

## A seven-year audit of a diarrhoea training unit (DTU) in Port Harcourt, Nigeria

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### Summary

The Diarrhoea Training Unit [DTU] of the University of Port Harcourt Teaching Hospital in Nigeria was established in 1991 and has, in addition to treating cases, been involved in training medical students, paediatric residents, health workers and mothers caregivers on correct case management of diarrhoeal disease. The accomplishment of the Unit over a defined time frame, January 1993 to December 1999, was evaluated by employing predetermined indicators and the data were analyzed by using the Statistical Package PEPI [Computer Programs for Epidemiologic Analysis Version 2.07a]. Eight thousand, four hundred and eighty-six cases (4557 males and 3929 females) of acute diarrhoea were treated. Those with severe dehydration were eleven times fewer in 1998 and eight times fewer in 1999 than in 1993. The number of Oral Rehydration Salts (ORS) sachets used in the Unit increased from 3064 in 1993/94 to 17549 in 1998/99. There was no reduction in the number of cases treated, but the case-fatality rates dropped from 6 per 1000 in 1993 to 0.6 per 1000 in 1999 [likelihood ratio  $\chi^2 = 9.874$ ,  $p = 0.02$ ]. There was a significant reduction in the proportion of patients with bloody stools towards the end of the observation period [ $\chi^2$ (trend) = 82.60, 1 df,  $p = 0.000$  (1.00E-19)]. These results indicate some positive impact on the severity of diarrhoea in the area, but preventive measures should now constitute the main thrust.

**Keywords:** *Diarrhoea training unit, severe dehydration, case-fatality rates, preventive measures.*

### Résumé

Le département de la formation en diarrhée du centre hospitalier de Port harcourt au Nigeria est établi en 1991 et en plus de traitement des cas diarrhéiques, il donne des formations aux étudiants médicaux, aux internes pédiatrique, des travailleurs sanitaires, des mère/carers sur la gestion de la maladie diarrhée. Une évaluation d'œuvres accomplies du département dans un cadres de temps défini du janvier 1993 à décembre 1999 était faite en employant les indicateurs prédéterminés et les données étaient analysées à travers le programme statistique PEPI (les programmes logiciels pour l'analyse épidémiologique version 2.07a). Huit mille, quatre cent quatre vingt six cas (4557 hommes et 3929 femmes) de diarrhée grave étaient traité. Ceux ayant une déshydrations étaient onze fois plus inférieur en 1998 et huit fois plus inférieur en 1999 qu'en 1993. Le nombre du sachet des sels réhydratation buccale (SRB) utilisés dans le département s'est accru du 3064 en 1993/94 à 17549 en 1998/99. Il n'y a pas une réduction de nombre des cas traité mais le niveau de cas-mortel

s'est baissé de 6 per 1000 en 1993 à 0,06 per 1000 en 1999, (la proportion de probabilité ( $\chi^2 = 9,874$ ,  $p = 0,02$ ). Il y avait une réduction considérable de la proportion des malades avec de selle sanglante vers la fin de la période d'observation, [ $\chi^2$  (tendance) = 82,60, 1 df,  $p = 0,000$  (1,00E-19)]. Les résultats indique quelques effet positif sur la gravité de diarrhée dans le milieu mais les mesures de prévention devraient constituer le point principal.

### Introduction

Diarrhoeal disease, and particularly the acute watery variety, remains one of the leading causes of under-five mortality in most countries of the third world including Nigeria, [1-7]. Currently in Nigeria the incidence of acute watery diarrhoea is approximately 4.9 episodes per child per year and there are approximately 200,000 diarrhoea-related deaths of children aged below five years [7-8]. Most deaths in acute watery diarrhoea occur as a direct consequence of severe dehydration; and rehydration has always been a vital component of the treatment of diarrhoea. For several years this was achieved by using the intravenous route, but beginning from about the early 1970s in Nigeria rehydration was also achieved via the oral route [9,10]. Several oral rehydration solutions became available in the market, but were not standardized. The first attempt at standardization in Nigeria was made in the mid - 1980s when a group of paediatricians introduced the salt-sugar-solution, which is very simple to use and is currently one of several recommended home fluids for Oral Rehydration Therapy (ORT) in the country [10]. In the early 1990s, WHO/UNICEF held a series of workshops on "Strengthening the Teaching of Diarrhoeal Disease in Medical Schools in Nigeria", following which Diarrhoea Training Units [DTUs] were opened in almost all the teaching hospitals in the country [11]. The Unit at the University of Port Harcourt Teaching Hospital was established in September 1991. It has a capacity for ten cases at any given time, the paediatric clinic which is adjacent to it serves as the triage (a section in a DTU designated for initial reception and sorting of patients), and patients requiring admission are transferred to the Children's Emergency Ward about thirty metres away. Children admitted either at the Children's Emergency Ward or the Children's Wards are managed according to the Control of Diarrhoeal Disease Guidelines with ORS as soon as they can tolerate orally. The ORS is collected from the DTU hence the names of the diarrhoeal cases are rehydrated using Nigeria CDD [Control of Diarrhoeal Disease] Programme guidelines and cases with other illness including those with blood in their stools and other complications of diarrhoea are investigated and managed using standard treatment guideline including those of the Nigeria CDD Programme and standard paediatric texts.

