

## Viral diarrhoea epidemic – impact on a small island pharmacy

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### Abstract:

*This short paper describes the increased demands on the pharmacy department of Majuro Hospital in the Marshall Islands during a recent viral diarrhoea epidemic.*

*This paper discusses the increased number of patients, the increased usage of drugs and also the increased costs during this epidemic.*

*Surprisingly, the number of patients only rose 10%. However, the increase in workload of the outpatient department, laboratory and the pharmacy department was much greater. The percentage of children presenting to the outpatient department with diarrhoea increased from 10% to 80%. Oral rehydration solution (ORS) was the most common medication given during the epidemic in line with the World Health Organisation Guidelines. (PHD, 2005 Vol 12 No 1 Pages 149 - 152)*

### Introduction

The Republic of the Marshall Islands is a developing country of about 60,000 people<sup>1</sup>. The country composes of 29 coral atolls and 5 islands and is located just north of the equator in Micronesia in the Northwest Pacific Ocean. Majuro Atoll is the capital of the Marshall Islands and has approximately half the population.

Majuro Hospital is one of two hospitals in the country. A smaller hospital is located on Ebeye, the second most populated island of the country.

During early June, an increase in number of patients presenting with diarrhoea was noted. This short text is to outline the increased strain on the health care system during this epidemic.

### Materials and Methods

The study was retrospective and undertaken at Majuro Hospital. All patients presenting to the hospital outpatient department during the study period (January to July 2002) were included in the statistics.

The number of outpatients was calculated from encounter information collected by the medical record department.

The number of stool samples was obtained from the hospital laboratory log books. The amount of medication used was calculated by a stocktake before and after the epidemic period.

### Results

During the first five months of the year, the average number of patients that presented to the outpatient department in one month was 2155. Eighteen percent of these were children (defined as below 14 years of age by the hospital medical record department).

During the month of June there was a large increase in the number of children being seen in outpatients and being admitted to the hospital. There were 2366 patients presenting to outpatients during June and 2393 during July – an increase of just over 10%. Of these patients, 23% were children in June and 34% were children in July. The percentage of children seen in July (34%) was nearly double the average number (18%). Table 1, figure 1 and figure 2 show the number of patients and the number of children seen each month in Majuro Hospital during this period.

Due to the increased number of patients seen during the "summer" (June/July), the amount of medication supplied to patients also increased dramatically. The amount of acetaminophen (paracetamol), oral rehydration solution (ORS) and multivitamins increased the most. Table 2 shows a comparison of the number of items dispensed during the average six week period and the number of items dispensed during the six week period from 1st June to 13th July.

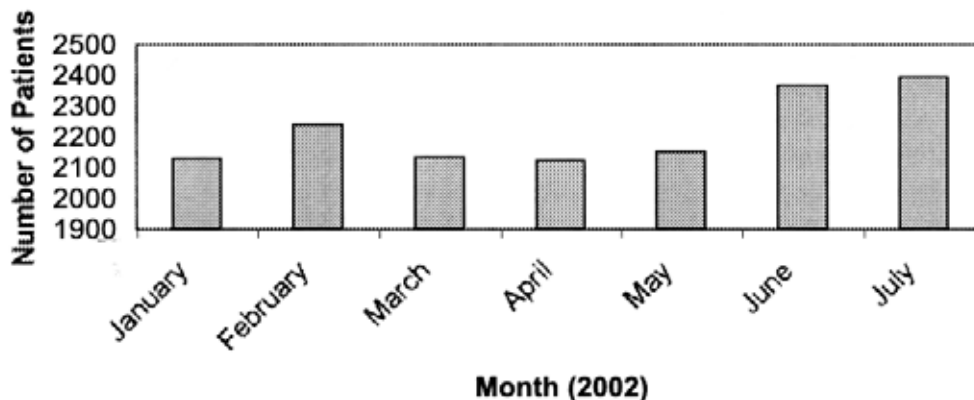
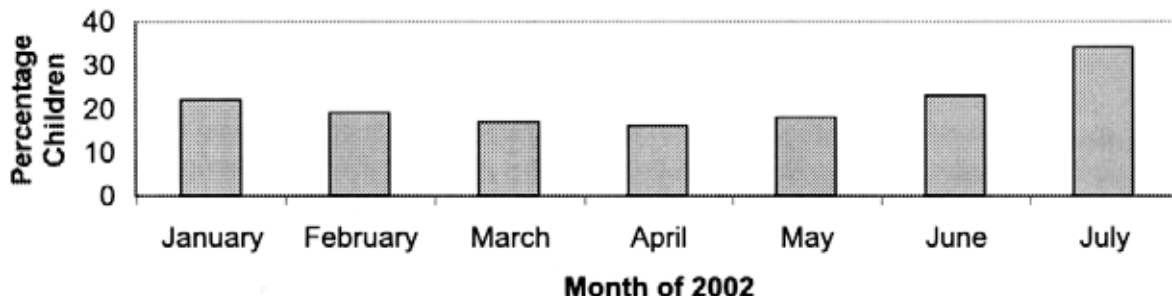
**Table 1. Total number of patients and percentage paediatrics seen in outpatients per month**

