World Health Organization (25) While the possibilities of extending this strategy to a national level is low, due to the larger complexity of the infrastructure required to run and supervise these centers, which also increases costs, the main use of this strategy is meant to be in training trainers We expect that, by having better trained personnel, the dilution of the effectiveness of the intervention may be averted

The intervention strategy that we have discussed focused only on public health care physicians However, several recent studies, based on the use of verbal autopsies (26), have shown the importance of private practitioners in providing care, not only to upper socio-economic segments of the population, but also to low socio-economic patients (9 13) Therefore, we have also been interested in the design and evaluation of training strategies directed to private primary health care physicians Results of these studies will be published shortly

In summary, our study showed that it is possible to extend the results of a successful research intervention to a larger context In so doing the efficacy of the intervention was sacrificed as the expense of training larger numbers of physicians However, there were significant gains in cost-benefit terms, thus justifying the extension of the intervention We urge other researchers who had demonstrated success with other educational strategies at a local level to find effective means of extending them to larger areas, incorporating them into on-going public health programs

References

1 Gutiérrez G, Guiscafré H Los errores en el tratamiento medico de padecimientos comunes, un grave problema de salud publica Gac Méd Mex 1992, 128 501
2 Carruthers G, Golberg T, Segall H Drug utilization A comprehensive literature review University of Toronto Ontario, Canada, 1987
3 Perez Cuevas R Muñoz H, Guiscafré H, Reyes H, Tomé P, Gutierrez G Patrones de prescripción terapéutica en diarrea e infecciones respiratorias agudas en dos instituciones de salud SSA e IMSS IV Características de la prescripción médica Gac Méd Mex 1992, 128 531
4 World Health Organization A manual for the treatment of diarrhoea For use by physicians and other senior health workers Document WHO/CDD/SER 80 2 Rev 2 1990
5 Anon Guia para el manejo efectivo de niños con enfermedad diarreica y pacientes con cólera Manual de Procedimientos Programa Nacional de Control de Enfermedades Diarreicas Consejo Nacional de Control de Enfermedades Diarreicas 7a e Mexico, 1993
6 Sepulveda-Amor J Valdespino JL, Tapia-Conver R Encuesta sobre practica y prevalencia de la terapia de rehidratación oral Direccion General de Epidemiología, SSA México, 1988
7 Encuesta sobre el Manejo Efectivo de Casos de Diarrea en el Hogar (EMECADI 91) Dirección General de Epidemiología Secretaría de Salud. México 1991
8 Encuesta sobre el Manejo Efectivo de Casos de Diarrea en el Hogar (EMECADI 93) Direccion General de Epidemiología Secretaría de Salud México, 1993
9 Analisis de la Mortalidad por Enfermedad Diarreica en menores de 5 años 1990 1993 Programa Nacional de Control de las Enfermedades Diarreicas Consejo Nacional de Control de las Enfermedades Diarreicas Secretaria de Salud México, 1994
10 The managment of diarrhoea and use of oral rehydration therapy A joint WHO-UNICEF statement World Health Organization, Geneva 1983
11 Analisis de la Mortalidad por Infecciones Respiratorias Agudas en menores de 5 años 1993 Programa Nacional de Control de las Infecciones Respiratorias Dirección General de Medicina Preventiva Secretaría de Salud México, 1994
12 Bang AT Bang RA Tale O, Sontakke P, Solanki J, Yargantiwar R et al Reduction in pneumonia mortality and total childhood mortality by means of a community-based intervention trial in Gadchiroli India Lancet 1990, 336 201
13 Reyes H Tomé P, Guiscafré H Martínez H Romero G Portillo E Rodriguez R Gutierrez G Autopsia verbal en niños con infeccion respiratoria y diarrea aguda Analisis del proceso enfermedad atencion muerte Bol Méd Hosp Infant Méx 1993 50 7
14 Liss RH Batchelor FR Economic evaluations of antibiotic use and resistance Rev Infect Dis 1987 9 297

15 Phillips M, Kumate Rodriguez J, Mota Hernández F Costos del tratamiento de la diarrea en un hospital de niños de la ciudad de México Bol Of Sanit Panam 1990, 109 27

16 Palafox M, Guiscafré H, Pérez-Cuevas R, Reyes H, Libreros V, Tomé P, Muñoz O Calidad de la atención médica en niños hospitalizados por diarrea aguda Bol Méd Hosp Infant Méx 1994, 51 507

17 Soumerai SB Factors influencing prescribing Aust J Hosp Farm 1988, 3 9

18 Soumerai SB, McLaughlin TJ, Avorn J Improving drug prescribing in primary care a critical analysis of the experimental literature. Milbank Q 1989, 67 268

19 Gutiérrez G, Guiscafré G Bronfman M, Walsh J, Martínez H Muñoz O Changing physician prescribing patterns evaluation of an educational strategy for acute diarrhea in Mexico City Medical Care 1994, 32 436

20 Case Management of Acute Respiratory Infection in Children for Developing Countries Manual for doctors and other senior health workers Acute respiratory infections control programme Geneva World Health Organization Document WHO/CDD/ 91 36, 1990

21 Guiscafre H, Pérez Cuevas R, Reyes H, Libreros V, Tomé P Avances en los criterios diagnósticos y terapéuticos en las infecciones respiratorias agudas Gac Méd Méx 1992, 128 565

22 Castro R Bronfman M, Castro V, Guiscafré H, Gutiérrez G Estrategias para mejorar los patrones terapéuticos utilizados en diarrea aguda en unidades de atención medica primaria IX Análisis del impacto económico de la estrategia utilizada Arch Invest Méd Mex 1988, 19 427

23 Programa Nacional de Control de las Enfermedades Diarreicas 1993-1994 Consejo Nacional para el Control de las Enfermedades Diarreicas Secretaría de Salud México, 1993 24

24 Gutierrez G, Tapia Conyer R, Guiscafre H, Reyes H, Martínez H, Kumate J Impact of oral rehydration and selected public health interventions on reduction of mortality due to diarrhoeal diseases in childhood The case of Mexico Bull World Health Org (in press)

25 Anon Unidad de capacitacion para el tratamiento de la diarrea. Diálogo sobre la Diarrea Appropriate Health Resources and Technologies Action Group OPS/OMS 1991 37 4

26 Gutiérrez G, Reyes H, Martínez H Tomé P, Guiscafré H Study of the disease-health seeking-death process another use of the verbal autopsy Int J Epidemiol 1994, 23 427

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