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Medical students and paediatric residents rotate through the unit and various cadres of health workers are trained at regular intervals on correct diarrhoea case management. The aim of this report is to evaluate the accomplishment of the unit over a period of seven years.

### Subject and methods

This is a retrospective analysis carried out in the Diarrhoea Training Unit [DTU] of the University of Port Harcourt Teaching Hospital in Nigeria and involved using four indicators; the number of cases, the of cases with blood in stool, and the number of deaths from those admitted into the wards from January 1, 1993 to December 31, 1999. The observation period was commenced from 1993 because records were most complete from that year. For the purposes of this report, blood in stool was defined as "traces to frank blood" either on the nappy or as otherwise reported by the mother or other caregiver. Other information obtained from the Unit registers included the date the patient presented, the age and gender of the patient and the degree of dehydration. All mortality records in the Department of Paediatrics during the seven-year study period were reviewed and all deaths related to diarrhoea were entered in the study protocol.

### Data handling and Statistical analysis

The data were arranged in a multiway frequency table with monthly and yearly totals in separate columns. Each cell contained the number of acute watery diarrhoea and those with varying quantity of blood in the stool. Some data were represented in the form of bar charts and line graphs. In figure 2, the 'Y' and 'Z' axes are drawn on different scales because of the very few cases of death. Data were analyzed using the software statistical package PEPI [computer Programs for Epidemiologic Analysis Version 2.07a]. Chisquare statistics ( $\chi^2$ ) with the appropriate modifications was used in calculating trends and proportions. Hewitt's Rank sum test and Ratchet Circular Scan Test were used in calculating seasonal variations.

### Ethical considerations

Permission to report events in the Diarrhoea Training unit was obtained from the Ethics Committee of the University of Port Harcourt Teaching Hospital in accordance with hospital policy on all forms of research.

### Results

Eight thousand, four hundred and eighty-six (8486) cases of acute diarrhoea were treated in the Unit during the seven-year period. There were 4557 males and 3929 females with a male to female ratio of 1.16:1. Six thousand seven hundred and fifty-two (6752) [79.6%] of the patients were less than three years old. Four hundred and seventy-seven [5.6%] of cases had varying amount of blood in their stools. The number of ORS sachets used in each year of the observation period is shown in Figure 1 and the proportion of sachets used per patient in each of the seven-year period were approximately 1.5 in 1993, 1.7 in 1994, 1.1 in 1995, 1.0 in 1996, 4.4 in 1997, 4.5 in 1998 and 4.7 in 1999. As shown in the Table and Figure 2, there was a significant reduction in the proportion of children with bloody stools during the period of observation. [ $\chi^2$  (trend) = 82.60, 1df,  $P = 0.000$  [1.00E-19]. There were six cases with severe dehydration in 1993, 3 in each of 1994 and 1995, 1 in each of 1996, 1997, 1998 and 1999. "Seven" of "1150" cases died in 1993, "2" of "812" in 1994, "2" of "2165" in 1998 and "1" of '11589' in 1999. The pattern is illustrated in figure 2 and demonstrated as a significant reduction in case fatality rates. [Likelihood ratio  $X^2 = 9.874$ ,  $p = 0.02$ ]. Of particular interest here is the magnitude of change for each of the indicators used in assessing the impact of the DTU; case-fatality rate by a factor of 6, proportion of bloody stools by a factor of 2.8, ORS utilization by a factor of 1.9 and cases seen by a factor of 1.5.