Month (Year 2002)	Total number of patients	Total number of children (0-14 years old)	Percentage of children in the clinic
January	2130	475	22
February	2239	421	19
March	2134	355	17
April	2122	338	16
May	2151	384	18
June	2366	538	23
July	2393	804	34

## Discussion

In early June a marked increase in the number of patients attending outpatient clinic was noticed. Paediatric patients made up the majority of these additional patients. Many of the children were experiencing diarrhoea, fever, nausea, lack of appetite and irritability.

There was concern that the epidemic could be related to a water borne parasite such as giardia. The number of stool samples sent to the laboratory increased dramatically during this time frame. The number of positive giardia samples increased as well, but only in proportion to the number of samples tested. There was

**Figure 1. Number of patients attending outpatient clinic by month****Figure 2. Percentage of outpatients who are children (0-14 years old)**

The extra cost of medication was calculated at approximately USD 1200 – as shown in table 3.

Stool samples were sent to the hospital laboratory in many of the cases. The average number of stool samples tested during the months January to May was 255 (per month). June and July saw nearly double this with 480 and 520 samples tested respectively. All samples were tested for giardia. Table 4 and Figure 3 shows the number of stool samples tested and the percentage found to have giardia. Although the actual number of samples found with giardia did increase, the increase was directly proportionally to the number of samples tested.

no increase in the percentage of giardia seen during this epidemic.

There was also no increase in any other bacteria found in stool samples during this time. Both this and the patients' symptoms were suggestive of a viral cause.

During any epidemic, the whole hospital is put under additional strain. The doctors see more patients, the laboratory processes more samples, the pharmacy dispenses more prescriptions, the outpatient nurses are stretched between more patients and administration is kept busier due to the extra workload. The main areas affected by this epidemic were outpatient services, the laboratory and the pharmacy department.

**Table 2. Amount of medication supplied to patients**

Medication	Normal 6 weekly usage	Epidemic 6 weekly usage (approx.)
Acetaminophen 100mg/1ml drops	400 bottles	600 bottles
Acetaminophen 160mg/5ml suspension	500 bottles	975 bottles
Amoxicillin 250mg/5ml 150ml suspension	220	325
Diphenhydramine 12.5mg/5ml elixir	200	600
Multivitamin Drops	150	225
Multivitamin Chewable tablets	500 tablets	25,000 tablets
ORS (Oral rehydration sachets)	100 sachets	2000 sachets

**Table 3. Extra medications and extra cost of medication to hospital for 6 week period**

Medication	Extra Supplies required	Extra cost to Hospital (US dollars)
Acetaminophen 100mg/1ml drops	200 bottles	130
Acetaminophen 160mg/5ml suspension	475 bottles	270
Amoxicillin 250mg/5ml 150ml suspension	100 bottles	75
Diphenhydramine 12.5mg/5ml elixir	380 bottles	190
Multivitamin Drops	75 bottles	200
Multivitamin Chewable tablets	24,500 tablets	365
ORS (Oral rehydration sachets)	1900 sachets	Provided free by WHO

From these figures in table 1 and 2, it can be calculated that just under 10% of children in the first 5 months of the year had an illness treated with ORS (based on each patient receiving 2 ORS sachets). During July, this same calculation reveals approximately 80% of the children seen were treated with ORS. Even though there was only a 10% overall increase in the number of patients presenting to the outpatient department, from these calculations, there was a marked shift in the presenting complaint.