### Seasonal variation

The combined monthly totals of cases of acute diarrhoea for the seven-year observation period are shown in the bottom row of the Table. Hewitt's Rank Sum Test for a seasonal peak revealed a 5-month peak from June to October, [Rank Sum = 49,  $p = 0.029$ ]. Similarly, combined monthly totals for cases with blood in stools are shown in the same row but in parentheses. It reveals a 3-month peak from November to January representing 31.9% of cases, [Ratchet Circular Scan Test statistic = 3.24,  $P < 0.01$ ].

**Table 1:** Cases of acute diarrhoea in the study with those reporting blood in stools in parentheses

Year/Month of the study	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Totals
1993	251 [40]	72 [3]	112 [14]	101 [10]	13 [0]	8 [2]	84 [8]	108 [12]	40 [2]	42 [13]	126 [27]	193 [98]	1150 [139]
1994	238 [10]	12 [0]	72 [5]	85 [1]	55 [0]	183 [11]	28 [3]	1 [0]	0 [0]	0 [0]	72 [4]	66 [2]	812 [36]
1995	85 [5]	53 [1]	104 [12]	41 [5]	80 [4]	76 [0]	67 [0]	38 [2]	107 [7]	49 [2]	19 [8]	73 [3]	792 [49]
1996	36 [4]	2 [0]	38 [3]	18 [0]	8 [0]	15 [0]	29 [1]	49 [1]	125 [8]	94 [1]	17 [0]	19 [4]	450 [22]
1997	55 [7]	47 [5]	82 [1]	38 [3]	64 [4]	65 [6]	108 [12]	220 [22]	288 [23]	447 [6]	42 [2]	72 [3]	1528 [94]
1998	151 [5]	169 [5]	164 [11]	118 [5]	229 [14]	299 [11]	312 [12]	174 [8]	124 [6]	170 [9]	197 [9]	58 [3]	2165 [98]
1999	4 [0]	82 [2]	46 [2]	70 [4]	132 [6]	167 [3]	184 [6]	195 [1]	205 [1]	158 [6]	172 [3]	172 [5]	1589 [39]
Totals	820 [71]	437 [16]	618 [48]	471 [28]	581 [28]	815 [33]	812 [42]	785 [46]	889 [47]	960 [37]	645 [53]	653 [28]	8486 [477]



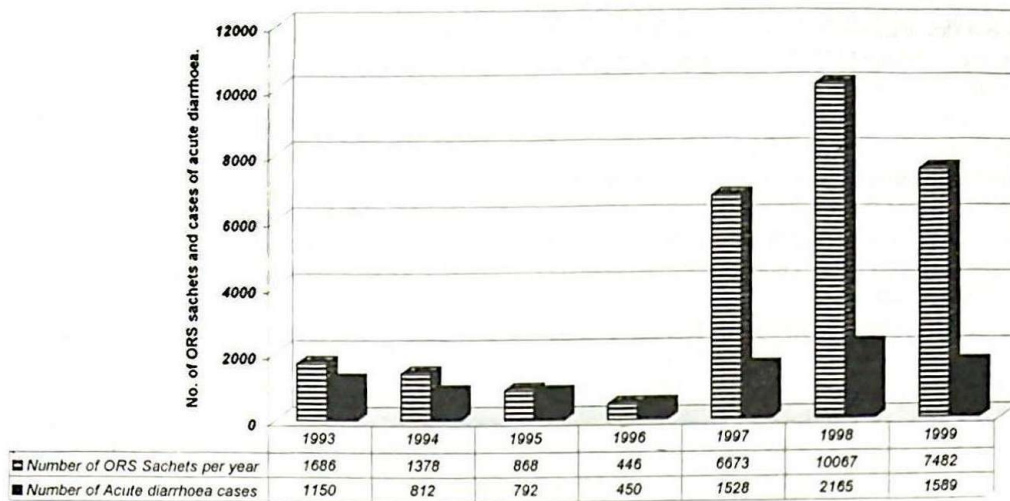


Fig. 1: Pattern of ORS sachets utilization and numbers of acute diarrhoea cases from 1993 to 1999

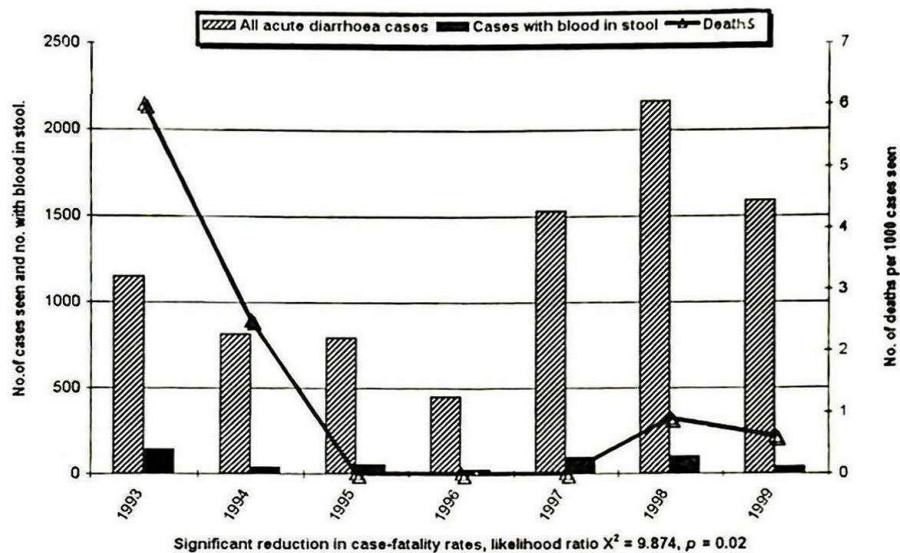


Fig. 2: Combined bar and line chart showing number of cases seen, those with blood in stool and deaths in the observation period.

## Discussion

There is no doubt that the Diarrhoea Training Unit had a positive impact on the severity of diarrhoea in the area. This is clearly demonstrated mainly by the significant drop in the number of cases of severe dehydration and the case-fatality rates over the seven-year observation period. The magnitude of drop of case-fatality rates being the highest compared to the other indicators is also a reflection of the positive impact of the DTU in its immediate catchment area. The pattern of utilization in the Unit of ORS sachets represents a reflection of the availability or otherwise of these sachets over the seven-year period. From about 1997, supply of sachets to the Unit has been relatively regular.

The other observations such as the age distribution of the cases, their sex ratio and the seasonal differences reinforce findings by other workers. [12,13] The finding of a significant drop in the proportion of cases with blood in stools over the observation period, agrees with the unpublished data collected from health facilities in Rivers State, which tended to suggest a reduction in cases of bloody diarrhoea seen at these facilities. It therefore may suggest some beneficial effect of the message on prevention of diarrhoea given to parents in the Diarrhoea Training Unit.

The proportion of cases of acute watery diarrhoea seen in the Diarrhoea Training Unit towards the end of the observation period was higher than that at the beginning of the period. Although this finding appears to run contrary to the expectations of one of the decade goals; that by the year 2000, there should be a 25% reduction in the incidence of diarrhoeal disease [14], it could represent a reflection of an increased awareness of the population of the needs to have diarrhoea cases properly managed in hospital and specifically in Diarrhoea Training Units. The increase in the number of cases seen could also be attributed to the availability of free ORS sachets for the treatment of cases seen at the centre. Reports of diarrhoea cases from other health facilities in the state submitted to the Epidemiology Unit of the Ministry of Health show a steady decline in the overall number of cases and also in the cases of bloody diarrhoea. Thus the training on proper diarrhoea case management has probably contributed to the achievement of the goals of increasing ORT use rate and reducing fatalities from diarrhoea cases in the state.

The seasonal variation noted in diarrhoeal cases in this review is similar to what has been documented in other texts on diarrhoeal disease with peak incidence of diarrhoeal cases caused



by viruses in the cool dry seasons and those of bacterial origin peaking in the dry wet seasons [15]. The authors are for now unable to categorically state which agents caused diarrhoea in these patients, since stool cultures are not routinely carried out in the DTU. However, the seasonal variation pattern observed in this report could form the basis of future research in the Unit.

The authors believe that the results are indicative of some positive impact on severity of diarrhoea in the area, but promoting preventive measures should now constitute the main thrust in activities in the country. The dominant strategy in this respect would be synergism in programmes of relevant sectors, both governmental and non-governmental. In the Nigeria Control of Diarrhoeal Diseases (CDD) Programme, 1991-1995 [16], this need was recognized and, in addition to appropriate case management at the household and health facility levels, "reduction in disease incidence through improved availability and use of potable water as well as improved environmental sanitation" were recognized as one of the three - phased strategy for diarrhoeal disease control in the country. Additionally, promoting breast-feeding, improving overall immunization coverage, wider use of vitamin A supplementation and health education aimed at promoting health-seeking behaviour among the populace will further reduce the incidence, severity and morbidity and mortality from diarrhoea cases.

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