Despite the burden on hospital services, costs, surprisingly, were maintained. This was mainly due to the fact that the epidemic was viral rather than

bacterial. There was a slight increase in the number of antibiotics prescribed. The greatest increase in prescriptions was for ORS and multivitamins. Acetaminophen (paracetamol) was also frequently dispensed during this time for the treatment of fever. The World Health Organisation (WHO) provides ORS free and acetaminophen is relatively cheap.

In line with WHO Guidelines for the treatment of diarrhoea, ORS was the main item prescribed during the epidemic<sup>2</sup>. Also in accordance with the WHO Guidelines, antibiotic therapy was not given routinely. There was an insignificant increase in the amount of amoxicillin given in relation to the number of children presenting with diarrhoea.

The increase in multivitamins dispensed would have little impact clinically for the patient and was not an excessive burden in cost.

Unfortunately, at the time of reporting there were no figures on the number of prescriptions dispensed. However, from the increased amount of ORS and multivitamin drops given during this time, it can be deduced that there was a significant increase in the number of prescriptions.

### Conclusion

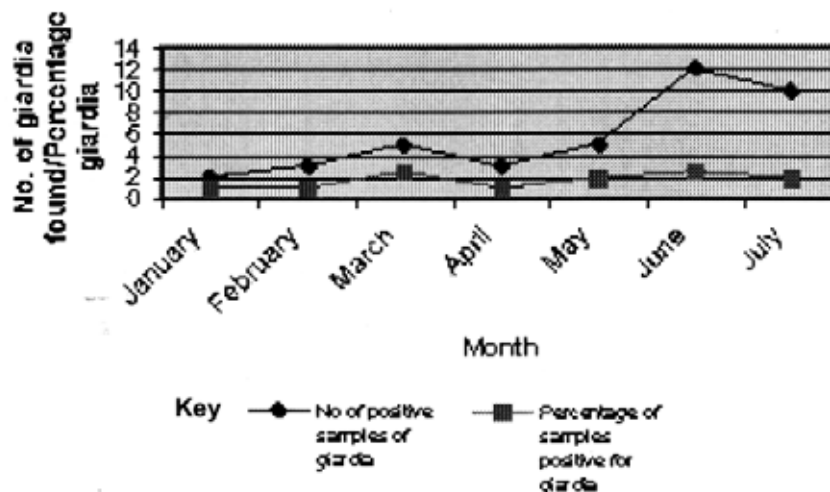
This epidemic demonstrated that a non-bacterial epidemic can place significant additional demands for the outpatient department, laboratory and pharmacy department of a small island hospital. Even though there was only an increase of about 10% in patients seen, the number of laboratory tests performed nearly doubled and the number of medications dispensed increased dramatically. It is also significant that there was a large increase in the percentage of patients presenting with diarrhoea related illnesses and a reduction in those presenting with other illnesses.

Large quantities of items such as ORS and acetaminophen need to be kept in reserve for occasions such as this to maintain supply and to avoid shortages during periods of high demands.

**Table 4. Number of stool samples tested in the lab and number positive for giardia**

Month	Number of samples tested	Number of positive giardia	Percentage of giardia in stool samples tested
January	199	2	1.0
February	314	3	1.0
March	198	5	2.5
April	299	3	1.0
May	266	5	1.9
June	480	12	2.5
July	520	10	1.9

**Figure 3. Number of samples tested and percentage of samples found with giardia**



**References**

1. *Social Statistics Bulletin – June 2002*. Office of Planning and Statistics, Republic of Marshall Islands, June 2002
2. World Health Organisation. *A Manual for the Treatment of Diarrhoea*. 1990.

If there's a way to do better.....find it  
(Thomas A Edison)